



# Field Devices

## Application and Selection Guide

Commercial HVAC Components — Engineered for Success



## About valve selection

The valve selection section is constructed in one of two ways:

### For unassembled product:

As a reference, pictures will represent the valves and actuators separately; and part numbers are highlighted in blue. To order a complete product one OS# must be chosen from each blue box.

### For factory assembled product:

The complete assembled OS# will be displayed in the body of the chart (except for cartridge cage valves, both an actuator and valve must be chosen). Pictures will also reference the factory assembled configuration.

## Additional product information

To find more detailed information on the individual products included in this document, go to: <http://customer.honeywell.com> and use the search text box to quickly locate product specific content.

# SUPPORT

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## Contact Information

### Commercial Components

Technical Hotline 888.516.9347

### Take-Off Service

Let Honeywell Take-Off Service provide a complete job schedule for your projects for damper actuators, valves and VFDs.

## E-mail

[buildingsproductsupport@honeywell.com](mailto:buildingsproductsupport@honeywell.com)

[takeoff.service@honeywell.com](mailto:takeoff.service@honeywell.com)

## Online Resources

### Honeywell Product Ordering

Get the information you want and order the products you need.

## URL

<http://mybuildings.honeywell.com>

### Honeywell BMS Site

Comprehensive product information for you and your customers.

<http://buildings.honeywell.com/bms>

## Specification Take-Off Service

The Honeywell Take-Off Service can create product schedules from:

- Product specifications
- Existing schedules
- Drawings
- Obsolete or competitive schedules

Our goal is to help provide you with the best possible solution for each job.



### Products Supported by the Take-Off Service

- Commercial Water and Steam Valves
- Valve Actuators (Electric or Pneumatic)
- Damper Actuators (Electric or Pneumatic)
- Variable Frequency Drives

1. Submit your information by Email to [takeoff.service@honeywell.com](mailto:takeoff.service@honeywell.com)
2. Include your desired turn-around time.
3. Take-Off Service staff will send you a confirmation that your email was received. We always attempt to have your request finished as soon as possible. Please note, however, that the quality of the submitted information largely determines the turn-around time. We will work closely with you to ensure that we have enough information to move forward as quickly as possible.
4. A final product schedule document will be returned to you following take-off completion.

### Included In the Final Take-Off Document

We send a comprehensive spreadsheet, which contains:

- A complete product schedule
- Base price
- Directions on how to order Honeywell products
- Links to product submittals
- Quote identification number

### Questions

If you have questions about the Honeywell Take-Off Service, please email us at [takeoff.service@honeywell.com](mailto:takeoff.service@honeywell.com).

|                   |                                  |     |
|-------------------|----------------------------------|-----|
| <b>Section 1:</b> | <b>Actuators</b>                 | 5   |
| <b>Section 2:</b> | <b>Valves</b>                    | 52  |
| <b>Section 3:</b> | <b>Economizers</b>               | 227 |
| <b>Section 4:</b> | <b>Variable Frequency Drives</b> | 233 |
| <b>Section 5:</b> | <b>Sensors</b>                   | 245 |
| <b>Section 6:</b> | <b>Appendices</b>                | 292 |

## Section 1: Actuators

|                                 |    |                                                  |    |
|---------------------------------|----|--------------------------------------------------|----|
| Overview - Actuators .....      | 6  | Non-spring Return N05 Series                     |    |
| Direct Coupled Actuators        |    | Product Selection .....                          | 7  |
| Product Selection .....         | 7  | Submittal Data .....                             | 18 |
| Fire and Smoke Damper Actuators |    | Wiring Diagrams .....                            | 32 |
| Product Selection .....         | 9  | Accessories .....                                | 35 |
| Spring Return S03 Series        |    | Non-spring Return N10 Series                     |    |
| Product Selection .....         | 7  | Product Selection .....                          | 7  |
| Submittal Data .....            | 12 | Submittal Data .....                             | 19 |
| Wiring Diagrams .....           | 28 | Wiring Diagrams .....                            | 32 |
| Accessories .....               | 35 | Accessories .....                                | 35 |
| Spring Return S05 Series        |    | Non-spring Return N20 Series                     |    |
| Product Selection .....         | 7  | Product Selection .....                          | 7  |
| Submittal Data .....            | 13 | Submittal Data .....                             | 20 |
| Wiring Diagrams .....           | 28 | Wiring Diagrams .....                            | 33 |
| Accessories .....               | 35 | Accessories .....                                | 35 |
| Spring Return S10 Series        |    | Non-spring Return N34 Series                     |    |
| Product Selection .....         | 7  | Product Selection .....                          | 7  |
| Submittal Data .....            | 14 | Submittal Data .....                             | 21 |
| Wiring Diagrams .....           | 30 | Wiring Diagrams .....                            | 33 |
| Accessories .....               | 35 | Accessories .....                                | 35 |
| Spring Return S20 Series        |    | Spring Return MS4103F, MS8103F                   |    |
| Product Selection .....         | 7  | Product Selection .....                          | 9  |
| Submittal Data .....            | 15 | Submittal Data .....                             | 22 |
| Wiring Diagrams .....           | 30 | Accessories .....                                | 35 |
| Accessories .....               | 35 | Spring Return MS4104F, MS8104F                   |    |
| Non-spring Return ML6161        |    | Product Selection .....                          | 9  |
| Product Selection .....         | 7  | Submittal Data .....                             | 24 |
| Submittal Data .....            | 16 | Accessories .....                                | 35 |
| Wiring Diagrams .....           | 32 | Spring Return MS4109F, MS8109F                   |    |
| Accessories .....               | 35 | Product Selection .....                          | 9  |
| Non-spring Return ML6174        |    | Submittal Data .....                             | 25 |
| Product Selection .....         | 7  | Wiring Diagrams .....                            | 34 |
| Submittal Data .....            | 17 | Accessories .....                                | 35 |
| Wiring Diagrams .....           | 32 | Spring Return MS4120F; MS4620F; MS8120F          |    |
| Accessories .....               | 35 | Product Selection .....                          | 9  |
|                                 |    | Submittal Data .....                             | 26 |
|                                 |    | Wiring Diagrams .....                            | 34 |
|                                 |    | Accessories .....                                | 35 |
|                                 |    | Cross Reference - Direct Coupled Actuators ..... | 39 |

# Overview - Actuators

## Direct Coupled Actuators



Diamond Spring Return, Low Torque



Spring Return, Low Torque



Spring Return, High Torque



Non-Spring Return, Low Torque



Non-Spring Return, High Torque

### Precise, reliable performance. Lasting value.

**Ease of installation.** Everything you look for in direct-coupled actuators hinges on quality. And quality engineering is what makes Honeywell's complete line of actuators the top performers in the industry. Our global engineering team designs and tests our direct-coupled actuators to exceed rigorous global standards — and to meet Honeywell's own demanding life testing.

But we don't stop there. Thanks to our continuous improvement process, Honeywell actuators are now easier than ever to install. You'll also benefit from consistent wiring regardless of signal type, common accessories and a simplified selection process.

Honeywell's complete line of building control products, including valves and actuators, are already proven in more than three million buildings worldwide. So when you need spring or non-spring return actuators for your damper and valve applications, specify Honeywell. We make precision easy.

### Improve Installation Time

- Self-centering shaft adapter provides mounting flexibility and greater clamping force.
- Common wiring among families for every signal saves installation time.

### Decrease Material Cost

- Detachable access cover allows direct wiring without a junction box.

### Reduce Inventory

- Signal mode switch adapts models to two-position, floating (tri-state) or modulating (proportional) applications.

### Increase Control and Accuracy

- More than 200 reposition steps for modulating models provide precise control.

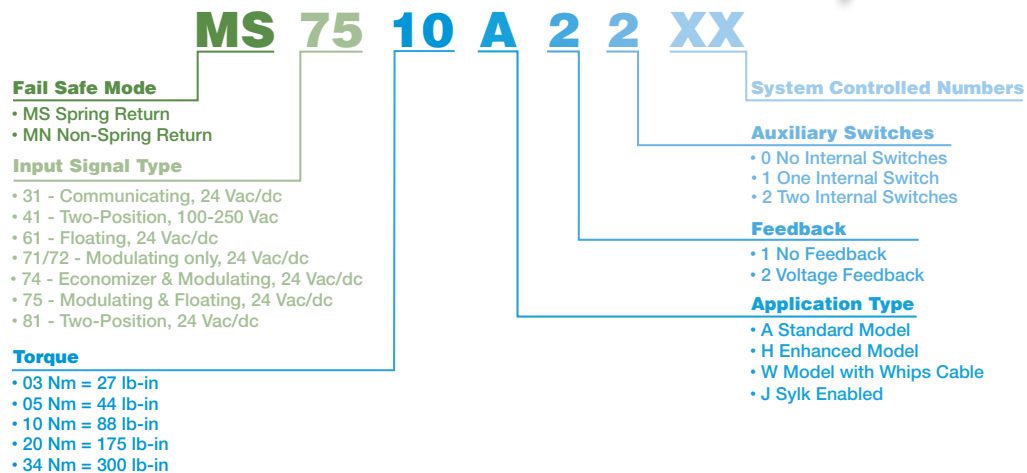
### Increased Flexibility

- Select models are available with or without three foot actuator whips cable.

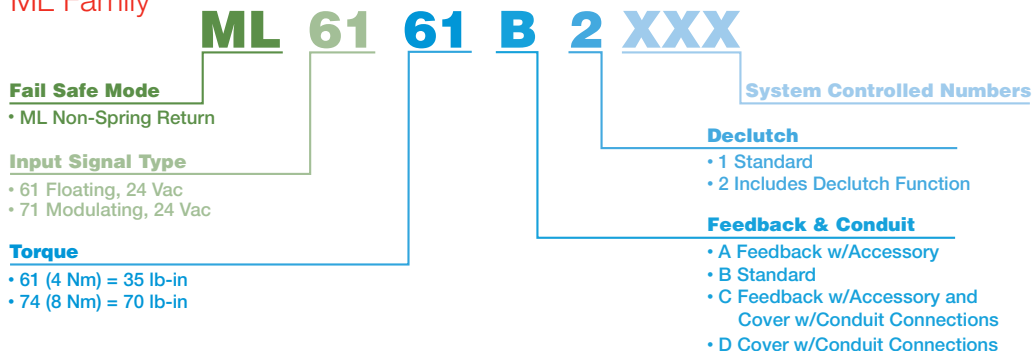


## EASY-TO-SELECT MODEL NUMBERS

### MS, MN, and Diamond Families



### ML Family



# Product Selection - Actuators

## Direct Coupled Actuators

### SPRING RETURN

|                                      |                                 | Running Time |                     | Power Supply |             |                     | Control Input/Output |        |            |          |                        |                       |                    | Auxiliary Switches |      |
|--------------------------------------|---------------------------------|--------------|---------------------|--------------|-------------|---------------------|----------------------|--------|------------|----------|------------------------|-----------------------|--------------------|--------------------|------|
| Order Specification Number           | Damper Area (4.5 lb-in/sq. ft.) | Drive (sec)  | Spring Return (sec) | 24 Vac / dc  | 120-230 Vac | VA Rating (Running) | Sylk-Enabled         | On/Off | 0/2-10 Vdc | Floating | 3 kOhm NTC, 3-Position | Feedback (0/2-10 Vdc) | Adj. Zero and Span | SPDT               | SPST |
| <b>Diamond 3 Nm (3 Nm, 27 lb-in)</b> |                                 |              |                     |              |             |                     |                      |        |            |          |                        |                       |                    |                    |      |
| MS7103A1021                          | 6                               | 90           | <25                 | •            |             | 4                   |                      |        | ••         |          |                        |                       |                    | 0                  | 0    |
| MS7103A2021                          | 6                               | 90           | <25                 | •            |             | 4                   |                      |        | ••         |          |                        | •                     |                    | 0                  | 0    |
| MS7103A2221                          | 6                               | 90           | <25                 | •            |             | 4                   |                      |        | ••         |          |                        | •                     |                    | 0                  | 2    |
| MS7103A2024                          | 6                               | 90           | <25                 | •            |             | 4                   |                      |        | ••         |          |                        | •                     |                    | 0                  | 0    |
| MS7103A2224                          | 6                               | 90           | <25                 | •            |             | 4                   |                      |        | ••         |          |                        | •                     |                    | 0                  | 2    |
| MS7503A2021                          | 6                               | 90           | <25                 | •            |             | 4                   |                      | •      | •          | •        |                        | •                     |                    | 0                  | 0    |
| MS7503A2221                          | 6                               | 90           | <25                 | •            |             | 4                   |                      | •      | •          | •        |                        | •                     |                    | 0                  | 2    |
| MS7503A2023                          | 6                               | 90           | <25                 | •            |             | 4                   |                      | •      | •          | •        |                        | •                     |                    | 0                  | 0    |
| MS7503A2223                          | 6                               | 90           | <25                 | •            |             | 4                   |                      | •      | •          | •        |                        | •                     |                    | 0                  | 2    |
| MS3103J1021                          | 6                               | 30-180       | <25                 | •            |             | 4.5                 | •                    |        |            |          |                        |                       |                    | 0                  | 0    |
| MS3103J1022                          | 6                               | 30-180       | <25                 | •            |             | 4.5                 | •                    |        |            |          |                        |                       |                    | 0                  | 0    |
| MS3103J1023                          | 6                               | 30-180       | <25                 | •            |             | 4.5                 | •                    |        |            |          |                        |                       |                    | 0                  | 0    |
| MS3103J1024                          | 6                               | 30-180       | <25                 | •            |             | 4.5                 | •                    |        |            |          |                        |                       |                    | 0                  | 0    |
| MS3103J1221                          | 6                               | 30-180       | <25                 | •            |             | 4.5                 | •                    |        |            |          |                        |                       |                    | 0                  | 2    |
| MS3103J1222                          | 6                               | 30-180       | <25                 | •            |             | 4.5                 | •                    |        |            |          |                        |                       |                    | 0                  | 2    |
| MS3103J1223                          | 6                               | 30-180       | <25                 | •            |             | 4.5                 | •                    |        |            |          |                        |                       |                    | 0                  | 2    |
| MS3103J1224                          | 6                               | 30-180       | <25                 | •            |             | 4.5                 | •                    |        |            |          |                        |                       |                    | 0                  | 2    |
| <b>S03 Series (3 Nm, 27 lb-in)</b>   |                                 |              |                     |              |             |                     |                      |        |            |          |                        |                       |                    |                    |      |
| MS4103A1030                          | 6                               | 45           | <25                 |              | •           | 9                   |                      | •      |            |          |                        |                       |                    | 0                  | 0    |
| MS4103A1130                          | 6                               | 45           | <25                 |              | •           | 9                   |                      | •      |            |          |                        |                       |                    | 1                  | 0    |
| MS8103A1030                          | 6                               | 45           | <25                 | •            |             | 6                   |                      | •      |            |          |                        |                       |                    | 0                  | 0    |
| MS8103A1130                          | 6                               | 45           | <25                 | •            |             | 6                   |                      | •      |            |          |                        |                       |                    | 1                  | 0    |
| MS3103J1030                          | 6                               | 90           | <25                 | •            |             | 6                   | •                    |        |            |          |                        |                       |                    | 0                  | 0    |
| MS7503A2030                          | 6                               | 90           | <25                 | •            |             | 6                   |                      | •      | •          | •        |                        | •                     |                    | 0                  | 0    |
| MS7503A2130                          | 6                               | 90           | <25                 | •            |             | 6                   |                      | •      | •          | •        |                        | •                     |                    | 1                  | 0    |
| <b>S05 Series (5 Nm, 44 lb-in)</b>   |                                 |              |                     |              |             |                     |                      |        |            |          |                        |                       |                    |                    |      |
| MS4105A1030                          | 10                              | 45           | <25                 |              | •           | 9                   |                      | •      |            |          |                        |                       |                    | 0                  | 0    |
| MS4105A1130                          | 10                              | 45           | <25                 |              | •           | 9                   |                      | •      |            |          |                        |                       |                    | 1                  | 0    |
| MS8105A1030                          | 10                              | 45           | <25                 | •            |             | 6                   |                      | •      |            |          |                        |                       |                    | 0                  | 0    |
| MS8105A1130                          | 10                              | 45           | <25                 | •            |             | 6                   |                      | •      |            |          |                        |                       |                    | 1                  | 0    |
| MS3105J3030                          | 10                              | 90           | <25                 | •            |             | 6                   | •                    |        |            |          |                        |                       |                    | 0                  | 0    |
| MS7505A2030                          | 10                              | 90           | <25                 | •            |             | 6                   |                      | •      | •          | •        |                        | •                     |                    | 0                  | 0    |
| MS7505A2130                          | 10                              | 90           | <25                 | •            |             | 6                   |                      | •      | •          | •        |                        | •                     |                    | 1                  | 0    |
| MS7405A2030*                         | 10                              | 90           | <25                 | •            |             | 6                   |                      |        | •          | •        | •                      | •                     |                    | 0                  | 0    |
| <b>S10 Series (10 Nm, 88 lb-in)</b>  |                                 |              |                     |              |             |                     |                      |        |            |          |                        |                       |                    |                    |      |
| MS4110A1002                          | 20                              | 45           | <25                 |              | •           | 45                  |                      | •      |            |          |                        |                       |                    | 0                  | 0    |
| MS4110A1200                          | 20                              | 45           | <25                 |              | •           | 45                  |                      | •      |            |          |                        |                       |                    | 2                  | 0    |
| MS8110A1008                          | 20                              | 45           | <25                 | •            |             | 30                  |                      | •      |            |          |                        |                       |                    | 0                  | 0    |
| MS8110A1206                          | 20                              | 45           | <25                 | •            |             | 30                  |                      | •      |            |          |                        |                       |                    | 2                  | 0    |
| MS3110J1008                          | 20                              | 90           | <25                 | •            |             | 14                  | •                    |        |            |          |                        |                       |                    | 0                  | 0    |
| MS7510A2008                          | 20                              | 90           | <25                 | •            |             | 14                  |                      | •      | •          | •        |                        | •                     |                    | 0                  | 0    |
| MS7510A2206                          | 20                              | 90           | <25                 | •            |             | 14                  |                      | •      | •          | •        |                        | •                     |                    | 2                  | 0    |
| <b>S20 Series (20 Nm, 175 lb-in)</b> |                                 |              |                     |              |             |                     |                      |        |            |          |                        |                       |                    |                    |      |
| MS4120A1001                          | 39                              | 45           | <25                 |              | •           | 60                  |                      | •      |            |          |                        |                       |                    | 0                  | 0    |
| MS4120A1209                          | 39                              | 45           | <25                 |              | •           | 60                  |                      | •      |            |          |                        |                       |                    | 2                  | 0    |
| MS8120A1007                          | 39                              | 45           | <25                 | •            |             | 40                  |                      | •      |            |          |                        |                       |                    | 0                  | 0    |
| MS8120A1205                          | 39                              | 45           | <25                 | •            |             | 40                  |                      | •      |            |          |                        |                       |                    | 2                  | 0    |
| MS3120J1007                          | 39                              | 90           | <25                 | •            |             | 16                  | •                    |        |            |          |                        |                       |                    | 0                  | 0    |
| MS7520A2007                          | 39                              | 90           | <25                 | •            |             | 16                  |                      | •      | •          | •        |                        | •                     |                    | 0                  | 0    |
| MS7520A2205                          | 39                              | 90           | <25                 | •            |             | 16                  |                      | •      | •          | •        |                        | •                     |                    | 2                  | 0    |
| MS7520H2208                          | 39                              | 90           | <25                 | •            |             | 16                  |                      |        | •          | •        |                        | •                     | •                  | 2                  | 0    |

\* Model includes Internal Minimum Position Potentiometer

\*\*2-10 Vdc control only

# Product Selection - Actuators

## Direct Coupled Actuators

### NON-SPRING RETURN

NON-SPRING RETURN

|                                                                                    |                                            |                                  |              | Power Supply |        | Control Input/Output |        |          |            |          |                       |      | Auxiliary Switches |
|------------------------------------------------------------------------------------|--------------------------------------------|----------------------------------|--------------|--------------|--------|----------------------|--------|----------|------------|----------|-----------------------|------|--------------------|
|                                                                                    | Order Specification Number (without whips) | Damper Area (4.5 lb-in/ sq. ft.) | Running Time | 24 Vac/dc    | 24 Vac | VA Rating (Running)  | On/Off | Floating | 0/2-10 Vdc | 2-10 Vdc | Feedback (0/2-10 Vdc) | SPDT |                    |
|   | N05 Series (5 Nm, 44 lb-in)                |                                  |              |              |        |                      |        |          |            |          |                       |      |                    |
|                                                                                    | MN6105A1011                                | 10                               | 90           | •            |        | 5                    | •      | •        |            |          |                       | 0    |                    |
|                                                                                    | MN6105A1201                                | 10                               | 90           | •            |        | 5                    | •      | •        |            |          |                       | 2    |                    |
|                                                                                    | MN7505A2001                                | 10                               | 90           | •            |        | 5                    | •      | •        | •          |          | •                     | 0    |                    |
|                                                                                    | MN7505A2209                                | 10                               | 90           | •            |        | 5                    | •      | •        | •          |          | •                     | 2    |                    |
|                                                                                    | N10 Series (10 Nm, 88 lb-in)               |                                  |              |              |        |                      |        |          |            |          |                       |      |                    |
|                                                                                    | MN6110A1003                                | 20                               | 90           | •            |        | 5                    | •      | •        |            |          |                       | 0    |                    |
|                                                                                    | MN6110A1201                                | 20                               | 90           | •            |        | 5                    | •      | •        |            |          |                       | 2    |                    |
|   | MN7510A2001                                | 20                               | 90           | •            |        | 5                    | •      | •        | •          |          | •                     | 0    |                    |
|                                                                                    | MN7510A2209                                | 20                               | 90           | •            |        | 5                    | •      | •        | •          |          | •                     | 2    |                    |
|                                                                                    | N20 Series (20 Nm, 175 lb-in)              |                                  |              |              |        |                      |        |          |            |          |                       |      |                    |
|                                                                                    | MN6120A1002                                | 39                               | 90           | •            |        | 6                    | •      | •        |            |          |                       | 0    |                    |
|                                                                                    | MN6120A1200                                | 39                               | 90           | •            |        | 6                    | •      | •        |            |          |                       | 2    |                    |
|                                                                                    | MN7220A2007                                | 39                               | 90           | •            |        | 6                    |        |          | •          |          | •                     | 0    |                    |
|                                                                                    | MN7220A2205                                | 39                               | 90           | •            |        | 6                    |        |          | •          |          | •                     | 2    |                    |
|                                                                                    | N34 Series (34 Nm, 300 lb-in)              |                                  |              |              |        |                      |        |          |            |          |                       |      |                    |
| MN7234A2008                                                                        | 67                                         | 90                               | •            |              | 8      |                      |        | •        |            | •        | 0                     |      |                    |
|   | ML6161/7161 (4 Nm, 35 lb-in)               |                                  |              |              |        |                      |        |          |            |          |                       |      |                    |
|                                                                                    | ML6161A2009                                | 8                                | 90           |              | •      | 1.8                  | •      | •        |            |          | w/ accessory          | 0    |                    |
|                                                                                    | ML6161B2024                                | 8                                | 90           |              | •      | 1.8                  | •      | •        |            |          |                       | 0    |                    |
|  | ML6174/7174 (8 Nm, 70 lb-in)               |                                  |              |              |        |                      |        |          |            |          |                       |      |                    |
|                                                                                    | ML6174B2019                                | 16                               | 90           |              | •      | 2.4                  | •      | •        |            |          |                       | 0    |                    |

# Product Selection - Actuators

## Fire and Smoke Damper Actuators

### Safety First

Safety should never be left to chance. Honeywell fire and smoke actuators are designed to meet both UL-555 and UL-555S 250 and 350 degrees F safety requirements for fire and smoke applications. Fast-acting actuators close dampers in as fast as 15 seconds, and the integral spring return ensures the consistent, proper level of torque. For the highest level of occupant safety, you can count on Honeywell.

- Meets UL-555 and UL-555S requirements
- Robust die-cast aluminum and flame resistant plastic housing for protection and long service life
- Maximum spring return timing from 15– 25 seconds
- Reliably built by the industry leader

### Complete Line

Whether you're working retrofit applications or new construction, Honeywell has the right two-position spring return actuator for the job—with the largest torque range in the industry. Along with meeting safety standards, Honeywell fire and smoke actuators also feature an energy-saving patented design that eliminates limit switches to reduce power consumption.

- 27, 30, 80 and 175 lb-in. torque models available
- Energy-saving design
- No audible noise during holding

### Trust That's Earned

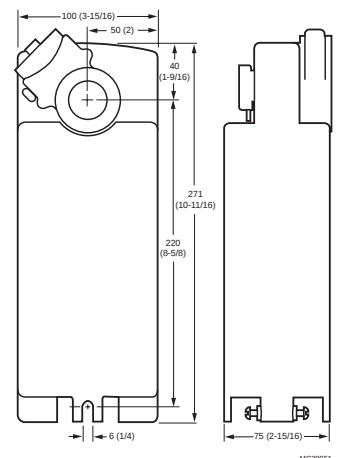
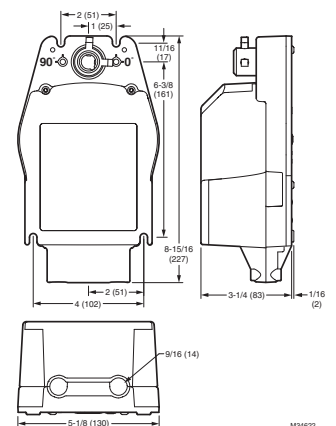
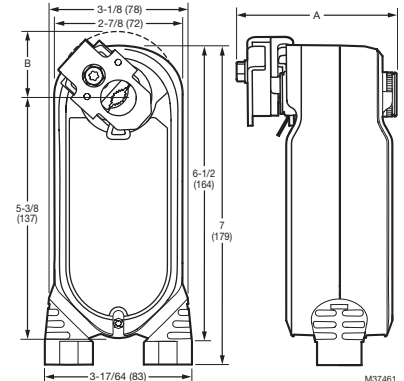
Where safety is concerned, you want products that are tested and proven. Request Honeywell fire and smoke actuators on your next job, and put the peace of mind of Honeywell reliability to work for you.

### Time Saving Features

Honeywell's reversible design saves you time during installation and replacement with integral conduit connector and simple shaft adapter. The integral conduit connector enables electrical installation without the need for additional connectors, saving you time and money.

### Replacement Opportunity

Honeywell is the leading supplier of fire and smoke actuators designed for UL555 and UL555S. Our current product line is designed for universal replacement of all existing Honeywell fire and smoke damper actuators. UL-555 and UL-555S requires that all new construction fire and smoke damper projects have the actuator assembled and tested at the damper manufacturer. A like-for-like retrofit replacement or technically equal UL-555 and UL-555S approved device is recommended.



# Product Selection - Actuators

## Fire and Smoke Damper Actuators

## Fire and Smoke Spring Return Actuators

| Torque            | Rating                      | Model Number | Voltage          | SPST<br>Aux Switch | Conduit<br>Connector | Shaft Adaptor          | Legacy Honeywell*                                                                                                    | Belimo Cross                 | Siemens Cross          |            |           |
|-------------------|-----------------------------|--------------|------------------|--------------------|----------------------|------------------------|----------------------------------------------------------------------------------------------------------------------|------------------------------|------------------------|------------|-----------|
| 27 lb-in (3 Nm)   | UL-555<br>UL-555S<br>250 °F | MS4103F1021  | 120-230 Vac      | 0                  | Threaded Swivel      | SCSA                   | None                                                                                                                 | FSTF120 US<br>FSTF230 US     | GJD221.1U<br>GJD321.1U |            |           |
|                   |                             | MS4103F1023  |                  |                    | U-bolt               | U-bolt                 |                                                                                                                      |                              |                        |            |           |
|                   |                             | MS4103F1025  |                  |                    | Clip-In              | SCSA                   |                                                                                                                      |                              |                        |            |           |
|                   |                             | MS4103F1026  |                  | 2                  | Threaded Swivel      | SCSA                   |                                                                                                                      | FSTF120-S US<br>FSTF230-S US | GJD226.1U<br>GJD326.1U |            |           |
|                   |                             | MS4103F1221  |                  |                    | U-bolt               | U-bolt                 |                                                                                                                      |                              |                        |            |           |
|                   |                             | MS4103F1223  |                  |                    | Clip-In              | SCSA                   |                                                                                                                      |                              |                        |            |           |
|                   |                             | MS4103F1225  | 24 Vac<br>24 Vdc | 0                  | Threaded Swivel      | SCSA                   |                                                                                                                      | FSTF24 US                    | GJD121.1U              |            |           |
|                   |                             | MS8103F1021  |                  |                    | U-bolt               | U-bolt                 |                                                                                                                      |                              |                        |            |           |
|                   |                             | MS8103F1023  |                  |                    | Clip-In              | SCSA                   |                                                                                                                      |                              |                        |            |           |
|                   |                             | MS8103F1025  |                  | 2                  | Threaded Swivel      | SCSA                   |                                                                                                                      | FSTF24-S US                  | GJD126.1U              |            |           |
|                   |                             | MS8103F1026  |                  |                    | U-bolt               | U-bolt                 |                                                                                                                      |                              |                        |            |           |
|                   |                             | MS8103F1221  |                  |                    | Clip-In              | SCSA                   |                                                                                                                      |                              |                        |            |           |
|                   |                             | MS8103F1223  |                  |                    |                      |                        |                                                                                                                      |                              |                        |            |           |
|                   |                             | MS8103F1225  |                  |                    |                      |                        |                                                                                                                      |                              |                        |            |           |
|                   |                             | MS8103F1226  |                  |                    |                      |                        |                                                                                                                      |                              |                        |            |           |
| 30 lb-in (3.4 Nm) | UL-555<br>UL-555S<br>350 °F | MS4104F1010  | 120 Vac          | 0                  | Clip-In              | Hub with Set<br>Screws | ML4115A1009<br>ML4115A1017<br>ML4115B1008<br>ML4115B1016<br>ML4115H1002<br>ML4115J1009<br>ML4202F1000<br>ML4302F1008 | FSLF120 US                   | GRD221.1U              |            |           |
|                   |                             | MS4104F1210  | 120 Vac          | 2                  |                      |                        | ML4115C1007<br>ML4115C1015<br>ML4115D1006<br>ML4115D1014<br>ML4702F1009<br>ML4802F1007                               | FSLF120-S US                 | GRD226.1U              |            |           |
|                   |                             | MS4604F1010  | 230 Vac          | 0                  |                      |                        | ML8115A1005<br>ML8115A1013<br>ML8115B1004<br>ML8115B1012<br>ML8115H1008<br>ML8115J1005<br>ML8202F1006<br>ML8302F1004 | FSLF230 US                   | GRD321.1U              |            |           |
|                   |                             | MS4604F1210  | 230 Vac          | 2                  |                      |                        | MS4709F1014<br>MS4809F1012                                                                                           | FSLF230-S US                 | GRD326.1U              |            |           |
|                   |                             | MS8104F1010  | 24 Vac           | 0                  |                      |                        | MS8209F1003<br>MS8309F1001                                                                                           | FSLF24 US                    | GRD121.1U              |            |           |
|                   |                             | MS8104F1210  | 24 Vac           | 2                  |                      |                        | FSAF120 US<br>FSAF120-S US<br>FSAF230 US<br>FSAF230-S US<br>FSAF24 US<br>FSAF24-S US                                 | GRD126.1U                    |                        |            |           |
|                   |                             | MS4109F1010  | 120 Vac          | 0                  |                      |                        |                                                                                                                      |                              |                        |            |           |
| 80 lb-in (9 Nm)   | UL-555<br>UL-555S<br>350 °F | MS4109F1210  | 120 Vac          | 2                  | Clip-In              | Hub with Set<br>Screws | MS4209F1007<br>MS4309F1005                                                                                           | FSNF120 US<br>FSNF120-S US   | GKD221.1U<br>GKD226.1U |            |           |
|                   |                             | MS4609F1010  | 230 Vac          | 0                  |                      |                        | MS4709F1014<br>MS4809F1012                                                                                           | FSNF230 US<br>FSNF230-S US   | GKD321.1U<br>GKD326.1U |            |           |
|                   |                             | MS4609F1210  | 230 Vac          | 2                  |                      |                        | MS8209F1003<br>MS8309F1001                                                                                           | FSNF24 US<br>FSNF24-S US     | GKD121.1U<br>GKD126.1U |            |           |
|                   |                             | MS8109F1010  | 24 Vac           | 0                  |                      |                        |                                                                                                                      |                              |                        |            |           |
|                   |                             | MS8109F1210  | 24 Vac           | 2                  |                      |                        |                                                                                                                      |                              |                        |            |           |
|                   |                             | MS4120F1006  | 120 Vac          | 0                  |                      |                        | Clip-In                                                                                                              | SCSA                         | None                   | FSAF120 US | GVD221.1U |
| MS4120F1204       | 120 Vac                     | 2            | FSAF120-S US     | GVD226.1U          |                      |                        |                                                                                                                      |                              |                        |            |           |
| MS4620F1005       | 230 Vac                     | 0            | FSAF230 US       | GVD321.1U          |                      |                        |                                                                                                                      |                              |                        |            |           |
| MS4620F1203       | 230 Vac                     | 2            | FSAF230-S US     | GVD326.1U          |                      |                        |                                                                                                                      |                              |                        |            |           |
| MS8120F1002       | 24 Vac                      | 0            | FSAF24 US        | GVD121.1U          |                      |                        |                                                                                                                      |                              |                        |            |           |
| MS8120F1200       | 24 Vac                      | 2            | FSAF24-S US      | GVD126.1U          |                      |                        |                                                                                                                      |                              |                        |            |           |

\*When converting legacy Honeywell select the model with internal end switches if a switch kit was being used.



MS7103 and MS3103 Spring Return Direct Coupled Actuators (DCA) are used within heating, ventilating and air-conditioning (HVAC) systems. They can drive a variety of quarter-turn, final control elements requiring spring return fail-safe operation.

### FEATURES

- Brushless DC submotor with electronic stall protection
- Self-centering shaft adaptor (shaft coupling) for wide range of shaft sizes
- Fast test mode
- MS7103 models for use with 2-10 Vdc control
- MS7503 Universal models for use with (0)2-10 Vdc, floating and two-position control
- MS3103 models for use with Sylk-enabled controllers
- Models available with two internal end switches
- Durable plastic housing with built-in mechanical end limits
- Spring return direction field selectable
- Shaft position indicator and scale
- UL (cUL) listed and CE compliant
- Plenum rated actuator and control/power cable

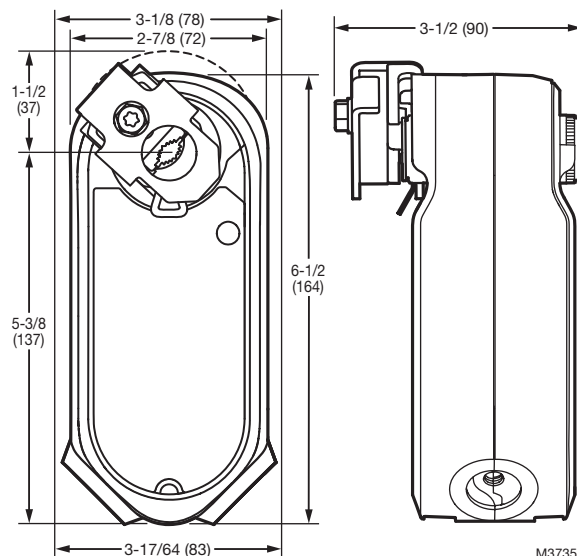
### SPECIFICATIONS

|                                                     |                                                                                                                                                                                              |
|-----------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Actuator Type .....                                 | Damper; Valve                                                                                                                                                                                |
| Rotational Stroke .....                             | 95 ±3 degrees                                                                                                                                                                                |
| Fail Safe Mode .....                                | Spring Return                                                                                                                                                                                |
| Torque .....                                        | 27 lb-in. (3 Nm)                                                                                                                                                                             |
| Spring Return Torque .....                          | 27 lb-in (3 Nm)                                                                                                                                                                              |
| Spring Return Direction .....                       | By orientation                                                                                                                                                                               |
| External Auxiliary Switches Available...            | No                                                                                                                                                                                           |
| Cable Specification .....                           | Power Cable: Plenum Rated, 3 ft (0.914 m) length from end of access cover, 18 AWG<br>Switch Cable: Appliance Rated, 3 ft (0.914 m) length from end of access cover, 18 AWG                   |
| Ingress Protection Rating .....                     | IP54                                                                                                                                                                                         |
| Environmental Rating .....                          | NEMA2                                                                                                                                                                                        |
| Frequency .....                                     | 50 Hz; 60 Hz                                                                                                                                                                                 |
| Mounting .....                                      | Direct Coupled                                                                                                                                                                               |
| Maximum Noise Rating, Driving (dBA @ 1m) .....      | <40                                                                                                                                                                                          |
| Maximum Noise Rating, Spring Return (dBA @ 1m)..... | <65                                                                                                                                                                                          |
| Rotational Stroke Adjustment .....                  | Mechanically limited 5 degree increments                                                                                                                                                     |
| Compatible Damper Shafts.....                       | SCSA: 3/8 to 5/8 in. round or 1/4 to 1/2 in. square (9 to 16 mm round or 6 to 13 mm square)<br>U-bolt: 3/8 to 3/4 in. round or 1/4 to 1/2 in. square (9 to 19 mm round or 6 to 13 mm square) |
| Shaft Adapter Type .....                            | Self-centering clamping, U-bolt                                                                                                                                                              |
| Materials.....                                      | Plenum rated plastic housing                                                                                                                                                                 |
| Operating Humidity Range (% RH).....                | 5 to 95% RH, non-condensing                                                                                                                                                                  |
| Ambient Operating Temperature.....                  | -40 F to +150F (-40 C to +65 C)                                                                                                                                                              |
| Shipping and Storage Temperature.....               | -40 F to +150F (-40 C to +65 C)                                                                                                                                                              |
| Weight .....                                        | 1.7 lb (0.78 kg)                                                                                                                                                                             |
| Includes.....                                       | Mounting bracket                                                                                                                                                                             |

### APPROVALS

- UL60730
- IEC 60730-1 and Part 2 -4
- UL1097 for Double Insulation
- CE Certification Low Voltage Directive 2014/35/EU
- CE EMC 2004/108/EC
- Switch cables are UL certified only

### DIMENSIONS DIAGRAM



# Submittal Data - Actuators

## Spring Return S03 Series



MS4103, MS7503 and MS8103 Spring Return Direct Coupled Actuators (DCA) are used within heating, ventilating and air-conditioning (HVAC) systems. They can drive a variety of quarter-turn, final control elements requiring spring return fail-safe operation.

### SPECIFICATIONS

|                                                   |                                                                                                       |
|---------------------------------------------------|-------------------------------------------------------------------------------------------------------|
| Actuator Type .....                               | Damper; Valve                                                                                         |
| Rotational Stroke .....                           | 95 ±3 degrees                                                                                         |
| Fail Safe Mode .....                              | Spring Return                                                                                         |
| Torque .....                                      | 27 lb-in. (3 Nm)                                                                                      |
| Spring Return Torque .....                        | 27 lb-in (3 Nm)                                                                                       |
| Spring Return Direction.....                      | By orientation                                                                                        |
| External Auxiliary Switches Available...          | No                                                                                                    |
| Electrical Connections .....                      | Enclosed screw terminal strip<br>(22 to 14 AWG)                                                       |
| Ingress Protection Rating .....                   | IP54                                                                                                  |
| Environmental Rating .....                        | NEMA2                                                                                                 |
| Frequency .....                                   | 50 Hz; 60 Hz                                                                                          |
| Mounting .....                                    | Direct Coupled                                                                                        |
| Maximum Noise Rating,<br>Holding (dBA @ 1m) ..... | 20 (no audible noise)                                                                                 |
| Maximum Noise Rating,<br>Driving (dBA @ 1m) ..... | 50                                                                                                    |
| Rotation to Open .....                            | By switch                                                                                             |
| Rotational Stroke Adjustment .....                | Mechanically limited 5 degree<br>increments                                                           |
| Compatible Damper Shafts .....                    | 3/8 to 5/8 in. round or 1/4 to<br>1/2 in. square<br>(9 to 16 mm round or 6 to 13<br>mm square)        |
| Shaft Adapter Type .....                          | Self-centering clamping                                                                               |
| Materials .....                                   | Plenum rated plastic housing                                                                          |
| Operating Humidity Range (% RH) .....             | 5 to 95% RH, non-condensing                                                                           |
| Ambient Temperature Range .....                   | -40 F to +149F (-40 C to +65 C)<br>-22 F to +149F (-30 C to +65 C)<br>for two-position actuators only |
| Temperature Ratings (Shipping) .....              | -40 F to +150F (-40 C to +65 C)                                                                       |
| Storage Temperature Range .....                   | -40 F to +150F (-40 C to +65 C)                                                                       |
| Weight .....                                      | 3.5 lb (1.6 kg)                                                                                       |
| Includes.....                                     | Mounting bracket, self-<br>centering shaft adapter                                                    |

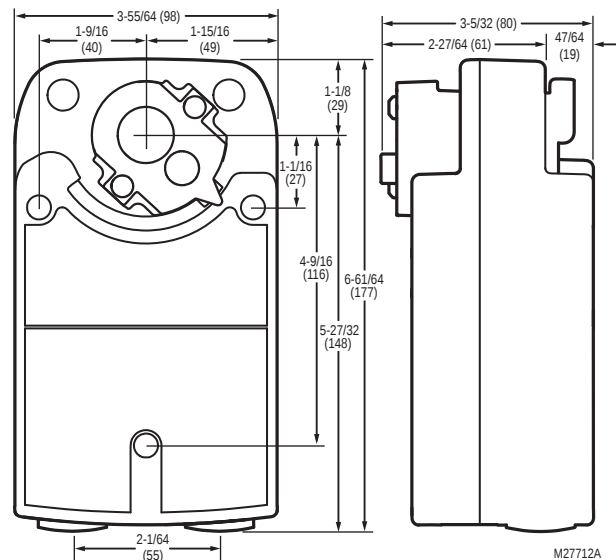
### APPROVALS

|                                          |                                                                                                     |
|------------------------------------------|-----------------------------------------------------------------------------------------------------|
| CE.....                                  | EMC 2004/108/EC;<br>Certification Low Voltage<br>Directive 2006/95/EC; IEC<br>60730-1 and Part 2-14 |
| C-Tick .....                             | N314                                                                                                |
| Underwriters Laboratories, Inc.....      | UL 873                                                                                              |
| Canadian Underwriters Laboratories, Inc. | cUL C22.2 No. 24-93                                                                                 |

### FEATURES

- Brushless DC submotor with electronic stall protection on all models
- Self-centering shaft adaptor (shaft coupling) for wide range of shaft sizes
- Models available for use with two-position, SPST, line- (Series 40) or low- (Series 80) voltage controls
- Models available for use with floating or switched SPDT (Series 60) controls
- Models available for use with proportional current or voltage (Series 70) controls
- Models available with combined floating and modulating control in a single device
- Models available with an internal end switch
- Access cover to facilitate connectivity
- Durable plastic housing with built-in mechanical end limits
- Spring return direction field selectable
- Shaft position indicator and scale
- UL (cUL) listed and CE compliant
- All models are plenum rated per UL873

### DIMENSIONS DIAGRAM





MS4105, MS7405, MS7505, and MS8105 Spring Return Direct Coupled Actuators (DCA) are used within heating, ventilating and air-conditioning (HVAC) systems. They can drive a variety of quarter-turn, final control elements requiring spring return fail-safe operation.

### SPECIFICATIONS

|                                               |                                                                                                       |
|-----------------------------------------------|-------------------------------------------------------------------------------------------------------|
| Actuator Type .....                           | Damper; Valve                                                                                         |
| Rotational Stroke .....                       | 95 ±3 degrees                                                                                         |
| Fail Safe Mode.....                           | Spring Return                                                                                         |
| Torque.....                                   | 44 lb-in. (5 Nm)                                                                                      |
| Spring Return Torque .....                    | 44 lb-in. (5 Nm)                                                                                      |
| Spring Return Direction .....                 | By orientation                                                                                        |
| External Auxiliary Switches Available....     | No                                                                                                    |
| Environmental Rating .....                    | NEMA2                                                                                                 |
| Ingress Protection Rating .....               | IP54                                                                                                  |
| Frequency .....                               | 50 Hz; 60 Hz                                                                                          |
| Mounting.....                                 | Direct Coupled                                                                                        |
| Maximum Noise Rating, Holding (dBA @ 1m)..... | 20 (no audible noise)                                                                                 |
| Maximum Noise Rating, Driving (dBA @ 1m)..... | 50                                                                                                    |
| Rotation to Open .....                        | By switch                                                                                             |
| Rotational Stroke Adjustment .....            | Mechanically limited 5 degree increments                                                              |
| Compatible Damper Shafts .....                | 3/8 to 5/8 in. round or 1/4 to 1/2 in. square (9 to 16 mm round or 6 to 13 mm square)                 |
| Shaft Adapter Type.....                       | Self-centering clamping                                                                               |
| Materials .....                               | Plenum rated plastic housing                                                                          |
| Operating Humidity Range (% RH) .....         | 5 to 95% RH, non-condensing                                                                           |
| Ambient Temperature Range .....               | -40 F to +149F (-40 C to +65 C)<br>-22 F to +149F (-30 C to +65 C)<br>for two-position actuators only |
| Temperature Ratings (Shipping).....           | -40 F to +150F (-40 C to +65 C)                                                                       |
| Storage Temperature Range .....               | -40 F to +150F (-40 C to +65 C)                                                                       |
| Weight .....                                  | 3.5 lb (1.6 kg)                                                                                       |
| Includes.....                                 | Mounting bracket, self-centering shaft adapter                                                        |

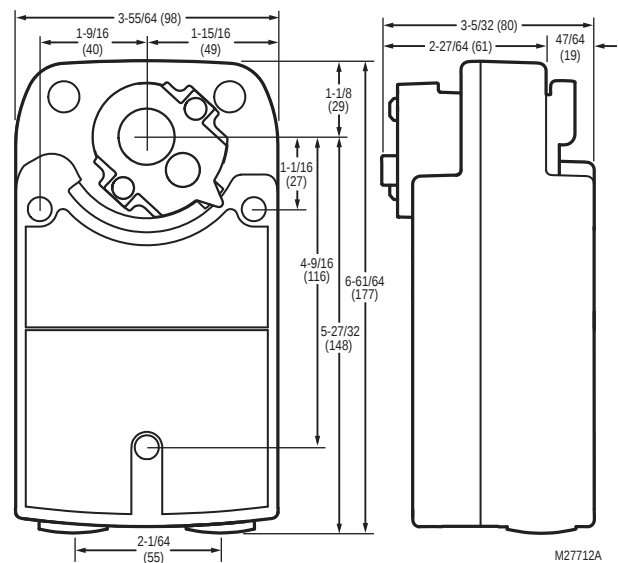
### APPROVALS

|                                               |                                                                                                     |
|-----------------------------------------------|-----------------------------------------------------------------------------------------------------|
| CE.....                                       | EMC 2004/108/EC;<br>Certification Low Voltage<br>Directive 2006/95/EC; IEC<br>60730-1 and Part 2-14 |
| C-Tick .....                                  | N314                                                                                                |
| Underwriters Laboratories, Inc. ....          | UL 873                                                                                              |
| Canadian Underwriters Laboratories, Inc. .... | cUL C22.2 No. 24-93                                                                                 |

### FEATURES

- Brushless DC submotor with electronic stall protection on all models
- Self-centering shaft adaptor (shaft coupling) for wide range of shaft sizes
- Models available for use with two-position, SPST, line- (Series 40) or low- (Series 80) voltage controls
- Models available for use with floating or switched SPDT (Series 60) controls
- Models available for use with proportional current or voltage (Series 70) controls
- Models available with combined floating and modulating control in a single device
- Models available with an internal end switch
- Access cover includes enclosed screw terminal strip (22 to 14 AWG) for electrical connections.
- Models available with 3 foot 18 AWG color-coded cable
- Durable plastic housing with built-in mechanical end limits
- Spring return direction field selectable
- Shaft position indicator and scale
- UL (cUL) listed and CE compliant
- All models are plenum rated per UL873

### DIMENSIONS DIAGRAM



# Submittal Data - Actuators

## Spring Return S10 Series



MS4110, MS7510 and MS8110 Spring Return Direct Coupled Actuators (DCA) are used within heating, ventilating and air-conditioning (HVAC) systems. They can drive a variety of quarter-turn, final control elements requiring spring return fail-safe operation.

### SPECIFICATIONS

|                                                |                                                                                             |
|------------------------------------------------|---------------------------------------------------------------------------------------------|
| Actuator Type .....                            | Damper; Valve                                                                               |
| Rotational Stroke .....                        | 95 ±3 degrees                                                                               |
| Fail Safe Mode .....                           | Spring Return                                                                               |
| Torque .....                                   | 88 lb-in. (10 Nm)                                                                           |
| Spring Return Torque .....                     | 88 lb-in. (10 Nm)                                                                           |
| Spring Return Direction .....                  | By orientation                                                                              |
| External Auxiliary Switches Available .....    | Yes, SW2-US                                                                                 |
| Environmental Rating .....                     | NEMA2                                                                                       |
| Frequency .....                                | 50 Hz; 60 Hz                                                                                |
| Manual operation .....                         | Manual crank                                                                                |
| Mounting .....                                 | Direct Coupled                                                                              |
| Maximum Noise Rating, Holding (dBA @ 1m) ..... | 20 (no audible noise)                                                                       |
| Maximum Noise Rating, Driving (dBA @ 1m) ..... | 40                                                                                          |
| Rotational Stroke Adjustment .....             | Mechanically limited 5 degree increments                                                    |
| Compatible Damper Shafts .....                 | 3/8 to 1.06 in. round or 3/8 to 1 1/16 in. square (10 to 27 mm round or 10 to 18 mm square) |
| Shaft Adapter Type .....                       | Self-centering clamping                                                                     |
| Materials .....                                | Aluminum housing, Plenum rated plastic access cover                                         |
| Operating Humidity Range (% RH) .....          | 5 to 95% RH, non-condensing                                                                 |
| Ambient Temperature Range .....                | -40 F to +140 F (-40 C to +60 C)                                                            |
| Storage Temperature Range .....                | -40 F to +158 F (-40 C to +70 C)                                                            |
| Weight .....                                   | 6 lb (2.72 kg)                                                                              |
| Includes .....                                 | Mounting bracket, self-centering shaft adapter, 3mm crank                                   |
| Comments .....                                 | Integral 1/2 in. NPSM conduit connection.                                                   |

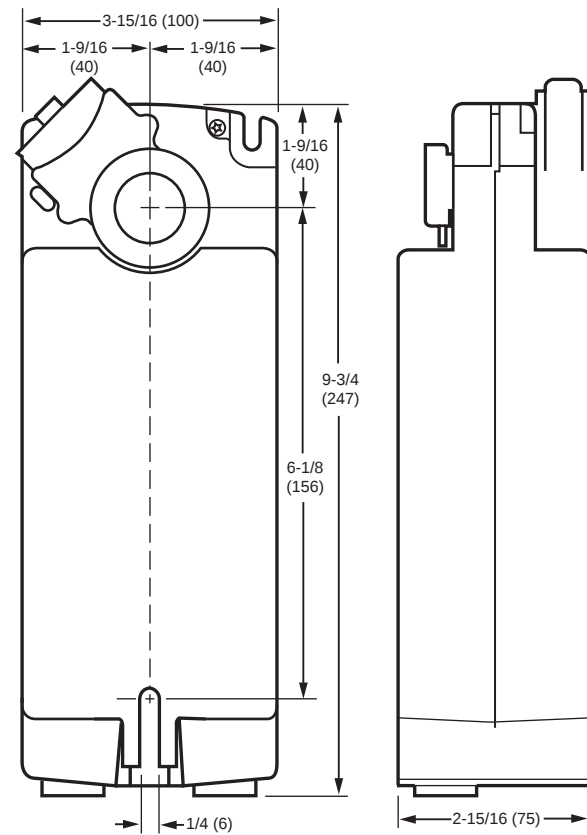
### APPROVALS

|                                               |                       |
|-----------------------------------------------|-----------------------|
| CE .....                                      | 89/336/ECC, 73/23/EEC |
| C-Tick .....                                  | N314                  |
| Underwriters Laboratories, Inc. ....          | UL873, Plenum Rated   |
| Canadian Underwriters Laboratories, Inc. .... | cUL C22.2 No. 24-93   |

### FEATURES

- Brushless DC submotor with electronic stall protection for floating/modulating models.
- Brush DC submotor with electronic stall protection for 2-position models.
- Self-centering shaft adapter (shaft coupling) for wide range of shaft sizes.
- Models available for use with two-position, single pole single throw (spst), line- (Series 40) or low- (Series 80) voltage controls.
- Models available for use with proportional current or voltage (Series 70) controls.
- Models available with combined floating/modulating control in a single device.
- Models available with adjustable zero and span.
- Models available with line-voltage internal end switches.
- Access cover includes enclosed screw terminal strip (22 to 14 AWG) for electrical connections.
- Models available with 3 foot 18 AWG color-coded cable.
- Metal housing with built-in mechanical end limits.
- Spring return direction field-selectable.
- Shaft position indicator and scale.
- Manual winding capability with locking function.
- UL (cUL) listed and CE compliant.
- All Models are plenum-rated per UL873.

### DIMENSIONS DIAGRAM



M20952



MS4120, MS7520 and MS8120 Spring Return Direct Coupled Actuators (DCA) are used within heating, ventilating and air-conditioning (HVAC) systems. They can drive a variety of quarter-turn, final control elements requiring spring return fail-safe operation.

### SPECIFICATIONS

|                                               |                                                                                             |
|-----------------------------------------------|---------------------------------------------------------------------------------------------|
| Actuator Type .....                           | Damper; Valve                                                                               |
| Rotational Stroke .....                       | 95 ±3 degrees                                                                               |
| Fail Safe Mode.....                           | Spring Return                                                                               |
| Torque.....                                   | 175 lb-in. (20 Nm)                                                                          |
| Spring Return Torque .....                    | 175 lb-in. (20 Nm)                                                                          |
| Spring Return Direction .....                 | By orientation                                                                              |
| External Auxiliary Switches Available...      | Yes, SW2-US                                                                                 |
| Environmental Rating .....                    | NEMA2                                                                                       |
| Frequency .....                               | 50 Hz; 60 Hz                                                                                |
| Manual operation.....                         | Manual crank                                                                                |
| Mounting.....                                 | Direct Coupled                                                                              |
| Maximum Noise Rating, Holding (dBA @ 1m)..... | 20 (no audible noise)                                                                       |
| Maximum Noise Rating, Driving (dBA @ 1m)..... | 40                                                                                          |
| Rotational Stroke Adjustment .....            | Mechanically limited 5 degree increments                                                    |
| Compatible Damper Shafts .....                | 3/8 to 1.06 in. round or 3/8 to 1 1/16 in. square (10 to 27 mm round or 10 to 18 mm square) |
| Shaft Adapter Type.....                       | Self-centering clamping                                                                     |
| Materials.....                                | Aluminum housing, Plenum rated plastic access cover                                         |
| Operating Humidity Range (% RH) .....         | 5 to 95% RH, non-condensing                                                                 |
| Ambient Temperature Range .....               | -40 F to +140 F (-40 C to +60 C)                                                            |
| Storage Temperature Range .....               | -40 F to +158 F (-40 C to +70 C)                                                            |
| Weight .....                                  | 6 lb (2.72 kg)                                                                              |
| Includes.....                                 | Mounting bracket, self-centering shaft adapter, 3mm crank                                   |
| Comments .....                                | Integral 1/2 in. NPSM conduit connection.                                                   |

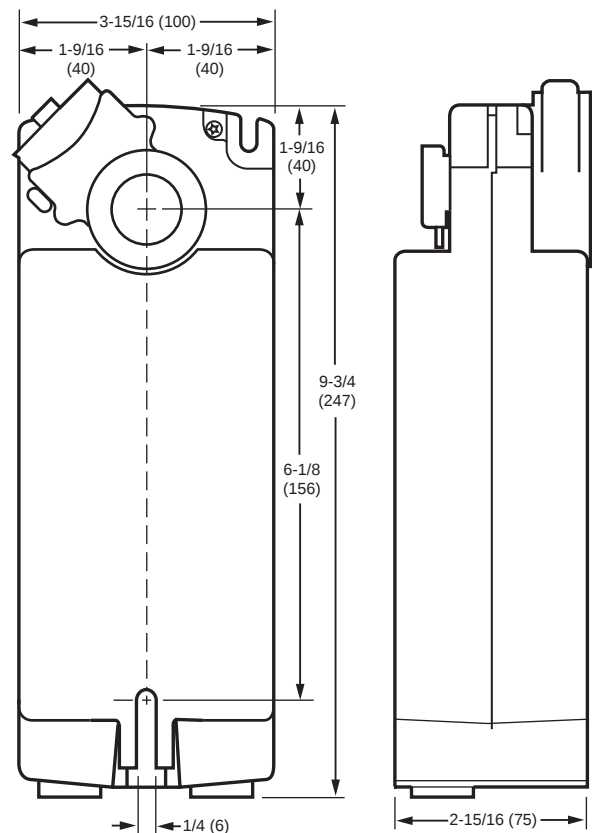
### APPROVALS

|                                          |                       |
|------------------------------------------|-----------------------|
| CE.....                                  | 89/336/ECC, 73/23/EEC |
| C-Tick .....                             | N314                  |
| Underwriters Laboratories, Inc. ....     | UL873, Plenum Rated   |
| Canadian Underwriters Laboratories, Inc. | cUL C22.2 No. 24-93   |

### FEATURES

- Brushless DC submotor with electronic stall protection for floating/modulating models.
- Brush DC submotor with electronic stall protection for 2-position models.
- Self-centering shaft adapter (shaft coupling) for wide range of shaft sizes.
- Models available for use with two-position, single pole single throw (spst), line- (Series 40) or low- (Series 80) voltage controls.
- Models available for use with proportional current or voltage (Series 70) controls.
- Models available with combined floating/modulating control in a single device.
- Models available with adjustable zero and span.
- Models available with line-voltage internal end switches.
- Access cover includes enclosed screw terminal strip (22 to 14 AWG) for electrical connections.
- Models available with 3 foot 18 AWG color-coded cable.
- Metal housing with built-in mechanical end limits.
- Spring return direction field-selectable.
- Shaft position indicator and scale.
- Manual winding capability with locking function.
- UL (cUL) listed and CE compliant.
- All models are plenum-rated per UL873.

### DIMENSIONS DIAGRAM



M20952

# Submittal Data - Actuators

## Non-spring Return ML6161



Used to control dampers in applications such as variable air volume (VAV) terminal units and for mounting on ball valves; suitable for use with SPDT or floating thermostats or building automation controls.

### FEATURES

- Control for air damper applications with up to 10 sq.ft. assuming 3.5 in-lb per sq.ft. of damper area, velocity independent.
- Superior A/C synchronous submotor for consistent timing and actuator longevity.
- Eliminate need for limit switches or mechanical stops by providing magnetic coupling.
- All models include manual declutch lever and bag assembly with two minimum position setscrews.
- Mount directly on 3/8 inch or 1/2 inch square or round damper shaft.
- Selectable 45, 60 and 90 stroke in either clockwise or counterclockwise direction.

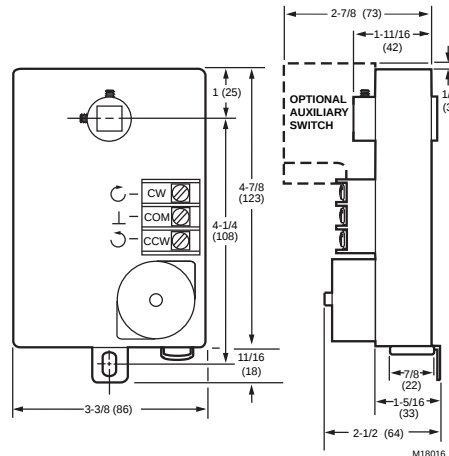
### SPECIFICATIONS

|                                                  |                                                                        |
|--------------------------------------------------|------------------------------------------------------------------------|
| Actuator Type .....                              | Damper                                                                 |
| Rotational Stroke .....                          | 90 degrees                                                             |
| Fail Safe Mode .....                             | Non-Spring Return                                                      |
| Torque .....                                     | 35 lb-in. (4 Nm)                                                       |
| External Auxiliary Switches Available...         | Yes, 201052B                                                           |
| Electrical Connections .....                     | Screw terminals                                                        |
| Environmental Rating .....                       | NEMA 1                                                                 |
| Feedback .....                                   | With accessory                                                         |
| Frequency .....                                  | 50 Hz; 60 Hz                                                           |
| Manual operation .....                           | Declutch mechanism                                                     |
| Mounting .....                                   | Direct Coupled                                                         |
| Maximum Noise Rating,<br>Driving (dBA @ 1m)..... | 45                                                                     |
| Rotation to Open .....                           | By wiring                                                              |
| Rotational Stroke Adjustment .....               | Mechanically limited at 45 or<br>60 degrees in cw or ccw<br>directions |
| Compatible Damper Shafts.....                    | 3/8 to 1/2 in. square or round<br>(10 to 13 mm square/round)           |
| Shaft Adapter Type .....                         | Aluminum Hub, two set screws                                           |
| Supply Voltage .....                             | 24 Vac $\pm$ 20%                                                       |
| Materials .....                                  | Steel plate and Plenum rated<br>plastic                                |
| Operating Humidity Range (% RH).....             | 5 to 95% RH, non-condensing                                            |
| Ambient Temperature Range .....                  | 20 F to 125 F (-18 C to +50 C)                                         |
| Storage Temperature Range.....                   | 20 F to 130 F (-18 C to +54 C)                                         |
| Weight .....                                     | 1.5 lb (0.68 kg)                                                       |
| Includes.....                                    | 4074ENY Bag Assembly                                                   |

### APPROVALS

|                                          |                       |
|------------------------------------------|-----------------------|
| CE.....                                  | 89/336/ECC, 73/23/EEC |
| C-Tick .....                             | N314                  |
| Underwriters Laboratories, Inc.....      | UL873, Plenum Rated   |
| Canadian Underwriters Laboratories, Inc. | cUL C22.2 No. 24-93   |

### DIMENSIONS DIAGRAM





Used to control dampers in applications such as variable air volume (VAV) terminal units and for mounting on ball valves; suitable for use with SPDT or floating thermostats or building automation controls.

### FEATURES

- Control for air damper applications with up to 20 sq.ft. assuming 3.5 in-lb per sq.ft. of damper area, velocity independent.
- Magnetic coupling eliminates the need for mechanical stops or limit switch adjustments by limiting stall torque to 130 lb-in. maximum.
- Mount directly on 3/8 to 1/2 in. round and square damper shafts. All models include manual declutch lever for ease of mounting and bag assembly with two minimum position setscrews. 90 second timing models are suitable for use with pressure independent VAV systems.
- Selectable 45, 60, and 90 degree stroke in either clockwise or counterclockwise direction.

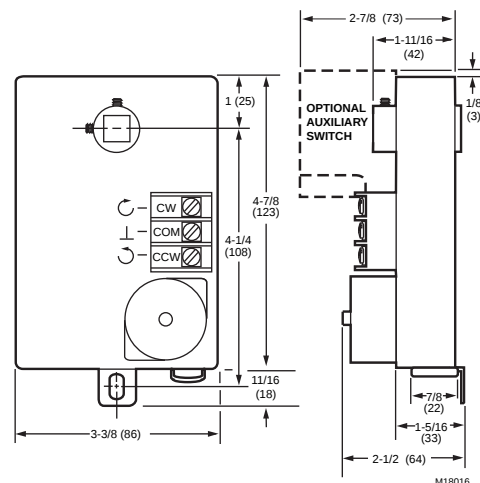
### SPECIFICATIONS

|                                            |                                                                  |
|--------------------------------------------|------------------------------------------------------------------|
| Actuator Type .....                        | Damper                                                           |
| Rotational Stroke .....                    | 90 degrees                                                       |
| Fail Safe Mode.....                        | Non-Spring Return                                                |
| Torque.....                                | 70 lb-in (8 Nm)                                                  |
| External Auxiliary Switches Available..... | Yes, 201052B                                                     |
| Environmental Rating .....                 | NEMA1                                                            |
| Feedback .....                             | With accessory                                                   |
| Frequency .....                            | 50 Hz; 60 Hz                                                     |
| Manual operation.....                      | Declutch mechanism                                               |
| Mounting.....                              | Direct Coupled                                                   |
| Maximum Noise Rating,                      |                                                                  |
| Driving (dBA @ 1m) .....                   | 45                                                               |
| Rotation to Open .....                     | By wiring                                                        |
| Rotational Stroke Adjustment .....         | Mechanically limited at 45 or 60 degrees in cw or ccw directions |
| Compatible Damper Shafts .....             | 3/8 to 1/2 in. square or round (10 to 13 mm square/round)        |
| Shaft Adapter Type.....                    | Aluminum Hub, two set screws                                     |
| Supply Voltage .....                       | 24 Vac ±20%                                                      |
| Materials.....                             | Steel plate and Plenum rated plastic                             |
| Operating Humidity Range (% RH) .....      | 5 to 95% RH, non-condensing                                      |
| Ambient Temperature Range .....            | 20 F to 125 F (-18 C to +50 C)                                   |
| Storage Temperature Range .....            | 20 F to 130 F (-18 C to +54 C)                                   |
| Weight .....                               | 1.5 lb (0.68 kg)                                                 |
| Includes.....                              | 4074ENY Bag Assembly                                             |

### APPROVALS

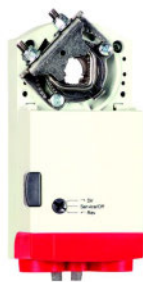
Underwriters Laboratories, Inc. ....UL873, Plenum Rated  
Canadian Underwriters Laboratories, Inc.cUL C22.2 No. 24-93

### DIMENSIONS DIAGRAMS



# Submittal Data - Actuators

## Non-spring Return N05 Series



This non-spring return direct-coupled damper actuator provides modulating and floating/2-position control for: air dampers, air handlers, ventilation flaps, louvers and reliable control for air damper applications with up to 10 sq. ft./44lb.-in. (5 Nm) and 20 sq. ft./88 lb.-in. (10 Nm) (seal-less damper blades; air friction-dependent).

### FEATURES

- Declutch for manual adjustment
- Adjustable mechanical end limits
- Access cover includes enclosed screw terminal strip (22 to 14 AWG) for electrical connections
- Models available with 3 foot 18 AWG color-coded cable
- Mountable in any orientation
- Function selection switch for selecting modulating or floating/2-position control

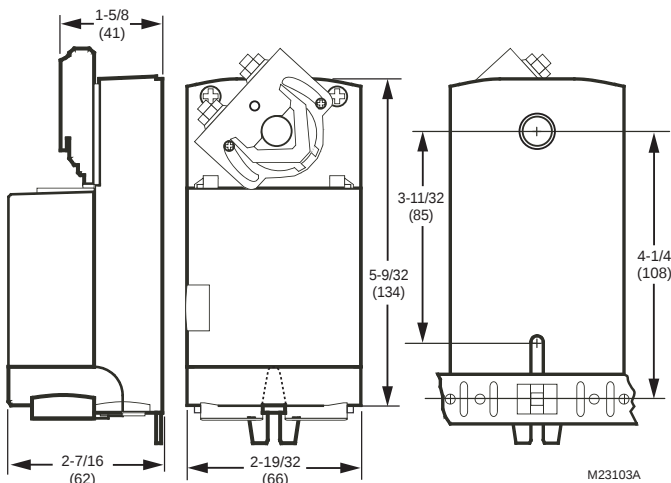
### SPECIFICATIONS

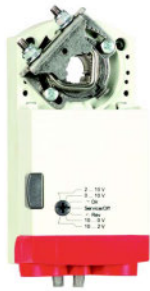
|                                                  |                                                                                                |
|--------------------------------------------------|------------------------------------------------------------------------------------------------|
| Actuator Type .....                              | Damper; Valve                                                                                  |
| Rotational Stroke .....                          | 95 ±3 degrees                                                                                  |
| Fail Safe Mode .....                             | Non-Spring Return                                                                              |
| Torque .....                                     | 44 lb.-in. (5 Nm)                                                                              |
| External Auxiliary Switches Available...         | Yes, SSW2-1M                                                                                   |
| Environmental Rating .....                       | NEMA2                                                                                          |
| Frequency .....                                  | 50 Hz; 60 Hz                                                                                   |
| Manual operation .....                           | Declutch mechanism                                                                             |
| Mounting .....                                   | Direct Coupled                                                                                 |
| Maximum Noise Rating,<br>Driving (dBA @ 1m)..... | 35                                                                                             |
| Rotation to Open .....                           | By switch                                                                                      |
| Rotational Stroke Adjustment .....               | Dual Integral Adj. Stops<br>(3 degree increments)                                              |
| Compatible Damper Shafts.....                    | 1/4 to 1/2 in. square or<br>3/8 to 5/8 in. round<br>(6 to 13 mm square or<br>8 to 16 mm round) |
| Shaft Adapter Type .....                         | U-bolt clamp                                                                                   |
| Supply Voltage .....                             | 24 Vac +20%, -15%, 24 Vdc                                                                      |
| Materials.....                                   | Plenum rated plastic housing                                                                   |
| Ingress Protection Rating.....                   | IP54                                                                                           |
| Operating Humidity Range (% RH).....             | 5 to 95% RH, non-condensing                                                                    |
| Ambient Temperature Range .....                  | -5 F to +140 F (-20 C to +60 C)                                                                |
| Storage Temperature Range .....                  | -22 F to +176 F (-30 C to +80 C)                                                               |
| Weight .....                                     | 1 lb (0.45 kg)                                                                                 |
| Includes.....                                    | Mounting bracket, screws,<br>shaft adapter, water-tight<br>strain-relief cable fittings        |
| Comments .....                                   | Integral 1/2 in. NPSM conduit<br>connection.                                                   |

### APPROVALS

|                                          |                       |
|------------------------------------------|-----------------------|
| CE.....                                  | 89/336/ECC, 73/23/EEC |
| C-Tick.....                              | N314                  |
| Underwriters Laboratories, Inc.....      | UL873, Plenum Rated   |
| Canadian Underwriters Laboratories, Inc. | cUL C22.2 No. 24-93   |

### DIMENSIONS DIAGRAM





This non-spring return direct-coupled damper actuator provides modulating and floating/2-position control for air dampers, air handlers, ventilation flaps, louvers and reliable control for air damper applications with up to 20 sq ft/88 lb-in. (10 Nm) (seal-less damper blades; air friction-dependent).

### FEATURES

- Declutch for manual adjustment
- Adjustable mechanical end limits
- Removable access cover for direct wiring
- Mountable in any orientation
- Function selection switch for selecting modulating or floating/2-position control

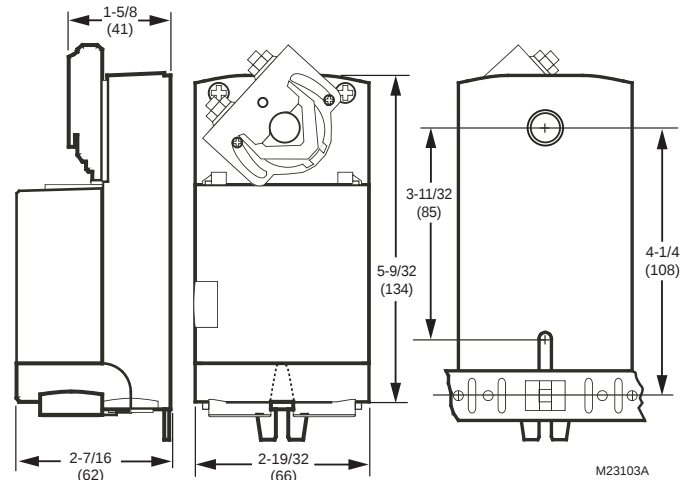
### SPECIFICATIONS

|                                                |                                                                                       |
|------------------------------------------------|---------------------------------------------------------------------------------------|
| Actuator Type .....                            | Damper; Valve                                                                         |
| Rotational Stroke .....                        | 95 ±3 degrees                                                                         |
| Fail Safe Mode .....                           | Non-Spring Return                                                                     |
| Torque .....                                   | 88 lb-in. (10 Nm)                                                                     |
| External Auxiliary Switches Available .....    | Yes, SSW2-1M                                                                          |
| Electrical Connections .....                   | Enclosed screw terminal strip (22 to 14 AWG)                                          |
| Environmental Rating .....                     | NEMA2                                                                                 |
| Frequency .....                                | 50 Hz; 60 Hz                                                                          |
| Manual operation .....                         | Declutch mechanism                                                                    |
| Mounting .....                                 | Direct Coupled                                                                        |
| Maximum Noise Rating, Driving (dBA @ 1m) ..... | 35                                                                                    |
| Rotation to Open .....                         | By switch                                                                             |
| Rotational Stroke Adjustment .....             | Dual Integral Adj. Stops (3 degree increments)                                        |
| Compatible Damper Shafts .....                 | 1/4 to 1/2 in. square or 3/8 to 5/8 in. round (6 to 13 mm square or 8 to 16 mm round) |
| Shaft Adapter Type .....                       | U-bolt clamp                                                                          |
| Supply Voltage .....                           | 24 Vac +20%, -15%, 24 Vdc                                                             |
| Materials .....                                | Plenum rated plastic housing                                                          |
| Ingress Protection Rating .....                | IP54                                                                                  |
| Operating Humidity Range (% RH) .....          | 5 to 95% RH, non-condensing                                                           |
| Ambient Temperature Range .....                | -5 F to +140 F (-20 C to +60 C)                                                       |
| Storage Temperature Range .....                | -22 F to +176 F (-30 C to +80 C)                                                      |
| Weight .....                                   | 1 lb (0.45 kg)                                                                        |
| Includes .....                                 | Mounting bracket, screws, shaft adapter, water-tight strain-relief cable fittings     |
| Comments .....                                 | Integral 1/2 in. NPSM conduit connection.                                             |

### APPROVALS

|                                               |                       |
|-----------------------------------------------|-----------------------|
| CE .....                                      | 89/336/ECC, 73/23/EEC |
| C-Tick .....                                  | N314                  |
| Underwriters Laboratories, Inc. ....          | UL873, Plenum Rated   |
| Canadian Underwriters Laboratories, Inc. .... | cUL C22.2 No. 24-93   |

### DIMENSIONS DIAGRAM



# Submittal Data - Actuators

## Non-spring Return N20 Series



These direct-coupled damper actuators provide adjustable modulating control for: air dampers, air handling units, ventilation flaps, louvers and reliable control for air damper applications with up to 4.6 m<sup>2</sup>/50 sq ft (seal-less dampers; air friction-dependent).

### FEATURES

- Control for air damper applications with up to 50 sq ft assuming 3.5 in-lb per sq ft of damper area, velocity independent.
- Patented self-centering shaft adapter.
- Access cover to facilitate connectivity.
- Declutch for manual adjustment.
- Mechanical end limits.
- Field-installable auxiliary switches.
- Rotation direction selectable by switch.
- Mountable in any orientation (no IP54 if upside down).
- Mechanical position indicator.
- CE approved. UL approved.

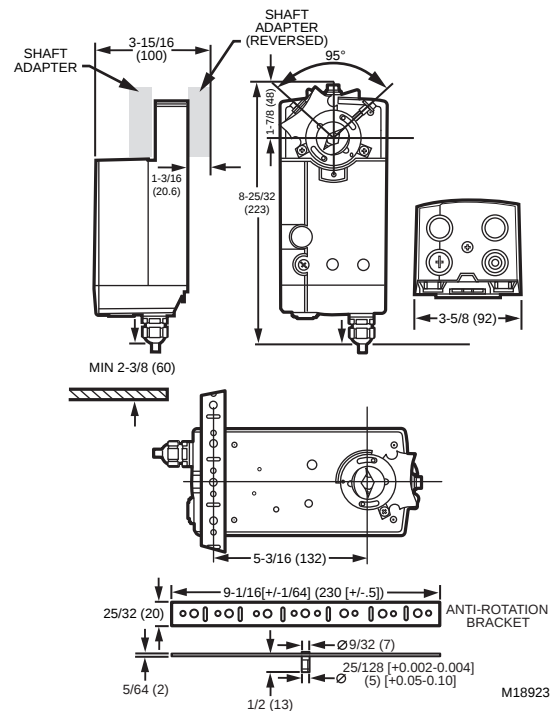
### SPECIFICATIONS

|                                               |                                                                                             |
|-----------------------------------------------|---------------------------------------------------------------------------------------------|
| Actuator Type .....                           | Damper; Valve                                                                               |
| Rotational Stroke .....                       | 95 ±3 degrees                                                                               |
| Fail Safe Mode .....                          | Non-Spring Return                                                                           |
| Torque .....                                  | 175 lb-in. (20 Nm)                                                                          |
| External Auxiliary Switches Available...      | Yes, SW2-US                                                                                 |
| Electrical Connections .....                  | Enclosed screw terminal strip (22 to 14 AWG)                                                |
| Environmental Rating .....                    | NEMA2; IP54                                                                                 |
| Frequency .....                               | 50 Hz; 60 Hz                                                                                |
| Manual operation .....                        | Declutch mechanism                                                                          |
| Mounting .....                                | Direct Coupled                                                                              |
| Maximum Noise Rating, Driving (dBA @ 1m)..... | 40                                                                                          |
| Rotation to Open .....                        | By switch                                                                                   |
| Rotational Stroke Adjustment .....            | Dual Integral Adj. Stops (3 degree increments)                                              |
| Compatible Damper Shafts .....                | 3/8 to 1.06 in. round or 3/8 to 1 1/16 in. square (10 to 27 mm round or 10 to 18 mm square) |
| Shaft Adapter Type .....                      | Self-centering clamping                                                                     |
| Materials .....                               | Plenum rated plastic housing                                                                |
| Operating Humidity Range (% RH) .....         | 5 to 95% RH, non-condensing                                                                 |
| Ambient Temperature Range .....               | -5 F to +140 F (-20 C to +60 C)                                                             |
| Storage Temperature Range .....               | -40 F to +175 F (-40 C to +80 C)                                                            |
| Weight .....                                  | 3.2 lb (1.45 kg)                                                                            |
| Includes .....                                | Mounting bracket, self-centering shaft adapter                                              |
| Comments .....                                | Integral 1/2 in. NPSM conduit connection.                                                   |

### APPROVALS

|                                               |                       |
|-----------------------------------------------|-----------------------|
| CE .....                                      | 89/336/ECC, 73/23/EEC |
| C-Tick .....                                  | N314                  |
| Underwriters Laboratories, Inc. ....          | UL873, Plenum Rated   |
| Canadian Underwriters Laboratories, Inc. .... | cUL C22.2 No. 24-93   |

### DIMENSIONS DIAGRAM





These direct coupled damper actuators provide adjustable modulating control for air dampers, air handling units, ventilation flaps, louvers and reliable control for air damper applications with up to 7.9 m<sup>2</sup>/85 sq ft (seal-less dampers; air friction-dependent).

### FEATURES

- Control for air damper applications with up to 85 sq ft assuming 3.5 in-lb per sq ft of damper area, velocity independent.
- Patented self-centering shaft adapter.
- Access cover to facilitate connectivity.
- Declutch for manual adjustment.
- Mechanical end limits.
- Field-installable auxiliary switches.
- Rotation direction selectable by switch.
- Mountable in any orientation (no IP54 if upside down).
- Mechanical position indicator.
- CE approved. UL approved.

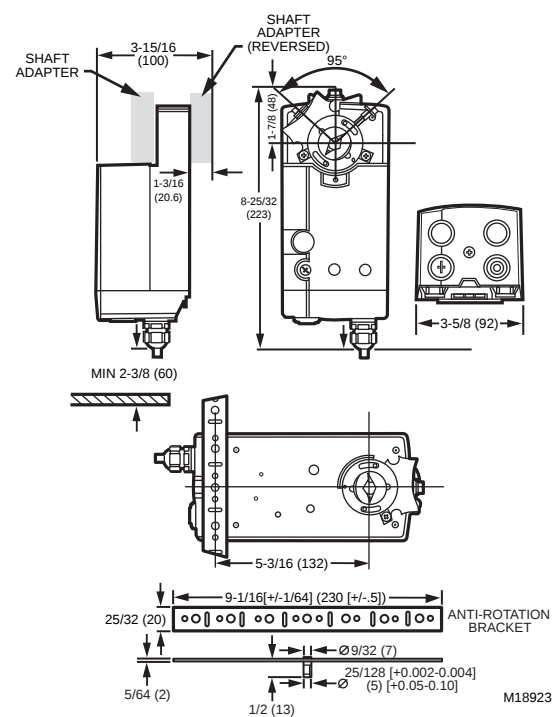
### SPECIFICATIONS

|                                                |                                                                                             |
|------------------------------------------------|---------------------------------------------------------------------------------------------|
| Actuator Type .....                            | Damper; Valve                                                                               |
| Rotational Stroke .....                        | 95 ±3 degrees                                                                               |
| Fail Safe Mode .....                           | Non-Spring Return                                                                           |
| Torque.....                                    | 300 lb-in. (34 Nm)                                                                          |
| External Auxiliary Switches Available.....     | Yes, SW2-US                                                                                 |
| Electrical Connections.....                    | Enclosed screw terminal strip (22 to 14 AWG)                                                |
| Environmental Rating .....                     | NEMA2                                                                                       |
| Frequency .....                                | 50 Hz; 60 Hz                                                                                |
| Manual operation.....                          | Declutch mechanism                                                                          |
| Mounting.....                                  | Direct Coupled                                                                              |
| Maximum Noise Rating, Driving (dBA @ 1m) ..... | 40                                                                                          |
| Rotation to Open .....                         | By switch                                                                                   |
| Compatible Damper Shafts .....                 | 3/8 to 1.06 in. round or 3/8 to 1 1/16 in. square (10 to 27 mm round or 10 to 18 mm square) |
| Shaft Adapter Type.....                        | Self-centering clamping                                                                     |
| Materials .....                                | Plenum rated plastic housing                                                                |
| Operating Humidity Range (% RH) .....          | 5 to 95% RH, non-condensing                                                                 |
| Ambient Temperature Range .....                | -5 F to +140 F (-20 C to +60 C)                                                             |
| Storage Temperature Range .....                | -40 F to +175 F (-40 C to +80 C)                                                            |
| Weight .....                                   | 3.2 lb (1.45 kg)                                                                            |
| Includes.....                                  | Mounting bracket, self-centering shaft adapter                                              |
| Comments .....                                 | Integral 1/2 in. NPSM conduit connection.                                                   |

### APPROVALS

|                                               |                       |
|-----------------------------------------------|-----------------------|
| CE .....                                      | 89/336/ECC, 73/23/EEC |
| C-Tick .....                                  | N314                  |
| Underwriters Laboratories, Inc. ....          | UL873, Plenum Rated   |
| Canadian Underwriters Laboratories, Inc. .... | cUL C22.2 No. 24-93   |

### DIMENSIONS DIAGRAM



# Submittal Data - Actuators

## Spring Return MS4103F, MS8103F



MS4103F, MS8103F Spring Return Direct Coupled Actuators (DCA) are used within Fire/Smoke damper control applications. The actuator accepts an on/off signal from a single-pole, single-throw (spst) controller. Reversible mounting allows actuator to be used for either clockwise (cw) or counterclockwise (ccw) spring return and are designed to operate reliably in smoke control systems requiring Underwriter's Laboratories Inc. UL555S ratings up to 250°F.

### SPECIFICATIONS

|                                                                                          |                                                            |
|------------------------------------------------------------------------------------------|------------------------------------------------------------|
| Device Weight .....                                                                      | 1.7 lbs (0.78 kg)                                          |
| Ambient Operating Temperature ...                                                        | 14°F to 131°F (-10°C to 55°C)                              |
| Shipping and Storage.....                                                                | -40°F to 150°F (-40°C to 65°C)                             |
| Temperature                                                                              |                                                            |
| Humidity Ratings .....                                                                   | 5% to 95% R.H., Non-Condensing                             |
| Auxiliary Switches (Two SPST) .....                                                      | Fixed switches on 10 and 80 degrees 125 VAC, 1A, res. load |
| Mounting                                                                                 |                                                            |
| Self-Centering Shaft Adapter (shaft coupling)                                            |                                                            |
| Round Damper Shafts .....                                                                | 3/8 to 5/8 in. (9 to 16 mm)                                |
| Square Damper Shafts .....                                                               | 1/4 to 1/2 in. (6 to 13 mm)                                |
| Nominal tightening torque for self-centering shaft adapter screw is 106 lb-in (12 Nm)    |                                                            |
| Non Self-Centering Shaft Adapter                                                         |                                                            |
| Round Damper Shafts .....                                                                | 1/4 to 3/4 in. (6 to 19 mm)                                |
| Square Damper Shafts .....                                                               | 1/4 to 1/2 in. (6 to 13 mm)                                |
| Nominal tightening torque for non self-centering shaft adapter screws is 62 lb-in (7 Nm) |                                                            |
| Minimum Damper Shaft Length ....                                                         | 3.25 in. (83 mm) recommended                               |
| for Self-Centering Shaft Adapter                                                         |                                                            |
| Minimum Damper Shaft Length ....                                                         | 3 in. (75 mm)                                              |
| for Non Self -Centering Shaft Adapter                                                    |                                                            |
| Spring Return Timing (at rated .....                                                     | < 25 seconds                                               |
| load and operating temperature range)                                                    |                                                            |
| Cable Specification                                                                      |                                                            |

### FEATURES

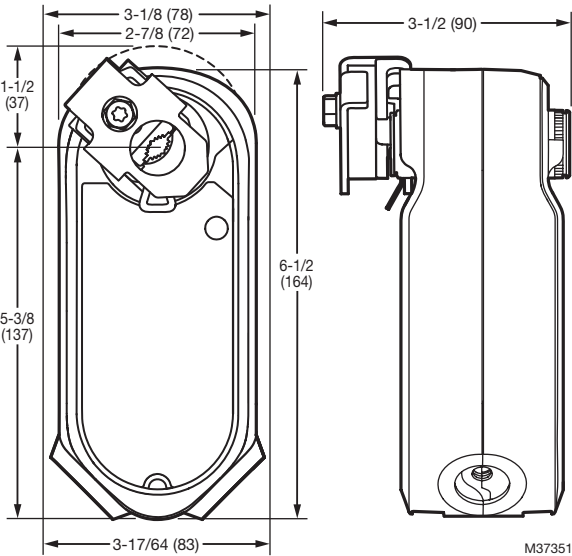
- 27 lb-in (3 Nm) minimum driving torque
- Spring return timing < 25 s
- Optimized drive time < 45 s. No audible noise during holding
- Models available for 24V, 120/230 VAC
- 95° angle of rotation
- Actuator holds rated torque at reduced power level
- Operating temperature from 14°F to 131°F (-10°C to 55°C) at 95% RH
- Housing design allows flush mounting to damper
- Models available with SPST position-indicating switches (10°, 80° stroke)
- Quarter-turn rotary valves, such as ball valves mounted directly to the drive shaft
- Available with cable on all models
- 1/2" 360° Conduit connection with thread

|                                |                                                                                                                                                                                |
|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Low-Voltage Power Cable .....  | Flammability rating UL VW1, 3 ft (0.914 m) length from end of access cover, 18 AWG. In Plenum spaces use flexible conduit to protect the wiring.                               |
| Line-Voltage Power Cable ..... | Flammability rating UL VW1, 3 ft (0.914 m) length from end of access cover, 18 AWG. In Plenum spaces use flexible conduit to protect the wiring.                               |
| Switch Cable.....              | Flammability rating UL VW1, 3 ft (0.914 m) length from end of access cover, 18 AWG. In Plenum spaces use flexible conduit to protect the wiring.                               |
| Stroke .....                   | 95° ±3°, mechanically limited.                                                                                                                                                 |
| Approvals .....                | UL60730<br>IEC 60730-1 and Part 2-14<br>UL555S Temperature Degradation Test, Long Term Holding test<br>IP54, depends on position NEMA 2<br>Flame Resistance UL94-5VA<br>UL2043 |
| Enclosure Ratings.....         |                                                                                                                                                                                |
| Noise Rating (Typical)         |                                                                                                                                                                                |
| Driving Open .....             | < 50 dB(A)                                                                                                                                                                     |
| Spring Return .....            | < 57 dB(A)                                                                                                                                                                     |
| Holding.....                   | No audible noise                                                                                                                                                               |

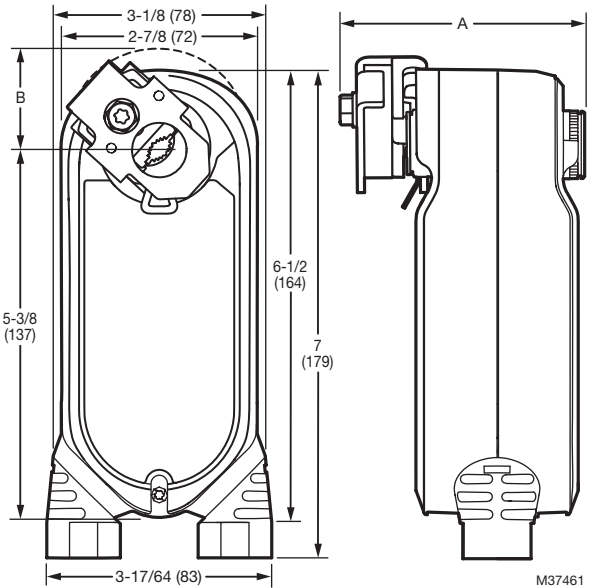
DIMENSION DIAGRAM

| Type of Shaft Adapter      | A                   | B                                |
|----------------------------|---------------------|----------------------------------|
| Self-Centering Adapter     | 3.54 in.<br>(90 mm) | 1.54 in. (39 mm)                 |
| Non Self-Centering Adapter | 3.11 in.<br>(79 mm) | 1.57 in. <sup>1</sup><br>(40 mm) |

<sup>1</sup> For 1/2 shaft.



Dimensional drawing of actuator without conduit in in. (mm).



Dimensional drawing of actuator in in. (mm). See table for A and B dimensions.

ACTUATORS

# Submittal Data - Actuators

## Spring Return MS4104F, MS8104F



### Fire and Smoke Damper Actuator

Spring return direct coupled actuators (DCA) for on/off damper control. The actuator accepts an on/off signal from a single-pole, singlethrow (SPST) controller. They are designed to operate reliably in smoke control systems requiring Underwriters Laboratories Inc. UL555S ratings up to 350 F.

### SPECIFICATIONS

|                                              |                                                              |
|----------------------------------------------|--------------------------------------------------------------|
| Actuator Type .....                          | Damper                                                       |
| Rotational Stroke .....                      | 95 +/- 3 degrees                                             |
| Fail Safe Mode .....                         | Spring Return                                                |
| Torque .....                                 | 30 lb-in. (3.4 Nm)                                           |
| Minimum Driving Torque at 350 F .....        | 30 lb-in.                                                    |
| Spring Return Torque .....                   | 30 lb-in. (3.4 Nm)                                           |
| Number of Internal Auxiliary Switches: ..... | 2                                                            |
| Electrical Connections .....                 | Color-coded leads                                            |
| Electrical Connection Length .....           | 32 in. (0.8 m)                                               |
| Environmental Rating .....                   | NEMA 1, IP40                                                 |
| Frequency .....                              | 60 Hz                                                        |
| Mounting .....                               | Direct Coupled                                               |
| Maximum Noise Rating,Holding (dBA @ 1m) ...  | 20 (no audible noise)                                        |
| Maximum Noise Rating,Driving (dBA @ 1m)..... | 80                                                           |
| Compatible Damper Shafts.....                | 3/8 to 1/2 in. round<br>(10 to 13 mm square/round)           |
| Shaft Adapter Type .....                     | Aluminum Hub, two set<br>screws                              |
| Materials .....                              | Aluminum housing                                             |
| Operating Humidity Range (% RH) .....        | 5 to 95% RH, non-condensing                                  |
| Ambient Temperature Range .....              | 0 F to +130 F<br>(-18 C to +55 C)                            |
| Storage Temperature Range .....              | -40 F to 140 F<br>(-40 C to +60 C)                           |
| Weight .....                                 | 5 lb (2.27 kg)                                               |
| Comments .....                               | Two integral 3/8 in. clip-in<br>flexible conduit connections |

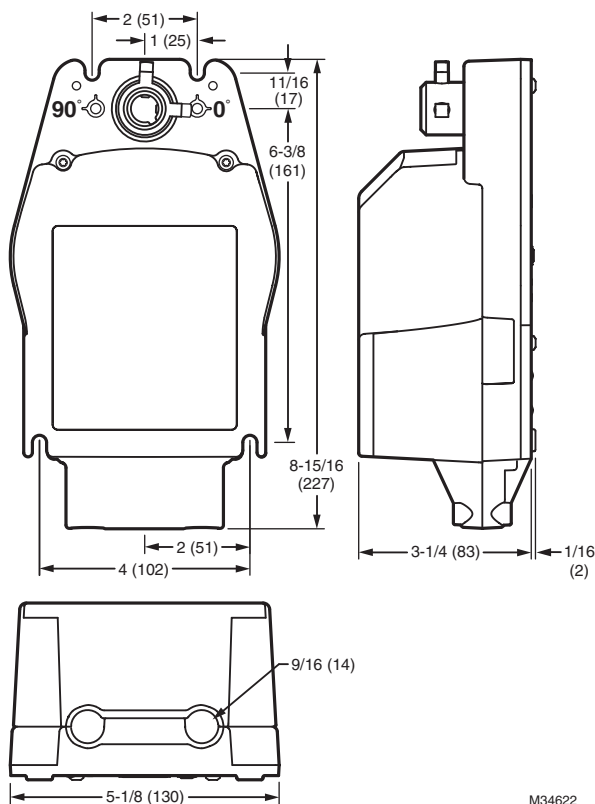
### APPROVALS

|                                               |                       |
|-----------------------------------------------|-----------------------|
| CE .....                                      | 89/336/ECC, 73/23/EEC |
| C-Tick .....                                  | N314                  |
| Underwriters Laboratories, Inc .....          | UL873, Plenum Rated   |
| Canadian Underwriters Laboratories, Inc. .... | cUL C22.2 No. 24-93   |

### FEATURES

- Reversible mounting facilitates use in either clockwise (cw) or counterclockwise (ccw) spring rotation.
- Integral spring return ensures level of return torque.
- Fifteen-second spring return timing.
- No special cycling required during long-term holding. (See Operation section.)
- No audible noise during holding.
- Patent pending design eliminates need for limit switches to reduce power consumption.
- Models available for 24 and 120 Vac.
- Ninety-five degree angle of rotation.
- Actuator holds rated torque at reduced power level.
- Die-cast aluminum housing.
- Housing design allows flush mounting to damper.
- Designed to operate reliably in smoke control systems requiring Underwriters Laboratories Inc. UL555S ratings up to 350°F.
- Models available with SPST position-indicating switches (7°, 85° stroke).

### DIMENSIONS DIAGRAM



M34622



### Fire and Smoke Damper Actuator

Spring return direct coupled actuators (DCA) for on/off damper control. The actuator accepts an on/off signal from a single-pole, singlethrow (SPST) controller. They are designed to operate reliably in smoke control systems requiring Underwriters Laboratories Inc. UL555S ratings up to 350 F.

### SPECIFICATIONS

|                                                |                                                              |
|------------------------------------------------|--------------------------------------------------------------|
| Actuator Type .....                            | Damper                                                       |
| Rotational Stroke .....                        | 95 +/- 3 degrees                                             |
| Fail Safe Mode .....                           | Spring Return                                                |
| Torque .....                                   | 80 lb-in. (9 Nm)                                             |
| Minimum Driving Torque at 350 F .....          | 80 lb-in.                                                    |
| Spring Return Torque .....                     | 80 lb-in. (9 Nm)                                             |
| Number of Internal Auxiliary Switches: .....   | 2                                                            |
| Environmental Rating .....                     | NEMA 1, IP40                                                 |
| Frequency .....                                | 60 Hz                                                        |
| Mounting .....                                 | Direct Coupled                                               |
| Maximum Noise Rating, Holding (dBA @ 1m) ..... | 20 (no audible noise)                                        |
| Maximum Noise Rating, Driving (dBA @ 1m) ..... | 80                                                           |
| Compatible Damper Shafts .....                 | 3/8 to 1/2 in. round<br>(10 to 13 mm square/round)           |
| Shaft Adapter Type .....                       | Aluminum Hub, four set<br>screws                             |
| Supply Voltage .....                           | 120 Vac +10%, -15%                                           |
| Materials .....                                | Aluminum housing                                             |
| Operating Humidity Range (% RH) .....          | 5 to 95% RH, non-condensing                                  |
| Ambient Temperature Range .....                | 0 F to +130 F<br>(-18 C to +55 C)                            |
| Storage Temperature Range .....                | -40 F to 140 F<br>(-40 C to +60 C)                           |
| Weight .....                                   | 5 lb (2.27 kg)                                               |
| Comments .....                                 | Two integral 3/8 in. clip-in<br>flexible conduit connections |

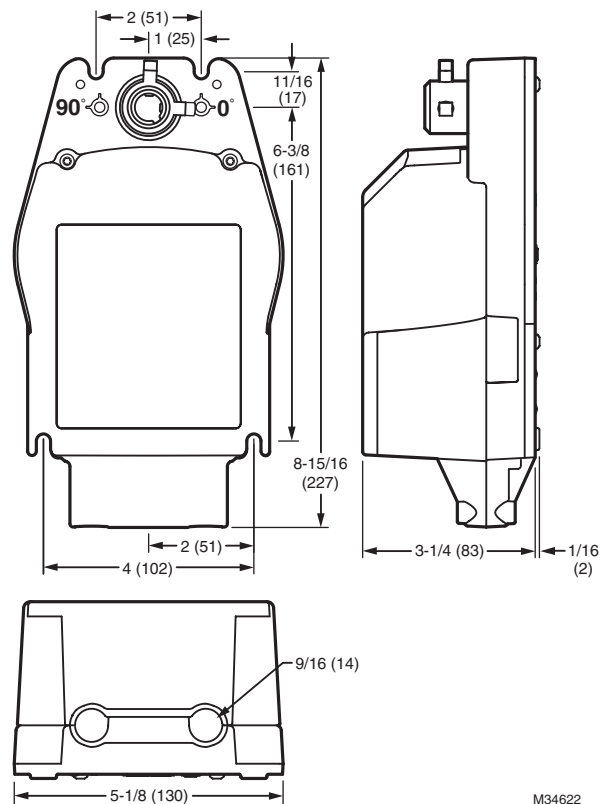
### APPROVALS

|                                               |                       |
|-----------------------------------------------|-----------------------|
| CE .....                                      | 89/336/ECC, 73/23/EEC |
| C-Tick .....                                  | N314                  |
| Underwriters Laboratories, Inc .....          | UL873, Plenum Rated   |
| Canadian Underwriters Laboratories, Inc. .... | cUL C22.2 No. 24-93   |

### FEATURES

- Reversible mounting facilitates use in either clockwise (cw) or counterclockwise (ccw) spring rotation.
- Integral spring return ensures level of return torque.
- Fifteen-second spring return timing.
- No special cycling required during long-term holding. (See Operation section.)
- No audible noise during holding.
- Patent pending design eliminates need for limit switches to reduce power consumption.
- Models available for 24 and 120 Vac.
- Ninety-five degree angle of rotation.
- Actuator holds rated torque at reduced power level.
- Die-cast aluminum housing.
- Housing design allows flush mounting to damper.
- Designed to operate reliably in smoke control systems requiring Underwriters Laboratories Inc. UL555S ratings up to 350°F.
- Models available with SPST position indicating switches (7°, 85° stroke).

### DIMENSIONS DIAGRAM



M34622

# Submittal Data - Actuators

## Spring Return MS4120F; MS4620F; MS8120F



### Fire and Smoke Damper Actuator

Spring return direct coupled actuators (DCA) for on/off damper control with an integral junction box. The actuator accepts an on/off signal from a single-pole, single-throw (SPST) controller. They are designed to operate reliably in smoke control systems requiring Underwriters Laboratories Inc. UL555S ratings up to 350 F.

### FEATURES

- Brush DC submotor with electronic stall protection for 2-position models
- Self-centering shaft adapter (shaft coupling) for wide range of shaft sizes
- Models available for use with two-position, single pole single throw (spst), line- (Series 40) or low- (Series 80) voltage controls
- Metal housing with built-in mechanical end limits
- Spring return direction field-selectable
- Shaft position indicator and scale
- Manual winding capability with locking function
- UL (cUL) listed and CE compliant
- All models are plenum-rated per UL873

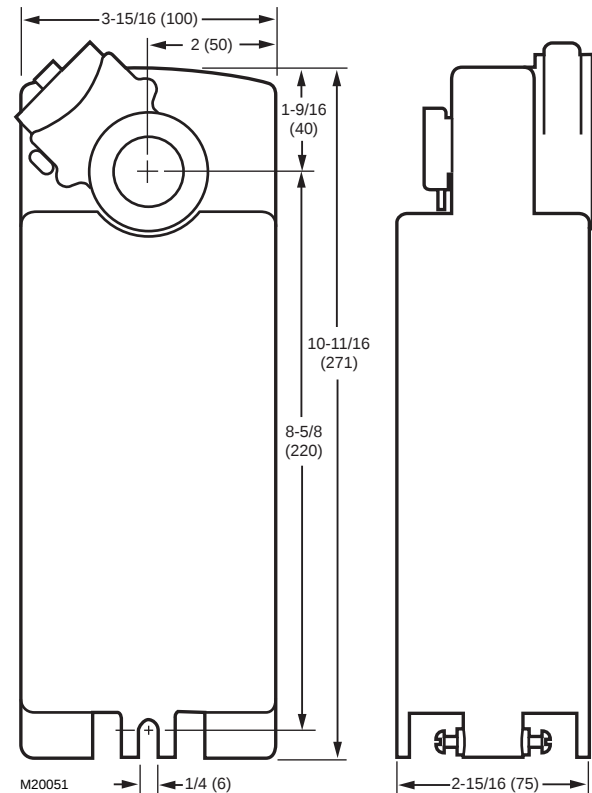
### SPECIFICATIONS

|                                                |                                                                                             |
|------------------------------------------------|---------------------------------------------------------------------------------------------|
| Actuator Type .....                            | Damper                                                                                      |
| Rotational Stroke .....                        | 95 ±3 degrees                                                                               |
| Fail Safe Mode .....                           | Spring Return                                                                               |
| Torque .....                                   | 175 lb-in. (20 Nm)                                                                          |
| Minimum Driving Torque at 350 F .....          | 175 lb-in.                                                                                  |
| Spring Return Torque .....                     | 175 lb-in. (20 Nm)                                                                          |
| Spring Return Direction: .....                 | By orientation                                                                              |
| External Auxiliary Switches Available...       | No                                                                                          |
| Electrical Connections .....                   | Teflon-jacketed cable                                                                       |
| Electrical Connection Length .....             | 40 in. (1 m)                                                                                |
| Environmental Rating .....                     | NEMA2                                                                                       |
| Ingress Protection Rating .....                | IP54                                                                                        |
| Frequency .....                                | 60 Hz                                                                                       |
| Manual operation .....                         | Manual crank                                                                                |
| Mounting .....                                 | Direct Coupled                                                                              |
| Maximum Noise Rating, Holding (dBA @ 1m) ..... | 20 (no audible noise)                                                                       |
| Maximum Noise Rating, Driving (dBA @ 1m) ..... | 70                                                                                          |
| Compatible Damper Shafts .....                 | 3/8 to 1.06 in. round or 3/8 to 1 1/16 in. square (10 to 27 mm round or 10 to 18 mm square) |
| Shaft Adapter Type .....                       | Self-centering clamping                                                                     |
| Supply Voltage .....                           | 120 Vac ±10%                                                                                |
| Materials .....                                | Aluminum housing                                                                            |
| Operating Humidity Range (% RH) .....          | 5 to 95% RH, non-condensing                                                                 |
| Ambient Temperature Range .....                | -40 F to +130 F (-40 C to +55 C)                                                            |
| Storage Temperature Range .....                | -40 F to +140 F (-40 C to +60 C)                                                            |
| Weight .....                                   | 8 lb (3.63 kg)                                                                              |
| Includes .....                                 | Self-centering shaft adapter, 3mm crank                                                     |
| Comments .....                                 | Two integral 3/8 in. flexible conduit connections                                           |

### APPROVALS

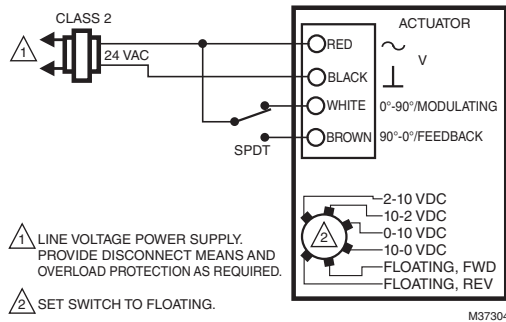
|                                               |                       |
|-----------------------------------------------|-----------------------|
| CE .....                                      | 89/336/ECC, 73/23/EEC |
| C-Tick .....                                  | N314                  |
| Underwriters Laboratories, Inc. ....          | UL873, Plenum Rated   |
| Canadian Underwriters Laboratories, Inc. .... | cUL C22.2 No. 24-93   |

### DIMENSIONS DIAGRAM

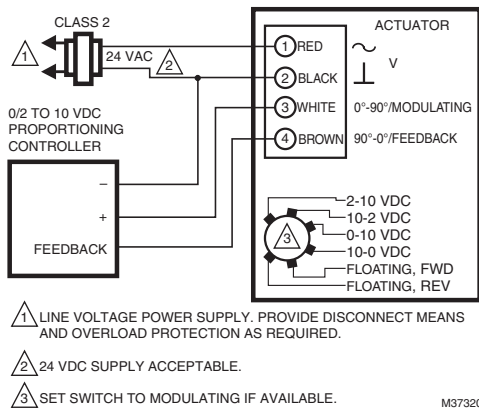


# Wiring Diagrams - Actuators

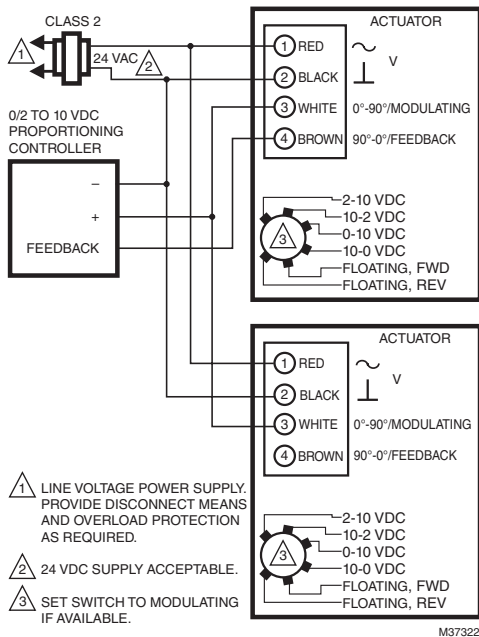
## Wiring for SPDT on/off control, MS75.



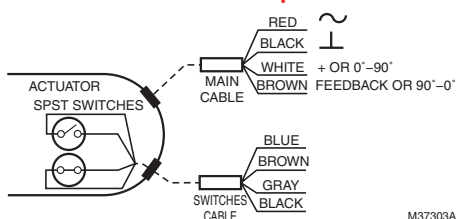
## Wiring for modulating (0/2-10 VDC) proportioning control, MS75 (shown) and MS71.



## Wiring for modulating (0/2-10 VDC) proportioning control operating multiple actuators, MS75 (shown) and MS71.

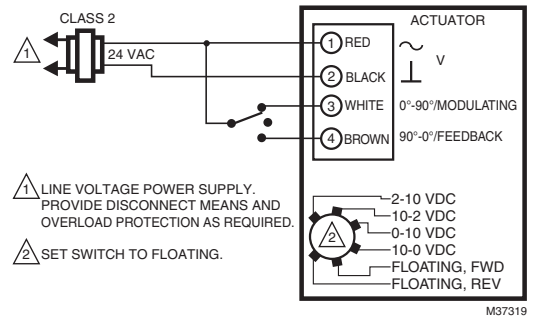


## Return to closed position.

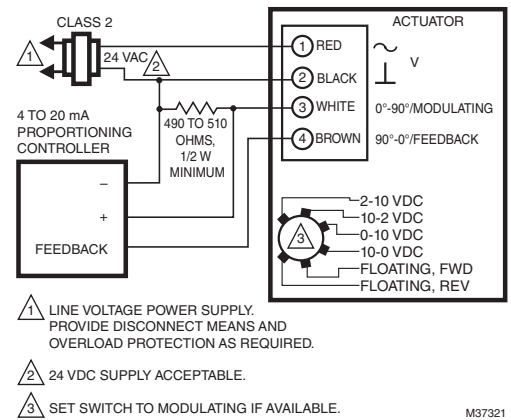


## Diamond 3 Nm (MS7103, MS7503)

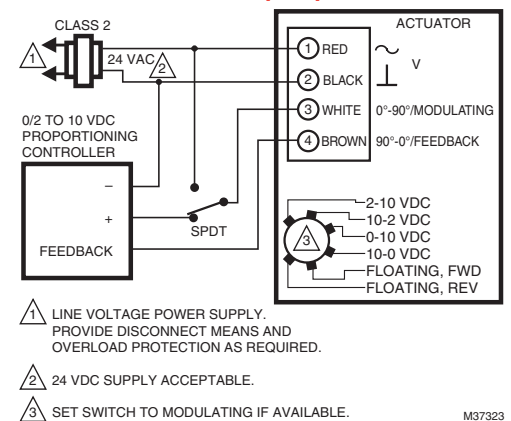
## Wiring for floating control, MS75.



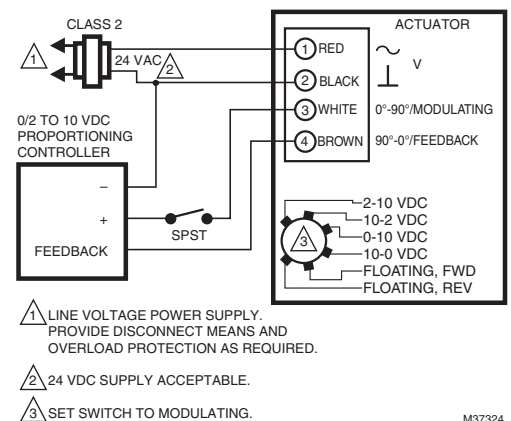
## Wiring for 4-20 mA proportioning controllers, MS75 (shown) and MS71.



## Override to open position



## Cable installation details.

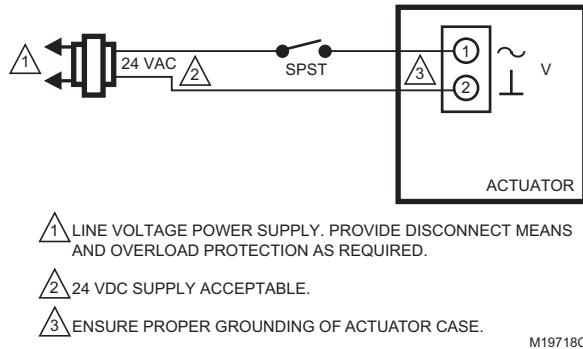


# Wiring Diagrams - Actuators

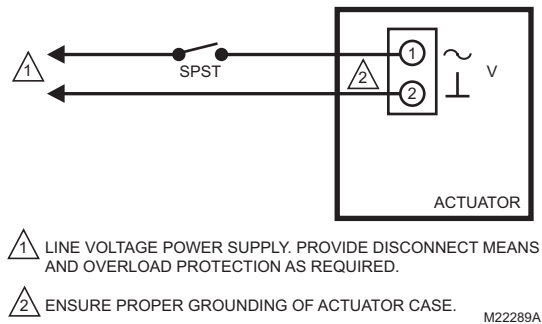
## Spring Return S03 and S05 Series

S03 Series (MS4103, MS7403, MS7503, MS8103) and  
S05 Series (MS4105, MS7105, MS7405, MS7505, MS8105)

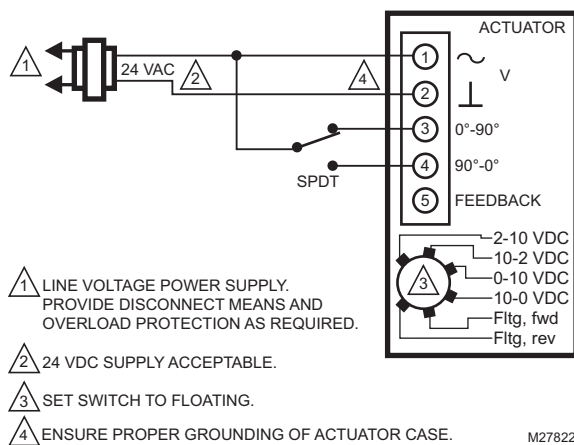
### Wiring for low-voltage two-position control



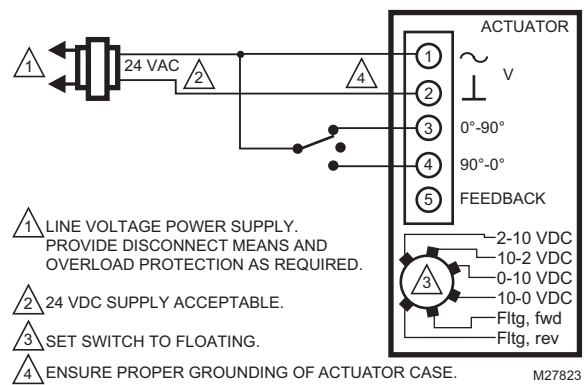
### Wiring for line-voltage two-position control



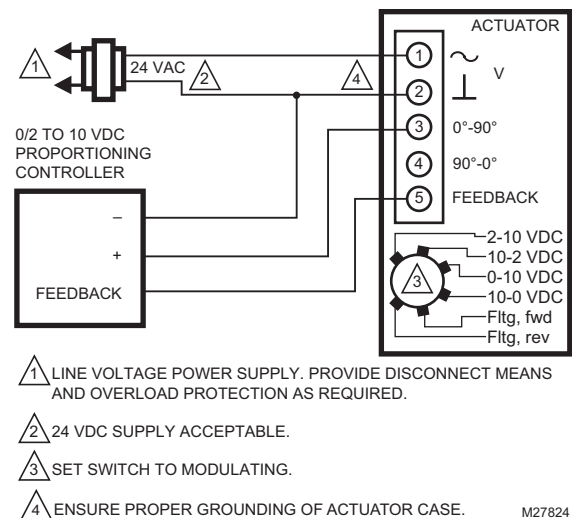
### Wiring for SPDT on/off Control



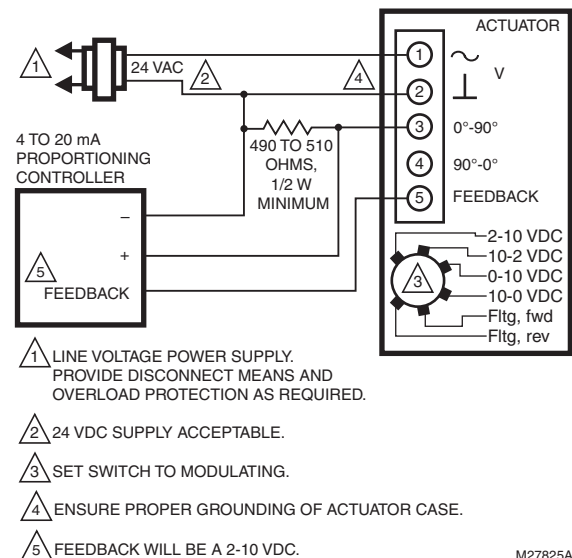
### Wiring for floating control



### Wiring for (0)2-10 VDC proportioning controllers



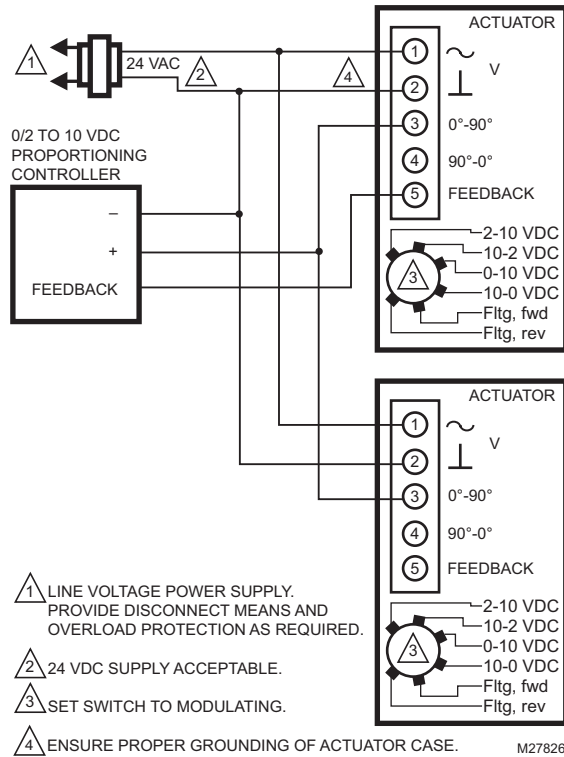
### Wiring for 4-20 mA proportioning controllers



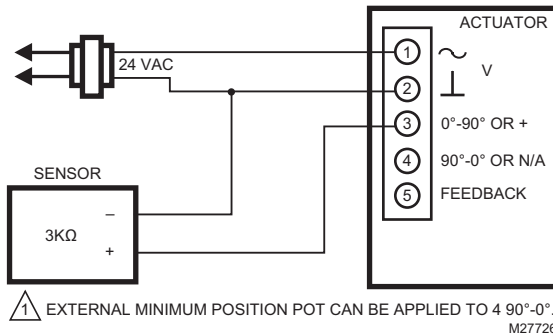
# Wiring Diagrams - Actuators

## Spring Return S03 and S05 Series

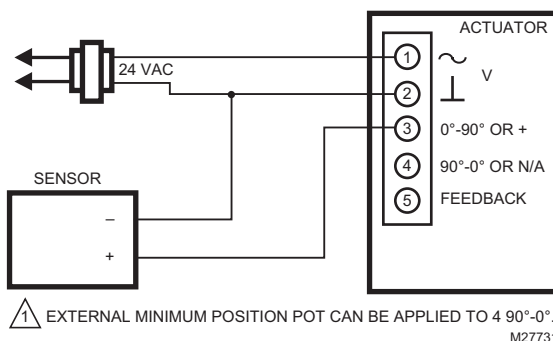
### Wiring for (0)2-10 Vdc proportioning controller operating multiple actuators



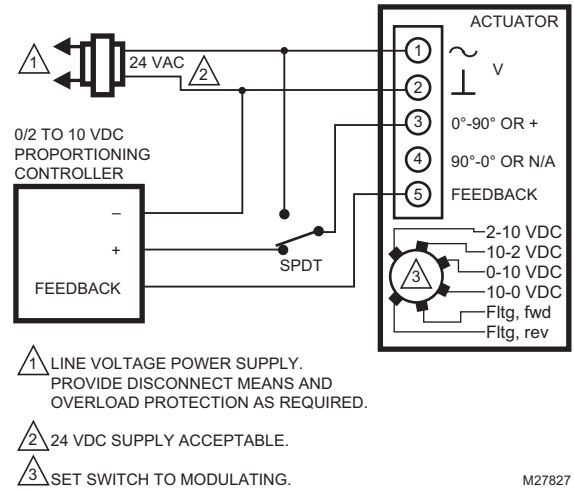
### Wiring for 3 kOhm Economizer controllers



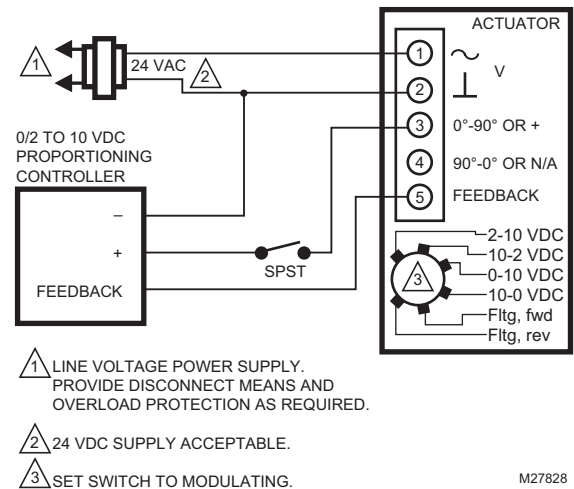
### Wiring for 3 position Economizer controllers



### Override to full open



### Override to full close

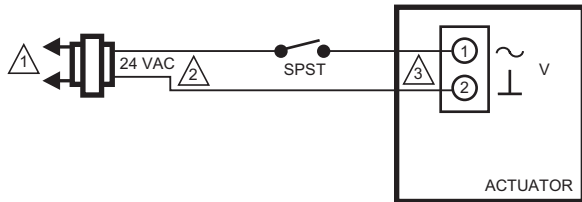


# Wiring Diagrams - Actuators

## Spring Return S10 and S20 Series

S10 Series (MS4110, MS7510, MS8110) and S20 Series (MS4120, MS7520, MS8120)

### Wiring for On/Off Control

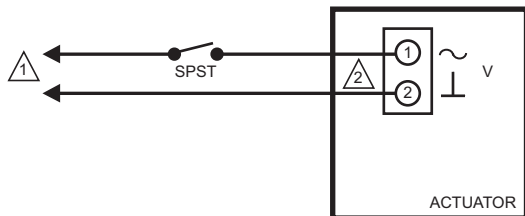


1 LINE VOLTAGE POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED.

2 24 VDC SUPPLY ACCEPTABLE.

3 ENSURE PROPER GROUNDING OF ACTUATOR CASE.

M19718C

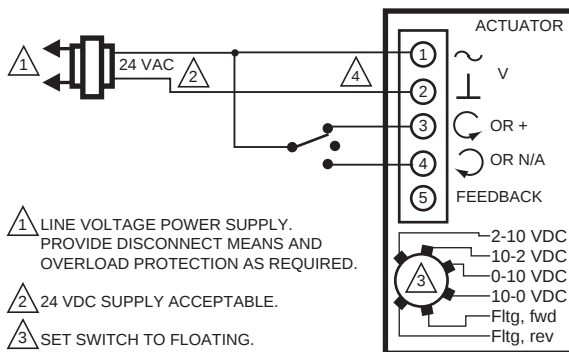


1 LINE VOLTAGE POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED.

2 ENSURE PROPER GROUNDING OF ACTUATOR CASE.

M22289A

### Wiring for Floating Control (Floating mode setting)



1 LINE VOLTAGE POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED.

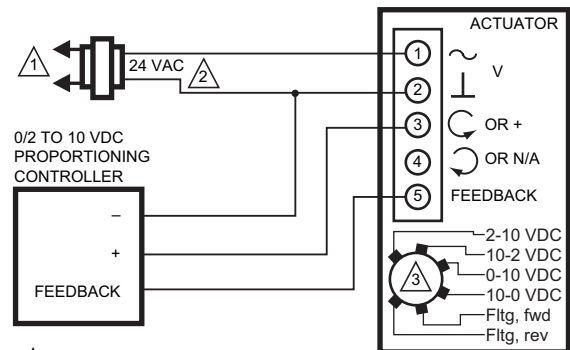
2 24 VDC SUPPLY ACCEPTABLE.

3 SET SWITCH TO FLOATING.

4 ENSURE PROPER GROUNDING OF ACTUATOR CASE.

M19573B

### Wiring for Proportioning controllers (Modulating mode setting)

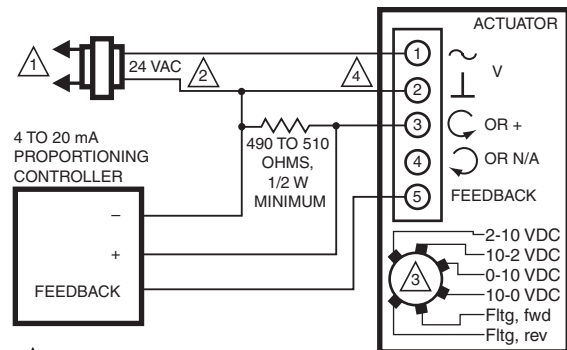


1 LINE VOLTAGE POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED.

2 24 VDC SUPPLY ACCEPTABLE.

3 SET SWITCH TO MODULATING.

M19574A



1 LINE VOLTAGE POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED.

2 24 VDC SUPPLY ACCEPTABLE.

3 SET SWITCH TO MODULATING.

4 ENSURE PROPER GROUNDING OF ACTUATOR CASE.

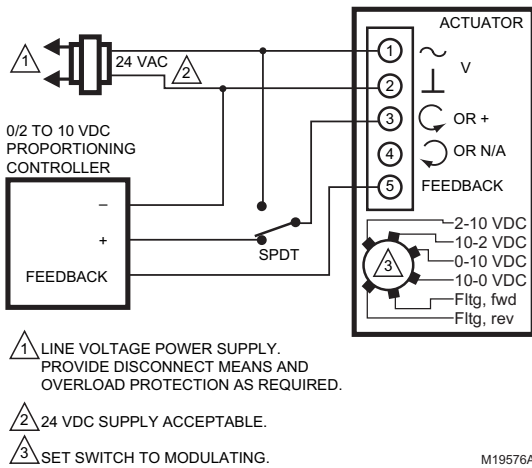
5 FEEDBACK WILL BE A 2-10 VDC.

M22282C

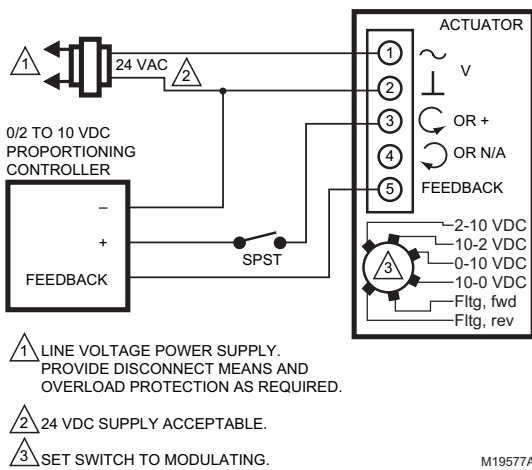
# Wiring Diagrams - Actuators

## Spring Return S10 and S20 Series

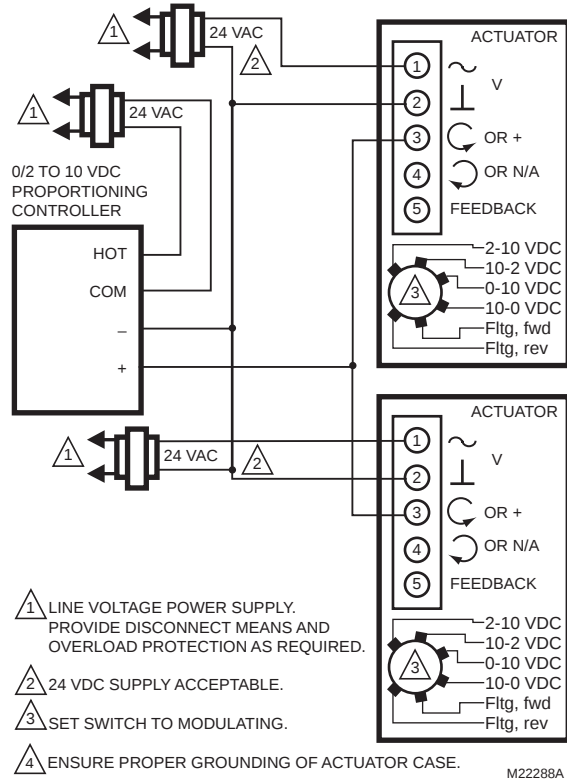
### Override to full open (Modulating mode setting)



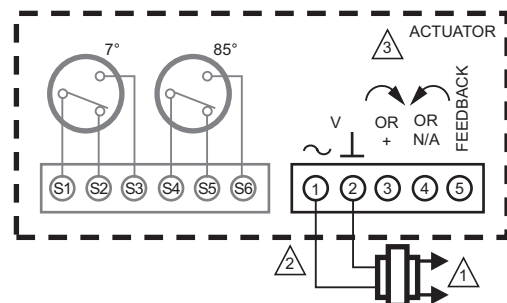
### Override to full closed (Modulating mode setting)



### Wiring for Proportioning controllers operating multiple actuators (Modulating mode setting)



### Terminal Block Details

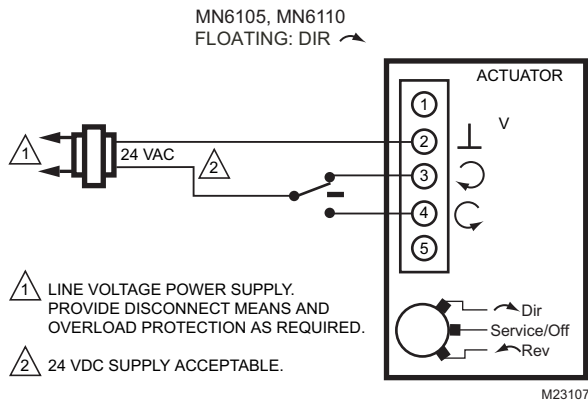


# Wiring Diagrams - Actuators

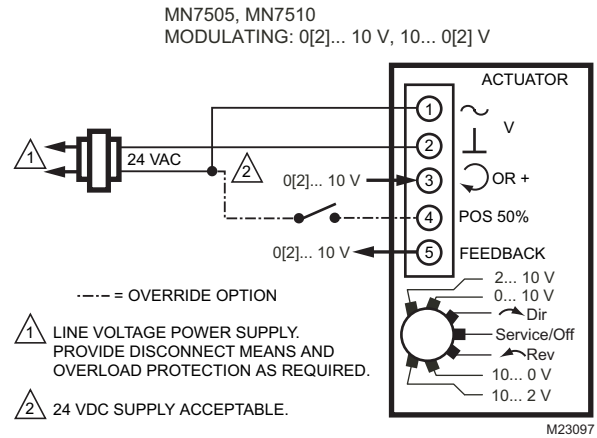
## Non-spring Return N05 and N10 Series

### N05 Series (MN6105, MN7505) and N10 Series (MN6110, MN7510)

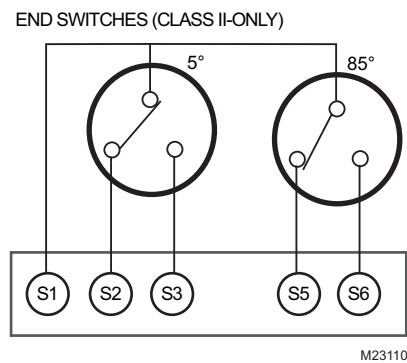
#### Wiring for Floating Control



#### Wiring for Voltage Control



#### Wiring for Auxiliary Switches

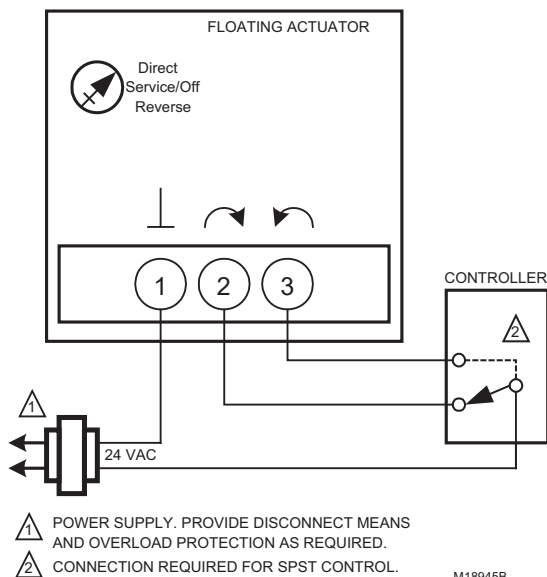


# Wiring Diagrams - Actuators

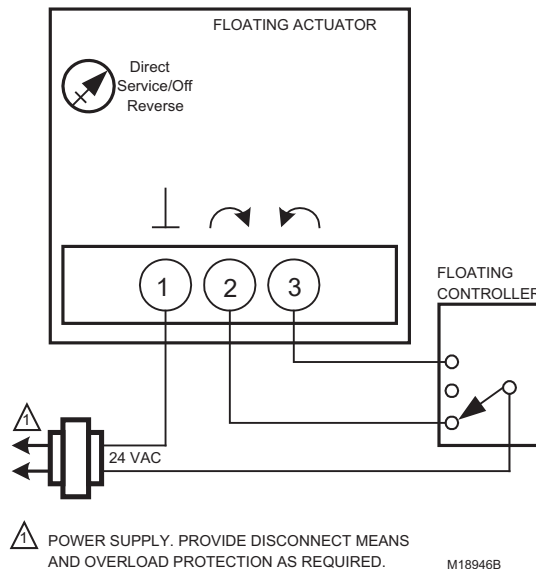
## Non-spring Return N20 and N34 Series

N20 Series (MN6120, MN7220) and N34 Series (MN7234)

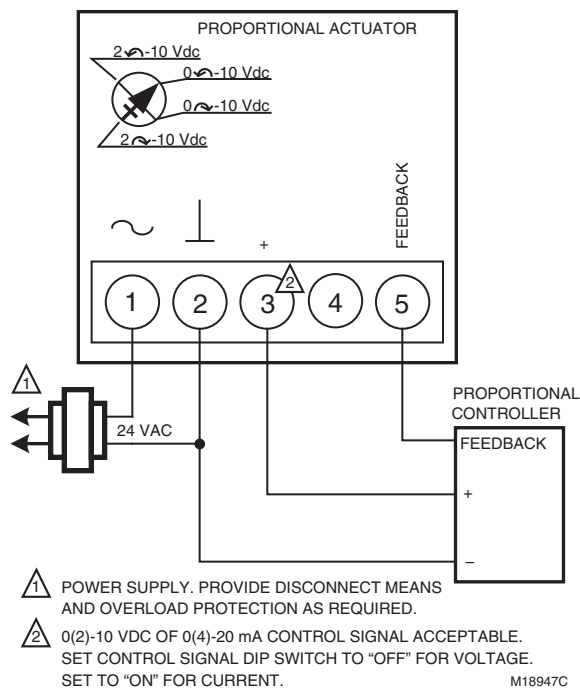
### Used for On/Off Control



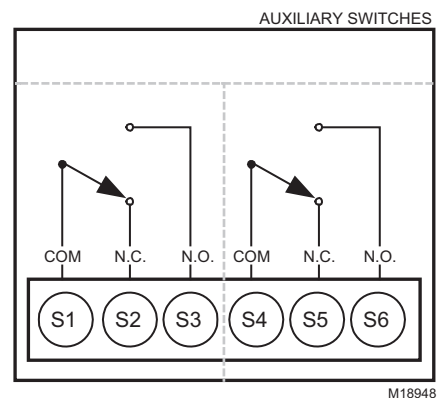
### Wiring for Floating Control



### Wiring for Modulating Control



### Wiring for Auxiliary Switches

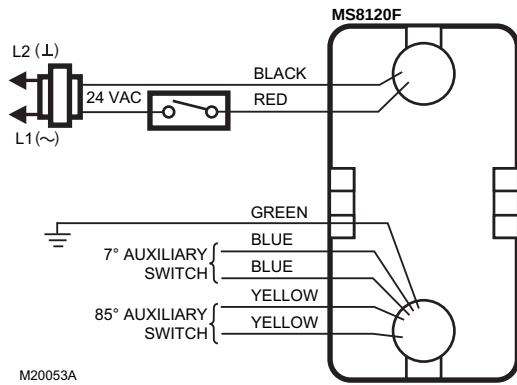


# Wiring Diagrams - Actuators

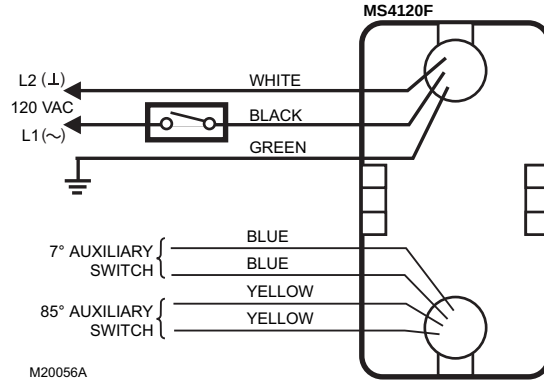
## Fire and Smoke Damper Actuators

MS4120F, MS4620F, MS8120F, MS4109F, MS8109F, MS4104F and MS8104F

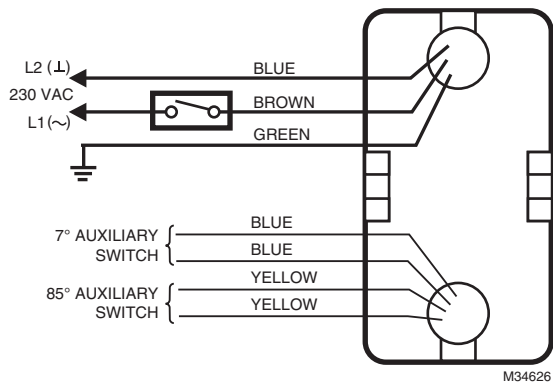
**Wiring for 24V Control**



**Wiring for 120V Control**



**Wiring for 230V Control**



# Accessories - Actuators

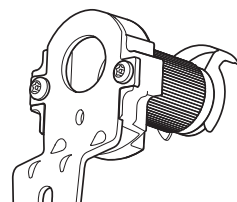
## Ball Joints, Push Rod Accessories

|                                                                                   | Product Number  | Description                                                                          | Used With                 |
|-----------------------------------------------------------------------------------|-----------------|--------------------------------------------------------------------------------------|---------------------------|
|  | <b>27518/U</b>  | Crankarm balljoint with 1/4 - 28 UNF male threads, fits 5-16 inch diameter push rods | All Actuators and Dampers |
|  | <b>27520G/U</b> | Push Rod (5/16 in. dia., 24 in. length)                                              | All Actuators and Dampers |
|                                                                                   | <b>27520K/U</b> | Push Rod (5/16 in. dia., 36 in. length)                                              | All Actuators and Dampers |
|                                                                                   | <b>102546/U</b> | Ball Joint, 5/16 in.                                                                 | Damper Linkages           |

## Control, Positioning, Feedback Accessories

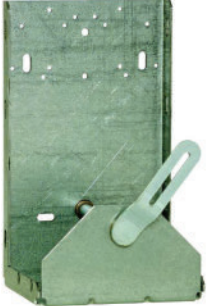
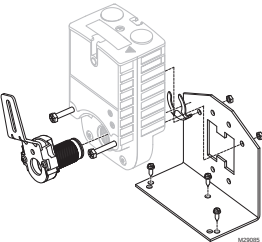
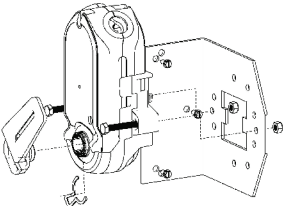
|                                                                                    | Product Number   | Description                                           | Used With                                                                                                        |
|------------------------------------------------------------------------------------|------------------|-------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|
|   | <b>200976A/U</b> | Auxiliary Feedback Potentiometer (0 to 500 ohm)       | ML6161, ML6174                                                                                                   |
|  | <b>SW2-US</b>    | Auxiliary Switch Package (2 adjustable SPDT switches) | MS and MN Series High Torque Actuators (MNXX20 and XX34)<br>MNXX10 and MNXX20 not compatible with fire and smoke |

## Crankarms

|                                                                                     | Product Number      | Description                                                   | Used With                                               |
|-------------------------------------------------------------------------------------|---------------------|---------------------------------------------------------------|---------------------------------------------------------|
|  | <b>205830A/U</b>    | Rotary-to-Linear Kit Used With: 35 and 70 lb-in NSR Actuators | 35 and 70 lb-in.NSR                                     |
|  | <b>26026G/U</b>     | Damper Crank Arm, 1/2 in. damper shaft                        | All Actuators and Damper                                |
|  | <b>STRN-CA-01/U</b> | Non Self-centering Crank Arm for S03 and S05 Series Actuators | S03, S05 Actuators (not for use with Diamond actuators) |

# Accessories - Actuators

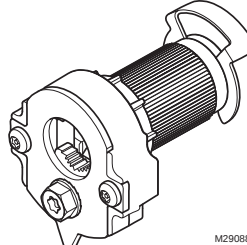
## Mounting Accessories

|                                                                                     | Product Number | Description                                    | Used With                                                                                         |
|-------------------------------------------------------------------------------------|----------------|------------------------------------------------|---------------------------------------------------------------------------------------------------|
|    | 205649/U       | Mounting Bracket                               | ML41x5, ML81x5, MSxx04F, MSxx09F and MSxx20F Actuator                                             |
|    | 50000407-001/U | Actuator Tandem Mounting Kit                   | N20, N34 Actuator ;<br>S10, S20 Actuators                                                         |
|    | 50001194-001/U | Foot Mounting Kit                              | MS and MN Series High Torque Actuators (MNXX20 and MNXX34) MSxx10 and MSxx20, but not for MSxx20F |
|   | STRN-CRK-01/U  | Crank arm kit for S03 and S05 Series Actuators | S03, S05 Actuators (not for use with Diamond actuator)                                            |
|  | DIAM-CRK-01    | Diamond crank arm kit                          | Diamond actuators                                                                                 |

## Rotational Limiters, Position Indicators

|                                                                                     | Product Number | Description          | Used With      |
|-------------------------------------------------------------------------------------|----------------|----------------------|----------------|
|  | 4074ENJ/U      | Minimum Position Kit | ML6161, ML6174 |

## Shaft Adapter Accessories (cont.)

|                                                                                               | Product Number | Description                  | Used With                                               |
|-----------------------------------------------------------------------------------------------|----------------|------------------------------|---------------------------------------------------------|
|              | 32004254-001/U | Self-Centering Shaft Adapter | N34 Actuators                                           |
|                                                                                               | 32004254-002/U | Self-Centering Shaft Adapter | S10, S20 Actuator                                       |
|                                                                                               | 172092060      | Self-Centering Shaft Adapter | N20 Actuator                                            |
|              | 4074ENY/U      | 3/8 in. Shaft Kit            | ML6161, ML6174                                          |
|             | 4074EVK/U      | Short Shaft Kit              | ML6161, ML6174                                          |
| <br>M29088 | STRN-SCSA/U    | Self-centering Shaft Adapter | S03, S05 Actuators (not for use with Diamond actuators) |

# Accessories - Actuators

## Enclosure Accessories

|                                                                                   | Product Number | Description                                  | Used With                                                        |
|-----------------------------------------------------------------------------------|----------------|----------------------------------------------|------------------------------------------------------------------|
|  | 32003036-001/U | Weather Enclosure                            | All Actuators                                                    |
|  | 50005859-001/U | NEMA 4 Enclosure for Direct Coupled Actuator | ML6161, ML6174, N20, N34 Actuators; S03, S05, S10, S20 Actuators |
|  | 7640QW/U       | Enclosure for Conduit Connection             | ML6161, ML6174                                                   |

## Q7002 Interface Modules

|                                                                                     | Product Number | Description                                                                                         | Used With                                                 |
|-------------------------------------------------------------------------------------|----------------|-----------------------------------------------------------------------------------------------------|-----------------------------------------------------------|
|  | Q7002B1009/U   | Transducer, Accepts dc voltage, current or resistive input and provides a voltage or current output | Direct Coupled Proportional Actuators and Modutrol Motors |
|                                                                                     | Q7002C1007/U   | Transducer, Accepts a pulse-width modulation (PWM) signal and provides a voltage output             | Direct Coupled Proportional Actuators and Modutrol Motors |

## Miscellaneous Accessories

|                                                                                     | Product Number | Description                         | Used With                       |
|-------------------------------------------------------------------------------------|----------------|-------------------------------------|---------------------------------|
|  | 32000085-001/B | Strain Relief Fitting 1/2" x 14 NPT | MS, MN and MVN Series Actuators |

# Cross Reference - Actuators

## Direct Coupled Actuators

| Belimo Model | Fail Safe | Torque (lb-in) | Control Signal     | Power       | Feedback            | Switches | Timing (sec) | Honeywell Model | Torque (lb-in) | Control Signal                 | Power      | Feedback     | Switches | Timing (sec) |
|--------------|-----------|----------------|--------------------|-------------|---------------------|----------|--------------|-----------------|----------------|--------------------------------|------------|--------------|----------|--------------|
| CMB24-3      | NSR       | 18 lb-in       | On/Off, Floating   | 24 Vac/Vdc  | —                   | —        | 35           | ML6161A2009     | 35 lb-in       | On/Off, Floating               | 24 Vac     | —            | —        | 90           |
| CMB120-3     | NSR       | 18 lb-in       | On/Off, Floating   | 100-240 Vac | —                   | —        | 35           | ML6161A2009     | 35 lb-in       | On/Off, Floating               | 24 Vac     | —            | —        | 90           |
| CMB24-SR-R   | NSR       | 18 lb-in       | 2-10 Vdc (4-20 mA) | 24 Vac/Vdc  | 2-10 Vdc            | —        | 35           | MN7505A2001     | 44 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc | (0) 2-10 Vdc | —        | 90           |
| CMB24-SR-L   | NSR       | 18 lb-in       | 2-10 Vdc (4-20 mA) | 24 Vac/Vdc  | 2-10 Vdc            | —        | 35           | MN7505A2001     | 44 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc | (0) 2-10 Vdc | —        | 90           |
| LMB24-3      | NSR       | 45 lb-in       | On/Off, Floating   | 24 Vac/Vdc  | —                   | —        | 95           | MN6105A1011     | 44 lb-in       | On/Off, Floating               | 24 Vac/Vdc | —            | —        | 90           |
| LMB24-3-T    | NSR       | 45 lb-in       | On/Off, Floating   | 24 Vac/Vdc  | —                   | —        | 95           | MN6105A1011     | 44 lb-in       | On/Off, Floating               | 24 Vac/Vdc | —            | —        | 90           |
| LMB24-3-S    | NSR       | 45 lb-in       | On/Off, Floating   | 24 Vac/Vdc  | —                   | 1        | 95           | MN6105A1201     | 44 lb-in       | On/Off, Floating               | 24 Vac/Vdc | —            | 2        | 90           |
| LMB24-SR     | NSR       | 45 lb-in       | 2-10 Vdc (4-20 mA) | 24 Vac/Vdc  | 2-10 Vdc            | —        | 95           | MN7505A2001     | 44 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc | (0) 2-10 Vdc | —        | 90           |
| LMX24-SR     | NSR       | 45 lb-in       | 2-10 Vdc (4-20 mA) | 24 Vac/Vdc  | 2-10 Vdc            | —        | 95           | MN7505A2001     | 44 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc | (0) 2-10 Vdc | —        | 90           |
| LMB24-SR-T   | NSR       | 45 lb-in       | 2-10 Vdc (4-20 mA) | 24 Vac/Vdc  | —                   | —        | 95           | MN7505A2001     | 44 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc | (0) 2-10 Vdc | —        | 90           |
| LMX24-SR-T   | NSR       | 45 lb-in       | 2-10 Vdc (4-20 mA) | 24 Vac/Vdc  | —                   | —        | 95           | MN7505A2001     | 44 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc | (0) 2-10 Vdc | —        | 90           |
| LMB24-MFT    | NSR       | 45 lb-in       | MFT                | 24 Vac/Vdc  | Variable (0-10 Vdc) | —        | 150          | MN7505A2001     | 44 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc | (0) 2-10 Vdc | —        | 90           |
| LMX24-MFT    | NSR       | 45 lb-in       | MFT                | 24 Vac/Vdc  | Variable (0-10 Vdc) | —        | 150          | MN7505A2001     | 44 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc | (0) 2-10 Vdc | —        | 90           |
| LMX24-MFT    | NSR       | 45 lb-in       | MFT                | 24 Vac/Vdc  | Variable (0-10 Vdc) | Add-On   | 150          | MN7505A2209     | 44 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc | (0) 2-10 Vdc | 2        | 90           |
| LMCB24-3     | NSR       | 45 lb-in       | On/Off, Floating   | 24 Vac/Vdc  | —                   | —        | 35           | MN6105A1011     | 44 lb-in       | On/Off, Floating               | 24 Vac/Vdc | —            | —        | 90           |
| LMCB24-3-T   | NSR       | 45 lb-in       | On/Off, Floating   | 24 Vac/Vdc  | —                   | —        | 35           | MN6105A1011     | 44 lb-in       | On/Off, Floating               | 24 Vac/Vdc | —            | —        | 90           |
| LMX24-3      | NSR       | 45 lb-in       | On/Off, Floating   | 24 Vac/Vdc  | —                   | —        | 95           | MN6105A1011     | 44 lb-in       | On/Off, Floating               | 24 Vac/Vdc | —            | —        | 90           |
| LMX24-3-T    | NSR       | 45 lb-in       | On/Off, Floating   | 24 Vac/Vdc  | —                   | —        | 95           | MN6105A1011     | 44 lb-in       | On/Off, Floating               | 24 Vac/Vdc | —            | —        | 90           |
| LMCB24-SR    | NSR       | 45 lb-in       | 2-10 Vdc (4-20 mA) | 24 Vac/Vdc  | 2-10 Vdc            | —        | 35           | MN7505A2001     | 44 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc | (0) 2-10 Vdc | —        | 90           |
| LMCB24-SR-T  | NSR       | 45 lb-in       | 2-10 Vdc (4-20 mA) | 24 Vac/Vdc  | —                   | —        | 35           | MN7505A2001     | 44 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc | (0) 2-10 Vdc | —        | 90           |
| LMX120-SR    | NSR       | 45 lb-in       | 2-10 Vdc (4-20 mA) | 100-240 Vac | 2-10 Vdc            | —        | 95           | MN7505A2001     | 44 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc | (0) 2-10 Vdc | —        | 90           |
| LMX120-3     | NSR       | 45 lb-in       | On/Off, Floating   | 100-240 Vac | —                   | —        | 150          | MN6105A1011     | 44 lb-in       | On/Off, Floating               | 24 Vac/Vdc | —            | —        | 90           |
| LMQX24-MFT   | NSR       | 35 lb-in       | MFT                | 24 Vac/Vdc  | Variable (0-10 Vdc) | —        | 150          | ML6161A2009     | 35 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac     | —            | —        | 90           |
| NMB24-3      | NSR       | 90 lb-in       | On/Off, Floating   | 24 Vac/Vdc  | —                   | —        | 95           | MN6110A1003     | 88 lb-in       | On/Off, Floating               | 24 Vac/Vdc | —            | —        | 90           |
| NMCB24-3     | NSR       | 90 lb-in       | On/Off, Floating   | 24 Vac/Vdc  | —                   | —        | 45           | MN6110A1003     | 88 lb-in       | On/Off, Floating               | 24 Vac/Vdc | —            | —        | 90           |
| NMX24-3      | NSR       | 90 lb-in       | On/Off, Floating   | 24 Vac/Vdc  | —                   | —        | 95           | MN6110A1003     | 88 lb-in       | On/Off, Floating               | 24 Vac/Vdc | —            | —        | 90           |
| NMX24-3-T    | NSR       | 90 lb-in       | On/Off, Floating   | 24 Vac/Vdc  | —                   | —        | 95           | MN6110A1003     | 88 lb-in       | On/Off, Floating               | 24 Vac/Vdc | —            | —        | 90           |
| NMX120-3     | NSR       | 90 lb-in       | On/Off, Floating   | 100-240 Vac | —                   | —        | 150          | MN6110A1003     | 88 lb-in       | On/Off, Floating               | 24 Vac/Vdc | —            | —        | 90           |
| NMX120-SR    | NSR       | 90 lb-in       | 2-10 Vdc (4-20 mA) | 100-240 Vac | 2-10 Vdc            | —        | 150          | MN7510A2001     | 88 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc | (0) 2-10 Vdc | —        | 90           |
| NMCX24-MFT   | NSR       | 90 lb-in       | MFT                | 24 Vac/Vdc  | Variable (0-10 Vdc) | —        | 150          | MN7510A2001     | 88 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc | (0) 2-10 Vdc | —        | 90           |
| NMQX24-MFT   | NSR       | 70 lb-in       | MFT                | 24 Vac/Vdc  | Variable (0-10 Vdc) | —        | 150          | MN7510A2001     | 88 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc | (0) 2-10 Vdc | —        | 90           |
| NMB24-SR     | NSR       | 90 lb-in       | 2-10 Vdc (4-20 mA) | 24 Vac/Vdc  | —                   | —        | 95           | MN7510A2001     | 88 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc | (0) 2-10 Vdc | —        | 90           |
| NMCB24-SR    | NSR       | 90 lb-in       | 2-10 Vdc (4-20 mA) | 24 Vac/Vdc  | 2-10 Vdc            | —        | 45           | MN7510A2001     | 88 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc | (0) 2-10 Vdc | —        | 90           |
| NMX24-SR     | NSR       | 90 lb-in       | 2-10 Vdc (4-20 mA) | 24 Vac/Vdc  | 2-10 Vdc            | —        | 95           | MN7510A2001     | 88 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc | (0) 2-10 Vdc | —        | 90           |
| NMX24-SR-T   | NSR       | 90 lb-in       | 2-10 Vdc (4-20 mA) | 24 Vac/Vdc  | —                   | —        | 95           | MN7510A2001     | 88 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc | (0) 2-10 Vdc | —        | 90           |
| NMB24-MFT    | NSR       | 90 lb-in       | MFT                | 24 Vac/Vdc  | Variable (0-10 Vdc) | —        | 150          | MN7510A2001     | 88 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc | (0) 2-10 Vdc | —        | 90           |
| NMX24-MFT    | NSR       | 90 lb-in       | MFT                | 24 Vac/Vdc  | Variable (0-10 Vdc) | —        | 150          | MN7510A2001     | 88 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc | (0) 2-10 Vdc | —        | 90           |
| AMB24-3      | NSR       | 180 lb-in      | On/Off, Floating   | 24 Vac/Vdc  | —                   | —        | 95           | MN6120A1002     | 175 lb-in      | On/Off, Floating               | 24 Vac/Vdc | —            | —        | 90           |
| AMX24-3      | NSR       | 180 lb-in      | On/Off, Floating   | 24 Vac/Vdc  | —                   | —        | 95           | MN6120A1002     | 175 lb-in      | On/Off, Floating               | 24 Vac/Vdc | —            | —        | 90           |
| AMX24-3-T    | NSR       | 180 lb-in      | On/Off, Floating   | 24 Vac/Vdc  | —                   | —        | 95           | MN6120A1002     | 175 lb-in      | On/Off, Floating               | 24 Vac/Vdc | —            | —        | 90           |
| AMB24-3-S    | NSR       | 180 lb-in      | On/Off, Floating   | 24 Vac/Vdc  | —                   | 1        | 95           | MN6120A1200     | 175 lb-in      | On/Off, Floating               | 24 Vac/Vdc | —            | 2        | 90           |
| AMB24-SR     | NSR       | 180 lb-in      | 2-10 Vdc (4-20 mA) | 24 Vac/Vdc  | 2-10 Vdc            | —        | 95           | MN7220A2007     | 175 lb-in      | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc | (0) 2-10 Vdc | —        | 90           |
| AMX24-SR     | NSR       | 180 lb-in      | 2-10 Vdc (4-20 mA) | 24 Vac/Vdc  | 2-10 Vdc            | —        | 95           | MN7220A2007     | 175 lb-in      | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc | (0) 2-10 Vdc | —        | 90           |
| AMX24-SR-T   | NSR       | 180 lb-in      | 2-10 Vdc (4-20 mA) | 24 Vac/Vdc  | —                   | —        | 95           | MN7220A2007     | 175 lb-in      | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc | (0) 2-10 Vdc | —        | 90           |
| AMB24-MFT    | NSR       | 180 lb-in      | MFT                | 24 Vac/Vdc  | Variable (0-10 Vdc) | —        | 150          | MN7220A2007     | 175 lb-in      | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc | (0) 2-10 Vdc | —        | 90           |
| AMX24-MFT    | NSR       | 180 lb-in      | MFT                | 24 Vac/Vdc  | Variable (0-10 Vdc) | —        | 150          | MN7220A2007     | 175 lb-in      | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc | (0) 2-10 Vdc | —        | 90           |
| AMX120-3     | NSR       | 180 lb-in      | On/Off, Floating   | 100-240 Vac | —                   | —        | 95           | MN6120A1002     | 175 lb-in      | On/Off, Floating               | 24 Vac/Vdc | —            | —        | 90           |
| AMX120-SR    | NSR       | 180 lb-in      | 2-10 Vdc (4-20 mA) | 100-240 Vac | 2-10 Vdc            | —        | 95           | MN6120A1002     | 175 lb-in      | On/Off, Floating               | 24 Vac/Vdc | (0) 2-10 Vdc | —        | 90           |
| AMQX24-MFT   | NSR       | 140 lb-in      | MFT                | 24 Vac/Vdc  | Variable (0-10 Vdc) | —        | 150          | MN7220A2007     | 175 lb-in      | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc | (0) 2-10 Vdc | —        | 90           |
| GMB24-SR     | NSR       | 360 lb-in      | 2-10 Vdc (4-20 mA) | 24 Vac/Vdc  | 2-10 Vdc            | —        | 150          | MN7234A2008     | 300 lb-in      | (0) 2-10 Vdc, (0) 4-20 mA      | 24 Vac/Vdc | (0) 2-10 Vdc | —        | 90           |
| GMX24-SR     | NSR       | 360 lb-in      | 2-10 Vdc (4-20 mA) | 24 Vac/Vdc  | 2-10 Vdc            | —        | 150          | MN7234A2008     | 300 lb-in      | (0) 2-10 Vdc, (0) 4-20 mA      | 24 Vac/Vdc | (0) 2-10 Vdc | —        | 90           |
| GMX24-MFT    | NSR       | 360 lb-in      | MFT                | 24 Vac/Vdc  | Variable (0-10 Vdc) | —        | 150          | MN7234A2008     | 300 lb-in      | (0) 2-10 Vdc, (0) 4-20 mA      | 24 Vac/Vdc | (0) 2-10 Vdc | —        | 90           |
| TFB24        | SR        | 22 lb-in       | On/Off             | 24 Vac/Vdc  | —                   | —        | 75           | MS8103A1030     | 27 lb-in       | Two-Position (SPST)            | 24 Vac/Vdc | —            | —        | 45           |

# Cross Reference - Actuators

## Direct Coupled Actuators

| Belimo Model   | Fail Safe | Torque (lb-in) | Control Signal                      | Power       | Feedback            | Switches | Timing (sec) | Honeywell Model | Torque (lb-in) | Control Signal                                                  | Power       | Feedback     | Switches | Timing (sec) |
|----------------|-----------|----------------|-------------------------------------|-------------|---------------------|----------|--------------|-----------------|----------------|-----------------------------------------------------------------|-------------|--------------|----------|--------------|
| TFB24-S        | SR        | 22 lb-in       | On/Off                              | 24 Vac/Vdc  | —                   | 1        | 75           | MS8103A1130     | 27 lb-in       | Two-Position (SPST)                                             | 24 Vac/Vdc  | —            | 1        | 45           |
| TFLB24         | SR        | 22 lb-in       | On/Off                              | 24 Vac/Vdc  | —                   | —        | 75           | MS8103A1030     | 27 lb-in       | Two-Position (SPST)                                             | 24 Vac/Vdc  | —            | —        | 45           |
| TFB120         | SR        | 22 lb-in       | On/Off                              | 100-240 Vac | —                   | —        | 75           | MS4103A1030     | 27 lb-in       | Two-Position (SPST)                                             | 100-250 Vac | —            | —        | 45           |
| TFB120-S       | SR        | 22 lb-in       | On/Off                              | 100-240 Vac | —                   | 1        | 75           | MS4103A1130     | 27 lb-in       | Two-Position (SPST)                                             | 100-250 Vac | —            | 1        | 45           |
| TFLB120        | SR        | 22 lb-in       | On/Off                              | 100-240 Vac | —                   | —        | 75           | MS4103A1030     | 27 lb-in       | Two-Position (SPST)                                             | 100-250 Vac | —            | —        | 45           |
| TFCB120-S      | SR        | 22 lb-in       | On/Off                              | 100-240 Vac | —                   | 1        | 30           | MS4103A1130     | 27 lb-in       | Two-Position (SPST)                                             | 100-250 Vac | —            | 1        | 45           |
| TFB24-SR       | SR        | 22 lb-in       | 2-10 Vdc (4-20 mA)                  | 24 Vac/Vdc  | 2-10 Vdc            | —        | 95           | MS7103A2021     | 27 lb-in       | (0) 2-10 Vdc                                                    | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| TFB24-SR-S     | SR        | 22 lb-in       | 2-10 Vdc (4-20 mA)                  | 24 Vac/Vdc  | 2-10 Vdc            | 1        | 95           | MS7103A2221     | 27 lb-in       | (0) 2-10 Vdc                                                    | 24 Vac/Vdc  | (0) 2-10 Vdc | 2        | 90           |
| TFB120-SR      | SR        | 22 lb-in       | 2-10 Vdc (4-20 mA)                  | 100-240 Vac | —                   | —        | 95           | MS4103A1030     | 27 lb-in       | Two-Position (SPST)                                             | 100-250 Vac | —            | —        | 45           |
| TFB24-3        | SR        | 22 lb-in       | Floating                            | 24 Vac/Vdc  | —                   | —        | 95           | MS7503A2021     | 27 lb-in       | On/Off, Floating, (0) 2-10 Vdc                                  | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| TFB24-3-S      | SR        | 22 lb-in       | Floating                            | 24 Vac/Vdc  | —                   | 1        | 95           | MS7503A2221     | 27 lb-in       | On/Off, Floating, (0) 2-10 Vdc                                  | 24 Vac/Vdc  | (0) 2-10 Vdc | 2        | 90           |
| TFB24-MFT      | SR        | 22 lb-in       | MFT                                 | 24 Vac/Vdc  | Variable (0-10 Vdc) | —        | 95           | MS7503A2021     | 27 lb-in       | On/Off, Floating, (0) 2-10 Vdc                                  | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| TFB24-MFT-S    | SR        | 22 lb-in       | MFT                                 | 24 Vac/Vdc  | Variable (0-10 Vdc) | 1        | 95           | MS7503A2221     | 27 lb-in       | On/Off, Floating, (0) 2-10 Vdc                                  | 24 Vac/Vdc  | (0) 2-10 Vdc | 2        | 90           |
| TFX24          | SR        | 22 lb-in       | On/Off                              | 24 Vac/Vdc  | —                   | —        | <75          | MS8105A1030     | 44 lb-in       | Two-Position (SPST)                                             | 24 Vac/Vdc  | —            | —        | 45           |
| TFX24-S        | SR        | 22 lb-in       | On/Off                              | 24 Vac/Vdc  | —                   | 1        | <75          | MS8105A1130     | 44 lb-in       | Two-Position (SPST)                                             | 24 Vac/Vdc  | —            | 1        | 45           |
| TFX24-SR       | SR        | 22 lb-in       | 2-10 Vdc (4-20 mA)                  | 24 Vac/Vdc  | 2-10 Vdc            | —        | 95           | MS7505A2030     | 44 lb-in       | On/Off, Floating, (0) 2-10 Vdc                                  | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| TFX24-SR-S     | SR        | 22 lb-in       | 2-10 Vdc (4-20 mA)                  | 24 Vac/Vdc  | 2-10 Vdc            | 1        | 95           | MS7505A2130     | 44 lb-in       | On/Off, Floating, (0) 2-10 Vdc                                  | 24 Vac/Vdc  | (0) 2-10 Vdc | 1        | 90           |
| TFX24-3        | SR        | 22 lb-in       | Floating                            | 24 Vac/Vdc  | —                   | —        | 95           | MS7505A2030     | 44 lb-in       | On/Off, Floating, (0) 2-10 Vdc                                  | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| TFX24-3-S      | SR        | 22 lb-in       | Floating                            | 24 Vac/Vdc  | —                   | 1        | 95           | MS7505A2130     | 44 lb-in       | On/Off, Floating, (0) 2-10 Vdc                                  | 24 Vac/Vdc  | (0) 2-10 Vdc | 1        | 90           |
| TFX24-MFT      | SR        | 22 lb-in       | MFT                                 | 24 Vac/Vdc  | Variable (0-10 Vdc) | —        | 150          | MS7505A2030     | 44 lb-in       | On/Off, Floating, (0) 2-10 Vdc                                  | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| TFX24-MFT-S    | SR        | 22 lb-in       | MFT                                 | 24 Vac/Vdc  | Variable (0-10 Vdc) | 1        | 150          | MS7505A2130     | 44 lb-in       | On/Off, Floating, (0) 2-10 Vdc                                  | 24 Vac/Vdc  | (0) 2-10 Vdc | 1        | 90           |
| LF24-S US      | SR        | 35 lb-in       | On/Off                              | 24 Vac/Vdc  | —                   | 1        | 40-75        | MS8105A1130     | 44 lb-in       | Two-Position (SPST)                                             | 24 Vac/Vdc  | —            | 1        | 45           |
| LF120 US       | SR        | 35 lb-in       | On/Off                              | 120 Vac     | —                   | —        | 40-75        | MS4105A1030     | 44 lb-in       | Two-Position (SPST)                                             | 100-250 Vac | —            | —        | 45           |
| LF120-S US     | SR        | 35 lb-in       | On/Off                              | 120 Vac     | —                   | 1        | 40-75        | MS4105A1130     | 44 lb-in       | Two-Position (SPST)                                             | 100-250 Vac | —            | 1        | 45           |
| LF230 US       | SR        | 35 lb-in       | On/Off                              | 230 Vac     | —                   | —        | 40-75        | MS4105A1030     | 44 lb-in       | Two-Position (SPST)                                             | 100-250 Vac | —            | —        | 45           |
| LF230-S US     | SR        | 35 lb-in       | On/Off                              | 230 Vac     | —                   | 1        | 40-75        | MS4105A1130     | 44 lb-in       | Two-Position (SPST)                                             | 100-250 Vac | —            | 1        | 45           |
| LF24-3 US      | SR        | 35 lb-in       | Modulating                          | 24 Vac/Vdc  | —                   | —        | 150          | MS7505A2030     | 44 lb-in       | On/Off, Floating, (0) 2-10 Vdc                                  | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| LF24-3-S US    | SR        | 35 lb-in       | Modulating                          | 24 Vac/Vdc  | —                   | 1        | 150          | MS7505A2130     | 44 lb-in       | On/Off, Floating, (0) 2-10 Vdc                                  | 24 Vac/Vdc  | (0) 2-10 Vdc | 1        | 90           |
| LFC24-3-R US   | SR        | 35 lb-in       | Floating                            | 24 Vac/Vdc  | —                   | —        | 90           | MS7505A2030     | 44 lb-in       | On/Off, Floating, (0) 2-10 Vdc                                  | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| LFC24-3-S US   | SR        | 35 lb-in       | Floating                            | 24 Vac/Vdc  | —                   | 1        | 90           | MS7505A2130     | 44 lb-in       | On/Off, Floating, (0) 2-10 Vdc                                  | 24 Vac/Vdc  | (0) 2-10 Vdc | 1        | 90           |
| LF24-SR US     | SR        | 35 lb-in       | 2-10 Vdc (4-20 mA)                  | 24 Vac/Vdc  | 2-10 Vdc            | —        | 150          | MS7505A2030     | 44 lb-in       | On/Off, Floating, (0) 2-10 Vdc                                  | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| LF24-SR-S US   | SR        | 35 lb-in       | 2-10 Vdc (4-20 mA)                  | 24 Vac/Vdc  | 2-10 Vdc            | 1        | 150          | MS7505A2130     | 44 lb-in       | On/Off, Floating, (0) 2-10 Vdc                                  | 24 Vac/Vdc  | (0) 2-10 Vdc | 1        | 90           |
| LF24-SR-E US   | SR        | 35 lb-in       | 2-10 Vdc, Built-in minimum position | 24 Vac/Vdc  | 2-10 Vdc            | —        | 150          | MS7405A2030     | 44 lb-in       | On/Off, Floating, (0) 2-10 Vdc, Economizer (3 kOhm, 3-Position) | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| LF24-MFT US    | SR        | 35 lb-in       | MFT                                 | 24 Vac/Vdc  | 2-10 Vdc            | —        | 150          | MS7505A2030     | 44 lb-in       | On/Off, Floating, (0) 2-10 Vdc                                  | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| LF24-MFT-S US  | SR        | 35 lb-in       | MFT                                 | 24 Vac/Vdc  | 2-10 Vdc            | 1        | 150          | MS7505A2130     | 44 lb-in       | On/Off, Floating, (0) 2-10 Vdc                                  | 24 Vac/Vdc  | (0) 2-10 Vdc | 1        | 90           |
| LF24-MFT-20 US | SR        | 35 lb-in       | MFT                                 | 24 Vac/Vdc  | 2-10 Vdc            | —        | 150          | MS7505A2030     | 44 lb-in       | On/Off, Floating, (0) 2-10 Vdc                                  | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| NFB24          | SR        | 90 lb-in       | On/Off                              | 24 Vac/Vdc  | —                   | —        | <75          | MS8110A1008     | 88 lb-in       | Two-Position (SPST)                                             | 24 Vac/Vdc  | —            | —        | 45           |
| NFB24-S        | SR        | 90 lb-in       | On/Off                              | 24 Vac/Vdc  | —                   | 2        | <75          | MS8110A1206     | 88 lb-in       | Two-Position (SPST)                                             | 24 Vac/Vdc  | —            | 2        | 45           |
| NFBUP          | SR        | 90 lb-in       | On/Off                              | 24-240Vac   | —                   | —        | <75          | MS4110A1002     | 88 lb-in       | Two-Position (SPST)                                             | 100-250 Vac | —            | —        | 45           |
| NFBUP-S        | SR        | 90 lb-in       | On/Off                              | 24-240Vac   | —                   | 2        | <75          | MS4110A1200     | 88 lb-in       | Two-Position (SPST)                                             | 100-250 Vac | —            | 2        | 45           |
| NFB24-SR       | SR        | 90 lb-in       | 2-10 Vdc (4-20 mA)                  | 24 Vac/Vdc  | 2-10 Vdc            | —        | 95           | MS7510A2008     | 88 lb-in       | On/Off, Floating, (0) 2-10 Vdc                                  | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| NFB24-SR-S     | SR        | 90 lb-in       | 2-10 Vdc (4-20 mA)                  | 24 Vac/Vdc  | 2-10 Vdc            | 2        | 95           | MS7510A2206     | 88 lb-in       | On/Off, Floating, (0) 2-10 Vdc                                  | 24 Vac/Vdc  | (0) 2-10 Vdc | 2        | 90           |

# Cross Reference - Actuators

## Direct Coupled Actuators

| Belimo Model  | Fail Safe | Torque (lb-in) | Control Signal     | Power      | Feedback            | Switches | Timing (sec) | Honeywell Model          | Torque (lb-in) | Control Signal                 | Power       | Feedback     | Switches | Timing (sec) |
|---------------|-----------|----------------|--------------------|------------|---------------------|----------|--------------|--------------------------|----------------|--------------------------------|-------------|--------------|----------|--------------|
| NFB24-MFT     | SR        | 90 lb-in       | MFT                | 24 Vac/Vdc | Variable (0-10 Vdc) | —        | 150          | MS7510A2008              | 88 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| NFB24-MFT-S   | SR        | 90 lb-in       | 0-135 kOhm         | 24 Vac/Vdc | Variable (0-10 Vdc) | 2        | 150          | MS7510A2206              | 88 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | 2        | 90           |
| NFX24         | SR        | 90 lb-in       | On/Off             | 24 Vac/Vdc | —                   | —        | <75          | MS8110A1008              | 88 lb-in       | Two-Position (SPST)            | 24 Vac/Vdc  | —            | —        | 45           |
| NFX24-S       | SR        | 90 lb-in       | On/Off             | 24 Vac/Vdc | —                   | 2        | <75          | MS8110A1206              | 88 lb-in       | Two-Position (SPST)            | 24 Vac/Vdc  | —            | 2        | 45           |
| NFX24-SR      | SR        | 90 lb-in       | 2-10 Vdc (4-20 mA) | 24 Vac/Vdc | 2-10 Vdc            | —        | 95           | MS7510A2008              | 88 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| NFX24-SR-S    | SR        | 90 lb-in       | 2-10 Vdc (4-20 mA) | 24 Vac/Vdc | 2-10 Vdc            | 2        | 95           | MS7510A2206              | 88 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | 2        | 90           |
| NFX24-MFT     | SR        | 90 lb-in       | MFT                | 24 Vac/Vdc | Variable (0-10 Vdc) | —        | 150          | MS7510A2008              | 88 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| NFX24-MFT-S   | SR        | 90 lb-in       | MFT                | 24 Vac/Vdc | Variable (0-10 Vdc) | 2        | 150          | MS7510A2206              | 88 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | 2        | 90           |
| AF24 US       | SR        | 133 lb-in      | On/Off             | 24 Vac/Vdc | —                   | —        | 150          | MS8120A1007              | 175 lb-in      | Two-Position (SPST)            | 24 Vac/Vdc  | —            | —        | 45           |
| AF24-S US     | SR        | 133 lb-in      | On/Off             | 24 Vac/Vdc | —                   | 2        | 150          | MS8120A1205              | 175 lb-in      | Two-Position (SPST)            | 24 Vac/Vdc  | —            | 2        | 45           |
| AF120 US      | SR        | 133 lb-in      | On/Off             | 120 Vac    | —                   | —        | 150          | MS4120A1001              | 175 lb-in      | Two-Position (SPST)            | 100-250 Vac | —            | —        | 45           |
| AF120-S US    | SR        | 133 lb-in      | On/Off             | 120 Vac    | —                   | 2        | 150          | MS4120A1209              | 175 lb-in      | Two-Position (SPST)            | 100-250 Vac | —            | 2        | 45           |
| AF230 US      | SR        | 133 lb-in      | On/Off             | 230 Vac    | —                   | —        | 150          | MS4120A1001              | 175 lb-in      | Two-Position (SPST)            | 100-250 Vac | —            | —        | 45           |
| AF230-S US    | SR        | 133 lb-in      | On/Off             | 230 Vac    | —                   | 2        | 150          | MS4120A1209              | 175 lb-in      | Two-Position (SPST)            | 100-250 Vac | —            | 2        | 45           |
| AF24-SR US    | SR        | 133 lb-in      | 2-10 Vdc (4-20 mA) | 24 Vac/Vdc | 2-10 Vdc            | —        | 150          | MS7520A2007              | 175 lb-in      | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| AF24-MFT US   | SR        | 133 lb-in      | MFT                | 24 Vac/Vdc | 2-10 Vdc            | —        | 150          | MS7520A2007              | 175 lb-in      | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| AF24-MFT-S US | SR        | 133 lb-in      | MFT                | 24 Vac/Vdc | 2-10 Vdc            | 2        | 150          | MS7520A2205              | 175 lb-in      | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | 2        | 90           |
| AF24-MFT-S US | SR        | 133 lb-in      | MFT                | 24 Vac/Vdc | 2-10 Vdc            | 2        | 150          | MS7520H2208              | 175 lb-in      | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | 2        | 90           |
| AF24-MFT95 US | SR        | 133 lb-in      | 0-135 kOhm         | 24 Vac/Vdc | —                   | —        | 150          | MS7520A2007 + Q7002B1009 | 175 lb-in      | 0-135 kOhm                     | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| AFB24         | SR        | 180 lb-in      | On/Off             | 24 Vac/Vdc | —                   | —        | <75          | MS8120A1007              | 175 lb-in      | Two-Position (SPST)            | 24 Vac/Vdc  | —            | —        | 45           |
| AFB24-S       | SR        | 180 lb-in      | On/Off             | 24 Vac/Vdc | —                   | 2        | <75          | MS8120A1205              | 175 lb-in      | Two-Position (SPST)            | 24 Vac/Vdc  | —            | 2        | 45           |
| AFBUP         | SR        | 180 lb-in      | On/Off             | 24-240Vac  | —                   | —        | <75          | MS4120A1001              | 175 lb-in      | Two-Position (SPST)            | 100-250 Vac | —            | —        | 45           |
| AFBUP-S       | SR        | 180 lb-in      | On/Off             | 24-240Vac  | —                   | 2        | <75          | MS4120A1209              | 175 lb-in      | Two-Position (SPST)            | 100-250 Vac | —            | 2        | 45           |
| AFB24-SR      | SR        | 180 lb-in      | 2-10 Vdc (4-20 mA) | 24 Vac/Vdc | 2-10 Vdc            | —        | 95           | MS7520A2007              | 175 lb-in      | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| AFB24-SR-S    | SR        | 180 lb-in      | 2-10 Vdc (4-20 mA) | 24 Vac/Vdc | 2-10 Vdc            | 2        | 95           | MS7520A2205              | 175 lb-in      | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | 2        | 90           |
| AFB24-MFT     | SR        | 180 lb-in      | MFT                | 24 Vac/Vdc | Variable (0-10 Vdc) | —        | 150          | MS7520A2007              | 175 lb-in      | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| AFB24-MFT-S   | SR        | 180 lb-in      | MFT                | 24 Vac/Vdc | Variable (0-10 Vdc) | 2        | 150          | MS7520A2205              | 175 lb-in      | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | 2        | 90           |
| AFB24-MFT95   | SR        | 180 lb-in      | 0-135 kOhm         | 24 Vac/Vdc | Variable (0-10 Vdc) | —        | 150          | MS7520A2007 + Q7002B1009 | 175 lb-in      | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| AFX24         | SR        | 180 lb-in      | On/Off             | 24 Vac/Vdc | —                   | —        | <75          | MS8120A1007              | 175 lb-in      | Two-Position (SPST)            | 24 Vac/Vdc  | —            | —        | 45           |
| AFX24-S       | SR        | 180 lb-in      | On/Off             | 24 Vac/Vdc | —                   | 2        | <75          | MS8120A1205              | 175 lb-in      | Two-Position (SPST)            | 24 Vac/Vdc  | —            | 2        | 45           |
| AFX24-SR      | SR        | 180 lb-in      | 2-10 Vdc (4-20 mA) | 24 Vac/Vdc | 2-10 Vdc            | —        | 95           | MS7520A2007              | 175 lb-in      | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| AFX24-SR-S    | SR        | 180 lb-in      | 2-10 Vdc (4-20 mA) | 24 Vac/Vdc | 2-10 Vdc            | 2        | 95           | MS7520A2205              | 175 lb-in      | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | 2        | 90           |
| AFX24MFT      | SR        | 180 lb-in      | MFT                | 24 Vac/Vdc | Variable (0-10 Vdc) | —        | 150          | MS7520A2007              | 175 lb-in      | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| AFX24-MFT-S   | SR        | 180 lb-in      | MFT                | 24 Vac/Vdc | Variable (0-10 Vdc) | 2        | 150          | MS7520A2205              | 175 lb-in      | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | 2        | 90           |
| AFX24-MFT95   | SR        | 180 lb-in      | 0-135 kOhm         | 24 Vac/Vdc | Variable (0-10 Vdc) | —        | 150          | MS7520A2007 + Q7002B1009 | 175 lb-in      | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |

Belimo Notes: All models described as (0) 2-10 Vdc can be used with a 4-20 mA control input. Shunt a 500 kOhm, 1/2 W resistor across the input at the actuator.

# Cross Reference - Actuators

## Direct Coupled Actuators

| Johnson Model | Fail Safe | Torque (lb-in)      | Control Signal                        | Power                    | Feedback                                                             | Switches | Timing (sec)                                                                           | Honeywell Model       | Torque (lb-in) | Control Signal                 | Power      | Feedback     | Switches | Timing (sec) |
|---------------|-----------|---------------------|---------------------------------------|--------------------------|----------------------------------------------------------------------|----------|----------------------------------------------------------------------------------------|-----------------------|----------------|--------------------------------|------------|--------------|----------|--------------|
| M9102-AGA-2S  | NSR       | 18 lb-in            | Floating                              | 18 to 30 Vac at 50/60 Hz | —                                                                    | —        | 30                                                                                     | ML6161A2009           | 35 lb-in       | On/Off, Floating               | 24 Vac/Vdc | —            | —        | 90           |
| M9102-AGA-3S  | NSR       | 18 lb-in            | Floating                              | 18 to 30 Vac at 50/60 Hz | —                                                                    | —        | 30                                                                                     | ML6161A2009           | 35 lb-in       | On/Off, Floating               | 24 Vac/Vdc | —            | —        | 90           |
| M9102-IGA-2S  | NSR       | 18 lb-in            | On/Off, Floating                      | 18 to 30 Vac at 50/60 Hz | —                                                                    | —        | 30                                                                                     | ML6161A2009           | 35 lb-in       | On/Off, Floating               | 24 Vac/Vdc | —            | —        | 90           |
| M9102-IGA-3S  | NSR       | 18 lb-in            | On/Off, Floating                      | 18 to 30 Vac at 50/60 Hz | —                                                                    | —        | 30                                                                                     | ML6161A2009           | 35 lb-in       | On/Off, Floating               | 24 Vac/Vdc | —            | —        | 90           |
| M9104-AGA-2S  | NSR       | 35 lb-in            | Floating                              | 18 to 30 Vac at 50/60 Hz | —                                                                    | —        | 60                                                                                     | ML6161A2009           | 35 lb-in       | On/Off, Floating               | 24 Vac/Vdc | —            | —        | 90           |
| M9104-AGA-3S  | NSR       | 35 lb-in            | Floating                              | 18 to 30 Vac at 50/60 Hz | —                                                                    | —        | 60                                                                                     | ML6161A2009           | 35 lb-in       | On/Off, Floating               | 24 Vac/Vdc | —            | —        | 90           |
| M9104-IGA-2S  | NSR       | 35 lb-in            | On/Off, Floating                      | 18 to 30 Vac at 50/60 Hz | —                                                                    | —        | 60                                                                                     | ML6161A2009           | 35 lb-in       | On/Off, Floating               | 24 Vac/Vdc | —            | —        | 90           |
| M9104-IGA-3S  | NSR       | 35 lb-in            | On/Off, Floating                      | 18 to 30 Vac at 50/60 Hz | —                                                                    | —        | 60                                                                                     | ML6161A2009           | 35 lb-in       | On/Off, Floating               | 24 Vac/Vdc | —            | —        | 90           |
| M9104-GGA-2S  | NSR       | 35 lb-in            | (0) 2-10 Vdc, (0) 4-20 mA, Reversible | 18 to 30 Vac at 50/60 Hz | (0) 2-10 Vdc                                                         | —        | 60                                                                                     | MN7505A2001           | 44 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc | (0) 2-10 Vdc | —        | 90           |
| M9104-GGA-3S  | NSR       | 35 lb-in            | (0) 2-10 Vdc, (0) 4-20 mA, Reversible | 18 to 30 Vac at 50/60 Hz | (0) 2-10 Vdc                                                         | —        | 60                                                                                     | MN7505A2001           | 44 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc | (0) 2-10 Vdc | —        | 90           |
| M9104-AGA-2N  | NSR       | 35 lb-in            | Floating                              | 20 to 30 Vac at 50/60 Hz | —                                                                    | —        | 90/108 (at 60/50 Hz)                                                                   | MN6105A1011           | 44 lb-in       | On/Off, Floating               | 24 Vac/Vdc | —            | —        | 90           |
| M9104-AGS-2N  | NSR       | 35 lb-in            | Floating                              | 20 to 30 Vac at 50/60 Hz | —                                                                    | —        | 90/108 (at 60/50 Hz)                                                                   | MN6105A1011           | 44 lb-in       | On/Off, Floating               | 24 Vac/Vdc | —            | —        | 90           |
| M9106-IGA-2   | NSR       | 53 lb-in & 35 lb-in | On/Off, Floating                      | 20 to 30 Vac at 50/60 Hz | —                                                                    | —        | Selectable: 60, 90, 120, 330, or 660 (at 60 Hz). 72, 108, 144, 396, or 792 (at 50 Hz). | MN6105A1011           | 44 lb-in       | On/Off, Floating               | 24 Vac/Vdc | —            | —        | 90           |
| M9106-IGC-2   | NSR       | 53 lb-in & 35 lb-in | On/Off, Floating                      | 20 to 30 Vac at 50/60 Hz | —                                                                    | 2        | Selectable: 60, 90, 120, 330, or 660 (at 60 Hz). 72, 108, 144, 396, or 792 (at 50 Hz). | MN6105A1201           | 44 lb-in       | On/Off, Floating               | 24 Vac/Vdc | —            | 2        | 90           |
| M9106-AGA-2   | NSR       | 53 lb-in            | Floating                              | 20 to 30 Vac at 50/60 Hz | —                                                                    | —        | 60/72 (at 60/50 Hz)                                                                    | MN6110A1003           | 88 lb-in       | On/Off, Floating               | 24 Vac/Vdc | —            | —        | 90           |
| M9106-AGA2N01 | NSR       | 53 lb-in            | Floating                              | 20 to 30 Vac at 50/60 Hz | —                                                                    | —        | 60/72 (at 60/50 Hz)                                                                    | MN6110A1003           | 88 lb-in       | On/Off, Floating               | 24 Vac/Vdc | —            | —        | 90           |
| M9106-AGA2N02 | NSR       | 53 lb-in            | Floating                              | 20 to 30 Vac at 50/60 Hz | —                                                                    | —        | 120/144 (at 60/50 Hz)                                                                  | MN6110A1003           | 88 lb-in       | On/Off, Floating               | 24 Vac/Vdc | —            | —        | 90           |
| M9106-AGC-2   | NSR       | 53 lb-in            | Floating                              | 20 to 30 Vac at 50/60 Hz | —                                                                    | 2        | 60/72 (at 60/50 Hz)                                                                    | MN6110A1201           | 88 lb-in       | On/Off, Floating               | 24 Vac/Vdc | —            | 2        | 90           |
| M9106-AGF-2   | NSR       | 53 lb-in            | Floating                              | 20 to 30 Vac at 50/60 Hz | 0-10 kOhm                                                            | —        | 60/72 (at 60/50 Hz)                                                                    | ML6174B2019 + 200976C | 70 lb-in       | On/Off, Floating               | 24 Vac     | 0-2 kOhm     | —        | 90           |
| M9106-GGA-2   | NSR       | 53 lb-in            | (0) 2-10 Vdc, (0) 4 to 20 mA          | 20 to 30 Vac at 50/60 Hz | (0) 2-10 Vdc for 90 (1 mA at 10 Vdc). Corresponds to span selection. | —        | 60/72 (at 60/50 Hz)                                                                    | MN7510A2001           | 88 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc | (0) 2-10 Vdc | —        | 90           |
| M9106-GGC-2   | NSR       | 53 lb-in            | (0) 2-10 Vdc, (0) 4 to 20 mA          | 20 to 30 Vac at 50/60 Hz | (0) 2-10 Vdc for 90 (1 mA at 10 Vdc). Corresponds to span selection. | 2        | 60/72 (at 60/50 Hz)                                                                    | MN7510A2209           | 88 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc | (0) 2-10 Vdc | 2        | 90           |
| M9108-AGA-2   | NSR       | 70 lb-in            | On/Off, Floating                      | 20 to 30 Vac at 50/60 Hz | —                                                                    | —        | 25-50 for 0-70 lb-in, 30 at 50% load.                                                  | MN6110A1003           | 88 lb-in       | On/Off, Floating               | 24 Vac/Vdc | —            | —        | 90           |
| M9108-AGC-2   | NSR       | 70 lb-in            | On/Off, Floating                      | 20 to 30 Vac at 50/60 Hz | —                                                                    | 2        | 25-50 for 0-70 lb-in, 30 at 50% load.                                                  | MN6110A1201           | 88 lb-in       | On/Off, Floating               | 24 Vac/Vdc | —            | 2        | 90           |

# Cross Reference - Actuators

## Direct Coupled Actuators

| Johnson Model | Fail Safe | Torque (lb-in)        | Control Signal                                                   | Power                    | Feedback                                                             | Switches | Timing (sec)                            | Honeywell Model       | Torque (lb-in) | Control Signal                 | Power      | Feedback     | Switches | Timing (sec) |
|---------------|-----------|-----------------------|------------------------------------------------------------------|--------------------------|----------------------------------------------------------------------|----------|-----------------------------------------|-----------------------|----------------|--------------------------------|------------|--------------|----------|--------------|
| M9108-AGD-2   | NSR       | 70 lb-in              | On/Off, Floating                                                 | 20 to 30 Vac at 50/60 Hz | 0-135 kOhm                                                           | —        | 25-50 for 0-70 lb-in, 30 at 50% load.   | ML6174B2019 + 200976A | 70 lb-in       | On/Off, Floating               | 24 Vac     | 0-500 kOhm   | —        | 90           |
| M9108-AGE-2   | NSR       | 70 lb-in              | On/Off, Floating                                                 | 20 to 30 Vac at 50/60 Hz | 0-1 kOhm                                                             | —        | 25-50 for 0-70 lb-in, 30 at 50% load.   | ML6174B2019 + 200976C | 70 lb-in       | On/Off, Floating               | 24 Vac     | 0-2 kOhm     | —        | 90           |
| M9108-GGA-2   | NSR       | 70 lb-in              | 0-20 Vdc (selectable zero and span), (0) 4 to 20 mA, Reversible. | 20 to 30 Vac at 50/60 Hz | (0) 2-10 Vdc for 90 (1 mA at 10 Vdc). Corresponds to span selection. | —        | 25-50 for 0-70 lb-in, 30 at 50% load.   | MN7510A2001           | 88 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc | (0) 2-10 Vdc | —        | 90           |
| M9108-GGC-2   | NSR       | 70 lb-in              | 0-20 Vdc (selectable zero and span), (0) 4 to 20 mA, Reversible. | 20 to 30 Vac at 50/60 Hz | (0) 2-10 Vdc for 90 (1 mA at 10 Vdc). Corresponds to span selection. | 2        | 25-50 for 0-70 lb-in, 30 at 50% load.   | MN7510A2209           | 88 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc | (0) 2-10 Vdc | 2        | 90           |
| M9108-HGA-2   | NSR       | 70 lb-in              | 0-20 Vdc (adjustable zero and span), (0) 4 to 20 mA, Reversible. | 20 to 30 Vac at 50/60 Hz | (0) 2-10 Vdc for 90 (1 mA at 10 Vdc). Corresponds to span selection. | —        | 25-50 for 0-70 lb-in, 30 at 50% load.   | MN7510A2001           | 88 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc | (0) 2-10 Vdc | —        | 90           |
| M9108-HGC-2   | NSR       | 70 lb-in              | 0-20 Vdc (adjustable zero and span), (0) 4 to 20 mA, Reversible. | 20 to 30 Vac at 50/60 Hz | (0) 2-10 Vdc for 90 (1 mA at 10 Vdc). Corresponds to span selection. | 2        | 25-50 for 0-70 lb-in, 30 at 50% load.   | MN7510A2209           | 88 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc | (0) 2-10 Vdc | 2        | 90           |
| M9109-AGA-2   | NSR       | 80 lb-in              | Floating                                                         | 20 to 30 Vac at 50/60 Hz | —                                                                    | —        | 60/72 (at 60/50 Hz)                     | MN6110A1003           | 88 lb-in       | On/Off, Floating               | 24 Vac/Vdc | —            | —        | 90           |
| M9109-AGC-2   | NSR       | 80 lb-in              | Floating                                                         | 20 to 30 Vac at 50/60 Hz | —                                                                    | 2        | 60/72 (at 60/50 Hz)                     | MN6110A1201           | 88 lb-in       | On/Off, Floating               | 24 Vac/Vdc | —            | 2        | 90           |
| M9109-GGA-2   | NSR       | 80 lb-in              | (0) 2-10 Vdc, (0) 4-20 mA, Reversible                            | 20 to 30 Vac at 50/60 Hz | (0) 2-10 Vdc for 90 (1 mA at 10 Vdc). Corresponds to span selection. | —        | 60/72 (at 60/50 Hz)                     | MN7510A2001           | 88 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc | (0) 2-10 Vdc | —        | 90           |
| M9109-GGC-2   | NSR       | 80 lb-in              | (0) 2-10 Vdc, (0) 4-20 mA, Reversible                            | 20 to 30 Vac at 50/60 Hz | (0) 2-10 Vdc for 90 (1 mA at 10 Vdc). Corresponds to span selection. | 2        | 60/72 (at 60/50 Hz)                     | MN7510A2209           | 88 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc | (0) 2-10 Vdc | 2        | 90           |
| M9116-AGA-2   | NSR       | 140 lb-in             | On/Off, Floating                                                 | 20 to 30 Vac at 50/60 Hz | —                                                                    | —        | 70-115 for 0-140 lb-in, 80 at 50% load. | MN6120A1002           | 175 lb-in      | On/Off, Floating               | 24 Vac/Vdc | —            | —        | 90           |
| M9116-AGC-2   | NSR       | 140 lb-in             | On/Off, Floating                                                 | 20 to 30 Vac at 50/60 Hz | —                                                                    | 2        | 70-115 for 0-140 lb-in, 80 at 50% load. | MN6120A1200           | 175 lb-in      | On/Off, Floating               | 24 Vac/Vdc | —            | 2        | 90           |
| M9116-AGD-2   | NSR       | 140 lb-in             | On/Off, Floating                                                 | 20 to 30 Vac at 50/60 Hz | 0-135 kOhm                                                           | —        | 70-115 for 0-140 lb-in, 80 at 50% load. | MN6120A1002           | 175 lb-in      | On/Off, Floating               | 24 Vac/Vdc | —            | —        | 90           |
| M9116-AGE-2   | NSR       | 140 lb-in             | On/Off, Floating                                                 | 20 to 30 Vac at 50/60 Hz | 0-1 kOhm                                                             | —        | 70-115 for 0-140 lb-in, 80 at 50% load. | MN6120A1002           | 175 lb-in      | On/Off, Floating               | 24 Vac/Vdc | —            | —        | 90           |
| M9116-GGA-2   | NSR       | 140 lb-in             | (0) 2-10 Vdc, (0) 4-20 mA, Reversible                            | 20 to 30 Vac at 50/60 Hz | (0) 2-10 Vdc for 90 (1 mA at 10 Vdc). Corresponds to span selection. | —        | 70-115 for 0-140 lb-in, 80 at 50% load. | MN7220A2007           | 175 lb-in      | (0) 2-10 Vdc, (0) 4-20 mA      | 24 Vac/Vdc | (0) 2-10 Vdc | —        | 90           |
| M9116-GGC-2   | NSR       | 140 lb-in             | (0) 2-10 Vdc, (0) 4-20 mA, Reversible                            | 20 to 30 Vac at 50/60 Hz | (0) 2-10 Vdc for 90 (1 mA at 10 Vdc). Corresponds to span selection. | 2        | 70-115 for 0-140 lb-in, 80 at 50% load. | MN7220A2205           | 175 lb-in      | (0) 2-10 Vdc, (0) 4-20 mA      | 24 Vac/Vdc | (0) 2-10 Vdc | 2        | 90           |
| M9116-HGA-2   | NSR       | 140 lb-in & 280 lb-in | (0) 2-10 Vdc, (0) 4-20 mA, Reversible                            | 20 to 30 Vac at 50/60 Hz | (0) 2-10 Vdc for 90 (1 mA at 10 Vdc). Corresponds to span selection. | —        | 70-115 for 0-140 lb-in, 80 at 50% load. | MN7220A2007           | 175 lb-in      | (0) 2-10 Vdc, (0) 4-20 mA      | 24 Vac/Vdc | (0) 2-10 Vdc | —        | 90           |

# Cross Reference - Actuators

## Direct Coupled Actuators

| Johnson Model | Fail Safe | Torque (lb-in)        | Control Signal                        | Power                    | Feedback                                                                    | Switches | Timing (sec)                              | Honeywell Model      | Torque (lb-in) | Control Signal                 | Power       | Feedback     | Switches | Timing (sec) |
|---------------|-----------|-----------------------|---------------------------------------|--------------------------|-----------------------------------------------------------------------------|----------|-------------------------------------------|----------------------|----------------|--------------------------------|-------------|--------------|----------|--------------|
| M9116-HGC-2   | NSR       | 140 lb-in & 280 lb-in | (0) 2-10 Vdc, (0) 4-20 mA, Reversible | 20 to 30 Vac at 50/60 Hz | (0) 2-10 Vdc for 90 (1 mA at 10 Vdc). Corresponds to span selection.        | 2        | 70-115 for 0-140 lb-in, 80 at 50% load.   | MN7220A2205          | 175 lb-in      | (0) 2-10 Vdc, (0) 4-20 mA      | 24 Vac/Vdc  | (0) 2-10 Vdc | 2        | 90           |
| M9124-GGA-2   | NSR       | 210 lb-in & 420 lb-in | (0) 2-10 Vdc, (0) 4-20 mA, Reversible | 20 to 30 Vac at 50/60 Hz | (0) 2-10 Vdc for 90 (1 mA at 10 Vdc). Corresponds to span selection.        | —        | 115-175 for 0-210 lb-in, 130 at 50% load. | MN7234A2008          | 300 lb-in      | (0) 2-10 Vdc, (0) 4-20 mA      | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| M9124-GGC-2   | NSR       | 210 lb-in & 420 lb-in | (0) 2-10 Vdc, (0) 4-20 mA, Reversible | 20 to 30 Vac at 50/60 Hz | (0) 2-10 Vdc for 90 (1 mA at 10 Vdc). Corresponds to span selection.        | 2        | 115-175 for 0-210 lb-in, 130 at 50% load. | MN7234A2008 + SW2-US | 300 lb-in      | (0) 2-10 Vdc, (0) 4-20 mA      | 24 Vac/Vdc  | (0) 2-10 Vdc | 2        | 90           |
| M9124-HGA-2   | NSR       | 210 lb-in & 420 lb-in | (0) 2-10 Vdc, (0) 4-20 mA, Reversible | 20 to 30 Vac at 50/60 Hz | (0) 2-10 Vdc for 90 (1 mA at 10 Vdc). Corresponds to span selection.        | —        | 115-175 for 0-210 lb-in, 130 at 50% load. | MN7234A2008          | 300 lb-in      | (0) 2-10 Vdc, (0) 4-20 mA      | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| M9124-HGC-2   | NSR       | 210 lb-in & 420 lb-in | (0) 2-10 Vdc, (0) 4-20 mA, Reversible | 20 to 30 Vac at 50/60 Hz | (0) 2-10 Vdc for 90 (1 mA at 10 Vdc). Corresponds to span selection.        | 2        | 115-175 for 0-210 lb-in, 130 at 50% load. | MN7234A2008 + SW2-US | 300 lb-in      | (0) 2-10 Vdc, (0) 4-20 mA      | 24 Vac/Vdc  | (0) 2-10 Vdc | 2        | 90           |
| M9132-GGA-2   | NSR       | 280 lb-in & 560 lb-in | (0) 2-10 Vdc, (0) 4-20 mA, Reversible | 20 to 30 Vac at 50/60 Hz | (0) 2-10 Vdc for 90 (1 mA at 10 Vdc). Corresponds to span and stroke limits | —        | 115-205 for 0-280 lb-in, 140 at 50% load. | MN7234A2008          | 300 lb-in      | (0) 2-10 Vdc, (0) 4-20 mA      | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| M9132-GGC-2   | NSR       | 280 lb-in & 560 lb-in | (0) 2-10 Vdc, (0) 4-20 mA, Reversible | 20 to 30 Vac at 50/60 Hz | (0) 2-10 Vdc for 90 (1 mA at 10 Vdc). Corresponds to span and stroke limits | 2        | 115-205 for 0-280 lb-in, 140 at 50% load. | MN7234A2008 + SW2-US | 300 lb-in      | (0) 2-10 Vdc, (0) 4-20 mA      | 24 Vac/Vdc  | (0) 2-10 Vdc | 2        | 90           |
| M9203-AGA-2   | SR        | 27 lb-in              | On/Off, Floating                      | 20 to 30 Vac at 50/60 Hz | —                                                                           | —        | 150                                       | MS7503A2021          | 27 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| M9203-AGB-2   | SR        | 27 lb-in              | On/Off, Floating                      | 20 to 30 Vac at 50/60 Hz | —                                                                           | 1        | 150                                       | MS7503A2221          | 27 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | 2        | 90           |
| M9203-AGA-2Z  | SR        | 27 lb-in              | On/Off, Floating                      | 20 to 30 Vac at 50/60 Hz | —                                                                           | —        | 90                                        | MS7503A2021          | 27 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| M9203-AGB-2Z  | SR        | 27 lb-in              | On/Off, Floating                      | 20 to 30 Vac at 50/60 Hz | —                                                                           | 1        | 90                                        | MS7503A2221          | 27 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | 2        | 90           |
| M9203-BGA-2   | SR        | 27 lb-in              | On/Off                                | 20 to 30 Vac at 50/60 Hz | —                                                                           | —        | < 75                                      | MS8103A1030          | 27 lb-in       | Two-Position (SPST)            | 24 Vac/Vdc  | —            | —        | 45           |
| M9203-BGB-2   | SR        | 27 lb-in              | On/Off                                | 20 to 30 Vac at 50/60 Hz | —                                                                           | 1        | < 75                                      | MS8103A1130          | 27 lb-in       | Two-Position (SPST)            | 24 Vac/Vdc  | —            | 1        | 45           |
| M9203-BUA-2   | SR        | 27 lb-in              | On/Off                                | 85 to 264 Vac at 50/60Hz | —                                                                           | —        | < 75                                      | MS4103A1030          | 27 lb-in       | Two-Position (SPST)            | 100-250 Vac | —            | —        | 45           |
| M9203-BUB-2   | SR        | 27 lb-in              | On/Off                                | 85 to 264 Vac at 50/60Hz | —                                                                           | 1        | < 75                                      | MS4103A1130          | 27 lb-in       | Two-Position (SPST)            | 100-250 Vac | —            | 1        | 45           |
| M9203-GGA-2   | SR        | 27 lb-in              | (0) 2-10 Vdc, (0) 4-20 mA, Reversible | 20 to 30 Vac at 50/60 Hz | (0) 2-10 Vdc                                                                | —        | 150                                       | MS7503A2021          | 27 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| M9203-GGB-2   | SR        | 27 lb-in              | (0) 2-10 Vdc, (0) 4-20 mA, Reversible | 20 to 30 Vac at 50/60 Hz | (0) 2-10 Vdc                                                                | 1        | 150                                       | MS7503A2221          | 27 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | 2        | 90           |
| M9203-GGA-2Z  | SR        | 27 lb-in              | (0) 2-10 Vdc, (0) 4-20 mA, Reversible | 20 to 30 Vac at 50/60 Hz | (0) 2-10 Vdc                                                                | —        | 90                                        | MS7503A2021          | 27 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| M9203-GGB-2Z  | SR        | 27 lb-in              | (0) 2-10 Vdc, (0) 4-20 mA, Reversible | 20 to 30 Vac at 50/60 Hz | (0) 2-10 Vdc                                                                | 1        | 90                                        | MS7503A2221          | 27 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | 2        | 90           |

# Cross Reference - Actuators

## Direct Coupled Actuators

| Johnson Model | Fail Safe | Torque (lb-in) | Control Signal                        | Power                      | Feedback     | Switches | Timing (sec) | Honeywell Model | Torque (lb-in) | Control Signal                 | Power       | Feedback     | Switches | Timing (sec) |
|---------------|-----------|----------------|---------------------------------------|----------------------------|--------------|----------|--------------|-----------------|----------------|--------------------------------|-------------|--------------|----------|--------------|
| M9208-AGA-2   | SR        | 70 lb-in       | On/Off, Floating                      | 20 to 30 Vac at 50/60 Hz   | —            | —        | 150          | MS7510A2008     | 88 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| M9208-AGA-3   | SR        | 70 lb-in       | On/Off, Floating                      | 20 to 30 Vac at 50/60 Hz   | —            | —        | 150          | MS7510A2008     | 88 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| M9208-AGC-3   | SR        | 70 lb-in       | On/Off, Floating                      | 20 to 30 Vac at 50/60 Hz   | —            | 2        | 150          | MS7510A2206     | 88 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | 2        | 90           |
| M9208-BGA-3   | SR        | 70 lb-in       | On/Off                                | 18 to 30 Vac at 50/60 Hz   | —            | —        | < 75         | MS8110A1008     | 88 lb-in       | Two-Position (SPST)            | 24 Vac/Vdc  | —            | —        | 45           |
| M9208-BGC-3   | SR        | 70 lb-in       | On/Off                                | 18 to 30 Vac at 50/60 Hz   | —            | 2        | < 75         | MS8110A1206     | 88 lb-in       | Two-Position (SPST)            | 24 Vac/Vdc  | —            | 2        | 45           |
| M9208-BAA-3   | SR        | 70 lb-in       | On/Off                                | 102 to 132 Vac at 50/60 Hz | —            | —        | < 75         | MS4110A1002     | 88 lb-in       | Two-Position (SPST)            | 100-250 Vac | —            | —        | 45           |
| M9208-BAC-3   | SR        | 70 lb-in       | On/Off                                | 102 to 132 Vac at 50/60 Hz | —            | 2        | < 75         | MS4110A1200     | 88 lb-in       | Two-Position (SPST)            | 100-250 Vac | —            | 2        | 45           |
| M9208-BDA-3   | SR        | 70 lb-in       | On/Off                                | 198 to 264 Vac at 50/60 Hz | —            | —        | < 75         | MS4110A1002     | 88 lb-in       | Two-Position (SPST)            | 100-250 Vac | —            | —        | 45           |
| M9208-BDC-3   | SR        | 70 lb-in       | On/Off                                | 198 to 264 Vac at 50/60 Hz | —            | 2        | < 75         | MS4110A1200     | 88 lb-in       | Two-Position (SPST)            | 100-250 Vac | —            | 2        | 45           |
| M9208-GGA-2   | SR        | 70 lb-in       | (0) 2-10 Vdc, (0) 4-20 mA, Reversible | 20 to 30 Vac at 50/60 Hz   | (0) 2-10 Vdc | —        | 150          | MS7510A2008     | 88 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| M9208-GGA-3   | SR        | 70 lb-in       | (0) 2-10 Vdc, (0) 4-20 mA, Reversible | 20 to 30 Vac at 50/60 Hz   | (0) 2-10 Vdc | —        | 150          | MS7510A2008     | 88 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| M9208-GGC-3   | SR        | 70 lb-in       | (0) 2-10 Vdc, (0) 4-20 mA, Reversible | 20 to 30 Vac at 50/60 Hz   | (0) 2-10 Vdc | 2        | 150          | MS7510A2206     | 88 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | 2        | 90           |
| M9210-AGA-3   | SR        | 89 lb-in       | On/Off, Floating                      | 20 to 30 Vac at 50/60 Hz   | —            | —        | 150          | MS7510A2008     | 88 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| M9210-AGC-3   | SR        | 89 lb-in       | On/Off, Floating                      | 20 to 30 Vac at 50/60 Hz   | —            | 2        | 150          | MS7510A2206     | 88 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | 2        | 90           |
| M9210-BGA-3   | SR        | 89 lb-in       | On/Off                                | 20 to 30 Vac at 50/60 Hz   | —            | —        | 24 to 57     | MS8110A1008     | 88 lb-in       | Two-Position (SPST)            | 24 Vac/Vdc  | —            | —        | 45           |
| M9210-BGC-3   | SR        | 89 lb-in       | On/Off                                | 20 to 30 Vac at 50/60 Hz   | —            | 2        | 24 to 57     | MS8110A1206     | 88 lb-in       | Two-Position (SPST)            | 24 Vac/Vdc  | —            | 2        | 45           |
| M9210-BAA-3   | SR        | 89 lb-in       | On/Off                                | 102 to 132 Vac at 50/60 Hz | —            | —        | 24 to 57     | MS4110A1002     | 88 lb-in       | Two-Position (SPST)            | 100-250 Vac | —            | —        | 45           |
| M9210-BAC-3   | SR        | 89 lb-in       | On/Off                                | 102 to 132 Vac at 50/60 Hz | —            | 2        | 24 to 57     | MS4110A1200     | 88 lb-in       | Two-Position (SPST)            | 100-250 Vac | —            | 2        | 45           |
| M9210-BDA-3   | SR        | 89 lb-in       | On/Off                                | 198 to 264 Vac at 50/60 Hz | —            | —        | 24 to 57     | MS4110A1002     | 88 lb-in       | Two-Position (SPST)            | 100-250 Vac | —            | —        | 45           |
| M9210-BDC-3   | SR        | 89 lb-in       | On/Off                                | 198 to 264 Vac at 50/60 Hz | —            | 2        | 24 to 57     | MS4110A1200     | 88 lb-in       | Two-Position (SPST)            | 100-250 Vac | —            | 2        | 45           |
| M9210-GGA-3   | SR        | 89 lb-in       | (0) 2-10 Vdc, (0) 4-20 mA, Reversible | 20 to 30 Vac at 50/60 Hz   | (0) 2-10 Vdc | —        | 150          | MS7510A2008     | 88 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| M9210-GGC-3   | SR        | 89 lb-in       | (0) 2-10 Vdc, (0) 4-20 mA, Reversible | 20 to 30 Vac at 50/60 Hz   | (0) 2-10 Vdc | 2        | 150          | MS7510A2206     | 88 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | 2        | 90           |
| M9210-HGA-3   | SR        | 89 lb-in       | (0) 2-10 Vdc, (0) 4-20 mA, Reversible | 20 to 30 Vac at 50/60 Hz   | (0) 2-10 Vdc | —        | 150          | MS7510A2008     | 88 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| M9210-HGC-3   | SR        | 89 lb-in       | (0) 2-10 Vdc, (0) 4-20 mA, Reversible | 20 to 30 Vac at 50/60 Hz   | (0) 2-10 Vdc | 2        | 150          | MS7510A2206     | 88 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | 2        | 90           |
| M9220-AGA-3   | SR        | 177 lb-in      | On/Off, Floating                      | 20 to 30 Vac at 50/60 Hz   | —            | —        | 150          | MS7520A2007     | 175 lb-in      | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| M9220-AGC-3   | SR        | 177 lb-in      | On/Off, Floating                      | 20 to 30 Vac at 50/60 Hz   | —            | 2        | 150          | MS7520A2205     | 175 lb-in      | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | 2        | 90           |

# Cross Reference - Actuators

## Direct Coupled Actuators

| Johnson Model | Fail Safe | Torque (lb-in) | Control Signal                        | Power                      | Feedback     | Switches | Timing (sec) | Honeywell Model | Torque (lb-in) | Control Signal                 | Power       | Feedback     | Switches | Timing (sec) |
|---------------|-----------|----------------|---------------------------------------|----------------------------|--------------|----------|--------------|-----------------|----------------|--------------------------------|-------------|--------------|----------|--------------|
| M9220-BGA-3   | SR        | 177 lb-in      | On/Off                                | 20 to 30 Vac at 50/60 Hz   | —            | —        | 24 to 57     | MS8120A1007     | 175 lb-in      | Two-Position (SPST)            | 24 Vac/Vdc  | —            | —        | 45           |
| M9220-BGC-3   | SR        | 177 lb-in      | On/Off                                | 20 to 30 Vac at 50/60 Hz   | —            | 2        | 24 to 57     | MS8120A1205     | 175 lb-in      | Two-Position (SPST)            | 24 Vac/Vdc  | —            | 2        | 45           |
| M9220-BAA-3   | SR        | 177 lb-in      | On/Off                                | 102 to 132 Vac at 50/60 Hz | —            | —        | 24 to 57     | MS4120A1001     | 175 lb-in      | Two-Position (SPST)            | 100-250 Vac | —            | —        | 45           |
| M9220-BAC-3   | SR        | 177 lb-in      | On/Off                                | 102 to 132 Vac at 50/60 Hz | —            | 2        | 24 to 57     | MS4120A1209     | 175 lb-in      | Two-Position (SPST)            | 100-250 Vac | —            | 2        | 45           |
| M9220-BDA-3   | SR        | 177 lb-in      | On/Off                                | 198 to 264 Vac at 50/60 Hz | —            | —        | 24 to 57     | MS4120A1001     | 175 lb-in      | Two-Position (SPST)            | 100-250 Vac | —            | —        | 45           |
| M9220-BDC-3   | SR        | 177 lb-in      | On/Off                                | 198 to 264 Vac at 50/60 Hz | —            | 2        | 24 to 57     | MS4120A1209     | 175 lb-in      | Two-Position (SPST)            | 100-250 Vac | —            | 2        | 45           |
| M9220-GGA-3   | SR        | 177 lb-in      | (0) 2-10 Vdc, (0) 4-20 mA, Reversible | 20 to 30 Vac at 50/60 Hz   | (0) 2-10 Vdc | —        | 150          | MS7520A2007     | 175 lb-in      | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| M9220-GGC-3   | SR        | 177 lb-in      | (0) 2-10 Vdc, (0) 4-20 mA, Reversible | 20 to 30 Vac at 50/60 Hz   | (0) 2-10 Vdc | 2        | 150          | MS7520A2205     | 175 lb-in      | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | 2        | 90           |
| M9220-HGA-3   | SR        | 177 lb-in      | (0) 2-10 Vdc, (0) 4-20 mA, Reversible | 20 to 30 Vac at 50/60 Hz   | (0) 2-10 Vdc | —        | 150          | MS7520A2007     | 175 lb-in      | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| M9220-HGC-3   | SR        | 177 lb-in      | (0) 2-10 Vdc, (0) 4-20 mA, Reversible | 20 to 30 Vac at 50/60 Hz   | (0) 2-10 Vdc | 2        | 150          | MS7520A2205     | 175 lb-in      | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | 2        | 90           |

Johnson Notes: All models described as (0) 2-10 Vdc can be used with a 4-20 mA control input. Shunt a 500 kOhm, 1/2 W resistor across the input at the actuator.

# Cross Reference - Actuators

## Direct Coupled Actuators

| Invensys Model | Fail Safe | Torque (lb-in) | Control Signal        | Power             | Feedback | Switches | Timing (sec) | Honeywell Model | Torque (lb-in) | Control Signal                 | Power       | Feedback     | Switches | Timing (sec) |
|----------------|-----------|----------------|-----------------------|-------------------|----------|----------|--------------|-----------------|----------------|--------------------------------|-------------|--------------|----------|--------------|
| MF41-6043      | NSR       | 35 lb-in       | Floating              | 24 Vac            | —        | —        | < 90         | MN6105A1011     | 44 lb-in       | On/Off, Floating               | 24 Vac/Vdc  | —            | —        | 90           |
| MF41-6043-502  | NSR       | 35 lb-in       | Floating              | 24 Vac            | —        | 2        | < 90         | MN6105A1201     | 44 lb-in       | On/Off, Floating               | 24 Vac/Vdc  | —            | 2        | 90           |
| MF41-6043-510  | NSR       | 35 lb-in       | Floating              | 24 Vac            | 0-1 kOhm | —        | < 90         | MN7505A2001     | 44 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| MF41-6083      | NSR       | 70 lb-in       | Floating              | 24 Vac            | —        | —        | < 125        | MN6110A1003     | 88 lb-in       | On/Off, Floating               | 24 Vac/Vdc  | —            | —        | 90           |
| MF41-6083-502  | NSR       | 70 lb-in       | Floating              | 24 Vac            | —        | 2        | < 125        | MN6110A1201     | 88 lb-in       | On/Off, Floating               | 24 Vac/Vdc  | —            | 2        | 90           |
| MF41-6083-510  | NSR       | 70 lb-in       | Floating              | 24 Vac            | 0-1 kOhm | —        | < 125        | MN7510A2001     | 88 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| MF41-6153      | NSR       | 133 lb-in      | Floating              | 24 Vac            | —        | —        | < 125        | MN6120A1002     | 175 lb-in      | On/Off, Floating               | 24 Vac/Vdc  | —            | —        | 90           |
| MF4D-6043-100  | NSR       | 35 lb-in       | Floating              | 24 Vac, 20-30 Vdc | —        | —        | < 85         | MS7505A2030     | 44 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| MF4D-6083-100  | NSR       | 70 lb-in       | Floating              | 24 Vac, 20-30 Vdc | —        | —        | < 85         | MS7510A2008     | 88 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| MF4E-60430-100 | NSR       | 35 lb-in       | Floating              | 24 Vac            | —        | —        | 90           | MN6105A1011     | 44 lb-in       | On/Off, Floating               | 24 Vac/Vdc  | —            | —        | 90           |
| MF4E-60830-100 | NSR       | 70 lb-in       | Floating              | 24 Vac            | —        | —        | 90           | MN6110A1003     | 88 lb-in       | On/Off, Floating               | 24 Vac/Vdc  | —            | —        | 90           |
| MS41-6043      | NSR       | 35 lb-in       | 0-10 Vdc              | 24 Vac            | 0-10 Vdc | —        | < 90         | MN7505A2001     | 44 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| MS41-6043-502  | NSR       | 35 lb-in       | 0-10 Vdc              | 24 Vac            | 0-10 Vdc | 2        | < 90         | MN7505A2209     | 44 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | 2        | 90           |
| MS41-6043-520  | NSR       | 35 lb-in       | 0-10 Vdc (adjustable) | 24 Vac            | 0-10 Vdc | —        | < 90         | MN7505A2001     | 44 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| MS41-6043-522  | NSR       | 35 lb-in       | 0-10 Vdc (adjustable) | 24 Vac            | 0-10 Vdc | 2        | < 90         | MN7505A2209     | 44 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | 2        | 90           |
| MS41-6083      | NSR       | 70 lb-in       | 0-10 Vdc              | 24 Vac            | 0-10 Vdc | —        | < 125        | MN7510A2001     | 88 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| MS41-6083-502  | NSR       | 70 lb-in       | 0-10 Vdc              | 24 Vac            | 0-10 Vdc | 2        | < 125        | MN7510A2209     | 88 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | 2        | 90           |
| MS41-6083-520  | NSR       | 70 lb-in       | 0-10 Vdc (adjustable) | 24 Vac            | 0-10 Vdc | —        | < 125        | MN7510A2001     | 88 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| MS41-6083-522  | NSR       | 70 lb-in       | 0-10 Vdc (adjustable) | 24 Vac            | 0-10 Vdc | 2        | < 125        | MN7510A2209     | 88 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | 2        | 90           |
| MS41-6153      | NSR       | 133 lb-in      | 0-10 Vdc              | 24 Vac            | 0-10 Vdc | —        | < 125        | MN7220A2007     | 175 lb-in      | (0) 2-10 Vdc, (0) 4-20 mA      | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| MS41-6153-502  | NSR       | 133 lb-in      | 0-10 Vdc              | 24 Vac            | 0-10 Vdc | 2        | < 125        | MN7220A2205     | 175 lb-in      | (0) 2-10 Vdc, (0) 4-20 mA      | 24 Vac/Vdc  | (0) 2-10 Vdc | 2        | 90           |
| MS41-6340      | NSR       | 300 lb-in      | 2-10 Vdc, 4-20 mA     | 120 Vac           | —        | —        | < 145        | MN7234A2008     | 300 lb-in      | (0) 2-10 Vdc, (0) 4-20 mA      | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| MS41-6341      | NSR       | 300 lb-in      | 2-10 Vdc, 4-20 mA     | 240 Vac           | —        | —        | < 145        | MN7234A2008     | 300 lb-in      | (0) 2-10 Vdc, (0) 4-20 mA      | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| MS41-6343      | NSR       | 300 lb-in      | 2-10 Vdc, 4-20 mA     | 24 Vac            | —        | —        | < 145        | MN7234A2008     | 300 lb-in      | (0) 2-10 Vdc, (0) 4-20 mA      | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| MS4D-6043-100  | NSR       | 35 lb-in       | 2-10 Vdc              | 24 Vac, 20-30 Vdc | 2-10 Vdc | —        | < 85         | MN7505A2001     | 44 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| MS4D-6043-150  | NSR       | 35 lb-in       | 0-10 Vdc              | 24 Vac, 20-30 Vdc | 2-10 Vdc | —        | < 85         | MN7505A2001     | 44 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| MS4D-6043-160  | NSR       | 35 lb-in       | 4-20 mA               | 24 Vac, 20-30 Vdc | 2-10 Vdc | —        | < 85         | MN7505A2001     | 44 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| MS4D-6083-100  | NSR       | 70 lb-in       | 2-10 Vdc              | 24 Vac, 20-30 Vdc | 2-10 Vdc | —        | < 85         | MN7510A2001     | 88 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| MS4D-6083-150  | NSR       | 70 lb-in       | 0-10 Vdc              | 24 Vac, 20-30 Vdc | 2-10 Vdc | —        | < 85         | MN7510A2001     | 88 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| MS4D-6083-160  | NSR       | 70 lb-in       | 4-20 mA               | 24 Vac, 20-30 Vdc | 2-10 Vdc | —        | < 85         | MN7510A2001     | 88 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| MS50-H2001     | NSR       | 300 lb-in      | 1-5 Vdc, 4-20 mA      | 120 Vac           | —        | —        | 145          | MN7234A2008     | 300 lb-in      | (0) 2-10 Vdc, (0) 4-20 mA      | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| MS50-H2101     | NSR       | 300 lb-in      | 1-5 Vdc, 4-20 mA      | 240 Vac           | —        | —        | 145          | MN7234A2008     | 300 lb-in      | (0) 2-10 Vdc, (0) 4-20 mA      | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| MS50-H2301     | NSR       | 300 lb-in      | 1-5 Vdc, 4-20 mA      | 24 Vac            | —        | —        | 145          | MN7234A2008     | 300 lb-in      | (0) 2-10 Vdc, (0) 4-20 mA      | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| MA40-7043      | SR        | 35 lb-in       | On/Off                | 24 Vac, 22-30 Vdc | —        | —        | < 50         | MS8105A1030     | 44 lb-in       | Two-Position (SPST)            | 24 Vac/Vdc  | —            | —        | 45           |
| MA40-7043-501  | SR        | 35 lb-in       | On/Off                | 24 Vac, 22-30 Vdc | —        | 1        | < 50         | MS8105A1130     | 44 lb-in       | Two-Position (SPST)            | 24 Vac/Vdc  | —            | 1        | 45           |
| MA40-7170      | SR        | 150 lb-in      | On/Off                | 120 Vac           | —        | —        | < 145        | MS4120A1001     | 175 lb-in      | Two-Position (SPST)            | 100-250 Vac | —            | —        | 45           |
| MA40-7171      | SR        | 150 lb-in      | On/Off                | 240 Vac           | —        | —        | < 145        | MS4120A1001     | 175 lb-in      | Two-Position (SPST)            | 100-250 Vac | —            | —        | 45           |
| MA40-7173      | SR        | 150 lb-in      | On/Off                | 24 Vac, ±20%      | —        | —        | < 145        | MS8120A1007     | 175 lb-in      | Two-Position (SPST)            | 24 Vac/Vdc  | —            | —        | 45           |
| MA41-7073      | SR        | 60 lb-in       | On/Off                | 24 Vac, 22-30 Vdc | —        | —        | < 80         | MS8110A1008     | 88 lb-in       | Two-Position (SPST)            | 24 Vac/Vdc  | —            | —        | 45           |
| MA41-7073-502  | SR        | 60 lb-in       | On/Off                | 24 Vac, 22-30 Vdc | —        | 2        | < 80         | MS8110A1206     | 88 lb-in       | Two-Position (SPST)            | 24 Vac/Vdc  | —            | 2        | 45           |

# Cross Reference - Actuators

## Direct Coupled Actuators

| Invensys Model | Fail Safe | Torque (lb-in) | Control Signal    | Power             | Feedback | Switches | Timing (sec) | Honeywell Model | Torque (lb-in) | Control Signal                 | Power       | Feedback     | Switches | Timing (sec) |
|----------------|-----------|----------------|-------------------|-------------------|----------|----------|--------------|-----------------|----------------|--------------------------------|-------------|--------------|----------|--------------|
| MA41-7153      | SR        | 133 lb-in      | On/Off            | 24 Vac, 22-30 Vdc | —        | —        | < 190        | MS8120A1007     | 175 lb-in      | Two-Position (SPST)            | 24 Vac/Vdc  | —            | —        | 45           |
| MA41-7153-502  | SR        | 133 lb-in      | On/Off            | 24 Vac, 22-30 Vdc | —        | 2        | < 190        | MS8120A1205     | 175 lb-in      | Two-Position (SPST)            | 24 Vac/Vdc  | —            | 2        | 45           |
| MA4D-7030-000  | SR        | 30 lb-in       | On/Off            | 120 Vac           | —        | —        | < 56         | MS4105A1030     | 44 lb-in       | Two-Position (SPST)            | 100-250 Vac | —            | —        | 45           |
| MA4D-7031-000  | SR        | 30 lb-in       | On/Off            | 230 Vac           | —        | —        | < 56         | MS4105A1030     | 44 lb-in       | Two-Position (SPST)            | 100-250 Vac | —            | —        | 45           |
| MA4D-7033-100  | SR        | 30 lb-in       | On/Off            | 24 Vac, 20-30 Vdc | —        | —        | < 56         | MS8105A1008     | 44 lb-in       | Two-Position (SPST)            | 24 Vac/Vdc  | —            | —        | 45           |
| MA4D-8030-000  | SR        | 30 lb-in       | On/Off            | 120 Vac           | —        | —        | < 56         | MS4105A1030     | 44 lb-in       | Two-Position (SPST)            | 100-250 Vac | —            | —        | 45           |
| MA4D-8031-000  | SR        | 30 lb-in       | On/Off            | 230 Vac           | —        | —        | < 56         | MS4105A1030     | 44 lb-in       | Two-Position (SPST)            | 100-250 Vac | —            | —        | 45           |
| MA4D-8033-100  | SR        | 30 lb-in       | On/Off            | 24 Vac, 20-30 Vdc | —        | —        | < 56         | MS8105A1008     | 44 lb-in       | Two-Position (SPST)            | 24 Vac/Vdc  | —            | —        | 45           |
| MF40-7043      | SR        | 35 lb-in       | Floating          | 24 Vac, 22-30 Vdc | —        | —        | < 130        | MS7505A2030     | 44 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| MF40-7043-501  | SR        | 35 lb-in       | Floating          | 24 Vac, 22-30 Vdc | —        | 1        | < 130        | MS7505A2130     | 44 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | 1        | 90           |
| MF40-7173      | SR        | 150 lb-in      | Floating          | 24 Vac, ±20%      | —        | —        | < 145        | MS7520A2007     | 175 lb-in      | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| MF41-7073      | SR        | 60 lb-in       | Floating          | 24 Vac, 22-30 Vdc | —        | —        | < 195        | MS7510A2008     | 88 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| MF41-7073-502  | SR        | 60 lb-in       | Floating          | 24 Vac, 22-30 Vdc | —        | 2        | < 195        | MS7510A2206     | 88 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | 2        | 90           |
| MF41-7153      | SR        | 133 lb-in      | Floating          | 24 Vac, 22-30 Vdc | —        | —        | < 190        | MS7520A2007     | 175 lb-in      | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| MF41-7153-502  | SR        | 133 lb-in      | Floating          | 24 Vac, 22-30 Vdc | —        | 2        | < 190        | MS7520A2205     | 175 lb-in      | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | 2        | 90           |
| MF4D-7033-100  | SR        | 30 lb-in       | Floating          | 24 Vac, 20-30 Vdc | 2-10 Vdc | —        | < 85         | MS7505A2008     | 44 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| MF4D-8033-100  | SR        | 30 lb-in       | Floating          | 24 Vac, 20-30 Vdc | 2-10 Vdc | —        | < 85         | MS7505A2008     | 44 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| MS40-7043      | SR        | 35 lb-in       | 2-10 Vdc, 4-20 mA | 24 Vac, 22-30 Vdc | 2-10 Vdc | —        | < 130        | MS7505A2030     | 44 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| MS40-7043-501  | SR        | 35 lb-in       | 2-10 Vdc, 4-20 mA | 24 Vac, 22-30 Vdc | 2-10 Vdc | 1        | < 130        | MS7505A2130     | 44 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | 1        | 90           |
| MS40-7170      | SR        | 150 lb-in      | 2-10 Vdc, 4-20 mA | 120 Vac           | —        | —        | < 145        | MS7520A2007     | 175 lb-in      | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| MS40-7171      | SR        | 150 lb-in      | 2-10 Vdc, 4-20 mA | 240 Vac           | —        | —        | < 145        | MS7520A2007     | 175 lb-in      | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| MS40-7173      | SR        | 150 lb-in      | 2-10 Vdc, 4-20 mA | 24 Vac, ±20%      | —        | —        | < 145        | MS7520A2007     | 175 lb-in      | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| MS41-7073      | SR        | 60 lb-in       | 2-10 Vdc, 4-20 mA | 24 Vac, 22-30 Vdc | 2-10 Vdc | —        | < 195        | MS7510A2008     | 88 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| MS41-7073-502  | SR        | 60 lb-in       | 2-10 Vdc, 4-20 mA | 24 Vac, 22-30 Vdc | 2-10 Vdc | 2        | < 195        | MS7510A2206     | 88 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | 2        | 90           |
| MS41-7153      | SR        | 133 lb-in      | 2-10 Vdc, 4-20 mA | 24 Vac, 22-30 Vdc | 2-10 Vdc | —        | < 190        | MS7520A2007     | 175 lb-in      | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| MS41-7153-502  | SR        | 133 lb-in      | 2-10 Vdc, 4-20 mA | 24 Vac, 22-30 Vdc | 2-10 Vdc | 2        | < 190        | MS7520A2205     | 175 lb-in      | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | 2        | 90           |
| MS4D-7033-100  | SR        | 30 lb-in       | 2-10 Vdc, 4-20 mA | 24 Vac, 20-30 Vdc | 2-10 Vdc | —        | < 85         | MS7505A2008     | 44 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| MS4D-7033-150  | SR        | 30 lb-in       | 0-10 Vdc, 4-20 mA | 24 Vac, 20-30 Vdc | 2-10 Vdc | —        | < 85         | MS7505A2008     | 44 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| MS4D-7033-160  | SR        | 30 lb-in       | 4-20 mA           | 24 Vac, 22-30 Vdc | 2-10 Vdc | —        | < 85         | MS7505A2008     | 44 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| MS4D-8033-100  | SR        | 30 lb-in       | 2-10 Vdc, 4-20 mA | 24 Vac, 22-30 Vdc | 2-10 Vdc | —        | < 85         | MS7505A2008     | 44 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| MS4D-8033-150  | SR        | 30 lb-in       | 0-10 Vdc, 4-20 mA | 24 Vac, 22-30 Vdc | 2-10 Vdc | —        | < 85         | MS7505A2008     | 44 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| MS4D-8033-160  | SR        | 30 lb-in       | 4-20 mA           | 24 Vac, 22-30 Vdc | 2-10 Vdc | —        | < 85         | MS7505A2008     | 44 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| MS50-E2001     | SR        | 150 lb-in      | 1-5 Vdc, 4- 20 mA | 120 Vac           | —        | —        | 145          | MS7520A2007     | 175 lb-in      | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| MS50-E2101     | SR        | 150 lb-in      | 1-5 Vdc, 4- 20 mA | 240 Vac           | —        | —        | 145          | MS7520A2007     | 175 lb-in      | On/Off                         | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| MS50-E2301     | SR        | 150 lb-in      | 1-5 Vdc, 4- 20 mA | 24 Vac            | —        | —        | 145          | MS7520A2007     | 175 lb-in      | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |

Invensys Notes: All models described as (0)2-10 Vdc can be used with a 4-20 mA control input. Shunt a 500 kOhm, 1/2 W resistor across the input at the actuator.

# Cross Reference - Actuators

## Direct Coupled Actuators

| Siemens Model | Fail Safe | Torque (lb-in) | Control Signal   | Power      | Feedback | Switches | Timing (sec) | Honeywell Model       | Torque (lb-in) | Control Signal                 | Power       | Feedback     | Switches | Timing (sec) |
|---------------|-----------|----------------|------------------|------------|----------|----------|--------------|-----------------------|----------------|--------------------------------|-------------|--------------|----------|--------------|
| GDE131.1U     | NSR       | 44 lb-in       | Floating         | 24 Vac     | —        | —        | 90           | MN6105A1011           | 44 lb-in       | On/Off, Floating               | 24 Vac/Vdc  | —            | —        | 90           |
| GDE131.1P     | NSR       | 44 lb-in       | Floating         | 24 Vac     | —        | —        | 90           | MN6105A1011           | 44 lb-in       | On/Off, Floating               | 24 Vac/Vdc  | —            | —        | 90           |
| GDE161.1P     | NSR       | 44 lb-in       | 0-10 Vdc         | 24 Vac     | 0-1 kOhm | —        | 90           | MN7505A2001           | 44 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| GDE132.1P     | NSR       | 44 lb-in       | Floating         | 24 Vac     | 0-1 kOhm | —        | 90           | MN7505A2001           | 44 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| GDE136.1P     | NSR       | 44 lb-in       | Floating         | 24 Vac     | —        | 2        | 90           | MN6105A1201           | 44 lb-in       | On/Off, Floating               | 24 Vac/Vdc  | —            | 2        | 90           |
| GLB131.1P     | NSR       | 88 lb-in       | Floating         | 24 Vac     | —        | —        | 125          | MN6110A1003           | 88 lb-in       | On/Off, Floating               | 24 Vac/Vdc  | —            | —        | 90           |
| GLB161.1P     | NSR       | 88 lb-in       | 0-10 Vdc         | 24 Vac     | —        | —        | 125          | MN7510A2001           | 88 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| GLB132.1P     | NSR       | 88 lb-in       | Floating         | 24 Vac     | 0-1 kOhm | —        | 125          | ML6174A2002 + 200976C | 70 lb-in       | On/Off, Floating               | 24 Vac      | 0-2 kOhm     | —        | 90           |
| GLB136.1P     | NSR       | 88 lb-in       | Floating         | 24 Vac     | —        | 2        | 125          | MN6110A1201           | 88 lb-in       | On/Off, Floating               | 24 Vac/Vdc  | —            | 2        | 90           |
| GLB163.1P     | NSR       | 88 lb-in       | 0-10 Vdc         | 24 Vac     | —        | —        | 125          | MN7510A2001           | 88 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| GLB164.1P     | NSR       | 88 lb-in       | 0-10 Vdc         | 24 Vac     | —        | 2        | 125          | MN7510A2209           | 88 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | 2        | 90           |
| GLB166.1P     | NSR       | 88 lb-in       | 0-10 Vdc         | 24 Vac     | —        | 2        | 125          | MN7510A2209           | 88 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | 2        | 90           |
| GEB131.1U     | NSR       | 132 lb-in      | Floating         | 24 Vac     | —        | —        | 125          | MN6120A1002           | 175 lb-in      | On/Off, Floating               | 24 Vac/Vdc  | —            | —        | 90           |
| GEB136.1U     | NSR       | 132 lb-in      | Floating         | 24 Vac     | —        | 2        | 125          | MN6120A1200           | 175 lb-in      | On/Off, Floating               | 24 Vac/Vdc  | —            | 2        | 90           |
| GEB161.1U     | NSR       | 132 lb-in      | 0-10 Vdc         | 24 Vac     | —        | —        | 125          | MN7220A2007           | 175 lb-in      | (0) 2-10 Vdc, (0) 4-20 mA      | 24 Vac/Vdc  | —            | —        | 90           |
| GBB171.1P     | NSR       | 221 lb-in      | On/Off, Floating | 24 Vac     | —        | —        | 150          | MN6120A1002           | 175 lb-in      | On/Off, Floating               | 24 Vac/Vdc  | —            | —        | 90           |
| GBB131.1U     | NSR       | 221 lb-in      | Floating         | 24 Vac     | —        | —        | 150          | MN6120A1002           | 175 lb-in      | On/Off, Floating               | 24 Vac/Vdc  | —            | —        | 90           |
| GBB136.1U     | NSR       | 221 lb-in      | Floating         | 24 Vac     | —        | —        | 150          | MN6120A1200           | 175 lb-in      | On/Off, Floating               | 24 Vac/Vdc  | —            | —        | 90           |
| GBB161.1U     | NSR       | 221 lb-in      | 0-10 Vdc         | 24 Vac     | —        | —        | 150          | MN7220A2007           | 175 lb-in      | (0) 2-10 Vdc, (0) 4-20 mA      | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| GBB166.1U     | NSR       | 221 lb-in      | 0-10 Vdc         | 24 Vac     | —        | 2        | 150          | MN7220A2205           | 175 lb-in      | (0) 2-10 Vdc, (0) 4-20 mA      | 24 Vac/Vdc  | (0) 2-10 Vdc | 2        | 90           |
| GBB151.1P     | NSR       | 221 lb-in      | 4-20 mA          | 24 Vac     | —        | —        | 150          | MN7220A2007           | 175 lb-in      | (0) 2-10 Vdc, (0) 4-20 mA      | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| GBB166.1P     | NSR       | 221 lb-in      | 0-10 Vdc         | 24 Vac     | —        | 2        | 150          | MN7220A2205           | 175 lb-in      | (0) 2-10 Vdc, (0) 4-20 mA      | 24 Vac/Vdc  | (0) 2-10 Vdc | 2        | 90           |
| GBB156.1P     | NSR       | 221 lb-in      | 4-20 mA          | 24 Vac     | —        | 2        | 150          | MN7220A2205           | 175 lb-in      | (0) 2-10 Vdc, (0) 4-20 mA      | 24 Vac/Vdc  | (0) 2-10 Vdc | 2        | 90           |
| GIB161.1U     | NSR       | 310 lb-in      | 0-10 Vdc         | 24 Vac     | —        | —        | 150          | MN7234A2008           | 300 lb-in      | (0) 2-10 Vdc, (0) 4-20 mA      | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| GIB151.1U     | NSR       | 310 lb-in      | 4-20 mA          | 24 Vac     | —        | —        | 150          | MN7234A2008           | 300 lb-in      | (0) 2-10 Vdc, (0) 4-20 mA      | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| GIB166.1U     | NSR       | 310 lb-in      | 0-10 Vdc         | 24 Vac     | —        | 2        | 150          | MN7234A2008 + SW-US2  | 300 lb-in      | (0) 2-10 Vdc, (0) 4-20 mA      | 24 Vac/Vdc  | (0) 2-10 Vdc | 2        | 90           |
| GIB156.1U     | NSR       | 310 lb-in      | 4-20 mA          | 24 Vac     | —        | 2        | 150          | MN7234A2008 + SW2-US  | 300 lb-in      | (0) 2-10 Vdc, (0) 4-20 mA      | 24 Vac/Vdc  | (0) 2-10 Vdc | 2        | 90           |
| GQD121.1P     | SR        | 20 lb-in       | On/Off           | 24 Vac/dc  | —        | —        | 30           | MS8103A1030           | 27 lb-in       | Two-Position (SPST)            | 24 Vac/Vdc  | —            | —        | 45           |
| GQD126.1P     | SR        | 20 lb-in       | On/Off           | 24 Vac/dc  | —        | 2        | 30           | MS8103A1130           | 27 lb-in       | Two-Position (SPST)            | 24 Vac/Vdc  | —            | 1        | 45           |
| GQD221.1U     | SR        | 20 lb-in       | On/Off           | 120 Vac    | —        | —        | 30           | MS4103A1030           | 27 lb-in       | Two-Position (SPST)            | 100-250 Vac | —            | —        | 45           |
| GQD226.1P     | SR        | 20 lb-in       | On/Off           | 120 Vac    | —        | 2        | 30           | MS4103A1130           | 27 lb-in       | Two-Position (SPST)            | 100-250 Vac | —            | —        | 45           |
| GQD131.1P     | SR        | 20 lb-in       | Floating         | 24 Vac/dc  | —        | —        | 30           | MS7503A2021           | 27 lb-in       | Floating, (0) 2-10 Vdc         | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| GQD136.1P     | SR        | 20 lb-in       | Floating         | 24 Vac/dc  | —        | 2        | 30           | MS7503A2221           | 27 lb-in       | Floating, (0) 2-10 Vdc         | 24 Vac/Vdc  | (0) 2-10 Vdc | 2        | 90           |
| GQD151.1P     | SR        | 20 lb-in       | 2-10 Vdc         | 24 Vac/dc  | 2-10 Vdc | —        | 30           | MS7503A2021           | 27 lb-in       | Floating, (0) 2-10 Vdc         | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| GQD156.1P     | SR        | 20 lb-in       | 2-10 Vdc         | 24 Vac/dc  | 2-10 Vdc | 2        | 30           | MS7503A2221           | 27 lb-in       | Floating, (0) 2-10 Vdc         | 24 Vac/Vdc  | (0) 2-10 Vdc | 2        | 90           |
| GMA121.1U     | SR        | 62 lb-in       | On/Off           | 24 Vac/dc  | —        | —        | 90           | MS8110A1008           | 88 lb-in       | Two-Position (SPST)            | 24 Vac/Vdc  | —            | —        | 45           |
| GMA121.1P     | SR        | 62 lb-in       | On/Off           | 24 Vac/dc  | —        | —        | 90           | MS8110A1008           | 88 lb-in       | Two-Position (SPST)            | 24 Vac/Vdc  | —            | —        | 45           |
| GMA126.1U     | SR        | 62 lb-in       | On/Off           | 24 Vac/dc  | —        | 2        | 90           | MS8110A1206           | 88 lb-in       | Two-Position (SPST)            | 24 Vac/Vdc  | —            | 2        | 45           |
| GMA126.1P     | SR        | 62 lb-in       | On/Off           | 24 Vac/dc  | —        | 2        | 90           | MS8110A1206           | 88 lb-in       | Two-Position (SPST)            | 24 Vac/Vdc  | —            | 2        | 45           |
| GMA221.1U     | SR        | 62 lb-in       | On/Off           | 120 Vac    | —        | —        | 90           | MS4110A1002           | 88 lb-in       | Two-Position (SPST)            | 100-250 Vac | —            | —        | 45           |
| GMA226.1U     | SR        | 62 lb-in       | On/Off           | 120 Vac    | —        | 2        | 90           | MS4110A1200           | 88 lb-in       | Two-Position (SPST)            | 100-250 Vac | —            | 2        | 45           |
| GMA131.1U     | SR        | 62 lb-in       | Floating         | 24 Vac/Vdc | —        | —        | 90           | MS7510A2008           | 88 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| GMA131.1P     | SR        | 62 lb-in       | Floating         | 24 Vac/Vdc | —        | —        | 90           | MS7510A2008           | 88 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| GMA132.1U     | SR        | 62 lb-in       | Floating         | 24 Vac/Vdc | 0-1 kOhm | —        | 90           | MS7510A2008           | 88 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| GMA136.1U     | SR        | 62 lb-in       | Floating         | 24 Vac/dc  | —        | 2        | 90           | MS7510A2206           | 88 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | 2        | 90           |
| GMA151.1U     | SR        | 62 lb-in       | 2-10 Vdc         | 24 Vac/Vdc | 0-1 kOhm | —        | 90           | MS7510A2008           | 88 lb-in       | (0) 2-10 Vdc, (0) 4-20 mA      | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |

# Cross Reference - Actuators

## Direct Coupled Actuators

| Siemens Model | Fail Safe | Torque (lb-in) | Control Signal | Power      | Feedback | Switches | Timing (sec) | Honeywell Model | Torque (lb-in) | Control Signal                 | Power       | Feedback     | Switches | Timing (sec) |
|---------------|-----------|----------------|----------------|------------|----------|----------|--------------|-----------------|----------------|--------------------------------|-------------|--------------|----------|--------------|
| GMA151.1P     | SR        | 62 lb-in       | 2-10 Vdc       | 24 Vac/Vdc | 0-1 kOhm | —        | 90           | MS7510A2008     | 88 lb-in       | (0) 2-10 Vdc, (0) 4-20 mA      | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| GMA156.1U     | SR        | 62 lb-in       | 2-10 Vdc       | 24 Vac/Vdc | 0-1 kOhm | 2        | 90           | MS7510A2206     | 88 lb-in       | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | 2        | 90           |
| GMA156.1P     | SR        | 62 lb-in       | 2-10 Vdc       | 24 Vac/Vdc | 0-1 kOhm | 2        | 90           | MS7510A2206     | 88 lb-in       | (0) 2-10 Vdc, (0) 4-20 mA      | 24 Vac/Vdc  | (0) 2-10 Vdc | 2        | 90           |
| GCA121.1U     | SR        | 160 lb-in      | On/Off         | 24 Vac/dc  | —        | —        | 90           | MS8120A1007     | 175 lb-in      | Two-Position (SPST)            | 24 Vac/Vdc  | —            | —        | 45           |
| GCA121.1P     | SR        | 160 lb-in      | On/Off         | 24 Vac/dc  | —        | —        | 90           | MS8120A1007     | 175 lb-in      | Two-Position (SPST)            | 24 Vac/Vdc  | —            | —        | 45           |
| GCA126.1U     | SR        | 160 lb-in      | On/Off         | 24 Vac/dc  | —        | 2        | 90           | MS8120A1205     | 175 lb-in      | Two-Position (SPST)            | 24 Vac/Vdc  | —            | 2        | 45           |
| GCA126.1P     | SR        | 160 lb-in      | On/Off         | 24 Vac/dc  | —        | 2        | 90           | MS8120A1205     | 175 lb-in      | Two-Position (SPST)            | 24 Vac/Vdc  | —            | 2        | 45           |
| GCA221.1U     | SR        | 160 lb-in      | On/Off         | 120 Vac    | —        | —        | 90           | MS4120A1001     | 175 lb-in      | Two-Position (SPST)            | 100-250 Vac | —            | —        | 45           |
| GCA226.1U     | SR        | 160 lb-in      | On/Off         | 120 Vac    | —        | 2        | 90           | MS4120A1209     | 175 lb-in      | Two-Position (SPST)            | 100-250 Vac | —            | 2        | 45           |
| GCA131.1U     | SR        | 160 lb-in      | Floating       | 24 Vac/dc  | —        | —        | 90           | MS7520A2007     | 175 lb-in      | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| GCA131.1P     | SR        | 160 lb-in      | Floating       | 24 Vac/dc  | —        | —        | 90           | MS7520A2007     | 175 lb-in      | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| GCA136.1U     | SR        | 160 lb-in      | Floating       | 24 Vac/dc  | —        | 2        | 90           | MS7520A2205     | 175 lb-in      | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | 2        | 90           |
| GCA136.1P     | SR        | 160 lb-in      | Floating       | 24 Vac/dc  | —        | 2        | 90           | MS7520A2205     | 175 lb-in      | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | 2        | 90           |
| GCA132.1U     | SR        | 160 lb-in      | Floating       | 24 Vac/dc  | 0-1 kOhm | —        | 90           | MS7520A2007     | 175 lb-in      | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| GCA132.1P     | SR        | 160 lb-in      | Floating       | 24 Vac/dc  | 0-1 kOhm | —        | 90           | MS7520A2007     | 175 lb-in      | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| GCA151.1U     | SR        | 160 lb-in      | 4-20 mA        | 24 Vac/dc  | —        | —        | 90           | MS7520A2007     | 175 lb-in      | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| GCA151.1P     | SR        | 160 lb-in      | 4-20 mA        | 24 Vac/dc  | —        | —        | 90           | MS7520A2007     | 175 lb-in      | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| GCA156.1U     | SR        | 160 lb-in      | 4-20 mA        | 24 Vac/dc  | —        | 2        | 90           | MS7520A2205     | 175 lb-in      | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | 2        | 90           |
| GCA156.1P     | SR        | 160 lb-in      | 4-20 mA        | 24 Vac/dc  | —        | 2        | 90           | MS7520A2205     | 175 lb-in      | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | 2        | 90           |
| GCA161.1U     | SR        | 160 lb-in      | 0-10 Vdc       | 24 Vac/dc  | —        | —        | 90           | MS7520A2007     | 175 lb-in      | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| GCA161.1P     | SR        | 160 lb-in      | 0-10 Vdc       | 24 Vac/dc  | —        | —        | 90           | MS7520A2007     | 175 lb-in      | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | —        | 90           |
| GCA166.1U     | SR        | 160 lb-in      | 0-10 Vdc       | 24 Vac/dc  | —        | 2        | 90           | MS7520A2205     | 175 lb-in      | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | 2        | 90           |
| GCA166.1P     | SR        | 160 lb-in      | 0-10 Vdc       | 24 Vac/dc  | —        | 2        | 90           | MS7520A2205     | 175 lb-in      | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | 2        | 90           |
| GCA163.1U     | SR        | 160 lb-in      | 0-10 Vdc       | 24 Vac/dc  | —        | —        | 90           | MS7520H2208     | 175 lb-in      | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | 2        | 90           |
| GCA164.1U     | SR        | 160 lb-in      | 0-10 Vdc       | 24 Vac/dc  | —        | 2        | 90           | MS7520H2208     | 175 lb-in      | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | 2        | 90           |
| GCA166.1P     | SR        | 160 lb-in      | 0-10 Vdc       | 24 Vac/dc  | —        | 2        | 90           | MS7520A2205     | 175 lb-in      | On/Off, Floating, (0) 2-10 Vdc | 24 Vac/Vdc  | (0) 2-10 Vdc | 2        | 90           |

Siemens Notes: All models described as (0) 2-10 Vdc can be used with a 4-20 mA control input. Shunt a 500 kOhm, 1/2 W resistor across the input at the actuator.

Lined area for notes.

## Section 2: Valves

|                                                                |        |                                                                         |          |
|----------------------------------------------------------------|--------|-------------------------------------------------------------------------|----------|
| Overview .....                                                 | 54     | Pressure Independent Control Valves, NPT ½"-1¼"                         |          |
| Control Valve Applications .....                               | 54     | Product Selection .....                                                 | 98, 100  |
| 2-Way Control Valves                                           |        | Submittal Data.....                                                     | 170, 190 |
| Product Selection .....                                        | 55     | Dimensional Diagram.....                                                | 190      |
| Accessories .....                                              | 222    | Wiring Diagrams .....                                                   | 209      |
| 3-Way Control Valves                                           |        | Short Order Codes .....                                                 | 102      |
| Product Selection .....                                        | 57     | Accessories .....                                                       | 224      |
| Accessories .....                                              | 224    | Pressure Independent Control Valves, NPT 1½"-3"                         |          |
| 2-way & 3-way 1/2" - 1" NPT Zone Valves, VN Series             |        | Product Selection .....                                                 | 99, 101  |
| Product Selection .....                                        | 58     | Submittal Data.....                                                     | 190      |
| Submittal Data.....                                            | 176    | Dimensional Diagram.....                                                | 190      |
| Accessories .....                                              | 224    | Wiring Diagrams .....                                                   | 209      |
| Cartridge Globe Valves                                         |        | Short Order Codes .....                                                 | 112      |
| Product Selection .....                                        | 60     | Accessories .....                                                       | 224      |
| Submittal Data.....                                            | 177    | Pressure Independent Control Valves, Flanged 2½"-6"                     |          |
| 2-Way Control Ball Valves With MVN Actuators ½"-1¼"            |        | Product Selection .....                                                 | 125      |
| Product Selection .....                                        | 62     | Submittal Data.....                                                     | 191      |
| Submittal Data.....                                            | 181    | Dimensional Diagram.....                                                | 191      |
| Wiring Diagrams .....                                          | 213    | NPT Globe Valves ½"- 3", With Dedicated Valve Actuators                 |          |
| Short Order Codes .....                                        | 66     | Product Selection .....                                                 | 126      |
| Accessories .....                                              | 224    | Submittal Data.....                                                     | 171, 185 |
| 2-Way Control Ball Valves With Direct Coupled Actuators ½"-3"  |        | Dimensional Diagram.....                                                | 185      |
| Product Selection .....                                        | 62, 63 | Close-off Pressure Charts .....                                         | 134      |
| Submittal Data.....                                            | 179    | Accessories .....                                                       | 222      |
| Wiring Diagrams .....                                          | 209    | NPT Globe Valves ½"- 3", With DCA and Valve Linkage                     |          |
| Short Order Codes .....                                        | 76     | Product Selection .....                                                 | 128      |
| Accessories .....                                              | 224    | Submittal Data.....                                                     | 185      |
| 3-Way Control Ball Valves With MVN Actuators ½"-1¼"            |        | Dimensional Diagram.....                                                | 185      |
| Product Selection .....                                        | 64     | Accessories .....                                                       | 222      |
| Submittal Data.....                                            | 181    | NPT Globe Valves ½"- 3", With Pneumatic Actuator                        |          |
| Wiring Diagrams .....                                          | 213    | Product Selection .....                                                 | 132      |
| Short Order Codes .....                                        | 72     | Submittal Data.....                                                     | 166, 185 |
| Accessories .....                                              | 224    | Dimensional Diagram.....                                                | 185      |
| 3-Way Control Ball Valves With Direct Coupled Actuators ½"-2½" |        | Accessories .....                                                       | 224      |
| Product Selection .....                                        | 64, 65 | Flanged Globe Valves 2½"- 3", With DCA and Valve Linkage                |          |
| Submittal Data.....                                            | 181    | Product Selection .....                                                 | 136      |
| Wiring Diagrams .....                                          | 209    | Submittal Data.....                                                     | 188, 197 |
| Short Order Codes .....                                        | 87     | Dimensional Diagram.....                                                | 188, 197 |
| Accessories .....                                              | 224    | Accessories .....                                                       | 222      |
| 2-Way Flanged Control Ball Valves 4"-6", NEMA 2+3R             |        | Threaded/Flanged Globe Valves 2"- 3", With Tandem DCA and Valve Linkage |          |
| Product Selection .....                                        | 94     | Product Selection .....                                                 | 138      |
| Submittal Data.....                                            | 183    | Submittal Data.....                                                     | 188, 198 |
| Dimensional Diagram.....                                       | 183    | Dimensional Diagram.....                                                | 188, 198 |
| 3-Way Flanged Control Ball Valves 4"-6", NEMA 2+3R             |        | Accessories .....                                                       | 222      |
| Product Selection .....                                        | 95     | Flanged Globe Valves 2½"- 3", With Dedicated Valve Actuators            |          |
| Submittal Data.....                                            | 184    | Product Selection .....                                                 | 140      |
| Dimensional Diagram.....                                       | 184    | Submittal Data.....                                                     | 171, 188 |
| Flanged Control Ball Valves 2½"- 6"                            |        | Dimensional Diagram.....                                                | 171, 188 |
| Product Selection .....                                        | 96     | Accessories .....                                                       | 222      |

## Section 2: Valves (CONT.)

### Flanged Globe Valves 4"- 6", With Tandem DCA and Valve

#### Linkage

|                           |          |
|---------------------------|----------|
| Product Selection .....   | 143      |
| Submittal Data.....       | 188, 198 |
| Dimensional Diagram ..... | 188, 198 |
| Accessories .....         | 222      |

### Flanged Globe Valves 4"- 6", With Dedicated Valve Actuators

|                         |          |
|-------------------------|----------|
| Product Selection ..... | 145      |
| Submittal Data.....     | 171, 188 |
| Accessories .....       | 222      |

### Flanged Globe Valves 2½"- 3", With Pneumatic Actuators

|                                 |          |
|---------------------------------|----------|
| Product Selection .....         | 146      |
| Submittal Data.....             | 166, 188 |
| Close-off Pressure Charts ..... | 149      |
| Accessories .....               | 224      |

### Flanged Globe Valves 4"- 6", With Pneumatic Actuators

|                                 |          |
|---------------------------------|----------|
| Product Selection .....         | 148      |
| Submittal Data.....             | 166, 188 |
| Dimensional Diagram .....       | 188      |
| Close-off Pressure Charts ..... | 149      |
| Accessories .....               | 224      |

### Resilient Seat Butterfly Valves, 2-Way Fail-in-place

|                           |     |
|---------------------------|-----|
| Product Selection .....   | 150 |
| Submittal Data.....       | 193 |
| Dimensional Diagram ..... | 193 |
| Accessories .....         | 222 |

### Resilient Seat Butterfly Valves, 2-Way Electronic Fail-safe

|                           |     |
|---------------------------|-----|
| Product Selection .....   | 152 |
| Submittal Data.....       | 194 |
| Dimensional Diagram ..... | 192 |
| Accessories .....         | 222 |

### Resilient Seat Butterfly Valves, 3-Way Fail-in-place

|                           |     |
|---------------------------|-----|
| Product Selection .....   | 153 |
| Submittal Data.....       | 192 |
| Dimensional Diagram ..... | 192 |
| Accessories .....         | 222 |

### Resilient Seat Butterfly Valves, 3-Way Fail-in-place

|                           |     |
|---------------------------|-----|
| Product Selection .....   | 153 |
| Submittal Data.....       | 192 |
| Dimensional Diagram ..... | 192 |
| Accessories .....         | 222 |

# Overview - Valves

## Control Valve Applications

| Control Valve Applications |                         |                                 |            |                |                |            |                |            |             |             |             |                 |
|----------------------------|-------------------------|---------------------------------|------------|----------------|----------------|------------|----------------|------------|-------------|-------------|-------------|-----------------|
| Pipe Size, inches (DN)     |                         |                                 |            |                |                |            |                |            |             |             |             |                 |
|                            | 1/2"<br>DN15            | 3/4"<br>DN20                    | 1"<br>DN25 | 1-1/4"<br>DN32 | 1-1/2"<br>DN40 | 2"<br>DN50 | 2-1/2"<br>DN65 | 3"<br>DN80 | 4"<br>DN100 | 5"<br>DN125 | 6"<br>DN150 | 8-24"<br>>DN200 |
| Unitary Equipment          | Fan Coil Units          | Cartridge globe valves          |            |                |                |            |                |            |             |             |             |                 |
|                            |                         | Control ball valves             |            |                |                |            |                |            |             |             |             |                 |
|                            |                         | Pressure regulated valves       |            |                |                |            |                |            |             |             |             |                 |
|                            |                         | Zone valves                     |            |                |                |            |                |            |             |             |             |                 |
|                            | Unit Heaters            | Cartridge globe valves          |            |                |                |            |                |            |             |             |             |                 |
|                            |                         | Control ball valves             |            |                |                |            |                |            |             |             |             |                 |
|                            |                         | Pressure regulated valves       |            |                |                |            |                |            |             |             |             |                 |
|                            |                         | Zone valves                     |            |                |                |            |                |            |             |             |             |                 |
|                            | Convectors              | Control ball valves             |            |                |                |            |                |            |             |             |             |                 |
|                            |                         | Cartridge globe valves          |            |                |                |            |                |            |             |             |             |                 |
|                            |                         | Pressure regulated valves       |            |                |                |            |                |            |             |             |             |                 |
|                            |                         | Zone valves                     |            |                |                |            |                |            |             |             |             |                 |
|                            | Radiant Panels          | Control ball valves             |            |                |                |            |                |            |             |             |             |                 |
|                            |                         | Cartridge globe valves          |            |                |                |            |                |            |             |             |             |                 |
|                            |                         | Pressure regulated valves       |            |                |                |            |                |            |             |             |             |                 |
|                            |                         | Zone valves                     |            |                |                |            |                |            |             |             |             |                 |
|                            | Unit Ventilator         | Cartridge globe valves          |            |                |                |            |                |            |             |             |             |                 |
|                            |                         | Control ball valves             |            |                |                |            |                |            |             |             |             |                 |
|                            |                         | Pressure regulated valves       |            |                |                |            |                |            |             |             |             |                 |
|                            |                         | Zone valves                     |            |                |                |            |                |            |             |             |             |                 |
|                            | Reheat Coils            | Cartridge globe valves          |            |                |                |            |                |            |             |             |             |                 |
|                            |                         | Control ball valves             |            |                |                |            |                |            |             |             |             |                 |
|                            |                         | Pressure regulated valves       |            |                |                |            |                |            |             |             |             |                 |
|                            |                         | Zone valves                     |            |                |                |            |                |            |             |             |             |                 |
| Air Handling Units         | Heating & Cooling Coils | Control ball valves             |            |                |                |            |                |            |             |             |             |                 |
|                            |                         | Pressure regulated valves       |            |                |                |            |                |            |             |             |             |                 |
|                            |                         | Zone valves                     |            |                |                |            |                |            |             |             |             |                 |
|                            |                         | Water Source Heat Pump          |            |                |                |            |                |            |             |             |             |                 |
|                            | Blower Coil             | Cartridge globe valves          |            |                |                |            |                |            |             |             |             |                 |
|                            |                         | Control ball valves             |            |                |                |            |                |            |             |             |             |                 |
|                            |                         | Pressure regulated valves       |            |                |                |            |                |            |             |             |             |                 |
|                            |                         | Zone valves                     |            |                |                |            |                |            |             |             |             |                 |
|                            | Chilled Ceiling         | Threaded globe valve            |            |                |                |            |                |            |             |             |             |                 |
|                            |                         | Threaded control ball valves    |            |                |                |            |                |            |             |             |             |                 |
|                            |                         | Pressure regulated valves       |            |                |                |            |                |            |             |             |             |                 |
|                            |                         | Humidifiers                     |            |                |                |            |                |            |             |             |             |                 |
| Central Plant              | Outdoor reset           | Threaded globe valve            |            |                |                |            |                |            |             |             |             |                 |
|                            |                         | Threaded control ball valves    |            |                |                |            |                |            |             |             |             |                 |
|                            |                         | Flanged globe valve             |            |                |                |            |                |            |             |             |             |                 |
|                            |                         | Flanged ball valve              |            |                |                |            |                |            |             |             |             |                 |
|                            | Boiler Bypass           | Threaded globe valve            |            |                |                |            |                |            |             |             |             |                 |
|                            |                         | Threaded control ball valves    |            |                |                |            |                |            |             |             |             |                 |
|                            |                         | Flanged globe valve             |            |                |                |            |                |            |             |             |             |                 |
|                            |                         | Flanged ball valve              |            |                |                |            |                |            |             |             |             |                 |
|                            | Heat reclaim            | Threaded globe valve            |            |                |                |            |                |            |             |             |             |                 |
|                            |                         | Threaded control ball valves    |            |                |                |            |                |            |             |             |             |                 |
|                            |                         | Steam Heat Exchangers           |            |                |                |            |                |            |             |             |             |                 |
|                            |                         | Flanged globe valve             |            |                |                |            |                |            |             |             |             |                 |
|                            | Greenhouse              | Threaded globe valve            |            |                |                |            |                |            |             |             |             |                 |
|                            |                         | Threaded control ball valves    |            |                |                |            |                |            |             |             |             |                 |
|                            |                         | Flanged globe valve             |            |                |                |            |                |            |             |             |             |                 |
|                            |                         | Flanged ball valve              |            |                |                |            |                |            |             |             |             |                 |
|                            | Thermal Storage         | Threaded globe valve            |            |                |                |            |                |            |             |             |             |                 |
|                            |                         | Threaded control ball valves    |            |                |                |            |                |            |             |             |             |                 |
|                            |                         | Flanged globe valve             |            |                |                |            |                |            |             |             |             |                 |
|                            |                         | Resilient seat butterfly valves |            |                |                |            |                |            |             |             |             |                 |
|                            | Chillers                | Threaded globe valve            |            |                |                |            |                |            |             |             |             |                 |
|                            |                         | Threaded control ball valves    |            |                |                |            |                |            |             |             |             |                 |
|                            |                         | Flanged globe valve             |            |                |                |            |                |            |             |             |             |                 |
|                            |                         | Flanged ball valve              |            |                |                |            |                |            |             |             |             |                 |
|                            | Cooling Towers          | Threaded globe valve            |            |                |                |            |                |            |             |             |             |                 |
|                            |                         | Threaded control ball valves    |            |                |                |            |                |            |             |             |             |                 |
|                            |                         | Resilient seat butterfly valves |            |                |                |            |                |            |             |             |             |                 |
|                            |                         | Pressure regulated valves       |            |                |                |            |                |            |             |             |             |                 |
|                            | Isolation valves        | Threaded control ball valves    |            |                |                |            |                |            |             |             |             |                 |
|                            |                         | Resilient seat butterfly valves |            |                |                |            |                |            |             |             |             |                 |

# Product Selection - Valves

## 2-Way Control Valves

| Attribute              | Specification                       | Unitary         | Zone     | Globe    |        |        |         |                   |        |
|------------------------|-------------------------------------|-----------------|----------|----------|--------|--------|---------|-------------------|--------|
|                        |                                     | Cartridge Globe | Threaded | Threaded |        |        | Flanged | Pressure-Balanced |        |
|                        |                                     | V58x2           | VN       | V5011N   | V5011F | V5011G | VGf2xS  | V5862A3           | VGf2xP |
| Pipe Size              | 1/2" [DN15]                         | •               | •        | •        |        |        |         |                   |        |
|                        | 3/4" [DN20]                         | •               | •        | •        |        |        |         |                   |        |
|                        | 1" [DN25]                           | •               | •        | •        |        |        |         | •                 |        |
|                        | 1-1/4" [DN32]                       | •               |          | •        |        |        |         | •                 |        |
|                        | 1-1/2" [DN40]                       |                 |          | •        |        |        |         | •                 |        |
|                        | 2" [DN50]                           |                 |          | •        |        |        |         |                   |        |
|                        | 2-1/2" [DN65]                       |                 |          |          | •      | •      | •       |                   | •      |
|                        | 3" [DN80]                           |                 |          |          | •      | •      | •       |                   | •      |
|                        | 4" [DN100]                          |                 |          |          |        |        | •       |                   | •      |
|                        | 5" [DN125]                          |                 |          |          |        |        | •       |                   | •      |
|                        | 6" [DN150]                          |                 |          |          |        |        | •       |                   | •      |
|                        | Other (maximum size)                |                 |          |          |        |        |         |                   |        |
| Pipe Fittings          | Sweat                               | •               |          |          |        |        |         |                   |        |
|                        | NPT Internal Thread                 | •               | •        | •        | •      | •      |         | •                 |        |
|                        | Inverted Flare                      |                 |          |          |        |        |         |                   |        |
|                        | ANSI Flange                         |                 |          |          |        |        | •       |                   | •      |
| Static Pressure        | ANSI 125/150                        |                 |          | •        | •      | •      | •       |                   | •      |
|                        | ANSI 250/300                        |                 |          |          |        |        | •       |                   |        |
|                        | Other                               | 230 psi         | PN20     |          |        |        |         | 230 psi           |        |
| Media                  | Chilled Water                       | •               | •        | •        | •      | •      | •       | •                 | •      |
|                        | Hot Water                           | •               | •        | •        | •      | •      | •       | •                 | •      |
|                        | Low Pressure Steam                  |                 |          | N1       | •      | •      | •       |                   | •      |
|                        | High Pressure Steam                 |                 |          | N2       |        | •      | •       |                   | •      |
| Flow Capacity, Cv      | Multiple ratings per pipe size      | •               | •        | •        | •      | •      |         | •                 |        |
|                        | One rating/size above 1/2"          |                 |          | •        | •      | •      | •       |                   | •      |
| Valve Action           | Direct Acting (Stem down to close)  | A2              |          | N1, N2   | •      | •      | •       | •                 | •      |
|                        | Reverse Acting (Stem up to close)   | A3              |          |          |        |        |         |                   |        |
|                        | Rotary N.O.                         |                 | •        |          |        |        |         |                   |        |
|                        | Rotary N.C.                         |                 | •        |          |        |        |         |                   |        |
| Flow Characteristic    | Equal Percentage                    | •               | •        | •        | •      |        | •       |                   | •      |
|                        | Modified Equal Percentage           |                 |          |          |        |        |         |                   |        |
|                        | Linear                              |                 |          | •        |        | •      | •       | •                 | •      |
| Close-off pressure***  | High** (100 psid minimum)           | •               |          |          |        |        |         | •                 | •      |
|                        | Medium (40 psid minimum)            | •               | • 87 psi |          |        |        |         |                   |        |
|                        | Varies with actuator                |                 |          | •        | •      | •      | •       |                   |        |
| Maximum Seat Leakage   | ANSI Class III (0.10% Cv max.)      | 0.02%           |          | 0.05%    |        |        | •       |                   |        |
|                        | ANSI Class IV (0.01% Cv max.)       |                 |          |          |        |        |         | •                 | •      |
|                        | Bubble-tight design                 |                 |          |          |        |        |         |                   |        |
|                        | Other (see product data literature) |                 | < 0.05%  |          | 0.5%   | 0.5%   |         |                   |        |
| Rangeability           | High (50:1 minimum)                 | •               |          | •        | •      | •      | •       | •                 | •      |
|                        | Medium* (15~50:1)                   |                 |          |          |        |        |         |                   |        |
|                        | Low (under 15:1)                    |                 |          |          |        |        |         |                   |        |
| Trim                   | Brass, plated brass, bronze         |                 | •        |          | •      |        |         |                   |        |
|                        | Brass plug /Stainless seat          |                 |          | N1       |        |        |         |                   |        |
|                        | Stainless Steel                     |                 | •        | N2       |        | •      | •       | •                 | •      |
|                        | Resilient materials                 | •               |          |          |        |        |         |                   |        |
| In-line Serviceability | Cartridge                           | •               |          |          |        |        |         |                   |        |
|                        | Packing                             |                 |          | •        | •      | •      | •       | •                 | •      |
|                        | Rebuild                             |                 |          | •        | •      | •      |         |                   |        |
| Actuation Options      | Electronic Modulating               | •               | •        | •        | •      | •      | •       | •                 | •      |
|                        | Tri-state floating                  | •               |          | •        | •      | •      | •       | •                 | •      |
|                        | Pulse Width Modulation              |                 |          |          |        |        |         |                   |        |
|                        | 2-position low voltage              | •               | •        | •        | •      | •      | •       |                   | •      |
|                        | 2-position line voltage             |                 | •        | •        | •      | •      | •       |                   | •      |
|                        | Electric Spring Return              | •               |          | •        | •      | •      | •       | •                 | •      |
|                        | Electronic Fail Safe                |                 | •        |          |        |        |         |                   |        |
|                        | Pneumatic, low pressure             | •               |          | •        | •      | •      | •       |                   | •      |

### Notes

\* Best used with supply water reset from outdoor air temperature.

\*\* Can dead-head pumps. Use with VFD-controlled pumps with maximum pressure cut-out

\*\*\* Maximum operating differential pressure. Static close-off pressure may be higher. Maximum pressure for quiet service may be less.

# Product Selection - Valves

## 2-Way Control Valves

| Attribute              | Specification                       | Control Ball |         | Pressure-Regulated |               | Butterfly      |                  |
|------------------------|-------------------------------------|--------------|---------|--------------------|---------------|----------------|------------------|
|                        |                                     | Threaded     | Flanged | Threaded           | Wafer Flanged | Resilient Seat | High Performance |
|                        |                                     | VBN2         | VBF2    | VRN2               | VRW2          | VR2            | VH2              |
| Pipe Size              | 1/2" [DN15]                         | •            |         | •                  |               |                |                  |
|                        | 3/4" [DN20]                         | •            |         | •                  |               |                |                  |
|                        | 1" [DN25]                           | •            |         | •                  |               |                |                  |
|                        | 1-1/4" [DN32]                       | •            |         | •                  |               |                |                  |
|                        | 1-1/2" [DN40]                       | •            |         | •                  |               |                |                  |
|                        | 2" [DN50]                           | •            |         | •                  |               | •              | •                |
|                        | 2-1/2" [DN65]                       | •            |         | •                  | •             | •              | •                |
|                        | 3" [DN80]                           | •            |         | •                  | •             | •              | •                |
|                        | 4" [DN100]                          |              | •       |                    | •             | •              | •                |
|                        | 5" [DN125]                          |              | •       |                    | •             | •              | •                |
|                        | 6" [DN150]                          |              | •       |                    | •             | •              | •                |
|                        | Other (maximum size)                |              |         |                    |               | 24" [DN600]    |                  |
| Pipe Fittings          | Sweat                               |              |         |                    |               |                |                  |
|                        | NPT Internal Thread                 | •            |         | •                  |               |                |                  |
|                        | Inverted Flare                      |              |         |                    |               |                |                  |
| Static Pressure        | ANSI Flange                         |              | •       |                    | •             | •              | •                |
|                        | ANSI 125/150                        |              | •       |                    | •             |                | •                |
|                        | ANSI 250/300                        |              |         |                    | •             |                |                  |
|                        | Other                               | 360 psi      |         | 360 psi            |               | 232 psi        |                  |
| Media                  | Chilled Water                       | •            | •       | •                  | •             | •              | •                |
|                        | Hot Water                           | •            | •       | •                  | •             | •              | •                |
|                        | Low Pressure Steam                  |              |         |                    |               |                | •                |
|                        | High Pressure Steam                 |              |         |                    |               |                | up to 50 psi     |
| Flow Capacity, Cv      | Multiple ratings per pipe size      | •            | •       | x (gpm)            | x (gpm)       |                |                  |
|                        | One rating/size above 1/2"          |              |         |                    |               | •              | •                |
| Valve Action           | Direct Acting (Stem down to close)  |              |         |                    |               |                |                  |
|                        | Reverse Acting (Stem up to close)   |              |         |                    |               |                |                  |
|                        | Rotary N.O.                         | •            | •       | •                  | •             | •              | •                |
|                        | Rotary N.C.                         | •            | •       | •                  | •             | •              | •                |
| Flow Characteristic    | Equal Percentage                    |              |         | •                  | •             |                |                  |
|                        | Modified Equal Percentage           | •            | •       |                    |               | •              | •                |
|                        | Linear                              |              |         | •                  |               |                |                  |
| Close-off pressure***  | High** (100 psid minimum)           | •            | •       | •                  | •             | •              | •                |
|                        | Medium (40 psid minimum)            |              |         |                    |               |                |                  |
|                        | Varies with actuator                |              |         |                    |               |                |                  |
| Maximum Seat Leakage   | ANSI Class III (0.10% Cv max.)      |              |         | •                  |               |                |                  |
|                        | ANSI Class IV (0.01% Cv max.)       | •            | •       |                    |               |                |                  |
|                        | Bubble-tight design                 |              |         |                    |               | •              | •                |
|                        | Other (see product data literature) |              |         |                    | < 0.2%        |                |                  |
| Rangeability           | High (50:1 minimum)                 | •            | •       | •                  | •             |                | •                |
|                        | Medium* (15~50:1)                   | •            |         | < 10 gpm           |               |                |                  |
|                        | Low (under 15:1)                    |              |         |                    |               | •              |                  |
| Trim                   | Brass, plated brass, bronze         | •            |         | •                  |               |                |                  |
|                        | Brass plug /Stainless seat          |              |         |                    |               |                |                  |
|                        | Stainless Steel                     | •            | •       | •                  | •             | •              | •                |
|                        | Resilient materials                 |              |         | •                  | •             | •              |                  |
| In-line Serviceability | Cartridge                           |              |         | •                  | •             |                |                  |
|                        | Packing                             | •            | •       | •                  | •             |                |                  |
|                        | Rebuild                             |              | •       | Regulator          |               |                |                  |
| Actuation Options      | Electronic Modulating               | •            | •       | •                  | •             | •              | •                |
|                        | Tri-state floating                  | •            | •       | •                  | •             | •              | •                |
|                        | Pulse Width Modulation              |              |         |                    |               |                |                  |
|                        | 2-position low voltage              | •            | •       | •                  | •             | •              | •                |
|                        | 2-position line voltage             | •            | •       | •                  | •             | •              | •                |
|                        | Electric Spring Return              | •            | •       | •                  |               | 2"-2.5"        | 2"-4"            |
|                        | Electronic Fail Safe                |              |         |                    | •             | 3"-12"         | 5"-6"            |
|                        | Pneumatic, low pressure             |              |         |                    |               |                |                  |

### Notes

\* Best used with supply water reset from outdoor air temperature.

\*\* Can dead-head pumps. Use with VFD-controlled pumps with maximum pressure cut-out

\*\*\* Maximum operating differential pressure. Static close-off pressure may be higher. Maximum pressure for quiet service may be less.

# Product Selection - Valves

## 3-Way Control Valves

| Attribute                  | Specification                       | Unitary         |         | Zone     | Globe     |         |          | Control Ball |         | Butterfly      |                  |         |
|----------------------------|-------------------------------------|-----------------|---------|----------|-----------|---------|----------|--------------|---------|----------------|------------------|---------|
|                            |                                     | Cartridge Globe |         | Threaded | Threaded  | Flanged |          | Threaded     | Flanged | Resilient Seat | High Performance |         |
|                            |                                     | V58x3           | V5863A3 | VN       | V5013N... | VGF3xLD | VGF3xEM  | VBN3         | VBF3    | VR3,4,5        | VH3,4,5          | VH6,7,8 |
| Pipe Size                  | 1/2" [DN15]                         | •               |         | •        | •         |         |          | •            |         |                |                  |         |
|                            | 3/4" [DN20]                         | •               |         | •        | •         |         |          | •            |         |                |                  |         |
|                            | 1" [DN25]                           |                 | •       | •        | •         |         |          | •            |         |                |                  |         |
|                            | 1-1/4" [DN32]                       |                 | •       |          | •         |         |          | •            |         |                |                  |         |
|                            | 1-1/2" [DN40]                       |                 | •       |          | •         |         |          | •            |         |                |                  |         |
|                            | 2" [DN50]                           |                 |         |          | •         |         |          | •            |         | •              | •                | •       |
|                            | 2-1/2" [DN65]                       |                 |         |          |           | •       | •        | •            |         | •              | •                | •       |
|                            | 3" [DN80]                           |                 |         |          |           | •       | •        |              |         | •              | •                | •       |
|                            | 4" [DN100]                          |                 |         |          |           | •       | •        |              | •       | •              | •                | •       |
| Pipe Fittings              | 5" [DN125]                          |                 |         |          |           | •       | •        |              | •       | •              | •                | •       |
|                            | 6" [DN150]                          |                 |         |          |           | •       | •        |              | •       | •              | •                | •       |
|                            | Other (maximum size)                |                 |         |          |           |         |          |              |         |                | 20" [DN500]      |         |
|                            | Sweat                               | •               |         |          |           |         |          |              |         |                |                  |         |
| Static Pressure            | NPT Internal Thread                 | •               | •       | •        | •         |         |          | •            |         |                |                  |         |
|                            | Inverted Flare                      |                 |         |          |           |         |          |              |         |                |                  |         |
|                            | ANSI Flange                         |                 |         |          | •         | •       | •        |              | •       |                | •                | •       |
| Media                      | ANSI 125/150                        |                 |         |          | •         | •       | •        |              | •       |                |                  |         |
|                            | ANSI 250/300                        |                 |         |          | •         | •       | •        |              |         |                |                  |         |
|                            | Other                               | 230 psi         | 230 psi | PN20     |           |         |          | 360 psi      |         |                | 250 psi          |         |
| Flow Capacity, Cv          | Chilled Water                       | •               | •       | •        | •         | •       | •        | •            | •       | •              | •                | •       |
|                            | Hot Water                           | •               | •       | •        | •         | •       | •        | •            | •       | •              | •                | •       |
| Valve Action               | Multiple ratings per pipe size      | •               | •       | •        | •         |         |          | •            | •       |                |                  |         |
|                            | One rating/size above 1/2"          |                 |         |          | •         | •       | •        |              |         | •              | •                | •       |
| A-port Flow Characteristic | Mixing                              | •               | •       | •        | •         | •       | •        | •            | •       | •              | •                |         |
|                            | Diverting                           |                 |         | •        |           | •       |          | •            | •       | •              |                  | •       |
|                            | Equal Percentage                    | •               |         | •        | •         | •       |          |              |         |                |                  |         |
|                            | Modified Equal Percentage           |                 |         |          |           |         |          | •            | •       | •              | •                | •       |
| B-port Flow Characteristic | Linear                              |                 | •       |          |           | •       |          |              |         |                |                  |         |
|                            | Quick Open                          |                 |         |          |           |         |          |              |         |                |                  |         |
|                            | Modified Equal Percentage           |                 |         |          |           |         |          |              |         | •              | •                | •       |
|                            | Linear                              |                 |         |          | •         | •       | •        |              |         |                |                  |         |
| Close-off pressure***      | Linear, Reduced Cv                  | •               | •       |          |           |         |          | •            | •       |                |                  |         |
|                            | Total Constant Flow                 | •               | •       |          | •         | •       |          |              |         |                |                  |         |
|                            | High (60 psid minimum)              | •               | •       |          |           |         |          |              | •       | •              | •                | •       |
|                            | Medium (30 psid minimum)            | •               |         | • 87 psi |           |         |          | •            |         | •              | •                | •       |
| Maximum Seat Leakage**     | Varies with actuator                |                 |         |          | •         | •       | •        |              |         |                |                  |         |
|                            | ANSI Class III (0.10% Cv max.)      | •               | •       |          | •         | •       |          |              |         |                |                  |         |
|                            | ANSI Class IV (0.01% Cv max.)       |                 |         |          |           |         |          | •            | A-port  | •              | •                | •       |
|                            | Bubble-tight design                 |                 |         |          |           |         |          |              |         | •              | •                | •       |
| Rangeability               | Other (see product data literature) |                 |         | <0.05%   |           |         | A = 0.5% |              | B-port  |                |                  |         |
|                            | High (50:1 minimum)                 | •               | •       |          | •         | •       | •        | •            | •       |                |                  |         |
|                            | Medium* (15~50:1)                   |                 |         |          |           |         |          | •            |         |                |                  |         |
|                            | Low (under 15:1)                    |                 |         |          |           |         |          |              |         | •              | •                | •       |
| Trim                       | Brass, plated brass, bronze         |                 | •       | •        | •         |         |          | •            |         |                |                  |         |
|                            | Stainless Steel                     |                 |         | •        | •         | •       | •        |              | •       |                |                  |         |
|                            | Resilient materials                 | •               |         |          |           |         |          |              |         | •              | •                | •       |
| In-line Serviceability     |                                     |                 |         |          |           |         |          |              |         |                |                  |         |
|                            | Cartridge                           | •               |         |          |           |         |          |              |         |                |                  |         |
|                            | Packing                             |                 | •       |          | •         | •       | •        | •            | •       |                |                  |         |
| Actuation Options          | Rebuild                             |                 |         |          | •         |         |          |              | •       |                |                  |         |
|                            | Electronic Modulating               | •               | •       | •        | •         | •       | •        | •            | •       | •              | •                | •       |
|                            | Tri-state floating                  | •               |         | •        | •         | •       | •        | •            | •       | •              | •                | •       |
|                            | Pulse Width Modulation              |                 |         |          |           |         |          |              |         |                |                  |         |
|                            | 2-position low voltage              | •               | •       | •        | •         | •       | •        | •            | •       | Limited        |                  |         |
|                            | 2-position line voltage             |                 |         | •        | •         | •       | •        | •            | •       | •              | •                | •       |
|                            | Electric Spring Return              | •               | •       |          | •         | •       | •        | •            | •       | Limited        |                  |         |
|                            | Electronic Fail Safe                |                 |         | •        |           |         |          |              |         |                |                  |         |
| Pneumatic, low pressure    |                                     | •               |         |          | •         | •       | •        |              |         | Limited        |                  |         |
|                            |                                     |                 |         |          |           |         |          |              |         |                |                  |         |

Notes

- \* Best used with supply water reset from outdoor air temperature.
- \*\* A port specification
- \*\*\* A-port maximum operating differential pressure. Static close-off pressure may be higher. Maximum pressure for quiet service may be less.
- \*\*\*\* Stem down to close
- \*\*\*\*\* Stem up to close
- "Limited" = not available in large sizes

# Product Selection - Valves

## 2-way & 3-way 1/2" - 1" NPT Zone Valves, VN Series



### Common Features

- Class leading specifications for temperature, close-off pressure, static pressure and leakage
- Extremely compact design with removable actuator
- 1/2 inch to 1 inch offering designed for optimum flow-rates
- Quick response actuators, available in EFS and Non-EFS versions

**5-YEAR  
LIMITED  
WARRANTY**

| Actuator Features         |            |  | Non Fail Safe                                      | Electronic Fail Safe |             |
|---------------------------|------------|--|----------------------------------------------------|----------------------|-------------|
| Actuator Model Number     |            |  | VN3ZZA00TOL                                        | VN3ZZA00TEL          | VN3ZZA00TFL |
| Power Supply              | Voltage    |  | 24 VAC                                             | 24 VAC               | 24 VAC      |
|                           | Frequency  |  | 50/60 Hz                                           | 50/60 Hz             | 50/60 Hz    |
|                           | Power      |  | ≤3.5 VA                                            | ≤7.5 VA              | ≤7.5 VA     |
| Control                   | Modulating |  | •                                                  | •                    | •           |
|                           | Floating   |  |                                                    |                      |             |
|                           | 2-position |  |                                                    |                      |             |
| Actuator Stroke (degrees) |            |  | 90°                                                | 90°                  | 90°         |
| Timing (seconds)          |            |  | ≤40 secs                                           | ≤40 secs             | ≤40 secs    |
| Fail Safe Action          |            |  | Fail in Place                                      | Closed               | Open        |
| Valve Features Trim       |            |  | Nickel Plated Brass Ball with Stainless Steel Stem |                      |             |

| 2-Way | Valve Size (inches) | Close-off Pressure (psid) | Cv  | Assembly Model Number |             |             |
|-------|---------------------|---------------------------|-----|-----------------------|-------------|-------------|
|       | 1/2"                | 87                        | 2.3 | VN32A15NTOL           | VN32A15NTEL | VN32A15NTFL |
|       | 3/4"                | 87                        | 3.7 | VN32A20NTOL           | VN32A20NTEL | VN32A20NTFL |
|       | 1"                  | 87                        | 6.6 | VN32A25NTOL           | VN32A25NTEL | VN32A25NTFL |

| 3-Way | Valve Size (inches) | Close-off Pressure (psid) | Cv  | Assembly Model Number |             |             |
|-------|---------------------|---------------------------|-----|-----------------------|-------------|-------------|
|       | 1/2"                | 87                        | 3.7 | VN33A15NTOL           | VN33A15NTEL | VN33A15NTFL |
|       | 3/4"                | 87                        | 5.3 | VN33A20NTOL           | VN33A20NTEL | VN33A20NTFL |
|       | 1"                  | 87                        | 7.7 | VN33A25NTOL           | VN33A25NTEL | VN33A25NTFL |

| Control Signal |    | Voltage |      |      |      |      |      |      |      |       |  |
|----------------|----|---------|------|------|------|------|------|------|------|-------|--|
| 0-10 Vdc       |    | 1.11    | 2.22 | 3.33 | 4.44 | 5.56 | 6.67 | 7.78 | 8.89 | 10.00 |  |
| 2-10 Vdc       |    | 2.89    | 3.78 | 4.67 | 5.56 | 6.44 | 7.33 | 8.22 | 9.11 | 10.00 |  |
| Valve Size     |    | Cv      |      |      |      |      |      |      |      |       |  |
| in.            | DN | 10°     | 20°  | 30°  | 40°  | 50°  | 60°  | 70°  | 80°  | 90°   |  |
| 1/2"           | 15 | 0.11    | 0.16 | 0.24 | 0.35 | 0.51 | 0.74 | 1.08 | 1.58 | 2.30  |  |
| 3/4"           | 20 | 0.18    | 0.26 | 0.38 | 0.56 | 0.82 | 1.19 | 1.74 | 2.54 | 3.70  |  |
| 1"             | 25 | 0.32    | 0.47 | 0.68 | 1.00 | 1.46 | 2.12 | 3.10 | 4.52 | 6.60  |  |
| in.            | DN | 10°     | 20°  | 30°  | 40°  | 50°  | 60°  | 70°  | 80°  | 90°   |  |
| 1/2"           | 15 | 0.18    | 0.26 | 0.38 | 0.56 | 0.82 | 1.19 | 1.74 | 2.54 | 3.70  |  |
| 3/4"           | 20 | 0.26    | 0.38 | 0.55 | 0.80 | 1.17 | 1.71 | 2.49 | 3.63 | 5.30  |  |
| 1"             | 25 | 0.37    | 0.55 | 0.80 | 1.16 | 1.70 | 2.48 | 3.62 | 5.28 | 7.70  |  |

# Product Selection - Valves

## 2-way & 3-way 1/2" - 1" NPT Zone Valves, VN Series

|                           |  |  | Actuator Features                     |                                                    |             | Non Fail Safe |             |             | Electronic Fail Safe |             |             |  |
|---------------------------|--|--|---------------------------------------|----------------------------------------------------|-------------|---------------|-------------|-------------|----------------------|-------------|-------------|--|
|                           |  |  | Actuator O.S Number/ Short Order Code |                                                    | VN8ZZA00TOL | VN8ZZB00TOL   | VN8ZZC00TOL | VN8ZZA00TEL | VN8ZZB00TEL          | VN8ZZA00TFL | VN8ZZB00TFL |  |
| Power Supply              |  |  | Voltage                               | 24 VAC                                             | 110 VAC     | 220 VAC       | 24 VAC      | 100-240 VAC | 24 VAC               | 100-240 VAC |             |  |
|                           |  |  | Frequency                             | 50/60 Hz                                           | 50/60 Hz    | 50/60 Hz      | 50/60 Hz    | 50/60 Hz    | 50/60 Hz             | 50/60 Hz    |             |  |
|                           |  |  | Power                                 | 3.5 VA                                             | 3 VA        | 7.5 VA        | 5.5 VA      | 9 VA        | 5.5 VA               | 9 VA        |             |  |
| Control                   |  |  |                                       |                                                    |             |               |             |             |                      |             |             |  |
|                           |  |  | 2- position (3-wire)                  | •                                                  | •           | •             |             |             |                      |             |             |  |
|                           |  |  | 2- position (2-wire)                  |                                                    |             |               | •           | •           | •                    | •           |             |  |
| Actuator Stroke (degrees) |  |  |                                       | 90°                                                | 90°         | 90°           | 90°         | 90°         | 90°                  | 90°         |             |  |
| Timing (seconds)          |  |  |                                       | ≤40 secs                                           | ≤40 secs    | ≤40 secs      | ≤40 secs    | ≤40 secs    | ≤40 secs             | ≤40 secs    |             |  |
| Fail Safe Action          |  |  | Fail in Place                         |                                                    |             |               | Closed      |             | Open                 |             |             |  |
| Valve Features            |  |  | Trim                                  | Nickel Plated Brass Ball with Stainless Steel Stem |             |               |             |             |                      |             |             |  |

| 2-Way | Valve Size (inches) | Close-off Pressure (psid) | Cv  | Assembly Model Number |             |             |             |             |             |             |
|-------|---------------------|---------------------------|-----|-----------------------|-------------|-------------|-------------|-------------|-------------|-------------|
|       | 1/2"                | 87                        | 4.6 | VN82A15NTOL           | VN82B15NTOL | VN82C15NTOL | VN82A15NTEL | VN82B15NTEL | VN82A15NTFL | VN82B15NTFL |
|       | 3/4"                | 87                        | 8.1 | VN82A20NTOL           | VN82B20NTOL | VN82C20NTOL | VN82A20NTEL | VN82B20NTEL | VN82A20NTFL | VN82B20NTFL |
|       | 1"                  | 87                        | 9.2 | VN82A25NTOL           | VN82B25NTOL | VN82C25NTOL | VN82A25NTEL | VN82B25NTEL | VN82A25NTFL | VN82B25NTFL |

| 3-Way | Valve Size (inches) | Close-off Pressure (psid) | Cv   | Assembly Model Number |             |             |             |             |             |             |
|-------|---------------------|---------------------------|------|-----------------------|-------------|-------------|-------------|-------------|-------------|-------------|
|       | 1/2"                | 87                        | 4.9  | VN83A15NTOL           | VN83B15NTOL | VN83C15NTOL | VN83A15NTEL | VN83B15NTEL | VN83A15NTFL | VN83B15NTFL |
|       | 3/4"                | 87                        | 9.2  | VN83A20NTOL           | VN83B20NTOL | VN83C20NTOL | VN83A20NTEL | VN83B20NTEL | VN83A20NTFL | VN83B20NTFL |
|       | 1"                  | 87                        | 16.2 | VN83A25NTOL           | VN83B25NTOL | VN83C25NTOL | VN83A25NTEL | VN83B25NTEL | VN83A25NTFL | VN83B25NTFL |

# Product Selection - Valves

## Cartridge Globe Valves

For more than 50 years, Honeywell has manufactured the V58 series of premium Cartridge Globe Valves. The compact size and replacement capabilities make it a great choice for controlling modulating unitary equipment.

Valves 1" and larger feature a pressure balanced design with enhanced close-off (levels).

### Common Features

- For closed loop HVAC systems with up to 50% glycol, not for use with steam
- Maximum static pressure 235 psi
- Long stroke allows for a wide range of control
- Leakage rate: 0.02% of Cv
- Insert replacement tool allows for the valve cartridge to be replaced or changed without draining the system (1/2" and 3/4" models only)
- Brass body and stainless steel stem
- Threaded plastic valve cover/manual handle allows for manual operation
- Corrosion resistant



2-Way



3-Way

|                       |                         |                                     | Non Fail Safe |               |               |               |
|-----------------------|-------------------------|-------------------------------------|---------------|---------------|---------------|---------------|
| Actuator O.S. Number  |                         |                                     | M6410A1029    | M6410A3017    | M7410F1000    | M7410F3006    |
| Power Supply          |                         | Voltage                             | 24 Vac        | 24 Vac        | 24 Vac        | 24 Vac        |
|                       |                         | Frequency                           | 50/60 Hz      | 50/60 Hz      | 50/60 Hz      | 50/60 Hz      |
|                       |                         | Power                               | 0.7 VA        | 0.7 VA        | 1.4 VA        | 1.4 VA        |
|                       |                         | Stem Force (lb.)                    | 40.5          | 67.5          | 40.5          | 67.5          |
| Control               | 2-Position SPDT         |                                     | •             | •             |               |               |
|                       | Floating                |                                     | •             | •             |               |               |
|                       | 0(2)-10 Vdc             |                                     |               |               | DIP Switch    | DIP Switch    |
|                       |                         | 4-20 mA (external 500 Ohm resistor) |               |               | •             | •             |
|                       |                         | Pneumatic Spring Range              |               |               |               |               |
| Fail Safe Action      |                         |                                     | Stay in Place | Stay in Place | Stay in Place | Stay in Place |
| Reversible Operation  | Wiring Change           |                                     | •             | •             |               |               |
|                       | DIP Switch              |                                     |               |               | •             | •             |
| Stroke Timing         | Seconds @ 60 Hz (Drive) |                                     | 125           | 125           | 125           | 125           |
|                       | Fail Safe               |                                     |               |               |               |               |
| Manual Override       |                         | (Use valve dust cap)                | •             | •             | •             | •             |
| Position Indicator    |                         |                                     | •             | •             | •             | •             |
| Electrical Connection | Cable length, in.       |                                     | 36            | 36            | 36            | 36            |
|                       | Plenum-rated Cable      |                                     | •             | •             | •             | •             |
|                       | Screw terminals         |                                     |               |               |               |               |
|                       |                         | 1/2 in. flexible conduit hub        | •             | •             | •             | •             |

| Flow Characteristic | Valve Closes | Valve O.S. Number | Close-off Pressure, psid |     |     |     |
|---------------------|--------------|-------------------|--------------------------|-----|-----|-----|
| Equal%              | Stem Down    | V5862A2005        | 232                      |     | 232 |     |
|                     |              | V5852A2007        | 232                      |     | 232 |     |
|                     |              | V5862A2013        | 232                      |     | 232 |     |
|                     |              | V5852A2015        | 232                      |     | 232 |     |
|                     |              | V5862A2021        | 232                      |     | 232 |     |
|                     |              | V5852A2023        | 232                      |     | 232 |     |
|                     |              | V5862A2039        | 232                      |     | 232 |     |
|                     |              | V5852A2031        | 232                      |     | 232 |     |
|                     |              | V5862A2047        | 174                      |     | 174 |     |
|                     |              | V5852A2049        | 174                      |     | 174 |     |
|                     |              | V5862A2054        | 174                      |     | 174 |     |
|                     |              | V5852A2056        | 174                      |     | 174 |     |
|                     |              | V5862A2062        | 58                       |     | 58  |     |
|                     |              | V5852A2064        | 58                       |     | 58  |     |
| V5862A2070          | 58           |                   | 58                       |     |     |     |
| V5852A2072          | 58           |                   | 58                       |     |     |     |
| Linear              | Stem Up      | V5862A3003        |                          | 232 |     | 232 |
|                     |              | V5862A3011        |                          | 232 |     | 232 |
|                     |              | V5862A3029        |                          | 232 |     | 232 |
|                     |              | V5862A3037        |                          | 174 |     | 174 |
|                     |              | V5862A3045        |                          | 145 |     | 145 |

| Flow Characteristic      | Valve Closes         | Valve O.S. Number | Close-off Pressure, psid |     |      |     |
|--------------------------|----------------------|-------------------|--------------------------|-----|------|-----|
| A-AB Equal%, B-AB Linear | Port A to AB Stem up | V5863A2004        | 116                      |     | 116  |     |
|                          |                      | V5853A2006        | 116                      |     | 116  |     |
|                          |                      | V5863A2012        | 116                      |     | 116  |     |
|                          |                      | V5853A2014        | 116                      |     | 116  |     |
|                          |                      | V5863A2020        | 116                      |     | 36   |     |
|                          |                      | V5853A2022        | 116                      |     | 36   |     |
|                          |                      | V5863A2038        | 36                       |     | 36   |     |
|                          |                      | V5853A2030        | 36                       |     | 36   |     |
|                          |                      | V5863A2046        | 34                       |     | 34   |     |
|                          |                      | V5853A2048        | 34                       |     | 34   |     |
|                          |                      | V5863A1006        | 34                       |     | 34   |     |
|                          |                      | V5853A1008        | 34                       |     | 34   |     |
|                          |                      | V5863A1014        | 34                       |     | 34   |     |
|                          |                      | V5853A1016        | 34                       |     | 34   |     |
|                          |                      | V5863A2053        | 7.25                     |     | 7.25 |     |
|                          |                      | V5853A2055        | 7.25                     |     | 7.25 |     |
|                          |                      | V5863A2061        | 7.25                     |     | 7.25 |     |
|                          |                      | V5853A2063        | 7.25                     |     | 7.25 |     |
| Linear                   |                      | V5863A3002        |                          | 232 |      | 232 |
|                          |                      | V5863A3010        |                          | 232 |      | 232 |
|                          |                      | V5863A3028        |                          | 232 |      | 232 |
|                          |                      | V5863A3036        |                          | 174 |      | 174 |
|                          |                      | V5863A3044        |                          | 145 |      | 145 |

<sup>1</sup> B port Cv is 20% less

# Product Selection - Valves

## Cartridge Globe Valves



|                       |  |                                     |  |  |  | Fail Safe  |            |            |            |
|-----------------------|--|-------------------------------------|--|--|--|------------|------------|------------|------------|
| Actuator O.S. Number  |  |                                     |  |  |  | M6435A1004 | M6435A3000 | M7435F1001 | M7435F3007 |
| Power Supply          |  | Voltage                             |  |  |  | 24 Vac     | 24 Vac     | 24 Vac     | 24 Vac     |
|                       |  | Frequency                           |  |  |  | 50/60 Hz   | 50/60 Hz   | 50/60 Hz   | 50/60 Hz   |
|                       |  | Power                               |  |  |  | 10 VA      | 10 VA      | 5 VA       | 5 VA       |
|                       |  | Stem Force (lb.)                    |  |  |  | 40.5       | 90         | 40.5       | 90         |
| Control               |  | 2-Position SPDT                     |  |  |  | •          | •          |            |            |
|                       |  | Floating                            |  |  |  | •          | •          |            |            |
|                       |  | 0(2)-10 Vdc                         |  |  |  |            |            | DIP Switch | DIP Switch |
|                       |  | 4-20 mA (external 500 Ohm resistor) |  |  |  |            |            | •          | •          |
|                       |  | Pneumatic Spring Range              |  |  |  |            |            |            |            |
| Fail Safe Action      |  |                                     |  |  |  | Stem Up    | Stem Up    | Stem Up    | Stem Up    |
| Reversible Operation  |  | Wiring Change                       |  |  |  | •          | •          |            |            |
|                       |  | DIP Switch                          |  |  |  |            |            | •          | •          |
| Stroke Timing         |  | Seconds @ 60 Hz (Drive)             |  |  |  | 50         | 50         | 50         | 50         |
|                       |  | Fail Safe                           |  |  |  | 10         | 10         | 10         | 10         |
| Manual Override       |  | (Use valve dust cap)                |  |  |  | •          | •          | •          | •          |
| Position Indicator    |  |                                     |  |  |  | •          | •          | •          | •          |
| Electrical Connection |  | Cable length, in.                   |  |  |  | —          | —          | —          | —          |
|                       |  | Plenum-rated Cable                  |  |  |  |            |            |            |            |
|                       |  | Screw terminals                     |  |  |  | •          | •          | •          | •          |
|                       |  | 1/2 in. flexible conduit hub        |  |  |  | •          | •          | •          | •          |

| Valve Size (inches) | Pipe Connection Type | Flow Capacity (Cv) | Flow Characteristic      | Valve Closes           | Valve O.S. Number | Close-off Pressure, psid |     |      |     | Replacement Insert |
|---------------------|----------------------|--------------------|--------------------------|------------------------|-------------------|--------------------------|-----|------|-----|--------------------|
| 2-Way               | 1/2"                 | f NPT              | Equal%                   | Stem Down <sup>2</sup> | V5862A2005        | 232                      |     | 232  |     | 0902812            |
|                     |                      | Sweat              |                          |                        | V5852A2007        | 232                      |     | 232  |     | 0902812            |
|                     |                      | f NPT              |                          |                        | V5862A2013        | 232                      |     | 232  |     | 0902811            |
|                     |                      | Sweat              |                          |                        | V5852A2015        | 232                      |     | 232  |     | 0902811            |
|                     |                      | f NPT              |                          |                        | V5862A2021        | 232                      |     | 232  |     | 0902810            |
|                     |                      | Sweat              |                          |                        | V5852A2023        | 232                      |     | 232  |     | 0902810            |
|                     |                      | f NPT              |                          |                        | V5862A2039        | 232                      |     | 232  |     | 0902809            |
|                     |                      | Sweat              |                          |                        | V5852A2031        | 232                      |     | 232  |     | 0902809            |
|                     | 3/4"                 | f NPT              | Equal%                   | Stem Down <sup>2</sup> | V5862A2047        | 174                      |     | 174  |     | 0902808            |
|                     |                      | Sweat              |                          |                        | V5852A2049        | 174                      |     | 174  |     | 0902808            |
|                     |                      | f NPT              |                          |                        | V5862A2054        | 174                      |     | 174  |     | 0902807            |
|                     |                      | Sweat              |                          |                        | V5852A2056        | 174                      |     | 174  |     | 0902807            |
|                     |                      | f NPT              |                          |                        | V5862A2062        | 58                       |     | 58   |     | 0902814            |
|                     |                      | Sweat              |                          |                        | V5852A2064        | 58                       |     | 58   |     | 0902814            |
|                     |                      | f NPT              |                          |                        | V5862A2070        | 58                       |     | 58   |     | 0902815            |
|                     |                      | Sweat              |                          |                        | V5852A2072        | 58                       |     | 58   |     | 0902815            |
|                     | 1"                   | f NPT              | Linear                   | Stem Up                | V5862A3003        |                          | 232 |      | 232 | 0903827            |
|                     |                      | f NPT              |                          |                        | V5862A3011        |                          | 232 |      | 232 | 0903827            |
|                     |                      | f NPT              |                          |                        | V5862A3029        |                          | 232 |      | 232 | 0903827            |
|                     |                      | f NPT              |                          |                        | V5862A3037        |                          | 174 |      | 174 | 0903828            |
| 3-Way               | 1/2"                 | f NPT              | A-AB Equal%, B-AB Linear | Port A to AB Stem up   | V5862A3045        | 145                      |     | 145  |     | 0903829            |
|                     |                      | f NPT              |                          |                        | V5863A2004        | 116                      |     | 116  |     | 0902821            |
|                     |                      | Sweat              |                          |                        | V5853A2006        | 116                      |     | 116  |     | 0902821            |
|                     |                      | f NPT              |                          |                        | V5863A2012        | 116                      |     | 116  |     | 0902822            |
|                     |                      | Sweat              |                          |                        | V5853A2014        | 116                      |     | 116  |     | 0902822            |
|                     |                      | f NPT              |                          |                        | V5863A2020        | 36                       |     | 36   |     | 0902823            |
|                     |                      | Sweat              |                          |                        | V5853A2022        | 36                       |     | 36   |     | 0902823            |
|                     |                      | f NPT              |                          |                        | V5863A2038        | 36                       |     | 36   |     | 0902824            |
|                     | 3/4"                 | Sweat              |                          |                        | V5853A2030        | 36                       |     | 36   |     | 0902824            |
|                     |                      | f NPT              |                          |                        | V5863A2046        | 34                       |     | 34   |     | 0902825            |
|                     |                      | Sweat              |                          |                        | V5853A2048        | 34                       |     | 34   |     | 0902825            |
|                     |                      | f NPT              |                          |                        | V5863A1006        | 34                       |     | 34   |     | 0902827            |
|                     |                      | Sweat              |                          |                        | V5853A1008        | 34                       |     | 34   |     | 0902827            |
|                     |                      | f NPT              |                          |                        | V5863A1014        | 34                       |     | 34   |     | 0902827            |
|                     |                      | Sweat              |                          |                        | V5853A1016        | 34                       |     | 34   |     | 0902827            |
|                     |                      | f NPT              |                          |                        | V5863A2053        | 7.25                     |     | 7.25 |     | 0902827            |
|                     | 1"                   | Sweat              |                          |                        | V5853A2055        | 7.25                     |     | 7.25 |     | 0902827            |
|                     |                      | f NPT              |                          |                        | V5863A2061        | 7.25                     |     | 7.25 |     | 0902827            |
|                     |                      | Sweat              |                          |                        | V5853A2063        | 7.25                     |     | 7.25 |     | 0902827            |
|                     |                      | f NPT              | Linear                   |                        | V5863A3002        |                          | 232 |      | 232 | 0903827            |
|                     |                      | f NPT              |                          |                        | V5863A3010        |                          | 232 |      | 232 | 0903827            |
|                     |                      | f NPT              |                          |                        | V5863A3028        |                          | 232 |      | 232 | 0903827            |
|                     |                      | f NPT              |                          |                        | V5863A3036        |                          | 174 |      | 174 | 0903828            |
|                     |                      | f NPT              |                          |                        | V5863A3044        |                          | 145 |      | 145 | 0903829            |

<sup>1</sup> B port Cv is 20% less

<sup>2</sup> Fail safe position for 1/2" and 3/4" 2-way is Normally Open with Mx435 spring return actuators. All other valves fail safe closed.

# Product Selection - Valves

## 2-Way Control Ball Valves With Non Spring Return Actuators 1/2"-3"



Example of complete orderable part number: **VBN2A000.38SA+MVN643A0000+C1**

Control Ball Valve, Female NPT Thread, 2-way, 1/2", CV .38, Stainless Steel trim,  
Standard Profile with MVN643A0000 Actuator, Fail in place and 1 meter cable.

Standard profile provides clearance between valve and actuator for insulation.  
Low profile enables installation of valve and actuator in tight spaces.

**5-YEAR**

**LIMITED  
WARRANTY**

If the complete orderable part number is too long for your ordering system, please refer to the Short Order Codes on pg 66 to 93.

2-Way

| Valve Specification |                 | Valve Profile | Standard Profile        |                 | Low Profile   |                 | Black Bracket |                 |
|---------------------|-----------------|---------------|-------------------------|-----------------|---------------|-----------------|---------------|-----------------|
|                     |                 | Valve Trim    | Plated Brass            | Stainless Steel | Plated Brass  | Stainless Steel | Plated Brass  | Stainless Steel |
| Valve Size (inches) | Close-off (psi) | Cv            | Valve Body Model Number |                 |               |                 |               |                 |
| 1/2"                | 130             | 0.38          | VBN2A000.38PA           | VBN2A000.38SA   | VBN2A000.38PL | VBN2A000.38SL   | VBN2A000.38PX | VBN2A000.38SX   |
|                     |                 | 0.68          | VBN2A000.68PA           | VBN2A000.68SA   | VBN2A000.68PL | VBN2A000.68SL   | VBN2A000.68PX | VBN2A000.68SX   |
|                     |                 | 1.3           | VBN2A001.30PA           | VBN2A001.30SA   | VBN2A001.30PL | VBN2A001.30SL   | VBN2A001.30PX | VBN2A001.30SX   |
|                     |                 | 2             | VBN2A002.00PA           | VBN2A002.00SA   | VBN2A002.00PL | VBN2A002.00SL   | VBN2A002.00PX | VBN2A002.00SX   |
|                     |                 | 2.6           | VBN2A002.60PA           | VBN2A002.60SA   | VBN2A002.60PL | VBN2A002.60SL   | VBN2A002.60PX | VBN2A002.60SX   |
|                     |                 | 4.7           | VBN2A004.70PA           | VBN2A004.70SA   | VBN2A004.70PL | VBN2A004.70SL   | VBN2A004.70PX | VBN2A004.70SX   |
| 3/4"                | 130             | 11.7          | VBN2A011.70PA           | VBN2A011.70SA   | VBN2A011.70PL | VBN2A011.70SL   | VBN2A011.70PX | VBN2A011.70SX   |
|                     |                 | 4.3           | VBN2B004.30PA           | VBN2B004.30SA   | VBN2B004.30PL | VBN2B004.30SL   | VBN2B004.30PX | VBN2B004.30SX   |
|                     |                 | 7.4           | VBN2B007.40PA           | VBN2B007.40SA   | VBN2B007.40PL | VBN2B007.40SL   | VBN2B007.40PX | VBN2B007.40SX   |
|                     |                 | 10.1          | VBN2B010.10PA           | VBN2B010.10SA   | VBN2B010.10PL | VBN2B010.10SL   | VBN2B010.10PX | VBN2B010.10SX   |
| 1"                  | 100             | 29            | VBN2B029.00PA           | VBN2B029.00SA   | VBN2B029.00PL | VBN2B029.00SL   | VBN2B029.00PX | VBN2B029.00SX   |
|                     |                 | 9             | VBN2C009.00PA           | VBN2C009.00SA   | VBN2C009.00PL | VBN2C009.00SL   | VBN2C009.00PX | VBN2C009.00SX   |
|                     |                 | 15.3          | VBN2C015.30PA           | VBN2C015.30SA   | VBN2C015.30PL | VBN2C015.30SL   | VBN2C015.30PX | VBN2C015.30SX   |
|                     |                 | 26            | VBN2C026.00PA           | VBN2C026.00SA   | VBN2C026.00PL | VBN2C026.00SL   | VBN2C026.00PX | VBN2C026.00SX   |
| 1-1/4"              | 100             | 54            | VBN2C054.00PA           | VBN2C054.00SA   | VBN2C054.00PL | VBN2C054.00SL   | VBN2C054.00PX | VBN2C054.00SX   |
|                     |                 | 14.9          | VBN2D014.90PA           | VBN2D014.90SA   | VBN2D014.90PL | VBN2D014.90SL   | VBN2D014.90PX | VBN2D014.90SX   |
|                     |                 | 25            | VBN2D025.00PA           | VBN2D025.00SA   | VBN2D025.00PL | VBN2D025.00SL   | VBN2D025.00PX | VBN2D025.00SX   |
|                     |                 | 37            | VBN2D037.00PA           | VBN2D037.00SA   | VBN2D037.00PL | VBN2D037.00SL   | VBN2D037.00PX | VBN2D037.00SX   |
| 1-1/2"              | 100             | 102           | VBN2D102.00PA           | VBN2D102.00SA   | VBN2D102.00PL | VBN2D102.00SL   | VBN2D102.00PX | VBN2D102.00SX   |
|                     |                 | 41            | N/A                     |                 |               |                 | VBN2E041.00PX | VBN2E041.00SX   |
|                     |                 | 74            |                         |                 |               |                 | VBN2E074.00PX | VBN2E074.00SX   |
|                     |                 | 172           |                         |                 |               |                 | VBN2E172.00PX | VBN2E172.00SX   |
| 2"                  | 100             | 42            |                         |                 |               |                 | VBN2F042.00PX | VBN2F042.00SX   |
|                     |                 | 57            |                         |                 |               |                 | VBN2F057.00PX | VBN2F057.00SX   |
|                     |                 | 71            |                         |                 |               |                 | VBN2F071.00PX | VBN2F071.00SX   |
|                     |                 | 100           |                         |                 |               |                 | VBN2F100.00PX | VBN2F100.00SX   |
| 2-1/2"              | 100             | 266           |                         |                 |               |                 | VBN2F266.00PX | VBN2F266.00SX   |
|                     |                 | 72            |                         |                 |               |                 | VBN2G072.00PX | VBN2G072.00SX   |
|                     |                 | 101           |                         |                 |               |                 | VBN2G101.00PX | VBN2G101.00SX   |
|                     |                 | 202           |                         |                 |               |                 | VBN2G202.00PX | VBN2G202.00SX   |
| 3"                  | 100             | 124           |                         |                 |               |                 | VBN2H124.00PX | VBN2H124.00SX   |
|                     |                 | 145           |                         |                 |               |                 | VBN2H145.00PX | VBN2H145.00SX   |

| Actuator Features |                   |            |           |                       |                 |                              |
|-------------------|-------------------|------------|-----------|-----------------------|-----------------|------------------------------|
|                   |                   |            |           | MVN Standard Profile  | MVN Low Profile | DCA or DCA w/ switches       |
| Control Signal    | Timing            | Voltage    | Enclosure | Actuator Model Number |                 |                              |
| Floating          | 90 sec.           | 24 VAC/DC* | NEMA 2    | +MVN613A0000          | +MVN613L0000    | +MN6105A1011 or +MN6105A1201 |
| Fast SPDT         | 30 sec.           |            |           | +MVN643A0000          | +MVN643L0000    |                              |
| Modulating        | 90 sec.           |            |           | +MVN713A0000          | +MVN713L0000    | +MN7505A2001 or +MN7505A2209 |
| Accessories       | 1 meter cable     |            |           | +C1                   |                 | N/A                          |
|                   | 3 meter cable     |            |           | +C3                   |                 | N/A                          |
|                   | NEMA 3R enclosure |            |           | N/A                   |                 | +3R                          |

\*MVN613 24 VAC only

## VALVES



Example of complete orderable part number: **VBN2A000.38SX+MS7103A2021+FSC**  
Control Ball Valve, Female NPT Thread, 2-way, 1/2", CV .38, Black Bracket, Stainless Steel trim with MS7103A2021 Actuator. Fail closed.

**5-YEAR  
LIMITED  
WARRANTY**

If the complete orderable part number is too long for your ordering system, please refer to the Short Order Codes on pg 66 to 93.

N/A

## Actuator Features

# Product Selection - Valves

## 3-Way Control Ball Valves With Non Spring Return Actuators ½"-2½"



Example of complete orderable part number: **VBN3A000.33PA+MVN613A0000+C1**  
Control Ball Valve, Female NPT Thread, 3-way, 1-1/2", CV .33, Plated Brass trim, with MVN613A0000 Actuator, Fail in place and 1 meter cable.

Standard profile provides clearance between valve and actuator for insulation.  
Low profile enables installation of valve and actuator in tight spaces.

If the complete orderable part number is too long for your ordering system, please refer to the Short Order Codes on pg 66 to 93.

**5-YEAR  
LIMITED  
WARRANTY**

3-Way

| Valve Specification |                 | Valve Profile | Standard Profile        | Low Profile     | Black Bracket |
|---------------------|-----------------|---------------|-------------------------|-----------------|---------------|
|                     |                 | Valve Trim    | Plated Brass            | Stainless Steel | Plated Brass  |
| Valve Size (inches) | Close-off (psi) | Cv            | Valve Body Model Number |                 |               |
| 1/2"                | 50              | 0.33          | VBN3A000.33PA           | VBN3A000.33PL   | VBN3A000.33PX |
|                     |                 | 0.59          | VBN3A000.59PA           | VBN3A000.59PL   | VBN3A000.59PX |
|                     |                 | 1.0           | VBN3A001.00PA           | VBN3A001.00PL   | VBN3A001.00PX |
|                     |                 | 2.4           | VBN3A002.40PA           | VBN3A002.40PL   | VBN3A002.40PX |
|                     |                 | 4.3           | VBN3A004.30PA           | VBN3A004.30PL   | VBN3A004.30PX |
|                     |                 | 8.0           | VBN3A008.00PA           | VBN3A008.00PL   | VBN3A008.00PX |
| 3/4"                | 50              | 3.8           | VBN3B003.80PA           | VBN3B003.80PL   | VBN3B003.80PX |
|                     |                 | 7.0           | VBN3B007.00PA           | VBN3B007.00PL   | VBN3B007.00PX |
|                     |                 | 11.0          | VBN3B011.00PA           | VBN3B011.00PL   | VBN3B011.00PX |
| 1"                  | 50              | 8.6           | VBN3C008.60PA           | VBN3C008.60PL   | VBN3C008.60PX |
|                     |                 | 14.9          | VBN3C014.90PA           | VBN3C014.90PL   | VBN3C014.90PX |
|                     |                 | 22            | VBN3C022.00PA           | VBN3C022.00PL   | VBN3C022.00PX |
|                     |                 | 31            | VBN3C031.00PA           | VBN3C031.00PL   | VBN3C031.00PX |
| 1-1/4"              | 40              | 12.7          | VBN3D012.70PA           | VBN3D012.70PL   | VBN3D012.70PX |
|                     |                 | 19.4          | VBN3D019.40PA           | VBN3D019.40PL   | VBN3D019.40PX |
|                     |                 | 27            | VBN3D027.00PA           | VBN3D027.00PL   | VBN3D027.00PX |
|                     |                 | 34            | VBN3D034.00PA           | VBN3D034.00PL   | VBN3D034.00PX |
| 1-1/2"              | 40              | 24            | N/A                     | N/A             | VBN3E024.00PX |
|                     |                 | 32            |                         |                 | VBN3E032.00PX |
|                     |                 | 61            |                         |                 | VBN3E061.00PX |
| 2"                  | 40              | 38            |                         |                 | VBN3F038.00PX |
|                     |                 | 57            |                         |                 | VBN3F057.00PX |
|                     |                 | 83            |                         |                 | VBN3F083.00PX |
|                     |                 | 109           |                         |                 | VBN3F109.00PX |
| 2-1/2"              | 40              | 74            |                         |                 | VBN3G074.00PX |
|                     |                 | 100           |                         |                 | VBN3G100.00PX |

| Actuator Features |                   |            |           |                       |                 |                              |
|-------------------|-------------------|------------|-----------|-----------------------|-----------------|------------------------------|
|                   |                   |            |           | MVN Standard Profile  | MVN Low Profile | DCA or DCA w/ switches       |
| Control Signal    | Timing            | Voltage    | Enclosure | Actuator Model Number |                 |                              |
| Floating          | 90 sec.           | 24 VAC/DC* | NEMA 2    | +MVN613A0000          | +MVN613L0000    | +MN6105A1011 or +MN6105A1201 |
| Fast SPDT         | 30 sec.           |            |           | +MVN643A0000          | +MVN643L0000    |                              |
| Modulating        | 90 sec.           |            |           | +MVN713A0000          | +MVN713L0000    | +MN7505A2001 or +MN7505A2209 |
| Accessories       | 1 meter cable     |            |           | +C1                   |                 | N/A                          |
|                   | 3 meter cable     |            |           | +C3                   |                 | N/A                          |
|                   | NEMA 3R enclosure |            |           | N/A                   |                 | +3R                          |

\*MVN613 24 VAC only

# Product Selection - Valves

## 3-Way Control Ball Valves With Spring Return Actuators 1/2"-2 1/2"



Example of complete orderable part number: **VBN3E032.00PX+MS8105A1030+FSC**  
Control Ball Valve, Female NPT Thread, 3-way, 1-1/2", CV 32, Black Bracket, Plated Brass trim with MS8105A1030 Actuator,  
Fail closed.

**5-YEAR  
LIMITED  
WARRANTY**

If the complete orderable part number is too long for your ordering system, please refer to the Short Order Codes on pg 66 to 93.

3-Way

| Valve Specification |                 | Valve Profile | Black Bracket           |               |
|---------------------|-----------------|---------------|-------------------------|---------------|
|                     |                 | Valve Trim    | Plated Brass            | Plated Brass  |
| Valve Size (inches) | Close-off (psi) | Cv            | Valve Body Model Number |               |
| 1/2"                | 50              | 0.33          | VBN3A000.33PX           | VBN3A000.33PX |
|                     |                 | 0.59          | VBN3A000.59PX           | VBN3A000.59PX |
|                     |                 | 1.0           | VBN3A001.00PX           | VBN3A001.00PX |
|                     |                 | 2             | VBN3A002.40PX           | VBN3A002.40PX |
|                     |                 | 4.3           | VBN3A004.30PX           | VBN3A004.30PX |
|                     |                 | 8.0           | VBN3A008.00PX           | VBN3A008.00PX |
| 3/4"                | 50              | 3.8           | VBN3B003.80PX           | VBN3B003.80PX |
|                     |                 | 7.0           | VBN3B007.00PX           | VBN3B007.00PX |
|                     |                 | 11.0          | VBN3B011.00PX           | VBN3B011.00PX |
| 1"                  | 50              | 8.6           | VBN3C008.60PX           | VBN3C008.60PX |
|                     |                 | 15            | VBN3C014.90PX           | VBN3C014.90PX |
|                     |                 | 22            | VBN3C022.00PX           | VBN3C022.00PX |
|                     |                 | 31            | VBN3C031.00PX           | VBN3C031.00PX |
| 1-1/4"              | 40              | 12.7          | VBN3D012.70PX           | VBN3D012.70PX |
|                     |                 | 19            | VBN3D019.40PX           | VBN3D019.40PX |
|                     |                 | 27            | VBN3D027.00PX           | VBN3D027.00PX |
|                     |                 | 34            | VBN3D034.00PX           | VBN3D034.00PX |
| 1-1/2"              | 40              | 24            | N/A                     | VBN3E024.00PX |
|                     |                 | 32            |                         | VBN3E032.00PX |
|                     |                 | 61            |                         | VBN3E061.00PX |
| 2"                  | 40              | 38            |                         | VBN3F038.00PX |
|                     |                 | 57            |                         | VBN3F057.00PX |
|                     |                 | 83            |                         | VBN3F083.00PX |
|                     |                 | 109           |                         | VBN3F109.00PX |
| 2-1/2"              | 40              | 74            |                         | VBN3G074.00PX |
|                     |                 | 100           |                         | VBN3G100.00PX |

| Actuator Features  |                                 |           |           |                                                              |                              |  |
|--------------------|---------------------------------|-----------|-----------|--------------------------------------------------------------|------------------------------|--|
|                    |                                 |           |           | DCA or DCA w/ switches                                       | DCA or DCA w/ switches       |  |
| Control Signal     | Timing                          | Voltage   | Enclosure | Actuator Model Number                                        |                              |  |
| Modulating         | 90 sec.                         | 24 VAC/DC | NEMA 2    | +MS7103A2021 or +MS7103A2221<br>+MS7503A2021 or +MS7503A2221 | +MS7505A2030 or +MS7505A2130 |  |
| Sylk               | 30-180 sec.                     |           |           | +MS3103J1023 or +MS3103J1223                                 |                              |  |
| 2-position         | 45 sec.                         |           |           |                                                              | +MS8105A1030 or +MS8105A1130 |  |
| 2-position         | 45 sec.                         | 120 VAC   |           |                                                              | +MS4105A1030 or +MS4105A1130 |  |
| Fail Safe Position | FSA - A-AB Open FSB - B-AB Open |           |           | +FSA or +FSB                                                 | +FSA or +FSB                 |  |
| Accessories        | NEMA 3R enclosure               |           |           | N/A                                                          | +3R                          |  |

VALVES

# Product Selection - Valves

## MVN Actuator With Standard Profile, 2-Way NPT Valves ½"-1 ¼"

**5-YEAR  
LIMITED  
WARRANTY**



### Common Features

- Max static pressure 360 psi (250°F)
- Medium: Water/glycol solutions up to 50%. Use globe valves for steam control.
- Fluid temperature range: -22 to +250°F
- Spring return actuators field-configurable for A-port normally open or normally closed fail safe.

### VB2 (Two-way)

- Equal % flow insert. Largest Cv rating in each valve size is full port, as noted
- Nickel-chrome plated brass or 316 stainless steel ball and stem
- ANSI class IV leakage (0.01% of Cv)

| Actuator Features                     |                       | Non Fail Safe |                     |                 |                     |                 |                     | Valve Only                                                                          |                     |                 |
|---------------------------------------|-----------------------|---------------|---------------------|-----------------|---------------------|-----------------|---------------------|-------------------------------------------------------------------------------------|---------------------|-----------------|
| Actuator O.S Number/ Short Order Code |                       | MVN613A0000   |                     | MVN613A0000+C1  |                     | MVN613A0000+C3  |                     | N/A                                                                                 |                     |                 |
| Power Supply                          | Voltage               | 24 VAC        |                     | 24 VAC          |                     | 24 VAC          |                     |  |                     |                 |
|                                       | Frequency             | 50/60 Hz      |                     | 50/60 Hz        |                     | 50/60 Hz        |                     |                                                                                     |                     |                 |
|                                       | Power                 | 1.5 VA        |                     | 1.5 VA          |                     | 1.5 VA          |                     |                                                                                     |                     |                 |
| Actuator Torque (lb.-in.)             |                       | 27            |                     | 27              |                     | 27              |                     |                                                                                     |                     |                 |
| Control                               | Modulating (0)2-10Vdc |               |                     |                 |                     |                 |                     |                                                                                     |                     |                 |
|                                       | Floating              | •             |                     | •               |                     | •               |                     |                                                                                     |                     |                 |
|                                       | Fast acting SPDT      |               |                     |                 |                     |                 |                     |                                                                                     |                     |                 |
| Actuator Stroke (degrees)             |                       | 90° ± 3°      |                     | 90° ± 3°        |                     | 90° ± 3°        |                     |                                                                                     |                     |                 |
| Timing (seconds)                      |                       | 90            |                     | 90              |                     | 90              |                     |                                                                                     |                     |                 |
| Fail Safe Action                      |                       | Fail in Place |                     | Fail in Place   |                     | Fail in Place   |                     |                                                                                     |                     |                 |
| Valve Features                        |                       | Trim          | Nickel-Plated Brass | Stainless Steel | Nickel-Plated Brass | Stainless Steel | Nickel-Plated Brass | Stainless Steel                                                                     | Nickel-Plated Brass | Stainless Steel |

| Valve Size (inches) | Close-off Pressure (psid) | Cv    | Short Order Codes |             |               |             |               |             |             |             |
|---------------------|---------------------------|-------|-------------------|-------------|---------------|-------------|---------------|-------------|-------------|-------------|
|                     |                           |       | No Cable          |             | 1 Meter Cable |             | 3 Meter Cable |             | Valve Only  |             |
|                     |                           |       |                   |             |               |             |               |             |             |             |
| 2-Way<br>1/2"       | 130                       | 0.38  | VB2ABPA1000       | VB2ABSA1000 | VB2ABPA1001   | VB2ABSA1001 | VB2ABPA1003   | VB2ABSA1003 | VB2ABPA0000 | VB2ABSA0000 |
|                     |                           | 0.68  | VB2ADPA1000       | VB2ADSA1000 | VB2ADPA1001   | VB2ADSA1001 | VB2ADPA1003   | VB2ADSA1003 | VB2ADPA0000 | VB2ADSA0000 |
|                     |                           | 1.3   | VB2AEP1000        | VB2AESA1000 | VB2AEP1001    | VB2AESA1001 | VB2AEP1003    | VB2AESA1003 | VB2AEP0000  | VB2AESA0000 |
|                     |                           | 2     | VB2AFP1000        | VB2AFSA1000 | VB2AFP1001    | VB2AFSA1001 | VB2AFP1003    | VB2AFSA1003 | VB2AFP0000  | VB2AFSA0000 |
|                     |                           | 2.6   | VB2AGP1000        | VB2AGSA1000 | VB2AGP1001    | VB2AGSA1001 | VB2AGP1003    | VB2AGSA1003 | VB2AGP0000  | VB2AGSA0000 |
|                     |                           | 4.7   | VB2AHP1000        | VB2AHSA1000 | VB2AHP1001    | VB2AHSA1001 | VB2AHP1003    | VB2AHSA1003 | VB2AHP0000  | VB2AHSA0000 |
|                     |                           | 11.7* | VB2AKP1000        | VB2AKSA1000 | VB2AKP1001    | VB2AKSA1001 | VB2AKP1003    | VB2AKSA1003 | VB2AKP0000  | VB2AKSA0000 |
| 3/4"                | 130                       | 4.3   | VB2BHP1000        | VB2BHSA1000 | VB2BHP1001    | VB2BHSA1001 | VB2BHP1003    | VB2BHSA1003 | VB2BHP0000  | VB2BHSA0000 |
|                     |                           | 7.4   | VB2BJP1000        | VB2BJS1000  | VB2BJP1001    | VB2BJS1001  | VB2BJP1003    | VB2BJS1003  | VB2BJP0000  | VB2BJS1000  |
|                     |                           | 10.1  | VB2BKPA1000       | VB2BKSA1000 | VB2BKPA1001   | VB2BKSA1001 | VB2BKPA1003   | VB2BKSA1003 | VB2BKPA0000 | VB2BKSA0000 |
|                     |                           | 29*   | VB2BMP1000        | VB2BMS1000  | VB2BMP1001    | VB2BMS1001  | VB2BMP1003    | VB2BMS1003  | VB2BMP0000  | VB2BMS0000  |
| 1"                  | 100                       | 9     | VB2CJP1000        | VB2CJS1000  | VB2CJP1001    | VB2CJS1001  | VB2CJP1003    | VB2CJS1003  | VB2CJP0000  | VB2CJS1000  |
|                     |                           | 15.3  | VB2CLP1000        | VB2CLS1000  | VB2CLP1001    | VB2CLS1001  | VB2CLP1003    | VB2CLS1003  | VB2CLP0000  | VB2CLS1000  |
|                     |                           | 26    | VB2CMP1000        | VB2CMS1000  | VB2CMP1001    | VB2CMS1001  | VB2CMP1003    | VB2CMS1003  | VB2CMP0000  | VB2CMS1000  |
|                     |                           | 54*   | VB2CPP1000        | VB2CPS1000  | VB2CPP1001    | VB2CPS1001  | VB2CPP1003    | VB2CPS1003  | VB2CPP0000  | VB2CPS1000  |
| 1-1/4"              | 100                       | 14.9  | VB2DKP1000        | VB2DKSA1000 | VB2DKP1001    | VB2DKSA1001 | VB2DKP1003    | VB2DKSA1003 | VB2DKP0000  | VB2DKSA0000 |
|                     |                           | 25    | VB2DLP1000        | VB2DLS1000  | VB2DLP1001    | VB2DLS1001  | VB2DLP1003    | VB2DLS1003  | VB2DLP0000  | VB2DLS1000  |
|                     |                           | 37    | VB2DMP1000        | VB2DMS1000  | VB2DMP1001    | VB2DMS1001  | VB2DMP1003    | VB2DMS1003  | VB2DMP0000  | VB2DMS1000  |
|                     |                           | 102*  | VB2DSP1000        | VB2DSS1000  | VB2DSP1001    | VB2DSS1001  | VB2DSP1003    | VB2DSS1003  | VB2DSP0000  | VB2DSS1000  |

\* Full port ball. No flow characterizing insert.

## Product Selection - Valves

## MVN Actuator With Standard Profile 2-Way NPT Valves ½"-1¼"

|                           |                           |       | Actuator Features                     |              | Non Fail Safe       |              |                 |              |                     |  |                 |  |
|---------------------------|---------------------------|-------|---------------------------------------|--------------|---------------------|--------------|-----------------|--------------|---------------------|--|-----------------|--|
|                           |                           |       | Actuator O.S Number/ Short Order Code |              | MVN643A0000         |              | MVN643A0000+C1  |              | MVN643A0000+C3      |  |                 |  |
| Power Supply              |                           |       | Voltage                               |              | 24 VAC/DC           |              | 24 VAC/DC       |              | 24 VAC/DC           |  |                 |  |
|                           |                           |       | Frequency                             |              | 50/60 Hz            |              | 50/60 Hz        |              | 50/60 Hz            |  |                 |  |
|                           |                           |       | Power                                 |              | 6 VA                |              | 6 VA            |              | 5 VA                |  |                 |  |
| Actuator Torque           |                           |       | (lb.-in.)                             |              | 27                  |              | 27              |              | 27                  |  |                 |  |
| Control                   |                           |       | Modulating (0)2-10Vdc                 |              |                     |              |                 |              | •                   |  |                 |  |
|                           |                           |       | Floating                              |              |                     |              |                 |              |                     |  |                 |  |
|                           |                           |       | Fast acting SPDT                      |              | •                   |              | •               |              |                     |  |                 |  |
| Actuator Stroke (degrees) |                           |       |                                       |              | 90° ± 3°            |              | 90° ± 3°        |              | 90° ± 3°            |  |                 |  |
| Timing                    |                           |       | (seconds)                             |              | 30                  |              | 30              |              | 90                  |  |                 |  |
| Fail Safe Action          |                           |       |                                       |              | Fail in Place       |              | Fail in Place   |              | Fail in Place       |  |                 |  |
| Valve Features            |                           |       | Trim                                  |              | Nickel-Plated Brass |              | Stainless Steel |              | Nickel-Plated Brass |  | Stainless Steel |  |
| Valve Size (inches)       | Close-off Pressure (psid) | Cv    | Short Order Codes                     |              |                     |              |                 |              |                     |  |                 |  |
|                           |                           |       | No Cable                              |              | 1 Meter Cable       |              | 3 Meter Cable   |              |                     |  |                 |  |
|                           |                           |       |                                       |              |                     |              |                 |              |                     |  |                 |  |
| 1/2"                      | 130                       | 0.38  | VBN2ABPA2000                          | VBN2ABSA2000 | VBN2ABPA2001        | VBN2ABSA2001 | VBN2ABPA2003    | VBN2ABSA2003 |                     |  |                 |  |
|                           |                           | 0.68  | VBN2ADPA2000                          | VBN2ADSA2000 | VBN2ADPA2001        | VBN2ADSA2001 | VBN2ADPA2003    | VBN2ADSA2003 |                     |  |                 |  |
|                           |                           | 1.3   | VBN2AEPA2000                          | VBN2AESA2000 | VBN2AEPA2001        | VBN2AESA2001 | VBN2AEPA2003    | VBN2AESA2003 |                     |  |                 |  |
|                           |                           | 2     | VBN2AFPA2000                          | VBN2AFSA2000 | VBN2AFPA2001        | VBN2AFSA2001 | VBN2AFPA2003    | VBN2AFSA2003 |                     |  |                 |  |
|                           |                           | 2.6   | VBN2AGPA2000                          | VBN2AGSA2000 | VBN2AGPA2001        | VBN2AGSA2001 | VBN2AGPA2003    | VBN2AGSA2003 |                     |  |                 |  |
|                           |                           | 4.7   | VBN2AHPA2000                          | VBN2AHSA2000 | VBN2AHPA2001        | VBN2AHSA2001 | VBN2AHPA2003    | VBN2AHSA2003 |                     |  |                 |  |
|                           |                           | 11.7* | VBN2AKPA2000                          | VBN2AKSA2000 | VBN2AKPA2001        | VBN2AKSA2001 | VBN2AKPA2003    | VBN2AKSA2003 |                     |  |                 |  |
| 3/4"                      | 130                       | 4.3   | VBN2BHPA2000                          | VBN2BHSA2000 | VBN2BHPA2001        | VBN2BHSA2001 | VBN2BHPA2003    | VBN2BHSA2003 |                     |  |                 |  |
|                           |                           | 7.4   | VBN2BJPA2000                          | VBN2BJSA2000 | VBN2BJPA2001        | VBN2BJSA2001 | VBN2BJPA2003    | VBN2BJSA2003 |                     |  |                 |  |
|                           |                           | 10.1  | VBN2BKPA2000                          | VBN2BKSA2000 | VBN2BKPA2001        | VBN2BKSA2001 | VBN2BKPA2003    | VBN2BKSA2003 |                     |  |                 |  |
|                           |                           | 29*   | VBN2BMPA2000                          | VBN2BMSA2000 | VBN2BMPA2001        | VBN2BMSA2001 | VBN2BMPA2003    | VBN2BMSA2003 |                     |  |                 |  |
| 1"                        | 100                       | 9     | VBN2CJPA2000                          | VBN2CJSA2000 | VBN2CJPA2001        | VBN2CJSA2001 | VBN2CJPA2003    | VBN2CJSA2003 |                     |  |                 |  |
|                           |                           | 15.3  | VBN2CLPA2000                          | VBN2CLSA2000 | VBN2CLPA2001        | VBN2CLSA2001 | VBN2CLPA2003    | VBN2CLSA2003 |                     |  |                 |  |
|                           |                           | 26    | VBN2CMPA2000                          | VBN2CMSA2000 | VBN2CMPA2001        | VBN2CMSA2001 | VBN2CMPA2003    | VBN2CMSA2003 |                     |  |                 |  |
|                           |                           | 54*   | VBN2CPPA2000                          | VBN2CPSA2000 | VBN2CPPA2001        | VBN2CPSA2001 | VBN2CPPA2003    | VBN2CPSA2003 |                     |  |                 |  |
| 1-1/4"                    | 100                       | 14.9  | VBN2DKPA2000                          | VBN2DKSA2000 | VBN2DKPA2001        | VBN2DKSA2001 | VBN2DKPA2003    | VBN2DKSA2003 |                     |  |                 |  |
|                           |                           | 25    | VBN2DLPA2000                          | VBN2DLSA2000 | VBN2DLPA2001        | VBN2DLSA2001 | VBN2DLPA2003    | VBN2DLSA2003 |                     |  |                 |  |
|                           |                           | 37    | VBN2DMPA2000                          | VBN2DMSA2000 | VBN2DMPA2001        | VBN2DMSA2001 | VBN2DMPA2003    | VBN2DMSA2003 |                     |  |                 |  |
|                           |                           | 102*  | VBN2DSPA2000                          | VBN2DSSA2000 | VBN2DSPA2001        | VBN2DSSA2001 | VBN2DSPA2003    | VBN2DSSA2003 |                     |  |                 |  |

\* Full port ball. No flow characterizing insert.

# Product Selection - Valves

## MVN Actuator With Standard Profile 2-Way NPT Valves ½"-1¼"

|                           |                           |       | Actuator Features                     |              | Non Fail Safe       |              |                 |              |                     |  |                 |  |
|---------------------------|---------------------------|-------|---------------------------------------|--------------|---------------------|--------------|-----------------|--------------|---------------------|--|-----------------|--|
|                           |                           |       | Actuator O.S Number/ Short Order Code |              | MVN713A0000         |              | MVN713A0000+C1  |              | MVN713A0000+C3      |  |                 |  |
| Power Supply              |                           |       | Voltage                               |              | 24 VAC/DC           |              | 24 VAC/DC       |              | 24 VAC/DC           |  |                 |  |
|                           |                           |       | Frequency                             |              | 50/60 Hz            |              | 50/60 Hz        |              | 50/60 Hz            |  |                 |  |
|                           |                           |       | Power                                 |              | 5 VA                |              | 5 VA            |              | 5 VA                |  |                 |  |
| Actuator Torque           |                           |       | (lb.-in.)                             |              | 27                  |              | 27              |              | 27                  |  |                 |  |
| Control                   |                           |       | Modulating (0)2-10Vdc                 |              | •                   |              | •               |              | •                   |  |                 |  |
|                           |                           |       | Floating                              |              |                     |              |                 |              |                     |  |                 |  |
|                           |                           |       | Fast acting SPDT                      |              |                     |              |                 |              |                     |  |                 |  |
| Actuator Stroke (degrees) |                           |       |                                       |              | 90° ± 3°            |              | 90° ± 3°        |              | 90° ± 3°            |  |                 |  |
| Timing                    |                           |       | (seconds)                             |              | 90                  |              | 90              |              | 90                  |  |                 |  |
| Fail Safe Action          |                           |       |                                       |              | Fail in Place       |              | Fail in Place   |              | Fail in Place       |  |                 |  |
| Valve Features            |                           |       | Trim                                  |              | Nickel-Plated Brass |              | Stainless Steel |              | Nickel-Plated Brass |  | Stainless Steel |  |
| Valve Size (inches)       | Close-off Pressure (psid) | Cv    | Short Order Codes                     |              |                     |              |                 |              |                     |  |                 |  |
|                           |                           |       | No Cable                              |              | 1 Meter Cable       |              | 3 Meter Cable   |              |                     |  |                 |  |
| 1/2"                      | 130                       | 0.38  | VBN2ABPA3000                          | VBN2ABSA3000 | VBN2ABPA3001        | VBN2ABSA3001 | VBN2ABPA3003    | VBN2ABSA3003 |                     |  |                 |  |
|                           |                           | 0.68  | VBN2ADPA3000                          | VBN2ADSA3000 | VBN2ADPA3001        | VBN2ADSA3001 | VBN2ADPA3003    | VBN2ADSA3003 |                     |  |                 |  |
|                           |                           | 1.3   | VBN2AEP3000                           | VBN2AESA3000 | VBN2AEP3001         | VBN2AESA3001 | VBN2AEP3003     | VBN2AESA3003 |                     |  |                 |  |
|                           |                           | 2     | VBN2AFPA3000                          | VBN2AFSA3000 | VBN2AFPA3001        | VBN2AFSA3001 | VBN2AFPA3003    | VBN2AFSA3003 |                     |  |                 |  |
|                           |                           | 2.6   | VBN2AGPA3000                          | VBN2AGSA3000 | VBN2AGPA3001        | VBN2AGSA3001 | VBN2AGPA3003    | VBN2AGSA3003 |                     |  |                 |  |
|                           |                           | 4.7   | VBN2AHP3000                           | VBN2AHPA3000 | VBN2AHP3001         | VBN2AHPA3001 | VBN2AHP3003     | VBN2AHPA3003 |                     |  |                 |  |
|                           |                           | 11.7* | VBN2AKPA3000                          | VBN2AKSA3000 | VBN2AKPA3001        | VBN2AKSA3001 | VBN2AKPA3003    | VBN2AKSA3003 |                     |  |                 |  |
| 3/4"                      | 130                       | 4.3   | VBN2BHP3000                           | VBN2BHSA3000 | VBN2BHP3001         | VBN2BHSA3001 | VBN2BHP3003     | VBN2BHSA3003 |                     |  |                 |  |
|                           |                           | 7.4   | VBN2BJP3000                           | VBN2BJS3000  | VBN2BJP3001         | VBN2BJS3001  | VBN2BJP3003     | VBN2BJS3003  |                     |  |                 |  |
|                           |                           | 10.1  | VBN2BKPA3000                          | VBN2BKSA3000 | VBN2BKPA3001        | VBN2BKSA3001 | VBN2BKPA3003    | VBN2BKSA3003 |                     |  |                 |  |
|                           |                           | 29*   | VBN2BMP3000                           | VBN2BMS3000  | VBN2BMP3001         | VBN2BMS3001  | VBN2BMP3003     | VBN2BMS3003  |                     |  |                 |  |
| 1"                        | 100                       | 9     | VBN2CJP3000                           | VBN2CJS3000  | VBN2CJP3001         | VBN2CJS3001  | VBN2CJP3003     | VBN2CJS3003  |                     |  |                 |  |
|                           |                           | 15.3  | VBN2CLP3000                           | VBN2CLS3000  | VBN2CLP3001         | VBN2CLS3001  | VBN2CLP3003     | VBN2CLS3003  |                     |  |                 |  |
|                           |                           | 26    | VBN2CMP3000                           | VBN2CMS3000  | VBN2CMP3001         | VBN2CMS3001  | VBN2CMP3003     | VBN2CMS3003  |                     |  |                 |  |
|                           |                           | 54*   | VBN2CPP3000                           | VBN2CPS3000  | VBN2CPP3001         | VBN2CPS3001  | VBN2CPP3003     | VBN2CPS3003  |                     |  |                 |  |
| 1-1/4"                    | 100                       | 14.9  | VBN2DKP3000                           | VBN2DKS3000  | VBN2DKP3001         | VBN2DKS3001  | VBN2DKP3003     | VBN2DKS3003  |                     |  |                 |  |
|                           |                           | 25    | VBN2DLP3000                           | VBN2DLS3000  | VBN2DLP3001         | VBN2DLS3001  | VBN2DLP3003     | VBN2DLS3003  |                     |  |                 |  |
|                           |                           | 37    | VBN2DMP3000                           | VBN2DMS3000  | VBN2DMP3001         | VBN2DMS3001  | VBN2DMP3003     | VBN2DMS3003  |                     |  |                 |  |
|                           |                           | 102*  | VBN2DSP3000                           | VBN2DSS3000  | VBN2DSP3001         | VBN2DSS3001  | VBN2DSP3003     | VBN2DSS3003  |                     |  |                 |  |

\* Full port ball. No flow characterizing insert.

# Product Selection - Valves

## MVN Actuator With Low Profile 2-Way NPT Valves ½"-1¼"

### Common Features

- Max static pressure 360 psi (250°F)
- Medium: Water/glycol solutions up to 50%. Use globe valves for steam control.
- Fluid temperature range: -22 to +250°F
- Spring return actuators field-configurable for A-port normally open or normally closed fail safe.

### VCN2 (Two-way)

- Equal % flow insert. Largest Cv rating in each valve size is full port, as noted
- Nickel-chrome plated brass or 316 stainless steel ball and stem
- ANSI class IV leakage (0.01% of Cv)



| Actuator Features                     |                       | Non Fail Safe |                     |                 |                     |                 |                     | Valve Only                                                                        |                     |                 |
|---------------------------------------|-----------------------|---------------|---------------------|-----------------|---------------------|-----------------|---------------------|-----------------------------------------------------------------------------------|---------------------|-----------------|
| Actuator O.S Number/ Short Order Code |                       | MVN613L0000   |                     | MVN613L0000+C1  |                     | MVN613L0000+C3  |                     | N/A                                                                               |                     |                 |
| Power Supply                          | Voltage               | 24 Vac        |                     | 24 Vac          |                     | 24 Vac          |                     |  |                     |                 |
|                                       | Frequency             | 50/60 Hz      |                     | 50/60 Hz        |                     | 50/60 Hz        |                     |                                                                                   |                     |                 |
|                                       | Power                 | 1.5 VA        |                     | 1.5 VA          |                     | 1.5 VA          |                     |                                                                                   |                     |                 |
| Actuator Torque (lb.-in.)             |                       | 27            |                     | 27              |                     | 27              |                     |                                                                                   |                     |                 |
| Control                               | Modulating (0)2-10Vdc |               |                     |                 |                     |                 |                     |                                                                                   |                     |                 |
|                                       | Floating              | •             |                     | •               |                     | •               |                     |                                                                                   |                     |                 |
|                                       | Fast acting SPDT      |               |                     |                 |                     |                 |                     |                                                                                   |                     |                 |
| Actuator Stroke (degrees)             |                       | 90° ± 3°      |                     | 90 ±3           |                     | 90 ±3           |                     |                                                                                   |                     |                 |
| Timing (seconds)                      |                       | 90            |                     | 90              |                     | 90              |                     |                                                                                   |                     |                 |
| Fail Safe Action                      |                       | Fail in Place |                     | Fail in Place   |                     | Fail in Place   |                     |                                                                                   |                     |                 |
| Valve Features                        |                       | Trim          | Nickel-Plated Brass | Stainless Steel | Nickel-Plated Brass | Stainless Steel | Nickel-Plated Brass | Stainless Steel                                                                   | Nickel-Plated Brass | Stainless Steel |



| Valve Size (inches) | Close-off Pressure (psid) | Cv    | Short Order Codes |              |               |              |               |              |              |              |
|---------------------|---------------------------|-------|-------------------|--------------|---------------|--------------|---------------|--------------|--------------|--------------|
|                     |                           |       | No Cable          |              | 1 Meter Cable |              | 3 Meter Cable |              | Valve Only   |              |
|                     |                           |       |                   |              |               |              |               |              |              |              |
| 1/2"                | 130                       | 0.38  | VCN2ABPL1000      | VCN2ABSL1000 | VCN2ABPL1001  | VCN2ABSL1001 | VCN2ABPL1003  | VCN2ABSL1003 | VCN2ABPL0000 | VCN2ABSL0000 |
|                     |                           | 0.68  | VCN2ADPL1000      | VCN2ADSL1000 | VCN2ADPL1001  | VCN2ADSL1001 | VCN2ADPL1003  | VCN2ADSL1003 | VCN2ADPL0000 | VCN2ADSL0000 |
|                     |                           | 1.3   | VCN2AEPL1000      | VCN2AESL1000 | VCN2AEPL1001  | VCN2AESL1001 | VCN2AEPL1003  | VCN2AESL1003 | VCN2AEPL0000 | VCN2AESL0000 |
|                     |                           | 2     | VCN2AFPL1000      | VCN2AFSL1000 | VCN2AFPL1001  | VCN2AFSL1001 | VCN2AFPL1003  | VCN2AFSL1003 | VCN2AFPL0000 | VCN2AFSL0000 |
|                     |                           | 2.6   | VCN2AGPL1000      | VCN2AGSL1000 | VCN2AGPL1001  | VCN2AGSL1001 | VCN2AGPL1003  | VCN2AGSL1003 | VCN2AGPL0000 | VCN2AGSL0000 |
|                     |                           | 4.7   | VCN2AHPL1000      | VCN2AHSL1000 | VCN2AHPL1001  | VCN2AHSL1001 | VCN2AHPL1003  | VCN2AHSL1003 | VCN2AHPL0000 | VCN2AHSL0000 |
|                     |                           | 11.7* | VCN2AKPL1000      | VCN2AKSL1000 | VCN2AKPL1001  | VCN2AKSL1001 | VCN2AKPL1003  | VCN2AKSL1003 | VCN2AKPL0000 | VCN2AKSL0000 |
| 3/4"                | 130                       | 4.3   | VCN2BHPL1000      | VCN2BHSL1000 | VCN2BHPL1001  | VCN2BHSL1001 | VCN2BHPL1003  | VCN2BHSL1003 | VCN2BHPL0000 | VCN2BHSL0000 |
|                     |                           | 7.4   | VCN2BJPL1000      | VCN2BJS�1000 | VCN2BJPL1001  | VCN2BJS�1001 | VCN2BJPL1003  | VCN2BJS�1003 | VCN2BJPL0000 | VCN2BJS�0000 |
|                     |                           | 10.1  | VCN2BKPL1000      | VCN2BKSL1000 | VCN2BKPL1001  | VCN2BKSL1001 | VCN2BKPL1003  | VCN2BKSL1003 | VCN2BKPL0000 | VCN2BKSL0000 |
|                     |                           | 29*   | VCN2BMPL1000      | VCN2BMSL1000 | VCN2BMPL1001  | VCN2BMSL1001 | VCN2BMPL1003  | VCN2BMSL1003 | VCN2BMPL0000 | VCN2BMSL0000 |
| 1"                  | 100                       | 9     | VCN2CJPL1000      | VCN2CJS�1000 | VCN2CJPL1001  | VCN2CJS�1001 | VCN2CJPL1003  | VCN2CJS�1003 | VCN2CJPL0000 | VCN2CJS�0000 |
|                     |                           | 15.3  | VCN2CLPL1000      | VCN2CLS�1000 | VCN2CLPL1001  | VCN2CLS�1001 | VCN2CLPL1003  | VCN2CLS�1003 | VCN2CLPL0000 | VCN2CLS�0000 |
|                     |                           | 26    | VCN2CMPL1000      | VCN2CMSL1000 | VCN2CMPL1001  | VCN2CMSL1001 | VCN2CMPL1003  | VCN2CMSL1003 | VCN2CMPL0000 | VCN2CMSL0000 |
|                     |                           | 54*   | VCN2CPPL1000      | VCN2CPSL1000 | VCN2CPPL1001  | VCN2CPSL1001 | VCN2CPPL1003  | VCN2CPSL1003 | VCN2CPPL0000 | VCN2CPSL0000 |
| 1-1/4"              | 100                       | 14.9  | VCN2DKPL1000      | VCN2DKSL1000 | VCN2DKPL1001  | VCN2DKSL1001 | VCN2DKPL1003  | VCN2DKSL1003 | VCN2DKPL0000 | VCN2DKSL0000 |
|                     |                           | 25    | VCN2DLPL1000      | VCN2DLSL1000 | VCN2DLPL1001  | VCN2DLSL1001 | VCN2DLPL1003  | VCN2DLSL1003 | VCN2DLPL0000 | VCN2DLSL0000 |
|                     |                           | 37    | VCN2DMPL1000      | VCN2DMSL1000 | VCN2DMPL1001  | VCN2DMSL1001 | VCN2DMPL1003  | VCN2DMSL1003 | VCN2DMPL0000 | VCN2DMSL0000 |
|                     |                           | 102*  | VCN2DSPL1000      | VCN2DSSL1000 | VCN2DSPL1001  | VCN2DSSL1001 | VCN2DSPL1003  | VCN2DSSL1003 | VCN2DSPL0000 | VCN2DSSL0000 |

\* Full port ball. No flow characterizing insert.

# Product Selection - Valves

## MVN Actuator With Low Profile 2-Way NPT Valves ½"-1¼"

| Actuator Features                     |                       | Non Fail Safe |                     |                 |                                                                         |
|---------------------------------------|-----------------------|---------------|---------------------|-----------------|-------------------------------------------------------------------------|
| Actuator O.S Number/ Short Order Code |                       | MVN643L0000   | MVN643L0000+C1      |                 | MVN643L0000+C3                                                          |
| Power Supply                          | Voltage               | 24 VAC/DC     | 24 VAC/DC           |                 | 24 VAC/DC                                                               |
|                                       | Frequency             | 50/60 Hz      | 50/60 Hz            |                 | 50/60 Hz                                                                |
|                                       | Power                 | 6 VA          | 6 VA                |                 | 6 VA                                                                    |
| Actuator Torque (lb.-in.)             |                       | 27            | 27                  |                 | 27                                                                      |
| Control                               | Modulating (0)2-10Vdc |               |                     |                 |                                                                         |
|                                       | Floating              |               |                     |                 |                                                                         |
|                                       | Fast acting SPDT      | •             | •                   |                 | •                                                                       |
| Actuator Stroke (degrees)             |                       | 90° ± 3°      | 90° ± 3°            |                 | 90° ± 3°                                                                |
| Timing (seconds)                      |                       | 30            | 30                  |                 | 30                                                                      |
| Fail Safe Action                      |                       | Fail in Place | Fail in Place       |                 | Fail in Place                                                           |
| Valve Features                        |                       | Trim          | Nickel-Plated Brass | Stainless Steel | Nickel-Plated Brass Stainless Steel Nickel-Plated Brass Stainless Steel |

| Valve Size (Inches) | Close-off Pressure (psid) | Cv    | Short Order Codes |              |               |              |               |              |
|---------------------|---------------------------|-------|-------------------|--------------|---------------|--------------|---------------|--------------|
|                     |                           |       | No Cable          |              | 1 Meter Cable |              | 3 Meter Cable |              |
|                     |                           |       |                   |              |               |              |               |              |
| 1/2"                | 130                       | 0.38  | VBN2ABPL2000      | VBN2ABSL2000 | VBN2ABPL2001  | VBN2ABSL2001 | VBN2ABPL2003  | VBN2ABSL2003 |
|                     |                           | 0.68  | VBN2ADPL2000      | VBN2ADSL2000 | VBN2ADPL2001  | VBN2ADSL2001 | VBN2ADPL2003  | VBN2ADSL2003 |
|                     |                           | 1.3   | VBN2AEPL2000      | VBN2AESL2000 | VBN2AEPL2001  | VBN2AESL2001 | VBN2AEPL2003  | VBN2AESL2003 |
|                     |                           | 2     | VBN2AFPL2000      | VBN2AFSL2000 | VBN2AFPL2001  | VBN2AFSL2001 | VBN2AFPL2003  | VBN2AFSL2003 |
|                     |                           | 2.6   | VBN2AGPL2000      | VBN2AGSL2000 | VBN2AGPL2001  | VBN2AGSL2001 | VBN2AGPL2003  | VBN2AGSL2003 |
|                     |                           | 4.7   | VBN2AHPL2000      | VBN2AHSL2000 | VBN2AHPL2001  | VBN2AHSL2001 | VBN2AHPL2003  | VBN2AHSL2003 |
|                     |                           | 11.7* | VBN2AKPL2000      | VBN2AKSL2000 | VBN2AKPL2001  | VBN2AKSL2001 | VBN2AKPL2003  | VBN2AKSL2003 |
| 3/4"                | 130                       | 4.3   | VBN2BHPL2000      | VBN2BHSL2000 | VBN2BHPL2001  | VBN2BHSL2001 | VBN2BHPL2003  | VBN2BHSL2003 |
|                     |                           | 7.4   | VBN2BJPL2000      | VBN2BJS�2000 | VBN2BJPL2001  | VBN2BJS�2001 | VBN2BJPL2003  | VBN2BJS�2003 |
|                     |                           | 10.1  | VBN2BKPL2000      | VBN2BKSL2000 | VBN2BKPL2001  | VBN2BKSL2001 | VBN2BKPL2003  | VBN2BKSL2003 |
|                     |                           | 29*   | VBN2BMPL2000      | VBN2BMSL2000 | VBN2BMPL2001  | VBN2BMSL2001 | VBN2BMPL2003  | VBN2BMSL2003 |
| 1"                  | 100                       | 9     | VBN2CJPL2000      | VBN2CJSL2000 | VBN2CJPL2001  | VBN2CJSL2001 | VBN2CJPL2003  | VBN2CJSL2003 |
|                     |                           | 15.3  | VBN2CLPL2000      | VBN2CLSL2000 | VBN2CLPL2001  | VBN2CLSL2001 | VBN2CLPL2003  | VBN2CLSL2003 |
|                     |                           | 26    | VBN2CMPL2000      | VBN2CMSL2000 | VBN2CMPL2001  | VBN2CMSL2001 | VBN2CMPL2003  | VBN2CMSL2003 |
|                     |                           | 54*   | VBN2CPPL2000      | VBN2CPSL2000 | VBN2CPPL2001  | VBN2CPSL2001 | VBN2CPPL2003  | VBN2CPSL2003 |
| 1-1/4"              | 100                       | 14.9  | VBN2DKPL2000      | VBN2DKSL2000 | VBN2DKPL2001  | VBN2DKSL2001 | VBN2DKPL2003  | VBN2DKSL2003 |
|                     |                           | 25    | VBN2DLPL2000      | VBN2DLSL2000 | VBN2DLPL2001  | VBN2DLSL2001 | VBN2DLPL2003  | VBN2DLSL2003 |
|                     |                           | 37    | VBN2DMPL2000      | VBN2DMSL2000 | VBN2DMPL2001  | VBN2DMSL2001 | VBN2DMPL2003  | VBN2DMSL2003 |
|                     |                           | 102*  | VBN2DSPL2000      | VBN2DSSL2000 | VBN2DSPL2001  | VBN2DSSL2001 | VBN2DSPL2003  | VBN2DSSL2003 |

\* Full port ball. No flow characterizing insert.

## Product Selection - Valves

## MVN Actuator With Low Profile 2-Way NPT Valves 1/2"-1 1/4"

|                           |                           |       | Actuator Features                     |              | Non Fail Safe       |                 |                     |                 |                     |                 |
|---------------------------|---------------------------|-------|---------------------------------------|--------------|---------------------|-----------------|---------------------|-----------------|---------------------|-----------------|
|                           |                           |       | Actuator O.S Number/ Short Order Code |              | MVN713L0000         |                 | MVN713L0000+C1      |                 | MVN713L0000+C3      |                 |
| Power Supply              |                           |       | Voltage                               |              | 24 VAC/DC           |                 | 24 VAC/DC           |                 | 24 VAC/DC           |                 |
|                           |                           |       | Frequency                             |              | 50/60 Hz            |                 | 50/60 Hz            |                 | 50/60 Hz            |                 |
|                           |                           |       | Power                                 |              | 5 VA                |                 | 5 VA                |                 | 5 VA                |                 |
| Actuator Torque           |                           |       | (lb. -in.)                            |              | 27                  |                 | 27                  |                 | 27                  |                 |
| Control                   |                           |       | Modulating (0)2-10Vdc                 |              | •                   |                 | •                   |                 | •                   |                 |
|                           |                           |       | Floating                              |              |                     |                 |                     |                 |                     |                 |
|                           |                           |       | Fast acting SPDT                      |              |                     |                 |                     |                 |                     |                 |
| Actuator Stroke (degrees) |                           |       |                                       |              | 90° ± 3°            |                 | 90° ± 3°            |                 | 90° ± 3°            |                 |
| Timing                    |                           |       | (seconds)                             |              | 90                  |                 | 90                  |                 | 90                  |                 |
| Fail Safe Action          |                           |       |                                       |              | Fail in Place       |                 | Fail in Place       |                 | Fail in Place       |                 |
| Valve Features            |                           |       | Trim                                  |              | Nickel-Plated Brass | Stainless Steel | Nickel-Plated Brass | Stainless Steel | Nickel-Plated Brass | Stainless Steel |
| Valve Size (inches)       | Close-off Pressure (psid) | Cv    | Short Order Codes                     |              |                     |                 |                     |                 |                     |                 |
|                           |                           |       | No Cable                              |              | 1 Meter Cable       |                 | 3 Meter Cable       |                 |                     |                 |
| 1/2"                      | 130                       | 0.38  | VBN2ABPL3000                          | VBN2ABSL3000 | VBN2ABPL3001        | VBN2ABSL3001    | VBN2ABPL3003        | VBN2ABSL3003    |                     |                 |
|                           |                           | 0.68  | VBN2ADPL3000                          | VBN2ADSL3000 | VBN2ADPL3001        | VBN2ADSL3001    | VBN2ADPL3003        | VBN2ADSL3003    |                     |                 |
|                           |                           | 1.3   | VBN2AEPL3000                          | VBN2AESL3000 | VBN2AEPL3001        | VBN2AESL3001    | VBN2AEPL3003        | VBN2AESL3003    |                     |                 |
|                           |                           | 2     | VBN2AFPL3000                          | VBN2AFSL3000 | VBN2AFPL3001        | VBN2AFSL3001    | VBN2AFPL3003        | VBN2AFSL3003    |                     |                 |
|                           |                           | 2.6   | VBN2AGPL3000                          | VBN2AGSL3000 | VBN2AGPL3001        | VBN2AGSL3001    | VBN2AGPL3003        | VBN2AGSL3003    |                     |                 |
|                           |                           | 4.7   | VBN2AHPL3000                          | VBN2AHS�3000 | VBN2AHPL3001        | VBN2AHS�3001    | VBN2AHPL3003        | VBN2AHS�3003    |                     |                 |
|                           |                           | 11.7* | VBN2AKPL3000                          | VBN2AKSL3000 | VBN2AKPL3001        | VBN2AKSL3001    | VBN2AKPL3003        | VBN2AKSL3003    |                     |                 |
| 3/4"                      | 130                       | 4.3   | VBN2BHPL3000                          | VBN2BHSL3000 | VBN2BHPL3001        | VBN2BHSL3001    | VBN2BHPL3003        | VBN2BHSL3003    |                     |                 |
|                           |                           | 7.4   | VBN2BJPL3000                          | VBN2BJS�3000 | VBN2BJPL3001        | VBN2BJS�3001    | VBN2BJPL3003        | VBN2BJS�3003    |                     |                 |
|                           |                           | 10.1  | VBN2BKPL3000                          | VBN2BKSL3000 | VBN2BKPL3001        | VBN2BKSL3001    | VBN2BKPL3003        | VBN2BKSL3003    |                     |                 |
|                           |                           | 29*   | VBN2BMPL3000                          | VBN2BMSL3000 | VBN2BMPL3001        | VBN2BMSL3001    | VBN2BMPL3003        | VBN2BMSL3003    |                     |                 |
| 1"                        | 100                       | 9     | VBN2CJPL3000                          | VBN2CJS�3000 | VBN2CJPL3001        | VBN2CJS�3001    | VBN2CJPL3003        | VBN2CJS�3003    |                     |                 |
|                           |                           | 15.3  | VBN2CLPL3000                          | VBN2CLS�3000 | VBN2CLPL3001        | VBN2CLS�3001    | VBN2CLPL3003        | VBN2CLS�3003    |                     |                 |
|                           |                           | 26    | VBN2CMPL3000                          | VBN2CMSL3000 | VBN2CMPL3001        | VBN2CMSL3001    | VBN2CMPL3003        | VBN2CMSL3003    |                     |                 |
|                           |                           | 54*   | VBN2CPPL3000                          | VBN2CPSL3000 | VBN2CPPL3001        | VBN2CPSL3001    | VBN2CPPL3003        | VBN2CPSL3003    |                     |                 |
| 1-1/4"                    | 100                       | 14.9  | VBN2DKPL3000                          | VBN2DKSL3000 | VBN2DKPL3001        | VBN2DKSL3001    | VBN2DKPL3003        | VBN2DKSL3003    |                     |                 |
|                           |                           | 25    | VBN2DLPL3000                          | VBN2DLS�3000 | VBN2DLPL3001        | VBN2DLS�3001    | VBN2DLPL3003        | VBN2DLS�3003    |                     |                 |
|                           |                           | 37    | VBN2DMPL3000                          | VBN2DMSL3000 | VBN2DMPL3001        | VBN2DMSL3001    | VBN2DMPL3003        | VBN2DMSL3003    |                     |                 |
|                           |                           | 102*  | VBN2DSPL3000                          | VBN2DSSL3000 | VBN2DSPL3001        | VBN2DSSL3001    | VBN2DSPL3003        | VBN2DSSL3003    |                     |                 |

\* Full port ball. No flow characterizing insert.

# Product Selection - Valves

## MVN Actuator With Standard Profile 3-Way NPT Valves ½"-1¼"

### Common Features

- Max static pressure 360 psi (250°F)
- Medium: Water/glycol solutions up to 50%. Use globe valves for steam control.
- Fluid temperature range: -22 to +250°F
- Spring return actuators field-configurable for A-port normally open or normally closed fail safe.

### VBN2 (Two-way)

- Equal % flow insert. Largest Cv rating in each valve size is full port, as noted
- Nickel-chrome plated brass or 316 stainless steel ball and stem
- ANSI class IV leakage (0.01% of Cv)



3-Way

| Actuator Features                     |                       | Non Fail Safe |                     |                     |                     |                     |                     |
|---------------------------------------|-----------------------|---------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| Actuator O.S Number/ Short Order Code |                       | MVN613A0000   | MVN613A0000+C1      | MVN613A0000+C3      | MVN643A0000         | MVN643A0000+C1      | MVN643A0000+C3      |
| Power Supply                          | Voltage               | 24 Vac        | 24 Vac              | 24 Vac              | 24 Vac              | 24 Vac              | 24 Vac              |
|                                       | Frequency             | 50/60 Hz      | 50/60 Hz            | 50/60 Hz            | 50/60 Hz            | 50/60 Hz            | 50/60 Hz            |
|                                       | Power                 | 1.5 VA        | 1.5 VA              | 1.5 VA              | 6 VA                | 6 VA                | 6 VA                |
| Actuator Torque (lb.-in.)             |                       | 27            | 27                  | 27                  | 27                  | 27                  | 27                  |
| Control                               | Modulating (0)2-10Vdc |               |                     |                     |                     |                     |                     |
|                                       | Floating              | •             | •                   | •                   |                     |                     |                     |
|                                       | Fast acting SPDT      |               |                     |                     | •                   | •                   | •                   |
| Actuator Stroke (degrees)             |                       | 90 ±3         | 90 ±3               | 90 ±3               | 90 ±3               | 90 ±3               | 90 ±3               |
| Timing (seconds)                      |                       | 90            | 90                  | 90                  | 30                  | 30                  | 30                  |
| Fail Safe Action                      |                       | Fail in Place | Fail in Place       | Fail in Place       | Fail in Place       | Fail in Place       | Fail in Place       |
| Valve Features                        |                       | Trim          | Nickel-Plated Brass | Nickel-Plated Brass | Nickel-Plated Brass | Nickel-Plated Brass | Nickel-Plated Brass |

| Valve Size (inches) | Close-off Pressure (psid) | Cv    | Short Order Codes |               |               |               |               |               |
|---------------------|---------------------------|-------|-------------------|---------------|---------------|---------------|---------------|---------------|
|                     |                           |       | No Cable          | 1 Meter Cable | 3 Meter Cable | No Cable      | 1 Meter Cable | 3 Meter Cable |
| ½"                  | 50                        | 0.33  | VBN3ABPA1000      | VBN3ABPA1001  | VBN3ABPA1003  | VBN3ABPA2000  | VBN3ABPA2001  | VBN3ABPA2003  |
|                     |                           | 0.59  | VBN3ACPA1000      | VBN3ACPA1001  | VBN3ACPA1003  | VBN3ACPA2000  | VBN3ACPA2001  | VBN3ACPA2003  |
|                     |                           | 1     | VBN3AEP A1000     | VBN3AEP A1001 | VBN3AEP A1003 | VBN3AEP A2000 | VBN3AEP A2001 | VBN3AEP A2003 |
|                     |                           | 2.4   | VBN3AFPA1000      | VBN3AFPA1001  | VBN3AFPA1003  | VBN3AFPA2000  | VBN3AFPA2001  | VBN3AFPA2003  |
|                     |                           | 4.3   | VBN3AHPA1000      | VBN3AHPA1001  | VBN3AHPA1003  | VBN3AHPA2000  | VBN3AHPA2001  | VBN3AHPA2003  |
|                     |                           | 8*    | VBN3AJPA1000      | VBN3AJPA1001  | VBN3AJPA1003  | VBN3AJPA2000  | VBN3AJPA2001  | VBN3AJPA2003  |
| ¾"                  | 50                        | 3.8   | VBN3BGPA1000      | VBN3BGPA1001  | VBN3BGPA1003  | VBN3BGPA2000  | VBN3BGPA2001  | VBN3BGPA2003  |
|                     |                           | 7     | VBN3BJPA1000      | VBN3BJPA1001  | VBN3BJPA1003  | VBN3BJPA2000  | VBN3BJPA2001  | VBN3BJPA2003  |
|                     |                           | 11*   | VBN3BKPA1000      | VBN3BKPA1001  | VBN3BKPA1003  | VBN3BKPA2000  | VBN3BKPA2001  | VBN3BKPA2003  |
| 1"                  | 50                        | 8.6   | VBN3CJPA1000      | VBN3CJPA1001  | VBN3CJPA1003  | VBN3CJPA2000  | VBN3CJPA2001  | VBN3CJPA2003  |
|                     |                           | 14.9  | VBN3CKPA1000      | VBN3CKPA1001  | VBN3CKPA1003  | VBN3CKPA2000  | VBN3CKPA2001  | VBN3CKPA2003  |
|                     |                           | 22*   | VBN3CLPA1000      | VBN3CLPA1001  | VBN3CLPA1003  | VBN3CLPA2000  | VBN3CLPA2001  | VBN3CLPA2003  |
|                     |                           | 31*   | VBN3CMPA1000      | VBN3CMPA1001  | VBN3CMPA1003  | VBN3CMPA2000  | VBN3CMPA2001  | VBN3CMPA2003  |
| 1-¼"                | 40                        | 12.7  | VBN3DKPA1000      | VBN3DKPA1001  | VBN3DKPA1003  | VBN3DKPA2000  | VBN3DKPA2001  | VBN3DKPA2003  |
|                     |                           | 19.4* | VBN3DLPA1000      | VBN3DLPA1001  | VBN3DLPA1003  | VBN3DLPA2000  | VBN3DLPA2001  | VBN3DLPA2003  |
|                     |                           | 27    | VBN3DMPA1000      | VBN3DMPA1001  | VBN3DMPA1003  | VBN3DMPA2000  | VBN3DMPA2001  | VBN3DMPA2003  |
|                     |                           | 34*   | VBN3DNPA1000      | VBN3DNPA1001  | VBN3DNPA1003  | VBN3DNPA2000  | VBN3DNPA2001  | VBN3DNPA2003  |

\* Full port ball. No flow characterizing insert.

# Product Selection - Valves

## MVN Actuator With Standard Profile 3-Way NPT Valves 1/2"-1 1/4"

### Common Features

- Max static pressure 360 psi (250°F)
- Medium: Water/glycol solutions up to 50%.  
Use globe valves for steam control.
- Fluid temperature range: -22 to +250°F
- Spring return actuators field-configurable for A-port normally open or normally closed fail safe.

### VBN2 (Two-way)

- Equal % flow insert. Largest Cv rating in each valve size is full port, as noted
- Nickel-chrome plated brass or 316 stainless steel ball and stem
- ANSI class IV leakage (0.01% of Cv)

| Actuator Features                     |                       | Non Fail Safe |                     |                     | Valve Only                                                                          |
|---------------------------------------|-----------------------|---------------|---------------------|---------------------|-------------------------------------------------------------------------------------|
| Actuator O.S Number/ Short Order Code |                       | MVN713A0000   | MVN713A0000+C1      | MVN713A0000+C3      | N/A                                                                                 |
| Power Supply                          | Voltage               | 24 Vac        | 24 Vac              | 24 Vac              |  |
|                                       | Frequency             | 50/60 Hz      | 50/60 Hz            | 50/60 Hz            |                                                                                     |
|                                       | Power                 | 5 VA          | 5 VA                | 5 VA                |                                                                                     |
| Actuator Torque (lb.-in.)             |                       | 27            | 27                  | 27                  |                                                                                     |
| Control                               | Modulating (0)2-10Vdc | •             | •                   | •                   |                                                                                     |
|                                       | Floating              |               |                     |                     |                                                                                     |
|                                       | Fast acting SPDT      |               |                     |                     |                                                                                     |
| Actuator Stroke (degrees)             |                       | 90 ±3         | 90 ±3               | 90 ±3               |                                                                                     |
| Timing (seconds)                      |                       | 90            | 90                  | 90                  |                                                                                     |
| Fail Safe Action                      |                       | Fail in Place | Fail in Place       | Fail in Place       |                                                                                     |
| Valve Features                        |                       | Trim          | Nickel-Plated Brass | Nickel-Plated Brass | Nickel-Plated Brass                                                                 |

| Valve Size (inches) | Close-off Pressure (psid) | Cv    | Short Order Codes |               |               |              |
|---------------------|---------------------------|-------|-------------------|---------------|---------------|--------------|
|                     |                           |       | No Cable          | 1 Meter Cable | 3 Meter Cable | Valve Only   |
| 1/2"                | 50                        | 0.33  | VBN3ABPA3000      | VBN3ABPA3001  | VBN3ABPA3003  | VBN3ABPA0000 |
|                     |                           | 0.59  | VBN3ACPA3000      | VBN3ACPA3001  | VBN3ACPA3003  | VBN3ACPA0000 |
|                     |                           | 1     | VBN3AEP3000       | VBN3AEP3001   | VBN3AEP3003   | VBN3AEP3000  |
|                     |                           | 2.4   | VBN3AFPA3000      | VBN3AFPA3001  | VBN3AFPA3003  | VBN3AFPA0000 |
|                     |                           | 4.3   | VBN3AHPA3000      | VBN3AHPA3001  | VBN3AHPA3003  | VBN3AHPA0000 |
|                     |                           | 8*    | VBN3AJPA3000      | VBN3AJPA3001  | VBN3AJPA3003  | VBN3AJPA0000 |
| 3/4"                | 50                        | 3.8   | VBN3BGPA3000      | VBN3BGPA3001  | VBN3BGPA3003  | VBN3BGPA0000 |
|                     |                           | 7     | VBN3BJPA3000      | VBN3BJPA3001  | VBN3BJPA3003  | VBN3BJPA0000 |
|                     |                           | 11*   | VBN3BKPA3000      | VBN3BKPA3001  | VBN3BKPA3003  | VBN3BKPA0000 |
| 1"                  | 50                        | 8.6   | VBN3CJPA3000      | VBN3CJPA3001  | VBN3CJPA3003  | VBN3CJPA0000 |
|                     |                           | 14.9  | VBN3CKPA3000      | VBN3CKPA3001  | VBN3CKPA3003  | VBN3CKPA0000 |
|                     |                           | 22*   | VBN3CLPA3000      | VBN3CLPA3001  | VBN3CLPA3003  | VBN3CLPA0000 |
|                     |                           | 31*   | VBN3CMPA3000      | VBN3CMPA3001  | VBN3CMPA3003  | VBN3CMPA0000 |
| 1-1/4"              | 40                        | 12.7  | VBN3DKPA3000      | VBN3DKPA3001  | VBN3DKPA3003  | VBN3DKPA0000 |
|                     |                           | 19.4* | VBN3DLPA3000      | VBN3DLPA3001  | VBN3DLPA3003  | VBN3DLPA0000 |
|                     |                           | 27    | VBN3DMPA3000      | VBN3DMPA3001  | VBN3DMPA3003  | VBN3DMPA0000 |
|                     |                           | 34*   | VBN3DNPA3000      | VBN3DNPA3001  | VBN3DNPA3003  | VBN3DNPA0000 |

\* Full port ball. No flow characterizing insert.



3-Way

VALVES

# Product Selection - Valves

## MVN Actuator With Low Profile 3-Way NPT Valves ½"-1¼"

| Actuator Features                     |                       | Non Fail Safe            |                     |                     |                     |                     |
|---------------------------------------|-----------------------|--------------------------|---------------------|---------------------|---------------------|---------------------|
| Actuator O.S Number/ Short Order Code |                       | MVN613L0000              | MVN613L0000+C1      | MVN613L0000+C3      | MVN643L0000         | MVN643L0000+C3      |
| Power Supply                          | Voltage               | 24 VAC                   | 24 VAC              | 24 VAC              | 24 VAC/DC           | 24VAC/DC            |
|                                       | Frequency             | 50/60 Hz                 | 50/60 Hz            | 50/60 Hz            | 50/60 Hz            | 50/60 Hz            |
|                                       | Power                 | 1.5 VA                   | 1.5 VA              | 1.5 VA              | 6 VA                | 6 VA                |
| Actuator Torque (lb.-in.)             |                       | 27                       | 27                  | 27                  | 27                  | 27                  |
| Control                               | Modulating (0)2-10Vdc |                          |                     |                     |                     |                     |
|                                       | Floating              | •                        | •                   | •                   |                     |                     |
|                                       | Fast acting SPDT      |                          |                     |                     | •                   | •                   |
| Actuator Stroke (degrees)             |                       | 90° ± 3°                 | 90° ± 3°            | 90° ± 3°            | 90° ± 3°            | 90° ± 3°            |
| Timing (seconds)                      |                       | 90                       | 90                  | 90                  | 30                  | 30                  |
| Fail Safe Action                      |                       | Fail in Place            | Fail in Place       | Fail in Place       | Fail in Place       | Fail in Place       |
| Valve Features                        |                       | Trim Nickel-Plated Brass | Nickel-Plated Brass | Nickel-Plated Brass | Nickel-Plated Brass | Nickel-Plated Brass |

| Valve Size (Inches) | Close-off Pressure (psid) | Cv    | Short Order Codes |               |               |              |               |               |
|---------------------|---------------------------|-------|-------------------|---------------|---------------|--------------|---------------|---------------|
|                     |                           |       | No Cable          | 1 Meter Cable | 3 Meter Cable | No Cable     | 1 Meter Cable | 3 Meter Cable |
| 1/2"                | 50                        | 0.33  | VBN3ABPL1000      | VBN3ABPL1001  | VBN3ABPL1003  | VBN3ABPL2000 | VBN3ABPL2001  | VBN3ABPL2003  |
|                     |                           | 0.59  | VBN3ACPL1000      | VBN3ACPL1001  | VBN3ACPL1003  | VBN3ACPL2000 | VBN3ACPL2001  | VBN3ACPL2003  |
|                     |                           | 1     | VBN3AEPL1000      | VBN3AEPL1001  | VBN3AEPL1003  | VBN3AEPL2000 | VBN3AEPL2001  | VBN3AEPL2003  |
|                     |                           | 2.4   | VBN3AFPL1000      | VBN3AFPL1001  | VBN3AFPL1003  | VBN3AFPL2000 | VBN3AFPL2001  | VBN3AFPL2003  |
|                     |                           | 4.3   | VBN3AHPL1000      | VBN3AHPL1001  | VBN3AHPL1003  | VBN3AHPL2000 | VBN3AHPL2001  | VBN3AHPL2003  |
|                     |                           | 8*    | VBN3AJPL1000      | VBN3AJPL1001  | VBN3AJPL1003  | VBN3AJPL2000 | VBN3AJPL2001  | VBN3AJPL2003  |
| 3/4"                | 50                        | 3.8   | VBN3BGPL1000      | VBN3BGPL1001  | VBN3BGPL1003  | VBN3BGPL2000 | VBN3BGPL2001  | VBN3BGPL2003  |
|                     |                           | 7     | VBN3BJPL1000      | VBN3BJPL1001  | VBN3BJPL1003  | VBN3BJPL2000 | VBN3BJPL2001  | VBN3BJPL2003  |
|                     |                           | 11*   | VBN3BKPL1000      | VBN3BKPL1001  | VBN3BKPL1003  | VBN3BKPL2000 | VBN3BKPL2001  | VBN3BKPL2003  |
| 1"                  | 50                        | 8.6   | VBN3CJPL1000      | VBN3CJPL1001  | VBN3CJPL1003  | VBN3CJPL2000 | VBN3CJPL2001  | VBN3CJPL2003  |
|                     |                           | 14.9  | VBN3CKPL1000      | VBN3CKPL1001  | VBN3CKPL1003  | VBN3CKPL2000 | VBN3CKPL2001  | VBN3CKPL2003  |
|                     |                           | 22*   | VBN3CLPL1000      | VBN3CLPL1001  | VBN3CLPL1003  | VBN3CLPL2000 | VBN3CLPL2001  | VBN3CLPL2003  |
|                     |                           | 31*   | VBN3CMPL1000      | VBN3CMPL1001  | VBN3CMPL1003  | VBN3CMPL2000 | VBN3CMPL2001  | VBN3CMPL2003  |
| 1-1/4"              | 40                        | 12.7  | VBN3DKPL1000      | VBN3DKPL1001  | VBN3DKPL1003  | VBN3DKPL2000 | VBN3DKPL2001  | VBN3DKPL2003  |
|                     |                           | 19.4* | VBN3DLPL1000      | VBN3DLPL1001  | VBN3DLPL1003  | VBN3DLPL2000 | VBN3DLPL2001  | VBN3DLPL2003  |
|                     |                           | 27    | VBN3DMPL1000      | VBN3DMPL1001  | VBN3DMPL1003  | VBN3DMPL2000 | VBN3DMPL2001  | VBN3DMPL2003  |
|                     |                           | 34*   | VBN3DNPL1000      | VBN3DNPL1001  | VBN3DNPL1003  | VBN3DNPL2000 | VBN3DNPL2001  | VBN3DNPL2003  |

\* Full port ball. No flow characterizing insert.

# Product Selection - Valves

## MVN Actuator With Low Profile 3-Way NPT Valves 1/2"-1 1/4"

| Actuator Features                     |                       |  | Non Fail Safe            |                     |                     | Valve Only                                                                          |
|---------------------------------------|-----------------------|--|--------------------------|---------------------|---------------------|-------------------------------------------------------------------------------------|
| Actuator O.S Number/ Short Order Code |                       |  | MVN713L0000              | MVN713L0000+C1      | MVN713L0000+C3      | N/A                                                                                 |
| Power Supply                          | Voltage               |  | 24 VAC/DC                | 24 VAC/DC           | 24 VAC/DC           |  |
|                                       | Frequency             |  | 50/60 Hz                 | 50/60 Hz            | 50/60 Hz            |                                                                                     |
|                                       | Power                 |  | 5 VA                     | 5 VA                | 5 VA                |                                                                                     |
| Actuator Torque (lb.-in.)             |                       |  | 27                       | 27                  | 27                  |                                                                                     |
| Control                               | Modulating (0)2-10Vdc |  | •                        | •                   | •                   |                                                                                     |
|                                       | Floating              |  |                          |                     |                     |                                                                                     |
|                                       | Fast acting SPDT      |  |                          |                     |                     |                                                                                     |
| Actuator Stroke (degrees)             |                       |  | 90° ± 3°                 | 90° ± 3°            | 90° ± 3°            |                                                                                     |
| Timing (seconds)                      |                       |  | 90                       | 90                  | 90                  |                                                                                     |
| Fail Safe Action                      |                       |  | Fail in Place            | Fail in Place       | Fail in Place       |                                                                                     |
| Valve Features                        |                       |  | Trim Nickel-Plated Brass | Nickel-Plated Brass | Nickel-Plated Brass | Nickel-Plated Brass                                                                 |

| Valve Size (inches) | Close-off Pressure (psid) | Cv    | Short Order Codes |               |               |              |
|---------------------|---------------------------|-------|-------------------|---------------|---------------|--------------|
|                     |                           |       | No Cable          | 1 Meter Cable | 3 Meter Cable | Valve Only   |
| 1/2"                | 50                        | 0.33  | VBN3ABPL3000      | VBN3ABPL3001  | VBN3ABPL3003  | VBN3ABPL0000 |
|                     |                           | 0.59  | VBN3ACPL3000      | VBN3ACPL3001  | VBN3ACPL3003  | VBN3ACPL0000 |
|                     |                           | 1     | VBN3AEPL3000      | VBN3AEPL3001  | VBN3AEPL3003  | VBN3AEPL0000 |
|                     |                           | 2.4   | VBN3AFPL3000      | VBN3AFPL3001  | VBN3AFPL3003  | VBN3AFPL0000 |
|                     |                           | 4.3   | VBN3AHPL3000      | VBN3AHPL3001  | VBN3AHPL3003  | VBN3AHPL0000 |
|                     |                           | 8*    | VBN3AJPL3000      | VBN3AJPL3001  | VBN3AJPL3003  | VBN3AJPL0000 |
| 3/4"                | 50                        | 3.8   | VBN3BGPL3000      | VBN3BGPL3001  | VBN3BGPL3003  | VBN3BGPL0000 |
|                     |                           | 7     | VBN3BJPL3000      | VBN3BJPL3001  | VBN3BJPL3003  | VBN3BJPL0000 |
|                     |                           | 11*   | VBN3BKPL3000      | VBN3BKPL3001  | VBN3BKPL3003  | VBN3BKPL0000 |
| 1"                  | 50                        | 8.6   | VBN3CJPL3000      | VBN3CJPL3001  | VBN3CJPL3003  | VBN3CJPL0000 |
|                     |                           | 14.9  | VBN3CKPL3000      | VBN3CKPL3001  | VBN3CKPL3003  | VBN3CKPL0000 |
|                     |                           | 22*   | VBN3CLPL3000      | VBN3CLPL3001  | VBN3CLPL3003  | VBN3CLPL0000 |
|                     |                           | 31*   | VBN3CMPL3000      | VBN3CMPL3001  | VBN3CMPL3003  | VBN3CMPL0000 |
| 1-1/4"              | 40                        | 12.7  | VBN3DKPL3000      | VBN3DKPL3001  | VBN3DKPL3003  | VBN3DKPL0000 |
|                     |                           | 19.4* | VBN3DLPL3000      | VBN3DLPL3001  | VBN3DLPL3003  | VBN3DLPL0000 |
|                     |                           | 27    | VBN3DMPL3000      | VBN3DMPL3001  | VBN3DMPL3003  | VBN3DMPL0000 |
|                     |                           | 34*   | VBN3DNPL3000      | VBN3DNPL3001  | VBN3DNPL3003  | VBN3DNPL0000 |

\* Full port ball. No flow characterizing insert.

3-Way

VALVES

# Product Selection - Valves

## 2-Way NPT Valves ½"- 3", NEMA 2

### Common Features

- Max static pressure 360 psi (250°F)
- Medium: Water/glycol solutions up to 50%.  
Use globe valves for steam control.
- Fluid temperature range: -22 to +250°F
- Spring return actuators field-configurable for A-port normally open or normally closed fail safe.

### VBN2 (Two-way)

- Equal % flow insert. Largest Cv rating in each valve size is full port, as noted
- Nickel-chrome plated brass or 316 stainless steel ball and stem
- ANSI class IV leakage (0.01% of Cv)



2-Way

| Actuator Features           |                           |       | Non Fail Safe                       |                     |                 |                     |
|-----------------------------|---------------------------|-------|-------------------------------------|---------------------|-----------------|---------------------|
| Actuator O.S. Number        |                           |       | MN6105A1011                         |                     | MN6105A1201     |                     |
| Power Supply                |                           |       | Voltage                             |                     | 24 VAC/DC       |                     |
|                             |                           |       | Frequency                           |                     | 50 / 60 Hz      |                     |
|                             |                           |       | Power                               |                     | 5 VA            |                     |
| Actuator Torque             |                           |       | (lb.-in.)                           |                     | 44              |                     |
| Control                     |                           |       | (0)2-10 Vdc                         |                     |                 |                     |
|                             |                           |       | 4-20 mA (external 500 Ohm Resistor) |                     |                 |                     |
|                             |                           |       | Floating                            |                     | •               |                     |
|                             |                           |       | Two-Position SPDT                   |                     | •               |                     |
|                             |                           |       | Two-Position SPST                   |                     |                 |                     |
| Actuator Stroke             |                           |       | (degrees)                           |                     | 95° ± 3°        |                     |
| Timing                      |                           |       | (drive/spring return, seconds)      |                     | 90              |                     |
| Aux Switch                  |                           |       |                                     |                     | 0               |                     |
| Feedback                    |                           |       | 2-10 Vdc Built In                   |                     | -               |                     |
| Fail Safe Action            |                           |       | Stay in Place                       |                     | Stay in Place   |                     |
| Normal Position (no signal) |                           |       | Stay in Place                       |                     | Stay in Place   |                     |
| Valve Features              |                           |       | Trim                                | Nickel-Plated Brass | Stainless Steel | Nickel-Plated Brass |
| Valve Size (inches)         | Close-off Pressure (psid) | Cv    | Short Order Codes                   |                     |                 |                     |
|                             |                           |       |                                     |                     |                 |                     |
| 1/2"                        | 130                       | 0.38  | VBN2ABPX4000                        | VBN2ABSX4000        | VBN2ABPXC000    | VBN2ABSC0000        |
|                             |                           | 0.68  | VBN2ADPX4000                        | VBN2ADSX4000        | VBN2ADPXC000    | VBN2ADSC0000        |
|                             |                           | 1.3   | VBN2AEPX4000                        | VBN2AESX4000        | VBN2AEPXC000    | VBN2AESXC0000       |
|                             |                           | 2     | VBN2AFPX4000                        | VBN2AFSX4000        | VBN2AFPXC000    | VBN2AFSC0000        |
|                             |                           | 2.6   | VBN2AGPX4000                        | VBN2AGSX4000        | VBN2AGPXC000    | VBN2AGSC0000        |
|                             |                           | 4.7   | VBN2AHPX4000                        | VBN2AHSX4000        | VBN2AHPXC000    | VBN2AHSC0000        |
| 3/4"                        | 130                       | 11.7* | VBN2AKPX4000                        | VBN2AKSX4000        | VBN2AKPXC000    | VBN2AKSC0000        |
|                             |                           | 4.3   | VBN2BHPX4000                        | VBN2BHSX4000        | VBN2BHPXC000    | VBN2BHSC0000        |
|                             |                           | 7.4   | VBN2BJPX4000                        | VBN2BJSX4000        | VBN2BJPXC000    | VBN2BJSC0000        |
|                             |                           | 10.1  | VBN2BKPX4000                        | VBN2BKSX4000        | VBN2BKPXC000    | VBN2BKSC0000        |
|                             |                           | 29*   | VBN2BMPX4000                        | VBN2BMSX4000        | VBN2BMPXC000    | VBN2BMSC0000        |
|                             |                           | 9     | VBN2CJPX4000                        | VBN2CJSX4000        | VBN2CJPXC000    | VBN2CJSC0000        |
| 1"                          | 100                       | 15.3  | VBN2CLPX4000                        | VBN2CLSX4000        | VBN2CLPXC000    | VBN2CLSC0000        |
|                             |                           | 26    | VBN2CMPX4000                        | VBN2CMSX4000        | VBN2CMPXC000    | VBN2CMSC0000        |
|                             |                           | 54*   | VBN2CPPX4000                        | VBN2CPSX4000        | VBN2CPPXC000    | VBN2CPSXC0000       |
|                             |                           | 14.9  | VBN2DKPX4000                        | VBN2DKSX4000        | VBN2DKPXC000    | VBN2DKSC0000        |
| 1-1/4"                      | 100                       | 25    | VBN2DLPX4000                        | VBN2DLSX4000        | VBN2DLPXC000    | VBN2DLSC0000        |
|                             |                           | 37    | VBN2DMPX4000                        | VBN2DMSX4000        | VBN2DMPXC000    | VBN2DMSC0000        |
|                             |                           | 102*  | VBN2DSPX4000                        | VBN2DSSX4000        | VBN2DSPXC000    | VBN2DSSXC0000       |
|                             |                           | 41    | VBN2ENPX4000                        | VBN2ENSX4000        | VBN2ENPXC000    | VBN2ENSC0000        |
| 1-1/2"                      | 100                       | 74*   | VBN2ERPX4000                        | VBN2ERSX4000        | VBN2ERPXC000    | VBN2ERSXC0000       |
|                             |                           | 172*  | VBN2E1PX4000                        | VBN2E1SX4000        | VBN2E1PXC000    | VBN2E1SC0000        |
|                             |                           | 42    | VBN2FNPX4000                        | VBN2FNSX4000        | VBN2FNPXC000    | VBN2FNSC0000        |
|                             |                           | 57    | VBN2FPPX4000                        | VBN2FPSX4000        | VBN2FPPXC000    | VBN2FPSXC0000       |
| 2"                          | 100                       | 71    | VBN2FRPX4000                        | VBN2FRSX4000        | VBN2FRPXC000    | VBN2FRSC0000        |
|                             |                           | 100   | VBN2FSPX4000                        | VBN2FSSX4000        | VBN2FSPXC000    | VBN2FSSXC0000       |
|                             |                           | 266*  | VBN2F2PX4000                        | VBN2F2SX4000        | VBN2F2PXC000    | VBN2F2SC0000        |
|                             |                           | 72    | VBN2GRPX4000                        | VBN2GRSX4000        | VBN2GRPXC000    | VBN2GRSC0000        |
| 2-1/2"                      | 100                       | 101   | VBN2GSPX4000                        | VBN2GSSX4000        | VBN2GSPXC000    | VBN2GSSXC0000       |
|                             |                           | 202*  | VBN2G1PX4000                        | VBN2G1SX4000        | VBN2G1PXC000    | VBN2G1SC0000        |
|                             |                           | 124   | VBN2HTPX4000                        | VBN2HTSX4000        | VBN2HTPXC000    | VBN2HTSC0000        |
| 3"                          | 100                       | 145*  | VBN2HUPX4000                        | VBN2HUSX4000        | VBN2HUPXC000    | VBN2HUSXC0000       |

\* Full port ball. No flow characterizing insert.

## Product Selection - Valves

## 2-Way NPT Valves ½" - 3", NEMA 2

| Actuator Features                     |                                     |          | Non Fail Safe     |                     |                 |                     | Valve Only                                                                          |              |
|---------------------------------------|-------------------------------------|----------|-------------------|---------------------|-----------------|---------------------|-------------------------------------------------------------------------------------|--------------|
| Actuator O.S. Number                  |                                     |          | MN7505A2001       |                     | MN7505A2209     |                     | N/A                                                                                 |              |
| Power Supply                          | Voltage                             |          | 24 VAC/DC         |                     | 24 VAC/DC       |                     |  |              |
|                                       | Frequency                           |          | 50 / 60 Hz        |                     | 50 / 60 Hz      |                     |                                                                                     |              |
|                                       | Power                               |          | 5 VA              |                     | 5 VA            |                     |                                                                                     |              |
| Actuator Torque (lb.-in.)             |                                     | 44       |                   | 44                  |                 |                     |                                                                                     |              |
| Control                               | (0)2-10 Vdc                         |          | •                 |                     | •               |                     |                                                                                     |              |
|                                       | 4-20 mA (external 500 Ohm Resistor) |          | •                 |                     | •               |                     |                                                                                     |              |
|                                       | Floating                            |          | •                 |                     | •               |                     |                                                                                     |              |
|                                       | Two-Position SPDT                   |          | •                 |                     | •               |                     |                                                                                     |              |
|                                       | Two-Position SPST                   |          | •                 |                     | •               |                     |                                                                                     |              |
| Actuator Stroke (degrees)             |                                     | 95° ± 3° |                   | 95° ± 3°            |                 |                     |                                                                                     |              |
| Timing (drive/spring return, seconds) |                                     | 90       |                   | 90                  |                 |                     |                                                                                     |              |
| Aux Switch 2 x SPDT Add-on            |                                     | 0        |                   | 2                   |                 |                     |                                                                                     |              |
| Feedback 2-10 Vdc Built In            |                                     | •        |                   | •                   |                 |                     |                                                                                     |              |
| Fail Safe Action                      |                                     |          | Stay in Place     |                     | Stay in Place   |                     |                                                                                     |              |
| Normal Position (no signal)           |                                     |          | Closed            |                     | Closed          |                     |                                                                                     |              |
| Valve Features                        |                                     |          | Trim              | Nickel-Plated Brass | Stainless Steel | Nickel-Plated Brass |                                                                                     |              |
| Valve Size (inches)                   | Close-off Pressure (psid)           | Cv       | Short Order Codes |                     |                 |                     |                                                                                     |              |
| 1/2"                                  | 130                                 | 0.38     | VBN2ABPX5000      | VBN2ABSX5000        | VBN2ABPXD000    | VBN2ABSXD000        | VBN2ABPX0000                                                                        | VBN2ABSX0000 |
|                                       |                                     | 0.68     | VBN2ADPX5000      | VBN2ADSX5000        | VBN2ADPXD000    | VBN2ADSDX000        | VBN2ADPX0000                                                                        | VBN2ADSX0000 |
|                                       |                                     | 1.3      | VBN2AEPX5000      | VBN2AESX5000        | VBN2AEPXD000    | VBN2AESXD000        | VBN2AEPX0000                                                                        | VBN2AESX0000 |
|                                       |                                     | 2        | VBN2AFPX5000      | VBN2AFSX5000        | VBN2AFPXD000    | VBN2AFSDX000        | VBN2AFPX0000                                                                        | VBN2AFSX0000 |
|                                       |                                     | 2.6      | VBN2AGPX5000      | VBN2AGSX5000        | VBN2AGPXD000    | VBN2AGSDX000        | VBN2AGPX0000                                                                        | VBN2AGSX0000 |
|                                       |                                     | 4.7      | VBN2AHPX5000      | VBN2AHSX5000        | VBN2AHPXD000    | VBN2AHSXD000        | VBN2AHPX0000                                                                        | VBN2AHSX0000 |
|                                       |                                     | 11.7*    | VBN2AKPX5000      | VBN2AKSX5000        | VBN2AKPXD000    | VBN2AKSDX000        | VBN2AKPX0000                                                                        | VBN2AKSX0000 |
| 3/4"                                  | 130                                 | 4.3      | VBN2BHPX5000      | VBN2BHSX5000        | VBN2BHPXD000    | VBN2BHSXD000        | VBN2BHPX0000                                                                        | VBN2BHSX0000 |
|                                       |                                     | 7.4      | VBN2BJPX5000      | VBN2BJSX5000        | VBN2BJPXD000    | VBN2BJSXD000        | VBN2BJPX0000                                                                        | VBN2BJSX0000 |
|                                       |                                     | 10.1     | VBN2BKPX5000      | VBN2BKSX5000        | VBN2BKPXD000    | VBN2BKSDX000        | VBN2BKPX0000                                                                        | VBN2BKSX0000 |
|                                       |                                     | 29*      | VBN2BMPX5000      | VBN2BMSX5000        | VBN2BMPXD000    | VBN2BMSXD000        | VBN2BMPX0000                                                                        | VBN2BMSX0000 |
| 1"                                    | 100                                 | 9        | VBN2CJXP5000      | VBN2CJSX5000        | VBN2CJXPXD000   | VBN2CJSXD000        | VBN2CJXPX0000                                                                       | VBN2CJSX0000 |
|                                       |                                     | 15.3     | VBN2CLPX5000      | VBN2CLSX5000        | VBN2CLPXD000    | VBN2CLSXD000        | VBN2CLPX0000                                                                        | VBN2CLSX0000 |
|                                       |                                     | 26       | VBN2CMPX5000      | VBN2CMSX5000        | VBN2CMPXD000    | VBN2CMSXD000        | VBN2CMPX0000                                                                        | VBN2CMSX0000 |
|                                       |                                     | 54*      | VBN2CPPX5000      | VBN2CPSX5000        | VBN2CPPXD000    | VBN2CPSXD000        | VBN2CPPX0000                                                                        | VBN2CPSX0000 |
| 1-1/4"                                | 100                                 | 14.9     | VBN2DKPX5000      | VBN2DKSX5000        | VBN2DKPXD000    | VBN2DKSDX000        | VBN2DKPX0000                                                                        | VBN2DKSX0000 |
|                                       |                                     | 25       | VBN2DLPX5000      | VBN2DLSX5000        | VBN2DLPXD000    | VBN2DLSXD000        | VBN2DLPX0000                                                                        | VBN2DLSX0000 |
|                                       |                                     | 37       | VBN2DMPX5000      | VBN2DMSX5000        | VBN2DMPXD000    | VBN2DMSXD000        | VBN2DMPX0000                                                                        | VBN2DMSX0000 |
|                                       |                                     | 102*     | VBN2DSPX5000      | VBN2DSSX5000        | VBN2DSPXD000    | VBN2DSSXD000        | VBN2DSPX0000                                                                        | VBN2DSSX0000 |
| 1-1/2"                                | 100                                 | 41       | VBN2ENPX5000      | VBN2ENSX5000        | VBN2ENPXD000    | VBN2ENSXD000        | VBN2ENPX0000                                                                        | VBN2ENSX0000 |
|                                       |                                     | 74*      | VBN2ERPX5000      | VBN2ERSX5000        | VBN2ERPXD000    | VBN2ERSXD000        | VBN2ERPX0000                                                                        | VBN2ERSX0000 |
|                                       |                                     | 172*     | VBN2E1PX5000      | VBN2E1SX5000        | VBN2E1PXD000    | VBN2E1SXD000        | VBN2E1PX0000                                                                        | VBN2E1SX0000 |
| 2"                                    | 100                                 | 42       | VBN2FNPX5000      | VBN2FNSX5000        | VBN2FNPD000     | VBN2FNSXD000        | VBN2FNPX0000                                                                        | VBN2FNSX0000 |
|                                       |                                     | 57       | VBN2FPPX5000      | VBN2FPSX5000        | VBN2FPPXD000    | VBN2FPSXD000        | VBN2FPPX0000                                                                        | VBN2FPSX0000 |
|                                       |                                     | 71       | VBN2FRPX5000      | VBN2FRSX5000        | VBN2FRPD000     | VBN2FRSDX000        | VBN2FRPX0000                                                                        | VBN2FRSX0000 |
|                                       |                                     | 100      | VBN2FSPX5000      | VBN2FSSX5000        | VBN2FSPXD000    | VBN2FSSXD000        | VBN2FSPX0000                                                                        | VBN2FSSX0000 |
|                                       |                                     | 266*     | VBN2F2PX5000      | VBN2F2SX5000        | VBN2F2PXD000    | VBN2F2SXD000        | VBN2F2PX0000                                                                        | VBN2F2SX0000 |
| 2-1/2"                                | 100                                 | 72       | VBN2GRPX5000      | VBN2GRSX5000        | VBN2GRPXD000    | VBN2GRSDX000        | VBN2GRPX0000                                                                        | VBN2GRSX0000 |
|                                       |                                     | 101      | VBN2GSPX5000      | VBN2GSSX5000        | VBN2GSPXD000    | VBN2GSSXD000        | VBN2GSPX0000                                                                        | VBN2GSSX0000 |
|                                       |                                     | 202*     | VBN2G1PX5000      | VBN2G1SX5000        | VBN2G1PXD000    | VBN2G1SXD000        | VBN2G1PX0000                                                                        | VBN2G1SX0000 |
| 3"                                    | 100                                 | 124      | VBN2HTPX5000      | VBN2HTSX5000        | VBN2HTPXD000    | VBN2HTSX0000        | VBN2HTPX0000                                                                        | VBN2HTSX0000 |
|                                       |                                     | 145*     | VBN2HUPX5000      | VBN2HUSX5000        | VBN2HUPXD000    | VBN2HUSXD000        | VBN2HUPX0000                                                                        | VBN2HUSX0000 |

\* Full port ball. No flow characterizing insert.

# Product Selection - Valves

## 2-Way NPT Valves ½"- 1¼", NEMA 2

| Actuator Features                   |                           |           | Fail Safe                      |                     |                 |                     |                 |                     |                 |                     |                 |
|-------------------------------------|---------------------------|-----------|--------------------------------|---------------------|-----------------|---------------------|-----------------|---------------------|-----------------|---------------------|-----------------|
| Actuator O.S. Number                |                           |           | MS3103J1023                    |                     |                 |                     | MS3103J1223     |                     |                 |                     |                 |
| Power Supply                        |                           | Voltage   | 24 VAC/DC                      |                     |                 |                     | 24 VAC/DC       |                     |                 |                     |                 |
|                                     |                           | Frequency | 50 / 60 Hz                     |                     |                 |                     | 50 / 60 Hz      |                     |                 |                     |                 |
|                                     |                           | Power     | 4.5 VA                         |                     |                 |                     | 4.5 VA          |                     |                 |                     |                 |
| Actuator Torque                     |                           | (lb.-in.) | 27                             |                     |                 |                     | 27              |                     |                 |                     |                 |
| Control                             |                           |           | (0)2-10 Vdc                    |                     |                 |                     |                 |                     |                 |                     |                 |
| 4-20 mA (external 500 Ohm Resistor) |                           |           |                                |                     |                 |                     |                 |                     |                 |                     |                 |
| Sylk                                |                           |           | •                              |                     |                 |                     | •               |                     |                 |                     |                 |
| Two-Position SPDT                   |                           |           |                                |                     |                 |                     |                 |                     |                 |                     |                 |
| Two-Position SPST                   |                           |           |                                |                     |                 |                     |                 |                     |                 |                     |                 |
| Actuator Stroke                     |                           |           | (degrees)                      |                     |                 |                     | 95° ± 3°        |                     |                 |                     |                 |
| Timing                              |                           |           | (drive/spring return, seconds) |                     |                 |                     | 30-180 / 25     |                     |                 |                     |                 |
| Aux Switch                          |                           |           | 0                              |                     |                 |                     | 2               |                     |                 |                     |                 |
| Feedback                            |                           |           | Sylk                           |                     |                 |                     | Sylk            |                     |                 |                     |                 |
| Fail Safe Action                    |                           |           | Closed                         |                     | Open            |                     | Closed          |                     | Open            |                     |                 |
| Normal Position (no signal)         |                           |           | Closed                         |                     | Open            |                     | Closed          |                     | Open            |                     |                 |
| Valve Features                      |                           |           | Trim                           | Nickel-Plated Brass | Stainless Steel | Nickel-Plated Brass | Stainless Steel | Nickel-Plated Brass | Stainless Steel | Nickel-Plated Brass | Stainless Steel |
| Valve Size (inches)                 | Close-off Pressure (psid) | Cv        | Short Order Codes              |                     |                 |                     |                 |                     |                 |                     |                 |
| 1/2"                                | 130                       | 0.38      | VBN2ABPXG201                   | VBN2ABSXG201        | VBN2ABPXG101    | VBN2ABSXG101        | VBN2ABPXXH201   | VBN2ABSXXH201       | VBN2ABPXXH101   | VBN2ABSXXH101       |                 |
|                                     |                           | 0.68      | VBN2ADPXG201                   | VBN2ADSXG201        | VBN2ADPXG101    | VBN2ADSXG101        | VBN2ADPXXH201   | VBN2ADSXXH201       | VBN2ADPXXH101   | VBN2ADSXXH101       |                 |
|                                     |                           | 1.3       | VBN2AEPXG201                   | VBN2AESXG201        | VBN2AEPXG101    | VBN2AESXG101        | VBN2AEPXXH201   | VBN2AESXXH201       | VBN2AEPXXH101   | VBN2AESXXH101       |                 |
|                                     |                           | 2         | VBN2AFPXG201                   | VBN2AFSXG201        | VBN2AFPXG101    | VBN2AFSXG101        | VBN2AFPXXH201   | VBN2AFSXXH201       | VBN2AFPXXH101   | VBN2AFSXXH101       |                 |
|                                     |                           | 2.6       | VBN2AGPXG201                   | VBN2AGSXG201        | VBN2AGPXG101    | VBN2AGSXG101        | VBN2AGPXXH201   | VBN2AGSXXH201       | VBN2AGPXXH101   | VBN2AGSXXH101       |                 |
|                                     |                           | 4.7       | VBN2AHPXG201                   | VBN2AHSXG201        | VBN2AHPXG101    | VBN2AHSXG101        | VBN2AHPXXH201   | VBN2AHSXXH201       | VBN2AHPXXH101   | VBN2AHSXXH101       |                 |
| 3/4"                                | 130                       | 11.7*     | VBN2AKPXG201                   | VBN2AKSXG201        | VBN2AKPXG101    | VBN2AKSXG101        | VBN2AKPXXH201   | VBN2AKSXXH201       | VBN2AKPXXH101   | VBN2AKSXXH101       |                 |
|                                     |                           | 4.3       | VBN2BHPXG201                   | VBN2BHSXG201        | VBN2BHPXG101    | VBN2BHSXG101        | VBN2BHPXXH201   | VBN2BHSXXH201       | VBN2BHPXXH101   | VBN2BHSXXH101       |                 |
|                                     |                           | 7.4       | VBN2BJPXG201                   | VBN2BJSXG201        | VBN2BJPXG101    | VBN2BJSXG101        | VBN2BJPXXH201   | VBN2BJSXXH201       | VBN2BJPXXH101   | VBN2BJSXXH101       |                 |
|                                     |                           | 10.1      | VBN2BKPXG201                   | VBN2BKSXG201        | VBN2BKPXG101    | VBN2BKSXG101        | VBN2BKPXXH201   | VBN2BKSXXH201       | VBN2BKPXXH101   | VBN2BKSXXH101       |                 |
|                                     |                           | 29*       | VBN2BMPXG201                   | VBN2BMSXG201        | VBN2BMPXG101    | VBN2BMSXG101        | VBN2BMPXXH201   | VBN2BMSXXH201       | VBN2BMPXXH101   | VBN2BMSXXH101       |                 |
|                                     |                           | 9         | VBN2CJPGX201                   | VBN2CJSXG201        | VBN2CJPGX101    | VBN2CJSXG101        | VBN2CJPXXH201   | VBN2CJSXXH201       | VBN2CJPXXH101   | VBN2CJSXXH101       |                 |
| 1"                                  | 100                       | 15.3      | VBN2CLPXG201                   | VBN2CLSXG201        | VBN2CLPXG101    | VBN2CLSXG101        | VBN2CLPXXH201   | VBN2CLSXXH201       | VBN2CLPXXH101   | VBN2CLSXXH101       |                 |
|                                     |                           | 26        | VBN2CMPXG201                   | VBN2CMSXG201        | VBN2CMPXG101    | VBN2CMSXG101        | VBN2CMPXXH201   | VBN2CMSXXH201       | VBN2CMPXXH101   | VBN2CMSXXH101       |                 |
|                                     |                           | 54*       | VBN2CPPXG201                   | VBN2CPSXG201        | VBN2CPPXG101    | VBN2CPSXG101        | VBN2CPPXXH201   | VBN2CPSXXH201       | VBN2CPPXXH101   | VBN2CPSXXH101       |                 |
|                                     |                           |           |                                |                     |                 |                     |                 |                     |                 |                     |                 |
| 1-1/4"                              | 100                       | 14.9      | VBN2DKPXG201                   | VBN2DKSXG201        | VBN2DKPXG101    | VBN2DKSXG101        | VBN2DKPXXH201   | VBN2DKSXXH201       | VBN2DKPXXH101   | VBN2DKSXXH101       |                 |
|                                     |                           | 25        | VBN2DLPXG201                   | VBN2DLSXG201        | VBN2DLPXG101    | VBN2DLSXG101        | VBN2DLPXXH201   | VBN2DLSXXH201       | VBN2DLPXXH101   | VBN2DLSXXH101       |                 |
|                                     |                           | 37        | VBN2DMPXG201                   | VBN2DMSXG201        | VBN2DMPXG101    | VBN2DMSXG101        | VBN2DMPXXH201   | VBN2DMSXXH201       | VBN2DMPXXH101   | VBN2DMSXXH101       |                 |
|                                     |                           | 102*      | VBN2DSPXG201                   | VBN2DSSXG201        | VBN2DSPXG101    | VBN2DSSXG101        | VBN2DSPXXH201   | VBN2DSSXXH201       | VBN2DSPXXH101   | VBN2DSSXXH101       |                 |

2-Way

## Product Selection - Valves

## 2-Way NPT Valves ½" - 1 ¼", NEMA 2

| Actuator Features           |                           |                                     | Fail Safe           |                 |                     |                 |                     |                 |                     |                 |
|-----------------------------|---------------------------|-------------------------------------|---------------------|-----------------|---------------------|-----------------|---------------------|-----------------|---------------------|-----------------|
| Actuator O.S. Number        |                           |                                     | MS7103A2021         |                 |                     |                 | MS7103A2221         |                 |                     |                 |
| Power Supply                |                           | Voltage                             | 24 VAC/DC           |                 |                     |                 | 24 VAC/DC           |                 |                     |                 |
|                             |                           | Frequency                           | 50 / 60 Hz          |                 |                     |                 | 50 / 60 Hz          |                 |                     |                 |
|                             |                           | Power                               | 4 VA                |                 |                     |                 | 4 VA                |                 |                     |                 |
| Actuator Torque             |                           | (lb.-in.)                           | 27                  |                 |                     |                 | 27                  |                 |                     |                 |
| Control                     |                           | 2-10 Vdc                            | •                   |                 |                     |                 | •                   |                 |                     |                 |
|                             |                           | 4-20 mA (external 500 Ohm Resistor) | •                   |                 |                     |                 | •                   |                 |                     |                 |
|                             |                           | Floating                            |                     |                 |                     |                 |                     |                 |                     |                 |
|                             |                           | Two-Position SPDT                   |                     |                 |                     |                 |                     |                 |                     |                 |
|                             |                           | Two-Position SPST                   |                     |                 |                     |                 |                     |                 |                     |                 |
| Actuator Stroke             |                           | (degrees)                           | 95° ± 3°            |                 |                     |                 | 95° ± 3°            |                 |                     |                 |
| Timing                      |                           | (drive/spring return, seconds)      | 90 / 25             |                 |                     |                 | 90 / 25             |                 |                     |                 |
| Aux Switch                  |                           |                                     | 0                   |                 |                     |                 | 2                   |                 |                     |                 |
| Feedback                    |                           | 2-10 Vdc Built In                   | •                   |                 |                     |                 | •                   |                 |                     |                 |
| Fail Safe Action            |                           |                                     | Closed              |                 | Open                |                 | Closed              |                 | Open                |                 |
| Normal Position (no signal) |                           |                                     | Closed              |                 | Open                |                 | Closed              |                 | Open                |                 |
| Valve Features              |                           | Trim                                | Nickel-Plated Brass | Stainless Steel | Nickel-Plated Brass | Stainless Steel | Nickel-Plated Brass | Stainless Steel | Nickel-Plated Brass | Stainless Steel |
| Valve Size (inches)         | Close-off Pressure (psid) | Cv                                  | Short Order Codes   |                 |                     |                 |                     |                 |                     |                 |
| 1/2"                        | 130                       | 0.38                                | VBN2ABPX201         | VBN2ABSXE201    | VBN2ABPX101         | VBN2ABSXE101    | VBN2ABPXF201        | VBN2ABSXF201    | VBN2ABPXF101        | VBN2ABSXF101    |
|                             |                           | 0.68                                | VBN2ADPX201         | VBN2ADSXE201    | VBN2ADPX101         | VBN2ADSXE101    | VBN2ADPXF201        | VBN2ADSXF201    | VBN2ADPXF101        | VBN2ADSXF101    |
|                             |                           | 1.3                                 | VBN2AEPXE201        | VBN2AESXE201    | VBN2AEPXE101        | VBN2AESXE101    | VBN2AEPXF201        | VBN2AESXF201    | VBN2AEPXF101        | VBN2AESXF101    |
|                             |                           | 2                                   | VBN2AFPXE201        | VBN2AFSXE201    | VBN2AFPXE101        | VBN2AFSXE101    | VBN2AFPXF201        | VBN2AFSXF201    | VBN2AFPXF101        | VBN2AFSXF101    |
|                             |                           | 2.6                                 | VBN2AGPX201         | VBN2AGSXE201    | VBN2AGPX101         | VBN2AGSXE101    | VBN2AGPXF201        | VBN2AGSXF201    | VBN2AGPXF101        | VBN2AGSXF101    |
|                             |                           | 4.7                                 | VBN2AHPXE201        | VBN2AHSXE201    | VBN2AHPXE101        | VBN2AHSXE101    | VBN2AHPXF201        | VBN2AHSXF201    | VBN2AHPXF101        | VBN2AHSXF101    |
| 2-Way                       | 130                       | 11.7*                               | VBN2AKPX201         | VBN2AKSXE201    | VBN2AKPX101         | VBN2AKSXE101    | VBN2AKPXF201        | VBN2AKSXF201    | VBN2AKPXF101        | VBN2AKSXF101    |
|                             |                           | 4.3                                 | VBN2BHPXE201        | VBN2BHSXE201    | VBN2BHPXE101        | VBN2BHSXE101    | VBN2BHPXF201        | VBN2BHSXF201    | VBN2BHPXF101        | VBN2BHSXF101    |
|                             |                           | 7.4                                 | VBN2BJPX201         | VBN2BJSXE201    | VBN2BJPX101         | VBN2BJSXE101    | VBN2BJPXF201        | VBN2BJSXF201    | VBN2BJPXF101        | VBN2BJSXF101    |
|                             |                           | 10.1                                | VBN2BKPXE201        | VBN2BKSXE201    | VBN2BKPXE101        | VBN2BKSXE101    | VBN2BKPF201         | VBN2BKSXF201    | VBN2BKPF101         | VBN2BKSXF101    |
|                             |                           | 29*                                 | VBN2BMPXE201        | VBN2BMSXE201    | VBN2BMPXE101        | VBN2BMSXE101    | VBN2BMPXF201        | VBN2BMSXF201    | VBN2BMPXF101        | VBN2BMSXF101    |
|                             |                           | 9                                   | VBN2CJPX201         | VBN2CJSXE201    | VBN2CJPX101         | VBN2CJSXE101    | VBN2CJPXF201        | VBN2CJSXF201    | VBN2CJPXF101        | VBN2CJSXF101    |
| 1"                          | 100                       | 15.3                                | VBN2CLPX201         | VBN2CLSXE201    | VBN2CLPX101         | VBN2CLSXE101    | VBN2CLPXF201        | VBN2CLSXF201    | VBN2CLPXF101        | VBN2CLSXF101    |
|                             |                           | 26                                  | VBN2CMPXE201        | VBN2CMSXE201    | VBN2CMPXE101        | VBN2CMSXE101    | VBN2CMPXF201        | VBN2CMSXF201    | VBN2CMPXF101        | VBN2CMSXF101    |
|                             |                           | 54*                                 | VBN2CPPXE201        | VBN2CPSXE201    | VBN2CPPXE101        | VBN2CPSXE101    | VBN2CPPXF201        | VBN2CPSXF201    | VBN2CPPXF101        | VBN2CPSXF101    |
| 1-1/4"                      | 100                       | 14.9                                | VBN2DKPX201         | VBN2DKSXE201    | VBN2DKPX101         | VBN2DKSXE101    | VBN2DKPXF201        | VBN2DKSXF201    | VBN2DKPXF101        | VBN2DKSXF101    |
|                             |                           | 25                                  | VBN2DLPXE201        | VBN2DLSXE201    | VBN2DLPXE101        | VBN2DLSXE101    | VBN2DLPXF201        | VBN2DLSXF201    | VBN2DLPXF101        | VBN2DLSXF101    |
|                             |                           | 37                                  | VBN2DMPXE201        | VBN2DMSXE201    | VBN2DMPXE101        | VBN2DMSXE101    | VBN2DMPXF201        | VBN2DMSXF201    | VBN2DMPXF101        | VBN2DMSXF101    |
|                             |                           | 102*                                | VBN2DSPXE201        | VBN2DSSXE201    | VBN2DSPXE101        | VBN2DSSXE101    | VBN2DSPXF201        | VBN2DSSXF201    | VBN2DSPXF101        | VBN2DSSXF101    |

\* Full port ball. No flow characterizing insert.

Product Selection - Valves

2-Way NPT Valves 1/2"- 3", NEMA 2

| Actuator Features           |                           |                                     |                     | Fail Safe       |                     |                 |                     |                 |                     |                 |  |
|-----------------------------|---------------------------|-------------------------------------|---------------------|-----------------|---------------------|-----------------|---------------------|-----------------|---------------------|-----------------|--|
| Actuator O.S. Number        |                           |                                     | MS7503A2021         |                 |                     |                 | MS7503A2221         |                 |                     |                 |  |
| Power Supply                |                           | Voltage                             | 24 VAC/DC           |                 |                     |                 | 24 VAC/DC           |                 |                     |                 |  |
|                             |                           | Frequency                           | 50 / 60 Hz          |                 |                     |                 | 50 / 60 Hz          |                 |                     |                 |  |
|                             |                           | Power                               | 4 VA                |                 |                     |                 | 4 VA                |                 |                     |                 |  |
| Actuator Torque             |                           | (lb.-in.)                           | 27                  |                 |                     |                 | 27                  |                 |                     |                 |  |
| Control                     |                           | (0)2-10 Vdc                         | •                   |                 |                     |                 | •                   |                 |                     |                 |  |
|                             |                           | 4-20 mA (external 500 Ohm Resistor) | •                   |                 |                     |                 | •                   |                 |                     |                 |  |
|                             |                           | Floating                            | •                   |                 |                     |                 | •                   |                 |                     |                 |  |
|                             |                           | Two-Position SPDT                   | •                   |                 |                     |                 | •                   |                 |                     |                 |  |
|                             |                           | Two-Position SPST                   |                     |                 |                     |                 |                     |                 |                     |                 |  |
| Actuator Stroke             |                           | (degrees)                           | 95° ± 3°            |                 |                     |                 | 95° ± 3°            |                 |                     |                 |  |
| Timing                      |                           | (drive/spring return, seconds)      | 90 / 25             |                 |                     |                 | 90 / 25             |                 |                     |                 |  |
| Aux Switch                  |                           |                                     | 0                   |                 |                     |                 | 2                   |                 |                     |                 |  |
| Feedback                    |                           | 2-10 Vdc Built In                   | •                   |                 |                     |                 | •                   |                 |                     |                 |  |
| Fail Safe Action            |                           |                                     | Closed              |                 | Open                |                 | Closed              |                 | Open                |                 |  |
| Normal Position (no signal) |                           |                                     | Closed              |                 | Open                |                 | Closed              |                 | Open                |                 |  |
| Valve Features              |                           | Trim                                | Nickel-Plated Brass | Stainless Steel | Nickel-Plated Brass | Stainless Steel | Nickel-Plated Brass | Stainless Steel | Nickel-Plated Brass | Stainless Steel |  |
| Valve Size (inches)         | Close-off Pressure (psid) | Cv                                  | Short Order Codes   |                 |                     |                 |                     |                 |                     |                 |  |
| 1/2"                        | 130                       | 0.38                                | VBN2ABPXJ201        | VBN2ABSXJ201    | VBN2ABPXJ101        | VBN2ABSXJ101    | VBN2ABPXXK201       | VBN2ABSXXK201   | VBN2ABPXXK101       | VBN2ABSXXK101   |  |
|                             |                           | 0.68                                | VBN2ADPXJ201        | VBN2ADSXJ201    | VBN2ADPXJ101        | VBN2ADSXJ101    | VBN2ADPXXK201       | VBN2ADSXXK201   | VBN2ADPXXK101       | VBN2ADSXXK101   |  |
|                             |                           | 1.3                                 | VBN2AEPXJ201        | VBN2AESXJ201    | VBN2AEPXJ101        | VBN2AESXJ101    | VBN2AEPXXK201       | VBN2AESXXK201   | VBN2AEPXXK101       | VBN2AESXXK101   |  |
|                             |                           | 2                                   | VBN2AFPXJ201        | VBN2AFSXJ201    | VBN2AFPXJ101        | VBN2AFSXJ101    | VBN2AFPXXK201       | VBN2AFSXXK201   | VBN2AFPXXK101       | VBN2AFSXXK101   |  |
|                             |                           | 2.6                                 | VBN2AGPXJ201        | VBN2AGSXJ201    | VBN2AGPXJ101        | VBN2AGSXJ101    | VBN2AGPXXK201       | VBN2AGSXXK201   | VBN2AGPXXK101       | VBN2AGSXXK101   |  |
|                             |                           | 4.7                                 | VBN2AHPXJ201        | VBN2AHSXJ201    | VBN2AHPXJ101        | VBN2AHSXJ101    | VBN2AHPXXK201       | VBN2AHSXXK201   | VBN2AHPXXK101       | VBN2AHSXXK101   |  |
|                             |                           | 11.7*                               | VBN2AKPXJ201        | VBN2AKSXJ201    | VBN2AKPXJ101        | VBN2AKSXJ101    | VBN2AKPXXK201       | VBN2AKSXXK201   | VBN2AKPXXK101       | VBN2AKSXXK101   |  |
| 3/4"                        | 130                       | 4.3                                 | VBN2BHPXJ201        | VBN2BHSXJ201    | VBN2BHPXJ101        | VBN2BHSXJ101    | VBN2BHPXXK201       | VBN2BHSXXK201   | VBN2BHPXXK101       | VBN2BHSXXK101   |  |
|                             |                           | 7.4                                 | VBN2BJPXJ201        | VBN2BJSXJ201    | VBN2BJPXJ101        | VBN2BJSXJ101    | VBN2BJPXXK201       | VBN2BJSXXK201   | VBN2BJPXXK101       | VBN2BJSXXK101   |  |
|                             |                           | 10.1                                | VBN2BKPXJ201        | VBN2BKSXJ201    | VBN2BKPXJ101        | VBN2BKSXJ101    | VBN2BKPXXK201       | VBN2BKSXXK201   | VBN2BKPXXK101       | VBN2BKSXXK101   |  |
|                             |                           | 29*                                 | VBN2BMPXJ201        | VBN2BMSXJ201    | VBN2BMPXJ101        | VBN2BMSXJ101    | VBN2BMPXXK201       | VBN2BMSXXK201   | VBN2BMPXXK101       | VBN2BMSXXK101   |  |
| 1"                          | 100                       | 9                                   | VBN2CJPXJ201        | VBN2CJSXJ201    | VBN2CJPXJ101        | VBN2CJSXJ101    | VBN2CJPXXK201       | VBN2CJSXXK201   | VBN2CJPXXK101       | VBN2CJSXXK101   |  |
|                             |                           | 15.3                                | VBN2CLPXJ201        | VBN2CLSXJ201    | VBN2CLPXJ101        | VBN2CLSXJ101    | VBN2CLPXXK201       | VBN2CLSXXK201   | VBN2CLPXXK101       | VBN2CLSXXK101   |  |
|                             |                           | 26                                  | VBN2CMPXJ201        | VBN2CMSXJ201    | VBN2CMPXJ101        | VBN2CMSXJ101    | VBN2CMPXXK201       | VBN2CMSXXK201   | VBN2CMPXXK101       | VBN2CMSXXK101   |  |
|                             |                           | 54*                                 | VBN2CPPXJ201        | VBN2CPSXJ201    | VBN2CPPXJ101        | VBN2CPSXJ101    | VBN2CPPXXK201       | VBN2CPSXXK201   | VBN2CPPXXK101       | VBN2CPSXXK101   |  |
| 1-1/4"                      | 100                       | 14.9                                | VBN2DKPXJ201        | VBN2DKSXJ201    | VBN2DKPXJ101        | VBN2DKSXJ101    | VBN2DKPXXK201       | VBN2DKSXXK201   | VBN2DKPXXK101       | VBN2DKSXXK101   |  |
|                             |                           | 25                                  | VBN2DLPXJ201        | VBN2DLSXJ201    | VBN2DLPXJ101        | VBN2DLSXJ101    | VBN2DLPXXK201       | VBN2DLSXXK201   | VBN2DLPXXK101       | VBN2DLSXXK101   |  |
|                             |                           | 37                                  | VBN2DMPXJ201        | VBN2DMSXJ201    | VBN2DMPXJ101        | VBN2DMSXJ101    | VBN2DMPXXK201       | VBN2DMSXXK201   | VBN2DMPXXK101       | VBN2DMSXXK101   |  |
|                             |                           | 102*                                | VBN2DSPXJ201        | VBN2DSSXJ201    | VBN2DSPXJ101        | VBN2DSSXJ101    | VBN2DSPXXK201       | VBN2DSSXXK201   | VBN2DSPXXK101       | VBN2DSSXXK101   |  |

| Actuator Features           |                                     |                                | Fail Safe         |                     |                 |                     |                 |                     |                 |                     |                 |
|-----------------------------|-------------------------------------|--------------------------------|-------------------|---------------------|-----------------|---------------------|-----------------|---------------------|-----------------|---------------------|-----------------|
| Actuator O.S. Number        |                                     |                                | MS7505A2030       |                     |                 |                     | MS7505A2130     |                     |                 |                     |                 |
| Power Supply                | Voltage                             |                                | 24 VAC/DC         |                     |                 |                     | 24 VAC/DC       |                     |                 |                     |                 |
|                             | Frequency                           |                                | 50 / 60 Hz        |                     |                 |                     | 50 / 60 Hz      |                     |                 |                     |                 |
|                             | Power                               |                                | 6 VA              |                     |                 |                     | 6 VA            |                     |                 |                     |                 |
| Actuator Torque             |                                     | (lb.-in.)                      | 44                |                     |                 |                     | 44              |                     |                 |                     |                 |
| Control                     | (0)2-10 Vdc                         |                                | •                 |                     |                 |                     | •               |                     |                 |                     |                 |
|                             | 4-20 mA (external 500 Ohm Resistor) |                                | •                 |                     |                 |                     | •               |                     |                 |                     |                 |
|                             | Floating                            |                                | •                 |                     |                 |                     | •               |                     |                 |                     |                 |
|                             | Two-Position SPDT                   |                                | •                 |                     |                 |                     | •               |                     |                 |                     |                 |
|                             | Two-Position SPST                   |                                | •                 |                     |                 |                     | •               |                     |                 |                     |                 |
| Actuator Stroke             |                                     | (degrees)                      | 95° ± 3°          |                     |                 |                     | 95° ± 3°        |                     |                 |                     |                 |
| Timing                      |                                     | (drive/spring return, seconds) | 90 / 25           |                     |                 |                     | 90 / 25         |                     |                 |                     |                 |
| Aux Switch                  |                                     |                                | 0                 |                     |                 |                     | 1               |                     |                 |                     |                 |
| Feedback                    |                                     | 2-10 Vdc Built In              | •                 |                     |                 |                     | •               |                     |                 |                     |                 |
| Fail Safe Action            |                                     |                                | Closed            |                     | Open            |                     | Closed          |                     | Open            |                     |                 |
| Normal Position (no signal) |                                     |                                | Closed            |                     | Open            |                     | Closed          |                     | Open            |                     |                 |
| Valve Features              |                                     |                                | Trim              | Nickel-Plated Brass | Stainless Steel | Nickel-Plated Brass | Stainless Steel | Nickel-Plated Brass | Stainless Steel | Nickel-Plated Brass | Stainless Steel |
| Valve Size (inches)         | Close-off Pressure (psid)           | Cv                             | Short Order Codes |                     |                 |                     |                 |                     |                 |                     |                 |
| 2-Way                       | 1-1/2"                              | 100                            | 41                | VBN2ENPX6200        | VBN2ENSX6200    | VBN2ENPX6100        | VBN2ENSX6100    | VBN2ENPXB200        | VBN2ENSXB200    | VBN2ENPXB100        | VBN2ENSXB100    |
|                             |                                     |                                | 74*               | VBN2ERPX6200        | VBN2ERSX6200    | VBN2ERPX6100        | VBN2ERSX6100    | VBN2ERPXB200        | VBN2ERSXB200    | VBN2ERPXB100        | VBN2ERSXB100    |
|                             |                                     |                                | 172*              | VBN2E1PX6200        | VBN2E1SX6200    | VBN2E1PX6100        | VBN2E1SX6100    | VBN2E1PXB200        | VBN2E1SXB200    | VBN2E1PXB100        | VBN2E1SXB100    |
|                             | 2"                                  | 100                            | 42                | VBN2FNPX6200        | VBN2FNSX6200    | VBN2FNPX6100        | VBN2FNSX6100    | VBN2FNXPB200        | VBN2FNSXB200    | VBN2FNXPB100        | VBN2FNSXB100    |
|                             |                                     |                                | 57                | VBN2FPPX6200        | VBN2FPSX6200    | VBN2FPPX6100        | VBN2FPSX6100    | VBN2FPPXB200        | VBN2FPSXB200    | VBN2FPPXB100        | VBN2FPSXB100    |
|                             |                                     |                                | 71                | VBN2FRPX6200        | VBN2FRSX6200    | VBN2FRPX6100        | VBN2FRSX6100    | VBN2FRPXB200        | VBN2FRSXB200    | VBN2FRPXB100        | VBN2FRSXB100    |
|                             |                                     |                                | 100               | VBN2FSPX6200        | VBN2FSSX6200    | VBN2FSPX6100        | VBN2FSSX6100    | VBN2FSPXB200        | VBN2FSSXB200    | VBN2FSPXB100        | VBN2FSSXB100    |
|                             |                                     |                                | 266*              | VBN2F2PX6200        | VBN2F2SX6200    | VBN2F2PX6100        | VBN2F2SX6100    | VBN2F2PXB200        | VBN2F2SXB200    | VBN2F2PXB100        | VBN2F2SXB100    |
|                             | 2-1/2"                              | 100                            | 72                | VBN2GRPX6200        | VBN2GRSX6200    | VBN2GRPX6100        | VBN2GRSX6100    | VBN2GRPXB200        | VBN2GRSXB200    | VBN2GRPXB100        | VBN2GRSXB100    |
|                             |                                     |                                | 101               | VBN2GSPX6200        | VBN2GSSX6200    | VBN2GSPX6100        | VBN2GSSX6100    | VBN2GSPXB200        | VBN2GSSXB200    | VBN2GSPXB100        | VBN2GSSXB100    |
| 202*                        |                                     |                                | VBN2G1PX6200      | VBN2G1SX6200        | VBN2G1PX6100    | VBN2G1SX6100        | VBN2G1PXB200    | VBN2G1SXB200        | VBN2G1PXB100    | VBN2G1SXB100        |                 |
| 3                           | 100                                 | 124                            | VBN2HTPX6200      | VBN2HTSX6200        | VBN2HTPX6100    | VBN2HTSX6100        | VBN2HTPXB200    | VBN2HTSXB200        | VBN2HTPXB100    | VBN2HTSXB100        |                 |
|                             |                                     | 145*                           | VBN2HUPX6200      | VBN2HUSX6200        | VBN2HUPX6100    | VBN2HUSX6100        | VBN2HUPXB200    | VBN2HUSXB200        | VBN2HUPXB100    | VBN2HUSXB100        |                 |

\* Full port ball. No flow characterizing insert.

## Product Selection - Valves

## 2-Way NPT Valves ½" - 3", NEMA 2

| Actuator Features                     |                           |       |                   | Fail Safe    |                     |                 |                     |                 |                     |                 |                     |
|---------------------------------------|---------------------------|-------|-------------------|--------------|---------------------|-----------------|---------------------|-----------------|---------------------|-----------------|---------------------|
| Actuator O.S. Number                  |                           |       |                   | MS8105A1030  |                     |                 |                     | MS8105A1130     |                     |                 |                     |
| Power Supply                          |                           |       |                   | 24 VAC/DC    |                     |                 |                     | 24 VAC/DC       |                     |                 |                     |
| Frequency                             |                           |       |                   | 50 / 60 Hz   |                     |                 |                     | 50 / 60 Hz      |                     |                 |                     |
| Power                                 |                           |       |                   | 6 VA         |                     |                 |                     | 6 VA            |                     |                 |                     |
| Actuator Torque (lb.-in.)             |                           |       |                   | 44           |                     |                 |                     | 44              |                     |                 |                     |
| Control (0)2-10 Vdc                   |                           |       |                   |              |                     |                 |                     |                 |                     |                 |                     |
| 4-20 mA (external 500 Ohm Resistor)   |                           |       |                   |              |                     |                 |                     |                 |                     |                 |                     |
| Floating                              |                           |       |                   |              |                     |                 |                     |                 |                     |                 |                     |
| Two-Position SPDT                     |                           |       |                   |              |                     |                 |                     |                 |                     |                 |                     |
| Two-Position SPST                     |                           |       |                   | •            |                     |                 |                     | •               |                     |                 |                     |
| Actuator Stroke (degrees)             |                           |       |                   | 95° ± 3°     |                     |                 |                     | 95° ± 3°        |                     |                 |                     |
| Timing (drive/spring return, seconds) |                           |       |                   | 45 / 25      |                     |                 |                     | 45 / 25         |                     |                 |                     |
| Aux Switch                            |                           |       |                   | 0            |                     |                 |                     | 1               |                     |                 |                     |
| Feedback 2-10 Vdc Built In            |                           |       |                   |              |                     |                 |                     |                 |                     |                 |                     |
| Fail Safe Action                      |                           |       |                   | Closed       |                     | Open            |                     | Closed          |                     | Open            |                     |
| Normal Position (no signal)           |                           |       |                   | Closed       |                     | Open            |                     | Closed          |                     | Open            |                     |
| Valve Features                        |                           |       |                   | Trim         | Nickel-Plated Brass | Stainless Steel | Nickel-Plated Brass | Stainless Steel | Nickel-Plated Brass | Stainless Steel | Nickel-Plated Brass |
| Valve Size (inches)                   | Close-off Pressure (psid) | Cv    | Short Order Codes |              |                     |                 |                     |                 |                     |                 |                     |
| 1/2"                                  | 130                       | 0.38  | VBN2ABPX7200      | VBN2ABSX7200 | VBN2ABPX7100        | VBN2ABSX7100    | VBN2ABPX200         | VBN2ABSX200     | VBN2ABPX100         | VBN2ABSX100     |                     |
|                                       |                           | 0.68  | VBN2ADPX7200      | VBN2ADSX7200 | VBN2ADPX7100        | VBN2ADSX7100    | VBN2ADPX200         | VBN2ADSX200     | VBN2ADPX100         | VBN2ADSX100     |                     |
|                                       |                           | 1.3   | VBN2AEPX7200      | VBN2AESX7200 | VBN2AEPX7100        | VBN2AESX7100    | VBN2AEPX200         | VBN2AESX200     | VBN2AEPX100         | VBN2AESX100     |                     |
|                                       |                           | 2     | VBN2AFPX7200      | VBN2AFSX7200 | VBN2AFPX7100        | VBN2AFSX7100    | VBN2AFPX200         | VBN2AFSX200     | VBN2AFPX100         | VBN2AFSX100     |                     |
|                                       |                           | 2.6   | VBN2AGPX7200      | VBN2AGSX7200 | VBN2AGPX7100        | VBN2AGSX7100    | VBN2AGPX200         | VBN2AGSX200     | VBN2AGPX100         | VBN2AGSX100     |                     |
|                                       |                           | 4.7   | VBN2AHPX7200      | VBN2AHSX7200 | VBN2AHPX7100        | VBN2AHSX7100    | VBN2AHPX200         | VBN2AHSX200     | VBN2AHPX100         | VBN2AHSX100     |                     |
| 3/4"                                  | 130                       | 11.7* | VBN2AKPX7200      | VBN2AKSX7200 | VBN2AKPX7100        | VBN2AKSX7100    | VBN2AKPX200         | VBN2AKSX200     | VBN2AKPX100         | VBN2AKSX100     |                     |
|                                       |                           | 4.3   | VBN2BHPX7200      | VBN2BHSX7200 | VBN2BHPX7100        | VBN2BHSX7100    | VBN2BHPX200         | VBN2BHSX200     | VBN2BHPX100         | VBN2BHSX100     |                     |
|                                       |                           | 7.4   | VBN2BJPX7200      | VBN2BJSX7200 | VBN2BJPX7100        | VBN2BJSX7100    | VBN2BJPX200         | VBN2BJSX200     | VBN2BJPX100         | VBN2BJSX100     |                     |
|                                       |                           | 10.1  | VBN2BKPX7200      | VBN2BKSX7200 | VBN2BKPX7100        | VBN2BKSX7100    | VBN2BKPX200         | VBN2BKSX200     | VBN2BKPX100         | VBN2BKSX100     |                     |
|                                       |                           | 29*   | VBN2BMPX7200      | VBN2BMSX7200 | VBN2BMPX7100        | VBN2BMSX7100    | VBN2BMPX200         | VBN2BMSX200     | VBN2BMPX100         | VBN2BMSX100     |                     |
|                                       |                           | 9     | VBN2CJPX7200      | VBN2CJSX7200 | VBN2CJPX7100        | VBN2CJSX7100    | VBN2CJPX200         | VBN2CJSX200     | VBN2CJPX100         | VBN2CJSX100     |                     |
| 1"                                    | 100                       | 15.3  | VBN2CLPX7200      | VBN2CLSX7200 | VBN2CLPX7100        | VBN2CLSX7100    | VBN2CLPX200         | VBN2CLSX200     | VBN2CLPX100         | VBN2CLSX100     |                     |
|                                       |                           | 26    | VBN2CMPX7200      | VBN2CMSX7200 | VBN2CMPX7100        | VBN2CMSX7100    | VBN2CMPX200         | VBN2CMSX200     | VBN2CMPX100         | VBN2CMSX100     |                     |
|                                       |                           | 54*   | VBN2CPPX7200      | VBN2CPSX7200 | VBN2CPPX7100        | VBN2CPSX7100    | VBN2CPPX200         | VBN2CPSX200     | VBN2CPPX100         | VBN2CPSX100     |                     |
|                                       |                           | 14.9  | VBN2DKPX7200      | VBN2DKSX7200 | VBN2DKPX7100        | VBN2DKSX7100    | VBN2DKPX200         | VBN2DKSX200     | VBN2DKPX100         | VBN2DKSX100     |                     |
|                                       |                           | 25    | VBN2DLPX7200      | VBN2DLSX7200 | VBN2DLPX7100        | VBN2DLSX7100    | VBN2DLPX200         | VBN2DLSX200     | VBN2DLPX100         | VBN2DLSX100     |                     |
|                                       |                           | 37    | VBN2DMPX7200      | VBN2DMSX7200 | VBN2DMPX7100        | VBN2DMSX7100    | VBN2DMPX200         | VBN2DMSX200     | VBN2DMPX100         | VBN2DMSX100     |                     |
| 1-1/4"                                | 100                       | 102*  | VBN2DSPX7200      | VBN2DSSX7200 | VBN2DSPX7100        | VBN2DSSX7100    | VBN2DSPX200         | VBN2DSSX200     | VBN2DSPX100         | VBN2DSSX100     |                     |
|                                       |                           | 41    | VBN2ENPX7200      | VBN2ENSX7200 | VBN2ENPX7100        | VBN2ENSX7100    | VBN2ENPX200         | VBN2ENSX200     | VBN2ENPX100         | VBN2ENSX100     |                     |
|                                       |                           | 74*   | VBN2ERPX7200      | VBN2ERSX7200 | VBN2ERPX7100        | VBN2ERSX7100    | VBN2ERPX200         | VBN2ERSX200     | VBN2ERPX100         | VBN2ERSX100     |                     |
|                                       |                           | 172*  | VBN2E1PX7200      | VBN2E1SX7200 | VBN2E1PX7100        | VBN2E1SX7100    | VBN2E1PX200         | VBN2E1SX200     | VBN2E1PX100         | VBN2E1SX100     |                     |
|                                       |                           | 42    | VBN2FNPX7200      | VBN2FNSX7200 | VBN2FNPX7100        | VBN2FNSX7100    | VBN2FNPX200         | VBN2FNSX200     | VBN2FNPX100         | VBN2FNSX100     |                     |
|                                       |                           | 57    | VBN2FPPX7200      | VBN2FPSX7200 | VBN2FPPX7100        | VBN2FPSX7100    | VBN2FPPX200         | VBN2FPSX200     | VBN2FPPX100         | VBN2FPSX100     |                     |
| 2"                                    | 100                       | 71    | VBN2FRPX7200      | VBN2FRSX7200 | VBN2FRPX7100        | VBN2FRSX7100    | VBN2FRPX200         | VBN2FRSX200     | VBN2FRPX100         | VBN2FRSX100     |                     |
|                                       |                           | 100   | VBN2FSPX7200      | VBN2FSSX7200 | VBN2FSPX7100        | VBN2FSSX7100    | VBN2FSPX200         | VBN2FSSX200     | VBN2FSPX100         | VBN2FSSX100     |                     |
|                                       |                           | 266*  | VBN2F2PX7200      | VBN2F2SX7200 | VBN2F2PX7100        | VBN2F2SX7100    | VBN2F2PX200         | VBN2F2SX200     | VBN2F2PX100         | VBN2F2SX100     |                     |
|                                       |                           | 72    | VBN2GRPX7200      | VBN2GRSX7200 | VBN2GRPX7100        | VBN2GRSX7100    | VBN2GRPX200         | VBN2GRSX200     | VBN2GRPX100         | VBN2GRSX100     |                     |
|                                       |                           | 101   | VBN2GSPX7200      | VBN2GSSX7200 | VBN2GSPX7100        | VBN2GSSX7100    | VBN2GSPX200         | VBN2GSSX200     | VBN2GSPX100         | VBN2GSSX100     |                     |
|                                       |                           | 202*  | VBN2G1PX7200      | VBN2G1SX7200 | VBN2G1PX7100        | VBN2G1SX7100    | VBN2G1PX200         | VBN2G1SX200     | VBN2G1PX100         | VBN2G1SX100     |                     |
| 3"                                    | 100                       | 124   | VBN2HTPX7200      | VBN2HTSX7200 | VBN2HTPX7100        | VBN2HTSX7100    | VBN2HTPX200         | VBN2HTSX200     | VBN2HTPX100         | VBN2HTSX100     |                     |
|                                       |                           | 145*  | VBN2HUPX7200      | VBN2HUSX7200 | VBN2HUPX7100        | VBN2HUSX7100    | VBN2HUPX200         | VBN2HUSX200     | VBN2HUPX100         | VBN2HUSX100     |                     |

\* Full port ball. No flow characterizing insert.

Short Order Codes

Product Selection - Valves

2-Way NPT Valves ½"- 3", NEMA 2

| Actuator Features           |                           |                                     |                     | Fail Safe       |                     |                 |                     |                 |                     |                 |  |
|-----------------------------|---------------------------|-------------------------------------|---------------------|-----------------|---------------------|-----------------|---------------------|-----------------|---------------------|-----------------|--|
| Actuator O.S. Number        |                           |                                     |                     | MS4105A1030     |                     |                 |                     | MS4105A1130     |                     |                 |  |
| Power Supply                |                           | Voltage                             |                     | 100-250 VAC     |                     |                 |                     | 100-250 VAC     |                     |                 |  |
|                             |                           | Frequency                           |                     | 50 / 60 Hz      |                     |                 |                     | 50 / 60 Hz      |                     |                 |  |
| Actuator Torque             |                           | Power                               |                     | 6 VA            |                     |                 |                     | 6 VA            |                     |                 |  |
|                             |                           | (lb.-in.)                           |                     | 44              |                     |                 |                     | 44              |                     |                 |  |
| Control                     |                           | (0)2-10 Vdc                         |                     |                 |                     |                 |                     |                 |                     |                 |  |
|                             |                           | 4-20 mA (external 500 Ohm Resistor) |                     |                 |                     |                 |                     |                 |                     |                 |  |
|                             |                           | Floating                            |                     |                 |                     |                 |                     |                 |                     |                 |  |
|                             |                           | Two-Position SPDT                   |                     |                 |                     |                 |                     |                 |                     |                 |  |
|                             |                           | Two-Position SPST                   |                     | •               |                     |                 |                     | •               |                     |                 |  |
|                             |                           | Actuator Stroke (degrees)           |                     | 95° ± 3°        |                     |                 |                     | 95° ± 3°        |                     |                 |  |
| Timing                      |                           | (drive/spring return, seconds)      |                     | 45 / 25         |                     |                 |                     | 45 / 25         |                     |                 |  |
|                             |                           |                                     |                     |                 |                     |                 |                     |                 |                     |                 |  |
| Aux Switch                  |                           |                                     |                     | 0               |                     |                 |                     | 1               |                     |                 |  |
| Feedback                    |                           | 2-10 Vdc Built In                   |                     |                 |                     |                 |                     |                 |                     |                 |  |
| Fail Safe Action            |                           |                                     |                     | Closed          |                     | Open            |                     | Closed          |                     | Open            |  |
| Normal Position (no signal) |                           |                                     |                     | Closed          |                     | Open            |                     | Closed          |                     | Open            |  |
| Valve Features              |                           | Trim                                | Nickel-Plated Brass | Stainless Steel | Nickel-Plated Brass | Stainless Steel | Nickel-Plated Brass | Stainless Steel | Nickel-Plated Brass | Stainless Steel |  |
| Valve Size (inches)         | Close-off Pressure (psid) | Cv                                  | Short Order Codes   |                 |                     |                 |                     |                 |                     |                 |  |
|                             |                           |                                     |                     |                 |                     |                 |                     |                 |                     |                 |  |
| 1/2"                        | 130                       | 0.38                                | VBN2ABPX8200        | VBN2ABSX8200    | VBN2ABPX8100        | VBN2ABSX8100    | VBN2ABPX9200        | VBN2ABSX9200    | VBN2ABPX9100        | VBN2ABSX9100    |  |
|                             |                           | 0.68                                | VBN2ADPX8200        | VBN2ADSX8200    | VBN2ADPX8100        | VBN2ADSX8100    | VBN2ADPX9200        | VBN2ADSX9200    | VBN2ADPX9100        | VBN2ADSX9100    |  |
|                             |                           | 1.3                                 | VBN2AEPX8200        | VBN2AESX8200    | VBN2AEPX8100        | VBN2AESX8100    | VBN2AEPX9200        | VBN2AESX9200    | VBN2AEPX9100        | VBN2AESX9100    |  |
|                             |                           | 2                                   | VBN2AFPX8200        | VBN2AFSX8200    | VBN2AFPX8100        | VBN2AFSX8100    | VBN2AFPX9200        | VBN2AFSX9200    | VBN2AFPX9100        | VBN2AFSX9100    |  |
|                             |                           | 2.6                                 | VBN2AGPX8200        | VBN2AGSX8200    | VBN2AGPX8100        | VBN2AGSX8100    | VBN2AGPX9200        | VBN2AGSX9200    | VBN2AGPX9100        | VBN2AGSX9100    |  |
|                             |                           | 4.7                                 | VBN2AHPX8200        | VBN2AHSX8200    | VBN2AHPX8100        | VBN2AHSX8100    | VBN2AHPX9200        | VBN2AHSX9200    | VBN2AHPX9100        | VBN2AHSX9100    |  |
| 3/4"                        | 130                       | 11.7*                               | VBN2AKPX8200        | VBN2AKSX8200    | VBN2AKPX8100        | VBN2AKSX8100    | VBN2AKPX9200        | VBN2AKSX9200    | VBN2AKPX9100        | VBN2AKSX9100    |  |
|                             |                           | 4.3                                 | VBN2BHPX8200        | VBN2BHSX8200    | VBN2BHPX8100        | VBN2BHSX8100    | VBN2BHPX9200        | VBN2BHSX9200    | VBN2BHPX9100        | VBN2BHSX9100    |  |
|                             |                           | 7.4                                 | VBN2BJPX8200        | VBN2BJSX8200    | VBN2BJPX8100        | VBN2BJSX8100    | VBN2BJPX9200        | VBN2BJSX9200    | VBN2BJPX9100        | VBN2BJSX9100    |  |
|                             |                           | 10.1                                | VBN2BKPX8200        | VBN2BKSX8200    | VBN2BKPX8100        | VBN2BKSX8100    | VBN2BKPX9200        | VBN2BKSX9200    | VBN2BKPX9100        | VBN2BKSX9100    |  |
| 1"                          | 100                       | 29*                                 | VBN2BMPX8200        | VBN2BMSX8200    | VBN2BMPX8100        | VBN2BMSX8100    | VBN2BMPX9200        | VBN2BMSX9200    | VBN2BMPX9100        | VBN2BMSX9100    |  |
|                             |                           | 9                                   | VBN2CJPX8200        | VBN2CJSX8200    | VBN2CJPX8100        | VBN2CJSX8100    | VBN2CJPX9200        | VBN2CJSX9200    | VBN2CJPX9100        | VBN2CJSX9100    |  |
|                             |                           | 15.3                                | VBN2CLPX8200        | VBN2CLSX8200    | VBN2CLPX8100        | VBN2CLSX8100    | VBN2CLPX9200        | VBN2CLSX9200    | VBN2CLPX9100        | VBN2CLSX9100    |  |
|                             |                           | 26                                  | VBN2CMPX8200        | VBN2CMSX8200    | VBN2CMPX8100        | VBN2CMSX8100    | VBN2CMPX9200        | VBN2CMSX9200    | VBN2CMPX9100        | VBN2CMSX9100    |  |
| 1-1/4"                      | 100                       | 54*                                 | VBN2CPPX8200        | VBN2CPSX8200    | VBN2CPPX8100        | VBN2CPSX8100    | VBN2CPPX9200        | VBN2CPSX9200    | VBN2CPPX9100        | VBN2CPSX9100    |  |
|                             |                           | 14.9                                | VBN2DKPX8200        | VBN2DKSX8200    | VBN2DKPX8100        | VBN2DKSX8100    | VBN2DKPX9200        | VBN2DKSX9200    | VBN2DKPX9100        | VBN2DKSX9100    |  |
|                             |                           | 25                                  | VBN2DLPX8200        | VBN2DLSX8200    | VBN2DLPX8100        | VBN2DLSX8100    | VBN2DLPX9200        | VBN2DLSX9200    | VBN2DLPX9100        | VBN2DLSX9100    |  |
|                             |                           | 37                                  | VBN2DMPX8200        | VBN2DMSX8200    | VBN2DMPX8100        | VBN2DMSX8100    | VBN2DMPX9200        | VBN2DMSX9200    | VBN2DMPX9100        | VBN2DMSX9100    |  |
| 1-1/2"                      | 100                       | 102*                                | VBN2DSPX8200        | VBN2DSSX8200    | VBN2DSPX8100        | VBN2DSSX8100    | VBN2DSPX9200        | VBN2DSSX9200    | VBN2DSPX9100        | VBN2DSSX9100    |  |
|                             |                           | 41                                  | VBN2ENPX8200        | VBN2ENSX8200    | VBN2ENPX8100        | VBN2ENSX8100    | VBN2ENPX9200        | VBN2ENSX9200    | VBN2ENPX9100        | VBN2ENSX9100    |  |
|                             |                           | 74*                                 | VBN2ERPX8200        | VBN2ERSX8200    | VBN2ERPX8100        | VBN2ERSX8100    | VBN2ERPX9200        | VBN2ERSX9200    | VBN2ERPX9100        | VBN2ERSX9100    |  |
|                             |                           | 172*                                | VBN2E1PX8200        | VBN2E1SX8200    | VBN2E1PX8100        | VBN2E1SX8100    | VBN2E1PX9200        | VBN2E1SX9200    | VBN2E1PX9100        | VBN2E1SX9100    |  |
| 2"                          | 100                       | 42                                  | VBN2FNPX8200        | VBN2FNSX8200    | VBN2FNPX8100        | VBN2FNSX8100    | VBN2FNPX9200        | VBN2FNSX9200    | VBN2FNPX9100        | VBN2FNSX9100    |  |
|                             |                           | 57                                  | VBN2FPPX8200        | VBN2FPSX8200    | VBN2FPPX8100        | VBN2FPSX8100    | VBN2FPPX9200        | VBN2FPSX9200    | VBN2FPPX9100        | VBN2FPSX9100    |  |
|                             |                           | 71                                  | VBN2FRPX8200        | VBN2FRSX8200    | VBN2FRPX8100        | VBN2FRSX8100    | VBN2FRPX9200        | VBN2FRSX9200    | VBN2FRPX9100        | VBN2FRSX9100    |  |
|                             |                           | 100                                 | VBN2FSPX8200        | VBN2FSSX8200    | VBN2FSPX8100        | VBN2FSSX8100    | VBN2FSPX9200        | VBN2FSSX9200    | VBN2FSPX9100        | VBN2FSSX9100    |  |
| 2-1/2"                      | 100                       | 266*                                | VBN2F2PX8200        | VBN2F2SX8200    | VBN2F2PX8100        | VBN2F2SX8100    | VBN2F2PX9200        | VBN2F2SX9200    | VBN2F2PX9100        | VBN2F2SX9100    |  |
|                             |                           | 72                                  | VBN2GRPX8200        | VBN2GRSX8200    | VBN2GRPX8100        | VBN2GRSX8100    | VBN2GRPX9200        | VBN2GRSX9200    | VBN2GRPX9100        | VBN2GRSX9100    |  |
|                             |                           | 101                                 | VBN2GSPX8200        | VBN2GSSX8200    | VBN2GSPX8100        | VBN2GSSX8100    | VBN2GSPX9200        | VBN2GSSX9200    | VBN2GSPX9100        | VBN2GSSX9100    |  |
|                             |                           | 202*                                | VBN2G1PX8200        | VBN2G1SX8200    | VBN2G1PX8100        | VBN2G1SX8100    | VBN2G1PX9200        | VBN2G1SX9200    | VBN2G1PX9100        | VBN2G1SX9100    |  |
| 3"                          | 100                       | 124                                 | VBN2HTPX8200        | VBN2HTSX8200    | VBN2HTPX8100        | VBN2HTSX8100    | VBN2HTPX9200        | VBN2HTSX9200    | VBN2HTPX9100        | VBN2HTSX9100    |  |
|                             |                           | 145*                                | VBN2HUPX8200        | VBN2HUSX8200    | VBN2HUPX8100        | VBN2HUSX8100    | VBN2HUPX9200        | VBN2HUSX9200    | VBN2HUPX9100        | VBN2HUSX9100    |  |

\* Full port ball. No flow characterizing insert.

## Product Selection - Valves

## 2-Way NPT Valves ½"- 3", NEMA 3R

| Actuator Features                   |                           |                                | Non Fail Safe     |                     |                 |                     |                 |                     |                 |                     |
|-------------------------------------|---------------------------|--------------------------------|-------------------|---------------------|-----------------|---------------------|-----------------|---------------------|-----------------|---------------------|
| Actuator O.S. Number                |                           |                                | MN6105A1011       |                     | MN6105A1201     |                     | MN7505A2001     |                     | MN7505A2209     |                     |
| Power Supply                        |                           | Voltage                        | 24 VAC/DC         |                     | 24 VAC/DC       |                     | 24 VAC/DC       |                     | 24 VAC/DC       |                     |
|                                     |                           | Frequency                      | 50 / 60 Hz        |                     | 50 / 60 Hz      |                     | 50 / 60 Hz      |                     | 50 / 60 Hz      |                     |
|                                     |                           | Power                          | 5 VA              |                     | 5 VA            |                     | 5 VA            |                     | 5 VA            |                     |
| Actuator Torque                     |                           | (lb.-in.)                      | 44                |                     | 44              |                     | 44              |                     | 44              |                     |
| Control                             |                           | (0)2-10 Vdc                    |                   |                     |                 |                     | •               |                     | •               |                     |
| 4-20 mA (external 500 Ohm Resistor) |                           |                                |                   |                     |                 |                     | •               |                     | •               |                     |
|                                     |                           | Floating                       | •                 |                     | •               |                     | •               |                     | •               |                     |
|                                     |                           | Two-Position SPDT              | •                 |                     | •               |                     | •               |                     | •               |                     |
|                                     |                           | Two-Position SPST              |                   |                     |                 |                     | •               |                     | •               |                     |
| Actuator Stroke                     |                           | (degrees)                      | 95° ± 3°          |                     | 95° ± 3°        |                     | 95° ± 3°        |                     | 95° ± 3°        |                     |
| Timing                              |                           | (drive/spring return, seconds) | 90                |                     | 90              |                     | 90              |                     | 90              |                     |
| Aux Switch                          |                           |                                | 0                 |                     | 2               |                     | 0               |                     | 2               |                     |
| Feedback                            |                           | 2-10 Vdc Built In              | -                 |                     | -               |                     | •               |                     | •               |                     |
| Fail Safe Action                    |                           |                                | Stay in Place     |                     | Stay in Place   |                     | Stay in Place   |                     | Stay in Place   |                     |
| Normal Position (no signal)         |                           |                                | Stay in Place     |                     | Stay in Place   |                     | Closed          |                     | Closed          |                     |
| Valve Features                      |                           |                                | Trim              | Nickel-Plated Brass | Stainless Steel | Nickel-Plated Brass | Stainless Steel | Nickel-Plated Brass | Stainless Steel | Nickel-Plated Brass |
| Valve Size (inches)                 | Close-off Pressure (psid) | Cv                             | Short Order Codes |                     |                 |                     |                 |                     |                 |                     |
| 1/2"                                | 130                       | 0.38                           | VBN2ABPX4002      | VBN2ABSX4002        | VBN2ABPX002     | VBN2ABSX002         | VBN2ABPX5002    | VBN2ABSX5002        | VBN2ABPXD002    | VBN2ABSXD002        |
|                                     |                           | 0.68                           | VBN2ADPX4002      | VBN2ADSX4002        | VBN2ADPX002     | VBN2ADSX002         | VBN2ADPX5002    | VBN2ADSX5002        | VBN2ADPXD002    | VBN2ADSXD002        |
|                                     |                           | 1.3                            | VBN2AEPX4002      | VBN2AESX4002        | VBN2AEPX002     | VBN2AESX002         | VBN2AEPX5002    | VBN2AESX5002        | VBN2AEPXD002    | VBN2AESXD002        |
|                                     |                           | 2                              | VBN2AFPX4002      | VBN2AFSX4002        | VBN2AFPX002     | VBN2AFSX002         | VBN2AFPX5002    | VBN2AFSX5002        | VBN2AFPXD002    | VBN2AFSXD002        |
|                                     |                           | 2.6                            | VBN2AGPX4002      | VBN2AGSX4002        | VBN2AGPX002     | VBN2AGSX002         | VBN2AGPX5002    | VBN2AGSX5002        | VBN2AGPXD002    | VBN2AGSXD002        |
|                                     |                           | 4.7                            | VBN2AHPX4002      | VBN2AHSX4002        | VBN2AHPX002     | VBN2AHSX002         | VBN2AHPX5002    | VBN2AHSX5002        | VBN2AHPXD002    | VBN2AHSXD002        |
| 3/4"                                | 130                       | 11.7*                          | VBN2AKPX4002      | VBN2AKSX4002        | VBN2AKPX002     | VBN2AKSX002         | VBN2AKPX5002    | VBN2AKSX5002        | VBN2AKPXD002    | VBN2AKSXD002        |
|                                     |                           | 4.3                            | VBN2BHPX4002      | VBN2BHSX4002        | VBN2BHPX002     | VBN2BHSX002         | VBN2BHPX5002    | VBN2BHSX5002        | VBN2BHPXD002    | VBN2BHSD002         |
|                                     |                           | 7.4                            | VBN2BJPX4002      | VBN2BJSX4002        | VBN2BJPX002     | VBN2BJSX002         | VBN2BJPX5002    | VBN2BJSX5002        | VBN2BJPXD002    | VBN2BJSXD002        |
|                                     |                           | 10.1                           | VBN2BKPX4002      | VBN2BKSX4002        | VBN2BKPX002     | VBN2BKSX002         | VBN2BKPX5002    | VBN2BKSX5002        | VBN2BKPD002     | VBN2BKSD002         |
|                                     |                           | 29*                            | VBN2BMPX4002      | VBN2BMSX4002        | VBN2BMPX002     | VBN2BMSX002         | VBN2BMPX5002    | VBN2BMSX5002        | VBN2BMPXD002    | VBN2BMSXD002        |
|                                     |                           | 9                              | VBN2CJPX4002      | VBN2CJSX4002        | VBN2CJPX002     | VBN2CJSX002         | VBN2CJPX5002    | VBN2CJSX5002        | VBN2CJPXD002    | VBN2CJSXD002        |
| 1"                                  | 100                       | 15.3                           | VBN2CLPX4002      | VBN2CLSX4002        | VBN2CLPX002     | VBN2CLSX002         | VBN2CLPX5002    | VBN2CLSX5002        | VBN2CLPXD002    | VBN2CLSXD002        |
|                                     |                           | 26                             | VBN2CMPX4002      | VBN2CMSX4002        | VBN2CMPX002     | VBN2CMSX002         | VBN2CMPX5002    | VBN2CMSX5002        | VBN2CMPXD002    | VBN2CMSXD002        |
|                                     |                           | 54*                            | VBN2CPPX4002      | VBN2CPSX4002        | VBN2CPPX002     | VBN2CPSX002         | VBN2CPPX5002    | VBN2CPSX5002        | VBN2CPPXD002    | VBN2CPSXD002        |
|                                     |                           | 14.9                           | VBN2DKPX4002      | VBN2DKSX4002        | VBN2DKPX002     | VBN2DKSX002         | VBN2DKPX5002    | VBN2DKSX5002        | VBN2DKPXD002    | VBN2DKSD002         |
| 1-1/4"                              | 100                       | 25                             | VBN2DLPX4002      | VBN2DLSX4002        | VBN2DLPX002     | VBN2DLSX002         | VBN2DLPX5002    | VBN2DLSX5002        | VBN2DLPXD002    | VBN2DLSXD002        |
|                                     |                           | 37                             | VBN2DMPX4002      | VBN2DMSX4002        | VBN2DMPX002     | VBN2DMSX002         | VBN2DMPX5002    | VBN2DMSX5002        | VBN2DMPXD002    | VBN2DMSXD002        |
|                                     |                           | 102*                           | VBN2DSPX4002      | VBN2DSSX4002        | VBN2DSPX002     | VBN2DSSX002         | VBN2DSPX5002    | VBN2DSSX5002        | VBN2DSPXD002    | VBN2DSSXD002        |
|                                     |                           | 41                             | VBN2ENPX4002      | VBN2ENSX4002        | VBN2ENPX002     | VBN2ENSX002         | VBN2ENPX5002    | VBN2ENSX5002        | VBN2ENPXD002    | VBN2ENSXD002        |
| 1-1/2"                              | 100                       | 74*                            | VBN2ERPX4002      | VBN2ERSX4002        | VBN2ERPX002     | VBN2ERSX002         | VBN2ERPX5002    | VBN2ERSX5002        | VBN2ERPXD002    | VBN2ERSXD002        |
|                                     |                           | 172*                           | VBN2E1PX4002      | VBN2E1SX4002        | VBN2E1PX002     | VBN2E1SX002         | VBN2E1PX5002    | VBN2E1SX5002        | VBN2E1PXD002    | VBN2E1SXD002        |
|                                     |                           | 42                             | VBN2FNPX4002      | VBN2FNSX4002        | VBN2FNPX002     | VBN2FNSX002         | VBN2FNPX5002    | VBN2FNSX5002        | VBN2FNPXD002    | VBN2FNSXD002        |
|                                     |                           | 57                             | VBN2FPPX4002      | VBN2FPSX4002        | VBN2FPPX002     | VBN2FPSX002         | VBN2FPPX5002    | VBN2FPSX5002        | VBN2FPPXD002    | VBN2FPSXD002        |
| 2"                                  | 100                       | 71                             | VBN2FRPX4002      | VBN2FRSX4002        | VBN2FRPX002     | VBN2FRSX002         | VBN2FRPX5002    | VBN2FRSX5002        | VBN2FRPXD002    | VBN2FRSD002         |
|                                     |                           | 100                            | VBN2FSPX4002      | VBN2FSSX4002        | VBN2FSPX002     | VBN2FSSX002         | VBN2FSPX5002    | VBN2FSSX5002        | VBN2FSPXD002    | VBN2FSSXD002        |
|                                     |                           | 266*                           | VBN2F2PX4002      | VBN2F2SX4002        | VBN2F2PX002     | VBN2F2SX002         | VBN2F2PX5002    | VBN2F2SX5002        | VBN2F2PXD002    | VBN2F2SD002         |
|                                     |                           | 72                             | VBN2GRPX4002      | VBN2GRSX4002        | VBN2GRPX002     | VBN2GRSX002         | VBN2GRPX5002    | VBN2GRSX5002        | VBN2GRPXD002    | VBN2GRSD002         |
| 2-1/2"                              | 100                       | 101                            | VBN2GSPX4002      | VBN2GSSX4002        | VBN2GSPX002     | VBN2GSSX002         | VBN2GSPX5002    | VBN2GSSX5002        | VBN2GSPXD002    | VBN2GSSXD002        |
|                                     |                           | 202*                           | VBN2G1PX4002      | VBN2G1SX4002        | VBN2G1PX002     | VBN2G1SX002         | VBN2G1PX5002    | VBN2G1SX5002        | VBN2G1PXD002    | VBN2G1SD002         |
|                                     |                           | 124                            | VBN2HTPX4002      | VBN2HTSX4002        | VBN2HTPX002     | VBN2HTSX002         | VBN2HTPX5002    | VBN2HTSX5002        | VBN2HTPXD002    | VBN2HTSD002         |
| 3"                                  | 100                       | 145*                           | VBN2HUPX4002      | VBN2HUSX4002        | VBN2HUPX002     | VBN2HUSX002         | VBN2HUPX5002    | VBN2HUSX5002        | VBN2HUPXD002    | VBN2HUSXD002        |

\* Full port ball. No flow characterizing insert.

Short Order Codes

Product Selection - Valves

2-Way NPT Valves ½"- 3", NEMA 3R

2-Way

| Actuator Features           |                                     |                                | Fail Safe         |                     |                 |                     |                 |                     |                 |                     |                 |
|-----------------------------|-------------------------------------|--------------------------------|-------------------|---------------------|-----------------|---------------------|-----------------|---------------------|-----------------|---------------------|-----------------|
| Actuator O.S. Number        |                                     |                                | MS7505A2030       |                     |                 |                     | MS7505A2130     |                     |                 |                     |                 |
| Power Supply                | Voltage                             |                                | 24 VAC/DC         |                     |                 |                     | 24 VAC/DC       |                     |                 |                     |                 |
|                             | Frequency                           |                                | 50 / 60 Hz        |                     |                 |                     | 50 / 60 Hz      |                     |                 |                     |                 |
|                             | Power                               |                                | 6 VA              |                     |                 |                     | 6 VA            |                     |                 |                     |                 |
| Actuator Torque             |                                     | (lb.-in.)                      | 44                |                     |                 |                     | 44              |                     |                 |                     |                 |
| Control                     | (0)2-10 Vdc                         |                                | •                 |                     |                 |                     | •               |                     |                 |                     |                 |
|                             | 4-20 mA (external 500 Ohm Resistor) |                                | •                 |                     |                 |                     | •               |                     |                 |                     |                 |
|                             | Floating                            |                                | •                 |                     |                 |                     | •               |                     |                 |                     |                 |
|                             | Two-Position SPDT                   |                                | •                 |                     |                 |                     | •               |                     |                 |                     |                 |
|                             | Two-Position SPST                   |                                | •                 |                     |                 |                     | •               |                     |                 |                     |                 |
| Actuator Stroke             |                                     | (degrees)                      | 95° ± 3°          |                     |                 |                     | 95° ± 3°        |                     |                 |                     |                 |
| Timing                      |                                     | (drive/spring return, seconds) | 90 / 25           |                     |                 |                     | 90 / 25         |                     |                 |                     |                 |
| Aux Switch                  |                                     |                                | 0                 |                     |                 |                     | 1               |                     |                 |                     |                 |
| Feedback                    |                                     | 2-10 Vdc Built In              | •                 |                     |                 |                     | •               |                     |                 |                     |                 |
| Fail Safe Action            |                                     |                                | Closed            |                     | Open            |                     | Closed          |                     | Open            |                     |                 |
| Normal Position (no signal) |                                     |                                | Closed            |                     | Open            |                     | Closed          |                     | Open            |                     |                 |
| Valve Features              |                                     |                                | Trim              | Nickel-Plated Brass | Stainless Steel | Nickel-Plated Brass | Stainless Steel | Nickel-Plated Brass | Stainless Steel | Nickel-Plated Brass | Stainless Steel |
| Valve Size (inches)         | Close-off Pressure (psid)           | Cv                             | Short Order Codes |                     |                 |                     |                 |                     |                 |                     |                 |
| 1/2"                        | 130                                 | 0.38                           | VBN2ABPX6202      | VBN2ABSX6202        | VBN2ABPX6102    | VBN2ABSX6102        | VBN2ABPXB202    | VBN2ABSXB202        | VBN2ABPXB102    | VBN2ABSXB102        |                 |
|                             |                                     | 0.68                           | VBN2ADPX6202      | VBN2ADSX6202        | VBN2ADPX6102    | VBN2ADSX6102        | VBN2ADPXB202    | VBN2ADSXB202        | VBN2ADPXB102    | VBN2ADSXB102        |                 |
|                             |                                     | 1.3                            | VBN2AEPX6202      | VBN2AESX6202        | VBN2AEPX6102    | VBN2AESX6102        | VBN2AEPXB202    | VBN2AESXB202        | VBN2AEPXB102    | VBN2AESXB102        |                 |
|                             |                                     | 2                              | VBN2AFPX6202      | VBN2AFSX6202        | VBN2AFPX6102    | VBN2AFSX6102        | VBN2AFPXB202    | VBN2AFSXB202        | VBN2AFPXB102    | VBN2AFSXB102        |                 |
|                             |                                     | 2.6                            | VBN2AGPX6202      | VBN2AGSX6202        | VBN2AGPX6102    | VBN2AGSX6102        | VBN2AGPXB202    | VBN2AGSXB202        | VBN2AGPXB102    | VBN2AGSXB102        |                 |
|                             |                                     | 4.7                            | VBN2AHPX6202      | VBN2AHSX6202        | VBN2AHPX6102    | VBN2AHSX6102        | VBN2AHPXB202    | VBN2AHSXB202        | VBN2AHPXB102    | VBN2AHSXB102        |                 |
| 3/4"                        | 130                                 | 11.7*                          | VBN2AKPX6202      | VBN2AKSX6202        | VBN2AKPX6102    | VBN2AKSX6102        | VBN2AKPXB202    | VBN2AKSXB202        | VBN2AKPXB102    | VBN2AKSXB102        |                 |
|                             |                                     | 4.3                            | VBN2BHPX6202      | VBN2BHSX6202        | VBN2BHPX6102    | VBN2BHSX6102        | VBN2BHPXB202    | VBN2BHSXB202        | VBN2BHPXB102    | VBN2BHSXB102        |                 |
|                             |                                     | 7.4                            | VBN2BJPX6202      | VBN2BJSX6202        | VBN2BJPX6102    | VBN2BJSX6102        | VBN2BJPXB202    | VBN2BJSXB202        | VBN2BJPXB102    | VBN2BJSXB102        |                 |
|                             |                                     | 10.1                           | VBN2BKPX6202      | VBN2BKSX6202        | VBN2BKPX6102    | VBN2BKSX6102        | VBN2BKPB202     | VBN2BKSXB202        | VBN2BKPXB102    | VBN2BKSXB102        |                 |
|                             |                                     | 29*                            | VBN2BMPX6202      | VBN2BMSX6202        | VBN2BMPX6102    | VBN2BMSX6102        | VBN2BMPXB202    | VBN2BMSXB202        | VBN2BMPXB102    | VBN2BMSXB102        |                 |
|                             |                                     | 9                              | VBN2CJPX6202      | VBN2CJSX6202        | VBN2CJPX6102    | VBN2CJSX6102        | VBN2CJPXB202    | VBN2CJSXB202        | VBN2CJPXB102    | VBN2CJSXB102        |                 |
| 1"                          | 100                                 | 15.3                           | VBN2CLPX6202      | VBN2CLSX6202        | VBN2CLPX6102    | VBN2CLSX6102        | VBN2CLPXB202    | VBN2CLSXB202        | VBN2CLPXB102    | VBN2CLSXB102        |                 |
|                             |                                     | 26                             | VBN2CMPX6202      | VBN2CMSX6202        | VBN2CMPX6102    | VBN2CMSX6102        | VBN2CMPXB202    | VBN2CMSXB202        | VBN2CMPXB102    | VBN2CMSXB102        |                 |
|                             |                                     | 54*                            | VBN2CPPX6202      | VBN2CPSX6202        | VBN2CPPX6102    | VBN2CPSX6102        | VBN2CPPXB202    | VBN2CPSXB202        | VBN2CPPXB102    | VBN2CPSXB102        |                 |
|                             |                                     | 14.9                           | VBN2DKPX6202      | VBN2DKSX6202        | VBN2DKPX6102    | VBN2DKSX6102        | VBN2DKPXB202    | VBN2DKSXB202        | VBN2DKPXB102    | VBN2DKSXB102        |                 |
| 1-1/4"                      | 100                                 | 25                             | VBN2DLPX6202      | VBN2DLSX6202        | VBN2DLPX6102    | VBN2DLSX6102        | VBN2DLPXB202    | VBN2DLSXB202        | VBN2DLPXB102    | VBN2DLSXB102        |                 |
|                             |                                     | 37                             | VBN2DMPX6202      | VBN2DMSX6202        | VBN2DMPX6102    | VBN2DMSX6102        | VBN2DMPXB202    | VBN2DMSXB202        | VBN2DMPXB102    | VBN2DMSXB102        |                 |
|                             |                                     | 102*                           | VBN2DSPX6202      | VBN2DSSX6202        | VBN2DSPX6102    | VBN2DSSX6102        | VBN2DSPXB202    | VBN2DSSXB202        | VBN2DSPXB102    | VBN2DSSXB102        |                 |
|                             |                                     | 41                             | VBN2ENPX6202      | VBN2ENSX6202        | VBN2ENPX6102    | VBN2ENSX6102        | VBN2ENPXB202    | VBN2ENSXB202        | VBN2ENPXB102    | VBN2ENSXB102        |                 |
| 1-1/2"                      | 100                                 | 74*                            | VBN2ERPX6202      | VBN2ERSX6202        | VBN2ERPX6102    | VBN2ERSX6102        | VBN2ERPXB202    | VBN2ERSXB202        | VBN2ERPXB102    | VBN2ERSXB102        |                 |
|                             |                                     | 172*                           | VBN2E1PX6202      | VBN2E1SX6202        | VBN2E1PX6102    | VBN2E1SX6102        | VBN2E1PXB202    | VBN2E1SXB202        | VBN2E1PXB102    | VBN2E1SXB102        |                 |
|                             |                                     | 42                             | VBN2FNPPX6202     | VBN2FNSX6202        | VBN2FNPPX6102   | VBN2FNSX6102        | VBN2FNPPXB202   | VBN2FNSXB202        | VBN2FNPPXB102   | VBN2FNSXB102        |                 |
|                             |                                     | 57                             | VBN2FPPX6202      | VBN2FPSX6202        | VBN2FPPX6102    | VBN2FPSX6102        | VBN2FPPXB202    | VBN2FPSXB202        | VBN2FPPXB102    | VBN2FPSXB102        |                 |
| 2"                          | 100                                 | 71                             | VBN2FRPX6202      | VBN2FRSX6202        | VBN2FRPX6102    | VBN2FRSX6102        | VBN2FRPXB202    | VBN2FRSXB202        | VBN2FRPXB102    | VBN2FRSXB102        |                 |
|                             |                                     | 100                            | VBN2FSPX6202      | VBN2FSSX6202        | VBN2FSPX6102    | VBN2FSSX6102        | VBN2FSPXB202    | VBN2FSSXB202        | VBN2FSPXB102    | VBN2FSSXB102        |                 |
|                             |                                     | 266*                           | VBN2F2PPX6202     | VBN2F2SX6202        | VBN2F2PPX6102   | VBN2F2SX6102        | VBN2F2PXB202    | VBN2F2SXB202        | VBN2F2PXB102    | VBN2F2SXB102        |                 |
|                             |                                     | 72                             | VBN2GRPX6202      | VBN2GRSX6202        | VBN2GRPX6102    | VBN2GRSX6102        | VBN2GRPXB202    | VBN2GRSXB202        | VBN2GRPXB102    | VBN2GRSXB102        |                 |
| 2-1/2"                      | 100                                 | 101                            | VBN2GSPX6202      | VBN2GSSX6202        | VBN2GSPX6102    | VBN2GSSX6102        | VBN2GSPXB202    | VBN2GSSXB202        | VBN2GSPXB102    | VBN2GSSXB102        |                 |
|                             |                                     | 202*                           | VBN2G1PX6202      | VBN2G1SX6202        | VBN2G1PX6102    | VBN2G1SX6102        | VBN2G1PXB202    | VBN2G1SXB202        | VBN2G1PXB102    | VBN2G1SXB102        |                 |
|                             |                                     | 124                            | VBN2HTPX6202      | VBN2HTSX6202        | VBN2HTPX6102    | VBN2HTSX6102        | VBN2HTPXB202    | VBN2HTSXB202        | VBN2HTPXB102    | VBN2HTSXB102        |                 |
| 3"                          | 100                                 | 145*                           | VBN2HUPX6202      | VBN2HUSX6202        | VBN2HUPX6102    | VBN2HUSX6102        | VBN2HUPXB202    | VBN2HUSXB202        | VBN2HUPXB102    | VBN2HUSXB102        |                 |

\* Full port ball. No flow characterizing insert.

## Product Selection - Valves

## 2-Way NPT Valves ½"- 3", NEMA 3R

| Actuator Features           |                                     |       | Fail Safe         |                     |                 |                     |                 |                     |                 |                     |
|-----------------------------|-------------------------------------|-------|-------------------|---------------------|-----------------|---------------------|-----------------|---------------------|-----------------|---------------------|
| Actuator O.S. Number        |                                     |       | MS8105A1030       |                     |                 |                     | MS8105A1130     |                     |                 |                     |
| Power Supply                | Voltage                             |       | 24 VAC/DC         |                     |                 |                     | 24 VAC/DC       |                     |                 |                     |
|                             | Frequency                           |       | 50 / 60 Hz        |                     |                 |                     | 50 / 60 Hz      |                     |                 |                     |
| Actuator Torque             | Power                               |       | 6 VA              |                     |                 |                     | 6 VA            |                     |                 |                     |
|                             | (lb.-in.)                           |       | 44                |                     |                 |                     | 44              |                     |                 |                     |
| Control                     | (0)2-10 Vdc                         |       |                   |                     |                 |                     |                 |                     |                 |                     |
|                             | 4-20 mA (external 500 Ohm Resistor) |       |                   |                     |                 |                     |                 |                     |                 |                     |
|                             | Floating                            |       |                   |                     |                 |                     |                 |                     |                 |                     |
|                             | Two-Position SPDT                   |       |                   |                     |                 |                     |                 |                     |                 |                     |
| Actuator Stroke             | Two-Position SPST                   |       | •                 |                     |                 |                     | •               |                     |                 |                     |
|                             | (degrees)                           |       | 95° ± 3°          |                     |                 |                     | 95° ± 3°        |                     |                 |                     |
| Timing                      | (drive/spring return, seconds)      |       | 45 / 25           |                     |                 |                     | 45 / 25         |                     |                 |                     |
|                             | Aux Switch                          |       | 0                 |                     |                 |                     | 1               |                     |                 |                     |
| Feedback                    |                                     |       | 2-10 Vdc Built In |                     |                 |                     |                 |                     |                 |                     |
| Fail Safe Action            |                                     |       | Closed            |                     | Open            |                     | Closed          |                     | Open            |                     |
| Normal Position (no signal) |                                     |       | Closed            |                     | Open            |                     | Closed          |                     | Open            |                     |
| Valve Features              |                                     |       | Trim              | Nickel-Plated Brass | Stainless Steel | Nickel-Plated Brass | Stainless Steel | Nickel-Plated Brass | Stainless Steel | Nickel-Plated Brass |
| Valve Size (inches)         | Close-off Pressure (psid)           | Cv    | Short Order Codes |                     |                 |                     |                 |                     |                 |                     |
| 1/2"                        | 130                                 | 0.38  | VBN2ABPX7202      | VBN2ABSX7202        | VBN2ABPX7102    | VBN2ABSX7102        | VBN2ABPXA202    | VBN2ABSXA202        | VBN2ABPXA102    | VBN2ABSXA102        |
|                             |                                     | 0.68  | VBN2ADPX7202      | VBN2ADSX7202        | VBN2ADPX7102    | VBN2ADSX7102        | VBN2ADPXA202    | VBN2ADSXA202        | VBN2ADPXA102    | VBN2ADSXA102        |
|                             |                                     | 1.3   | VBN2AEPX7202      | VBN2AESX7202        | VBN2AEPX7102    | VBN2AESX7102        | VBN2AEPXA202    | VBN2AESXA202        | VBN2AEPXA102    | VBN2AESXA102        |
|                             |                                     | 2     | VBN2AFPX7202      | VBN2AFSX7202        | VBN2AFPX7102    | VBN2AFSX7102        | VBN2AFPXA202    | VBN2AFSXA202        | VBN2AFPXA102    | VBN2AFSXA102        |
|                             |                                     | 2.6   | VBN2AGPX7202      | VBN2AGSX7202        | VBN2AGPX7102    | VBN2AGSX7102        | VBN2AGPXA202    | VBN2AGSXA202        | VBN2AGPXA102    | VBN2AGSXA102        |
|                             |                                     | 4.7   | VBN2AHPX7202      | VBN2AHSX7202        | VBN2AHPX7102    | VBN2AHSX7102        | VBN2AHPXA202    | VBN2AHSXA202        | VBN2AHPXA102    | VBN2AHSXA102        |
|                             |                                     | 11.7* | VBN2AKPX7202      | VBN2AKSX7202        | VBN2AKPX7102    | VBN2AKSX7102        | VBN2AKPXA202    | VBN2AKSXA202        | VBN2AKPXA102    | VBN2AKSXA102        |
| 3/4"                        | 130                                 | 4.3   | VBN2BHPX7202      | VBN2BHSX7202        | VBN2BHPX7102    | VBN2BHSX7102        | VBN2BHPXA202    | VBN2BHSXA202        | VBN2BHPXA102    | VBN2BHSXA102        |
|                             |                                     | 7.4   | VBN2BJPX7202      | VBN2BJSX7202        | VBN2BJPX7102    | VBN2BJSX7102        | VBN2BJPXA202    | VBN2BJSXA202        | VBN2BJPXA102    | VBN2BJSXA102        |
|                             |                                     | 10.1  | VBN2BKPX7202      | VBN2BKSX7202        | VBN2BKPX7102    | VBN2BKSX7102        | VBN2BKPXA202    | VBN2BKSXA202        | VBN2BKPXA102    | VBN2BKSXA102        |
|                             |                                     | 29*   | VBN2BMPX7202      | VBN2BMSX7202        | VBN2BMPX7102    | VBN2BMSX7102        | VBN2BMPXA202    | VBN2BMSXA202        | VBN2BMPXA102    | VBN2BMSXA102        |
|                             |                                     | 9     | VBN2CJJPX7202     | VBN2CJSX7202        | VBN2CJJPX7102   | VBN2CJSX7102        | VBN2CJJPXA202   | VBN2CJSXA202        | VBN2CJJPXA102   | VBN2CJSXA102        |
| 1"                          | 100                                 | 15.3  | VBN2CLPX7202      | VBN2CLSX7202        | VBN2CLPX7102    | VBN2CLSX7102        | VBN2CLPXA202    | VBN2CLSXA202        | VBN2CLPXA102    | VBN2CLSXA102        |
|                             |                                     | 26    | VBN2CMPX7202      | VBN2CMSX7202        | VBN2CMPX7102    | VBN2CMSX7102        | VBN2CMPXA202    | VBN2CMSXA202        | VBN2CMPXA102    | VBN2CMSXA102        |
|                             |                                     | 54*   | VBN2CPPX7202      | VBN2CPSX7202        | VBN2CPPX7102    | VBN2CPSX7102        | VBN2CPPXA202    | VBN2CPSXA202        | VBN2CPPXA102    | VBN2CPSXA102        |
|                             |                                     | 14.9  | VBN2DKPX7202      | VBN2DKSX7202        | VBN2DKPX7102    | VBN2DKSX7102        | VBN2DKPXA202    | VBN2DKSXA202        | VBN2DKPXA102    | VBN2DKSXA102        |
| 1-1/4"                      | 100                                 | 35    | VBN2DLPX7202      | VBN2DLSX7202        | VBN2DLPX7102    | VBN2DLSX7102        | VBN2DLPXA202    | VBN2DLSXA202        | VBN2DLPXA102    | VBN2DLSXA102        |
|                             |                                     | 37    | VBN2DMPX7202      | VBN2DMSX7202        | VBN2DMPX7102    | VBN2DMSX7102        | VBN2DMPXA202    | VBN2DMSXA202        | VBN2DMPXA102    | VBN2DMSXA102        |
|                             |                                     | 102*  | VBN2DSPX7202      | VBN2DSSX7202        | VBN2DSPX7102    | VBN2DSSX7102        | VBN2DSPXA202    | VBN2DSSXA202        | VBN2DSPXA102    | VBN2DSSXA102        |
|                             |                                     | 41    | VBN2ENPX7202      | VBN2ENSX7202        | VBN2ENPX7102    | VBN2ENSX7102        | VBN2ENPXA202    | VBN2ENSXA202        | VBN2ENPXA102    | VBN2ENSXA102        |
| 1-1/2"                      | 100                                 | 74*   | VBN2ERPX7202      | VBN2ERSX7202        | VBN2ERPX7102    | VBN2ERSX7102        | VBN2ERPXA202    | VBN2ERSXA202        | VBN2ERPXA102    | VBN2ERSXA102        |
|                             |                                     | 172*  | VBN2E1PX7202      | VBN2E1SX7202        | VBN2E1PX7102    | VBN2E1SX7102        | VBN2E1PXA202    | VBN2E1SXA202        | VBN2E1PXA102    | VBN2E1SXA102        |
|                             |                                     | 42    | VBN2FNXP7202      | VBN2FNSX7202        | VBN2FNXP7102    | VBN2FNSX7102        | VBN2FNXPXA202   | VBN2FNSXA202        | VBN2FNXPXA102   | VBN2FNSXA102        |
|                             |                                     | 57    | VBN2FPPX7202      | VBN2FPSX7202        | VBN2FPPX7102    | VBN2FPSX7102        | VBN2FPPXA202    | VBN2FPSXA202        | VBN2FPPXA102    | VBN2FPSXA102        |
| 2"                          | 100                                 | 71    | VBN2FRPX7202      | VBN2FRSX7202        | VBN2FRPX7102    | VBN2FRSX7102        | VBN2FRPXA202    | VBN2FRSXA202        | VBN2FRPXA102    | VBN2FRSXA102        |
|                             |                                     | 100   | VBN2FSPX7202      | VBN2FSSX7202        | VBN2FSPX7102    | VBN2FSSX7102        | VBN2FSPXA202    | VBN2FSSXA202        | VBN2FSPXA102    | VBN2FSSXA102        |
|                             |                                     | 266*  | VBN2F2PX7202      | VBN2F2SX7202        | VBN2F2PX7102    | VBN2F2SX7102        | VBN2F2PXA202    | VBN2F2SXA202        | VBN2F2PXA102    | VBN2F2SXA102        |
|                             |                                     | 72    | VBN2GRPX7202      | VBN2GRSX7202        | VBN2GRPX7102    | VBN2GRSX7102        | VBN2GRPXA202    | VBN2GRSXA202        | VBN2GRPXA102    | VBN2GRSXA102        |
| 2-1/2"                      | 100                                 | 101   | VBN2GSPX7202      | VBN2GSSX7202        | VBN2GSPX7102    | VBN2GSSX7102        | VBN2GSPXA202    | VBN2GSSXA202        | VBN2GSPXA102    | VBN2GSSXA102        |
|                             |                                     | 202*  | VBN2G1PX7202      | VBN2G1SX7202        | VBN2G1PX7102    | VBN2G1SX7102        | VBN2G1PXA202    | VBN2G1SXA202        | VBN2G1PXA102    | VBN2G1SXA102        |
|                             |                                     | 124   | VBN2HTPX7202      | VBN2HTSX7202        | VBN2HTPX7102    | VBN2HTSX7102        | VBN2HTPXA202    | VBN2HTSXA202        | VBN2HTPXA102    | VBN2HTSXA102        |
| 3"                          | 100                                 | 145*  | VBN2HUPX7202      | VBN2HUSX7202        | VBN2HUPX7102    | VBN2HUSX7102        | VBN2HUPXA202    | VBN2HUSXA202        | VBN2HUPXA102    | VBN2HUSXA102        |

\* Full port ball. No flow characterizing insert.

2-Way

VALVES

Short Order Codes

Product Selection - Valves

2-Way NPT Valves ½"- 3", NEMA 3R

2-Way

| Actuator Features           |                                     |                   | Fail Safe           |                 |                     |                 |                     |                 |                     |                 |
|-----------------------------|-------------------------------------|-------------------|---------------------|-----------------|---------------------|-----------------|---------------------|-----------------|---------------------|-----------------|
| Actuator O.S. Number        |                                     |                   | MS4105A1030         |                 |                     |                 | MS4105A1130         |                 |                     |                 |
| Power Supply                | Voltage                             |                   | 100-250 VAC         |                 |                     |                 | 100-250 VAC         |                 |                     |                 |
|                             | Frequency                           |                   | 50 / 60 Hz          |                 |                     |                 | 50 / 60 Hz          |                 |                     |                 |
|                             | Power                               |                   | 6 VA                |                 |                     |                 | 6 VA                |                 |                     |                 |
| Actuator Torque             | (lb.-in.)                           |                   | 44                  |                 |                     |                 | 44                  |                 |                     |                 |
|                             | (0)2-10 Vdc                         |                   |                     |                 |                     |                 |                     |                 |                     |                 |
| Control                     | 4-20 mA (external 500 Ohm Resistor) |                   |                     |                 |                     |                 |                     |                 |                     |                 |
|                             | Floating                            |                   |                     |                 |                     |                 |                     |                 |                     |                 |
|                             | Two-Position SPDT                   |                   |                     |                 |                     |                 |                     |                 |                     |                 |
| Actuator Stroke             | (degrees)                           |                   | 95° ± 3°            |                 |                     |                 | 95° ± 3°            |                 |                     |                 |
|                             | (drive/spring return, seconds)      |                   | 45 / 25             |                 |                     |                 | 45 / 25             |                 |                     |                 |
| Aux Switch                  |                                     |                   | 0                   |                 |                     |                 | 1                   |                 |                     |                 |
| Feedback                    |                                     | 2-10 Vdc Built In |                     |                 |                     |                 |                     |                 |                     |                 |
| Fail Safe Action            |                                     |                   | Closed              |                 | Open                |                 | Closed              |                 | Open                |                 |
| Normal Position (no signal) |                                     |                   | Closed              |                 | Open                |                 | Closed              |                 | Open                |                 |
| Valve Features              |                                     | Trim              | Nickel-Plated Brass | Stainless Steel | Nickel-Plated Brass | Stainless Steel | Nickel-Plated Brass | Stainless Steel | Nickel-Plated Brass | Stainless Steel |
| Valve Size (inches)         | Close-off Pressure (psid)           | Cv                | Short Order Codes   |                 |                     |                 |                     |                 |                     |                 |
| 1/2"                        | 130                                 | 0.38              | VBN2ABPX8202        | VBN2ABSX8202    | VBN2ABPX8102        | VBN2ABSX8102    | VBN2ABPX9202        | VBN2ABSX9202    | VBN2ABPX9102        | VBN2ABSX9102    |
|                             |                                     | 0.68              | VBN2ADPX8202        | VBN2ADSX8202    | VBN2ADPX8102        | VBN2ADSX8102    | VBN2ADPX9202        | VBN2ADSX9202    | VBN2ADPX9102        | VBN2ADSX9102    |
|                             |                                     | 1.3               | VBN2AEPX8202        | VBN2AESX8202    | VBN2AEPX8102        | VBN2AESX8102    | VBN2AEPX9202        | VBN2AESX9202    | VBN2AEPX9102        | VBN2AESX9102    |
|                             |                                     | 2                 | VBN2AFPX8202        | VBN2AFSX8202    | VBN2AFPX8102        | VBN2AFSX8102    | VBN2AFPX9202        | VBN2AFSX9202    | VBN2AFPX9102        | VBN2AFSX9102    |
|                             |                                     | 2.6               | VBN2AGPX8202        | VBN2AGSX8202    | VBN2AGPX8102        | VBN2AGSX8102    | VBN2AGPX9202        | VBN2AGSX9202    | VBN2AGPX9102        | VBN2AGSX9102    |
|                             |                                     | 4.7               | VBN2AHPX8202        | VBN2AHSX8202    | VBN2AHPX8102        | VBN2AHSX8102    | VBN2AHPX9202        | VBN2AHSX9202    | VBN2AHPX9102        | VBN2AHSX9102    |
| 3/4"                        | 130                                 | 11.7*             | VBN2AKPX8202        | VBN2AKSX8202    | VBN2AKPX8102        | VBN2AKSX8102    | VBN2AKPX9202        | VBN2AKSX9202    | VBN2AKPX9102        | VBN2AKSX9102    |
|                             |                                     | 4.3               | VBN2BHPX8202        | VBN2BHSX8202    | VBN2BHPX8102        | VBN2BHSX8102    | VBN2BHPX9202        | VBN2BHSX9202    | VBN2BHPX9102        | VBN2BHSX9102    |
|                             |                                     | 7.4               | VBN2BJPX8202        | VBN2BJSX8202    | VBN2BJPX8102        | VBN2BJSX8102    | VBN2BJPX9202        | VBN2BJSX9202    | VBN2BJPX9102        | VBN2BJSX9102    |
|                             |                                     | 10.1              | VBN2BKPX8202        | VBN2BKSX8202    | VBN2BKPX8102        | VBN2BKSX8102    | VBN2BKPX9202        | VBN2BKSX9202    | VBN2BKPX9102        | VBN2BKSX9102    |
|                             |                                     | 29*               | VBN2BMPX8202        | VBN2BMSX8202    | VBN2BMPX8102        | VBN2BMSX8102    | VBN2BMPX9202        | VBN2BMSX9202    | VBN2BMPX9102        | VBN2BMSX9102    |
|                             |                                     | 9                 | VBN2CJPX8202        | VBN2CJSX8202    | VBN2CJPX8102        | VBN2CJSX8102    | VBN2CJPX9202        | VBN2CJSX9202    | VBN2CJPX9102        | VBN2CJSX9102    |
| 1"                          | 100                                 | 15.3              | VBN2CLPX8202        | VBN2CLSX8202    | VBN2CLPX8102        | VBN2CLSX8102    | VBN2CLPX9202        | VBN2CLSX9202    | VBN2CLPX9102        | VBN2CLSX9102    |
|                             |                                     | 26                | VBN2CMPX8202        | VBN2CMSX8202    | VBN2CMPX8102        | VBN2CMSX8102    | VBN2CMPX9202        | VBN2CMSX9202    | VBN2CMPX9102        | VBN2CMSX9102    |
|                             |                                     | 54*               | VBN2CPPX8202        | VBN2CPSX8202    | VBN2CPPX8102        | VBN2CPSX8102    | VBN2CPPX9202        | VBN2CPSX9202    | VBN2CPPX9102        | VBN2CPSX9102    |
|                             |                                     | 14.9              | VBN2DKPX8202        | VBN2DKSX8202    | VBN2DKPX8102        | VBN2DKSX8102    | VBN2DKPX9202        | VBN2DKSX9202    | VBN2DKPX9102        | VBN2DKSX9102    |
| 1-1/4"                      | 100                                 | 25                | VBN2DLPX8202        | VBN2DLSX8202    | VBN2DLPX8102        | VBN2DLSX8102    | VBN2DLPX9202        | VBN2DLSX9202    | VBN2DLPX9102        | VBN2DLSX9102    |
|                             |                                     | 3.6               | VBN2DMPX8202        | VBN2DMSX8202    | VBN2DMPX8102        | VBN2DMSX8102    | VBN2DMPX9202        | VBN2DMSX9202    | VBN2DMPX9102        | VBN2DMSX9102    |
|                             |                                     | 102*              | VBN2DSPX8202        | VBN2DSSX8202    | VBN2DSPX8102        | VBN2DSSX8102    | VBN2DSPX9202        | VBN2DSSX9202    | VBN2DSPX9102        | VBN2DSSX9102    |
|                             |                                     | 41                | VBN2ENPX8202        | VBN2ENSX8202    | VBN2ENPX8102        | VBN2ENSX8102    | VBN2ENPX9202        | VBN2ENSX9202    | VBN2ENPX9102        | VBN2ENSX9102    |
| 2"                          | 100                                 | 74*               | VBN2ERPX8202        | VBN2ERSX8202    | VBN2ERPX8102        | VBN2ERSX8102    | VBN2ERPX9202        | VBN2ERSX9202    | VBN2ERPX9102        | VBN2ERSX9102    |
|                             |                                     | 172*              | VBN2E1PX8202        | VBN2E1SX8202    | VBN2E1PX8102        | VBN2E1SX8102    | VBN2E1PX9202        | VBN2E1SX9202    | VBN2E1PX9102        | VBN2E1SX9102    |
|                             |                                     | 42                | VBN2FNPX8202        | VBN2FNSX8202    | VBN2FNPX8102        | VBN2FNSX8102    | VBN2FNPX9202        | VBN2FNSX9202    | VBN2FNPX9102        | VBN2FNSX9102    |
|                             |                                     | 57                | VBN2FPPX8202        | VBN2FPSX8202    | VBN2FPPX8102        | VBN2FPSX8102    | VBN2FPPX9202        | VBN2FPSX9202    | VBN2FPPX9102        | VBN2FPSX9102    |
|                             |                                     | 71                | VBN2FRPX8202        | VBN2FRSX8202    | VBN2FRPX8102        | VBN2FRSX8102    | VBN2FRPX9202        | VBN2FRSX9202    | VBN2FRPX9102        | VBN2FRSX9102    |
|                             |                                     | 100               | VBN2FSPX8202        | VBN2FSSX8202    | VBN2FSPX8102        | VBN2FSSX8102    | VBN2FSPX9202        | VBN2FSSX9202    | VBN2FSPX9102        | VBN2FSSX9102    |
| 2-1/2"                      | 100                                 | 266*              | VBN2F2PX8202        | VBN2F2SX8202    | VBN2F2PX8102        | VBN2F2SX8102    | VBN2F2PX9202        | VBN2F2SX9202    | VBN2F2PX9102        | VBN2F2SX9102    |
|                             |                                     | 72                | VBN2GRPX8202        | VBN2GRSX8202    | VBN2GRPX8102        | VBN2GRSX8102    | VBN2GRPX9202        | VBN2GRSX9202    | VBN2GRPX9102        | VBN2GRSX9102    |
|                             |                                     | 101               | VBN2GSPX8202        | VBN2GSSX8202    | VBN2GSPX8102        | VBN2GSSX8102    | VBN2GSPX9202        | VBN2GSSX9202    | VBN2GSPX9102        | VBN2GSSX9102    |
|                             |                                     | 202*              | VBN2G1PX8202        | VBN2G1SX8202    | VBN2G1PX8102        | VBN2G1SX8102    | VBN2G1PX9202        | VBN2G1SX9202    | VBN2G1PX9102        | VBN2G1SX9102    |
| 3"                          | 100                                 | 124               | VBN2HTPX8202        | VBN2HTSX8202    | VBN2HTPX8102        | VBN2HTSX8102    | VBN2HTPX9202        | VBN2HTSX9202    | VBN2HTPX9102        | VBN2HTSX9102    |
|                             |                                     | 145*              | VBN2HUPX8202        | VBN2HUSX8202    | VBN2HUPX8102        | VBN2HUSX8102    | VBN2HUPX9202        | VBN2HUSX9202    | VBN2HUPX9102        | VBN2HUSX9102    |

\* Full port ball. No flow characterizing insert.

## Product Selection - Valves

## 3-Way NPT Control Ball Valves ½"-2½", NEMA 2

## Common Features

## VBN3 (Three-way):

- Equal % A to AB, linear B to AB
- B-port Cv reduction of 20% approximates constant total loop flow
- Nickel-chrome plated brass ball and stem
- Convert to 2-way by plugging B port (plug not provided)
- Spring return actuators field-configurable for A-port normally open or normally closed fail safe.
- Mixing or diverting control with the same valve
- ANSI Class IV (0.01%) seat leakage on both A and B ports
- Available with NEMA 3R actuator enclosure



3-Way

| Actuator Features           |                              |                                     | Non Fail Safe       |                     |                     |                     | Valve Only                                                                          |
|-----------------------------|------------------------------|-------------------------------------|---------------------|---------------------|---------------------|---------------------|-------------------------------------------------------------------------------------|
| Actuator O.S. Number        |                              |                                     | MN6105A1011         | MN6105A1201         | MN7505A2001         | MN7505A2209         | N/A                                                                                 |
| Power Supply                |                              | Voltage                             | 24 VAC/DC           | 24 VAC/DC           | 24 VAC/DC           | 24 VAC/DC           |  |
|                             |                              | Frequency                           | 50 / 60 Hz          | 50 / 60 Hz          | 50 / 60 Hz          | 50 / 60 Hz          |                                                                                     |
|                             |                              | Power                               | 5 VA                | 5 VA                | 5 VA                | 5 VA                |                                                                                     |
| Actuator Torque             |                              | (lb.-in.)                           | 44                  | 44                  | 44                  | 44                  |                                                                                     |
| Control                     |                              | (0)2-10 Vdc                         |                     |                     | •                   | •                   |                                                                                     |
|                             |                              | 4-20 mA (external 500 Ohm Resistor) |                     |                     | •                   | •                   |                                                                                     |
|                             |                              | Floating                            | •                   | •                   | •                   | •                   |                                                                                     |
|                             |                              | Two-Position SPDT                   | •                   | •                   | •                   | •                   |                                                                                     |
|                             |                              | Two-Position SPST                   |                     |                     | •                   | •                   |                                                                                     |
| Actuator Stroke             |                              | (degrees)                           | 95° ± 3°            | 95° ± 3°            | 95° ± 3°            | 95° ± 3°            |                                                                                     |
| Timing                      |                              | (drive/spring return, seconds)      | 90                  | 90                  | 90                  | 90                  |                                                                                     |
| Aux Switch                  |                              |                                     | 0                   | 2                   | 0                   | 2                   |                                                                                     |
| Feedback                    |                              | 2-10 Vdc<br>Built In                |                     |                     | •                   | •                   |                                                                                     |
| Fail Safe Action            |                              |                                     | Stay in Place       | Stay in Place       | Stay in Place       | Stay in Place       |                                                                                     |
| Normal Position (no signal) |                              |                                     | Stay in Place       | Stay in Place       | A-AB Open           | A-AB Open           |                                                                                     |
| Valve Features              |                              | Trim                                | Nickel-Plated Brass | Nickel-Plated Brass | Nickel-Plated Brass | Nickel-Plated Brass | Nickel-Plated Brass                                                                 |
| Valve Size<br>(inches)      | Close-off Pressure<br>(psid) | Cv                                  | Short Order Codes   |                     |                     |                     |                                                                                     |
| 1/2"                        | 50                           | 0.33                                | VBN3ABPX4000        | VBN3ABPXC000        | VBN3ABPX5000        | VBN3ABPXD000        | VBN3ABPX0000                                                                        |
|                             |                              | 0.59                                | VBN3ACPX4000        | VBN3ACPXC000        | VBN3ACPX5000        | VBN3ACPXD000        | VBN3ACPX0000                                                                        |
|                             |                              | 1                                   | VBN3AEPX4000        | VBN3AEPXC000        | VBN3AEPX5000        | VBN3AEPXD000        | VBN3AEPX0000                                                                        |
|                             |                              | 2.4                                 | VBN3AFPX4000        | VBN3AFPXC000        | VBN3AFPX5000        | VBN3AFPXD000        | VBN3AFPX0000                                                                        |
|                             |                              | 4.3                                 | VBN3AHPX4000        | VBN3AHPXC000        | VBN3AHPX5000        | VBN3AHPXD000        | VBN3AHPX0000                                                                        |
| 3/4"                        | 50                           | 8*                                  | VBN3AJPX4000        | VBN3AJPC000         | VBN3AJPX5000        | VBN3AJPXD000        | VBN3AJPX0000                                                                        |
|                             |                              | 3.8                                 | VBN3BGPX4000        | VBN3BGPXC000        | VBN3BGPX5000        | VBN3BGPXD000        | VBN3BGPX0000                                                                        |
|                             |                              | 7                                   | VBN3BJPX4000        | VBN3BJPXC000        | VBN3BJPX5000        | VBN3BJPXD000        | VBN3BJPX0000                                                                        |
| 1"                          | 50                           | 11*                                 | VBN3BKPX4000        | VBN3BKPC000         | VBN3BKPX5000        | VBN3BKPD000         | VBN3BKPX0000                                                                        |
|                             |                              | 8.6                                 | VBN3CJPX4000        | VBN3CJPXC000        | VBN3CJPX5000        | VBN3CJPXD000        | VBN3CJPX0000                                                                        |
|                             |                              | 14.9                                | VBN3CKPX4000        | VBN3CKPXC000        | VBN3CKPX5000        | VBN3CKPD000         | VBN3CKPX0000                                                                        |
|                             |                              | 22*                                 | VBN3CLPX4000        | VBN3CLPXC000        | VBN3CLPX5000        | VBN3CLPD000         | VBN3CLPX0000                                                                        |
| 1-1/4"                      | 40                           | 31*                                 | VBN3CMPX4000        | VBN3CMPXC000        | VBN3CMPX5000        | VBN3CMPXD000        | VBN3CMPX0000                                                                        |
|                             |                              | 12.7                                | VBN3DKPX4000        | VBN3DKPXC000        | VBN3DKPX5000        | VBN3DKPD000         | VBN3DKPX0000                                                                        |
|                             |                              | 19.4*                               | VBN3DLPX4000        | VBN3DLPXC000        | VBN3DLPX5000        | VBN3DLPXD000        | VBN3DLPX0000                                                                        |
|                             |                              | 27                                  | VBN3DMPX4000        | VBN3DMPXC000        | VBN3DMPX5000        | VBN3DMPXD000        | VBN3DMPX0000                                                                        |
| 1-1/2"                      | 40                           | 34*                                 | VBN3DNPX4000        | VBN3DNPC000         | VBN3DNPX5000        | VBN3DNPD000         | VBN3DNPX0000                                                                        |
|                             |                              | 24                                  | VBN3ELPX4000        | VBN3ELPXC000        | VBN3ELPX5000        | VBN3ELPD000         | VBN3ELPX0000                                                                        |
|                             |                              | 32*                                 | VBN3EMPX4000        | VBN3EMPXC000        | VBN3EMPX5000        | VBN3EMPXD000        | VBN3EMPX0000                                                                        |
|                             |                              | 61*                                 | VBN3EPPX4000        | VBN3EPPXC000        | VBN3EPPX5000        | VBN3EPPXD000        | VBN3EPPX0000                                                                        |
| 2"                          | 40                           | 38                                  | VBN3FNPX4000        | VBN3FNPC000         | VBN3FNPX5000        | VBN3FNPD000         | VBN3FNPX0000                                                                        |
|                             |                              | 57*                                 | VBN3FPPX4000        | VBN3FPPXC000        | VBN3FPPX5000        | VBN3FPPXD000        | VBN3FPPX0000                                                                        |
|                             |                              | 83                                  | VBN3FRPX4000        | VBN3FRPXC000        | VBN3FRPX5000        | VBN3FRPD000         | VBN3FRPX0000                                                                        |
|                             |                              | 109*                                | VBN3FTPX4000        | VBN3FTPXC000        | VBN3FTPX5000        | VBN3FTPD000         | VBN3FTPX0000                                                                        |
| 2-1/2"                      | 40                           | 74                                  | VBN3GRPX4000        | VBN3GRPXC000        | VBN3GRPX5000        | VBN3GRPD000         | VBN3GRPX0000                                                                        |
|                             |                              | 100*                                | VBN3GSPX4000        | VBN3GSPXC000        | VBN3GSPX5000        | VBN3GSPXD000        | VBN3GSPX0000                                                                        |

\* Full port ball. No flow characterizing insert.

# Product Selection - Valves

## 3-Way NPT Control Ball Valves ½"-1¼", NEMA 2

| Actuator Features           |                           |                                     | Fail Safe           |                 |                     |                 |
|-----------------------------|---------------------------|-------------------------------------|---------------------|-----------------|---------------------|-----------------|
| Actuator O.S. Number        |                           |                                     | MS3103J1023         |                 | MS3103J1223         |                 |
| Power Supply                |                           | Voltage                             | 24 VAC/DC           |                 | 24 VAC/DC           |                 |
|                             |                           | Frequency                           | 50 / 60 Hz          |                 | 50 / 60 Hz          |                 |
|                             |                           | Power                               | 4.5 VA              |                 | 4.5 VA              |                 |
| Actuator Torque             |                           | (lb.-in.)                           | 27                  |                 | 27                  |                 |
| Control                     |                           | (0)2-10 Vdc                         |                     |                 |                     |                 |
|                             |                           | 4-20 mA (external 500 Ohm Resistor) |                     |                 |                     |                 |
|                             |                           | Sylk                                | •                   |                 | •                   |                 |
|                             |                           | Two-Position SPDT                   |                     |                 |                     |                 |
|                             |                           | Two-Position SPST                   |                     |                 |                     |                 |
| Actuator Stroke             |                           | (degrees)                           | 95° ± 3°            |                 | 95° ± 3°            |                 |
| Timing                      |                           | (drive/spring return, seconds)      | 30-180 / 25         |                 | 30-180 / 25         |                 |
| Aux Switch                  |                           |                                     | 0                   |                 | 2                   |                 |
| Feedback                    |                           |                                     | Sylk                |                 | Sylk                |                 |
| Fail Safe Action            |                           |                                     | B-AB Open (FSB)     | A-AB Open (FSA) | B-AB Open (FSB)     | A-AB Open (FSA) |
| Normal Position (no signal) |                           |                                     | B-AB Open           | A-AB Open       | B-AB Open           | A-AB Open       |
| Valve Features              |                           | Trim                                | Nickel-Plated Brass |                 | Nickel-Plated Brass |                 |
| Valve Size (inches)         | Close-off Pressure (psid) | Cv                                  | Short Order Codes   |                 |                     |                 |
| 1/2"                        | 50                        | 0.33                                | VBN3ABPXG301        | VBN3ABPXG401    | VBN3ABPXH301        | VBN3ABPXH401    |
|                             |                           | 0.59                                | VBN3ACPXG301        | VBN3ACPXG401    | VBN3ACPXH301        | VBN3ACPXH401    |
|                             |                           | 1                                   | VBN3AEPXG301        | VBN3AEPXG401    | VBN3AEPXH301        | VBN3AEPXH401    |
|                             |                           | 2.4                                 | VBN3AFPXG301        | VBN3AFPXG401    | VBN3AFPXH301        | VBN3AFPXH401    |
|                             |                           | 4.3                                 | VBN3AHPXG301        | VBN3AHPXG401    | VBN3AHPXH301        | VBN3AHPXH401    |
|                             |                           | 8*                                  | VBN3AJPXG301        | VBN3AJPXG401    | VBN3AJPXH301        | VBN3AJPXH401    |
| 3/4"                        | 50                        | 3.8                                 | VBN3BGPXG301        | VBN3BGPXG401    | VBN3BGPXH301        | VBN3BGPXH401    |
|                             |                           | 7                                   | VBN3BJPXG301        | VBN3BJPXG401    | VBN3BJPXH301        | VBN3BJPXH401    |
|                             |                           | 11*                                 | VBN3BKPXG301        | VBN3BKPXG401    | VBN3BKPXH301        | VBN3BKPXH401    |
| 1"                          | 50                        | 8.6                                 | VBN3CJPXG301        | VBN3CJPXG401    | VBN3CJPXH301        | VBN3CJPXH401    |
|                             |                           | 14.9                                | VBN3CKPXG301        | VBN3CKPXG401    | VBN3CKPXH301        | VBN3CKPXH401    |
|                             |                           | 22*                                 | VBN3CLPXG301        | VBN3CLPXG401    | VBN3CLPXH301        | VBN3CLPXH401    |
|                             |                           | 31*                                 | VBN3CMPXG301        | VBN3CMPXG401    | VBN3CMPXH301        | VBN3CMPXH401    |
| 1-1/4"                      | 40                        | 12.7                                | VBN3DKPXG301        | VBN3DKPXG401    | VBN3DKPXH301        | VBN3DKPXH401    |
|                             |                           | 19.4*                               | VBN3DLPXG301        | VBN3DLPXG401    | VBN3DLPXH301        | VBN3DLPXH401    |
|                             |                           | 27                                  | VBN3DMPXG301        | VBN3DMPXG401    | VBN3DMPXH301        | VBN3DMPXH401    |
|                             |                           | 34*                                 | VBN3DNPXG301        | VBN3DNPXG401    | VBN3DNPXH301        | VBN3DNPXH401    |

## Product Selection - Valves

## 3-Way NPT Control Ball Valves ½"-1¼", NEMA 2

3-Way

| Actuator Features           |                           |       | Fail Safe                           |                 |                     |                 | Fail Safe           |                 |                     |                 |
|-----------------------------|---------------------------|-------|-------------------------------------|-----------------|---------------------|-----------------|---------------------|-----------------|---------------------|-----------------|
| Actuator O.S. Number        |                           |       | MS7103A2021                         |                 | MS7103A2221         |                 | MS7503A2021         |                 | MS7503A2221         |                 |
| Power Supply                |                           |       | Voltage                             |                 | 24 VAC/DC           |                 | 24 VAC/DC           |                 | 24 VAC/DC           |                 |
|                             |                           |       | Frequency                           |                 | 50 / 60 Hz          |                 | 50 / 60 Hz          |                 | 50 / 60 Hz          |                 |
|                             |                           |       | Power                               |                 | 4 VA                |                 | 4 VA                |                 | 4 VA                |                 |
| Actuator Torque             |                           |       | (lb.-in.)                           |                 | 27                  |                 | 27                  |                 | 27                  |                 |
| Control                     |                           |       | 2-10 Vdc                            |                 | •                   |                 | •                   |                 | •                   |                 |
|                             |                           |       | 4-20 mA (external 500 Ohm Resistor) |                 | •                   |                 | •                   |                 | •                   |                 |
|                             |                           |       | Floating                            |                 |                     |                 | •                   |                 | •                   |                 |
|                             |                           |       | Two-Position SPDT                   |                 |                     |                 | •                   |                 | •                   |                 |
|                             |                           |       | Two-Position SPST                   |                 |                     |                 |                     |                 |                     |                 |
| Actuator Stroke             |                           |       | (degrees)                           |                 | 95° ± 3°            |                 | 95° ± 3°            |                 | 95° ± 3°            |                 |
| Timing                      |                           |       | (drive/spring return, seconds)      |                 | 90 / 25             |                 | 90 / 25             |                 | 90 / 25             |                 |
| Aux Switch                  |                           |       |                                     |                 | 0                   |                 | 2                   |                 | 2                   |                 |
| Feedback                    |                           |       | 2-10 Vdc Built In                   |                 | •                   |                 | •                   |                 | •                   |                 |
| Fail Safe Action            |                           |       | B-AB Open (FSB)                     | A-AB Open (FSA) | B-AB Open (FSB)     | A-AB Open (FSA) | B-AB Open (FSB)     | A-AB Open (FSA) | B-AB Open (FSB)     | A-AB Open (FSA) |
| Normal Position (no signal) |                           |       | B-AB Open                           | A-AB Open       | B-AB Open           | A-AB Open       | B-AB Open           | A-AB Open       | B-AB Open           | A-AB Open       |
| Valve Features              |                           |       | Trim                                |                 | Nickel-Plated Brass |                 | Nickel-Plated Brass |                 | Nickel-Plated Brass |                 |
| Valve Size (inches)         | Close-off Pressure (psid) | Cv    | Short Order Codes                   |                 |                     |                 |                     |                 |                     |                 |
| 1/2"                        | 50                        | 0.33  | VBN3ABPXE401                        | VBN3ABPXE301    | VBN3ABPXF401        | VBN3ABPXF301    | VBN3ABPXJ401        | VBN3ABPXJ301    | VBN3ABPXX401        | VBN3ABPXX301    |
|                             |                           | 0.59  | VBN3ACPXE401                        | VBN3ACPXE301    | VBN3ACPXF401        | VBN3ACPXF301    | VBN3ACPXJ401        | VBN3ACPXJ301    | VBN3ACPXX401        | VBN3ACPXX301    |
|                             |                           | 1     | VBN3AEPXE401                        | VBN3AEPXE301    | VBN3AEPXF401        | VBN3AEPXF301    | VBN3AEPXJ401        | VBN3AEPXJ301    | VBN3AEPXX401        | VBN3AEPXX301    |
|                             |                           | 2.4   | VBN3AFPXE401                        | VBN3AFPXE301    | VBN3AFPXF401        | VBN3AFPXF301    | VBN3AFPXJ401        | VBN3AFPXJ301    | VBN3AFPXX401        | VBN3AFPXX301    |
|                             |                           | 4.3   | VBN3AHPXE401                        | VBN3AHPXE301    | VBN3AHPXF401        | VBN3AHPXF301    | VBN3AHPXJ401        | VBN3AHPXJ301    | VBN3AHPXX401        | VBN3AHPXX301    |
| 3/4"                        | 50                        | 8*    | VBN3AJPXE401                        | VBN3AJPXE301    | VBN3AJPF401         | VBN3AJPF301     | VBN3AJPJ401         | VBN3AJPJ301     | VBN3AJPXX401        | VBN3AJPXX301    |
|                             |                           | 3.8   | VBN3BGPXE401                        | VBN3BGPXE301    | VBN3BGPXF401        | VBN3BGPXF301    | VBN3BGPXJ401        | VBN3BGPXJ301    | VBN3BGPXX401        | VBN3BGPXX301    |
|                             |                           | 7     | VBN3BJPXE401                        | VBN3BJPXE301    | VBN3BJPXF401        | VBN3BJPXF301    | VBN3BJPJ401         | VBN3BJPJ301     | VBN3BJPXX401        | VBN3BJPXX301    |
| 1"                          | 50                        | 11*   | VBN3BKPXE401                        | VBN3BKPXE301    | VBN3BKPF401         | VBN3BKPF301     | VBN3BKPJ401         | VBN3BKPJ301     | VBN3BKPXX401        | VBN3BKPXX301    |
|                             |                           | 8.6   | VBN3CJPXE401                        | VBN3CJPXE301    | VBN3CJPF401         | VBN3CJPF301     | VBN3CJPJ401         | VBN3CJPJ301     | VBN3CJPXX401        | VBN3CJPXX301    |
|                             |                           | 14.9  | VBN3CKPXE401                        | VBN3CKPXE301    | VBN3CKPXF401        | VBN3CKPXF301    | VBN3CKPJ401         | VBN3CKPJ301     | VBN3CKPXX401        | VBN3CKPXX301    |
|                             |                           | 22*   | VBN3CLPXE401                        | VBN3CLPXE301    | VBN3CLPXF401        | VBN3CLPXF301    | VBN3CLPJ401         | VBN3CLPJ301     | VBN3CLPXX401        | VBN3CLPXX301    |
| 1-1/4"                      | 40                        | 31*   | VBN3CMPXE401                        | VBN3CMPXE301    | VBN3CMPXF401        | VBN3CMPXF301    | VBN3CMPXJ401        | VBN3CMPXJ301    | VBN3CMPXX401        | VBN3CMPXX301    |
|                             |                           | 12.7  | VBN3DKPXE401                        | VBN3DKPXE301    | VBN3DKPXF401        | VBN3DKPXF301    | VBN3DKPXJ401        | VBN3DKPXJ301    | VBN3DKPXX401        | VBN3DKPXX301    |
|                             |                           | 19.4* | VBN3DLPXE401                        | VBN3DLPXE301    | VBN3DLPXF401        | VBN3DLPXF301    | VBN3DLPXJ401        | VBN3DLPXJ301    | VBN3DLPXX401        | VBN3DLPXX301    |
|                             |                           | 27    | VBN3DMPXE401                        | VBN3DMPXE301    | VBN3DMPXF401        | VBN3DMPXF301    | VBN3DMPXJ401        | VBN3DMPXJ301    | VBN3DMPXX401        | VBN3DMPXX301    |
|                             |                           | 34*   | VBN3DNPXE401                        | VBN3DNPXE301    | VBN3DNPF401         | VBN3DNPF301     | VBN3DNPXJ401        | VBN3DNPXJ301    | VBN3DNPXX401        | VBN3DNPXX301    |

\* Full port ball. No flow characterizing insert.

# Product Selection - Valves

## 3-Way NPT Control Ball Valves 1½"-2½", NEMA 2

| Actuator Features           |        |                                     | Fail Safe                 |                 |                     |                 |              |
|-----------------------------|--------|-------------------------------------|---------------------------|-----------------|---------------------|-----------------|--------------|
| Actuator O.S. Number        |        |                                     | MS7505A2030               |                 | MS7505A2130         |                 |              |
| Power Supply                |        | Voltage                             | 24 VAC/DC                 |                 | 24 VAC/DC           |                 |              |
|                             |        | Frequency                           | 50 / 60 Hz                |                 | 50 / 60 Hz          |                 |              |
|                             |        | Power                               | 6 VA                      |                 | 6 VA                |                 |              |
| Actuator Torque             |        | (lb.-in.)                           | 44                        |                 | 44                  |                 |              |
| Control                     |        | (0)2-10 Vdc                         | •                         |                 | •                   |                 |              |
|                             |        | 4-20 mA (external 500 Ohm Resistor) | •                         |                 | •                   |                 |              |
|                             |        | Floating                            | •                         |                 | •                   |                 |              |
|                             |        | Two-Position SPDT                   | •                         |                 | •                   |                 |              |
|                             |        | Two-Position SPST                   | •                         |                 | •                   |                 |              |
| Actuator Stroke             |        | (degrees)                           | 95° ± 3°                  |                 | 95° ± 3°            |                 |              |
| Timing                      |        | (drive/spring return, seconds)      | 90 / 25                   |                 | 90 / 25             |                 |              |
| Aux Switch                  |        |                                     | 0                         |                 | 1                   |                 |              |
| Feedback                    |        | 2-10 Vdc Built In                   | •                         |                 | •                   |                 |              |
| Fail Safe Action            |        |                                     | B-AB Open (FSB)           | A-AB Open (FSA) | B-AB Open (FSB)     | A-AB Open (FSA) |              |
| Normal Position (no signal) |        |                                     | B-AB Open                 | A-AB Open       | B-AB Open           | A-AB Open       |              |
| Valve Features              |        |                                     | Trim                      |                 | Nickel-Plated Brass |                 |              |
|                             |        |                                     |                           |                 |                     |                 |              |
| Valve Size (inches)         |        |                                     | Close-off Pressure (psid) |                 |                     |                 |              |
|                             |        |                                     | Cv                        |                 |                     |                 |              |
|                             |        |                                     | Short Order Codes         |                 |                     |                 |              |
| 3-Way                       | 1-1/2" | 40                                  | 24                        | VBN3ELPX6400    | VBN3ELPX6300        | VBN3ELPXB400    | VBN3ELPXB300 |
|                             |        |                                     | 32*                       | VBN3EMPX6400    | VBN3EMPX6300        | VBN3EMPXB400    | VBN3EMPXB300 |
|                             |        |                                     | 61*                       | VBN3EPPX6400    | VBN3EPPX6300        | VBN3EPPXB400    | VBN3EPPXB300 |
|                             | 2"     | 40                                  | 38                        | VBN3FNPX6400    | VBN3FNPX6300        | VBN3FNPXB400    | VBN3FNPXB300 |
|                             |        |                                     | 57*                       | VBN3FPPX6400    | VBN3FPPX6300        | VBN3FPPXB400    | VBN3FPPXB300 |
|                             |        |                                     | 83                        | VBN3FRPX6400    | VBN3FRPX6300        | VBN3FRPXB400    | VBN3FRPXB300 |
|                             |        |                                     | 109*                      | VBN3FTPX6400    | VBN3FTPX6300        | VBN3FTPXB400    | VBN3FTPXB300 |
|                             | 2-1/2" | 40                                  | 74                        | VBN3GRPX6400    | VBN3GRPX6300        | VBN3GRPXB400    | VBN3GRPXB300 |
|                             |        |                                     | 100*                      | VBN3GSPX6400    | VBN3GSPX6300        | VBN3GSPXB400    | VBN3GSPXB300 |

\* Full port ball. No flow characterizing insert.

3-Way

## Product Selection - Valves

## 3-Way NPT Control Ball Valves ½"-2½", NEMA 2

| Actuator Features           |                                     |       | Fail Safe           |                 |                     |                 |                     |                 |                     |                 |
|-----------------------------|-------------------------------------|-------|---------------------|-----------------|---------------------|-----------------|---------------------|-----------------|---------------------|-----------------|
| Actuator O.S. Number        |                                     |       | MS8105A1030         |                 | MS8105A1130         |                 | MS4105A1030         |                 | MS4105A1130         |                 |
| Power Supply                | Voltage                             |       | 24 VAC/DC           |                 | 24 VAC/DC           |                 | 100-250 VAC         |                 | 100-250 VAC         |                 |
|                             | Frequency                           |       | 50 / 60 Hz          |                 | 50 / 60 Hz          |                 | 50 / 60 Hz          |                 | 50 / 60 Hz          |                 |
|                             | Power                               |       | 6 VA                |                 | 6 VA                |                 | 6 VA                |                 | 6 VA                |                 |
| Actuator Torque             | (lb.-in.)                           |       | 44                  |                 | 44                  |                 | 44                  |                 | 44                  |                 |
| Control                     | (0)2-10 Vdc                         |       |                     |                 |                     |                 |                     |                 |                     |                 |
|                             | 4-20 mA (external 500 Ohm Resistor) |       |                     |                 |                     |                 |                     |                 |                     |                 |
|                             | Floating                            |       |                     |                 |                     |                 |                     |                 |                     |                 |
|                             | Two-Position SPDT                   |       |                     |                 |                     |                 |                     |                 |                     |                 |
|                             | Two-Position SPST                   |       | •                   |                 | •                   |                 | •                   |                 | •                   |                 |
| Actuator Stroke             | (degrees)                           |       | 95° ± 3°            |                 | 95° ± 3°            |                 | 95° ± 3°            |                 | 95° ± 3°            |                 |
| Timing                      | (drive/spring return, seconds)      |       | 45 / 25             |                 | 45 / 25             |                 | 45 / 25             |                 | 45 / 25             |                 |
| Aux Switch                  |                                     |       | 0                   |                 | 1                   |                 | 0                   |                 | 1                   |                 |
| Feedback                    | 2-10 Vdc Built In                   |       |                     |                 |                     |                 |                     |                 |                     |                 |
| Fail Safe Action            |                                     |       | B-AB Open (FSB)     | A-AB Open (FSA) | B-AB Open (FSB)     | A-AB Open (FSA) | B-AB Open (FSB)     | A-AB Open (FSA) | B-AB Open (FSB)     | A-AB Open (FSA) |
| Normal Position (no signal) |                                     |       | B-AB Open           | A-AB Open       | B-AB Open           | A-AB Open       | B-AB Open           | A-AB Open       | B-AB Open           | A-AB Open       |
| Valve Features              | Trim                                |       | Nickel-Plated Brass |                 | Nickel-Plated Brass |                 | Nickel-Plated Brass |                 | Nickel-Plated Brass |                 |
| Valve Size (inches)         | Close-off Pressure (psid)           | Cv    | Short Order Codes   |                 |                     |                 |                     |                 |                     |                 |
| 1/2"                        | 50                                  | 0.33  | VBN3ABPX7400        | VBN3ABPX7300    | VBN3ABPXA400        | VBN3ABPXA300    | VBN3ABPX8400        | VBN3ABPX8300    | VBN3ABPX9400        | VBN3ABPX9300    |
|                             |                                     |       | VBN3ACPX7400        | VBN3ACPX7300    | VBN3ACPXA400        | VBN3ACPXA300    | VBN3ACPX8400        | VBN3ACPX8300    | VBN3ACPX9400        | VBN3ACPX9300    |
|                             |                                     | 1     | VBN3AEPX7400        | VBN3AEPX7300    | VBN3AEPXA400        | VBN3AEPXA300    | VBN3AEPX8400        | VBN3AEPX8300    | VBN3AEPX9400        | VBN3AEPX9300    |
|                             |                                     | 2.4   | VBN3AFPX7400        | VBN3AFPX7300    | VBN3AFPXA400        | VBN3AFPXA300    | VBN3AFPX8400        | VBN3AFPX8300    | VBN3AFPX9400        | VBN3AFPX9300    |
|                             |                                     | 4.3   | VBN3AHPX7400        | VBN3AHPX7300    | VBN3AHPXA400        | VBN3AHPXA300    | VBN3AHPX8400        | VBN3AHPX8300    | VBN3AHPX9400        | VBN3AHPX9300    |
|                             |                                     | 8*    | VBN3AJPX7400        | VBN3AJPX7300    | VBN3AJPXA400        | VBN3AJPXA300    | VBN3AJPX8400        | VBN3AJPX8300    | VBN3AJPX9400        | VBN3AJPX9300    |
| 3/4"                        | 50                                  | 3.8   | VBN3BGPX7400        | VBN3BGPX7300    | VBN3BGPXA400        | VBN3BGPXA300    | VBN3BGPX8400        | VBN3BGPX8300    | VBN3BGPX9400        | VBN3BGPX9300    |
|                             |                                     | 7     | VBN3BJPX7400        | VBN3BJPX7300    | VBN3BJPXA400        | VBN3BJPXA300    | VBN3BJPX8400        | VBN3BJPX8300    | VBN3BJPX9400        | VBN3BJPX9300    |
|                             |                                     | 11*   | VBN3BKPX7400        | VBN3BKPX7300    | VBN3BKPXA400        | VBN3BKPXA300    | VBN3BKPX8400        | VBN3BKPX8300    | VBN3BKPX9400        | VBN3BKPX9300    |
| 1"                          | 50                                  | 8.6   | VBN3CJPX7400        | VBN3CJPX7300    | VBN3CJPXA400        | VBN3CJPXA300    | VBN3CJPX8400        | VBN3CJPX8300    | VBN3CJPX9400        | VBN3CJPX9300    |
|                             |                                     | 14.9  | VBN3CKPX7400        | VBN3CKPX7300    | VBN3CKPXA400        | VBN3CKPXA300    | VBN3CKPX8400        | VBN3CKPX8300    | VBN3CKPX9400        | VBN3CKPX9300    |
|                             |                                     | 22*   | VBN3CLPX7400        | VBN3CLPX7300    | VBN3CLPXA400        | VBN3CLPXA300    | VBN3CLPX8400        | VBN3CLPX8300    | VBN3CLPX9400        | VBN3CLPX9300    |
|                             |                                     | 31*   | VBN3CMPX7400        | VBN3CMPX7300    | VBN3CMPXA400        | VBN3CMPXA300    | VBN3CMPX8400        | VBN3CMPX8300    | VBN3CMPX9400        | VBN3CMPX9300    |
| 1-1/4"                      | 40                                  | 12.7  | VBN3DKPX7400        | VBN3DKPX7300    | VBN3DKPXA400        | VBN3DKPXA300    | VBN3DKPX8400        | VBN3DKPX8300    | VBN3DKPX9400        | VBN3DKPX9300    |
|                             |                                     | 19.4* | VBN3DLPX7400        | VBN3DLPX7300    | VBN3DLPXA400        | VBN3DLPXA300    | VBN3DLPX8400        | VBN3DLPX8300    | VBN3DLPX9400        | VBN3DLPX9300    |
|                             |                                     | 27    | VBN3DMPX7400        | VBN3DMPX7300    | VBN3DMPXA400        | VBN3DMPXA300    | VBN3DMPX8400        | VBN3DMPX8300    | VBN3DMPX9400        | VBN3DMPX9300    |
|                             |                                     | 34*   | VBN3DNPX7400        | VBN3DNPX7300    | VBN3DNPXA400        | VBN3DNPXA300    | VBN3DNPX8400        | VBN3DNPX8300    | VBN3DNPX9400        | VBN3DNPX9300    |
| 1-1/2"                      | 40                                  | 24    | VBN3ELPX7400        | VBN3ELPX7300    | VBN3ELPXA400        | VBN3ELPXA300    | VBN3ELPX8400        | VBN3ELPX8300    | VBN3ELPX9400        | VBN3ELPX9300    |
|                             |                                     | 32*   | VBN3EMPX7400        | VBN3EMPX7300    | VBN3EMPXA400        | VBN3EMPXA300    | VBN3EMPX8400        | VBN3EMPX8300    | VBN3EMPX9400        | VBN3EMPX9300    |
|                             |                                     | 61*   | VBN3EPPX7400        | VBN3EPPX7300    | VBN3EPPXA400        | VBN3EPPXA300    | VBN3EPPX8400        | VBN3EPPX8300    | VBN3EPPX9400        | VBN3EPPX9300    |
| 2"                          | 40                                  | 38    | VBN3FNPX7400        | VBN3FNPX7300    | VBN3FNPA400         | VBN3FNPA300     | VBN3FNPX8400        | VBN3FNPX8300    | VBN3FNPX9400        | VBN3FNPX9300    |
|                             |                                     | 57*   | VBN3FPPX7400        | VBN3FPPX7300    | VBN3FPPXA400        | VBN3FPPXA300    | VBN3FPPX8400        | VBN3FPPX8300    | VBN3FPPX9400        | VBN3FPPX9300    |
|                             |                                     | 83    | VBN3FRPX7400        | VBN3FRPX7300    | VBN3FRPXA400        | VBN3FRPXA300    | VBN3FRPX8400        | VBN3FRPX8300    | VBN3FRPX9400        | VBN3FRPX9300    |
|                             |                                     | 109*  | VBN3FTPX7400        | VBN3FTPX7300    | VBN3FTPXA400        | VBN3FTPXA300    | VBN3FTPX8400        | VBN3FTPX8300    | VBN3FTPX9400        | VBN3FTPX9300    |
| 2-1/2"                      | 40                                  | 74    | VBN3GRPX7400        | VBN3GRPX7300    | VBN3GRPXA400        | VBN3GRPXA300    | VBN3GRPX8400        | VBN3GRPX8300    | VBN3GRPX9400        | VBN3GRPX9300    |
|                             |                                     | 100*  | VBN3GSPX7400        | VBN3GSPX7300    | VBN3GSPXA400        | VBN3GSPXA300    | VBN3GSPX8400        | VBN3GSPX8300    | VBN3GSPX9400        | VBN3GSPX9300    |

\* Full port ball. No flow characterizing insert.

3-Way

VALVES

# Product Selection - Valves

## 3-Way NPT Control Ball Valves ½"-2½", NEMA 3R

3-Way

| Actuator Features           |                                     |       | Non Fail Safe     |                     |                     |                     | Fail Safe           |                     |                 |                     |
|-----------------------------|-------------------------------------|-------|-------------------|---------------------|---------------------|---------------------|---------------------|---------------------|-----------------|---------------------|
| Actuator O.S. Number        |                                     |       | MN6105A1011       | MN6105A1201         | MN7505A2001         | MN7505A2209         | MS7505A2030         |                     | MS7505A2130     |                     |
| Power Supply                | Voltage                             |       | 24 VAC/DC         | 24 VAC/DC           | 24 VAC/DC           | 24 VAC/DC           | 24 VAC/DC           |                     | 24 VAC/DC       |                     |
|                             | Frequency                           |       | 50 / 60 Hz        | 50 / 60 Hz          | 50 / 60 Hz          | 50 / 60 Hz          | 50 / 60 Hz          |                     | 50 / 60 Hz      |                     |
| Actuator Torque             | Power                               |       | 5 VA              | 5 VA                | 5 VA                | 5 VA                | 6 VA                |                     | 6 VA            |                     |
|                             | (lb.-in.)                           |       | 44                | 44                  | 44                  | 44                  | 44                  |                     | 44              |                     |
| Control                     | (0)2-10 Vdc                         |       |                   |                     | •                   | •                   | •                   |                     | •               |                     |
|                             | 4-20 mA (external 500 Ohm Resistor) |       |                   |                     | •                   | •                   | •                   |                     | •               |                     |
|                             | Floating                            |       | •                 | •                   | •                   | •                   | •                   |                     | •               |                     |
|                             | Two-Position SPDT                   |       | •                 | •                   | •                   | •                   | •                   |                     | •               |                     |
|                             | Two-Position SPST                   |       |                   |                     | •                   | •                   | •                   |                     | •               |                     |
|                             | (degrees)                           |       | 95° ± 3°          | 95° ± 3°            | 95° ± 3°            | 95° ± 3°            | 95° ± 3°            |                     | 95° ± 3°        |                     |
| Timing                      | (drive/spring return, seconds)      |       | 90                | 90                  | 90                  | 90                  | 90 / 25             |                     | 90 / 25         |                     |
| Aux Switch                  | 2 x SPDT Add-on                     |       | 0                 | 2                   | 0                   | 2                   | 0                   |                     | 1               |                     |
| Feedback                    | 2-10 Vdc Built In                   |       |                   |                     | •                   | •                   | •                   |                     | •               |                     |
| Fail Safe Action            |                                     |       | Stay in Place     | Stay in Place       | Stay in Place       | Stay in Place       | B-AB Open (FSB)     | A-AB Open (FSA)     | B-AB Open (FSB) | A-AB Open (FSA)     |
| Normal Position (no signal) |                                     |       | Stay in Place     | Stay in Place       | A-AB Open           | A-AB Open           | B-AB Open           | A-AB Open           | B-AB Open       | A-AB Open           |
| Valve Features              |                                     |       | Trim              | Nickel-Plated Brass | Nickel-Plated Brass | Nickel-Plated Brass | Nickel-Plated Brass | Nickel-Plated Brass |                 | Nickel-Plated Brass |
| Valve Size (inches)         | Close-off Pressure (psid)           | Cv    | Short Order Codes |                     |                     |                     |                     |                     |                 |                     |
| 1/2"                        | 50                                  | 0.33  | VBN3ABPX4002      | VBN3ABPXC002        | VBN3ABPX5002        | VBN3ABPXD002        | VBN3ABPX6402        | VBN3ABPX6302        | VBN3ABPXB402    | VBN3ABPXB302        |
|                             |                                     | 0.59  | VBN3ACPX4002      | VBN3ACPXC002        | VBN3ACPX5002        | VBN3ACPXD002        | VBN3ACPX6402        | VBN3ACPX6302        | VBN3ACPXB402    | VBN3ACPXB302        |
|                             |                                     | 1     | VBN3AEPX4002      | VBN3AEPXC002        | VBN3AEPX5002        | VBN3AEPXD002        | VBN3AEPX6402        | VBN3AEPX6302        | VBN3AEPXB402    | VBN3AEPXB302        |
|                             |                                     | 2.4   | VBN3AFPX4002      | VBN3AFPXC002        | VBN3AFPX5002        | VBN3AFPXD002        | VBN3AFPX6402        | VBN3AFPX6302        | VBN3AFPXB402    | VBN3AFPXB302        |
|                             |                                     | 4.3   | VBN3AHPX4002      | VBN3AHPXC002        | VBN3AHPX5002        | VBN3AHPXD002        | VBN3AHPX6402        | VBN3AHPX6302        | VBN3AHPXB402    | VBN3AHPXB302        |
| 3/4"                        | 50                                  | 8*    | VBN3AJPX4002      | VBN3AJPXC002        | VBN3AJPX5002        | VBN3AJPXD002        | VBN3AJPX6402        | VBN3AJPX6302        | VBN3AJPXB402    | VBN3AJPXB302        |
|                             |                                     | 3.8   | VBN3BGPX4002      | VBN3BGPXC002        | VBN3BGPX5002        | VBN3BGPXD002        | VBN3BGPX6402        | VBN3BGPX6302        | VBN3BGPXB402    | VBN3BGPXB302        |
|                             |                                     | 7     | VBN3BJPX4002      | VBN3BJPXC002        | VBN3BJPX5002        | VBN3BJPXD002        | VBN3BJPX6402        | VBN3BJPX6302        | VBN3BJPXB402    | VBN3BJPXB302        |
| 1"                          | 50                                  | 11*   | VBN3BKPX4002      | VBN3BKPC002         | VBN3BKPX5002        | VBN3BKPXD002        | VBN3BKPX6402        | VBN3BKPX6302        | VBN3BKPXB402    | VBN3BKPXB302        |
|                             |                                     | 8.6   | VBN3CJPX4002      | VBN3CJPXC002        | VBN3CJPX5002        | VBN3CJPXD002        | VBN3CJPX6402        | VBN3CJPX6302        | VBN3CJPXB402    | VBN3CJPXB302        |
|                             |                                     | 14.9  | VBN3CKPX4002      | VBN3CKPXC002        | VBN3CKPX5002        | VBN3CKPXD002        | VBN3CKPX6402        | VBN3CKPX6302        | VBN3CKPXB402    | VBN3CKPXB302        |
|                             |                                     | 22*   | VBN3CLPX4002      | VBN3CLPXC002        | VBN3CLPX5002        | VBN3CLPXD002        | VBN3CLPX6402        | VBN3CLPX6302        | VBN3CLPXB402    | VBN3CLPXB302        |
| 1-1/4"                      | 40                                  | 31*   | VBN3CMPX4002      | VBN3CMPXC002        | VBN3CMPX5002        | VBN3CMPXD002        | VBN3CMPX6402        | VBN3CMPX6302        | VBN3CMPXB402    | VBN3CMPXB302        |
|                             |                                     | 12.7  | VBN3DKPX4002      | VBN3DKPXC002        | VBN3DKPX5002        | VBN3DKPXD002        | VBN3DKPX6402        | VBN3DKPX6302        | VBN3DKPXB402    | VBN3DKPXB302        |
|                             |                                     | 19.4* | VBN3DLPX4002      | VBN3DLPXC002        | VBN3DLPX5002        | VBN3DLPXD002        | VBN3DLPX6402        | VBN3DLPX6302        | VBN3DLPXB402    | VBN3DLPXB302        |
|                             |                                     | 27    | VBN3DMPX4002      | VBN3DMPXC002        | VBN3DMPX5002        | VBN3DMPXD002        | VBN3DMPX6402        | VBN3DMPX6302        | VBN3DMPXB402    | VBN3DMPXB302        |
| 1-1/2"                      | 40                                  | 34*   | VBN3DNPX4002      | VBN3DNPXC002        | VBN3DNPX5002        | VBN3DNPXD002        | VBN3DNPX6402        | VBN3DNPX6302        | VBN3DNPXB402    | VBN3DNPXB302        |
|                             |                                     | 24    | VBN3ELPX4002      | VBN3ELPXC002        | VBN3ELPX5002        | VBN3ELPXD002        | VBN3ELPX6402        | VBN3ELPX6302        | VBN3ELPXB402    | VBN3ELPXB302        |
|                             |                                     | 32*   | VBN3EMPX4002      | VBN3EMPXC002        | VBN3EMPX5002        | VBN3EMPXD002        | VBN3EMPX6402        | VBN3EMPX6302        | VBN3EMPXB402    | VBN3EMPXB302        |
| 2"                          | 40                                  | 61*   | VBN3EPPX4002      | VBN3EPPXC002        | VBN3EPPX5002        | VBN3EPPXD002        | VBN3EPPX6402        | VBN3EPPX6302        | VBN3EPPXB402    | VBN3EPPXB302        |
|                             |                                     | 38    | VBN3FNPX4002      | VBN3FNPC002         | VBN3FNPX5002        | VBN3FNPD002         | VBN3FNPX6402        | VBN3FNPX6302        | VBN3FNPXB402    | VBN3FNPXB302        |
|                             |                                     | 57*   | VBN3FPPX4002      | VBN3FPPXC002        | VBN3FPPX5002        | VBN3FPPXD002        | VBN3FPPX6402        | VBN3FPPX6302        | VBN3FPPXB402    | VBN3FPPXB302        |
|                             |                                     | 83    | VBN3FRPX4002      | VBN3FRPXC002        | VBN3FRPX5002        | VBN3FRPD002         | VBN3FRPX6402        | VBN3FRPX6302        | VBN3FRPXB402    | VBN3FRPXB302        |
| 2-1/2"                      | 40                                  | 109*  | VBN3FTPX4002      | VBN3FTPC002         | VBN3FTPX5002        | VBN3FTPD002         | VBN3FTPX6402        | VBN3FTPX6302        | VBN3FTPXB402    | VBN3FTPXB302        |
|                             |                                     | 74    | VBN3GRPX4002      | VBN3GRPXC002        | VBN3GRPX5002        | VBN3GRPD002         | VBN3GRPX6402        | VBN3GRPX6302        | VBN3GRPXB402    | VBN3GRPXB302        |
|                             |                                     | 100*  | VBN3GSPX4002      | VBN3GSPXC002        | VBN3GSPX5002        | VBN3GSPXD002        | VBN3GSPX6402        | VBN3GSPX6302        | VBN3GSPXB402    | VBN3GSPXB302        |

\* Full port ball. No flow characterizing insert.

## Product Selection - Valves

## 3-Way NPT Control Ball Valves ½"-2½", NEMA 3R

| Actuator Features                     |                           |       | Fail Safe           |                 |                     |                 |                     |                 |                     |                 |
|---------------------------------------|---------------------------|-------|---------------------|-----------------|---------------------|-----------------|---------------------|-----------------|---------------------|-----------------|
| Actuator O.S. Number                  |                           |       | MS8105A1030         |                 | MS8105A1130         |                 | MS4105A1030         |                 | MS4105A1130         |                 |
| Power Supply                          | Voltage                   |       | 24 VAC/DC           |                 | 24 VAC/DC           |                 | 100-250 VAC         |                 | 100-250 VAC         |                 |
|                                       | Frequency                 |       | 50 / 60 Hz          |                 | 50 / 60 Hz          |                 | 50 / 60 Hz          |                 | 50 / 60 Hz          |                 |
|                                       | Power                     |       | 6 VA                |                 | 6 VA                |                 | 6 VA                |                 | 6 VA                |                 |
| Actuator Torque (lb.-in.)             |                           |       | 44                  |                 | 44                  |                 | 44                  |                 | 44                  |                 |
| Control (0)2-10 Vdc                   |                           |       |                     |                 |                     |                 |                     |                 |                     |                 |
| 4-20 mA (external 500 Ohm Resistor)   |                           |       |                     |                 |                     |                 |                     |                 |                     |                 |
| Floating                              |                           |       |                     |                 |                     |                 |                     |                 |                     |                 |
| Two-Position SPDT                     |                           |       |                     |                 |                     |                 |                     |                 |                     |                 |
| Two-Position SPST                     |                           |       | ●                   |                 | ●                   |                 | ●                   |                 | ●                   |                 |
| Actuator Stroke (degrees)             |                           |       | 95° ± 3°            |                 | 95° ± 3°            |                 | 95° ± 3°            |                 | 95° ± 3°            |                 |
| Timing (drive/spring return, seconds) |                           |       | 45 / 25             |                 | 45 / 25             |                 | 45 / 25             |                 | 45 / 25             |                 |
| Aux Switch 2 x SPDT Add-on            |                           |       | 0                   |                 | 1                   |                 | 0                   |                 | 1                   |                 |
| Feedback 2-10 Vdc Built In            |                           |       |                     |                 |                     |                 |                     |                 |                     |                 |
| Fail Safe Action                      |                           |       | B-AB Open (FSB)     | A-AB Open (FSA) | B-AB Open (FSB)     | A-AB Open (FSA) | B-AB Open (FSB)     | A-AB Open (FSA) | B-AB Open (FSB)     | A-AB Open (FSA) |
| Normal Position (no signal)           |                           |       | B-AB Open           | A-AB Open       | B-AB Open           | A-AB Open       | B-AB Open           | A-AB Open       | B-AB Open           | A-AB Open       |
| Valve Features                        |                           | Trim  | Nickel-Plated Brass |                 | Nickel-Plated Brass |                 | Nickel-Plated Brass |                 | Nickel-Plated Brass |                 |
| Valve Size (inches)                   | Close-off Pressure (psid) | Cv    | Short Order Codes   |                 |                     |                 |                     |                 |                     |                 |
| 1/2"                                  | 50                        | 0.33  | VBN3ABPX7402        | VBN3ABPX7302    | VBN3ABPXA402        | VBN3ABPXA302    | VBN3ABPX8402        | VBN3ABPX8302    | VBN3ABPX9402        | VBN3ABPX9302    |
|                                       |                           | 0.59  | VBN3ACPX7402        | VBN3ACPX7302    | VBN3ACPXA402        | VBN3ACPXA302    | VBN3ACPX8402        | VBN3ACPX8302    | VBN3ACPX9402        | VBN3ACPX9302    |
|                                       |                           | 1     | VBN3AEPX7402        | VBN3AEPX7302    | VBN3AEPXA402        | VBN3AEPXA302    | VBN3AEPX8402        | VBN3AEPX8302    | VBN3AEPX9402        | VBN3AEPX9302    |
|                                       |                           | 2.4   | VBN3AFPX7402        | VBN3AFPX7302    | VBN3AFPXA402        | VBN3AFPXA302    | VBN3AFPX8402        | VBN3AFPX8302    | VBN3AFPX9402        | VBN3AFPX9302    |
|                                       |                           | 4.3   | VBN3AHPX7402        | VBN3AHPX7302    | VBN3AHPXA402        | VBN3AHPXA302    | VBN3AHPX8402        | VBN3AHPX8302    | VBN3AHPX9402        | VBN3AHPX9302    |
|                                       |                           | 8*    | VBN3AJPX7402        | VBN3AJPX7302    | VBN3AJPXA402        | VBN3AJPXA302    | VBN3AJPX8402        | VBN3AJPX8302    | VBN3AJPX9402        | VBN3AJPX9302    |
| 3/4"                                  | 50                        | 3.8   | VBN3BGPX7402        | VBN3BGPX7302    | VBN3BGPXA402        | VBN3BGPXA302    | VBN3BGPX8402        | VBN3BGPX8302    | VBN3BGPX9402        | VBN3BGPX9302    |
|                                       |                           | 7     | VBN3BJPX7402        | VBN3BJPX7302    | VBN3BJPXA402        | VBN3BJPXA302    | VBN3BJPX8402        | VBN3BJPX8302    | VBN3BJPX9402        | VBN3BJPX9302    |
|                                       |                           | 11*   | VBN3BKPX7402        | VBN3BKPX7302    | VBN3BKPXA402        | VBN3BKPXA302    | VBN3BKPX8402        | VBN3BKPX8302    | VBN3BKPX9402        | VBN3BKPX9302    |
| 1"                                    | 50                        | 8.6   | VBN3CJPX7402        | VBN3CJPX7302    | VBN3CJPXA402        | VBN3CJPXA302    | VBN3CJPX8402        | VBN3CJPX8302    | VBN3CJPX9402        | VBN3CJPX9302    |
|                                       |                           | 14.9  | VBN3CKPX7402        | VBN3CKPX7302    | VBN3CKPXA402        | VBN3CKPXA302    | VBN3CKPX8402        | VBN3CKPX8302    | VBN3CKPX9402        | VBN3CKPX9302    |
|                                       |                           | 22*   | VBN3CLPX7402        | VBN3CLPX7302    | VBN3CLPXA402        | VBN3CLPXA302    | VBN3CLPX8402        | VBN3CLPX8302    | VBN3CLPX9402        | VBN3CLPX9302    |
|                                       |                           | 31*   | VBN3CMPX7402        | VBN3CMPX7302    | VBN3CMPXA402        | VBN3CMPXA302    | VBN3CMPX8402        | VBN3CMPX8302    | VBN3CMPX9402        | VBN3CMPX9302    |
| 1-1/4"                                | 40                        | 12.7  | VBN3DKPX7402        | VBN3DKPX7302    | VBN3DKPXA402        | VBN3DKPXA302    | VBN3DKPX8402        | VBN3DKPX8302    | VBN3DKPX9402        | VBN3DKPX9302    |
|                                       |                           | 19.4* | VBN3DLPX7402        | VBN3DLPX7302    | VBN3DLPXA402        | VBN3DLPXA302    | VBN3DLPX8402        | VBN3DLPX8302    | VBN3DLPX9402        | VBN3DLPX9302    |
|                                       |                           | 27    | VBN3DMPX7402        | VBN3DMPX7302    | VBN3DMPXA402        | VBN3DMPXA302    | VBN3DMPX8402        | VBN3DMPX8302    | VBN3DMPX9402        | VBN3DMPX9302    |
|                                       |                           | 34*   | VBN3DNPX7402        | VBN3DNPX7302    | VBN3DNPXA402        | VBN3DNPXA302    | VBN3DNPX8402        | VBN3DNPX8302    | VBN3DNPX9402        | VBN3DNPX9302    |
| 1-1/2"                                | 40                        | 24    | VBN3ELPX7402        | VBN3ELPX7302    | VBN3ELPXA402        | VBN3ELPXA302    | VBN3ELPX8402        | VBN3ELPX8302    | VBN3ELPX9402        | VBN3ELPX9302    |
|                                       |                           | 32*   | VBN3EMPX7402        | VBN3EMPX7302    | VBN3EMPXA402        | VBN3EMPXA302    | VBN3EMPX8402        | VBN3EMPX8302    | VBN3EMPX9402        | VBN3EMPX9302    |
|                                       |                           | 61*   | VBN3EPPX7402        | VBN3EPPX7302    | VBN3EPPXA402        | VBN3EPPXA302    | VBN3EPPX8402        | VBN3EPPX8302    | VBN3EPPX9402        | VBN3EPPX9302    |
| 2"                                    | 40                        | 38    | VBN3FNPX7402        | VBN3FNPX7302    | VBN3FNPPXA402       | VBN3FNPPXA302   | VBN3FNPX8402        | VBN3FNPX8302    | VBN3FNPX9402        | VBN3FNPX9302    |
|                                       |                           | 57*   | VBN3FPPX7402        | VBN3FPPX7302    | VBN3FPPXA402        | VBN3FPPXA302    | VBN3FPPX8402        | VBN3FPPX8302    | VBN3FPPX9402        | VBN3FPPX9302    |
|                                       |                           | 83    | VBN3FRPX7402        | VBN3FRPX7302    | VBN3FRPXA402        | VBN3FRPXA302    | VBN3FRPX8402        | VBN3FRPX8302    | VBN3FRPX9402        | VBN3FRPX9302    |
|                                       |                           | 109*  | VBN3FTPX7402        | VBN3FTPX7302    | VBN3FTPXA402        | VBN3FTPXA302    | VBN3FTPX8402        | VBN3FTPX8302    | VBN3FTPX9402        | VBN3FTPX9302    |
| 2-1/2"                                | 40                        | 74    | VBN3GRPX7402        | VBN3GRPX7302    | VBN3GRPXA402        | VBN3GRPXA302    | VBN3GRPX8402        | VBN3GRPX8302    | VBN3GRPX9402        | VBN3GRPX9302    |
|                                       |                           | 100*  | VBN3GSPX7402        | VBN3GSPX7302    | VBN3GSPXA402        | VBN3GSPXA302    | VBN3GSPX8402        | VBN3GSPX8302    | VBN3GSPX9402        | VBN3GSPX9302    |

\* Full port ball. No flow characterizing insert.

# Product Selection - Valves

## 2-Way Flanged Control Ball Valves 4"-6", NEMA 2+3R

### Common Features

- Maximum static pressure 240 psi (-22°F to 250°F)
- Spring return actuators field-configurable for A-port normally open or normally closed fail safe
- Use globe valves for steam ratings
- Medium: Water/glycol solutions up to 50%, closed loop HVAC systems only, not for use with steam
- ANSI class 125 flanged connections
- ANSI class IV leakage (0.01% of Cv)
- Valve ball and stem 316 stainless steel
- Equal percentage flow (laser-milled stainless steel ball)
- Cast iron body construction -- not for use with open systems such as cooling towers

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2-Way

| Actuator Features    |                                                  | Non Fail Safe             |                           | Fail Safe                 |                           | Valve Only                                                                          |
|----------------------|--------------------------------------------------|---------------------------|---------------------------|---------------------------|---------------------------|-------------------------------------------------------------------------------------|
| Actuator O.S. Number |                                                  | MN6110A1003<br>4 to 5 in. | MN7510A2001<br>4 to 5 in. | MS8110A1008<br>4 to 5 in. | MS7510A2008<br>4 to 5 in. | N/A                                                                                 |
|                      |                                                  | MN6134A1003<br>6 in.      | MN7234A2008<br>6 in.      | MS8120A1007<br>6 in.      | MS7520A2007<br>6 in.      |                                                                                     |
| Power Supply         | Voltage                                          | 24 Vac                    | 24 Vac                    | 24 Vac                    | 24 Vac                    |  |
|                      | Frequency                                        | 50 / 60 Hz                | 50 / 60 Hz                | 50 / 60 Hz                | 50 / 60 Hz                |                                                                                     |
|                      | Power                                            | 5 / 9 VA                  | 5 / 9 VA                  | 30 / 40 VA                | 14 / 16 VA                |                                                                                     |
|                      | Actuator Torque (lb.-in.)                        | 88/300                    | 88/300                    | 88/175                    | 88/175                    |                                                                                     |
|                      | Control (0)2-10 Vdc                              |                           | •                         |                           | •                         |                                                                                     |
|                      | 4-20 mA (external 500 Ohm Resistor)              |                           | •                         |                           | •                         |                                                                                     |
|                      | Floating                                         | •                         | •**                       |                           | •                         |                                                                                     |
|                      | Two-Position SPDT                                | •                         | •**                       |                           | •                         |                                                                                     |
|                      | Two-Position SPST                                | •                         | •**                       | •                         | •                         |                                                                                     |
|                      | Fail Safe Action (field configurable)            | Stay in Place             | Stay in Place             | Closed                    | Closed                    |                                                                                     |
|                      | Normal Position (no signal) (field configurable) | Stay in Place             | Closed                    | Closed                    | Closed                    |                                                                                     |
|                      | Actuator Stroke (degrees)                        | 95°                       | 95°                       | 95°                       | 95°                       |                                                                                     |
|                      | Timing (drive/spring return, seconds)            | 95                        | 95                        | 45/20                     | 90/20                     |                                                                                     |
|                      | Aux Switch 2 x SPDT Add-on                       | SW2-US                    | SW2-US                    | SW2-US                    | SW2-US                    |                                                                                     |
|                      | Feedback 2-10 Vdc Built In                       |                           | •                         |                           | •                         |                                                                                     |
| Valve Features       |                                                  | Trim                      | Stainless Steel           | Stainless Steel           | Stainless Steel           | Stainless Steel                                                                     |

| Valve Size<br>(Inches) | Close-off Pressure<br>(psid) | Cv  | Valve O.S. Number |            |            |             |            |
|------------------------|------------------------------|-----|-------------------|------------|------------|-------------|------------|
|                        |                              |     | NEMA 2 Actuator   |            |            |             |            |
| 4"                     | 70                           | 91  | VBF2JS1S0A        | VBF2JS1S0B | VBF2JS1S0C | VBF2JS1S0D  | VBF2JS1S0X |
|                        |                              | 118 | VBF2JT1S0A        | VBF2JT1S0B | VBF2JT1S0C | VBF2JT1S0D  | VBF2JT1S0X |
|                        |                              | 152 | VBF2JU1S0A        | VBF2JU1S0B | VBF2JU1S0C | VBF2JU1S0D  | VBF2JU1S0X |
|                        |                              | 197 | VBF2J11S0A        | VBF2J11S0B | VBF2J11S0C | VBF2J11S0D  | VBF2J11S0X |
|                        |                              | 254 | VBF2J21S0A        | VBF2J21S0B | VBF2J21S0C | VBF2J21S0D  | VBF2J21S0X |
| 5"                     | 70                           | 144 | VBF2KU1S0A        | VBF2KU1S0B | VBF2KU1S0C | VBF2KU1S0D  | VBF2KU1S0X |
|                        |                              | 185 | VBF2K11S0A        | VBF2K11S0B | VBF2K11S0C | VBF2K11S0D  | VBF2K11S0X |
|                        |                              | 240 | VBF2K21S0A        | VBF2K21S0B | VBF2K21S0C | VBF2K21S0D  | VBF2K21S0X |
|                        |                              | 309 | VBF2K31S0A        | VBF2K31S0B | VBF2K31S0C | VBF2K31S0D  | VBF2K31S0X |
|                        |                              | 400 | VBF2K41S0A        | VBF2K41S0B | VBF2K41S0C | —           | VBF2K41S0X |
| 6"                     | 70                           | 208 | VBF2L11S0A        | VBF2L11S0B | VBF2L11S0C | VBF2L11S0D* | VBF2L11S0X |
|                        |                              | 268 | VBF2L21S0A        | VBF2L21S0B | VBF2L21S0C | VBF2L21S0D* | VBF2L21S0X |
|                        |                              | 346 | VBF2L41S0A        | VBF2L41S0B | VBF2L41S0C | —           | VBF2L41S0X |
|                        |                              | 441 | VBF2L51S0A        | VBF2L51S0B | VBF2L51S0C | —           | VBF2L51S0X |
|                        |                              | 577 | VBF2L61S0A        | VBF2L61S0B | VBF2L61S0C | —           | VBF2L61S0X |
|                        |                              | 650 | VBF2L71S0A        | VBF2L71S0B | VBF2L71S0C | —           | VBF2L71S0X |
|                        |                              |     | NEMA 3R Actuator  |            |            |             |            |
| 4"                     | 70                           | 91  | VBF2JS1SRA        | VBF2JS1SRB | VBF2JS1SRC | VBF2JS1SRD  | —          |
|                        |                              | 118 | VBF2JT1SRA        | VBF2JT1SRB | VBF2JT1SRC | VBF2JT1SRD  | —          |
|                        |                              | 152 | VBF2JU1SRA        | VBF2JU1SRB | VBF2JU1SRC | VBF2JU1SRD  | —          |
|                        |                              | 197 | VBF2J11SRA        | VBF2J11SRB | VBF2J11SRC | VBF2J11SRD  | —          |
|                        |                              | 254 | VBF2J21SRA        | VBF2J21SRB | VBF2J21SRC | VBF2J21SRD  | —          |
| 5"                     | 70                           | 144 | VBF2KU1SRA        | VBF2KU1SRB | VBF2KU1SRC | VBF2KU1SRD  | —          |
|                        |                              | 185 | VBF2K11SRA        | VBF2K11SRB | VBF2K11SRC | VBF2K11SRD  | —          |
|                        |                              | 240 | VBF2K21SRA        | VBF2K21SRB | VBF2K21SRC | VBF2K21SRD  | —          |
|                        |                              | 309 | VBF2K31SRA        | VBF2K31SRB | VBF2K31SRC | VBF2K31SRD  | —          |
|                        |                              | 400 | VBF2K41SRA        | VBF2K41SRB | VBF2K41SRC | —           | —          |
| 6"                     | 70                           | 208 | VBF2L11SRA        | VBF2L11SRB | VBF2L11SRC | VBF2L11SRD* | —          |
|                        |                              | 268 | VBF2L21SRA        | VBF2L21SRB | VBF2L21SRC | VBF2L21SRD* | —          |
|                        |                              | 346 | VBF2L41SRA        | VBF2L41SRB | VBF2L41SRC | —           | —          |
|                        |                              | 441 | VBF2L51SRA        | VBF2L51SRB | VBF2L51SRC | —           | —          |
|                        |                              | 577 | VBF2L61SRA        | VBF2L61SRB | VBF2L61SRC | —           | —          |
|                        |                              | 650 | VBF2L71SRA        | VBF2L71SRB | VBF2L71SRC | —           | —          |

\* Maximum flow 700 gpm  
\*\*4 and 5 inch valves only.

## 3-Way Flanged Control Ball Valves 4"-6", NEMA 2+3R

### Common Features

- Spring return actuators field-configurable for A-port normally open or normally closed fail safe
- Globe valve A-B-AB flow pattern (side B port)
- Valve ball and stem 316 stainless steel
- Three-way: A-AB equal percentage, B-AB linear (80% of Cv on B-port) (laser-milled ball)
- Mixing or Diverting control and ANSI Class IV leakage specification (.01% of CV) for all sizes except as noted below.
- VBF3 4 inch with 327 CV, 5 inch with 400 CV, and 6 inch with 650 CV.
  - Mixing control only.
  - Class IV (.01% of CV) leakage A to AB.
  - Class III (.1% of CV) leakage B to AB.
- Cast iron body construction -- not for use with open systems such as cooling towers

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3-Way

| Actuator Features           |                                     |                 | Non Fail Safe             |                           | Fail Safe                 |                           | Valve Only |
|-----------------------------|-------------------------------------|-----------------|---------------------------|---------------------------|---------------------------|---------------------------|------------|
| Actuator O.S. Number        |                                     |                 | MN6110A1003<br>4 to 5 in. | MN7510A2001<br>4 to 5 in. | MS8110A1008<br>4 to 5 in. | MS7510A2008<br>4 to 5 in. | N/A        |
|                             |                                     |                 | MN6134A1003<br>6 in.      | MN7234A2008<br>6 in.      | MS8120A1007<br>6 in.      | MS7520A2007<br>6 in.      |            |
| Power Supply                | Voltage                             | 24 Vac          | 24 Vac                    | 24 Vac                    | 24 Vac                    |                           |            |
|                             | Frequency                           | 50 / 60 Hz      | 50 / 60 Hz                | 50 / 60 Hz                | 50 / 60 Hz                |                           |            |
|                             | Power                               | 5 / 9 VA        | 5 / 9 VA                  | 30 / 40 VA                | 14 / 16 VA                |                           |            |
| Actuator Torque             | (lb.-in.)                           | 88/300          | 88/300                    | 88/175                    | 88/175                    |                           |            |
| Control                     | (0)2-10 Vdc                         |                 | •                         |                           | •                         |                           |            |
|                             | 4-20 mA (external 500 Ohm Resistor) |                 | •                         |                           | •                         |                           |            |
|                             | Floating                            | •               | •**                       |                           | •                         |                           |            |
|                             | Two-Position SPDT                   | •               | •**                       |                           | •                         |                           |            |
|                             | Two-Position SPST                   | •               | •**                       | •                         | •                         |                           |            |
| Fail Safe Action            | (field configurable)                | Stay in Place   | Stay in Place             | A-AB Closed               | A-AB Closed               |                           |            |
| Normal Position (no signal) | (field configurable)                | Stay in Place   | A-AB Closed               | A-AB Closed               | A-AB Closed               |                           |            |
| Actuator Stroke             | (degrees)                           | 95°             | 95°                       | 95°                       | 95°                       |                           |            |
| Timing                      | (drive/spring return, seconds)      | 95              | 95                        | 45/20                     | 90/20                     |                           |            |
| Aux Switch                  | 2 x SPDT Add-on                     | SW2-US          | SW2-US                    | SW2-US                    | SW2-US                    |                           |            |
| Feedback                    | 2-10 Vdc Built In                   |                 | •                         |                           | •                         |                           |            |
| Valve Features              | Trim                                | Stainless Steel | Stainless Steel           | Stainless Steel           | Stainless Steel           |                           |            |



| Valve Size (inches) | Close-off Pressure (psid) | Cv  | Valve O.S. Number |            |            |             |            |
|---------------------|---------------------------|-----|-------------------|------------|------------|-------------|------------|
|                     |                           |     | NEMA 2 Actuator   |            |            |             |            |
| 4"                  | 70                        | 91  | VBF3JS1S0A        | VBF3JS1S0B | VBF3JS1S0C | VBF3JS1S0D  | VBF3JS1S0X |
|                     |                           | 118 | VBF3JT1S0A        | VBF3JT1S0B | VBF3JT1S0C | VBF3JT1S0D  | VBF3JT1S0X |
|                     |                           | 152 | VBF3JU1S0A        | VBF3JU1S0B | VBF3JU1S0C | VBF3JU1S0D  | VBF3JU1S0X |
|                     |                           | 197 | VBF3J11S0A        | VBF3J11S0B | VBF3J11S0C | VBF3J11S0D  | VBF3J11S0X |
|                     |                           | 254 | VBF3J21S0A        | VBF3J21S0B | VBF3J21S0C | VBF3J21S0D  | VBF3J21S0X |
|                     |                           | 327 | VBF3J31S0A        | VBF3J31S0B | VBF3J31S0C | VBF3J31S0D  | VBF3J31S0X |
| 5"                  | 70                        | 144 | VBF3KU1S0A        | VBF3KU1S0B | VBF3KU1S0C | VBF3KU1S0D  | VBF3KU1S0X |
|                     |                           | 185 | VBF3K11S0A        | VBF3K11S0B | VBF3K11S0C | VBF3K11S0D  | VBF3K11S0X |
|                     |                           | 240 | VBF3K21S0A        | VBF3K21S0B | VBF3K21S0C | VBF3K21S0D  | VBF3K21S0X |
|                     |                           | 309 | VBF3K31S0A        | VBF3K31S0B | VBF3K31S0C | VBF3K31S0D  | VBF3K31S0X |
|                     |                           | 400 | VBF3K41S0A        | VBF3K41S0B | VBF3K41S0C | —           | VBF3K41S0X |
| 6"                  | 70                        | 208 | VBF3L11S0A        | VBF3L11S0B | VBF3L11S0C | VBF3L11S0D* | VBF3L11S0X |
|                     |                           | 268 | VBF3L21S0A        | VBF3L21S0B | VBF3L21S0C | VBF3L21S0D* | VBF3L21S0X |
|                     |                           | 346 | VBF3L41S0A        | VBF3L41S0B | VBF3L41S0C | —           | VBF3L41S0X |
|                     |                           | 441 | VBF3L51S0A        | VBF3L51S0B | VBF3L51S0C | —           | VBF3L51S0X |
|                     |                           | 577 | VBF3L61S0A        | VBF3L61S0B | VBF3L61S0C | —           | VBF3L61S0X |
|                     |                           | 650 | VBF3L71S0A        | VBF3L71S0B | VBF3L71S0C | —           | VBF3L71S0X |
|                     |                           |     | NEMA 3R Actuator  |            |            |             |            |
| 4"                  | 70                        | 91  | VBF3JS1SRA        | VBF3JS1SRB | VBF3JS1SRC | VBF3JS1SRD  | —          |
|                     |                           | 118 | VBF3JT1SRA        | VBF3JT1SRB | VBF3JT1SRC | VBF3JT1SRD  | —          |
|                     |                           | 152 | VBF3JU1SRA        | VBF3JU1SRB | VBF3JU1SRC | VBF3JU1SRD  | —          |
|                     |                           | 197 | VBF3J11SRA        | VBF3J11SRB | VBF3J11SRC | VBF3J11SRD  | —          |
|                     |                           | 254 | VBF3J21SRA        | VBF3J21SRB | VBF3J21SRC | VBF3J21SRD  | —          |
|                     |                           | 327 | VBF3J31SRA        | VBF3J31SRB | VBF3J31SRC | VBF3J31SRD  | —          |
| 5"                  | 70                        | 144 | VBF3KU1SRA        | VBF3KU1SRB | VBF3KU1SRC | VBF3KU1SRD  | —          |
|                     |                           | 185 | VBF3K11SRA        | VBF3K11SRB | VBF3K11SRC | VBF3K11SRD  | —          |
|                     |                           | 240 | VBF3K21SRA        | VBF3K21SRB | VBF3K21SRC | VBF3K21SRD  | —          |
|                     |                           | 309 | VBF3K31SRA        | VBF3K31SRB | VBF3K31SRC | VBF3K31SRD  | —          |
|                     |                           | 400 | VBF3K41SRA        | VBF3K41SRB | VBF3K41SRC | —           | —          |
| 6"                  | 70                        | 208 | VBF3L11SRA        | VBF3L11SRB | VBF3L11SRC | VBF3L11SRD* | —          |
|                     |                           | 268 | VBF3L21SRA        | VBF3L21SRB | VBF3L21SRC | VBF3L21SRD* | —          |
|                     |                           | 346 | VBF3L41SRA        | VBF3L41SRB | VBF3L41SRC | —           | —          |
|                     |                           | 441 | VBF3L51SRA        | VBF3L51SRB | VBF3L51SRC | —           | —          |
|                     |                           | 577 | VBF3L61SRA        | VBF3L61SRB | VBF3L61SRC | —           | —          |
|                     |                           | 650 | VBF3L71SRA        | VBF3L71SRB | VBF3L71SRC | —           | —          |

\* Maximum flow 700 gpm  
\*\*4 and 5 inch valves only.

# Product Selection - Valves

## Flanged Control Ball Valves 2½"- 6"

### Common Features

- For closed loop HVAC systems with up to 50% glycol, not for use with steam
- Sizes from 2-1/2" to 6" with ANSI Class 125 flanged connections
- Flow characteristics
  - Two-way: equal percentage
  - Three-way: A-AB equal percentage, B-AB linear.
- Choice of four actuator mounting positions on the 4", 5" and 6" valve
- Field configurable for normally open or normally closed fail safe position
- Removable manual operating handle to control valve during installation or in event of power failure (2-1/2" and 3" models)
- ANSI Class leakage specifications:
  - 2-way; ANSI Class IV leakage (0.01% of Cv)
  - 3-way; A to AB; ANSI Class IV leakage (0.01% of Cv)
  - 3-way; B to AB; ANSI Class III leakage (0.1% of Cv)
- Wide range of Cv choices from 63 to 360
- Valve ball and stem 316 stainless steel for all valves except 3-way 2-1/2" valve



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| Actuator Features                                |                                     | Non Fail Safe              |                            |                            |                            |                            |                |
|--------------------------------------------------|-------------------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------|
| Actuator O.S. Number                             |                                     | MN7505A2001<br>MN7505A2209 | MN6105A1011<br>MN6105A1201 | MN7510A2001<br>MN7510A2209 | MN6110A1003<br>MN6110A1201 | MN6120A1002<br>MN6120A1200 | MN723A2008     |
| Power Supply                                     | Voltage                             | 24 Vac                     | 24 Vac                     | 24 Vac                     | 24 Vac                     | 24 Vac                     | 24 Vac         |
|                                                  | Frequency                           | 50/60 Hz                   | 50/60 Hz                   | 50/60 Hz                   | 50/60 Hz                   | 50/60 Hz                   | 50/60 Hz       |
| Actuator Torque                                  | Power                               | 5 VA                       | 5 VA                       | 5 VA                       | 5 VA                       | 6 VA                       | 9 VA           |
|                                                  | (lb.-in.)                           | 44                         | 44                         | 88                         | 88                         | 175                        | 300            |
| Control                                          | (0)2-10 Vdc                         | •                          |                            | •                          |                            |                            | •              |
|                                                  | 4-20 mA (external 500 Ohm Resistor) | •                          |                            | •                          |                            |                            | •              |
| Fail Safe Action                                 | Floating                            | •                          | •                          | •                          | •                          | •                          |                |
|                                                  | Two-Position SPDT                   | •                          | •                          | •                          | •                          | •                          |                |
|                                                  | Two-Position SPST                   | •                          | •                          | •                          | •                          | •                          |                |
|                                                  | Stay in place                       |                            |                            |                            |                            |                            |                |
| Normal Position (no signal) (field configurable) |                                     | Open or Closed             | Stay in Place              | Open or Closed             | Stay in Place              | Stay in Place              | Open or Closed |
| Actuator Stroke (degrees)                        |                                     | 95                         | 95                         | 95                         | 95                         | 95                         | 95             |
| Timing (seconds)                                 |                                     | 95                         | 95                         | 95                         | 95                         | 95                         | 95             |
| Aux Switch                                       | SPDT Built In                       | 0 / 2                      | 0 / 2                      | 0 / 2                      | 0 / 2                      | 0 / 2                      |                |
|                                                  | 2 x SPDT Add-On                     |                            |                            |                            |                            | SW2-US                     | SW2-US         |
| Feedback (0)2-10 Vdc Built In                    |                                     | •                          |                            | •                          |                            |                            | •              |

|       | Valve Size (inches) | Cv  | Valve Type        | Max Static Water Pressure | Valve Trim      | Valve OS Number | Close-off Pressure, psid |     |    |     |
|-------|---------------------|-----|-------------------|---------------------------|-----------------|-----------------|--------------------------|-----|----|-----|
| 2-Way | 2-1/2"              | 63  | On/Off, Mod       | 360 psi @ 250°F           | Stainless Steel | VBF5011A1734    | 100                      | 100 |    |     |
|       | 3"                  | 100 | On/Off, Mod       | 360 psi @ 250°F           | Stainless Steel | VBF5011A1767    | 100                      | 100 |    |     |
|       | 4"                  | 160 | On/Off, Mod       | 240 psig @ 250°F          | Stainless Steel | VBF5011A1858    |                          |     | 70 | 70  |
|       | 5"                  | 250 | On/Off, Mod       | 240 psig @ 250°F          | Stainless Steel | VBF5011A1882    |                          |     | 70 | 70  |
|       | 6"                  | 360 | On/Off, Mod       | 240 psig @ 250°F          | Stainless Steel | VBF5011A1916    |                          |     |    | 70* |
| 3-Way | 2.5"                | 63  | Mixing, Diverting | 360 psi @ 250°F           | Brass           | VBF5013B1003    | 40                       | 40  |    |     |
|       | 3"                  | 100 | Mixing, Diverting | 360 psi @ 250°F           | Stainless Steel | VBF5013B1011    |                          |     | 70 | 70  |
|       | 4"                  | 160 | Mixing, Diverting | 240 psig @ 250°F          | Stainless Steel | VBF5013B1029    |                          |     | 70 | 70  |
|       | 5"                  | 250 | Mixing, Diverting | 240 psig @ 250°F          | Stainless Steel | VBF5013B1037    |                          |     | 70 | 70  |
|       | 6"                  | 360 | Mixing, Diverting | 240 psig @ 250°F          | Stainless Steel | VBF5013B1045    |                          |     |    | 70* |

\* 2-position only

# Product Selection - Valves

## Flanged Control Ball Valves 2½"- 6"



**5-YEAR  
LIMITED  
WARRANTY**

| Actuator Features                                |                                     | Fail Safe                  |                            |                            |                            |                            |                            |                                           |                            |                            |
|--------------------------------------------------|-------------------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|-------------------------------------------|----------------------------|----------------------------|
| Actuator O.S. Number                             |                                     | MS7505A2030<br>MS7505A2130 | MS8105A1030<br>MS8105A1130 | MS4105A1030<br>MS4105A1130 | MS7510A2008<br>MS7510A2206 | MS8110A1008<br>MS8110A1206 | MS4110A1002<br>MS4110A1200 | MS7520A2007<br>MS7520A2205<br>MS7520H2208 | MS8120A1007<br>MS8120A1205 | MS4120A1001<br>MS4120A1209 |
| Power Supply                                     | Voltage                             | 24 Vac                     | 24 Vac                     | 100-250 Vac                | 24 Vac                     | 24 Vac                     | 100-250 Vac                | 24 Vac                                    | 24 Vac                     | 100-250 Vac                |
|                                                  | Frequency                           | 50/60 Hz                   | 50/60 Hz                   | 60 Hz                      | 50/60 Hz                   | 50/60 Hz                   | 60 Hz                      | 50/60 Hz                                  | 50/60 Hz                   | 60 Hz                      |
|                                                  | Power                               | 7.5 VA                     | 8 VA                       | 11 VA                      | 14 VA                      | 30 VA                      | 45 VA                      | 16 VA                                     | 40 VA                      | 60 VA                      |
| Actuator Torque                                  | (lb.-in.)                           | 44                         | 44                         | 44                         | 88                         | 88                         | 88                         | 175                                       | 175                        | 175                        |
| Control                                          | (0)2-10 Vdc                         | •                          |                            |                            | •                          |                            |                            | •                                         |                            |                            |
|                                                  | 4-20 mA (external 500 Ohm Resistor) | •                          |                            |                            | •                          |                            |                            | •                                         |                            |                            |
|                                                  | Floating                            | •                          |                            |                            | •                          |                            |                            | •                                         |                            |                            |
|                                                  | Two-Position SPDT                   | •                          |                            |                            | •                          |                            |                            | •                                         |                            |                            |
|                                                  | Two-Position SPST                   | •                          | •                          | •                          | •                          | •                          | •                          | •                                         | •                          | •                          |
| Fail Safe Action                                 |                                     | Configurable Open/Closed   |                            |                            |                            |                            |                            |                                           |                            |                            |
| Normal Position (no signal) (field configurable) |                                     | Open or Closed             |                            |                            |                            |                            |                            |                                           |                            |                            |
| Actuator Stroke                                  | (degrees)                           | 95                         | 95                         | 95                         | 95                         | 95                         | 95                         | 95                                        | 95                         | 95                         |
| Timing                                           | (seconds)                           | 90                         | 45                         | 45                         | 90                         | 45                         | 45                         | 90                                        | 45                         | 45                         |
| Aux Switch                                       | SPDT Built In                       | 0 / 1                      | 0 / 1                      | 0 / 1                      | 0 / 2                      | 0 / 2                      | 0 / 2                      | 0 / 2 / 2                                 | 0 / 2                      | 0 / 2                      |
|                                                  | 2 x SPDT Add-On                     |                            |                            |                            | SW2-US                     | SW2-US                     | SW2-US                     | SW2-US                                    | SW2-US                     | SW2-US                     |
| Feedback                                         | (0)2-10 Vdc Built In                | •                          |                            |                            | •                          |                            |                            | •                                         |                            |                            |

|       | Valve Size (inches) | Cv  | Valve Type        | Max Static Water Pressure | Valve Trim      | Valve OS Number | Close-off Pressure, psid |     |     |    |    |     |       |
|-------|---------------------|-----|-------------------|---------------------------|-----------------|-----------------|--------------------------|-----|-----|----|----|-----|-------|
|       |                     |     |                   |                           |                 |                 |                          |     |     |    |    |     |       |
| 2-Way | 2-1/2"              | 63  | On/Off, Mod       | 360 psi @ 250°F           | Stainless Steel | VBF5011A1734    | 100                      | 100 | 100 |    |    |     |       |
|       | 3"                  | 100 | On/Off, Mod       | 360 psi @ 250°F           | Stainless Steel | VBF5011A1767    | 100                      | 100 | 100 |    |    |     |       |
|       | 4"                  | 160 | On/Off, Mod       | 240 psig @ 250°F          | Stainless Steel | VBF5011A1858    |                          |     |     | 70 | 70 | 70  |       |
|       | 5"                  | 250 | On/Off, Mod       | 240 psig @ 250°F          | Stainless Steel | VBF5011A1882    |                          |     |     | 70 | 70 | 70  |       |
|       | 6"                  | 360 | On/Off, Mod       | 240 psig @ 250°F          | Stainless Steel | VBF5011A1916    |                          |     |     |    |    | 70* | 70 70 |
| 3-Way | 2.5"                | 63  | Mixing, Diverting | 360 psi @ 250°F           | Brass           | VBF5013B1003    | 40                       | 40  | 40  |    |    |     |       |
|       | 3"                  | 100 | Mixing, Diverting | 360 psi @ 250°F           | Stainless Steel | VBF5013B1011    |                          |     |     | 70 | 70 | 70  |       |
|       | 4"                  | 160 | Mixing, Diverting | 240 psig @ 250°F          | Stainless Steel | VBF5013B1029    |                          |     |     | 70 | 70 | 70  |       |
|       | 5"                  | 250 | Mixing, Diverting | 240 psig @ 250°F          | Stainless Steel | VBF5013B1037    |                          |     |     | 70 | 70 | 70  |       |
|       | 6"                  | 360 | Mixing, Diverting | 240 psig @ 250°F          | Stainless Steel | VBF5013B1045    |                          |     |     |    |    | 70* | 70 70 |

\* Maximum flow 700 GPM

# Product Selection - Valves

## Pressure Independent Control Valves with Non Spring Return Actuators 1/2"-1 1/4"



Example of complete orderable part number: **VRN2A005.00SA** + **MVN643A0000** + **C1**  
 Pressure Independent Control Valve, Female NPT Thread, 2-way, 1/2", 5 GPM, Stainless Steel trim with  
 MVN643A0000 Actuator, Fail in place and 1 meter cable.

**5-YEAR  
LIMITED  
WARRANTY**

If the complete orderable part number is too long for your ordering system, please refer to the Short Order Codes on pg 102 to 124.

| Valve Specification    |                             |     |           | Valve Profile | Standard Profile        |                 | Black Bracket |                 |
|------------------------|-----------------------------|-----|-----------|---------------|-------------------------|-----------------|---------------|-----------------|
|                        |                             |     |           | Valve Trim    | Plated Brass            | Stainless Steel | Plated Brass  | Stainless Steel |
| Valve Size<br>(inches) | Differential Pressure, psid |     | Close-off | Max. gpm      | Valve Body Model Number |                 |               |                 |
|                        | Min                         | Max |           |               |                         |                 |               |                 |
| 1/2"                   | 3.0                         | 35  | 100       | 1.0           | VRN2A001.00PA           | VRN2A001.00SA   | VRN2A001.00PX | VRN2A001.00SX   |
|                        |                             |     |           | 2.0           | VRN2A002.00PA           | VRN2A002.00SA   | VRN2A002.00PX | VRN2A002.00SX   |
|                        |                             |     |           | 3.0           | VRN2A003.00PA           | VRN2A003.00SA   | VRN2A003.00PX | VRN2A003.00SX   |
|                        |                             |     |           | 4.0           | VRN2A004.00PA           | VRN2A004.00SA   | VRN2A004.00PX | VRN2A004.00SX   |
|                        |                             |     |           | 5.0           | VRN2A005.00PA           | VRN2A005.00SA   | VRN2A005.00PX | VRN2A005.00SX   |
|                        |                             |     |           | 6.0           | VRN2A006.00PA           | VRN2A006.00SA   | VRN2A006.00PX | VRN2A006.00SX   |
|                        |                             |     |           | 7.0           | VRN2A007.00PA           | VRN2A007.00SA   | VRN2A007.00PX | VRN2A007.00SX   |
| 3/4"                   | 3.0                         | 35  | 100       | 1.0           | VRN2B001.00PA           | VRN2B001.00SA   | VRN2B001.00PX | VRN2B001.00SX   |
|                        |                             |     |           | 2.0           | VRN2B002.00PA           | VRN2B002.00SA   | VRN2B002.00PX | VRN2B002.00SX   |
|                        |                             |     |           | 3.0           | VRN2B003.00PA           | VRN2B003.00SA   | VRN2B003.00PX | VRN2B003.00SX   |
|                        |                             |     |           | 4.0           | VRN2B004.00PA           | VRN2B004.00SA   | VRN2B004.00PX | VRN2B004.00SX   |
|                        |                             |     |           | 5.0           | VRN2B005.00PA           | VRN2B005.00SA   | VRN2B005.00PX | VRN2B005.00SX   |
|                        |                             |     |           | 6.0           | VRN2B006.00PA           | VRN2B006.00SA   | VRN2B006.00PX | VRN2B006.00SX   |
|                        |                             |     |           | 7.0           | VRN2B007.00PA           | VRN2B007.00SA   | VRN2B007.00PX | VRN2B007.00SX   |
|                        | 6.0                         | 35  | 100       | 8.0           | VRN2B008.00PA           | VRN2B008.00SA   | VRN2B008.00PX | VRN2B008.00SX   |
|                        |                             |     |           | 9.0           | VRN2B009.00PA           | VRN2B009.00SA   | VRN2B009.00PX | VRN2B009.00SX   |
|                        |                             |     |           | 10.0          | VRN2B010.00PA           | VRN2B010.00SA   | VRN2B010.00PX | VRN2B010.00SX   |
| 1"                     | 3.0                         | 35  | 100       | 1.0           | VRN2C001.00PA           | VRN2C001.00SA   | VRN2C001.00PX | VRN2C001.00SX   |
|                        |                             |     |           | 2.0           | VRN2C002.00PA           | VRN2C002.00SA   | VRN2C002.00PX | VRN2C002.00SX   |
|                        |                             |     |           | 3.0           | VRN2C003.00PA           | VRN2C003.00SA   | VRN2C003.00PX | VRN2C003.00SX   |
|                        |                             |     |           | 4.0           | VRN2C004.00PA           | VRN2C004.00SA   | VRN2C004.00PX | VRN2C004.00SX   |
|                        |                             |     |           | 5.0           | VRN2C005.00PA           | VRN2C005.00SA   | VRN2C005.00PX | VRN2C005.00SX   |
|                        |                             |     |           | 6.0           | VRN2C006.00PA           | VRN2C006.00SA   | VRN2C006.00PX | VRN2C006.00SX   |
|                        |                             |     |           | 7.0           | VRN2C007.00PA           | VRN2C007.00SA   | VRN2C007.00PX | VRN2C007.00SX   |
|                        | 6.0                         | 35  | 100       | 8.0           | VRN2C008.00PA           | VRN2C008.00SA   | VRN2C008.00PX | VRN2C008.00SX   |
|                        |                             |     |           | 9.0           | VRN2C009.00PA           | VRN2C009.00SA   | VRN2C009.00PX | VRN2C009.00SX   |
|                        | 3.0                         | 50  | 100       | 10            | VRN2C010.00PA           | VRN2C010.00SA   | VRN2C010.00PX | VRN2C010.00SX   |
|                        |                             |     |           | 15            | VRN2C015.00PA           | VRN2C015.00SA   | VRN2C015.00PX | VRN2C015.00SX   |
|                        | 4.0                         | 50  | 100       | 20            | VRN2C020.00PA           | VRN2C020.00SA   | VRN2C020.00PX | VRN2C020.00SX   |
|                        |                             |     |           |               |                         |                 |               |                 |
| 1-1/4"                 | 3.0                         | 50  | 100       | 10            | VRN2D010.00PA           | VRN2D010.00SA   | VRN2D010.00PX | VRN2D010.00SX   |
|                        | 4.0                         |     |           | 15            | VRN2D015.00PA           | VRN2D015.00SA   | VRN2D015.00PX | VRN2D015.00SX   |
|                        | 20                          |     |           | VRN2D020.00PA | VRN2D020.00SA           | VRN2D020.00PX   | VRN2D020.00SX |                 |
|                        | 5.0                         | 25  |           | VRN2D025.00PA | VRN2D025.00SA           | VRN2D025.00PX   | VRN2D025.00SX |                 |
|                        | 6.5                         | 58  |           | 30            | VRN2D030.00PA           | VRN2D030.00SA   | VRN2D030.00PX | VRN2D030.00SX   |
|                        |                             |     |           | 35            | VRN2D035.00PA           | VRN2D035.00SA   | VRN2D035.00PX | VRN2D035.00SX   |

| Actuator Features |                   |            |           |                       |                              |
|-------------------|-------------------|------------|-----------|-----------------------|------------------------------|
|                   |                   |            |           | MVN Standard Profile  | DCA or DCA w/ switches       |
| Control Signal    | Timing            | Voltage    | Enclosure | Actuator Model Number |                              |
| Floating          | 90 sec.           | 24 VAC/DC* | NEMA 2    | +MVN613A0000          | +MN6105A1011 or +MN6105A1201 |
| Fast SPDT         | 30 sec.           |            |           | +MVN643A0000          |                              |
| Modulating        | 90 sec.           |            |           | +MVN713A0000          | +MN7505A2001 or +MN7505A2209 |
| Accessories       | 1 meter cable     |            |           | +C1                   | N/A                          |
|                   | 3 meter cable     |            |           | +C3                   | N/A                          |
|                   | NEMA 3R enclosure |            |           | N/A                   | +3R                          |

# Product Selection - Valves

## Pressure Independent Control Valves with Non Spring Return Actuators 1½"-3"



Example of complete orderable part number: **VRN2E020.00SX** + **MN6105A1011**

Pressure Independent Control Valve, Female NPT Thread, 2-way, 1-1/2", 20 GPM, Stainless Steel trim with MN6105A1011 Actuator, Fail in place.

**5-YEAR  
LIMITED  
WARRANTY**

If the complete orderable part number is too long for your ordering system, please refer to the Short Order Codes on pg 102 to 124.

| Valve Specification    |                             |               |               | Valve Profile | Black Bracket           |                 |
|------------------------|-----------------------------|---------------|---------------|---------------|-------------------------|-----------------|
|                        |                             |               |               | Valve Trim    | Plated Brass            | Stainless Steel |
| Valve Size<br>(inches) | Differential Pressure, psid |               | Close-off     | Max. gpm      | Valve Body Model Number |                 |
|                        | Min                         | Max           |               |               |                         |                 |
| 1-1/2"                 | 3.0                         | 50            | 100           | 10            | VRN2E010.00PX           | VRN2E010.00SX   |
|                        | 4.0                         |               |               | 15            | VRN2E015.00PX           | VRN2E015.00SX   |
|                        | 5.0                         |               |               | 20            | VRN2E020.00PX           | VRN2E020.00SX   |
|                        | 4.0                         |               |               | 25            | VRN2E025.00PX           | VRN2E025.00SX   |
|                        | 6.0                         | 30            |               | VRN2E030.00PX | VRN2E030.00SX           |                 |
|                        |                             | 35            |               | VRN2E035.00PX | VRN2E035.00SX           |                 |
|                        |                             | 40            |               | VRN2E040.00PX | VRN2E040.00SX           |                 |
|                        |                             | 45            |               | VRN2E045.00PX | VRN2E045.00SX           |                 |
|                        | 7.0                         | 50            |               | VRN2E050.00PX | VRN2E050.00SX           |                 |
|                        |                             | 55            |               | VRN2E055.00PX | VRN2E055.00SX           |                 |
|                        |                             | 60            |               | VRN2E060.00PX | VRN2E060.00SX           |                 |
|                        |                             | 65            |               | VRN2E065.00PX | VRN2E065.00SX           |                 |
|                        |                             | 70            |               | VRN2E070.00PX | VRN2E070.00SX           |                 |
|                        |                             | 75            |               | VRN2E075.00PX | VRN2E075.00SX           |                 |
|                        |                             | 80            |               | VRN2E080.00PX | VRN2E080.00SX           |                 |
|                        |                             | 85            |               | VRN2E085.00PX | VRN2E085.00SX           |                 |
|                        |                             | 95            |               | VRN2E095.00PX | VRN2E095.00SX           |                 |
| 11.0                   |                             |               |               |               |                         |                 |
| 2"                     | 4.0                         | 58            | 100           | 25            | VRN2F025.00PX           | VRN2F025.00SX   |
|                        | 6.0                         |               |               | 30            | VRN2F030.00PX           | VRN2F030.00SX   |
|                        |                             |               |               | 35            | VRN2F035.00PX           | VRN2F035.00SX   |
|                        |                             |               |               | 40            | VRN2F040.00PX           | VRN2F040.00SX   |
|                        |                             |               |               | 45            | VRN2F045.00PX           | VRN2F045.00SX   |
|                        | 7.0                         |               |               | 50            | VRN2F050.00PX           | VRN2F050.00SX   |
|                        |                             |               |               | 55            | VRN2F055.00PX           | VRN2F055.00SX   |
|                        |                             |               |               | 60            | VRN2F060.00PX           | VRN2F060.00SX   |
|                        |                             |               |               | 65            | VRN2F065.00PX           | VRN2F065.00SX   |
|                        |                             |               |               | 70            | VRN2F070.00PX           | VRN2F070.00SX   |
| 75                     |                             | VRN2F075.00PX | VRN2F075.00SX |               |                         |                 |
| 2-1/2"                 | 4.0                         | 58            | 100           | 25            | VRN2G025.00PX           | VRN2G025.00SX   |
|                        | 6.0                         |               |               | 30            | VRN2G030.00PX           | VRN2G030.00SX   |
|                        |                             |               |               | 35            | VRN2G035.00PX           | VRN2G035.00SX   |
|                        |                             |               |               | 40            | VRN2G040.00PX           | VRN2G040.00SX   |
|                        |                             |               |               | 45            | VRN2G045.00PX           | VRN2G045.00SX   |
|                        | 7.0                         |               |               | 50            | VRN2G050.00PX           | VRN2G050.00SX   |
|                        |                             |               |               | 55            | VRN2G055.00PX           | VRN2G055.00SX   |
|                        |                             |               |               | 60            | VRN2G060.00PX           | VRN2G060.00SX   |
|                        |                             |               |               | 65            | VRN2G065.00PX           | VRN2G065.00SX   |
|                        | 10                          |               |               | 70            | VRN2G070.00PX           | VRN2G070.00SX   |
|                        |                             |               |               | 75            | VRN2G075.00PX           | VRN2G075.00SX   |
|                        |                             |               |               | 80            | VRN2G080.00PX           | VRN2G080.00SX   |
| 85                     |                             | VRN2G085.00PX | VRN2G085.00SX |               |                         |                 |
| 12                     | 95                          | VRN2G095.00PX | VRN2G095.00SX |               |                         |                 |
| 3"                     | 4.0                         | 58            | 100           | 25            | VRN2H025.00PX           | VRN2H025.00SX   |
|                        | 6.0                         |               |               | 30            | VRN2H030.00PX           | VRN2H030.00SX   |
|                        |                             |               |               | 35            | VRN2H035.00PX           | VRN2H035.00SX   |
|                        |                             |               |               | 40            | VRN2H040.00PX           | VRN2H040.00SX   |
|                        |                             |               |               | 45            | VRN2H045.00PX           | VRN2H045.00SX   |
|                        | 7.0                         |               |               | 50            | VRN2H050.00PX           | VRN2H050.00SX   |
|                        |                             |               |               | 55            | VRN2H055.00PX           | VRN2H055.00SX   |
|                        |                             |               |               | 60            | VRN2H060.00PX           | VRN2H060.00SX   |
|                        |                             |               |               | 65            | VRN2H065.00PX           | VRN2H065.00SX   |
|                        | 10                          |               |               | 70            | VRN2H070.00PX           | VRN2H070.00SX   |
|                        |                             |               |               | 75            | VRN2H075.00PX           | VRN2H075.00SX   |
|                        |                             |               |               | 80            | VRN2H080.00PX           | VRN2H080.00SX   |
|                        |                             |               |               | 85            | VRN2H085.00PX           | VRN2H085.00SX   |
|                        | 12                          |               |               | 95            | VRN2H095.00PX           | VRN2H095.00SX   |

| Actuator Features |                   |           |           |                              |
|-------------------|-------------------|-----------|-----------|------------------------------|
|                   |                   |           |           | DCA or DCA w/ switches       |
| Control Signal    | Timing            | Voltage   | Enclosure | Actuator Model Number        |
| Floating          | 90 sec.           | 24 VAC/DC | NEMA 2    | +MN6105A1011 or +MN6105A1201 |
| Modulating        | 90 sec.           |           |           | +MN7505A2001 or +MN7505A2209 |
| Accessories       | NEMA 3R enclosure |           |           | +3R                          |

# Product Selection - Valves

## Pressure Independent Control Valves With Spring Return Actuators 1/2"-1 1/4"



Example of complete orderable part number: **VRN2A005.00PX + MS7103A2021 + FSC**  
 Pressure Independent Control Valve, Female NPT Thread, 2-way, 1/2", 5 GPM, Black Bracket, Plated Brass  
 trim with MS7103A2021 Actuator, Fail closed.

**5-YEAR  
LIMITED  
WARRANTY**

If the complete orderable part number is too long for your ordering system, please refer to the Short Order Codes on pg 102 to 124.

| Valve Specification    |                             |     |               | Valve Profile | Black Bracket           |                 | Black Bracket |                 |
|------------------------|-----------------------------|-----|---------------|---------------|-------------------------|-----------------|---------------|-----------------|
|                        |                             |     |               | Valve Trim    | Plated Brass            | Stainless Steel | Plated Brass  | Stainless Steel |
| Valve Size<br>(inches) | Differential Pressure, psid |     | Close-off     | Max. gpm      | Valve Body Model Number |                 |               |                 |
|                        | Min                         | Max |               |               |                         |                 |               |                 |
| 1/2"                   | 3.0                         | 35  | 100           | 1.0           | VRN2A001.00PX           | VRN2A001.00SX   | VRN2A001.00PX | VRN2A001.00SX   |
|                        |                             |     |               | 2.0           | VRN2A002.00PX           | VRN2A002.00SX   | VRN2A002.00PX | VRN2A002.00SX   |
|                        |                             |     |               | 3.0           | VRN2A003.00PX           | VRN2A003.00SX   | VRN2A003.00PX | VRN2A003.00SX   |
|                        |                             |     |               | 4.0           | VRN2A004.00PX           | VRN2A004.00SX   | VRN2A004.00PX | VRN2A004.00SX   |
|                        |                             |     |               | 5.0           | VRN2A005.00PX           | VRN2A005.00SX   | VRN2A005.00PX | VRN2A005.00SX   |
|                        |                             |     |               | 6.0           | VRN2A006.00PX           | VRN2A006.00SX   | VRN2A006.00PX | VRN2A006.00SX   |
|                        |                             |     |               | 7.0           | VRN2A007.00PX           | VRN2A007.00SX   | VRN2A007.00PX | VRN2A007.00SX   |
| 3/4"                   | 3.0                         | 35  | 100           | 1.0           | VRN2B001.00PX           | VRN2B001.00SX   | VRN2B001.00PX | VRN2B001.00SX   |
|                        |                             |     |               | 2.0           | VRN2B002.00PX           | VRN2B002.00SX   | VRN2B002.00PX | VRN2B002.00SX   |
|                        |                             |     |               | 3.0           | VRN2B003.00PX           | VRN2B003.00SX   | VRN2B003.00PX | VRN2B003.00SX   |
|                        |                             |     |               | 4.0           | VRN2B004.00PX           | VRN2B004.00SX   | VRN2B004.00PX | VRN2B004.00SX   |
|                        |                             |     |               | 5.0           | VRN2B005.00PX           | VRN2B005.00SX   | VRN2B005.00PX | VRN2B005.00SX   |
|                        |                             |     |               | 6.0           | VRN2B006.00PX           | VRN2B006.00SX   | VRN2B006.00PX | VRN2B006.00SX   |
|                        |                             |     |               | 7.0           | VRN2B007.00PX           | VRN2B007.00SX   | VRN2B007.00PX | VRN2B007.00SX   |
|                        | 6.0                         | 8.0 |               | VRN2B008.00PX | VRN2B008.00SX           | VRN2B008.00PX   | VRN2B008.00SX |                 |
|                        |                             | 9.0 |               | VRN2B009.00PX | VRN2B009.00SX           | VRN2B009.00PX   | VRN2B009.00SX |                 |
|                        |                             | 10  |               | VRN2B010.00PX | VRN2B010.00SX           | VRN2B010.00PX   | VRN2B010.00SX |                 |
| 1"                     | 3.0                         | 35  | 100           | 1.0           | VRN2C001.00PX           | VRN2C001.00SX   | VRN2C001.00PX | VRN2C001.00SX   |
|                        |                             |     |               | 2.0           | VRN2C002.00PX           | VRN2C002.00SX   | VRN2C002.00PX | VRN2C002.00SX   |
|                        |                             |     |               | 3.0           | VRN2C003.00PX           | VRN2C003.00SX   | VRN2C003.00PX | VRN2C003.00SX   |
|                        |                             |     |               | 4.0           | VRN2C004.00PX           | VRN2C004.00SX   | VRN2C004.00PX | VRN2C004.00SX   |
|                        |                             |     |               | 5.0           | VRN2C005.00PX           | VRN2C005.00SX   | VRN2C005.00PX | VRN2C005.00SX   |
|                        |                             |     |               | 6.0           | VRN2C006.00PX           | VRN2C006.00SX   | VRN2C006.00PX | VRN2C006.00SX   |
|                        |                             |     |               | 7.0           | VRN2C007.00PX           | VRN2C007.00SX   | VRN2C007.00PX | VRN2C007.00SX   |
|                        | 6.0                         | 8.0 |               | VRN2C008.00PX | VRN2C008.00SX           | VRN2C008.00PX   | VRN2C008.00SX |                 |
|                        |                             | 9.0 |               | VRN2C009.00PX | VRN2C009.00SX           | VRN2C009.00PX   | VRN2C009.00SX |                 |
|                        | 3.0                         | 50  |               | 10            | VRN2C010.00PX           | VRN2C010.00SX   | VRN2C010.00PX | VRN2C010.00SX   |
|                        |                             |     |               | 15            | VRN2C015.00PX           | VRN2C015.00SX   | VRN2C015.00PX | VRN2C015.00SX   |
|                        | 4.0                         | 20  |               | VRN2C020.00PX | VRN2C020.00SX           | VRN2C020.00PX   | VRN2C020.00SX |                 |
|                        | 1-1/4"                      | 3.0 |               | 50            | 100                     | 10              | VRN2D010.00PX | VRN2D010.00SX   |
| 15                     |                             |     | VRN2D015.00PX |               |                         | VRN2D015.00SX   | VRN2D015.00PX | VRN2D015.00SX   |
| 4.0                    |                             | 20  | VRN2D020.00PX | VRN2D020.00SX |                         | VRN2D020.00PX   | VRN2D020.00SX |                 |
| 5.0                    |                             | 25  | VRN2D025.00PX | VRN2D025.00SX |                         | VRN2D025.00PX   | VRN2D025.00SX |                 |
| 6.5                    |                             | 58  | 30            | VRN2D030.00PX |                         | VRN2D030.00SX   | VRN2D030.00PX | VRN2D030.00SX   |
|                        |                             |     | 35            | VRN2D035.00PX |                         | VRN2D035.00SX   | VRN2D035.00PX | VRN2D035.00SX   |

| Actuator Features  |                                              |           |           |                                                              |  |                              |
|--------------------|----------------------------------------------|-----------|-----------|--------------------------------------------------------------|--|------------------------------|
|                    |                                              |           |           | DCA or DCA w/ switches                                       |  | DCA or DCA w/ switches       |
| Control Signal     | Timing                                       | Voltage   | Enclosure | Actuator Model Number                                        |  |                              |
| Modulating         | 90 sec.                                      | 24 VAC/DC | NEMA 2    | +MS7103A2021 or +MS7103A2221<br>+MS7503A2021 or +MS7503A2221 |  | +MS7505A2030 or +MS7505A2130 |
| Sylk               | 30-180 sec.                                  |           |           | +MS3103J1023 or +MS3103J1223                                 |  |                              |
| 2-position         | 45 sec.                                      |           |           |                                                              |  |                              |
| 2-position         | 45 sec.                                      | 120 VAC   |           | +MS8105A1030 or +MS8105A1130<br>+MS4105A1030 or +MS4105A1130 |  |                              |
| Fail Safe Position | FSO - Fail Safe Open, FSC - Fail Safe Closed |           |           | +FSO or +FSC                                                 |  | +FSO or +FSC                 |
| Accessories        | NEMA 3R enclosure                            |           |           | N/A                                                          |  | +3R                          |

# Product Selection - Valves

## Pressure Independent Control Valves With Spring Return Actuators 1½"-3"



Example of complete orderable part number: **VRN2E020.00SX + MS7505A2030 + FSC**  
 Pressure Independent Control Valve, Female NPT Thread, 2-way, 1-1/2", 20 GPM, Stainless Steel trim with  
 MS7505A2030 Actuator, Fail closed.

**5-YEAR  
LIMITED  
WARRANTY**

If the complete orderable part number is too long for your ordering system, please refer to the Short Order Codes on pg 102 to 124.

| Valve Specification    |                             |               |               | Valve Profile | Black Bracket           |                 |
|------------------------|-----------------------------|---------------|---------------|---------------|-------------------------|-----------------|
| Valve Size<br>(inches) | Differential Pressure, psid |               | Close-off     | Valve Trim    | Plated Brass            | Stainless Steel |
|                        | Min                         | Max           |               | Max. gpm      | Valve Body Model Number |                 |
| 1-1/2"                 | 3.0                         | 50            | 100           | 10            | VRN2E010.00PX           | VRN2E010.00SX   |
|                        | 4.0                         |               |               | 15            | VRN2E015.00PX           | VRN2E015.00SX   |
|                        | 5.0                         |               |               | 20            | VRN2E020.00PX           | VRN2E020.00SX   |
|                        | 4.0                         |               |               | 25            | VRN2E025.00PX           | VRN2E025.00SX   |
|                        | 6.0                         | 30            |               | VRN2E030.00PX | VRN2E030.00SX           |                 |
|                        |                             | 35            |               | VRN2E035.00PX | VRN2E035.00SX           |                 |
|                        |                             | 40            |               | VRN2E040.00PX | VRN2E040.00SX           |                 |
|                        |                             | 45            |               | VRN2E045.00PX | VRN2E045.00SX           |                 |
|                        | 7.0                         | 50            |               | VRN2E050.00PX | VRN2E050.00SX           |                 |
|                        |                             | 55            |               | VRN2E055.00PX | VRN2E055.00SX           |                 |
|                        |                             | 60            |               | VRN2E060.00PX | VRN2E060.00SX           |                 |
|                        |                             | 65            |               | VRN2E065.00PX | VRN2E065.00SX           |                 |
|                        |                             | 70            |               | VRN2E070.00PX | VRN2E070.00SX           |                 |
|                        |                             | 75            |               | VRN2E075.00PX | VRN2E075.00SX           |                 |
|                        |                             | 80            |               | VRN2E080.00PX | VRN2E080.00SX           |                 |
|                        |                             | 85            |               | VRN2E085.00PX | VRN2E085.00SX           |                 |
| 11.0                   | 95                          | VRN2E095.00PX | VRN2E095.00SX |               |                         |                 |
| 2"                     | 4.0                         | 58            | 100           | 25            | VRN2F025.00PX           | VRN2F025.00SX   |
|                        | 6.0                         |               |               | 30            | VRN2F030.00PX           | VRN2F030.00SX   |
|                        |                             |               |               | 35            | VRN2F035.00PX           | VRN2F035.00SX   |
|                        |                             |               |               | 40            | VRN2F040.00PX           | VRN2F040.00SX   |
|                        |                             |               |               | 45            | VRN2F045.00PX           | VRN2F045.00SX   |
|                        | 7.0                         |               |               | 50            | VRN2F050.00PX           | VRN2F050.00SX   |
|                        |                             |               |               | 55            | VRN2F055.00PX           | VRN2F055.00SX   |
|                        |                             |               |               | 60            | VRN2F060.00PX           | VRN2F060.00SX   |
|                        |                             |               |               | 65            | VRN2F065.00PX           | VRN2F065.00SX   |
|                        |                             |               |               | 70            | VRN2F070.00PX           | VRN2F070.00SX   |
| 75                     |                             | VRN2F075.00PX | VRN2F075.00SX |               |                         |                 |
| 2-1/2"                 | 4.0                         | 58            | 100           | 25            | VRN2G025.00PX           | VRN2G025.00SX   |
|                        | 30                          |               |               | VRN2G030.00PX | VRN2G030.00SX           |                 |
|                        | 35                          |               |               | VRN2G035.00PX | VRN2G035.00SX           |                 |
|                        | 40                          |               |               | VRN2G040.00PX | VRN2G040.00SX           |                 |
|                        | 45                          |               |               | VRN2G045.00PX | VRN2G045.00SX           |                 |
|                        | 50                          |               |               | VRN2G050.00PX | VRN2G050.00SX           |                 |
|                        | 55                          |               |               | VRN2G055.00PX | VRN2G055.00SX           |                 |
|                        | 60                          |               |               | VRN2G060.00PX | VRN2G060.00SX           |                 |
|                        | 65                          |               |               | VRN2G065.00PX | VRN2G065.00SX           |                 |
|                        | 70                          |               |               | VRN2G070.00PX | VRN2G070.00SX           |                 |
|                        | 75                          |               |               | VRN2G075.00PX | VRN2G075.00SX           |                 |
|                        | 80                          |               |               | VRN2G080.00PX | VRN2G080.00SX           |                 |
| 3"                     | 4.0                         | 58            | 100           | 85            | VRN2G085.00PX           | VRN2G085.00SX   |
|                        | 95                          |               |               | VRN2G095.00PX | VRN2G095.00SX           |                 |
|                        | 25                          |               |               | VRN2H025.00PX | VRN2H025.00SX           |                 |
|                        | 30                          |               |               | VRN2H030.00PX | VRN2H030.00SX           |                 |
|                        | 35                          |               |               | VRN2H035.00PX | VRN2H035.00SX           |                 |
|                        | 40                          |               |               | VRN2H040.00PX | VRN2H040.00SX           |                 |
|                        | 45                          |               |               | VRN2H045.00PX | VRN2H045.00SX           |                 |
|                        | 50                          |               |               | VRN2H050.00PX | VRN2H050.00SX           |                 |
|                        | 55                          |               |               | VRN2H055.00PX | VRN2H055.00SX           |                 |
|                        | 60                          |               |               | VRN2H060.00PX | VRN2H060.00SX           |                 |
| 3"                     | 6.0                         | 58            | 100           | 65            | VRN2H065.00PX           | VRN2H065.00SX   |
|                        | 70                          |               |               | VRN2H070.00PX | VRN2H070.00SX           |                 |
|                        | 75                          |               |               | VRN2H075.00PX | VRN2H075.00SX           |                 |
|                        | 80                          |               |               | VRN2H080.00PX | VRN2H080.00SX           |                 |
|                        | 85                          |               |               | VRN2H085.00PX | VRN2H085.00SX           |                 |
|                        | 95                          |               |               | VRN2H095.00PX | VRN2H095.00SX           |                 |
|                        | 10                          |               |               |               |                         |                 |
|                        | 12                          |               |               |               |                         |                 |

| Actuator Features  |                                              |           |           |                              |  |
|--------------------|----------------------------------------------|-----------|-----------|------------------------------|--|
|                    |                                              |           |           | DCA or DCA w/ switches       |  |
| Control Signal     | Timing                                       | Voltage   | Enclosure | Actuator Model Number        |  |
| Floating           | 90 sec.                                      | 24 VAC/DC | NEMA 2    | +MS7505A2030 or +MS7505A2130 |  |
| 2-position         | 45 sec.                                      |           |           | +MS8105A1030 or +MS8105A1130 |  |
| 2-position         | 45 sec.                                      | 120 VAC   |           | +MS4105A1030 or +MS4105A1130 |  |
| Fail Safe Position | FSO - Fail Safe Open, FSC - Fail Safe Closed |           |           | +FSO or +FSC                 |  |
| Accessories        | NEMA 3R enclosure                            |           |           | +3R                          |  |

# Product Selection - Valves

## Pressure Independent Control Valves, NPT ½"-1¼"

### Common Features

- Sizes from 1/2 to 3 in. with internal (female) NPT connections.
- Controls hot or chilled water with up to 50% glycol.
- Regulated flow rates available from 1 to 95 gpm.
- Differential pressure regulator for constant pressure drop across valve seat.
- Positive pressure, rolling diaphragm regulator design for long service life for flow control accuracy of ±5% over specified control range.
- Equal percentage flow characteristic using patented flow control ball insert.



| Actuator Features                     |                       | Non Fail Safe |                     |                 |                     |                 |                     |                 |
|---------------------------------------|-----------------------|---------------|---------------------|-----------------|---------------------|-----------------|---------------------|-----------------|
| Actuator O.S Number/ Short Order Code |                       | MVN613A0000   |                     | MVN613A0000+C1  |                     | MVN613A0000+C3  |                     |                 |
| Power Supply                          | Voltage               | 24 VAC        |                     | 24 VAC          |                     | 24 VAC/DC       |                     |                 |
|                                       | Frequency             | 50/60 Hz      |                     | 50/60 Hz        |                     | 50/60 Hz        |                     |                 |
|                                       | Power                 | 1.5 VA        |                     | 1.5 VA          |                     | 6 VA            |                     |                 |
| Actuator Torque (lb.-in.)             |                       | 27            |                     | 27              |                     | 27              |                     |                 |
| Control                               | Modulating (0)2-10Vdc |               |                     |                 |                     |                 |                     |                 |
|                                       | Floating              | •             |                     | •               |                     |                 |                     |                 |
|                                       | Fast acting SPDT      |               |                     |                 |                     | •               |                     |                 |
| Actuator Stroke (degrees)             |                       | 90° ± 3°      |                     | 90° ± 3°        |                     | 90° ± 3°        |                     |                 |
| Timing (seconds)                      |                       | 90            |                     | 90              |                     | 30              |                     |                 |
| Fail Safe Action                      |                       | Fail in Place |                     | Fail in Place   |                     | Fail in Place   |                     |                 |
| Valve Features                        |                       | Trim          | Nickel-Plated Brass | Stainless Steel | Nickel-Plated Brass | Stainless Steel | Nickel-Plated Brass | Stainless Steel |

| Valve Size<br>(inches) | Differential Pressure** (psid) |      | Close-off<br>Pressure (psid) | Max. GPM     | Short Order Codes |              |               |              |               |              |
|------------------------|--------------------------------|------|------------------------------|--------------|-------------------|--------------|---------------|--------------|---------------|--------------|
|                        | Min.                           | Max. |                              |              | No Cable          |              | 1 Meter Cable |              | 3 Meter Cable |              |
|                        |                                |      |                              |              |                   |              |               |              |               |              |
| 1/2"                   | 3.0                            | 35   | 100                          | 1            | VRN2ABPA1000      | VRN2ABSA1000 | VRN2ABPA1001  | VRN2ABSA1001 | VRN2ABPA1003  | VRN2ABSA1003 |
|                        |                                |      |                              | 2            | VRN2ADPA1000      | VRN2ADSA1000 | VRN2ADPA1001  | VRN2ADSA1001 | VRN2ADPA1003  | VRN2ADSA1003 |
|                        |                                |      |                              | 3            | VRN2AEP1000       | VRN2AESA1000 | VRN2AEP1001   | VRN2AESA1001 | VRN2AEP1003   | VRN2AESA1003 |
|                        |                                |      |                              | 4            | VRN2AFPA1000      | VRN2AFSA1000 | VRN2AFPA1001  | VRN2AFSA1001 | VRN2AFPA1003  | VRN2AFSA1003 |
|                        |                                |      |                              | 5            | VRN2AGPA1000      | VRN2AGSA1000 | VRN2AGPA1001  | VRN2AGSA1001 | VRN2AGPA1003  | VRN2AGSA1003 |
|                        |                                |      |                              | 6            | VRN2AHPA1000      | VRN2AHSA1000 | VRN2AHPA1001  | VRN2AHSA1001 | VRN2AHPA1003  | VRN2AHSA1003 |
|                        |                                |      |                              | 7            | VRN2AJPA1000      | VRN2AJSA1000 | VRN2AJPA1001  | VRN2AJSA1001 | VRN2AJPA1003  | VRN2AJSA1003 |
| 3/4"                   | 3.0                            | 35   | 100                          | 1            | VRN2BBPA1000      | VRN2BBSA1000 | VRN2BBPA1001  | VRN2BBSA1001 | VRN2BBPA1003  | VRN2BBSA1003 |
|                        |                                |      |                              | 2            | VRN2BDPA1000      | VRN2BDSA1000 | VRN2BDPA1001  | VRN2BDSA1001 | VRN2BDPA1003  | VRN2BDSA1003 |
|                        |                                |      |                              | 3            | VRN2BEP1000       | VRN2BESA1000 | VRN2BEP1001   | VRN2BESA1001 | VRN2BEP1003   | VRN2BESA1003 |
|                        |                                |      |                              | 4            | VRN2BFPA1000      | VRN2BFS1000  | VRN2BFPA1001  | VRN2BFS1001  | VRN2BFPA1003  | VRN2BFS1003  |
|                        |                                |      |                              | 5            | VRN2BGPA1000      | VRN2BGSA1000 | VRN2BGPA1001  | VRN2BGSA1001 | VRN2BGPA1003  | VRN2BGSA1003 |
|                        |                                |      |                              | 6            | VRN2BHPA1000      | VRN2BHSA1000 | VRN2BHPA1001  | VRN2BHSA1001 | VRN2BHPA1003  | VRN2BHSA1003 |
|                        |                                |      |                              | 7            | VRN2BJPA1000      | VRN2BJS1000  | VRN2BJPA1001  | VRN2BJS1001  | VRN2BJPA1003  | VRN2BJS1003  |
|                        | 6.0                            | 35   | 100                          | 8            | VRN2BKPA1000      | VRN2BKSA1000 | VRN2BKPA1001  | VRN2BKSA1001 | VRN2BKPA1003  | VRN2BKSA1003 |
|                        |                                |      |                              | 9            | VRN2BLPA1000      | VRN2BLSA1000 | VRN2BLPA1001  | VRN2BLSA1001 | VRN2BLPA1003  | VRN2BLSA1003 |
|                        |                                |      |                              | 10*          | VRN2BMPA1000      | VRN2BMSA1000 | VRN2BMPA1001  | VRN2BMSA1001 | VRN2BMPA1003  | VRN2BMSA1003 |
| 1"                     | 3.0                            | 35   | 100                          | 1            | VRN2CBPA1000      | VRN2CBSA1000 | VRN2CBPA1001  | VRN2CBSA1001 | VRN2CBPA1003  | VRN2CBSA1003 |
|                        |                                |      |                              | 2            | VRN2CDPA1000      | VRN2CDSA1000 | VRN2CDPA1001  | VRN2CDSA1001 | VRN2CDPA1003  | VRN2CDSA1003 |
|                        |                                |      |                              | 3            | VRN2CEPA1000      | VRN2CESA1000 | VRN2CEPA1001  | VRN2CESA1001 | VRN2CEPA1003  | VRN2CESA1003 |
|                        |                                |      |                              | 4            | VRN2CFPA1000      | VRN2CFSA1000 | VRN2CFPA1001  | VRN2CFSA1001 | VRN2CFPA1003  | VRN2CFSA1003 |
|                        |                                |      |                              | 5            | VRN2CGPA1000      | VRN2CGSA1000 | VRN2CGPA1001  | VRN2CGSA1001 | VRN2CGPA1003  | VRN2CGSA1003 |
|                        |                                |      |                              | 6            | VRN2CHPA1000      | VRN2CHSA1000 | VRN2CHPA1001  | VRN2CHSA1001 | VRN2CHPA1003  | VRN2CHSA1003 |
|                        |                                |      |                              | 7            | VRN2CJPA1000      | VRN2CJS1000  | VRN2CJPA1001  | VRN2CJS1001  | VRN2CJPA1003  | VRN2CJS1003  |
|                        | 6.0                            | 35   | 100                          | 8            | VRN2CKPA1000      | VRN2CKSA1000 | VRN2CKPA1001  | VRN2CKSA1001 | VRN2CKPA1003  | VRN2CKSA1003 |
|                        |                                |      |                              | 9            | VRN2CLPA1000      | VRN2CLSA1000 | VRN2CLPA1001  | VRN2CLSA1001 | VRN2CLPA1003  | VRN2CLSA1003 |
|                        |                                |      |                              | 10           | VRN2CMPA1000      | VRN2CMSA1000 | VRN2CMPA1001  | VRN2CMSA1001 | VRN2CMPA1003  | VRN2CMSA1003 |
| 1-1/4"                 | 4.0                            | 50   | 100                          | 15           | VRN2CNPA1000      | VRN2CNSA1000 | VRN2CNPA1001  | VRN2CNSA1001 | VRN2CNPA1003  | VRN2CNSA1003 |
|                        |                                |      |                              | 20           | VRN2CPPA1000      | VRN2CPSA1000 | VRN2CPPA1001  | VRN2CPSA1001 | VRN2CPPA1003  | VRN2CPSA1003 |
|                        |                                |      |                              | 10           | VRN2DMPA1000      | VRN2DMSA1000 | VRN2DMPA1001  | VRN2DMSA1001 | VRN2DMPA1003  | VRN2DMSA1003 |
|                        |                                |      |                              | 15           | VRN2DNPA1000      | VRN2DNSA1000 | VRN2DNPA1001  | VRN2DNSA1001 | VRN2DNPA1003  | VRN2DNSA1003 |
|                        | 5.0                            | 50   | 100                          | 20           | VRN2DPPA1000      | VRN2DPSA1000 | VRN2DPPA1001  | VRN2DPSA1001 | VRN2DPPA1003  | VRN2DPSA1003 |
|                        |                                |      |                              | 25           | VRN2DQPA1000      | VRN2DQSA1000 | VRN2DQPA1001  | VRN2DQSA1001 | VRN2DQPA1003  | VRN2DQSA1003 |
|                        |                                |      |                              | 30           | VRN2DRPA1000      | VRN2DRSA1000 | VRN2DRPA1001  | VRN2DRSA1001 | VRN2DRPA1003  | VRN2DRSA1003 |
| 6.5                    | 50                             | 100  | 35*                          | VRN2DSPA1000 | VRN2DSSA1000      | VRN2DSPA1001 | VRN2DSSA1001  | VRN2DSPA1003 | VRN2DSSA1003  |              |

\* Full port ball

\*\* Differential pressure regulator operating range, ±5%

# Product Selection - Valves

## Pressure Independent Control Valves, NPT ½"-1¼"

|                     |                                |              | Actuator Features                     |                     | Non Fail Safe         |                 |                |                     |                |                 |               |  |
|---------------------|--------------------------------|--------------|---------------------------------------|---------------------|-----------------------|-----------------|----------------|---------------------|----------------|-----------------|---------------|--|
|                     |                                |              | Actuator O.S Number/ Short Order Code |                     | MVN643A0000           |                 | MVN643A0000+C1 |                     | MVN643A0000+C3 |                 |               |  |
|                     |                                |              | Power Supply                          |                     | Voltage               |                 | 24 VAC/DC      |                     | 24 VAC/DC      |                 | 24 VAC/DC     |  |
|                     |                                |              |                                       |                     | Frequency             |                 | 50/60 Hz       |                     | 50/60 Hz       |                 | 50/60 Hz      |  |
|                     |                                |              |                                       |                     | Power                 |                 | 6 VA           |                     | 6 VA           |                 | 6 VA          |  |
|                     |                                |              | Actuator Torque                       |                     | (lb. -in.)            |                 | 27             |                     | 27             |                 | 27            |  |
|                     |                                |              | Control                               |                     | Modulating (0)2-10Vdc |                 |                |                     |                |                 |               |  |
|                     |                                |              |                                       |                     | Floating              |                 |                |                     |                |                 |               |  |
|                     |                                |              |                                       |                     | Fast acting SPDT      |                 | •              |                     | •              |                 | •             |  |
|                     |                                |              | Actuator Stroke (degrees)             |                     | 90° ± 3°              |                 | 90° ± 3°       |                     | 90° ± 3°       |                 | 90° ± 3°      |  |
|                     |                                |              | Timing                                |                     | (seconds)             |                 | 30             |                     | 30             |                 | 30            |  |
|                     |                                |              | Fail Safe Action                      |                     | Fail in Place         |                 | Fail in Place  |                     | Fail in Place  |                 | Fail in Place |  |
| Valve Features      |                                | Trim         |                                       | Nickel-Plated Brass |                       | Stainless Steel |                | Nickel-Plated Brass |                | Stainless Steel |               |  |
| Valve Size (inches) | Differential Pressure** (psid) |              | Close-off Pressure (psid)             | Max. GPM            | Short Order Codes     |                 |                |                     |                |                 |               |  |
|                     | Min.                           | Max.         |                                       |                     | No Cable              |                 | 1 Meter Cable  |                     | 3 Meter Cable  |                 |               |  |
| 1/2"                | 3.0                            | 35           | 100                                   | 1                   | VRN2ABPA2000          | VRN2ABSA2000    | VRN2ABPA2001   | VRN2ABSA2001        | VRN2ABPA2003   | VRN2ABSA2003    |               |  |
|                     |                                |              |                                       | 2                   | VRN2ADPA2000          | VRN2ADSA2000    | VRN2ADPA2001   | VRN2ADSA2001        | VRN2ADPA2003   | VRN2ADSA2003    |               |  |
|                     |                                |              |                                       | 3                   | VRN2AEPa2000          | VRN2AESA2000    | VRN2AEPa2001   | VRN2AESA2001        | VRN2AEPa2003   | VRN2AESA2003    |               |  |
|                     |                                |              |                                       | 4                   | VRN2AFPA2000          | VRN2AFSA2000    | VRN2AFPA2001   | VRN2AFSA2001        | VRN2AFPA2003   | VRN2AFSA2003    |               |  |
|                     |                                |              |                                       | 5                   | VRN2AGPA2000          | VRN2AGSA2000    | VRN2AGPA2001   | VRN2AGSA2001        | VRN2AGPA2003   | VRN2AGSA2003    |               |  |
|                     |                                |              |                                       | 6                   | VRN2AHPa2000          | VRN2AHSa2000    | VRN2AHPa2001   | VRN2AHSa2001        | VRN2AHPa2003   | VRN2AHSa2003    |               |  |
|                     |                                |              |                                       | 7                   | VRN2AJPA2000          | VRN2AJSA2000    | VRN2AJPA2001   | VRN2AJSA2001        | VRN2AJPA2003   | VRN2AJSA2003    |               |  |
| 3/4"                | 3.0                            | 35           | 100                                   | 1                   | VRN2BBPA2000          | VRN2BBSa2000    | VRN2BBPA2001   | VRN2BBSa2001        | VRN2BBPA2003   | VRN2BBSa2003    |               |  |
|                     |                                |              |                                       | 2                   | VRN2BDPA2000          | VRN2BDSA2000    | VRN2BDPA2001   | VRN2BDSA2001        | VRN2BDPA2003   | VRN2BDSA2003    |               |  |
|                     |                                |              |                                       | 3                   | VRN2BEPa2000          | VRN2BESA2000    | VRN2BEPa2001   | VRN2BESA2001        | VRN2BEPa2003   | VRN2BESA2003    |               |  |
|                     |                                |              |                                       | 4                   | VRN2BFPA2000          | VRN2BFSA2000    | VRN2BFPA2001   | VRN2BFSA2001        | VRN2BFPA2003   | VRN2BFSA2003    |               |  |
|                     |                                |              |                                       | 5                   | VRN2BGPA2000          | VRN2BGSA2000    | VRN2BGPA2001   | VRN2BGSA2001        | VRN2BGPA2003   | VRN2BGSA2003    |               |  |
|                     |                                |              |                                       | 6                   | VRN2BHPa2000          | VRN2BHSA2000    | VRN2BHPa2001   | VRN2BHSA2001        | VRN2BHPa2003   | VRN2BHSA2003    |               |  |
|                     |                                |              |                                       | 7                   | VRN2BJPA2000          | VRN2BJSa2000    | VRN2BJPA2001   | VRN2BJSa2001        | VRN2BJPA2003   | VRN2BJSa2003    |               |  |
|                     | 6.0                            | 35           | 100                                   | 8                   | VRN2BKPA2000          | VRN2BKSA2000    | VRN2BKPA2001   | VRN2BKSA2001        | VRN2BKPA2003   | VRN2BKSA2003    |               |  |
|                     |                                |              |                                       | 9                   | VRN2BLPA2000          | VRN2BLSa2000    | VRN2BLPA2001   | VRN2BLSa2001        | VRN2BLPA2003   | VRN2BLSa2003    |               |  |
|                     |                                |              |                                       | 10*                 | VRN2BMPa2000          | VRN2BMSa2000    | VRN2BMPa2001   | VRN2BMSa2001        | VRN2BMPa2003   | VRN2BMSa2003    |               |  |
| 1"                  | 3.0                            | 35           | 100                                   | 1                   | VRN2CBPA2000          | VRN2CBSa2000    | VRN2CBPA2001   | VRN2CBSa2001        | VRN2CBPA2003   | VRN2CBSa2003    |               |  |
|                     |                                |              |                                       | 2                   | VRN2CDPA2000          | VRN2CDSA2000    | VRN2CDPA2001   | VRN2CDSA2001        | VRN2CDPA2003   | VRN2CDSA2003    |               |  |
|                     |                                |              |                                       | 3                   | VRN2CEPA2000          | VRN2CESa2000    | VRN2CEPA2001   | VRN2CESa2001        | VRN2CEPA2003   | VRN2CESa2003    |               |  |
|                     |                                |              |                                       | 4                   | VRN2CFPA2000          | VRN2CFSA2000    | VRN2CFPA2001   | VRN2CFSA2001        | VRN2CFPA2003   | VRN2CFSA2003    |               |  |
|                     |                                |              |                                       | 5                   | VRN2CGPA2000          | VRN2CGSA2000    | VRN2CGPA2001   | VRN2CGSA2001        | VRN2CGPA2003   | VRN2CGSA2003    |               |  |
|                     |                                |              |                                       | 6                   | VRN2CHPA2000          | VRN2CHSA2000    | VRN2CHPA2001   | VRN2CHSA2001        | VRN2CHPA2003   | VRN2CHSA2003    |               |  |
|                     |                                |              |                                       | 7                   | VRN2CJPA2000          | VRN2CJSa2000    | VRN2CJPA2001   | VRN2CJSa2001        | VRN2CJPA2003   | VRN2CJSa2003    |               |  |
|                     | 6.0                            | 35           | 100                                   | 8                   | VRN2CKPA2000          | VRN2CKSA2000    | VRN2CKPA2001   | VRN2CKSA2001        | VRN2CKPA2003   | VRN2CKSA2003    |               |  |
|                     |                                |              |                                       | 9                   | VRN2CLPA2000          | VRN2CLSa2000    | VRN2CLPA2001   | VRN2CLSa2001        | VRN2CLPA2003   | VRN2CLSa2003    |               |  |
|                     | 4.0                            | 50           | 100                                   | 10                  | VRN2CMPa2000          | VRN2CMSa2000    | VRN2CMPa2001   | VRN2CMSa2001        | VRN2CMPa2003   | VRN2CMSa2003    |               |  |
|                     |                                |              |                                       | 15                  | VRN2CNPA2000          | VRN2CNSA2000    | VRN2CNPA2001   | VRN2CNSA2001        | VRN2CNPA2003   | VRN2CNSA2003    |               |  |
|                     |                                |              |                                       | 20                  | VRN2CPPa2000          | VRN2CPSa2000    | VRN2CPPa2001   | VRN2CPSa2001        | VRN2CPPa2003   | VRN2CPSa2003    |               |  |
| 1-1/4"              | 4.0                            | 50           | 100                                   | 10                  | VRN2DMPa2000          | VRN2DMSa2000    | VRN2DMPa2001   | VRN2DMSa2001        | VRN2DMPa2003   | VRN2DMSa2003    |               |  |
|                     |                                |              |                                       | 15                  | VRN2DNPA2000          | VRN2DNSa2000    | VRN2DNPA2001   | VRN2DNSa2001        | VRN2DNPA2003   | VRN2DNSa2003    |               |  |
|                     | 20                             |              |                                       | VRN2DPPa2000        | VRN2DPSa2000          | VRN2DPPa2001    | VRN2DPSa2001   | VRN2DPPa2003        | VRN2DPSa2003   |                 |               |  |
|                     | 5.0                            |              |                                       | 25                  | VRN2DQPA2000          | VRN2DQSA2000    | VRN2DQPA2001   | VRN2DQSA2001        | VRN2DQPA2003   | VRN2DQSA2003    |               |  |
|                     |                                |              |                                       | 30                  | VRN2DRPA2000          | VRN2DRSA2000    | VRN2DRPA2001   | VRN2DRSA2001        | VRN2DRPA2003   | VRN2DRSA2003    |               |  |
| 6.5                 | 35*                            | VRN2DSPa2000 | VRN2DSSa2000                          | VRN2DSPa2001        | VRN2DSSa2001          | VRN2DSPa2003    | VRN2DSSa2003   |                     |                |                 |               |  |

\* Full port ball

\*\* Differential pressure regulator operating range, ±5%

# Product Selection - Valves

## Pressure Independent Control Valves, NPT ½"-1¼"

### Common Features

- Sizes from 1/2 to 3 in. with internal (female) NPT connections.
- Controls hot or chilled water with up to 50% glycol.
- Regulated flow rates available from 1 to 95 gpm.
- Differential pressure regulator for constant pressure drop across valve seat.
- Positive pressure, rolling diaphragm regulator design for long service life for flow control accuracy of ±5% over specified control range.
- Equal percentage flow characteristic using patented flow control ball insert.



| Actuator Features                     |                       | Non Fail Safe |                     |                 | Valve Only                                                                          |                 |
|---------------------------------------|-----------------------|---------------|---------------------|-----------------|-------------------------------------------------------------------------------------|-----------------|
| Actuator O.S Number/ Short Order Code |                       | MVN713A0000   | MVN713A0000+C1      | MVN713A0000+C3  | N/A                                                                                 |                 |
| Power Supply                          | Voltage               | 24 VAC/DC     | 24 VAC/DC           | 24 VAC/DC       |  |                 |
|                                       | Frequency             | 50/60 Hz      | 50/60 Hz            | 50/60 Hz        |                                                                                     |                 |
|                                       | Power                 | 5 VA          | 5 VA                | 5 VA            |                                                                                     |                 |
| Actuator Torque (lb.-in.)             |                       | 27            | 27                  | 27              |                                                                                     |                 |
| Control                               | Modulating (0)2-10Vdc | •             | •                   | •               |                                                                                     |                 |
|                                       | Floating              |               |                     |                 |                                                                                     |                 |
|                                       | Fast acting SPDT      |               |                     |                 |                                                                                     |                 |
| Actuator Stroke (degrees)             |                       | 90° ± 3°      | 90° ± 3°            | 90° ± 3°        |                                                                                     |                 |
| Timing (seconds)                      |                       | 90            | 90                  | 90              |                                                                                     |                 |
| Fail Safe Action                      |                       | Fail in Place | Fail in Place       | Fail in Place   |                                                                                     |                 |
| Valve Features                        |                       | Trim          | Nickel-Plated Brass | Stainless Steel | Nickel-Plated Brass                                                                 | Stainless Steel |

| Valve Size (inches) | Differential Pressure** (psid) |      | Close-off Pressure (psid) | Max. GPM | Short Order Codes |              |               |              |               |              |              |              |
|---------------------|--------------------------------|------|---------------------------|----------|-------------------|--------------|---------------|--------------|---------------|--------------|--------------|--------------|
|                     | Min.                           | Max. |                           |          | No Cable          |              | 1 Meter Cable |              | 3 Meter Cable |              | Valve Only   |              |
|                     |                                |      |                           |          |                   |              |               |              |               |              |              |              |
| 1/2"                | 3.0                            | 35   | 100                       | 1        | VRN2ABPA3000      | VRN2ABSA3000 | VRN2ABPA3001  | VRN2ABSA3001 | VRN2ABPA3003  | VRN2ABSA3003 | VRN2ABPA0000 | VRN2ABSA0000 |
|                     |                                |      |                           | 2        | VRN2ADPA3000      | VRN2ADSA3000 | VRN2ADPA3001  | VRN2ADSA3001 | VRN2ADPA3003  | VRN2ADSA3003 | VRN2ADPA0000 | VRN2ADSA0000 |
|                     |                                |      |                           | 3        | VRN2AEP3000       | VRN2AESA3000 | VRN2AEP3001   | VRN2AESA3001 | VRN2AEP3003   | VRN2AESA3003 | VRN2AEP3000  | VRN2AESA0000 |
|                     |                                |      |                           | 4        | VRN2AFPA3000      | VRN2AFSA3000 | VRN2AFPA3001  | VRN2AFSA3001 | VRN2AFPA3003  | VRN2AFSA3003 | VRN2AFPA0000 | VRN2AFSA0000 |
|                     |                                |      |                           | 5        | VRN2AGPA3000      | VRN2AGSA3000 | VRN2AGPA3001  | VRN2AGSA3001 | VRN2AGPA3003  | VRN2AGSA3003 | VRN2AGPA0000 | VRN2AGSA0000 |
|                     |                                |      |                           | 6        | VRN2AHP3000       | VRN2AHPA3000 | VRN2AHP3001   | VRN2AHPA3001 | VRN2AHP3003   | VRN2AHPA3003 | VRN2AHP3000  | VRN2AHPA0000 |
|                     |                                |      |                           | 7        | VRN2AJPA3000      | VRN2AJSA3000 | VRN2AJPA3001  | VRN2AJSA3001 | VRN2AJPA3003  | VRN2AJSA3003 | VRN2AJPA0000 | VRN2AJSA0000 |
| 3/4"                | 3.0                            | 35   | 100                       | 1        | VRN2BBPA3000      | VRN2BBSA3000 | VRN2BBPA3001  | VRN2BBSA3001 | VRN2BBPA3003  | VRN2BBSA3003 | VRN2BBPA0000 | VRN2BBSA0000 |
|                     |                                |      |                           | 2        | VRN2BDPA3000      | VRN2BDSA3000 | VRN2BDPA3001  | VRN2BDSA3001 | VRN2BDPA3003  | VRN2BDSA3003 | VRN2BDPA0000 | VRN2BDSA0000 |
|                     |                                |      |                           | 3        | VRN2BEP3000       | VRN2BESA3000 | VRN2BEP3001   | VRN2BESA3001 | VRN2BEP3003   | VRN2BESA3003 | VRN2BEP3000  | VRN2BESA0000 |
|                     |                                |      |                           | 4        | VRN2BFPA3000      | VRN2BFSA3000 | VRN2BFPA3001  | VRN2BFSA3001 | VRN2BFPA3003  | VRN2BFSA3003 | VRN2BFPA0000 | VRN2BFSA0000 |
|                     |                                |      |                           | 5        | VRN2BGPA3000      | VRN2BGSA3000 | VRN2BGPA3001  | VRN2BGSA3001 | VRN2BGPA3003  | VRN2BGSA3003 | VRN2BGPA0000 | VRN2BGSA0000 |
|                     |                                |      |                           | 6        | VRN2BHP3000       | VRN2BHSA3000 | VRN2BHP3001   | VRN2BHSA3001 | VRN2BHP3003   | VRN2BHSA3003 | VRN2BHP3000  | VRN2BHSA0000 |
|                     |                                |      |                           | 7        | VRN2BJPA3000      | VRN2BJS3000  | VRN2BJPA3001  | VRN2BJS3001  | VRN2BJPA3003  | VRN2BJS3003  | VRN2BJPA0000 | VRN2BJS3000  |
|                     | 6.0                            |      |                           | 8        | VRN2BKPA3000      | VRN2BKSA3000 | VRN2BKPA3001  | VRN2BKSA3001 | VRN2BKPA3003  | VRN2BKSA3003 | VRN2BKPA0000 | VRN2BKSA0000 |
|                     |                                |      |                           | 9        | VRN2BLPA3000      | VRN2BLSA3000 | VRN2BLPA3001  | VRN2BLSA3001 | VRN2BLPA3003  | VRN2BLSA3003 | VRN2BLPA0000 | VRN2BLSA0000 |
|                     |                                |      |                           | 10*      | VRN2BMP3000       | VRN2BMSA3000 | VRN2BMP3001   | VRN2BMSA3001 | VRN2BMP3003   | VRN2BMSA3003 | VRN2BMP3000  | VRN2BMSA0000 |
| 1"                  | 3.0                            | 35   | 100                       | 1        | VRN2CBPA3000      | VRN2CBSA3000 | VRN2CBPA3001  | VRN2CBSA3001 | VRN2CBPA3003  | VRN2CBSA3003 | VRN2CBPA0000 | VRN2CBSA0000 |
|                     |                                |      |                           | 2        | VRN2CDPA3000      | VRN2CDSA3000 | VRN2CDPA3001  | VRN2CDSA3001 | VRN2CDPA3003  | VRN2CDSA3003 | VRN2CDPA0000 | VRN2CDSA0000 |
|                     |                                |      |                           | 3        | VRN2CEPA3000      | VRN2CESA3000 | VRN2CEPA3001  | VRN2CESA3001 | VRN2CEPA3003  | VRN2CESA3003 | VRN2CEPA0000 | VRN2CESA0000 |
|                     |                                |      |                           | 4        | VRN2CFPA3000      | VRN2CFSA3000 | VRN2CFPA3001  | VRN2CFSA3001 | VRN2CFPA3003  | VRN2CFSA3003 | VRN2CFPA0000 | VRN2CFSA0000 |
|                     |                                |      |                           | 5        | VRN2CGPA3000      | VRN2CGSA3000 | VRN2CGPA3001  | VRN2CGSA3001 | VRN2CGPA3003  | VRN2CGSA3003 | VRN2CGPA0000 | VRN2CGSA0000 |
|                     |                                |      |                           | 6        | VRN2CHPA3000      | VRN2CHSA3000 | VRN2CHPA3001  | VRN2CHSA3001 | VRN2CHPA3003  | VRN2CHSA3003 | VRN2CHPA0000 | VRN2CHSA0000 |
|                     |                                |      |                           | 7        | VRN2CJPA3000      | VRN2CJSA3000 | VRN2CJPA3001  | VRN2CJSA3001 | VRN2CJPA3003  | VRN2CJSA3003 | VRN2CJPA0000 | VRN2CJSA0000 |
|                     | 6.0                            |      |                           | 8        | VRN2CKPA3000      | VRN2CKSA3000 | VRN2CKPA3001  | VRN2CKSA3001 | VRN2CKPA3003  | VRN2CKSA3003 | VRN2CKPA0000 | VRN2CKSA0000 |
|                     |                                |      |                           | 9        | VRN2CLPA3000      | VRN2CLSA3000 | VRN2CLPA3001  | VRN2CLSA3001 | VRN2CLPA3003  | VRN2CLSA3003 | VRN2CLPA0000 | VRN2CLSA0000 |
|                     |                                |      |                           | 10       | VRN2CMP3000       | VRN2CMSA3000 | VRN2CMP3001   | VRN2CMSA3001 | VRN2CMP3003   | VRN2CMSA3003 | VRN2CMP3000  | VRN2CMSA0000 |
|                     | 4.0                            | 50   |                           | 15       | VRN2CNPA3000      | VRN2CNPA3000 | VRN2CNPA3001  | VRN2CNPA3001 | VRN2CNPA3003  | VRN2CNPA3003 | VRN2CNPA0000 | VRN2CNPA0000 |
|                     |                                |      |                           | 20       | VRN2CPA3000       | VRN2CPA3000  | VRN2CPA3001   | VRN2CPA3001  | VRN2CPA3003   | VRN2CPA3003  | VRN2CPA0000  | VRN2CPA0000  |
|                     |                                |      |                           | 35*      | VRN2DMP3000       | VRN2DMPA3000 | VRN2DMP3001   | VRN2DMPA3001 | VRN2DMP3003   | VRN2DMPA3003 | VRN2DMP3000  | VRN2DMPA0000 |
| 1-1/4"              | 4.0                            | 50   | 100                       | 15       | VRN2DNPA3000      | VRN2DNPA3000 | VRN2DNPA3001  | VRN2DNPA3001 | VRN2DNPA3003  | VRN2DNPA3003 | VRN2DNPA0000 | VRN2DNPA0000 |
|                     |                                |      |                           | 20       | VRN2DPPA3000      | VRN2DPPA3000 | VRN2DPPA3001  | VRN2DPPA3001 | VRN2DPPA3003  | VRN2DPPA3003 | VRN2DPPA0000 | VRN2DPPA0000 |
|                     |                                |      |                           | 25       | VRN2DQPA3000      | VRN2DQPA3000 | VRN2DQPA3001  | VRN2DQPA3001 | VRN2DQPA3003  | VRN2DQPA3003 | VRN2DQPA0000 | VRN2DQPA0000 |
|                     | 5.0                            |      |                           | 30       | VRN2DRPA3000      | VRN2DRPA3000 | VRN2DRPA3001  | VRN2DRPA3001 | VRN2DRPA3003  | VRN2DRPA3003 | VRN2DRPA0000 | VRN2DRPA0000 |
|                     |                                |      |                           | 35*      | VRN2DSPA3000      | VRN2DSPA3000 | VRN2DSPA3001  | VRN2DSPA3001 | VRN2DSPA3003  | VRN2DSPA3003 | VRN2DSPA0000 | VRN2DSPA0000 |

\* Full port ball

\*\* Differential pressure regulator operating range, ±5%

# Product Selection - Valves

## Pressure Independent Control Valves, NPT ½"-1¼" NEMA 2

### Common Features

- Sizes from 1/2 to 3 in. with internal (female) NPT connections.
- Controls hot or chilled water with up to 50% glycol.
- Regulated flow rates available from 1 to 95 gpm.
- Differential pressure regulator for constant pressure drop across valve seat.
- Positive pressure, rolling diaphragm regulator design for long service life for flow control accuracy of ±5% over specified control range.
- Equal percentage flow characteristic using patented flow control ball insert.



| Actuator Features                      |           | Non Fail Safe |                                                                         |
|----------------------------------------|-----------|---------------|-------------------------------------------------------------------------|
| Actuator O.S Number                    |           | MN6105A1011   | MN6105A1201                                                             |
| Power Supply                           | Voltage   | 24 VAC/DC     | 24 VAC/DC                                                               |
|                                        | Frequency | 50 / 60 Hz    | 50 / 60 Hz                                                              |
|                                        | Power     | 5 VA          | 5 VA                                                                    |
| Actuator Torque (lb.-in.)              |           | 44            | 44                                                                      |
| Control (0)2-10Vdc                     |           |               |                                                                         |
| 4-20 mA (w/ external 500 Ohm Resistor) |           |               |                                                                         |
| Floating                               |           | •             | •                                                                       |
| Two-Position SPDT                      |           | •             | •                                                                       |
| Two-Position SPST                      |           |               |                                                                         |
| Actuator Stroke (degrees)              |           | 95° ± 3°      | 95° ± 3°                                                                |
| Timing (drive/spring return, seconds)  |           | 90            | 90                                                                      |
| Aux Switch                             |           | 0             | 2                                                                       |
| Feedback 2-10 Vdc Built In             |           | -             | -                                                                       |
| Fail Safe Action                       |           | Stay in Place | Stay in Place                                                           |
| Normal Position (no signal)            |           | Stay in Place | Stay in Place                                                           |
| Valve Features                         |           | Trim          | Nickel-Plated Brass Stainless Steel Nickel-Plated Brass Stainless Steel |

| Valve Size (inches) | Differential Pressure** (psid) |      | Close-off Pressure (psid) | Max. GPM | Short Order Codes |              |              |              |
|---------------------|--------------------------------|------|---------------------------|----------|-------------------|--------------|--------------|--------------|
|                     | Min.                           | Max. |                           |          |                   |              |              |              |
| 1/2"                | 3.0                            | 35   | 100                       | 1        | VRN2ABPX4000      | VRN2ABSX4000 | VRN2ABPXC000 | VRN2ABSXC000 |
|                     |                                |      |                           | 2        | VRN2ADPX4000      | VRN2ADSX4000 | VRN2ADPXC000 | VRN2ADSXC000 |
|                     |                                |      |                           | 3        | VRN2AEPX4000      | VRN2AESX4000 | VRN2AEPXC000 | VRN2AESXC000 |
|                     |                                |      |                           | 4        | VRN2AFPX4000      | VRN2AFSX4000 | VRN2AFPXC000 | VRN2AFSXC000 |
|                     |                                |      |                           | 5        | VRN2AGPX4000      | VRN2AGSX4000 | VRN2AGPXC000 | VRN2AGSXC000 |
|                     |                                |      |                           | 6        | VRN2AHPX4000      | VRN2AHSX4000 | VRN2AHPXC000 | VRN2AHSXC000 |
|                     |                                |      |                           | 7        | VRN2AJPX4000      | VRN2AJSX4000 | VRN2AJPXC000 | VRN2AJSXC000 |
| 3/4"                | 3.0                            | 35   | 100                       | 1        | VRN2BBPX4000      | VRN2BBSX4000 | VRN2BBPXC000 | VRN2BBSXC000 |
|                     |                                |      |                           | 2        | VRN2BDPX4000      | VRN2BDSX4000 | VRN2BDPXC000 | VRN2BDSXC000 |
|                     |                                |      |                           | 3        | VRN2BEPX4000      | VRN2BESX4000 | VRN2BEPXC000 | VRN2BESXC000 |
|                     |                                |      |                           | 4        | VRN2BFPX4000      | VRN2BFSX4000 | VRN2BFPXC000 | VRN2BFSXC000 |
|                     |                                |      |                           | 5        | VRN2BGPX4000      | VRN2BGSX4000 | VRN2BGPXC000 | VRN2BGSXC000 |
|                     |                                |      |                           | 6        | VRN2BHPX4000      | VRN2BHSX4000 | VRN2BHPXC000 | VRN2BHSXC000 |
|                     |                                |      |                           | 7        | VRN2BJPX4000      | VRN2BJSX4000 | VRN2BJPXC000 | VRN2BJSXC000 |
|                     | 6.0                            | 35   | 100                       | 8        | VRN2BKPX4000      | VRN2BKSX4000 | VRN2BKPXC000 | VRN2BKSXC000 |
|                     |                                |      |                           | 9        | VRN2BLPX4000      | VRN2BLSX4000 | VRN2BLPXC000 | VRN2BLSXC000 |
|                     |                                |      |                           | 10*      | VRN2BMPX4000      | VRN2BMSX4000 | VRN2BMPXC000 | VRN2BMSXC000 |
| 1"                  | 3.0                            | 35   | 100                       | 1        | VRN2CBPX4000      | VRN2CBSX4000 | VRN2CBPXC000 | VRN2CBSXC000 |
|                     |                                |      |                           | 2        | VRN2CDPX4000      | VRN2CDSX4000 | VRN2CDPXC000 | VRN2CDSXC000 |
|                     |                                |      |                           | 3        | VRN2CEPX4000      | VRN2CESX4000 | VRN2CEPXC000 | VRN2CESXC000 |
|                     |                                |      |                           | 4        | VRN2CFPX4000      | VRN2CFSX4000 | VRN2CFPXC000 | VRN2CFSXC000 |
|                     |                                |      |                           | 5        | VRN2CGPX4000      | VRN2CGSX4000 | VRN2CGPXC000 | VRN2CGSXC000 |
|                     |                                |      |                           | 6        | VRN2CHPX4000      | VRN2CHSX4000 | VRN2CHPXC000 | VRN2CHSXC000 |
|                     |                                |      |                           | 7        | VRN2CJPX4000      | VRN2CJSX4000 | VRN2CJPXC000 | VRN2CJSXC000 |
|                     | 6.0                            | 35   | 100                       | 8        | VRN2CKPX4000      | VRN2CKSX4000 | VRN2CKPXC000 | VRN2CKSXC000 |
|                     |                                |      |                           | 9        | VRN2CLPX4000      | VRN2CLSX4000 | VRN2CLPXC000 | VRN2CLSXC000 |
|                     |                                |      |                           | 10       | VRN2CMPX4000      | VRN2CMSX4000 | VRN2CMPXC000 | VRN2CMSXC000 |
|                     | 4.0                            | 50   | 100                       | 15       | VRN2CNPX4000      | VRN2CNSX4000 | VRN2CNPXC000 | VRN2CNSXC000 |
|                     |                                |      |                           | 20       | VRN2CPPX4000      | VRN2CPSX4000 | VRN2CPPXC000 | VRN2CPSXC000 |
|                     |                                |      |                           | 10       | VRN2DMPX4000      | VRN2DMSX4000 | VRN2DMPXC000 | VRN2DMSXC000 |
|                     |                                |      |                           | 15       | VRN2DNPX4000      | VRN2DNSX4000 | VRN2DNPXC000 | VRN2DNSXC000 |
|                     |                                |      |                           | 20       | VRN2DPPX4000      | VRN2DPSX4000 | VRN2DPPXC000 | VRN2DPSXC000 |
| 1-1/4"              | 4.0                            | 50   | 100                       | 25       | VRN2DQPX4000      | VRN2DQSX4000 | VRN2DQPXC000 | VRN2DQSXC000 |
|                     |                                |      |                           | 30       | VRN2DRPX4000      | VRN2DRSX4000 | VRN2DRPXC000 | VRN2DRSXC000 |
|                     |                                |      |                           | 35*      | VRN2DSPX4000      | VRN2DSSX4000 | VRN2DSPXC000 | VRN2DSSXC000 |
|                     |                                |      |                           |          |                   |              |              |              |

\* Full port ball

\*\* Differential pressure regulator operating range, ±5%

# Product Selection - Valves

## Pressure Independent Control Valves, NPT ½"-1¼" NEMA 2

### Common Features

- Sizes from 1/2 to 3 in. with internal (female) NPT connections.
- Controls hot or chilled water with up to 50% glycol.
- Regulated flow rates available from 1 to 95 gpm.
- Differential pressure regulator for constant pressure drop across valve seat.
- Positive pressure, rolling diaphragm regulator design for long service life for flow control accuracy of ±5% over specified control range.
- Equal percentage flow characteristic using patented flow control ball insert.

| Actuator Features                     |                                        | Non Fail Safe       |                 | Valve Only                                                                          |                 |
|---------------------------------------|----------------------------------------|---------------------|-----------------|-------------------------------------------------------------------------------------|-----------------|
| Actuator O.S Number                   |                                        | MN7505A2001         | MN7505A2209     | N/A                                                                                 |                 |
| Power Supply                          | Voltage                                | 24 VAC/DC           | 24 VAC/DC       |  |                 |
|                                       | Frequency                              | 50 / 60 Hz          | 50 / 60 Hz      |                                                                                     |                 |
|                                       | Power                                  | 5 VA                | 5 VA            |                                                                                     |                 |
| Actuator Torque (lb.-in.)             |                                        | 44                  | 44              |                                                                                     |                 |
| Control                               | (0)2-10Vdc                             | •                   | •               |                                                                                     |                 |
|                                       | 4-20 mA (w/ external 500 Ohm Resistor) | •                   | •               |                                                                                     |                 |
|                                       | Floating                               | •                   | •               |                                                                                     |                 |
|                                       | Two-Position SPDT                      | •                   | •               |                                                                                     |                 |
|                                       | Two-Position SPST                      | •                   | •               |                                                                                     |                 |
| Actuator Stroke (degrees)             |                                        | 95° ± 3°            | 95° ± 3°        |                                                                                     |                 |
| Timing (drive/spring return, seconds) |                                        | 90                  | 90              |                                                                                     |                 |
| Aux Switch                            |                                        | 0                   | 2               |                                                                                     |                 |
| Feedback 2-10 Vdc Built In            |                                        | •                   | •               |                                                                                     |                 |
| Fail Safe Action                      |                                        | Stay in Place       | Stay in Place   |                                                                                     |                 |
| Normal Position (no signal)           |                                        | Closed              | Closed          |                                                                                     |                 |
| Valve Features Trim                   |                                        | Nickel-Plated Brass | Stainless Steel | Nickel-Plated Brass                                                                 | Stainless Steel |

| Valve Size (inches) | Differential Pressure** (psid) |      | Close-off Pressure (psid) | Max. GPM | Short Order Codes |              |              |              |              |              |  |  |  |  |  |  |
|---------------------|--------------------------------|------|---------------------------|----------|-------------------|--------------|--------------|--------------|--------------|--------------|--|--|--|--|--|--|
|                     | Min.                           | Max. |                           |          |                   |              |              |              |              |              |  |  |  |  |  |  |
| 1/2"                | 3.0                            | 35   | 100                       | 1        | VRN2ABPX5000      | VRN2ABSX5000 | VRN2ABPXD000 | VRN2ABSXD000 | VRN2ABPX0000 | VRN2ABSX0000 |  |  |  |  |  |  |
|                     |                                |      |                           | 2        | VRN2ADPX5000      | VRN2ADSX5000 | VRN2ADPXD000 | VRN2ADSDX000 | VRN2ADPX0000 | VRN2ADSX0000 |  |  |  |  |  |  |
|                     |                                |      |                           | 3        | VRN2AEPX5000      | VRN2AESX5000 | VRN2AEPXD000 | VRN2AESXD000 | VRN2AEPX0000 | VRN2AESX0000 |  |  |  |  |  |  |
|                     |                                |      |                           | 4        | VRN2AFPX5000      | VRN2AFSX5000 | VRN2AFPXD000 | VRN2AFSXD000 | VRN2AFPX0000 | VRN2AFSX0000 |  |  |  |  |  |  |
|                     |                                |      |                           | 5        | VRN2AGPX5000      | VRN2AGSX5000 | VRN2AGPXD000 | VRN2AGSXD000 | VRN2AGPX0000 | VRN2AGSX0000 |  |  |  |  |  |  |
|                     |                                |      |                           | 6        | VRN2AHPX5000      | VRN2AHSX5000 | VRN2AHPXD000 | VRN2AHSXD000 | VRN2AHPX0000 | VRN2AHSX0000 |  |  |  |  |  |  |
|                     |                                |      |                           | 7        | VRN2AJPX5000      | VRN2AJSX5000 | VRN2AJPXD000 | VRN2AJSDX000 | VRN2AJPX0000 | VRN2AJSX0000 |  |  |  |  |  |  |
| 3/4"                | 3.0                            | 35   | 100                       | 1        | VRN2BBPX5000      | VRN2BBSX5000 | VRN2BBPXD000 | VRN2BBSXD000 | VRN2BBPX0000 | VRN2BBSX0000 |  |  |  |  |  |  |
|                     |                                |      |                           | 2        | VRN2BDPX5000      | VRN2BDSX5000 | VRN2BDPXD000 | VRN2BDSXD000 | VRN2BDPX0000 | VRN2BDSX0000 |  |  |  |  |  |  |
|                     |                                |      |                           | 3        | VRN2BEPX5000      | VRN2BESX5000 | VRN2BEPXD000 | VRN2BESXD000 | VRN2BEPX0000 | VRN2BESX0000 |  |  |  |  |  |  |
|                     |                                |      |                           | 4        | VRN2BFPX5000      | VRN2BFSX5000 | VRN2BFPXD000 | VRN2BFSXD000 | VRN2BFPX0000 | VRN2BFSX0000 |  |  |  |  |  |  |
|                     |                                |      |                           | 5        | VRN2BGPX5000      | VRN2BGSX5000 | VRN2BGPXD000 | VRN2BGSXD000 | VRN2BGPX0000 | VRN2BGSX0000 |  |  |  |  |  |  |
|                     |                                |      |                           | 6        | VRN2BHPX5000      | VRN2BHSX5000 | VRN2BHPXD000 | VRN2BHSXD000 | VRN2BHPX0000 | VRN2BHSX0000 |  |  |  |  |  |  |
|                     |                                |      |                           | 7        | VRN2BJPX5000      | VRN2BJSX5000 | VRN2BJPXD000 | VRN2BJSXD000 | VRN2BJPX0000 | VRN2BJSX0000 |  |  |  |  |  |  |
|                     | 6.0                            | 35   | 100                       | 8        | VRN2BKPX5000      | VRN2BKSX5000 | VRN2BKPXD000 | VRN2BKSDX000 | VRN2BKPX0000 | VRN2BKSX0000 |  |  |  |  |  |  |
|                     |                                |      |                           | 9        | VRN2BLPX5000      | VRN2BLSX5000 | VRN2BLPXD000 | VRN2BLSXD000 | VRN2BLPX0000 | VRN2BLSX0000 |  |  |  |  |  |  |
|                     |                                |      |                           | 10*      | VRN2BMPX5000      | VRN2BMSX5000 | VRN2BMPXD000 | VRN2BMSXD000 | VRN2BMPX0000 | VRN2BMSX0000 |  |  |  |  |  |  |
| 1"                  | 3.0                            | 35   | 100                       | 1        | VRN2CBPX5000      | VRN2CBSX5000 | VRN2CBPXD000 | VRN2CBSXD000 | VRN2CBPX0000 | VRN2CBSX0000 |  |  |  |  |  |  |
|                     |                                |      |                           | 2        | VRN2CDPX5000      | VRN2CDSX5000 | VRN2CDPXD000 | VRN2CDSXD000 | VRN2CDPX0000 | VRN2CDSX0000 |  |  |  |  |  |  |
|                     |                                |      |                           | 3        | VRN2CEPX5000      | VRN2CESX5000 | VRN2CEPXD000 | VRN2CESXD000 | VRN2CEPX0000 | VRN2CESX0000 |  |  |  |  |  |  |
|                     |                                |      |                           | 4        | VRN2CFPX5000      | VRN2CFSX5000 | VRN2CFPXD000 | VRN2CFSXD000 | VRN2CFPX0000 | VRN2CFSX0000 |  |  |  |  |  |  |
|                     |                                |      |                           | 5        | VRN2CGPX5000      | VRN2CGSX5000 | VRN2CGPXD000 | VRN2CGSXD000 | VRN2CGPX0000 | VRN2CGSX0000 |  |  |  |  |  |  |
|                     |                                |      |                           | 6        | VRN2CHPX5000      | VRN2CHSX5000 | VRN2CHPXD000 | VRN2CHSXD000 | VRN2CHPX0000 | VRN2CHSX0000 |  |  |  |  |  |  |
|                     |                                |      |                           | 7        | VRN2CJPX5000      | VRN2CJSX5000 | VRN2CJPXD000 | VRN2CJSXD000 | VRN2CJPX0000 | VRN2CJSX0000 |  |  |  |  |  |  |
|                     | 6.0                            | 35   | 100                       | 8        | VRN2CKPX5000      | VRN2CKSX5000 | VRN2CKPXD000 | VRN2CKSDX000 | VRN2CKPX0000 | VRN2CKSX0000 |  |  |  |  |  |  |
|                     |                                |      |                           | 9        | VRN2CLPX5000      | VRN2CLSX5000 | VRN2CLPXD000 | VRN2CLSDX000 | VRN2CLPX0000 | VRN2CLSX0000 |  |  |  |  |  |  |
|                     |                                |      |                           | 10       | VRN2CMPX5000      | VRN2CMSX5000 | VRN2CMPXD000 | VRN2CMSXD000 | VRN2CMPX0000 | VRN2CMSX0000 |  |  |  |  |  |  |
|                     | 4.0                            | 50   | 100                       | 15       | VRN2CNPX5000      | VRN2CNSX5000 | VRN2CNPXD000 | VRN2CNSXD000 | VRN2CNPX0000 | VRN2CNSX0000 |  |  |  |  |  |  |
|                     |                                |      |                           | 20       | VRN2CPPX5000      | VRN2CPSX5000 | VRN2CPPXD000 | VRN2CPSXD000 | VRN2CPPX0000 | VRN2CPSX0000 |  |  |  |  |  |  |
|                     |                                |      |                           | 10       | VRN2DMPX5000      | VRN2DMSX5000 | VRN2DMPXD000 | VRN2DMSXD000 | VRN2DMPX0000 | VRN2DMSX0000 |  |  |  |  |  |  |
|                     |                                |      |                           | 15       | VRN2DNPX5000      | VRN2DNSX5000 | VRN2DNPXD000 | VRN2DNSXD000 | VRN2DNPX0000 | VRN2DNSX0000 |  |  |  |  |  |  |
|                     |                                |      |                           | 20       | VRN2DPPX5000      | VRN2DPSX5000 | VRN2DPPXD000 | VRN2DPSXD000 | VRN2DPPX0000 | VRN2DPSX0000 |  |  |  |  |  |  |
| 1-1/4"              | 4.0                            | 50   | 100                       | 25       | VRN2DQPX5000      | VRN2DQSX5000 | VRN2DQPXD000 | VRN2DQSDX000 | VRN2DQPX0000 | VRN2DQSX0000 |  |  |  |  |  |  |
|                     |                                |      |                           | 30       | VRN2DRPX5000      | VRN2DRSX5000 | VRN2DRPXD000 | VRN2DRSDX000 | VRN2DRPX0000 | VRN2DRSX0000 |  |  |  |  |  |  |
|                     |                                |      |                           | 35*      | VRN2DSPX5000      | VRN2DSSX5000 | VRN2DSPXD000 | VRN2DSSXD000 | VRN2DSPX0000 | VRN2DSSX0000 |  |  |  |  |  |  |
|                     | 5.0                            | 50   | 100                       |          |                   |              |              |              |              |              |  |  |  |  |  |  |
|                     |                                |      |                           |          |                   |              |              |              |              |              |  |  |  |  |  |  |
| 1-1/4"              | 6.5                            | 50   | 100                       |          |                   |              |              |              |              |              |  |  |  |  |  |  |
|                     |                                |      |                           |          |                   |              |              |              |              |              |  |  |  |  |  |  |
|                     |                                |      |                           |          |                   |              |              |              |              |              |  |  |  |  |  |  |

\* Full port ball

\*\* Differential pressure regulator operating range, ±5%

# Product Selection - Valves

## Pressure Independent Control Valves, NPT ½"-1¼" NEMA 2

| Actuator Features                      |           | Fail Safe           |                 |                     |                 |
|----------------------------------------|-----------|---------------------|-----------------|---------------------|-----------------|
| Actuator O.S Number                    |           | MS3103J1023         |                 | MS3103J1223         |                 |
| Power Supply                           | Voltage   | 24 VAC/DC           |                 | 24 VAC/DC           |                 |
|                                        | Frequency | 50 / 60 Hz          |                 | 50 / 60 Hz          |                 |
|                                        | Power     | 4.5 VA              |                 | 4.5 VA              |                 |
| Actuator Torque (lb.-in.)              |           | 27                  |                 | 27                  |                 |
| Control (0)2-10Vdc                     |           |                     |                 |                     |                 |
| 4-20 mA (w/ external 500 Ohm Resistor) |           |                     |                 |                     |                 |
| Sylk                                   |           | •                   |                 | •                   |                 |
| Two-Position SPDT                      |           |                     |                 |                     |                 |
| Two-Position SPST                      |           |                     |                 |                     |                 |
| Actuator Stroke (degrees)              |           | 95° ± 3°            |                 | 95° ± 3°            |                 |
| Timing (drive/spring return, seconds)  |           | 30-180 / 25         |                 | 30-180 / 25         |                 |
| Aux Switch                             |           | 0                   |                 | 2                   |                 |
| Feedback                               |           | Sylk                |                 | Sylk                |                 |
| Fail Safe Action                       |           | Closed              | Open            | Closed              | Open            |
| Normal Position (no signal)            |           | Closed              | Open            | Closed              | Open            |
| Valve Features Trim                    |           | Nickel-Plated Brass | Stainless Steel | Nickel-Plated Brass | Stainless Steel |

| Valve Size (inches) | Differential Pressure** (psid) |      | Close-off Pressure (psid) | Max. GPM | Short Order Codes |              |              |              |              |              |              |              |              |              |
|---------------------|--------------------------------|------|---------------------------|----------|-------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
|                     | Min.                           | Max. |                           |          |                   |              |              |              |              |              |              |              |              |              |
| 1/2                 | 3.0                            | 35   | 100                       | 1        | VRN2ABPXG201      | VRN2ABSXG201 | VRN2ABPXH201 | VRN2ABSXG101 | VRN2ABPXH101 | VRN2ABSXH201 | VRN2ABPXH101 | VRN2ABSXH101 | VRN2ABSXH101 | VRN2ABSXH101 |
|                     |                                |      |                           | 2        | VRN2ADPXG201      | VRN2ADSXG201 | VRN2ADPXH201 | VRN2ADSXG101 | VRN2ADPXH101 | VRN2ADSXH201 | VRN2ADPXH101 | VRN2ADSXH101 | VRN2ADSXH101 | VRN2ADSXH101 |
|                     |                                |      |                           | 3        | VRN2AEPXG201      | VRN2AESXG201 | VRN2AEPXH201 | VRN2AESXG101 | VRN2AEPXH101 | VRN2AESXH201 | VRN2AEPXH101 | VRN2AESXH101 | VRN2AESXH101 | VRN2AESXH101 |
|                     |                                |      |                           | 4        | VRN2AFPXG201      | VRN2AFSXG201 | VRN2AFPXH201 | VRN2AFSXG101 | VRN2AFPXH101 | VRN2AFSXH201 | VRN2AFPXH101 | VRN2AFSXH101 | VRN2AFSXH101 | VRN2AFSXH101 |
|                     |                                |      |                           | 5        | VRN2AGPXG201      | VRN2AGSXG201 | VRN2AGPXH201 | VRN2AGSXG101 | VRN2AGPXH101 | VRN2AGSXH201 | VRN2AGPXH101 | VRN2AGSXH101 | VRN2AGSXH101 | VRN2AGSXH101 |
|                     |                                |      |                           | 6        | VRN2AHPXG201      | VRN2AHSXG201 | VRN2AHPXH201 | VRN2AHSXG101 | VRN2AHPXH101 | VRN2AHSXH201 | VRN2AHPXH101 | VRN2AHSXH101 | VRN2AHSXH101 | VRN2AHSXH101 |
|                     |                                |      |                           | 7        | VRN2AJPXG201      | VRN2AJSXG201 | VRN2AJPXH201 | VRN2AJSXG101 | VRN2AJPXH101 | VRN2AJSXH201 | VRN2AJPXH101 | VRN2AJSXH101 | VRN2AJSXH101 | VRN2AJSXH101 |
| 3/4                 | 3.0                            | 35   | 100                       | 1        | VRN2BBPXG201      | VRN2BBSXG201 | VRN2BBPXH201 | VRN2BBSXG101 | VRN2BBPXH101 | VRN2BBSXH201 | VRN2BBPXH101 | VRN2BBSXH101 | VRN2BBSXH101 | VRN2BBSXH101 |
|                     |                                |      |                           | 2        | VRN2BDPXG201      | VRN2BDSXG201 | VRN2BDPXH201 | VRN2BDSXG101 | VRN2BDPXH101 | VRN2BDSXH201 | VRN2BDPXH101 | VRN2BDSXH101 | VRN2BDSXH101 | VRN2BDSXH101 |
|                     |                                |      |                           | 3        | VRN2BEPXG201      | VRN2BESXG201 | VRN2BEPXH201 | VRN2BESXG101 | VRN2BEPXH101 | VRN2BESXH201 | VRN2BEPXH101 | VRN2BESXH101 | VRN2BESXH101 | VRN2BESXH101 |
|                     |                                |      |                           | 4        | VRN2BFPXG201      | VRN2BFSXG201 | VRN2BFPXH201 | VRN2BFSXG101 | VRN2BFPXH101 | VRN2BFSXH201 | VRN2BFPXH101 | VRN2BFSXH101 | VRN2BFSXH101 | VRN2BFSXH101 |
|                     |                                |      |                           | 5        | VRN2BGXG201       | VRN2BGSXG201 | VRN2BGXH201  | VRN2BGSXG101 | VRN2BGXH101  | VRN2BGSXH201 | VRN2BGXH101  | VRN2BGSXH101 | VRN2BGSXH101 | VRN2BGSXH101 |
|                     |                                |      |                           | 6        | VRN2BHPXG201      | VRN2BHSXG201 | VRN2BHPXH201 | VRN2BHSXG101 | VRN2BHPXH101 | VRN2BHSXH201 | VRN2BHPXH101 | VRN2BHSXH101 | VRN2BHSXH101 | VRN2BHSXH101 |
|                     |                                |      |                           | 7        | VRN2BJPXG201      | VRN2BJSXG201 | VRN2BJPXH201 | VRN2BJSXG101 | VRN2BJPXH101 | VRN2BJSXH201 | VRN2BJPXH101 | VRN2BJSXH101 | VRN2BJSXH101 | VRN2BJSXH101 |
|                     | 6.0                            | 35   | 100                       | 8        | VRN2BKPXG201      | VRN2BKSXG201 | VRN2BKPXH201 | VRN2BKSXG101 | VRN2BKPXH101 | VRN2BKSXH201 | VRN2BKPXH101 | VRN2BKSXH101 | VRN2BKSXH101 | VRN2BKSXH101 |
|                     |                                |      |                           | 9        | VRN2BLPXG201      | VRN2BLSXG201 | VRN2BLPXH201 | VRN2BLSXG101 | VRN2BLPXH101 | VRN2BLSXH201 | VRN2BLPXH101 | VRN2BLSXH101 | VRN2BLSXH101 | VRN2BLSXH101 |
|                     |                                |      |                           | 10*      | VRN2BMPXG201      | VRN2BMSXG201 | VRN2BMPXH201 | VRN2BMSXG101 | VRN2BMPXH101 | VRN2BMSXH201 | VRN2BMPXH101 | VRN2BMSXH101 | VRN2BMSXH101 | VRN2BMSXH101 |
| 1                   | 3.0                            | 35   | 100                       | 1        | VRN2CBPXG201      | VRN2CBSXG201 | VRN2CBPXH201 | VRN2CBSXG101 | VRN2CBPXH101 | VRN2CBSXH201 | VRN2CBPXH101 | VRN2CBSXH101 | VRN2CBSXH101 | VRN2CBSXH101 |
|                     |                                |      |                           | 2        | VRN2CDPXG201      | VRN2CDSXG201 | VRN2CDPXH201 | VRN2CDSXG101 | VRN2CDPXH101 | VRN2CDSXH201 | VRN2CDPXH101 | VRN2CDSXH101 | VRN2CDSXH101 | VRN2CDSXH101 |
|                     |                                |      |                           | 3        | VRN2CEPXG201      | VRN2CESXG201 | VRN2CEPXH201 | VRN2CESXG101 | VRN2CEPXH101 | VRN2CESXH201 | VRN2CEPXH101 | VRN2CESXH101 | VRN2CESXH101 | VRN2CESXH101 |
|                     |                                |      |                           | 4        | VRN2CFPXG201      | VRN2CFSXG201 | VRN2CFPXH201 | VRN2CFSXG101 | VRN2CFPXH101 | VRN2CFSXH201 | VRN2CFPXH101 | VRN2CFSXH101 | VRN2CFSXH101 | VRN2CFSXH101 |
|                     |                                |      |                           | 5        | VRN2CGPXG201      | VRN2CGSXG201 | VRN2CGPXH201 | VRN2CGSXG101 | VRN2CGPXH101 | VRN2CGSXH201 | VRN2CGPXH101 | VRN2CGSXH101 | VRN2CGSXH101 | VRN2CGSXH101 |
|                     |                                |      |                           | 6        | VRN2CHPXG201      | VRN2CHSXG201 | VRN2CHPXH201 | VRN2CHSXG101 | VRN2CHPXH101 | VRN2CHSXH201 | VRN2CHPXH101 | VRN2CHSXH101 | VRN2CHSXH101 | VRN2CHSXH101 |
|                     |                                |      |                           | 7        | VRN2CJXG201       | VRN2CJSXG201 | VRN2CJPXH201 | VRN2CJSXG101 | VRN2CJPXH101 | VRN2CJSXH201 | VRN2CJPXH101 | VRN2CJSXH101 | VRN2CJSXH101 | VRN2CJSXH101 |
|                     | 6.0                            | 35   | 100                       | 8        | VRN2CKPXG201      | VRN2CKSXG201 | VRN2CKPXH201 | VRN2CKSXG101 | VRN2CKPXH101 | VRN2CKSXH201 | VRN2CKPXH101 | VRN2CKSXH101 | VRN2CKSXH101 | VRN2CKSXH101 |
|                     |                                |      |                           | 9        | VRN2CLPXG201      | VRN2CLSXG201 | VRN2CLPXH201 | VRN2CLSXG101 | VRN2CLPXH101 | VRN2CLSXH201 | VRN2CLPXH101 | VRN2CLSXH101 | VRN2CLSXH101 | VRN2CLSXH101 |
|                     |                                |      |                           | 10       | VRN2CMPXG201      | VRN2CMSXG201 | VRN2CMPXH201 | VRN2CMSXG101 | VRN2CMPXH101 | VRN2CMSXH201 | VRN2CMPXH101 | VRN2CMSXH101 | VRN2CMSXH101 | VRN2CMSXH101 |
|                     | 4.0                            | 50   | 100                       | 15       | VRN2CNPXG201      | VRN2CNSXG201 | VRN2CNPXH201 | VRN2CNSXG101 | VRN2CNPXH101 | VRN2CNSXH201 | VRN2CNPXH101 | VRN2CNSXH101 | VRN2CNSXH101 | VRN2CNSXH101 |
|                     |                                |      |                           | 20       | VRN2CPPXG201      | VRN2CPSXG201 | VRN2CPPXH201 | VRN2CPSXG101 | VRN2CPPXH101 | VRN2CPSXH201 | VRN2CPPXH101 | VRN2CPSXH101 | VRN2CPSXH101 | VRN2CPSXH101 |
|                     |                                |      |                           | 10       | VRN2DMPXG201      | VRN2DMSXG201 | VRN2DMPXH201 | VRN2DMSXG101 | VRN2DMPXH101 | VRN2DMSXH201 | VRN2DMPXH101 | VRN2DMSXH101 | VRN2DMSXH101 | VRN2DMSXH101 |
| 1 1/4               | 4.0                            | 50   | 100                       | 15       | VRN2DNXG201       | VRN2DNSXG201 | VRN2DNXH201  | VRN2DNSXG101 | VRN2DNXH101  | VRN2DNSXH201 | VRN2DNXH101  | VRN2DNSXH101 | VRN2DNSXH101 | VRN2DNSXH101 |
|                     |                                |      |                           | 20       | VRN2DPPXG201      | VRN2DPSXG201 | VRN2DPPXH201 | VRN2DPSXG101 | VRN2DPPXH101 | VRN2DPSXH201 | VRN2DPPXH101 | VRN2DPSXH101 | VRN2DPSXH101 | VRN2DPSXH101 |
|                     |                                |      |                           | 25       | VRN2DQXG201       | VRN2DQSXG201 | VRN2DQXH201  | VRN2DQSXG101 | VRN2DQXH101  | VRN2DQSXH201 | VRN2DQXH101  | VRN2DQSXH101 | VRN2DQSXH101 | VRN2DQSXH101 |
|                     |                                |      |                           | 30       | VRN2DRPXG201      | VRN2DRSXG201 | VRN2DRPXH201 | VRN2DRSXG101 | VRN2DRPXH101 | VRN2DRSXH201 | VRN2DRPXH101 | VRN2DRSXH101 | VRN2DRSXH101 | VRN2DRSXH101 |
|                     |                                |      |                           | 35*      | VRN2DSPXG201      | VRN2DSSXG201 | VRN2DSPXH201 | VRN2DSSXG101 | VRN2DSPXH101 | VRN2DSSXH201 | VRN2DSPXH101 | VRN2DSSXH101 | VRN2DSSXH101 | VRN2DSSXH101 |
|                     |                                |      |                           |          |                   |              |              |              |              |              |              |              |              |              |

\* Full port ball

\*\* Differential pressure regulator operating range, ±5%

# Product Selection - Valves

## Pressure Independent Control Valves, NPT ½"-1¼" NEMA 2

| Actuator Features   |  |                                        |                     | Fail Safe       |                     |                 |                     |                 |                     |                 |  |
|---------------------|--|----------------------------------------|---------------------|-----------------|---------------------|-----------------|---------------------|-----------------|---------------------|-----------------|--|
| Actuator O.S Number |  |                                        |                     | MS7103A2021     |                     |                 |                     | MS7103A2221     |                     |                 |  |
| Power Supply        |  | Voltage                                | 24 VAC/DC           | 24 VAC/DC       |                     |                 |                     | 24 VAC/DC       |                     |                 |  |
|                     |  | Frequency                              | 50 / 60 Hz          | 50 / 60 Hz      |                     |                 |                     | 50 / 60 Hz      |                     |                 |  |
|                     |  | Power                                  | 4 VA                | 4 VA            |                     |                 |                     | 4 VA            |                     |                 |  |
| Actuator Torque     |  | (lb.-in.)                              | 27                  | 27              |                     |                 |                     | 27              |                     |                 |  |
| Control             |  | (0)2-10Vdc                             | •                   | •               |                     |                 |                     | •               |                     |                 |  |
|                     |  | 4-20 mA (w/ external 500 Ohm Resistor) | •                   | •               |                     |                 |                     | •               |                     |                 |  |
|                     |  | Floating                               |                     |                 |                     |                 |                     |                 |                     |                 |  |
|                     |  | Two-Position SPDT                      |                     |                 |                     |                 |                     |                 |                     |                 |  |
|                     |  | Two-Position SPST                      |                     |                 |                     |                 |                     |                 |                     |                 |  |
| Actuator Stroke     |  | (degrees)                              | 95° ± 3°            | 95° ± 3°        |                     |                 |                     | 95° ± 3°        |                     |                 |  |
| Timing              |  | (drive/spring return, seconds)         | 90 / 25             | 90 / 25         |                     |                 |                     | 90 / 25         |                     |                 |  |
| Aux Switch          |  |                                        | 0                   | 2               |                     |                 |                     |                 |                     |                 |  |
| Feedback            |  | 2-10 Vdc Built In                      | •                   | •               |                     |                 |                     | •               |                     |                 |  |
| Fail Safe Action    |  |                                        | Closed              | Open            |                     |                 |                     | Closed          |                     |                 |  |
| Normal Position     |  | (no signal)                            | Closed              | Open            |                     |                 |                     | Closed          |                     |                 |  |
| Valve Features      |  | Trim                                   | Nickel-Plated Brass | Stainless Steel | Nickel-Plated Brass | Stainless Steel | Nickel-Plated Brass | Stainless Steel | Nickel-Plated Brass | Stainless Steel |  |

| Valve Size (inches) | Differential Pressure** (psid) |      | Close-off Pressure (psid) | Max. GPM | Short Order Codes |              |              |              |              |              |              |              |  |  |  |  |  |  |  |  |
|---------------------|--------------------------------|------|---------------------------|----------|-------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--|--|--|--|--|--|--|--|
|                     | Min.                           | Max. |                           |          |                   |              |              |              |              |              |              |              |  |  |  |  |  |  |  |  |
| 1/2"                | 3.0                            | 35   | 100                       | 1        | VRN2ABPX201       | VRN2ABSXE201 | VRN2ABPX101  | VRN2ABSXE101 | VRN2ABPXF201 | VRN2ABSXF201 | VRN2ABPX101  | VRN2ABSXF101 |  |  |  |  |  |  |  |  |
|                     |                                |      |                           | 2        | VRN2ADPX201       | VRN2ADSXE201 | VRN2ADPX101  | VRN2ADSXE101 | VRN2ADPXF201 | VRN2ADSXF201 | VRN2ADPX101  | VRN2ADSXF101 |  |  |  |  |  |  |  |  |
|                     |                                |      |                           | 3        | VRN2AEPXE201      | VRN2AESXE201 | VRN2AEPXE101 | VRN2AESXE101 | VRN2AEPXF201 | VRN2AESXF201 | VRN2AEPXE101 | VRN2AESXF101 |  |  |  |  |  |  |  |  |
|                     |                                |      |                           | 4        | VRN2AFPXE201      | VRN2AFSXE201 | VRN2AFPXE101 | VRN2AFSXE101 | VRN2AFPXF201 | VRN2AFSXF201 | VRN2AFPXE101 | VRN2AFSXF101 |  |  |  |  |  |  |  |  |
|                     |                                |      |                           | 5        | VRN2AGPX201       | VRN2AGSXE201 | VRN2AGPX101  | VRN2AGSXE101 | VRN2AGPXF201 | VRN2AGSXF201 | VRN2AGPX101  | VRN2AGSXF101 |  |  |  |  |  |  |  |  |
|                     |                                |      |                           | 6        | VRN2AHPXE201      | VRN2AHSXE201 | VRN2AHPXE101 | VRN2AHSXE101 | VRN2AHPXF201 | VRN2AHSXF201 | VRN2AHPXE101 | VRN2AHSXF101 |  |  |  |  |  |  |  |  |
|                     |                                |      |                           | 7        | VRN2AJXE201       | VRN2AJSE201  | VRN2AJXE101  | VRN2AJSE101  | VRN2AJXF201  | VRN2AJSE201  | VRN2AJXF101  | VRN2AJSE101  |  |  |  |  |  |  |  |  |
| 3/4"                | 3.0                            | 35   | 100                       | 1        | VRN2BBPX201       | VRN2BBSXE201 | VRN2BBPX101  | VRN2BBSXE101 | VRN2BBPXF201 | VRN2BBSXF201 | VRN2BBPX101  | VRN2BBSXF101 |  |  |  |  |  |  |  |  |
|                     |                                |      |                           | 2        | VRN2BDPX201       | VRN2BDSXE201 | VRN2BDPX101  | VRN2BDSXE101 | VRN2BDPXF201 | VRN2BDSXF201 | VRN2BDPX101  | VRN2BDSXF101 |  |  |  |  |  |  |  |  |
|                     |                                |      |                           | 3        | VRN2BEPXE201      | VRN2BESXE201 | VRN2BEPXE101 | VRN2BESXE101 | VRN2BEPXF201 | VRN2BESXF201 | VRN2BEPXE101 | VRN2BESXF101 |  |  |  |  |  |  |  |  |
|                     |                                |      |                           | 4        | VRN2BFPXE201      | VRN2BFSXE201 | VRN2BFPXE101 | VRN2BFSXE101 | VRN2BFPXF201 | VRN2BFSXF201 | VRN2BFPXE101 | VRN2BFSXF101 |  |  |  |  |  |  |  |  |
|                     |                                |      |                           | 5        | VRN2BGPXE201      | VRN2BGSXE201 | VRN2BGPXE101 | VRN2BGSXE101 | VRN2BGPXF201 | VRN2BGSXF201 | VRN2BGPXE101 | VRN2BGSXF101 |  |  |  |  |  |  |  |  |
|                     |                                |      |                           | 6        | VRN2BHPXE201      | VRN2BHSXE201 | VRN2BHPXE101 | VRN2BHSXE101 | VRN2BHPXF201 | VRN2BHSXF201 | VRN2BHPXE101 | VRN2BHSXF101 |  |  |  |  |  |  |  |  |
|                     |                                |      |                           | 7        | VRN2BJXE201       | VRN2BJSXE201 | VRN2BJXE101  | VRN2BJSXE101 | VRN2BJXF201  | VRN2BJSXF201 | VRN2BJXE101  | VRN2BJSXF101 |  |  |  |  |  |  |  |  |
|                     | 6.0                            | 35   | 100                       | 8        | VRN2BKPXE201      | VRN2BKSXE201 | VRN2BKPXE101 | VRN2BKSXE101 | VRN2BKPF201  | VRN2BKSXF201 | VRN2BKPXE101 | VRN2BKSXF101 |  |  |  |  |  |  |  |  |
|                     |                                |      |                           | 9        | VRN2BLPX201       | VRN2BLSXE201 | VRN2BLPX101  | VRN2BLSXE101 | VRN2BLPF201  | VRN2BLSXF201 | VRN2BLPX101  | VRN2BLSXF101 |  |  |  |  |  |  |  |  |
|                     |                                |      |                           | 10*      | VRN2BMPXE201      | VRN2BMSXE201 | VRN2BMPXE101 | VRN2BMSXE101 | VRN2BMPXF201 | VRN2BMSXF201 | VRN2BMPXE101 | VRN2BMSXF101 |  |  |  |  |  |  |  |  |
| 1"                  | 3.0                            | 35   | 100                       | 1        | VRN2CBPX201       | VRN2CBSXE201 | VRN2CBPX101  | VRN2CBSXE101 | VRN2CBPXF201 | VRN2CBSXF201 | VRN2CBPX101  | VRN2CBSXF101 |  |  |  |  |  |  |  |  |
|                     |                                |      |                           | 2        | VRN2CDPX201       | VRN2CDSXE201 | VRN2CDPX101  | VRN2CDSXE101 | VRN2CDPXF201 | VRN2CDSXF201 | VRN2CDPX101  | VRN2CDSXF101 |  |  |  |  |  |  |  |  |
|                     |                                |      |                           | 3        | VRN2CEPX201       | VRN2CESXE201 | VRN2CEPX101  | VRN2CESXE101 | VRN2CEPXF201 | VRN2CESXF201 | VRN2CEPX101  | VRN2CESXF101 |  |  |  |  |  |  |  |  |
|                     |                                |      |                           | 4        | VRN2CFPX201       | VRN2CFSXE201 | VRN2CFPX101  | VRN2CFSXE101 | VRN2CFPXF201 | VRN2CFSXF201 | VRN2CFPX101  | VRN2CFSXF101 |  |  |  |  |  |  |  |  |
|                     |                                |      |                           | 5        | VRN2CGPX201       | VRN2CGSXE201 | VRN2CGPX101  | VRN2CGSXE101 | VRN2CGPXF201 | VRN2CGSXF201 | VRN2CGPX101  | VRN2CGSXF101 |  |  |  |  |  |  |  |  |
|                     |                                |      |                           | 6        | VRN2CHPX201       | VRN2CHSXE201 | VRN2CHPX101  | VRN2CHSXE101 | VRN2CHPXF201 | VRN2CHSXF201 | VRN2CHPX101  | VRN2CHSXF101 |  |  |  |  |  |  |  |  |
|                     |                                |      |                           | 7        | VRN2CJXE201       | VRN2CJSXE201 | VRN2CJXE101  | VRN2CJSXE101 | VRN2CJPF201  | VRN2CJSXF201 | VRN2CJXE101  | VRN2CJSXF101 |  |  |  |  |  |  |  |  |
|                     | 6.0                            | 35   | 100                       | 8        | VRN2CKPX201       | VRN2CKSXE201 | VRN2CKPX101  | VRN2CKSXE101 | VRN2CKPXF201 | VRN2CKSXF201 | VRN2CKPX101  | VRN2CKSXF101 |  |  |  |  |  |  |  |  |
|                     |                                |      |                           | 9        | VRN2CLPX201       | VRN2CLSXE201 | VRN2CLPX101  | VRN2CLSXE101 | VRN2CLPXF201 | VRN2CLSXF201 | VRN2CLPX101  | VRN2CLSXF101 |  |  |  |  |  |  |  |  |
|                     |                                |      |                           | 10       | VRN2CMPXE201      | VRN2CMSXE201 | VRN2CMPXE101 | VRN2CMSXE101 | VRN2CMPXF201 | VRN2CMSXF201 | VRN2CMPXE101 | VRN2CMSXF101 |  |  |  |  |  |  |  |  |
|                     | 4.0                            | 50   | 100                       | 15       | VRN2CNPXE201      | VRN2CNSXE201 | VRN2CNPXE101 | VRN2CNSXE101 | VRN2CNPXF201 | VRN2CNSXF201 | VRN2CNPXE101 | VRN2CNSXF101 |  |  |  |  |  |  |  |  |
|                     |                                |      |                           | 20       | VRN2CPPXE201      | VRN2CPSXE201 | VRN2CPPXE101 | VRN2CPSXE101 | VRN2CPPXF201 | VRN2CPSXF201 | VRN2CPPXE101 | VRN2CPSXF101 |  |  |  |  |  |  |  |  |
|                     |                                |      |                           | 10       | VRN2DMPXE201      | VRN2DMSXE201 | VRN2DMPXE101 | VRN2DMSXE101 | VRN2DMPXF201 | VRN2DMSXF201 | VRN2DMPXE101 | VRN2DMSXF101 |  |  |  |  |  |  |  |  |
|                     |                                |      |                           | 15       | VRN2DNPX201       | VRN2DNSXE201 | VRN2DNPX101  | VRN2DNSXE101 | VRN2DNPF201  | VRN2DNSXF201 | VRN2DNPX101  | VRN2DNSXF101 |  |  |  |  |  |  |  |  |
|                     |                                |      |                           | 20       | VRN2DPPXE201      | VRN2DPSXE201 | VRN2DPPXE101 | VRN2DPSXE101 | VRN2DPPXF201 | VRN2DPSXF201 | VRN2DPPXE101 | VRN2DPSXF101 |  |  |  |  |  |  |  |  |
| 1-1/4"              | 5.0                            | 50   | 100                       | 25       | VRN2DQPX201       | VRN2DQSXE201 | VRN2DQPX101  | VRN2DQSXE101 | VRN2DQPF201  | VRN2DQSXF201 | VRN2DQPX101  | VRN2DQSXF101 |  |  |  |  |  |  |  |  |
|                     |                                |      |                           | 30       | VRN2DRPX201       | VRN2DRSXE201 | VRN2DRPX101  | VRN2DRSXE101 | VRN2DRPF201  | VRN2DRSXF201 | VRN2DRPX101  | VRN2DRSXF101 |  |  |  |  |  |  |  |  |
|                     | 6.5                            | 50   | 100                       | 35*      | VRN2DSPXE201      | VRN2DSSXE201 | VRN2DSPXE101 | VRN2DSSXE101 | VRN2DSPXF201 | VRN2DSSXF201 | VRN2DSPXE101 | VRN2DSSXF101 |  |  |  |  |  |  |  |  |
|                     |                                |      |                           |          |                   |              |              |              |              |              |              |              |  |  |  |  |  |  |  |  |

\* Full port ball

\*\* Differential pressure regulator operating range, ±5%

# Product Selection - Valves

## Pressure Independent Control Valves, NPT ½"-1¼" NEMA 2

|                        |                                |              |                              | Actuator Features   |                     | Fail Safe                              |                     |                 |                     |                 |                     |                 |  |      |  |
|------------------------|--------------------------------|--------------|------------------------------|---------------------|---------------------|----------------------------------------|---------------------|-----------------|---------------------|-----------------|---------------------|-----------------|--|------|--|
|                        |                                |              |                              | Actuator O.S Number |                     | MS7503A2021                            |                     |                 |                     | MS7503A2221     |                     |                 |  |      |  |
|                        |                                |              |                              | Power Supply        |                     | Voltage                                |                     | 24 VAC/DC       |                     |                 |                     | 24 VAC/DC       |  |      |  |
|                        |                                |              |                              |                     |                     | Frequency                              |                     | 50 / 60 Hz      |                     |                 |                     | 50 / 60 Hz      |  |      |  |
|                        |                                |              |                              |                     |                     | Power                                  |                     | 4 VA            |                     |                 |                     | 4 VA            |  |      |  |
|                        |                                |              |                              | Actuator Torque     |                     | (lb. -in.)                             |                     | 27              |                     |                 |                     | 27              |  |      |  |
|                        |                                |              |                              | Control             |                     | (0)2-10Vdc                             |                     | •               |                     |                 |                     | •               |  |      |  |
|                        |                                |              |                              |                     |                     | 4-20 mA (w/ external 500 Ohm Resistor) |                     | •               |                     |                 |                     | •               |  |      |  |
|                        |                                |              |                              |                     |                     | Floating                               |                     | •               |                     |                 |                     | •               |  |      |  |
|                        |                                |              |                              |                     |                     | Two-Position SPDT                      |                     | •               |                     |                 |                     | •               |  |      |  |
|                        |                                |              |                              |                     |                     | Two-Position SPST                      |                     |                 |                     |                 |                     |                 |  |      |  |
|                        |                                |              |                              | Actuator Stroke     |                     | (degrees)                              |                     | 95° ± 3°        |                     |                 |                     | 95° ± 3°        |  |      |  |
|                        |                                |              |                              | Timing              |                     | (drive/spring return, seconds)         |                     | 90 / 25         |                     |                 |                     | 90 / 25         |  |      |  |
|                        |                                |              |                              | Aux Switch          |                     |                                        |                     | 0               |                     |                 |                     | 2               |  |      |  |
|                        |                                |              |                              | Feedback            |                     | 2-10 Vdc Built In                      |                     | •               |                     |                 |                     | •               |  |      |  |
|                        |                                |              |                              |                     |                     |                                        |                     | Closed          |                     | Open            |                     | Closed          |  | Open |  |
|                        |                                |              |                              | Closed              |                     | Open                                   |                     | Closed          |                     | Open            |                     |                 |  |      |  |
| Valve Features         |                                |              |                              | Trim                | Nickel-Plated Brass | Stainless Steel                        | Nickel-Plated Brass | Stainless Steel | Nickel-Plated Brass | Stainless Steel | Nickel-Plated Brass | Stainless Steel |  |      |  |
| Valve Size<br>(inches) | Differential Pressure** (psid) |              | Close-off Pressure<br>(psid) | Max. GPM            | Short Order Codes   |                                        |                     |                 |                     |                 |                     |                 |  |      |  |
|                        | Min.                           | Max.         |                              |                     |                     |                                        |                     |                 |                     |                 |                     |                 |  |      |  |
| 1/2"                   | 3.0                            | 35           | 100                          | 1                   | VRN2ABPXJ201        | VRN2ABSXJ201                           | VRN2ABPXJ101        | VRN2ABSXJ101    | VRN2ABPKX201        | VRN2ABSXK201    | VRN2ABPKX101        | VRN2ABSXK101    |  |      |  |
|                        |                                |              |                              | 2                   | VRN2ADPXJ201        | VRN2ADSXJ201                           | VRN2ADPXJ101        | VRN2ADSXJ101    | VRN2ADPKX201        | VRN2ADSXK201    | VRN2ADPKX101        | VRN2ADSXK101    |  |      |  |
|                        |                                |              |                              | 3                   | VRN2AEPXJ201        | VRN2AESXJ201                           | VRN2AEPXJ101        | VRN2AESXJ101    | VRN2AEPKX201        | VRN2AESXK201    | VRN2AEPKX101        | VRN2AESXK101    |  |      |  |
|                        |                                |              |                              | 4                   | VRN2AFPXJ201        | VRN2AFSXJ201                           | VRN2AFPXJ101        | VRN2AFSXJ101    | VRN2AFPKX201        | VRN2AFSXK201    | VRN2AFPKX101        | VRN2AFSXK101    |  |      |  |
|                        |                                |              |                              | 5                   | VRN2AGPXJ201        | VRN2AGSXJ201                           | VRN2AGPXJ101        | VRN2AGSXJ101    | VRN2AGPKX201        | VRN2AGSXK201    | VRN2AGPKX101        | VRN2AGSXK101    |  |      |  |
|                        |                                |              |                              | 6                   | VRN2AHPXJ201        | VRN2AHSXJ201                           | VRN2AHPXJ101        | VRN2AHSXJ101    | VRN2AHPKX201        | VRN2AHSXK201    | VRN2AHPKX101        | VRN2AHSXK101    |  |      |  |
|                        |                                |              |                              | 7                   | VRN2AJPXJ201        | VRN2AJSXJ201                           | VRN2AJPXJ101        | VRN2AJSXJ101    | VRN2AJPKX201        | VRN2AJSXK201    | VRN2AJPKX101        | VRN2AJSXK101    |  |      |  |
| 3/4"                   | 3.0                            | 35           | 100                          | 1                   | VRN2BBPXJ201        | VRN2BBSXJ201                           | VRN2BBPXJ101        | VRN2BBSXJ101    | VRN2BBPKX201        | VRN2BBSXK201    | VRN2BBPKX101        | VRN2BBSXK101    |  |      |  |
|                        |                                |              |                              | 2                   | VRN2BDPXJ201        | VRN2BDSXJ201                           | VRN2BDPXJ101        | VRN2BDSXJ101    | VRN2BDPKX201        | VRN2BDSXK201    | VRN2BDPKX101        | VRN2BDSXK101    |  |      |  |
|                        |                                |              |                              | 3                   | VRN2BEPXJ201        | VRN2BESXJ201                           | VRN2BEPXJ101        | VRN2BESXJ101    | VRN2BEPKX201        | VRN2BESXK201    | VRN2BEPKX101        | VRN2BESXK101    |  |      |  |
|                        |                                |              |                              | 4                   | VRN2BFPXJ201        | VRN2BFSXJ201                           | VRN2BFPXJ101        | VRN2BFSXJ101    | VRN2BFPKX201        | VRN2BFSXK201    | VRN2BFPKX101        | VRN2BFSXK101    |  |      |  |
|                        |                                |              |                              | 5                   | VRN2BGPXJ201        | VRN2BGSXJ201                           | VRN2BGPXJ101        | VRN2BGSXJ101    | VRN2BGPKX201        | VRN2BGSXK201    | VRN2BGPKX101        | VRN2BGSXK101    |  |      |  |
|                        |                                |              |                              | 6                   | VRN2BHPXJ201        | VRN2BHSXJ201                           | VRN2BHPXJ101        | VRN2BHSXJ101    | VRN2BHPKX201        | VRN2BHSXK201    | VRN2BHPKX101        | VRN2BHSXK101    |  |      |  |
|                        |                                |              |                              | 7                   | VRN2BJPXJ201        | VRN2BJSXJ201                           | VRN2BJPXJ101        | VRN2BJSXJ101    | VRN2BJPKX201        | VRN2BJSXK201    | VRN2BJPKX101        | VRN2BJSXK101    |  |      |  |
|                        |                                |              |                              | 8                   | VRN2BKPXJ201        | VRN2BKSXJ201                           | VRN2BKPXJ101        | VRN2BKSXJ101    | VRN2BKPKX201        | VRN2BKSXK201    | VRN2BKPKX101        | VRN2BKSXK101    |  |      |  |
|                        | 6.0                            | 9            | VRN2BLPXJ201                 | VRN2BLSXJ201        | VRN2BLPXJ101        | VRN2BLSXJ101                           | VRN2BLPKX201        | VRN2BLSXK201    | VRN2BLPKX101        | VRN2BLSXK101    |                     |                 |  |      |  |
|                        |                                | 10*          | VRN2BMPXJ201                 | VRN2BMSXJ201        | VRN2BMPXJ101        | VRN2BMSXJ101                           | VRN2BMPKX201        | VRN2BMSXK201    | VRN2BMPKX101        | VRN2BMSXK101    |                     |                 |  |      |  |
| 1"                     | 3.0                            | 35           | 100                          | 1                   | VRN2CBPXJ201        | VRN2CBSXJ201                           | VRN2CBPXJ101        | VRN2CBSXJ101    | VRN2CBPKX201        | VRN2CBSXK201    | VRN2CBPKX101        | VRN2CBSXK101    |  |      |  |
|                        |                                |              |                              | 2                   | VRN2CDPXJ201        | VRN2CDSXJ201                           | VRN2CDPXJ101        | VRN2CDSXJ101    | VRN2CDPKX201        | VRN2CDSXK201    | VRN2CDPKX101        | VRN2CDSXK101    |  |      |  |
|                        |                                |              |                              | 3                   | VRN2CEPXJ201        | VRN2CESXJ201                           | VRN2CEPXJ101        | VRN2CESXJ101    | VRN2CEPKX201        | VRN2CESXK201    | VRN2CEPKX101        | VRN2CESXK101    |  |      |  |
|                        |                                |              |                              | 4                   | VRN2CFPXJ201        | VRN2CFSXJ201                           | VRN2CFPXJ101        | VRN2CFSXJ101    | VRN2CFPKX201        | VRN2CFSXK201    | VRN2CFPKX101        | VRN2CFSXK101    |  |      |  |
|                        |                                |              |                              | 5                   | VRN2CGPXJ201        | VRN2CGSXJ201                           | VRN2CGPXJ101        | VRN2CGSXJ101    | VRN2CGPKX201        | VRN2CGSXK201    | VRN2CGPKX101        | VRN2CGSXK101    |  |      |  |
|                        |                                |              |                              | 6                   | VRN2CHPXJ201        | VRN2CHSXJ201                           | VRN2CHPXJ101        | VRN2CHSXJ101    | VRN2CHPKX201        | VRN2CHSXK201    | VRN2CHPKX101        | VRN2CHSXK101    |  |      |  |
|                        |                                |              |                              | 7                   | VRN2CJPXJ201        | VRN2CJSXJ201                           | VRN2CJPXJ101        | VRN2CJSXJ101    | VRN2CJPKX201        | VRN2CJSXK201    | VRN2CJPKX101        | VRN2CJSXK101    |  |      |  |
|                        |                                |              |                              | 8                   | VRN2CKPXJ201        | VRN2CKSXJ201                           | VRN2CKPXJ101        | VRN2CKSXJ101    | VRN2CKPKX201        | VRN2CKSXK201    | VRN2CKPKX101        | VRN2CKSXK101    |  |      |  |
|                        | 6.0                            | 9            | VRN2CLPXJ201                 | VRN2CLSXJ201        | VRN2CLPXJ101        | VRN2CLSXJ101                           | VRN2CLPKX201        | VRN2CLSXK201    | VRN2CLPKX101        | VRN2CLSXK101    |                     |                 |  |      |  |
|                        |                                | 10           | VRN2CMPXJ201                 | VRN2CMSXJ201        | VRN2CMPXJ101        | VRN2CMSXJ101                           | VRN2CMPKX201        | VRN2CMSXK201    | VRN2CMPKX101        | VRN2CMSXK101    |                     |                 |  |      |  |
| 1-1/4"                 | 4.0                            | 50           | 100                          | 15                  | VRN2CNPXJ201        | VRN2CNSXJ201                           | VRN2CNPXJ101        | VRN2CNSXJ101    | VRN2CNPXK201        | VRN2CNSXK201    | VRN2CNPXK101        | VRN2CNSXK101    |  |      |  |
|                        |                                |              |                              | 20                  | VRN2CPPXJ201        | VRN2CPSXJ201                           | VRN2CPPXJ101        | VRN2CPSXJ101    | VRN2CPPKX201        | VRN2CPSXK201    | VRN2CPPKX101        | VRN2CPSXK101    |  |      |  |
|                        |                                |              |                              | 10                  | VRN2DMPXJ201        | VRN2DMSXJ201                           | VRN2DMPXJ101        | VRN2DMSXJ101    | VRN2DMPKX201        | VRN2DMSXK201    | VRN2DMPKX101        | VRN2DMSXK101    |  |      |  |
|                        |                                |              |                              | 15                  | VRN2DNPXJ201        | VRN2DNSXJ201                           | VRN2DNPXJ101        | VRN2DNSXJ101    | VRN2DNPKX201        | VRN2DNSXK201    | VRN2DNPKX101        | VRN2DNSXK101    |  |      |  |
|                        |                                |              |                              | 20                  | VRN2DPPXJ201        | VRN2DPSXJ201                           | VRN2DPPXJ101        | VRN2DPSXJ101    | VRN2DPPKX201        | VRN2DPSXK201    | VRN2DPPKX101        | VRN2DPSXK101    |  |      |  |
|                        |                                |              |                              | 25                  | VRN2DQPXJ201        | VRN2DQSXJ201                           | VRN2DQPXJ101        | VRN2DQSXJ101    | VRN2DQPKX201        | VRN2DQSXK201    | VRN2DQPKX101        | VRN2DQSXK101    |  |      |  |
| 5.0                    | 30                             | VRN2DRPXJ201 | VRN2DRSXJ201                 | VRN2DRPXJ101        | VRN2DRSXJ101        | VRN2DRPKX201                           | VRN2DRSXK201        | VRN2DRPKX101    | VRN2DRSXK101        |                 |                     |                 |  |      |  |
|                        | 35*                            | VRN2DSPXJ201 | VRN2DSSXJ201                 | VRN2DSPXJ101        | VRN2DSSXJ101        | VRN2DSPKX201                           | VRN2DSSXK201        | VRN2DSPKX101    | VRN2DSSXK101        |                 |                     |                 |  |      |  |

# Product Selection - Valves

## Pressure Independent Control Valves, NPT ½"-1¼" NEMA 2

| Actuator Features                      |           | Fail Safe           |                 |                     |                 |
|----------------------------------------|-----------|---------------------|-----------------|---------------------|-----------------|
| Actuator O.S Number                    |           | MS8105A1030         |                 | MS8105A1130         |                 |
| Power Supply                           | Voltage   | 24 VAC/DC           |                 | 24 VAC/DC           |                 |
|                                        | Frequency | 50 / 60 Hz          |                 | 50 / 60 Hz          |                 |
|                                        | Power     | 6 VA                |                 | 6 VA                |                 |
| Actuator Torque (lb.-in.)              |           | 44                  |                 | 44                  |                 |
| Control (0)2-10Vdc                     |           |                     |                 |                     |                 |
| 4-20 mA (w/ external 500 Ohm Resistor) |           |                     |                 |                     |                 |
| Floating                               |           |                     |                 |                     |                 |
| Two-Position SPDT                      |           |                     |                 |                     |                 |
| Two-Position SPST                      |           | •                   |                 | •                   |                 |
| Actuator Stroke (degrees)              |           | 95° ± 3°            |                 | 95° ± 3°            |                 |
| Timing (drive/spring return, seconds)  |           | 45 / 25             |                 | 45 / 25             |                 |
| Aux Switch                             |           | 0                   |                 | 1                   |                 |
| Feedback 2-10 Vdc Built In             |           |                     |                 |                     |                 |
| Fail Safe Action                       |           | Closed              | Open            | Closed              | Open            |
| Normal Position (no signal)            |           | Closed              | Open            | Closed              | Open            |
| Valve Features Trim                    |           | Nickel-Plated Brass | Stainless Steel | Nickel-Plated Brass | Stainless Steel |

| Valve Size (inches) | Differential Pressure** (psid) |      | Close-off Pressure (psid) | Max. GPM | Short Order Codes |              |              |              |              |              |              |              |              |              |
|---------------------|--------------------------------|------|---------------------------|----------|-------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
|                     | Min.                           | Max. |                           |          |                   |              |              |              |              |              |              |              |              |              |
| 1/2"                | 3.0                            | 35   | 100                       | 1        | VRN2ABPX7200      | VRN2ABSX7200 | VRN2ABPX7100 | VRN2ABSX7100 | VRN2ABPX7200 | VRN2ABSX7200 | VRN2ABPX7100 | VRN2ABSX7100 | VRN2ABPX7200 | VRN2ABSX7200 |
|                     |                                |      |                           | 2        | VRN2ADPX7200      | VRN2ADSX7200 | VRN2ADPX7100 | VRN2ADSX7100 | VRN2ADPX7200 | VRN2ADSX7200 | VRN2ADPX7100 | VRN2ADSX7100 | VRN2ADPX7200 | VRN2ADSX7200 |
|                     |                                |      |                           | 3        | VRN2AEPX7200      | VRN2AESX7200 | VRN2AEPX7100 | VRN2AESX7100 | VRN2AEPX7200 | VRN2AESX7200 | VRN2AEPX7100 | VRN2AESX7100 | VRN2AEPX7200 | VRN2AESX7200 |
|                     |                                |      |                           | 4        | VRN2AFPX7200      | VRN2AFSX7200 | VRN2AFPX7100 | VRN2AFSX7100 | VRN2AFPX7200 | VRN2AFSX7200 | VRN2AFPX7100 | VRN2AFSX7100 | VRN2AFPX7200 | VRN2AFSX7200 |
|                     |                                |      |                           | 5        | VRN2AGPX7200      | VRN2AGSX7200 | VRN2AGPX7100 | VRN2AGSX7100 | VRN2AGPX7200 | VRN2AGSX7200 | VRN2AGPX7100 | VRN2AGSX7100 | VRN2AGPX7200 | VRN2AGSX7200 |
|                     |                                |      |                           | 6        | VRN2AHPX7200      | VRN2AHSX7200 | VRN2AHPX7100 | VRN2AHSX7100 | VRN2AHPX7200 | VRN2AHSX7200 | VRN2AHPX7100 | VRN2AHSX7100 | VRN2AHPX7200 | VRN2AHSX7200 |
|                     |                                |      |                           | 7        | VRN2AJPX7200      | VRN2AJSX7200 | VRN2AJPX7100 | VRN2AJSX7100 | VRN2AJPX7200 | VRN2AJSX7200 | VRN2AJPX7100 | VRN2AJSX7100 | VRN2AJPX7200 | VRN2AJSX7200 |
| 3/4"                | 3.0                            | 35   | 100                       | 1        | VRN2BBPX7200      | VRN2BBSX7200 | VRN2BBPX7100 | VRN2BBSX7100 | VRN2BBPX7200 | VRN2BBSX7200 | VRN2BBPX7100 | VRN2BBSX7100 | VRN2BBPX7200 | VRN2BBSX7200 |
|                     |                                |      |                           | 2        | VRN2BDPX7200      | VRN2BDSX7200 | VRN2BDPX7100 | VRN2BDSX7100 | VRN2BDPX7200 | VRN2BDSX7200 | VRN2BDPX7100 | VRN2BDSX7100 | VRN2BDPX7200 | VRN2BDSX7200 |
|                     |                                |      |                           | 3        | VRN2BEPX7200      | VRN2BESX7200 | VRN2BEPX7100 | VRN2BESX7100 | VRN2BEPX7200 | VRN2BESX7200 | VRN2BEPX7100 | VRN2BESX7100 | VRN2BEPX7200 | VRN2BESX7200 |
|                     |                                |      |                           | 4        | VRN2BFPX7200      | VRN2BFSX7200 | VRN2BFPX7100 | VRN2BFSX7100 | VRN2BFPX7200 | VRN2BFSX7200 | VRN2BFPX7100 | VRN2BFSX7100 | VRN2BFPX7200 | VRN2BFSX7200 |
|                     |                                |      |                           | 5        | VRN2BGPX7200      | VRN2BGSX7200 | VRN2BGPX7100 | VRN2BGSX7100 | VRN2BGPX7200 | VRN2BGSX7200 | VRN2BGPX7100 | VRN2BGSX7100 | VRN2BGPX7200 | VRN2BGSX7200 |
|                     |                                |      |                           | 6        | VRN2BHPX7200      | VRN2BHSX7200 | VRN2BHPX7100 | VRN2BHSX7100 | VRN2BHPX7200 | VRN2BHSX7200 | VRN2BHPX7100 | VRN2BHSX7100 | VRN2BHPX7200 | VRN2BHSX7200 |
|                     | 6.0                            | 35   | 100                       | 7        | VRN2BJPX7200      | VRN2BJSX7200 | VRN2BJPX7100 | VRN2BJSX7100 | VRN2BJPX7200 | VRN2BJSX7200 | VRN2BJPX7100 | VRN2BJSX7100 | VRN2BJPX7200 | VRN2BJSX7200 |
|                     |                                |      |                           | 8        | VRN2BKPX7200      | VRN2BKSX7200 | VRN2BKPX7100 | VRN2BKSX7100 | VRN2BKPX7200 | VRN2BKSX7200 | VRN2BKPX7100 | VRN2BKSX7100 | VRN2BKPX7200 | VRN2BKSX7200 |
|                     |                                |      |                           | 9        | VRN2BLPX7200      | VRN2BLSX7200 | VRN2BLPX7100 | VRN2BLSX7100 | VRN2BLPX7200 | VRN2BLSX7200 | VRN2BLPX7100 | VRN2BLSX7100 | VRN2BLPX7200 | VRN2BLSX7200 |
|                     |                                |      |                           | 10*      | VRN2BMPX7200      | VRN2BMSX7200 | VRN2BMPX7100 | VRN2BMSX7100 | VRN2BMPX7200 | VRN2BMSX7200 | VRN2BMPX7100 | VRN2BMSX7100 | VRN2BMPX7200 | VRN2BMSX7200 |
| 1"                  | 3.0                            | 35   | 100                       | 1        | VRN2CBPX7200      | VRN2CBSX7200 | VRN2CBPX7100 | VRN2CBSX7100 | VRN2CBPX7200 | VRN2CBSX7200 | VRN2CBPX7100 | VRN2CBSX7100 | VRN2CBPX7200 | VRN2CBSX7200 |
|                     |                                |      |                           | 2        | VRN2CDPX7200      | VRN2CDSX7200 | VRN2CDPX7100 | VRN2CDSX7100 | VRN2CDPX7200 | VRN2CDSX7200 | VRN2CDPX7100 | VRN2CDSX7100 | VRN2CDPX7200 | VRN2CDSX7200 |
|                     |                                |      |                           | 3        | VRN2CEPX7200      | VRN2CESX7200 | VRN2CEPX7100 | VRN2CESX7100 | VRN2CEPX7200 | VRN2CESX7200 | VRN2CEPX7100 | VRN2CESX7100 | VRN2CEPX7200 | VRN2CESX7200 |
|                     |                                |      |                           | 4        | VRN2CFPX7200      | VRN2CFSX7200 | VRN2CFPX7100 | VRN2CFSX7100 | VRN2CFPX7200 | VRN2CFSX7200 | VRN2CFPX7100 | VRN2CFSX7100 | VRN2CFPX7200 | VRN2CFSX7200 |
|                     |                                |      |                           | 5        | VRN2CGPX7200      | VRN2CGSX7200 | VRN2CGPX7100 | VRN2CGSX7100 | VRN2CGPX7200 | VRN2CGSX7200 | VRN2CGPX7100 | VRN2CGSX7100 | VRN2CGPX7200 | VRN2CGSX7200 |
|                     |                                |      |                           | 6        | VRN2CHPX7200      | VRN2CHSX7200 | VRN2CHPX7100 | VRN2CHSX7100 | VRN2CHPX7200 | VRN2CHSX7200 | VRN2CHPX7100 | VRN2CHSX7100 | VRN2CHPX7200 | VRN2CHSX7200 |
|                     | 6.0                            | 35   | 100                       | 7        | VRN2CJPX7200      | VRN2CJSX7200 | VRN2CJPX7100 | VRN2CJSX7100 | VRN2CJPX7200 | VRN2CJSX7200 | VRN2CJPX7100 | VRN2CJSX7100 | VRN2CJPX7200 | VRN2CJSX7200 |
|                     |                                |      |                           | 8        | VRN2CKPX7200      | VRN2CKSX7200 | VRN2CKPX7100 | VRN2CKSX7100 | VRN2CKPX7200 | VRN2CKSX7200 | VRN2CKPX7100 | VRN2CKSX7100 | VRN2CKPX7200 | VRN2CKSX7200 |
|                     |                                |      |                           | 9        | VRN2CLPX7200      | VRN2CLSX7200 | VRN2CLPX7100 | VRN2CLSX7100 | VRN2CLPX7200 | VRN2CLSX7200 | VRN2CLPX7100 | VRN2CLSX7100 | VRN2CLPX7200 | VRN2CLSX7200 |
|                     |                                |      |                           | 10       | VRN2CMPX7200      | VRN2CMSX7200 | VRN2CMPX7100 | VRN2CMSX7100 | VRN2CMPX7200 | VRN2CMSX7200 | VRN2CMPX7100 | VRN2CMSX7100 | VRN2CMPX7200 | VRN2CMSX7200 |
| 1-1/4"              | 4.0                            | 50   | 100                       | 15       | VRN2CNPX7200      | VRN2CNSX7200 | VRN2CNPX7100 | VRN2CNSX7100 | VRN2CNPX7200 | VRN2CNSX7200 | VRN2CNPX7100 | VRN2CNSX7100 | VRN2CNPX7200 | VRN2CNSX7200 |
|                     |                                |      |                           | 20       | VRN2CPPX7200      | VRN2CPSX7200 | VRN2CPPX7100 | VRN2CPSX7100 | VRN2CPPX7200 | VRN2CPSX7200 | VRN2CPPX7100 | VRN2CPSX7100 | VRN2CPPX7200 | VRN2CPSX7200 |
|                     |                                |      |                           | 10       | VRN2DMPX7200      | VRN2DMSX7200 | VRN2DMPX7100 | VRN2DMSX7100 | VRN2DMPX7200 | VRN2DMSX7200 | VRN2DMPX7100 | VRN2DMSX7100 | VRN2DMPX7200 | VRN2DMSX7200 |
|                     |                                |      |                           | 15       | VRN2DNPX7200      | VRN2DNSX7200 | VRN2DNPX7100 | VRN2DNSX7100 | VRN2DNPX7200 | VRN2DNSX7200 | VRN2DNPX7100 | VRN2DNSX7100 | VRN2DNPX7200 | VRN2DNSX7200 |
|                     | 5.0                            | 50   | 100                       | 20       | VRN2DPPX7200      | VRN2DPSX7200 | VRN2DPPX7100 | VRN2DPSX7100 | VRN2DPPX7200 | VRN2DPSX7200 | VRN2DPPX7100 | VRN2DPSX7100 | VRN2DPPX7200 | VRN2DPSX7200 |
|                     |                                |      |                           | 25       | VRN2DQPX7200      | VRN2DQSX7200 | VRN2DQPX7100 | VRN2DQSX7100 | VRN2DQPX7200 | VRN2DQSX7200 | VRN2DQPX7100 | VRN2DQSX7100 | VRN2DQPX7200 | VRN2DQSX7200 |
|                     |                                |      |                           | 30       | VRN2DRPX7200      | VRN2DRSX7200 | VRN2DRPX7100 | VRN2DRSX7100 | VRN2DRPX7200 | VRN2DRSX7200 | VRN2DRPX7100 | VRN2DRSX7100 | VRN2DRPX7200 | VRN2DRSX7200 |
|                     | 6.5                            |      |                           | 35*      | VRN2DSPX7200      | VRN2DSSX7200 | VRN2DSPX7100 | VRN2DSSX7100 | VRN2DSPX7200 | VRN2DSSX7200 | VRN2DSPX7100 | VRN2DSSX7100 | VRN2DSPX7200 | VRN2DSSX7200 |

\* Full port ball

\*\* Differential pressure regulator operating range, ±5%

# Product Selection - Valves

## Pressure Independent Control Valves, NPT ½"-1¼" NEMA 2

| Actuator Features                        |           | Fail Safe   |                     |                 |                     |                 |                     |                 |                     |                 |
|------------------------------------------|-----------|-------------|---------------------|-----------------|---------------------|-----------------|---------------------|-----------------|---------------------|-----------------|
| Actuator O.S Number                      |           | MS4105A1030 |                     |                 |                     | MS4105A1130     |                     |                 |                     |                 |
| Power Supply                             | Voltage   | 100-250 VAC |                     |                 |                     | 100-250 VAC     |                     |                 |                     |                 |
|                                          | Frequency | 50 / 60 Hz  |                     |                 |                     | 50 / 60 Hz      |                     |                 |                     |                 |
|                                          | Power     | 6 VA        |                     |                 |                     | 6 VA            |                     |                 |                     |                 |
| Actuator Torque<br>(lb.-in.)             |           | 44          |                     |                 |                     | 44              |                     |                 |                     |                 |
| Control<br>(0)2-10Vdc                    |           |             |                     |                 |                     |                 |                     |                 |                     |                 |
| 4-20 mA (w/ external 500 Ohm Resistor)   |           |             |                     |                 |                     |                 |                     |                 |                     |                 |
| Floating                                 |           |             |                     |                 |                     |                 |                     |                 |                     |                 |
| Two-Position SPDT                        |           |             |                     |                 |                     |                 |                     |                 |                     |                 |
| Two-Position SPST                        |           | •           |                     |                 |                     | •               |                     |                 |                     |                 |
| Actuator Stroke<br>(degrees)             |           | 95° ± 3°    |                     |                 |                     | 95° ± 3°        |                     |                 |                     |                 |
| Timing<br>(drive/spring return, seconds) |           | 45 / 25     |                     |                 |                     | 45 / 25         |                     |                 |                     |                 |
| Aux Switch                               |           | 0           |                     |                 |                     | 1               |                     |                 |                     |                 |
| Feedback<br>2-10 Vdc Built In            |           |             |                     |                 |                     |                 |                     |                 |                     |                 |
| Fail Safe Action                         |           | Closed      |                     | Open            |                     | Closed          |                     | Open            |                     |                 |
| Normal Position<br>(no signal)           |           | Closed      |                     | Open            |                     | Closed          |                     | Open            |                     |                 |
| Valve Features                           |           | Trim        | Nickel-Plated Brass | Stainless Steel | Nickel-Plated Brass | Stainless Steel | Nickel-Plated Brass | Stainless Steel | Nickel-Plated Brass | Stainless Steel |

| Valve Size (inches) | Differential Pressure** (psid) |      | Close-off Pressure (psid) | Max. GPM | Short Order Codes |              |              |              |              |              |              |              |  |  |
|---------------------|--------------------------------|------|---------------------------|----------|-------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--|--|
|                     | Min.                           | Max. |                           |          |                   |              |              |              |              |              |              |              |  |  |
| 1/2"                | 3.0                            | 35   | 100                       | 1        | VRN2ABPX8200      | VRN2ABSX8200 | VRN2ABPX8100 | VRN2ABSX8100 | VRN2ABPX9200 | VRN2ABSX9200 | VRN2ABPX9100 | VRN2ABSX9100 |  |  |
|                     |                                |      |                           | 2        | VRN2ADPX8200      | VRN2ADSX8200 | VRN2ADPX8100 | VRN2ADSX8100 | VRN2ADPX9200 | VRN2ADSX9200 | VRN2ADPX9100 | VRN2ADSX9100 |  |  |
|                     |                                |      |                           | 3        | VRN2AEPX8200      | VRN2AESX8200 | VRN2AEPX8100 | VRN2AESX8100 | VRN2AEPX9200 | VRN2AESX9200 | VRN2AEPX9100 | VRN2AESX9100 |  |  |
|                     |                                |      |                           | 4        | VRN2AFPX8200      | VRN2AFSX8200 | VRN2AFPX8100 | VRN2AFSX8100 | VRN2AFPX9200 | VRN2AFSX9200 | VRN2AFPX9100 | VRN2AFSX9100 |  |  |
|                     |                                |      |                           | 5        | VRN2AGPX8200      | VRN2AGSX8200 | VRN2AGPX8100 | VRN2AGSX8100 | VRN2AGPX9200 | VRN2AGSX9200 | VRN2AGPX9100 | VRN2AGSX9100 |  |  |
|                     |                                |      |                           | 6        | VRN2AHPX8200      | VRN2AHSX8200 | VRN2AHPX8100 | VRN2AHSX8100 | VRN2AHPX9200 | VRN2AHSX9200 | VRN2AHPX9100 | VRN2AHSX9100 |  |  |
|                     |                                |      |                           | 7        | VRN2AJPX8200      | VRN2AJSX8200 | VRN2AJPX8100 | VRN2AJSX8100 | VRN2AJPX9200 | VRN2AJSX9200 | VRN2AJPX9100 | VRN2AJSX9100 |  |  |
| 3/4"                | 3.0                            | 35   | 100                       | 1        | VRN2BBPX8200      | VRN2BBSX8200 | VRN2BBPX8100 | VRN2BBSX8100 | VRN2BBPX9200 | VRN2BBSX9200 | VRN2BBPX9100 | VRN2BBSX9100 |  |  |
|                     |                                |      |                           | 2        | VRN2BDPX8200      | VRN2BDSX8200 | VRN2BDPX8100 | VRN2BDSX8100 | VRN2BDPX9200 | VRN2BDSX9200 | VRN2BDPX9100 | VRN2BDSX9100 |  |  |
|                     |                                |      |                           | 3        | VRN2BEPX8200      | VRN2BESX8200 | VRN2BEPX8100 | VRN2BESX8100 | VRN2BEPX9200 | VRN2BESX9200 | VRN2BEPX9100 | VRN2BESX9100 |  |  |
|                     |                                |      |                           | 4        | VRN2BFPX8200      | VRN2BFSX8200 | VRN2BFPX8100 | VRN2BFSX8100 | VRN2BFPX9200 | VRN2BFSX9200 | VRN2BFPX9100 | VRN2BFSX9100 |  |  |
|                     |                                |      |                           | 5        | VRN2BGPX8200      | VRN2BGSX8200 | VRN2BGPX8100 | VRN2BGSX8100 | VRN2BGPX9200 | VRN2BGSX9200 | VRN2BGPX9100 | VRN2BGSX9100 |  |  |
|                     |                                |      |                           | 6        | VRN2BHPX8200      | VRN2BHSX8200 | VRN2BHPX8100 | VRN2BHSX8100 | VRN2BHPX9200 | VRN2BHSX9200 | VRN2BHPX9100 | VRN2BHSX9100 |  |  |
|                     |                                |      |                           | 7        | VRN2BJPX8200      | VRN2BJSX8200 | VRN2BJPX8100 | VRN2BJSX8100 | VRN2BJPX9200 | VRN2BJSX9200 | VRN2BJPX9100 | VRN2BJSX9100 |  |  |
|                     | 6.0                            | 35   | 100                       | 8        | VRN2BKPX8200      | VRN2BKSX8200 | VRN2BKPX8100 | VRN2BKSX8100 | VRN2BKPX9200 | VRN2BKSX9200 | VRN2BKPX9100 | VRN2BKSX9100 |  |  |
|                     |                                |      |                           | 9        | VRN2BLPX8200      | VRN2BLSX8200 | VRN2BLPX8100 | VRN2BLSX8100 | VRN2BLPX9200 | VRN2BLSX9200 | VRN2BLPX9100 | VRN2BLSX9100 |  |  |
|                     |                                |      |                           | 10*      | VRN2BMPX8200      | VRN2BMSX8200 | VRN2BMPX8100 | VRN2BMSX8100 | VRN2BMPX9200 | VRN2BMSX9200 | VRN2BMPX9100 | VRN2BMSX9100 |  |  |
| 1"                  | 3.0                            | 35   | 100                       | 1        | VRN2CBPX8200      | VRN2CBSX8200 | VRN2CBPX8100 | VRN2CBSX8100 | VRN2CBPX9200 | VRN2CBSX9200 | VRN2CBPX9100 | VRN2CBSX9100 |  |  |
|                     |                                |      |                           | 2        | VRN2CDPX8200      | VRN2CDSX8200 | VRN2CDPX8100 | VRN2CDSX8100 | VRN2CDPX9200 | VRN2CDSX9200 | VRN2CDPX9100 | VRN2CDSX9100 |  |  |
|                     |                                |      |                           | 3        | VRN2CEPX8200      | VRN2CESX8200 | VRN2CEPX8100 | VRN2CESX8100 | VRN2CEPX9200 | VRN2CESX9200 | VRN2CEPX9100 | VRN2CESX9100 |  |  |
|                     |                                |      |                           | 4        | VRN2CFPX8200      | VRN2CFSX8200 | VRN2CFPX8100 | VRN2CFSX8100 | VRN2CFPX9200 | VRN2CFSX9200 | VRN2CFPX9100 | VRN2CFSX9100 |  |  |
|                     |                                |      |                           | 5        | VRN2CGPX8200      | VRN2CGSX8200 | VRN2CGPX8100 | VRN2CGSX8100 | VRN2CGPX9200 | VRN2CGSX9200 | VRN2CGPX9100 | VRN2CGSX9100 |  |  |
|                     |                                |      |                           | 6        | VRN2CHPX8200      | VRN2CHSX8200 | VRN2CHPX8100 | VRN2CHSX8100 | VRN2CHPX9200 | VRN2CHSX9200 | VRN2CHPX9100 | VRN2CHSX9100 |  |  |
|                     |                                |      |                           | 7        | VRN2CJPX8200      | VRN2CJSX8200 | VRN2CJPX8100 | VRN2CJSX8100 | VRN2CJPX9200 | VRN2CJSX9200 | VRN2CJPX9100 | VRN2CJSX9100 |  |  |
|                     | 6.0                            | 35   | 100                       | 8        | VRN2CKPX8200      | VRN2CKSX8200 | VRN2CKPX8100 | VRN2CKSX8100 | VRN2CKPX9200 | VRN2CKSX9200 | VRN2CKPX9100 | VRN2CKSX9100 |  |  |
|                     |                                |      |                           | 9        | VRN2CLPX8200      | VRN2CLSX8200 | VRN2CLPX8100 | VRN2CLSX8100 | VRN2CLPX9200 | VRN2CLSX9200 | VRN2CLPX9100 | VRN2CLSX9100 |  |  |
|                     |                                |      |                           | 10       | VRN2CMPX8200      | VRN2CMSX8200 | VRN2CMPX8100 | VRN2CMSX8100 | VRN2CMPX9200 | VRN2CMSX9200 | VRN2CMPX9100 | VRN2CMSX9100 |  |  |
|                     | 4.0                            | 50   | 100                       | 15       | VRN2CNPX8200      | VRN2CNSX8200 | VRN2CNPX8100 | VRN2CNSX8100 | VRN2CNPX9200 | VRN2CNSX9200 | VRN2CNPX9100 | VRN2CNSX9100 |  |  |
|                     |                                |      |                           | 20       | VRN2CPPX8200      | VRN2CPSX8200 | VRN2CPPX8100 | VRN2CPSX8100 | VRN2CPPX9200 | VRN2CPSX9200 | VRN2CPPX9100 | VRN2CPSX9100 |  |  |
|                     |                                |      |                           | 10       | VRN2DMPX8200      | VRN2DMSX8200 | VRN2DMPX8100 | VRN2DMSX8100 | VRN2DMPX9200 | VRN2DMSX9200 | VRN2DMPX9100 | VRN2DMSX9100 |  |  |
|                     |                                |      |                           | 15       | VRN2DNPX8200      | VRN2DNSX8200 | VRN2DNPX8100 | VRN2DNSX8100 | VRN2DNPX9200 | VRN2DNSX9200 | VRN2DNPX9100 | VRN2DNSX9100 |  |  |
|                     |                                |      |                           | 20       | VRN2DPPX8200      | VRN2DPSX8200 | VRN2DPPX8100 | VRN2DPSX8100 | VRN2DPPX9200 | VRN2DPSX9200 | VRN2DPPX9100 | VRN2DPSX9100 |  |  |
| 1-1/4"              | 4.0                            | 50   | 100                       | 25       | VRN2DQPX8200      | VRN2DQSX8200 | VRN2DQPX8100 | VRN2DQSX8100 | VRN2DQPX9200 | VRN2DQSX9200 | VRN2DQPX9100 | VRN2DQSX9100 |  |  |
|                     |                                |      |                           | 30       | VRN2DRPX8200      | VRN2DRSX8200 | VRN2DRPX8100 | VRN2DRSX8100 | VRN2DRPX9200 | VRN2DRSX9200 | VRN2DRPX9100 | VRN2DRSX9100 |  |  |
|                     |                                |      |                           | 35*      | VRN2DSPX8200      | VRN2DSSX8200 | VRN2DSPX8100 | VRN2DSSX8100 | VRN2DSPX9200 | VRN2DSSX9200 | VRN2DSPX9100 | VRN2DSSX9100 |  |  |
|                     |                                |      |                           |          |                   |              |              |              |              |              |              |              |  |  |
|                     |                                |      |                           |          |                   |              |              |              |              |              |              |              |  |  |

\* Full port ball

\*\* Differential pressure regulator operating range, ±5%

# Product Selection - Valves

## Pressure Independent Control Valves, NPT 1½"-3" NEMA 2

### Common Features

- Sizes from 1/2 to 3 in. with internal (female) NPT connections.
- Controls hot or chilled water with up to 50% glycol.
- Regulated flow rates available from 1 to 95 gpm.
- Differential pressure regulator for constant pressure drop across valve seat.
- Positive pressure, rolling diaphragm regulator design for long service life for flow control accuracy of ±5% over specified control range.
- Equal percentage flow characteristic using patented flow control ball insert.

| Actuator Features   |                                        | Non Fail Safe |                                                                         |
|---------------------|----------------------------------------|---------------|-------------------------------------------------------------------------|
| Actuator O.S Number |                                        | MN6105A1011   | MN6105A1201                                                             |
| Power Supply        | Voltage                                | 24 VAC/DC     | 24 VAC/DC                                                               |
|                     | Frequency                              | 50 / 60 Hz    | 50 / 60 Hz                                                              |
|                     | Power                                  | 5 VA          | 5 VA                                                                    |
| Actuator Torque     | (lb.-in.)                              | 44            | 44                                                                      |
| Control             | (0)2-10Vdc                             |               |                                                                         |
|                     | 4-20 mA (w/ external 500 Ohm Resistor) |               |                                                                         |
|                     | Floating                               | •             | •                                                                       |
|                     | Two-Position SPDT                      | •             | •                                                                       |
|                     | Two-Position SPST                      |               |                                                                         |
|                     |                                        |               |                                                                         |
| Actuator Stroke     | (degrees)                              | 95° ± 3°      | 95° ± 3°                                                                |
| Timing              | (drive/spring return, seconds)         | 90            | 90                                                                      |
| Aux Switch          |                                        | 0             | 2                                                                       |
| Feedback            | 2-10 Vdc Built In                      | -             | -                                                                       |
| Fail Safe Action    |                                        | Stay in Place | Stay in Place                                                           |
| Normal Position     | (no signal)                            | Stay in Place | Stay in Place                                                           |
| Valve Features      |                                        | Trim          | Nickel-Plated Brass Stainless Steel Nickel-Plated Brass Stainless Steel |

| Valve Size<br>(inches) | Differential Pressure** (psid) |      | Close-off<br>Pressure (psid) | Max. GPM     | Short Order Codes |              |              |              |              |
|------------------------|--------------------------------|------|------------------------------|--------------|-------------------|--------------|--------------|--------------|--------------|
|                        | Min.                           | Max. |                              |              |                   |              |              |              |              |
| 1-1/2"                 | 4                              | 50   | 100                          | 10           | VRN2EMPX4000      | VRN2EMXS4000 | VRN2EMPXC000 | VRN2EMSXC000 |              |
|                        |                                |      |                              | 15           | VRN2ENPX4000      | VRN2ENSX4000 | VRN2ENPXC000 | VRN2ENSXC000 |              |
|                        |                                |      |                              | 20           | VRN2EPPX4000      | VRN2EPSX4000 | VRN2EPPXC000 | VRN2EPSXC000 |              |
|                        |                                |      |                              | 25           | VRN2EQPX4000      | VRN2EQSX4000 | VRN2EQPXC000 | VRN2EQSXC000 |              |
|                        | 5                              |      |                              | 30           | VRN2ERPX4000      | VRN2ERSX4000 | VRN2ERPXC000 | VRN2ERSXC000 |              |
|                        |                                |      |                              | 35           | VRN2ESPX4000      | VRN2ESSX4000 | VRN2ESPC000  | VRN2ESSXC000 |              |
|                        | 4                              |      |                              | 40           | VRN2ETPX4000      | VRN2ETSX4000 | VRN2ETPXC000 | VRN2ETSXC000 |              |
|                        |                                |      |                              | 45           | VRN2EUPX4000      | VRN2EUSX4000 | VRN2EUPXC000 | VRN2EUSXC000 |              |
|                        | 6                              | 58   |                              | 50           | VRN2E1PX4000      | VRN2E1SX4000 | VRN2E1PXC000 | VRN2E1SXC000 |              |
|                        |                                |      |                              | 55           | VRN2E2PX4000      | VRN2E2SX4000 | VRN2E2PXC000 | VRN2E2SXC000 |              |
|                        |                                |      |                              | 60           | VRN2E3PX4000      | VRN2E3SX4000 | VRN2E3PXC000 | VRN2E3SXC000 |              |
|                        |                                |      |                              | 65           | VRN2E4PX4000      | VRN2E4SX4000 | VRN2E4PXC000 | VRN2E4SXC000 |              |
|                        |                                |      |                              | 70           | VRN2E5PX4000      | VRN2E5SX4000 | VRN2E5PXC000 | VRN2E5SXC000 |              |
|                        |                                |      |                              | 75           | VRN262PX4000      | VRN262SX4000 | VRN262PXC000 | VRN262SXC000 |              |
|                        |                                |      |                              | 80           | VRN2E7PX4000      | VRN2E7SX4000 | VRN2E7PXC000 | VRN2E7SXC000 |              |
|                        | 7                              |      |                              | 85           | VRN2E8PX4000      | VRN2E8SX4000 | VRN2E8PXC000 | VRN2E8SXC000 |              |
|                        |                                |      |                              | 95           | VRN2E9PX4000      | VRN2E9SX4000 | VRN2E9PXC000 | VRN2E9SXC000 |              |
| 11                     |                                |      | VRN2EQPX4000                 | VRN2EQSX4000 | VRN2EQPXC000      | VRN2EQSXC000 |              |              |              |
| 2"                     | 4                              | 58   | 100                          | 25           | VRN2FQPX4000      | VRN2FQSX4000 | VRN2FQPXC000 | VRN2FQSC000  |              |
|                        |                                |      |                              | 30           | VRN2FRPX4000      | VRN2FRSX4000 | VRN2FRPXC000 | VRN2FRSXC000 |              |
|                        |                                |      |                              | 35           | VRN2FSPX4000      | VRN2FSSX4000 | VRN2FSPXC000 | VRN2FSSXC000 |              |
|                        |                                |      |                              | 40           | VRN2FTPX4000      | VRN2FTSX4000 | VRN2FTPXC000 | VRN2FTSXC000 |              |
|                        | 6                              |      |                              |              | 45                | VRN2FUPX4000 | VRN2FUSX4000 | VRN2FUPXC000 | VRN2FUSXC000 |
|                        |                                |      |                              |              | 50                | VRN2F1PX4000 | VRN2F1SX4000 | VRN2F1PXC000 | VRN2F1SXC000 |
|                        | 7                              |      |                              |              | 55                | VRN2F2PX4000 | VRN2F2SX4000 | VRN2F2PXC000 | VRN2F2SXC000 |
|                        |                                |      |                              |              | 60                | VRN2F3PX4000 | VRN2F3SX4000 | VRN2F3PXC000 | VRN2F3SXC000 |
|                        |                                |      |                              |              | 65                | VRN2F4PX4000 | VRN2F4SX4000 | VRN2F4PXC000 | VRN2F4SXC000 |
|                        |                                |      |                              |              | 70                | VRN2F5PX4000 | VRN2F5SX4000 | VRN2F5PXC000 | VRN2F5SXC000 |
| 2-1/2"                 | 4                              | 58   | 100                          | 75           | VRN2F6PX4000      | VRN2F6SX4000 | VRN2F6PXC000 | VRN2F6SXC000 |              |
|                        |                                |      |                              | 25           | VRN2GQPX4000      | VRN2GQSX4000 | VRN2GQPXC000 | VRN2GQSC000  |              |
|                        |                                |      |                              | 30           | VRN2GRPX4000      | VRN2GRSX4000 | VRN2GRPXC000 | VRN2GRSXC000 |              |
|                        |                                |      |                              | 35           | VRN2GSPX4000      | VRN2GSSX4000 | VRN2GSPXC000 | VRN2GSSXC000 |              |
|                        | 6                              |      |                              |              | 40                | VRN2GTPX4000 | VRN2GTSX4000 | VRN2GTPXC000 | VRN2GTSXC000 |
|                        |                                |      |                              |              | 45                | VRN2GUPX4000 | VRN2GUSX4000 | VRN2GUPXC000 | VRN2GUSXC000 |
|                        | 7                              |      |                              |              | 50                | VRN2G1PX4000 | VRN2G1SX4000 | VRN2G1PXC000 | VRN2G1SXC000 |
|                        |                                |      |                              |              | 55                | VRN2G2PX4000 | VRN2G2SX4000 | VRN2G2PXC000 | VRN2G2SXC000 |
|                        |                                |      |                              |              | 60                | VRN2G3PX4000 | VRN2G3SX4000 | VRN2G3PXC000 | VRN2G3SXC000 |
|                        |                                |      |                              |              | 65                | VRN2G4PX4000 | VRN2G4SX4000 | VRN2G4PXC000 | VRN2G4SXC000 |
| 11                     |                                | 70   | VRN2G5PX4000                 | VRN2G5SX4000 | VRN2G5PXC000      | VRN2G5SXC000 |              |              |              |
|                        |                                | 75   | VRN2G6PX4000                 | VRN2G6SX4000 | VRN2G6PXC000      | VRN2G6SXC000 |              |              |              |
|                        |                                | 80   | VRN2G7PX4000                 | VRN2G7SX4000 | VRN2G7PXC000      | VRN2G7SXC000 |              |              |              |
|                        |                                | 85   | VRN2G8PX4000                 | VRN2G8SX4000 | VRN2G8PXC000      | VRN2G8SXC000 |              |              |              |
|                        |                                | 95*  | VRN2G9PX4000                 | VRN2G9SX4000 | VRN2G9PXC000      | VRN2G9SXC000 |              |              |              |
|                        |                                | 25   | VRN2HQPX4000                 | VRN2HQSX4000 | VRN2HQPXC000      | VRN2HQSC000  |              |              |              |
|                        |                                | 30   | VRN2HRPX4000                 | VRN2HRSX4000 | VRN2HRPXC000      | VRN2HRSXC000 |              |              |              |
| 3"                     | 4                              | 58   | 100                          | 35           | VRN2HSPX4000      | VRN2HSSX4000 | VRN2HSPXC000 | VRN2HSSXC000 |              |
|                        |                                |      |                              | 40           | VRN2HTPX4000      | VRN2HTSX4000 | VRN2HTPXC000 | VRN2HTSXC000 |              |
|                        |                                |      |                              | 45           | VRN2HUPX4000      | VRN2HUSX4000 | VRN2HUPXC000 | VRN2HUSXC000 |              |
|                        |                                |      |                              | 50           | VRN2H1PX4000      | VRN2H1SX4000 | VRN2H1PXC000 | VRN2H1SXC000 |              |
|                        | 6                              |      |                              |              | 55                | VRN2H2PX4000 | VRN2H2SX4000 | VRN2H2PXC000 | VRN2H2SXC000 |
|                        |                                |      |                              |              | 60                | VRN2H3PX4000 | VRN2H3SX4000 | VRN2H3PXC000 | VRN2H3SXC000 |
|                        |                                |      |                              |              | 65                | VRN2H4PX4000 | VRN2H4SX4000 | VRN2H4PXC000 | VRN2H4SXC000 |
|                        |                                |      |                              |              | 70                | VRN2H5PX4000 | VRN2H5SX4000 | VRN2H5PXC000 | VRN2H5SXC000 |
|                        | 7                              |      |                              |              | 75                | VRN2H6PX4000 | VRN2H6SX4000 | VRN2H6PXC000 | VRN2H6SXC000 |
|                        |                                |      |                              |              | 80                | VRN2H7PX4000 | VRN2H7SX4000 | VRN2H7PXC000 | VRN2H7SXC000 |
|                        |                                |      |                              |              | 85                | VRN2H8PX4000 | VRN2H8SX4000 | VRN2H8PXC000 | VRN2H8SXC000 |
|                        |                                |      |                              |              | 95*               | VRN2H9PX4000 | VRN2H9SX4000 | VRN2H9PXC000 | VRN2H9SXC000 |
|                        | 11                             |      |                              |              |                   |              |              |              |              |

\* Full port ball

\*\* Differential pressure regulator operating range, ±5%

# Product Selection - Valves

## Pressure Independent Control Valves, NPT 1½"-3" NEMA 2

### Common Features

- Sizes from 1/2 to 3 in. with internal (female) NPT connections.
- Controls hot or chilled water with up to 50% glycol.
- Regulated flow rates available from 1 to 95 gpm.
- Differential pressure regulator for constant pressure drop across valve seat.
- Positive pressure, rolling diaphragm regulator design for long service life for flow control accuracy of ±5% over specified control range.
- Equal percentage flow characteristic using patented flow control ball insert.

| Actuator Features   |                                        | Non Fail Safe |                     | Valve Only          |                     |
|---------------------|----------------------------------------|---------------|---------------------|---------------------|---------------------|
| Actuator O.S Number |                                        | MN7505A2001   | MN7505A2209         | N/A                 |                     |
| Power Supply        | Voltage                                | 24 VAC/DC     | 24 VAC/DC           |                     |                     |
|                     | Frequency                              | 50 / 60 Hz    | 50 / 60 Hz          |                     |                     |
|                     | Power                                  | 5 VA          | 5 VA                |                     |                     |
| Actuator Torque     | (lb.-in.)                              | 44            | 44                  |                     |                     |
| Control             | (0)2-10Vdc                             | •             | •                   |                     |                     |
|                     | 4-20 mA (w/ external 500 Ohm Resistor) | •             | •                   |                     |                     |
|                     | Floating                               | •             | •                   |                     |                     |
|                     | Two-Position SPDT                      | •             | •                   |                     |                     |
|                     | Two-Position SPST                      | •             | •                   |                     |                     |
|                     | Actuator Stroke (degrees)              | 95° ± 3°      | 95° ± 3°            |                     |                     |
| Timing              | (drive/spring return, seconds)         | 90            | 90                  |                     |                     |
| Aux Switch          |                                        | 0             | 2                   |                     |                     |
| Feedback            | 2-10 Vdc Built In                      | •             | •                   |                     |                     |
| Fail Safe Action    |                                        | Stay in Place | Stay in Place       |                     |                     |
| Normal Position     | (no signal)                            | Closed        | Closed              |                     |                     |
| Valve Features      |                                        | Trim          | Nickel-Plated Brass | Nickel-Plated Brass | Nickel-Plated Brass |
|                     |                                        |               | Stainless Steel     | Stainless Steel     | Stainless Steel     |



| Valve Size (inches) | Differential Pressure** (psid) |      | Close-off Pressure (psid) | Max. GPM | Short Order Codes |              |              |              |              |              |              |              |  |  |  |  |  |  |
|---------------------|--------------------------------|------|---------------------------|----------|-------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--|--|--|--|--|--|
|                     | Min.                           | Max. |                           |          |                   |              |              |              |              |              |              |              |  |  |  |  |  |  |
| 1-1/2"              | 4                              | 50   | 100                       | 10       | VRN2EMPX5000      | VRN2EMSX5000 | VRN2EMPXD000 | VRN2EMSXD000 | VRN2EMPX0000 | VRN2EMSX0000 |              |              |  |  |  |  |  |  |
|                     |                                |      |                           | 15       | VRN2ENPX5000      | VRN2ENSX5000 | VRN2ENPXD000 | VRN2ENSXD000 | VRN2ENPX0000 | VRN2ENSX0000 |              |              |  |  |  |  |  |  |
|                     |                                |      |                           | 20       | VRN2EPPX5000      | VRN2EPSX5000 | VRN2EPPXD000 | VRN2EPSXD000 | VRN2EPPX0000 | VRN2EPSX0000 |              |              |  |  |  |  |  |  |
|                     |                                |      |                           | 25       | VRN2EQPX5000      | VRN2EQSX5000 | VRN2EQPXD000 | VRN2EQSXD000 | VRN2EQPX0000 | VRN2EQSX0000 |              |              |  |  |  |  |  |  |
|                     | 5                              |      |                           | 30       | VRN2ERPX5000      | VRN2ERSX5000 | VRN2ERPXD000 | VRN2ERSXD000 | VRN2ERPX0000 | VRN2ERSX0000 |              |              |  |  |  |  |  |  |
|                     |                                |      |                           | 35       | VRN2ESPX5000      | VRN2ESSX5000 | VRN2ESPD000  | VRN2ESSXD000 | VRN2ESPX0000 | VRN2ESSX0000 |              |              |  |  |  |  |  |  |
|                     | 6                              |      |                           | 40       | VRN2ETPX5000      | VRN2ETSX5000 | VRN2ETPD000  | VRN2ETSD000  | VRN2ETPX0000 | VRN2ETSX0000 |              |              |  |  |  |  |  |  |
|                     |                                |      |                           | 45       | VRN2EUPX5000      | VRN2EUSX5000 | VRN2EUPXD000 | VRN2EUSXD000 | VRN2EUPX0000 | VRN2EUSX0000 |              |              |  |  |  |  |  |  |
|                     | 7                              | 58   |                           | 50       | VRN2E1PX5000      | VRN2E1SX5000 | VRN2E1PD000  | VRN2E1SD000  | VRN2E1PX0000 | VRN2E1SX0000 |              |              |  |  |  |  |  |  |
|                     |                                |      |                           | 55       | VRN2E2PX5000      | VRN2E2SX5000 | VRN2E2PD000  | VRN2E2SD000  | VRN2E2PX0000 | VRN2E2SX0000 |              |              |  |  |  |  |  |  |
|                     |                                |      |                           | 60       | VRN2E3PX5000      | VRN2E3SX5000 | VRN2E3PD000  | VRN2E3SD000  | VRN2E3PX0000 | VRN2E3SX0000 |              |              |  |  |  |  |  |  |
|                     |                                |      |                           | 65       | VRN2E4PX5000      | VRN2E4SX5000 | VRN2E4PD000  | VRN2E4SD000  | VRN2E4PX0000 | VRN2E4SX0000 |              |              |  |  |  |  |  |  |
|                     |                                |      |                           | 70       | VRN2E5PX5000      | VRN2E5SX5000 | VRN2E5PD000  | VRN2E5SD000  | VRN2E5PX0000 | VRN2E5SX0000 |              |              |  |  |  |  |  |  |
|                     |                                |      |                           | 75       | VRN2E6PX5000      | VRN2E6SX5000 | VRN2E6PD000  | VRN2E6SD000  | VRN2E6PX0000 | VRN2E6SX0000 |              |              |  |  |  |  |  |  |
|                     |                                |      |                           | 80       | VRN2E7PX5000      | VRN2E7SX5000 | VRN2E7PD000  | VRN2E7SD000  | VRN2E7PX0000 | VRN2E7SX0000 |              |              |  |  |  |  |  |  |
|                     |                                |      |                           | 85       | VRN2E8PX5000      | VRN2E8SX5000 | VRN2E8PD000  | VRN2E8SD000  | VRN2E8PX0000 | VRN2E8SX0000 |              |              |  |  |  |  |  |  |
|                     |                                |      |                           | 95       | VRN2E9PX5000      | VRN2E9SX5000 | VRN2E9PD000  | VRN2E9SD000  | VRN2E9PX0000 | VRN2E9SX0000 |              |              |  |  |  |  |  |  |
| 11                  |                                |      |                           |          |                   |              |              |              |              |              |              |              |  |  |  |  |  |  |
| 2"                  | 4                              | 58   | 100                       | 25       | VRN2FQPX5000      | VRN2FQSX5000 | VRN2FQPD000  | VRN2FQSD000  | VRN2FQPX0000 | VRN2FQSX0000 |              |              |  |  |  |  |  |  |
|                     |                                |      |                           | 30       | VRN2FRPX5000      | VRN2FRSX5000 | VRN2FRPD000  | VRN2FRSD000  | VRN2FRPX0000 | VRN2FRSX0000 |              |              |  |  |  |  |  |  |
|                     |                                |      |                           | 35       | VRN2FSPX5000      | VRN2FSSX5000 | VRN2FSPD000  | VRN2FSSD000  | VRN2FSPX0000 | VRN2FSSX0000 |              |              |  |  |  |  |  |  |
|                     |                                |      |                           | 40       | VRN2FTPX5000      | VRN2FTSX5000 | VRN2FTPD000  | VRN2FTSD000  | VRN2FTPX0000 | VRN2FTSX0000 |              |              |  |  |  |  |  |  |
|                     | 6                              |      |                           |          |                   | 45           | VRN2FUPX5000 | VRN2FUSX5000 | VRN2FUPD000  | VRN2FUSD000  | VRN2FUPX0000 | VRN2FUSX0000 |  |  |  |  |  |  |
|                     |                                |      |                           |          |                   | 50           | VRN2F1PX5000 | VRN2F1SX5000 | VRN2F1PD000  | VRN2F1SD000  | VRN2F1PX0000 | VRN2F1SX0000 |  |  |  |  |  |  |
|                     | 7                              |      |                           |          |                   | 55           | VRN2F2PX5000 | VRN2F2SX5000 | VRN2F2PD000  | VRN2F2SD000  | VRN2F2PX0000 | VRN2F2SX0000 |  |  |  |  |  |  |
|                     |                                |      |                           |          |                   | 60           | VRN2F3PX5000 | VRN2F3SX5000 | VRN2F3PD000  | VRN2F3SD000  | VRN2F3PX0000 | VRN2F3SX0000 |  |  |  |  |  |  |
|                     |                                |      |                           |          |                   | 65           | VRN2F4PX5000 | VRN2F4SX5000 | VRN2F4PD000  | VRN2F4SD000  | VRN2F4PX0000 | VRN2F4SX0000 |  |  |  |  |  |  |
|                     |                                |      |                           |          |                   | 70           | VRN2F5PX5000 | VRN2F5SX5000 | VRN2F5PD000  | VRN2F5SD000  | VRN2F5PX0000 | VRN2F5SX0000 |  |  |  |  |  |  |
|                     |                                |      |                           |          |                   | 75           | VRN2F6PX5000 | VRN2F6SX5000 | VRN2F6PD000  | VRN2F6SD000  | VRN2F6PX0000 | VRN2F6SX0000 |  |  |  |  |  |  |
|                     |                                |      |                           |          |                   | 80           | VRN2F7PX5000 | VRN2F7SX5000 | VRN2F7PD000  | VRN2F7SD000  | VRN2F7PX0000 | VRN2F7SX0000 |  |  |  |  |  |  |
|                     |                                |      |                           |          |                   | 85           | VRN2F8PX5000 | VRN2F8SX5000 | VRN2F8PD000  | VRN2F8SD000  | VRN2F8PX0000 | VRN2F8SX0000 |  |  |  |  |  |  |
|                     |                                |      |                           |          |                   | 95           | VRN2F9PX5000 | VRN2F9SX5000 | VRN2F9PD000  | VRN2F9SD000  | VRN2F9PX0000 | VRN2F9SX0000 |  |  |  |  |  |  |
| 2-1/2"              | 4                              | 58   | 100                       | 25       | VRN2GQPX5000      | VRN2GQSX5000 | VRN2GQPD000  | VRN2GQSD000  | VRN2GQPX0000 | VRN2GQSX0000 |              |              |  |  |  |  |  |  |
|                     |                                |      |                           | 30       | VRN2GRPX5000      | VRN2GRSX5000 | VRN2GRPD000  | VRN2GRSD000  | VRN2GRPX0000 | VRN2GRSX0000 |              |              |  |  |  |  |  |  |
|                     |                                |      |                           | 35       | VRN2GSPX5000      | VRN2GSSX5000 | VRN2GSPD000  | VRN2GSSD000  | VRN2GSPX0000 | VRN2GSSX0000 |              |              |  |  |  |  |  |  |
|                     |                                |      |                           | 40       | VRN2GTPX5000      | VRN2GTSX5000 | VRN2GTPD000  | VRN2GTSXD000 | VRN2GTPX0000 | VRN2GTSX0000 |              |              |  |  |  |  |  |  |
|                     | 6                              |      |                           |          |                   | 45           | VRN2GUPX5000 | VRN2GUSX5000 | VRN2GUPD000  | VRN2GUSD000  | VRN2GUPX0000 | VRN2GUSX0000 |  |  |  |  |  |  |
|                     |                                |      |                           |          |                   | 50           | VRN2G1PX5000 | VRN2G1SX5000 | VRN2G1PD000  | VRN2G1SD000  | VRN2G1PX0000 | VRN2G1SX0000 |  |  |  |  |  |  |
|                     | 7                              |      |                           |          |                   | 55           | VRN2G2PX5000 | VRN2G2SX5000 | VRN2G2PD000  | VRN2G2SD000  | VRN2G2PX0000 | VRN2G2SX0000 |  |  |  |  |  |  |
|                     |                                |      |                           |          |                   | 60           | VRN2G3PX5000 | VRN2G3SX5000 | VRN2G3PD000  | VRN2G3SD000  | VRN2G3PX0000 | VRN2G3SX0000 |  |  |  |  |  |  |
|                     |                                |      |                           |          |                   | 65           | VRN2G4PX5000 | VRN2G4SX5000 | VRN2G4PD000  | VRN2G4SD000  | VRN2G4PX0000 | VRN2G4SX0000 |  |  |  |  |  |  |
|                     |                                |      |                           |          |                   | 70           | VRN2G5PX5000 | VRN2G5SX5000 | VRN2G5PD000  | VRN2G5SD000  | VRN2G5PX0000 | VRN2G5SX0000 |  |  |  |  |  |  |
|                     |                                |      |                           |          |                   | 75           | VRN2G6PX5000 | VRN2G6SX5000 | VRN2G6PD000  | VRN2G6SD000  | VRN2G6PX0000 | VRN2G6SX0000 |  |  |  |  |  |  |
|                     |                                |      |                           |          |                   | 80           | VRN2G7PX5000 | VRN2G7SX5000 | VRN2G7PD000  | VRN2G7SD000  | VRN2G7PX0000 | VRN2G7SX0000 |  |  |  |  |  |  |
|                     |                                |      |                           |          |                   | 85           | VRN2G8PX5000 | VRN2G8SX5000 | VRN2G8PD000  | VRN2G8SD000  | VRN2G8PX0000 | VRN2G8SX0000 |  |  |  |  |  |  |
|                     |                                |      |                           |          |                   | 95*          | VRN2G9PX5000 | VRN2G9SX5000 | VRN2G9PD000  | VRN2G9SD000  | VRN2G9PX0000 | VRN2G9SX0000 |  |  |  |  |  |  |
| 3"                  | 7                              | 58   | 100                       | 25       | VRN2HQPX5000      | VRN2HQSX5000 | VRN2HQPXD000 | VRN2HQSD000  | VRN2HQPX0000 | VRN2HQSX0000 |              |              |  |  |  |  |  |  |
|                     |                                |      |                           | 30       | VRN2HRPX5000      | VRN2HRSX5000 | VRN2HRPXD000 | VRN2HRSXD000 | VRN2HRPX0000 | VRN2HRSX0000 |              |              |  |  |  |  |  |  |
|                     |                                |      |                           | 35       | VRN2HSPX5000      | VRN2HSSX5000 | VRN2HSPXD000 | VRN2HSSXD000 | VRN2HSPX0000 | VRN2HSSX0000 |              |              |  |  |  |  |  |  |
|                     |                                |      |                           | 40       | VRN2HTPX5000      | VRN2HTSX5000 | VRN2HTPD000  | VRN2HTSD000  | VRN2HTPX0000 | VRN2HTSX0000 |              |              |  |  |  |  |  |  |
|                     | 6                              |      |                           |          |                   | 45           | VRN2HUPX5000 | VRN2HUSX5000 | VRN2HUPXD000 | VRN2HUSD000  | VRN2HUPX0000 | VRN2HUSX0000 |  |  |  |  |  |  |
|                     |                                |      |                           |          |                   | 50           | VRN2H1PX5000 | VRN2H1SX5000 | VRN2H1PD000  | VRN2H1SD000  | VRN2H1PX0000 | VRN2H1SX0000 |  |  |  |  |  |  |
|                     | 7                              |      |                           |          |                   | 55           | VRN2H2PX5000 | VRN2H2SX5000 | VRN2H2PD000  | VRN2H2SD000  | VRN2H2PX0000 | VRN2H2SX0000 |  |  |  |  |  |  |
|                     |                                |      |                           |          |                   | 60           | VRN2H3PX5000 | VRN2H3SX5000 | VRN2H3PD000  | VRN2H3SD000  | VRN2H3PX0000 | VRN2H3SX0000 |  |  |  |  |  |  |
|                     |                                |      |                           |          |                   | 65           | VRN2H4PX5000 | VRN2H4SX5000 | VRN2H4PD000  | VRN2H4SD000  | VRN2H4PX0000 | VRN2H4SX0000 |  |  |  |  |  |  |
|                     |                                |      |                           |          |                   | 70           | VRN2H5PX5000 | VRN2H5SX5000 | VRN2H5PD000  | VRN2H5SD000  | VRN2H5PX0000 | VRN2H5SX0000 |  |  |  |  |  |  |
|                     |                                |      |                           |          |                   | 75           | VRN2H6PX5000 | VRN2H6SX5000 | VRN2H6PD000  | VRN2H6SD000  | VRN2H6PX0000 | VRN2H6SX0000 |  |  |  |  |  |  |
|                     |                                |      |                           |          |                   | 80           | VRN2H7PX5000 | VRN2H7SX5000 | VRN2H7PD000  | VRN2H7SD000  | VRN2H7PX0000 | VRN2H7SX0000 |  |  |  |  |  |  |
|                     |                                |      |                           |          |                   | 85           | VRN2H8PX5000 | VRN2H8SX5000 | VRN2H8PD000  | VRN2H8SD000  | VRN2H8PX0000 | VRN2H8SX0000 |  |  |  |  |  |  |
|                     |                                |      |                           |          |                   | 95*          | VRN2H9PX5000 | VRN2H9SX5000 | VRN2H9PD000  | VRN2H9SD000  | VRN2H9PX0000 | VRN2H9SX0000 |  |  |  |  |  |  |

\* Full port ball

\*\* Differential pressure regulator operating range, ±5%

## Product Selection - Valves

## Pressure Independent Control Valves, NPT 1½"-3" NEMA 2

| Actuator Features                      |  |  |  | Fail Safe   |                     |                 |                     |                 |                     |                 |                     |                 |
|----------------------------------------|--|--|--|-------------|---------------------|-----------------|---------------------|-----------------|---------------------|-----------------|---------------------|-----------------|
|                                        |  |  |  | MS7505A2030 |                     |                 |                     | MS7505A2130     |                     |                 |                     |                 |
| Actuator O.S Number                    |  |  |  |             |                     |                 |                     |                 |                     |                 |                     |                 |
| Power Supply                           |  |  |  | 24 VAC/DC   |                     |                 |                     | 24 VAC/DC       |                     |                 |                     |                 |
| Frequency                              |  |  |  | 50 / 60 Hz  |                     |                 |                     | 50 / 60 Hz      |                     |                 |                     |                 |
| Power                                  |  |  |  | 6 VA        |                     |                 |                     | 6 VA            |                     |                 |                     |                 |
| Actuator Torque (lb.-in.)              |  |  |  | 44          |                     |                 |                     | 44              |                     |                 |                     |                 |
| Control (0)2-10Vdc                     |  |  |  | •           |                     |                 |                     | •               |                     |                 |                     |                 |
| 4-20 mA (w/ external 500 Ohm Resistor) |  |  |  | •           |                     |                 |                     | •               |                     |                 |                     |                 |
| Floating                               |  |  |  | •           |                     |                 |                     | •               |                     |                 |                     |                 |
| Two-Position SPDT                      |  |  |  | •           |                     |                 |                     | •               |                     |                 |                     |                 |
| Two-Position SPST                      |  |  |  | •           |                     |                 |                     | •               |                     |                 |                     |                 |
| Actuator Stroke (degrees)              |  |  |  | 95° ± 3°    |                     |                 |                     | 95° ± 3°        |                     |                 |                     |                 |
| Timing (drive/spring return, seconds)  |  |  |  | 90 / 25     |                     |                 |                     | 90 / 25         |                     |                 |                     |                 |
| Aux Switch                             |  |  |  | 0           |                     |                 |                     | 1               |                     |                 |                     |                 |
| Feedback 2-10 Vdc Built In             |  |  |  | •           |                     |                 |                     | •               |                     |                 |                     |                 |
| Fail Safe Action                       |  |  |  | Closed      |                     | Open            |                     | Closed          |                     | Open            |                     |                 |
| Normal Position (no signal)            |  |  |  | Closed      |                     | Open            |                     | Closed          |                     | Open            |                     |                 |
| Valve Features                         |  |  |  | Trim        | Nickel-Plated Brass | Stainless Steel | Nickel-Plated Brass | Stainless Steel | Nickel-Plated Brass | Stainless Steel | Nickel-Plated Brass | Stainless Steel |

| Valve Size (inches) | Differential Pressure** (psid) |      | Close-off Pressure (psid) | Max. GPM     | Short Order Codes |              |              |              |              |              |              |              |              |              |
|---------------------|--------------------------------|------|---------------------------|--------------|-------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
|                     | Min.                           | Max. |                           |              |                   |              |              |              |              |              |              |              |              |              |
| 1-1/2"              | 4                              | 50   | 100                       | 10           | VRN2EMPX6200      | VRN2EMSX6200 | VRN2EMPX6100 | VRN2EMSX6100 | VRN2EMPXB200 | VRN2EMSXB200 | VRN2EMPXB100 | VRN2EMSXB100 |              |              |
|                     |                                |      |                           | 15           | VRN2ENPX6200      | VRN2ENSX6200 | VRN2ENPX6100 | VRN2ENSX6100 | VRN2ENPB200  | VRN2ENSXB200 | VRN2ENPB100  | VRN2ENSXB100 |              |              |
|                     |                                |      |                           | 20           | VRN2EPPX6200      | VRN2EPSX6200 | VRN2EPPX6100 | VRN2EPSX6100 | VRN2EPPXB200 | VRN2EPSXB200 | VRN2EPPXB100 | VRN2EPSXB100 |              |              |
|                     |                                |      |                           | 25           | VRN2EQPX6200      | VRN2EQSX6200 | VRN2EQPX6100 | VRN2EQSX6100 | VRN2EQPB200  | VRN2EQSXB200 | VRN2EQPB100  | VRN2EQSXB100 |              |              |
|                     | 6                              | 58   |                           | 30           | VRN2ERPX6200      | VRN2ERSX6200 | VRN2ERPX6100 | VRN2ERSX6100 | VRN2ERPB200  | VRN2ERSXB200 | VRN2ERPB100  | VRN2ERSXB100 |              |              |
|                     |                                |      |                           | 35           | VRN2ESPX6200      | VRN2ESSX6200 | VRN2ESPX6100 | VRN2ESSX6100 | VRN2ESPB200  | VRN2ESSXB200 | VRN2ESPB100  | VRN2ESSXB100 |              |              |
|                     |                                |      |                           | 40           | VRN2ETPX6200      | VRN2ETSX6200 | VRN2ETPX6100 | VRN2ETSX6100 | VRN2ETPB200  | VRN2ETSB200  | VRN2ETPB100  | VRN2ETSB100  |              |              |
|                     |                                |      |                           | 45           | VRN2EUPX6200      | VRN2EUSX6200 | VRN2EUPX6100 | VRN2EUSX6100 | VRN2EUPB200  | VRN2EUSXB200 | VRN2EUPB100  | VRN2EUSXB100 |              |              |
|                     | 7                              | 58   |                           | 50           | VRN2E1PX6200      | VRN2E1SX6200 | VRN2E1PX6100 | VRN2E1SX6100 | VRN2E1PB200  | VRN2E1SBX200 | VRN2E1PBX100 | VRN2E1SBX100 |              |              |
|                     |                                |      |                           | 55           | VRN2E2PX6200      | VRN2E2SX6200 | VRN2E2PX6100 | VRN2E2SX6100 | VRN2E2PB200  | VRN2E2SBX200 | VRN2E2PBX100 | VRN2E2SBX100 |              |              |
|                     |                                |      |                           | 60           | VRN2E3PX6200      | VRN2E3SX6200 | VRN2E3PX6100 | VRN2E3SX6100 | VRN2E3PB200  | VRN2E3SBX200 | VRN2E3PBX100 | VRN2E3SBX100 |              |              |
|                     |                                |      |                           | 65           | VRN2E4PX6200      | VRN2E4SX6200 | VRN2E4PX6100 | VRN2E4SX6100 | VRN2E4PB200  | VRN2E4SBX200 | VRN2E4PBX100 | VRN2E4SBX100 |              |              |
|                     | 2"                             | 4    |                           | 58           | 100               | 70           | VRN2E5PX6200 | VRN2E5SX6200 | VRN2E5PX6100 | VRN2E5SX6100 | VRN2E5PB200  | VRN2E5SBX200 | VRN2E5PBX100 | VRN2E5SBX100 |
|                     |                                |      |                           |              |                   | 75           | VRN262PX6200 | VRN262SX6200 | VRN262PX6100 | VRN262SX6100 | VRN262PB200  | VRN262SBX200 | VRN262PBX100 | VRN262SBX100 |
|                     |                                |      |                           |              |                   | 80           | VRN2E7PX6200 | VRN2E7SX6200 | VRN2E7PX6100 | VRN2E7SX6100 | VRN2E7PB200  | VRN2E7SBX200 | VRN2E7PBX100 | VRN2E7SBX100 |
|                     |                                |      |                           |              |                   | 85           | VRN2E8PX6200 | VRN2E8SX6200 | VRN2E8PX6100 | VRN2E8SX6100 | VRN2E8PB200  | VRN2E8SBX200 | VRN2E8PBX100 | VRN2E8SBX100 |
| 6                   |                                | 58   |                           | 95           |                   | VRN2E9PX6200 | VRN2E9SX6200 | VRN2E9PX6100 | VRN2E9SX6100 | VRN2E9PB200  | VRN2E9SBX200 | VRN2E9PBX100 | VRN2E9SBX100 |              |
|                     |                                |      |                           | 25           |                   | VRN2FQPX6200 | VRN2FQSX6200 | VRN2FQPX6100 | VRN2FQSX6100 | VRN2FQPB200  | VRN2FQSBX200 | VRN2FQPBX100 | VRN2FQSBX100 |              |
|                     |                                |      |                           | 30           |                   | VRN2FRPX6200 | VRN2FRSX6200 | VRN2FRPX6100 | VRN2FRSX6100 | VRN2FRPB200  | VRN2FRSBX200 | VRN2FRPBX100 | VRN2FRSBX100 |              |
|                     |                                |      |                           | 35           |                   | VRN2FSPX6200 | VRN2FSSX6200 | VRN2FSPX6100 | VRN2FSSX6100 | VRN2FSPB200  | VRN2FSSB200  | VRN2FSPB100  | VRN2FSSB100  |              |
| 7                   |                                | 58   |                           | 40           |                   | VRN2FTPX6200 | VRN2FTSX6200 | VRN2FTPX6100 | VRN2FTSX6100 | VRN2FTPB200  | VRN2FTSBX200 | VRN2FTPBX100 | VRN2FTSBX100 |              |
|                     |                                |      |                           | 45           |                   | VRN2FUPX6200 | VRN2FUSX6200 | VRN2FUPX6100 | VRN2FUSX6100 | VRN2FUPB200  | VRN2FUSB200  | VRN2FUPB100  | VRN2FUSB100  |              |
|                     |                                |      |                           | 50           |                   | VRN2F1PX6200 | VRN2F1SX6200 | VRN2F1PX6100 | VRN2F1SX6100 | VRN2F1PB200  | VRN2F1SBX200 | VRN2F1PBX100 | VRN2F1SBX100 |              |
|                     |                                |      |                           | 55           |                   | VRN2F2PX6200 | VRN2F2SX6200 | VRN2F2PX6100 | VRN2F2SX6100 | VRN2F2PB200  | VRN2F2SBX200 | VRN2F2PBX100 | VRN2F2SBX100 |              |
| 2-1/2"              | 4                              | 58   | 100                       | 60           | VRN2F3PX6200      | VRN2F3SX6200 | VRN2F3PX6100 | VRN2F3SX6100 | VRN2F3PB200  | VRN2F3SBX200 | VRN2F3PBX100 | VRN2F3SBX100 |              |              |
|                     |                                |      |                           | 65           | VRN2F4PX6200      | VRN2F4SX6200 | VRN2F4PX6100 | VRN2F4SX6100 | VRN2F4PB200  | VRN2F4SBX200 | VRN2F4PBX100 | VRN2F4SBX100 |              |              |
|                     |                                |      |                           | 70           | VRN2F5PX6200      | VRN2F5SX6200 | VRN2F5PX6100 | VRN2F5SX6100 | VRN2F5PB200  | VRN2F5SBX200 | VRN2F5PBX100 | VRN2F5SBX100 |              |              |
|                     |                                |      |                           | 75           | VRN2F6PX6200      | VRN2F6SX6200 | VRN2F6PX6100 | VRN2F6SX6100 | VRN2F6PB200  | VRN2F6SBX200 | VRN2F6PBX100 | VRN2F6SBX100 |              |              |
|                     | 6                              | 58   |                           | 25           | VRN2GQPX6200      | VRN2GQSX6200 | VRN2GQPX6100 | VRN2GQSX6100 | VRN2GQPB200  | VRN2GQSBX200 | VRN2GQPBX100 | VRN2GQSBX100 |              |              |
|                     |                                |      |                           | 30           | VRN2GRPX6200      | VRN2GRSX6200 | VRN2GRPX6100 | VRN2GRSX6100 | VRN2GRPB200  | VRN2GRSBX200 | VRN2GRPBX100 | VRN2GRSBX100 |              |              |
|                     |                                |      |                           | 35           | VRN2GSPX6200      | VRN2GSSX6200 | VRN2GSPX6100 | VRN2GSSX6100 | VRN2GSPB200  | VRN2GSSB200  | VRN2GSPB100  | VRN2GSSB100  |              |              |
|                     |                                |      |                           | 40           | VRN2GTPX6200      | VRN2GTSX6200 | VRN2GTPX6100 | VRN2GTSX6100 | VRN2GTPB200  | VRN2GTSB200  | VRN2GTPB100  | VRN2GTSB100  |              |              |
|                     | 7                              | 58   |                           | 45           | VRN2GUPX6200      | VRN2GUSX6200 | VRN2GUPX6100 | VRN2GUSX6100 | VRN2GUPB200  | VRN2GUSB200  | VRN2GUPB100  | VRN2GUSB100  |              |              |
|                     |                                |      |                           | 50           | VRN2G1PX6200      | VRN2G1SX6200 | VRN2G1PX6100 | VRN2G1SX6100 | VRN2G1PB200  | VRN2G1SBX200 | VRN2G1PBX100 | VRN2G1SBX100 |              |              |
|                     |                                |      |                           | 55           | VRN2G2PX6200      | VRN2G2SX6200 | VRN2G2PX6100 | VRN2G2SX6100 | VRN2G2PB200  | VRN2G2SBX200 | VRN2G2PBX100 | VRN2G2SBX100 |              |              |
|                     |                                |      |                           | 60           | VRN2G3PX6200      | VRN2G3SX6200 | VRN2G3PX6100 | VRN2G3SX6100 | VRN2G3PB200  | VRN2G3SBX200 | VRN2G3PBX100 | VRN2G3SBX100 |              |              |
|                     | 3"                             | 4    |                           | 58           | 100               | 65           | VRN2G4PX6200 | VRN2G4SX6200 | VRN2G4PX6100 | VRN2G4SX6100 | VRN2G4PB200  | VRN2G4SBX200 | VRN2G4PBX100 | VRN2G4SBX100 |
|                     |                                |      |                           |              |                   | 70           | VRN2G5PX6200 | VRN2G5SX6200 | VRN2G5PX6100 | VRN2G5SX6100 | VRN2G5PB200  | VRN2G5SBX200 | VRN2G5PBX100 | VRN2G5SBX100 |
| 75                  |                                |      | VRN2G6PX6200              |              |                   | VRN2G6SX6200 | VRN2G6PX6100 | VRN2G6SX6100 | VRN2G6PB200  | VRN2G6SBX200 | VRN2G6PBX100 | VRN2G6SBX100 |              |              |
| 80                  |                                |      | VRN2G7PX6200              |              |                   | VRN2G7SX6200 | VRN2G7PX6100 | VRN2G7SX6100 | VRN2G7PB200  | VRN2G7SBX200 | VRN2G7PBX100 | VRN2G7SBX100 |              |              |
| 6                   |                                | 58   |                           | 85           |                   | VRN2G8PX6200 | VRN2G8SX6200 | VRN2G8PX6100 | VRN2G8SX6100 | VRN2G8PB200  | VRN2G8SBX200 | VRN2G8PBX100 | VRN2G8SBX100 |              |
|                     |                                |      |                           | 95*          |                   | VRN2G9PX6200 | VRN2G9SX6200 | VRN2G9PX6100 | VRN2G9SX6100 | VRN2G9PB200  | VRN2G9SBX200 | VRN2G9PBX100 | VRN2G9SBX100 |              |
|                     |                                |      |                           | 25           |                   | VRN2HQPX6200 | VRN2HQSX6200 | VRN2HQPX6100 | VRN2HQSX6100 | VRN2HQPB200  | VRN2HQSBX200 | VRN2HQPBX100 | VRN2HQSBX100 |              |
|                     |                                |      |                           | 30           |                   | VRN2HRPX6200 | VRN2HRSX6200 | VRN2HRPX6100 | VRN2HRSX6100 | VRN2HRPB200  | VRN2HRSBX200 | VRN2HRPBX100 | VRN2HRSBX100 |              |
| 7                   |                                | 58   |                           | 35           |                   | VRN2HSPX6200 | VRN2HSSX6200 | VRN2HSPX6100 | VRN2HSSX6100 | VRN2HSPB200  | VRN2HSSB200  | VRN2HSPB100  | VRN2HSSB100  |              |
|                     |                                |      |                           | 40           |                   | VRN2HTPX6200 | VRN2HTSX6200 | VRN2HTPX6100 | VRN2HTSX6100 | VRN2HTPB200  | VRN2HTSBX200 | VRN2HTPBX100 | VRN2HTSBX100 |              |
|                     |                                |      |                           | 45           |                   | VRN2HUPX6200 | VRN2HUSX6200 | VRN2HUPX6100 | VRN2HUSX6100 | VRN2HUPB200  | VRN2HUSB200  | VRN2HUPB100  | VRN2HUSB100  |              |
|                     |                                |      |                           | 50           |                   | VRN2H1PX6200 | VRN2H1SX6200 | VRN2H1PX6100 | VRN2H1SX6100 | VRN2H1PB200  | VRN2H1SBX200 | VRN2H1PBX100 | VRN2H1SBX100 |              |
| 11                  | 58                             |      | 55                        | VRN2H2PX6200 | VRN2H2SX6200      | VRN2H2PX6100 | VRN2H2SX6100 | VRN2H2PB200  | VRN2H2SBX200 | VRN2H2PBX100 | VRN2H2SBX100 |              |              |              |
|                     |                                |      | 60                        | VRN2H3PX6200 | VRN2H3SX6200      | VRN2H3PX6100 | VRN2H3SX6100 | VRN2H3PB200  | VRN2H3SBX200 | VRN2H3PBX100 | VRN2H3SBX100 |              |              |              |
|                     |                                |      | 65                        | VRN2H4PX6200 | VRN2H4SX6200      | VRN2H4PX6100 | VRN2H4SX6100 | VRN2H4PB200  | VRN2H4SBX200 | VRN2H4PBX100 | VRN2H4SBX100 |              |              |              |
|                     |                                |      | 70                        | VRN2H5PX6200 | VRN2H5SX6200      | VRN2H5PX6100 | VRN2H5SX6100 | VRN2H5PB200  | VRN2H5SBX200 | VRN2H5PBX100 | VRN2H5SBX100 |              |              |              |
|                     |                                |      | 75                        | VRN2H6PX6200 | VRN2H6SX6200      | VRN2H6PX6100 | VRN2H6SX6100 | VRN2H6PB200  | VRN2H6SBX200 | VRN2H6PBX100 | VRN2H6SBX100 |              |              |              |
|                     |                                |      | 80                        | VRN2H7PX6200 | VRN2H7SX6200      | VRN2H7PX6100 | VRN2H7SX6100 | VRN2H7PB200  | VRN2H7SBX200 | VRN2H7PBX100 | VRN2H7SBX100 |              |              |              |
|                     |                                |      | 85                        | VRN2H8PX6200 | VRN2H8SX6200      | VRN2H8PX6100 | VRN2H8SX6100 | VRN2H8PB200  | VRN2H8SBX200 | VRN2H8PBX100 | VRN2H8SBX100 |              |              |              |
|                     |                                |      | 95*                       | VRN2H9PX6200 | VRN2H9SX6200      | VRN2H9PX6100 | VRN2H9SX6100 | VRN2H9PB200  | VRN2H9SBX200 | VRN2H9PBX100 | VRN2H9SBX100 |              |              |              |

\* Full port ball

\*\* Differential pressure regulator operating range, ±5%

## Product Selection - Valves

## Pressure Independent Control Valves, NPT 1½"-3" NEMA 2

| Actuator Features   |  |                                        |  |                     | Fail Safe       |                     |                 |                     |                 |                     |                 |  |
|---------------------|--|----------------------------------------|--|---------------------|-----------------|---------------------|-----------------|---------------------|-----------------|---------------------|-----------------|--|
| Actuator O.S Number |  |                                        |  |                     | MS8105A1030     |                     |                 |                     | MS8105A1130     |                     |                 |  |
| Power Supply        |  | Voltage                                |  | 24 VAC/DC           |                 |                     |                 | 24 VAC/DC           |                 |                     |                 |  |
|                     |  | Frequency                              |  | 50 / 60 Hz          |                 |                     |                 | 50 / 60 Hz          |                 |                     |                 |  |
|                     |  | Power                                  |  | 6 VA                |                 |                     |                 | 6 VA                |                 |                     |                 |  |
| Actuator Torque     |  | (lb. -in.)                             |  | 44                  |                 |                     |                 | 44                  |                 |                     |                 |  |
| Control             |  | (0)2-10Vdc                             |  |                     |                 |                     |                 |                     |                 |                     |                 |  |
|                     |  | 4-20 mA (w/ external 500 Ohm Resistor) |  |                     |                 |                     |                 |                     |                 |                     |                 |  |
|                     |  | Floating                               |  |                     |                 |                     |                 |                     |                 |                     |                 |  |
|                     |  | Two-Position SPDT                      |  |                     |                 |                     |                 |                     |                 |                     |                 |  |
|                     |  | Two-Position SPST                      |  | •                   |                 |                     |                 | •                   |                 |                     |                 |  |
| Actuator Stroke     |  | (degrees)                              |  | 95° ± 3°            |                 |                     |                 | 95° ± 3°            |                 |                     |                 |  |
| Timing              |  | (drive/spring return, seconds)         |  | 45 / 25             |                 |                     |                 | 45 / 25             |                 |                     |                 |  |
| Aux Switch          |  |                                        |  | 0                   |                 |                     |                 | 1                   |                 |                     |                 |  |
| Feedback            |  | 2-10 Vdc Built In                      |  |                     |                 |                     |                 |                     |                 |                     |                 |  |
| Fail Safe Action    |  |                                        |  | Closed              |                 | Open                |                 | Closed              |                 | Open                |                 |  |
| Normal Position     |  | (no signal)                            |  | Closed              |                 | Open                |                 | Closed              |                 | Open                |                 |  |
| Valve Features      |  | Trim                                   |  | Nickel-Plated Brass | Stainless Steel | Nickel-Plated Brass | Stainless Steel | Nickel-Plated Brass | Stainless Steel | Nickel-Plated Brass | Stainless Steel |  |

| Valve Size<br>(inches) | Differential Pressure** (psid) |      | Close-off<br>Pressure (psid) | Max. GPM | Short Order Codes |              |              |              |               |              |               |              |  |
|------------------------|--------------------------------|------|------------------------------|----------|-------------------|--------------|--------------|--------------|---------------|--------------|---------------|--------------|--|
|                        | Min.                           | Max. |                              |          |                   |              |              |              |               |              |               |              |  |
| 1-1/2"                 | 4                              | 50   | 100                          | 10       | VRN2EMPX7200      | VRN2EMSX7200 | VRN2EMPX7100 | VRN2EMSX7100 | VRN2EMPXA200  | VRN2EMSXA200 | VRN2EMPXA100  | VRN2EMSXA100 |  |
|                        |                                |      |                              | 15       | VRN2ENPX7200      | VRN2ENSX7200 | VRN2ENPX7100 | VRN2ENSX7100 | VRN2ENPXA200  | VRN2ENSXA200 | VRN2ENPXA100  | VRN2ENSXA100 |  |
|                        |                                |      |                              | 20       | VRN2EPPX7200      | VRN2EPSX7200 | VRN2EPPX7100 | VRN2EPSX7100 | VRN2EPPXA200  | VRN2EPSXA200 | VRN2EPPXA100  | VRN2EPSXA100 |  |
|                        |                                |      |                              | 25       | VRN2EQPX7200      | VRN2EQSX7200 | VRN2EQPX7100 | VRN2EQSX7100 | VRN2EQPXA200  | VRN2EQSXA200 | VRN2EQPXA100  | VRN2EQSXA100 |  |
|                        | 5                              | 50   |                              | 30       | VRN2ERPX7200      | VRN2ERSX7200 | VRN2ERPX7100 | VRN2ERSX7100 | VRN2ERPXA200  | VRN2ERSXA200 | VRN2ERPXA100  | VRN2ERSXA100 |  |
|                        |                                |      |                              | 35       | VRN2ESPX7200      | VRN2ESSX7100 | VRN2ESPX7100 | VRN2ESSX7100 | VRN2ESPSXA200 | VRN2ESSXA200 | VRN2ESPSXA100 | VRN2ESSXA100 |  |
|                        |                                |      |                              | 40       | VRN2ETPX7200      | VRN2ETSX7200 | VRN2ETPX7100 | VRN2ETSX7100 | VRN2ETPXA200  | VRN2ETSXA200 | VRN2ETPXA100  | VRN2ETSXA100 |  |
|                        |                                |      |                              | 45       | VRN2EUPX7200      | VRN2EUSX7200 | VRN2EUPX7100 | VRN2EUSX7100 | VRN2EUPXA200  | VRN2EUSXA200 | VRN2EUPXA100  | VRN2EUSXA100 |  |
|                        | 6                              | 50   |                              | 50       | VRN2E1PX7200      | VRN2E1SX7200 | VRN2E1PX7100 | VRN2E1SX7100 | VRN2E1PXA200  | VRN2E1SXA200 | VRN2E1PXA100  | VRN2E1SXA100 |  |
|                        |                                |      |                              | 55       | VRN2E2PX7200      | VRN2E2SX7200 | VRN2E2PX7100 | VRN2E2SX7100 | VRN2E2PXA200  | VRN2E2SXA200 | VRN2E2PXA100  | VRN2E2SXA100 |  |
|                        |                                |      |                              | 60       | VRN2E3PX7200      | VRN2E3SX7200 | VRN2E3PX7100 | VRN2E3SX7100 | VRN2E3PXA200  | VRN2E3SXA200 | VRN2E3PXA100  | VRN2E3SXA100 |  |
|                        |                                |      |                              | 65       | VRN2E4PX7200      | VRN2E4SX7200 | VRN2E4PX7100 | VRN2E4SX7100 | VRN2E4PXA200  | VRN2E4SXA200 | VRN2E4PXA100  | VRN2E4SXA100 |  |
|                        | 7                              | 58   |                              | 70       | VRN2E5PX7200      | VRN2E5SX7200 | VRN2E5PX7100 | VRN2E5SX7100 | VRN2E5PXA200  | VRN2E5SXA200 | VRN2E5PXA100  | VRN2E5SXA100 |  |
|                        |                                |      |                              | 75       | VRN262PX7200      | VRN262SX7200 | VRN262PX7100 | VRN262SX7100 | VRN262PXA200  | VRN262SXA200 | VRN262PXA100  | VRN262SXA100 |  |
|                        |                                |      |                              | 80       | VRN2E7PX7200      | VRN2E7SX7200 | VRN2E7PX7100 | VRN2E7SX7100 | VRN2E7PXA200  | VRN2E7SXA200 | VRN2E7PXA100  | VRN2E7SXA100 |  |
|                        |                                |      |                              | 85       | VRN2E8PX7200      | VRN2E8SX7200 | VRN2E8PX7100 | VRN2E8SX7100 | VRN2E8PXA200  | VRN2E8SXA200 | VRN2E8PXA100  | VRN2E8SXA100 |  |
| 2"                     | 4                              | 58   | 100                          | 95       | VRN2E9PX7200      | VRN2E9SX7200 | VRN2E9PX7100 | VRN2E9SX7100 | VRN2E9PXA200  | VRN2E9SXA200 | VRN2E9PXA100  | VRN2E9SXA100 |  |
|                        |                                |      |                              | 25       | VRN2FQPX7200      | VRN2FQSX7200 | VRN2FQPX7100 | VRN2FQSX7100 | VRN2FQPXA200  | VRN2FQSXA200 | VRN2FQPXA100  | VRN2FQSXA100 |  |
|                        |                                |      |                              | 30       | VRN2FRPX7200      | VRN2FRSX7200 | VRN2FRPX7100 | VRN2FRSX7100 | VRN2FRPXA200  | VRN2FRSXA200 | VRN2FRPXA100  | VRN2FRSXA100 |  |
|                        |                                |      |                              | 35       | VRN2FSPX7200      | VRN2FSSX7200 | VRN2FSPX7100 | VRN2FSSX7100 | VRN2FSPXA200  | VRN2FSSXA200 | VRN2FSPXA100  | VRN2FSSXA100 |  |
|                        | 6                              | 58   |                              | 40       | VRN2FTPX7200      | VRN2FTSX7200 | VRN2FTPX7100 | VRN2FTSX7100 | VRN2FTPXA200  | VRN2FTSXA200 | VRN2FTPXA100  | VRN2FTSXA100 |  |
|                        |                                |      |                              | 45       | VRN2FUPX7200      | VRN2FUSX7200 | VRN2FUPX7100 | VRN2FUSX7100 | VRN2FUPXA200  | VRN2FUSXA200 | VRN2FUPXA100  | VRN2FUSXA100 |  |
|                        |                                |      |                              | 50       | VRN2F1PX7200      | VRN2F1SX7200 | VRN2F1PX7100 | VRN2F1SX7100 | VRN2F1PXA200  | VRN2F1SXA200 | VRN2F1PXA100  | VRN2F1SXA100 |  |
|                        |                                |      |                              | 55       | VRN2F2PX7200      | VRN2F2SX7200 | VRN2F2PX7100 | VRN2F2SX7100 | VRN2F2PXA200  | VRN2F2SXA200 | VRN2F2PXA100  | VRN2F2SXA100 |  |
|                        | 7                              | 58   |                              | 60       | VRN2F3PX7200      | VRN2F3SX7200 | VRN2F3PX7100 | VRN2F3SX7100 | VRN2F3PXA200  | VRN2F3SXA200 | VRN2F3PXA100  | VRN2F3SXA100 |  |
|                        |                                |      |                              | 65       | VRN2F4PX7200      | VRN2F4SX7200 | VRN2F4PX7100 | VRN2F4SX7100 | VRN2F4PXA200  | VRN2F4SXA200 | VRN2F4PXA100  | VRN2F4SXA100 |  |
|                        |                                |      |                              | 70       | VRN2F5PX7200      | VRN2F5SX7200 | VRN2F5PX7100 | VRN2F5SX7100 | VRN2F5PXA200  | VRN2F5SXA200 | VRN2F5PXA100  | VRN2F5SXA100 |  |
|                        |                                |      |                              | 75       | VRN2F6PX7200      | VRN2F6SX7200 | VRN2F6PX7100 | VRN2F6SX7100 | VRN2F6PXA200  | VRN2F6SXA200 | VRN2F6PXA100  | VRN2F6SXA100 |  |
| 2-1/2"                 | 4                              | 58   | 100                          | 25       | VRN2GQPX7200      | VRN2GQSX7200 | VRN2GQPX7100 | VRN2GQSX7100 | VRN2GQPXA200  | VRN2GQSXA200 | VRN2GQPXA100  | VRN2GQSXA100 |  |
|                        |                                |      |                              | 30       | VRN2GRPX7200      | VRN2GRSX7200 | VRN2GRPX7100 | VRN2GRSX7100 | VRN2GRPXA200  | VRN2GRSXA200 | VRN2GRPXA100  | VRN2GRSXA100 |  |
|                        |                                |      |                              | 35       | VRN2GSPX7200      | VRN2GSSX7200 | VRN2GSPX7100 | VRN2GSSX7100 | VRN2GSPXA200  | VRN2GSSXA200 | VRN2GSPXA100  | VRN2GSSXA100 |  |
|                        |                                |      |                              | 40       | VRN2GTPX7200      | VRN2GTSX7200 | VRN2GTPX7100 | VRN2GTSX7100 | VRN2GTPXA200  | VRN2GTSXA200 | VRN2GTPXA100  | VRN2GTSXA100 |  |
|                        | 6                              | 58   |                              | 45       | VRN2GUPX7200      | VRN2GUSX7200 | VRN2GUPX7100 | VRN2GUSX7100 | VRN2GUPXA200  | VRN2GUSXA200 | VRN2GUPXA100  | VRN2GUSXA100 |  |
|                        |                                |      |                              | 50       | VRN2G1PX7200      | VRN2G1SX7200 | VRN2G1PX7100 | VRN2G1SX7100 | VRN2G1PXA200  | VRN2G1SXA200 | VRN2G1PXA100  | VRN2G1SXA100 |  |
|                        |                                |      |                              | 55       | VRN2G2PX7200      | VRN2G2SX7200 | VRN2G2PX7100 | VRN2G2SX7100 | VRN2G2PXA200  | VRN2G2SXA200 | VRN2G2PXA100  | VRN2G2SXA100 |  |
|                        |                                |      |                              | 60       | VRN2G3PX7200      | VRN2G3SX7200 | VRN2G3PX7100 | VRN2G3SX7100 | VRN2G3PXA200  | VRN2G3SXA200 | VRN2G3PXA100  | VRN2G3SXA100 |  |
|                        | 7                              | 58   |                              | 65       | VRN2G4PX7200      | VRN2G4SX7200 | VRN2G4PX7100 | VRN2G4SX7100 | VRN2G4PXA200  | VRN2G4SXA200 | VRN2G4PXA100  | VRN2G4SXA100 |  |
|                        |                                |      |                              | 70       | VRN2G5PX7200      | VRN2G5SX7200 | VRN2G5PX7100 | VRN2G5SX7100 | VRN2G5PXA200  | VRN2G5SXA200 | VRN2G5PXA100  | VRN2G5SXA100 |  |
|                        |                                |      |                              | 75       | VRN2G6PX7200      | VRN2G6SX7200 | VRN2G6PX7100 | VRN2G6SX7100 | VRN2G6PXA200  | VRN2G6SXA200 | VRN2G6PXA100  | VRN2G6SXA100 |  |
|                        |                                |      |                              | 80       | VRN2G7PX7200      | VRN2G7SX7200 | VRN2G7PX7100 | VRN2G7SX7100 | VRN2G7PXA200  | VRN2G7SXA200 | VRN2G7PXA100  | VRN2G7SXA100 |  |
|                        | 11                             | 58   |                              | 85       | VRN2G8PX7200      | VRN2G8SX7200 | VRN2G8PX7100 | VRN2G8SX7100 | VRN2G8PXA200  | VRN2G8SXA200 | VRN2G8PXA100  | VRN2G8SXA100 |  |
|                        |                                |      |                              | 95*      | VRN2G9PX7200      | VRN2G9SX7200 | VRN2G9PX7100 | VRN2G9SX7100 | VRN2G9PXA200  | VRN2G9SXA200 | VRN2G9PXA100  | VRN2G9SXA100 |  |
| 3"                     | 4                              | 58   | 100                          | 25       | VRN2HQPX7200      | VRN2HQSX7200 | VRN2HQPX7100 | VRN2HQSX7100 | VRN2HQPXA200  | VRN2HQSXA200 | VRN2HQPXA100  | VRN2HQSXA100 |  |
|                        |                                |      |                              | 30       | VRN2HRPX7200      | VRN2HRSX7200 | VRN2HRPX7100 | VRN2HRSX7100 | VRN2HRPXA200  | VRN2HRSXA200 | VRN2HRPXA100  | VRN2HRSXA100 |  |
|                        |                                |      |                              | 35       | VRN2HSPX7200      | VRN2HSSX7200 | VRN2HSPX7100 | VRN2HSSX7100 | VRN2HSPXA200  | VRN2HSSXA200 | VRN2HSPXA100  | VRN2HSSXA100 |  |
|                        |                                |      |                              | 40       | VRN2HTPX7200      | VRN2HTSX7200 | VRN2HTPX7100 | VRN2HTSX7100 | VRN2HTPXA200  | VRN2HTSXA200 | VRN2HTPXA100  | VRN2HTSXA100 |  |
|                        | 6                              | 58   |                              | 45       | VRN2HUPX7200      | VRN2HUSX7200 | VRN2HUPX7100 | VRN2HUSX7100 | VRN2HUPXA200  | VRN2HUSXA200 | VRN2HUPXA100  | VRN2HUSXA100 |  |
|                        |                                |      |                              | 50       | VRN2H1PX7200      | VRN2H1SX7200 | VRN2H1PX7100 | VRN2H1SX7100 | VRN2H1PXA200  | VRN2H1SXA200 | VRN2H1PXA100  | VRN2H1SXA100 |  |
|                        |                                |      |                              | 55       | VRN2H2PX7200      | VRN2H2SX7200 | VRN2H2PX7100 | VRN2H2SX7100 | VRN2H2PXA200  | VRN2H2SXA200 | VRN2H2PXA100  | VRN2H2SXA100 |  |
|                        |                                |      |                              | 60       | VRN2H3PX7200      | VRN2H3SX7200 | VRN2H3PX7100 | VRN2H3SX7100 | VRN2H3PXA200  | VRN2H3SXA200 | VRN2H3PXA100  | VRN2H3SXA100 |  |
|                        | 7                              | 58   |                              | 65       | VRN2H4PX7200      | VRN2H4SX7200 | VRN2H4PX7100 | VRN2H4SX7100 | VRN2H4PXA200  | VRN2H4SXA200 | VRN2H4PXA100  | VRN2H4SXA100 |  |
|                        |                                |      |                              | 70       | VRN2H5PX7200      | VRN2H5SX7200 | VRN2H5PX7100 | VRN2H5SX7100 | VRN2H5PXA200  | VRN2H5SXA200 | VRN2H5PXA100  | VRN2H5SXA100 |  |
|                        |                                |      |                              | 75       | VRN2H6PX7200      | VRN2H6SX7200 | VRN2H6PX7100 | VRN2H6SX7100 | VRN2H6PXA200  | VRN2H6SXA200 | VRN2H6PXA100  | VRN2H6SXA100 |  |
|                        |                                |      |                              | 80       | VRN2H7PX7200      | VRN2H7SX7200 | VRN2H7PX7100 | VRN2H7SX7100 | VRN2H7PXA200  | VRN2H7SXA200 | VRN2H7PXA100  | VRN2H7SXA100 |  |
|                        | 11                             | 58   |                              | 85       | VRN2H8PX7200      | VRN2H8SX7200 | VRN2H8PX7100 | VRN2H8SX7100 | VRN2H8PXA200  | VRN2H8SXA200 | VRN2H8PXA100  | VRN2H8SXA100 |  |
|                        |                                |      |                              | 95*      | VRN2H9PX7200      | VRN2H9SX7200 | VRN2H9PX7100 | VRN2H9SX7100 | VRN2H9PXA200  | VRN2H9SXA200 | VRN2H9PXA100  | VRN2H9SXA100 |  |

\* Full port ball

\*\* Differential pressure regulator operating range, ±5%

## Product Selection - Valves

## Pressure Independent Control Valves, NPT 1½"-3" NEMA 2

| Actuator Features   |  |                                        |  |  | Fail Safe   |                     |                 |                     |                 |                     |                 |                     |                 |
|---------------------|--|----------------------------------------|--|--|-------------|---------------------|-----------------|---------------------|-----------------|---------------------|-----------------|---------------------|-----------------|
| Actuator O.S Number |  |                                        |  |  | MS4105A1030 |                     |                 |                     | MS4105A1130     |                     |                 |                     |                 |
| Power Supply        |  | Voltage                                |  |  | 100-250 VAC |                     |                 |                     | 100-250 VAC     |                     |                 |                     |                 |
|                     |  | Frequency                              |  |  | 50 / 60 Hz  |                     |                 |                     | 50 / 60 Hz      |                     |                 |                     |                 |
|                     |  | Power                                  |  |  | 6 VA        |                     |                 |                     | 6 VA            |                     |                 |                     |                 |
| Actuator Torque     |  | (lb.-in.)                              |  |  | 44          |                     |                 |                     | 44              |                     |                 |                     |                 |
| Control             |  | (0)2-10Vdc                             |  |  |             |                     |                 |                     |                 |                     |                 |                     |                 |
|                     |  | 4-20 mA (w/ external 500 Ohm Resistor) |  |  |             |                     |                 |                     |                 |                     |                 |                     |                 |
|                     |  | Floating                               |  |  |             |                     |                 |                     |                 |                     |                 |                     |                 |
|                     |  | Two-Position SPDT                      |  |  |             |                     |                 |                     |                 |                     |                 |                     |                 |
|                     |  | Two-Position SPST                      |  |  | •           |                     |                 |                     | •               |                     |                 |                     |                 |
| Actuator Stroke     |  | (degrees)                              |  |  | 95° ± 3°    |                     |                 |                     | 95° ± 3°        |                     |                 |                     |                 |
| Timing              |  | (drive/spring return, seconds)         |  |  | 45 / 25     |                     |                 |                     | 45 / 25         |                     |                 |                     |                 |
| Aux Switch          |  |                                        |  |  | 0           |                     |                 |                     | 1               |                     |                 |                     |                 |
| Feedback            |  | 2-10 Vdc Built In                      |  |  |             |                     |                 |                     |                 |                     |                 |                     |                 |
| Fail Safe Action    |  |                                        |  |  | Closed      |                     | Open            |                     | Closed          |                     | Open            |                     |                 |
| Normal Position     |  | (no signal)                            |  |  | Closed      |                     | Open            |                     | Closed          |                     | Open            |                     |                 |
| Valve Features      |  |                                        |  |  | Trim        | Nickel-Plated Brass | Stainless Steel | Nickel-Plated Brass | Stainless Steel | Nickel-Plated Brass | Stainless Steel | Nickel-Plated Brass | Stainless Steel |

| Valve Size (inches) | Differential Pressure** (psid) |      | Close-off Pressure (psid) | Max. GPM     | Short Order Codes |              |              |              |              |              |              |              |              |              |
|---------------------|--------------------------------|------|---------------------------|--------------|-------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
|                     | Min.                           | Max. |                           |              |                   |              |              |              |              |              |              |              |              |              |
| 1-1/2"              | 4                              | 50   | 100                       | 10           | VRN2EMPX8200      | VRN2EMSX8200 | VRN2EMPX8100 | VRN2EMSX8100 | VRN2EMPX9200 | VRN2EMSX9200 | VRN2EMPX9100 | VRN2EMSX9100 |              |              |
|                     |                                |      |                           | 15           | VRN2ENPX8200      | VRN2ENSX8200 | VRN2ENPX8100 | VRN2ENSX8100 | VRN2ENPX9200 | VRN2ENSX9200 | VRN2ENPX9100 | VRN2ENSX9100 |              |              |
|                     |                                |      |                           | 20           | VRN2EPPX8200      | VRN2EPSX8200 | VRN2EPPX8100 | VRN2EPSX8100 | VRN2EPPX9200 | VRN2EPSX9200 | VRN2EPPX9100 | VRN2EPSX9100 |              |              |
|                     |                                |      |                           | 25           | VRN2EQPX8200      | VRN2EQSX8200 | VRN2EQPX8100 | VRN2EQSX8100 | VRN2EQPX9200 | VRN2EQSX9200 | VRN2EQPX9100 | VRN2EQSX9100 |              |              |
|                     |                                |      |                           | 30           | VRN2ERPX8200      | VRN2ERSX8200 | VRN2ERPX8100 | VRN2ERSX8100 | VRN2ERPX9200 | VRN2ERSX9200 | VRN2ERPX9100 | VRN2ERSX9100 |              |              |
|                     |                                |      |                           | 35           | VRN2ESPX8200      | VRN2ESSX8200 | VRN2ESPX8100 | VRN2ESSX8100 | VRN2ESPX9200 | VRN2ESSX9200 | VRN2ESPX9100 | VRN2ESSX9100 |              |              |
|                     | 6                              | 58   |                           | 40           | VRN2ETPX8200      | VRN2ETSX8200 | VRN2ETPX8100 | VRN2ETSX8100 | VRN2ETPX9200 | VRN2ETSX9200 | VRN2ETPX9100 | VRN2ETSX9100 |              |              |
|                     |                                |      |                           | 45           | VRN2EUPX8200      | VRN2EUSX8200 | VRN2EUPX8100 | VRN2EUSX8100 | VRN2EUPX9200 | VRN2EUSX9200 | VRN2EUPX9100 | VRN2EUSX9100 |              |              |
|                     |                                |      |                           | 50           | VRN2E1PX8200      | VRN2E1SX8200 | VRN2E1PX8100 | VRN2E1SX8100 | VRN2E1PX9200 | VRN2E1SX9200 | VRN2E1PX9100 | VRN2E1SX9100 |              |              |
|                     |                                |      |                           | 55           | VRN2E2PX8200      | VRN2E2SX8200 | VRN2E2PX8100 | VRN2E2SX8100 | VRN2E2PX9200 | VRN2E2SX9200 | VRN2E2PX9100 | VRN2E2SX9100 |              |              |
|                     |                                |      |                           | 60           | VRN2E3PX8200      | VRN2E3SX8200 | VRN2E3PX8100 | VRN2E3SX8100 | VRN2E3PX9200 | VRN2E3SX9200 | VRN2E3PX9100 | VRN2E3SX9100 |              |              |
|                     |                                |      |                           | 65           | VRN2E4PX8200      | VRN2E4SX8200 | VRN2E4PX8100 | VRN2E4SX8100 | VRN2E4PX9200 | VRN2E4SX9200 | VRN2E4PX9100 | VRN2E4SX9100 |              |              |
|                     | 7                              | 58   |                           | 70           | VRN2E5PX8200      | VRN2E5SX8200 | VRN2E5PX8100 | VRN2E5SX8100 | VRN2E5PX9200 | VRN2E5SX9200 | VRN2E5PX9100 | VRN2E5SX9100 |              |              |
|                     |                                |      |                           | 75           | VRN262PX8200      | VRN262SX8200 | VRN262PX8100 | VRN262SX8100 | VRN262PX9200 | VRN262SX9200 | VRN262PX9100 | VRN262SX9100 |              |              |
|                     |                                |      |                           | 80           | VRN2E7PX8200      | VRN2E7SX8200 | VRN2E7PX8100 | VRN2E7SX8100 | VRN2E7PX9200 | VRN2E7SX9200 | VRN2E7PX9100 | VRN2E7SX9100 |              |              |
|                     |                                |      |                           | 85           | VRN2E8PX8200      | VRN2E8SX8200 | VRN2E8PX8100 | VRN2E8SX8100 | VRN2E8PX9200 | VRN2E8SX9200 | VRN2E8PX9100 | VRN2E8SX9100 |              |              |
|                     |                                |      |                           | 95           | VRN2E9PX8200      | VRN2E9SX8200 | VRN2E9PX8100 | VRN2E9SX8100 | VRN2E9PX9200 | VRN2E9SX9200 | VRN2E9PX9100 | VRN2E9SX9100 |              |              |
|                     |                                |      |                           | 25           | VRN2FQPX8200      | VRN2FQSX8200 | VRN2FQPX8100 | VRN2FQSX8100 | VRN2FQPX9200 | VRN2FQSX9200 | VRN2FQPX9100 | VRN2FQSX9100 |              |              |
| 2"                  | 4                              | 58   | 100                       | 30           | VRN2FRPX8200      | VRN2FRSX8200 | VRN2FRPX8100 | VRN2FRSX8100 | VRN2FRPX9200 | VRN2FRSX9200 | VRN2FRPX9100 | VRN2FRSX9100 |              |              |
|                     |                                |      |                           | 35           | VRN2FSPX8200      | VRN2FSSX8200 | VRN2FSPX8100 | VRN2FSSX8100 | VRN2FSPX9200 | VRN2FSSX9200 | VRN2FSPX9100 | VRN2FSSX9100 |              |              |
|                     |                                |      |                           | 40           | VRN2FTPX8200      | VRN2FTSX8200 | VRN2FTPX8100 | VRN2FTSX8100 | VRN2FTPX9200 | VRN2FTSX9200 | VRN2FTPX9100 | VRN2FTSX9100 |              |              |
|                     |                                |      |                           | 45           | VRN2FUPX8200      | VRN2FUSX8200 | VRN2FUPX8100 | VRN2FUSX8100 | VRN2FUPX9200 | VRN2FUSX9200 | VRN2FUPX9100 | VRN2FUSX9100 |              |              |
|                     |                                |      |                           | 50           | VRN2F1PX8200      | VRN2F1SX8200 | VRN2F1PX8100 | VRN2F1SX8100 | VRN2F1PX9200 | VRN2F1SX9200 | VRN2F1PX9100 | VRN2F1SX9100 |              |              |
|                     |                                |      |                           | 55           | VRN2F2PX8200      | VRN2F2SX8200 | VRN2F2PX8100 | VRN2F2SX8100 | VRN2F2PX9200 | VRN2F2SX9200 | VRN2F2PX9100 | VRN2F2SX9100 |              |              |
|                     | 7                              | 58   |                           | 60           | VRN2F3PX8200      | VRN2F3SX8200 | VRN2F3PX8100 | VRN2F3SX8100 | VRN2F3PX9200 | VRN2F3SX9200 | VRN2F3PX9100 | VRN2F3SX9100 |              |              |
|                     |                                |      |                           | 65           | VRN2F4PX8200      | VRN2F4SX8200 | VRN2F4PX8100 | VRN2F4SX8100 | VRN2F4PX9200 | VRN2F4SX9200 | VRN2F4PX9100 | VRN2F4SX9100 |              |              |
|                     |                                |      |                           | 70           | VRN2F5PX8200      | VRN2F5SX8200 | VRN2F5PX8100 | VRN2F5SX8100 | VRN2F5PX9200 | VRN2F5SX9200 | VRN2F5PX9100 | VRN2F5SX9100 |              |              |
|                     |                                |      |                           | 75           | VRN2F6PX8200      | VRN2F6SX8200 | VRN2F6PX8100 | VRN2F6SX8100 | VRN2F6PX9200 | VRN2F6SX9200 | VRN2F6PX9100 | VRN2F6SX9100 |              |              |
|                     |                                |      |                           | 25           | VRN2GQPX8200      | VRN2GQSX8200 | VRN2GQPX8100 | VRN2GQSX8100 | VRN2GQPX9200 | VRN2GQSX9200 | VRN2GQPX9100 | VRN2GQSX9100 |              |              |
|                     |                                |      |                           | 30           | VRN2GRPX8200      | VRN2GRSX8200 | VRN2GRPX8100 | VRN2GRSX8100 | VRN2GRPX9200 | VRN2GRSX9200 | VRN2GRPX9100 | VRN2GRSX9100 |              |              |
| 2-1/2"              | 4                              | 58   | 100                       | 35           | VRN2GSPX8200      | VRN2GSSX8200 | VRN2GSPX8100 | VRN2GSSX8100 | VRN2GSPX9200 | VRN2GSSX9200 | VRN2GSPX9100 | VRN2GSSX9100 |              |              |
|                     |                                |      |                           | 40           | VRN2GTPX8200      | VRN2GTSX8200 | VRN2GTPX8100 | VRN2GTSX8100 | VRN2GTPX9200 | VRN2GTSX9200 | VRN2GTPX9100 | VRN2GTSX9100 |              |              |
|                     |                                |      |                           | 45           | VRN2GUPX8200      | VRN2GUSX8200 | VRN2GUPX8100 | VRN2GUSX8100 | VRN2GUPX9200 | VRN2GUSX9200 | VRN2GUPX9100 | VRN2GUSX9100 |              |              |
|                     |                                |      |                           | 50           | VRN2G1PX8200      | VRN2G1SX8200 | VRN2G1PX8100 | VRN2G1SX8100 | VRN2G1PX9200 | VRN2G1SX9200 | VRN2G1PX9100 | VRN2G1SX9100 |              |              |
|                     |                                |      |                           | 55           | VRN2G2PX8200      | VRN2G2SX8200 | VRN2G2PX8100 | VRN2G2SX8100 | VRN2G2PX9200 | VRN2G2SX9200 | VRN2G2PX9100 | VRN2G2SX9100 |              |              |
|                     |                                |      |                           | 60           | VRN2G3PX8200      | VRN2G3SX8200 | VRN2G3PX8100 | VRN2G3SX8100 | VRN2G3PX9200 | VRN2G3SX9200 | VRN2G3PX9100 | VRN2G3SX9100 |              |              |
|                     | 7                              | 58   |                           | 65           | VRN2G4PX8200      | VRN2G4SX8200 | VRN2G4PX8100 | VRN2G4SX8100 | VRN2G4PX9200 | VRN2G4SX9200 | VRN2G4PX9100 | VRN2G4SX9100 |              |              |
|                     |                                |      |                           | 70           | VRN2G5PX8200      | VRN2G5SX8200 | VRN2G5PX8100 | VRN2G5SX8100 | VRN2G5PX9200 | VRN2G5SX9200 | VRN2G5PX9100 | VRN2G5SX9100 |              |              |
|                     |                                |      |                           | 75           | VRN2G6PX8200      | VRN2G6SX8200 | VRN2G6PX8100 | VRN2G6SX8100 | VRN2G6PX9200 | VRN2G6SX9200 | VRN2G6PX9100 | VRN2G6SX9100 |              |              |
|                     |                                |      |                           | 80           | VRN2G7PX8200      | VRN2G7SX8200 | VRN2G7PX8100 | VRN2G7SX8100 | VRN2G7PX9200 | VRN2G7SX9200 | VRN2G7PX9100 | VRN2G7SX9100 |              |              |
|                     |                                |      |                           | 85           | VRN2G8PX8200      | VRN2G8SX8200 | VRN2G8PX8100 | VRN2G8SX8100 | VRN2G8PX9200 | VRN2G8SX9200 | VRN2G8PX9100 | VRN2G8SX9100 |              |              |
|                     |                                |      |                           | 95*          | VRN2G9PX8200      | VRN2G9SX8200 | VRN2G9PX8100 | VRN2G9SX8100 | VRN2G9PX9200 | VRN2G9SX9200 | VRN2G9PX9100 | VRN2G9SX9100 |              |              |
|                     | 3"                             | 4    |                           | 58           | 100               | 25           | VRN2HQPX8200 | VRN2HQSX8200 | VRN2HQPX8100 | VRN2HQSX8100 | VRN2HQPX9200 | VRN2HQSX9200 | VRN2HQPX9100 | VRN2HQSX9100 |
|                     |                                |      |                           |              |                   | 30           | VRN2HRPX8200 | VRN2HRSX8200 | VRN2HRPX8100 | VRN2HRSX8100 | VRN2HRPX9200 | VRN2HRSX9200 | VRN2HRPX9100 | VRN2HRSX9100 |
|                     |                                |      |                           |              |                   | 35           | VRN2HSPX8200 | VRN2HSSX8200 | VRN2HSPX8100 | VRN2HSSX8100 | VRN2HSPX9200 | VRN2HSSX9200 | VRN2HSPX9100 | VRN2HSSX9100 |
|                     |                                |      |                           |              |                   | 40           | VRN2HTPX8200 | VRN2HTSX8200 | VRN2HTPX8100 | VRN2HTSX8100 | VRN2HTPX9200 | VRN2HTSX9200 | VRN2HTPX9100 | VRN2HTSX9100 |
|                     |                                |      |                           |              |                   | 45           | VRN2HUPX8200 | VRN2HUSX8200 | VRN2HUPX8100 | VRN2HUSX8100 | VRN2HUPX9200 | VRN2HUSX9200 | VRN2HUPX9100 | VRN2HUSX9100 |
|                     |                                |      |                           |              |                   | 50           | VRN2H1PX8200 | VRN2H1SX8200 | VRN2H1PX8100 | VRN2H1SX8100 | VRN2H1PX9200 | VRN2H1SX9200 | VRN2H1PX9100 | VRN2H1SX9100 |
| 7                   |                                | 58   |                           | 55           |                   | VRN2H2PX8200 | VRN2H2SX8200 | VRN2H2PX8100 | VRN2H2SX8100 | VRN2H2PX9200 | VRN2H2SX9200 | VRN2H2PX9100 | VRN2H2SX9100 |              |
|                     |                                |      |                           | 60           |                   | VRN2H3PX8200 | VRN2H3SX8200 | VRN2H3PX8100 | VRN2H3SX8100 | VRN2H3PX9200 | VRN2H3SX9200 | VRN2H3PX9100 | VRN2H3SX9100 |              |
|                     |                                |      |                           | 65           |                   | VRN2H4PX8200 | VRN2H4SX8200 | VRN2H4PX8100 | VRN2H4SX8100 | VRN2H4PX9200 | VRN2H4SX9200 | VRN2H4PX9100 | VRN2H4SX9100 |              |
|                     |                                |      |                           | 70           |                   | VRN2H5PX8200 | VRN2H5SX8200 | VRN2H5PX8100 | VRN2H5SX8100 | VRN2H5PX9200 | VRN2H5SX9200 | VRN2H5PX9100 | VRN2H5SX9100 |              |
|                     |                                |      |                           | 75           |                   | VRN2H6PX8200 | VRN2H6SX8200 | VRN2H6PX8100 | VRN2H6SX8100 | VRN2H6PX9200 | VRN2H6SX9200 | VRN2H6PX9100 | VRN2H6SX9100 |              |
|                     |                                |      |                           | 80           |                   | VRN2H7PX8200 | VRN2H7SX8200 | VRN2H7PX8100 | VRN2H7SX8100 | VRN2H7PX9200 | VRN2H7SX9200 | VRN2H7PX9100 | VRN2H7SX9100 |              |
| 11                  | 58                             |      | 85                        | VRN2H8PX8200 | VRN2H8SX8200      | VRN2H8PX8100 | VRN2H8SX8100 | VRN2H8PX9200 | VRN2H8SX9200 | VRN2H8PX9100 | VRN2H8SX9100 |              |              |              |
|                     |                                |      | 95*                       | VRN2H9PX8200 | VRN2H9SX8200      | VRN2H9PX8100 | VRN2H9SX8100 | VRN2H9PX9200 | VRN2H9SX9200 | VRN2H9PX9100 | VRN2H9SX9100 |              |              |              |

# Product Selection - Valves

## Pressure Independent Control Valves, NPT ½"-1 ¼" NEMA 3R

|                     |                                |      | Actuator Features                      |              | Non Fail Safe       |                 |                     |                 |                     |                 |                     |                 |
|---------------------|--------------------------------|------|----------------------------------------|--------------|---------------------|-----------------|---------------------|-----------------|---------------------|-----------------|---------------------|-----------------|
|                     |                                |      | Actuator O.S Number                    |              | MN6105A1011         |                 | MN6105A1201         |                 | MN7505A2001         |                 | MN7505A2209         |                 |
| Power Supply        |                                |      | Voltage                                |              | 24 VAC/DC           |                 | 24 VAC/DC           |                 | 24 VAC/DC           |                 | 24 VAC/DC           |                 |
|                     |                                |      | Frequency                              |              | 50 / 60 Hz          |                 | 50 / 60 Hz          |                 | 50 / 60 Hz          |                 | 50 / 60 Hz          |                 |
|                     |                                |      | Power                                  |              | 5 VA                |                 | 5 VA                |                 | 5 VA                |                 | 5 VA                |                 |
| Actuator Torque     |                                |      | (lb. -in.)                             |              | 44                  |                 | 44                  |                 | 44                  |                 | 44                  |                 |
| Control             |                                |      | (0)2-10Vdc                             |              |                     |                 |                     |                 | •                   |                 | •                   |                 |
|                     |                                |      | 4-20 mA (w/ external 500 Ohm Resistor) |              |                     |                 |                     |                 | •                   |                 | •                   |                 |
|                     |                                |      | Floating                               |              | •                   |                 | •                   |                 | •                   |                 | •                   |                 |
|                     |                                |      | Two-Position SPDT                      |              | •                   |                 | •                   |                 | •                   |                 | •                   |                 |
|                     |                                |      | Two-Position SPST                      |              |                     |                 |                     |                 | •                   |                 | •                   |                 |
| Actuator Stroke     |                                |      | (degrees)                              |              | 95° ± 3°            |                 | 95° ± 3°            |                 | 95° ± 3°            |                 | 95° ± 3°            |                 |
| Timing              |                                |      | (drive/spring return, seconds)         |              | 90                  |                 | 90                  |                 | 90                  |                 | 90                  |                 |
| Aux Switch          |                                |      |                                        |              | 0                   |                 | 2                   |                 | 0                   |                 | 2                   |                 |
| Feedback            |                                |      | 2-10 Vdc Built In                      |              | —                   |                 | —                   |                 | •                   |                 | •                   |                 |
| Fail Safe Action    |                                |      |                                        |              | Stay in Place       |                 | Stay in Place       |                 | Stay in Place       |                 | Stay in Place       |                 |
| Normal Position     |                                |      | (no signal)                            |              | Stay in Place       |                 | Stay in Place       |                 | Closed              |                 | Closed              |                 |
| Valve Features      |                                |      | Trim                                   |              | Nickel-Plated Brass | Stainless Steel | Nickel-Plated Brass | Stainless Steel | Nickel-Plated Brass | Stainless Steel | Nickel-Plated Brass | Stainless Steel |
| Valve Size (inches) | Differential Pressure** (psid) |      | Close-off Pressure (psid)              | Max. GPM     | Short Order Codes   |                 |                     |                 |                     |                 |                     |                 |
|                     | Min.                           | Max. |                                        |              |                     |                 |                     |                 |                     |                 |                     |                 |
| 1/2"                | 3.0                            | 35   | 100                                    | 1            | VRN2ABPX4002        | VRN2ABSX4002    | VRN2ABPX002         | VRN2ABSXC002    | VRN2ABPX5002        | VRN2ABSX5002    | VRN2ABPXD002        | VRN2ABSXD002    |
|                     |                                |      |                                        | 2            | VRN2ADPX4002        | VRN2ADSX4002    | VRN2ADPX002         | VRN2ADSC002     | VRN2ADPX5002        | VRN2ADSX5002    | VRN2ADPXD002        | VRN2ADSD002     |
|                     |                                |      |                                        | 3            | VRN2AEPX4002        | VRN2AESX4002    | VRN2AEPX002         | VRN2AESXC002    | VRN2AEPX5002        | VRN2AESX5002    | VRN2AEPXD002        | VRN2AESXD002    |
|                     |                                |      |                                        | 4            | VRN2AFPX4002        | VRN2AFSX4002    | VRN2AFPX002         | VRN2AFSXC002    | VRN2AFPX5002        | VRN2AFSX5002    | VRN2AFPXD002        | VRN2AFSXD002    |
|                     |                                |      |                                        | 5            | VRN2AGPX4002        | VRN2AGSX4002    | VRN2AGPX002         | VRN2AGSXC002    | VRN2AGPX5002        | VRN2AGSX5002    | VRN2AGPXD002        | VRN2AGSXD002    |
|                     |                                |      |                                        | 6            | VRN2AHPX4002        | VRN2AHSX4002    | VRN2AHPX002         | VRN2AHSXC002    | VRN2AHPX5002        | VRN2AHSX5002    | VRN2AHPXD002        | VRN2AHSXD002    |
|                     |                                |      |                                        | 7            | VRN2AJPX4002        | VRN2AJSX4002    | VRN2AJPX002         | VRN2AJSC002     | VRN2AJPX5002        | VRN2AJSX5002    | VRN2AJPXD002        | VRN2AJSD002     |
| 3/4"                | 3.0                            | 35   | 100                                    | 1            | VRN2BBPX4002        | VRN2BBSX4002    | VRN2BBPX002         | VRN2BBSXC002    | VRN2BBPX5002        | VRN2BBSX5002    | VRN2BBPXD002        | VRN2BBSXD002    |
|                     |                                |      |                                        | 2            | VRN2BDPX4002        | VRN2BDSX4002    | VRN2BDPX002         | VRN2BDSXC002    | VRN2BDPX5002        | VRN2BDSX5002    | VRN2BDPXD002        | VRN2BDSXD002    |
|                     |                                |      |                                        | 3            | VRN2BEPX4002        | VRN2BESX4002    | VRN2BEPX002         | VRN2BESXC002    | VRN2BEPX5002        | VRN2BESX5002    | VRN2BEPXD002        | VRN2BESXD002    |
|                     |                                |      |                                        | 4            | VRN2BFPX4002        | VRN2BFSX4002    | VRN2BFPX002         | VRN2BFSXC002    | VRN2BFPX5002        | VRN2BFSX5002    | VRN2BFPXD002        | VRN2BFSXD002    |
|                     |                                |      |                                        | 5            | VRN2BGPX4002        | VRN2BGSX4002    | VRN2BGPX002         | VRN2BGSXC002    | VRN2BGPX5002        | VRN2BGSX5002    | VRN2BGPXD002        | VRN2BGSXD002    |
|                     |                                |      |                                        | 6            | VRN2BHPX4002        | VRN2BHSX4002    | VRN2BHPX002         | VRN2BHSXC002    | VRN2BHPX5002        | VRN2BHSX5002    | VRN2BHPXD002        | VRN2BHSXD002    |
|                     | 6.0                            | 35   | 100                                    | 7            | VRN2BJPX4002        | VRN2BJSX4002    | VRN2BJPX002         | VRN2BJSXC002    | VRN2BJPX5002        | VRN2BJSX5002    | VRN2BJPXD002        | VRN2BJSXD002    |
|                     |                                |      |                                        | 8            | VRN2BKPX4002        | VRN2BKSX4002    | VRN2BKPX002         | VRN2BKSC002     | VRN2BKPX5002        | VRN2BKSX5002    | VRN2BKPD002         | VRN2BKSD002     |
|                     |                                |      |                                        | 9            | VRN2BLPX4002        | VRN2BLSX4002    | VRN2BLPX002         | VRN2BLSXC002    | VRN2BLPX5002        | VRN2BLSX5002    | VRN2BLPD002         | VRN2BLSXD002    |
|                     |                                |      |                                        | 10*          | VRN2BMPX4002        | VRN2BMSX4002    | VRN2BMPX002         | VRN2BMSXC002    | VRN2BMPX5002        | VRN2BMSX5002    | VRN2BMPXD002        | VRN2BMSXD002    |
| 1"                  | 3.0                            | 35   | 100                                    | 1            | VRN2CBPX4002        | VRN2CBSX4002    | VRN2CBPX002         | VRN2CBSXC002    | VRN2CBPX5002        | VRN2CBSX5002    | VRN2CBPXD002        | VRN2CBSXD002    |
|                     |                                |      |                                        | 2            | VRN2CDPX4002        | VRN2CDSX4002    | VRN2CDPX002         | VRN2CDSXC002    | VRN2CDPX5002        | VRN2CDSX5002    | VRN2CDPXD002        | VRN2CDSXD002    |
|                     |                                |      |                                        | 3            | VRN2CEPX4002        | VRN2CESX4002    | VRN2CEPX002         | VRN2CESXC002    | VRN2CEPX5002        | VRN2CESX5002    | VRN2CEPXD002        | VRN2CESXD002    |
|                     |                                |      |                                        | 4            | VRN2CFPX4002        | VRN2CFSX4002    | VRN2CFPX002         | VRN2CFSXC002    | VRN2CFPX5002        | VRN2CFSX5002    | VRN2CFPXD002        | VRN2CFSXD002    |
|                     |                                |      |                                        | 5            | VRN2CGPX4002        | VRN2CGSX4002    | VRN2CGPX002         | VRN2CGSXC002    | VRN2CGPX5002        | VRN2CGSX5002    | VRN2CGPXD002        | VRN2CGSXD002    |
|                     |                                |      |                                        | 6            | VRN2CHPX4002        | VRN2CHSX4002    | VRN2CHPX002         | VRN2CHSXC002    | VRN2CHPX5002        | VRN2CHSX5002    | VRN2CHPXD002        | VRN2CHSXD002    |
|                     | 6.0                            | 35   | 100                                    | 7            | VRN2CJPX4002        | VRN2CJSX4002    | VRN2CJPX002         | VRN2CJSXC002    | VRN2CJPX5002        | VRN2CJSX5002    | VRN2CJPD002         | VRN2CJSXD002    |
|                     |                                |      |                                        | 8            | VRN2CKPX4002        | VRN2CKSX4002    | VRN2CKPX002         | VRN2CKSXC002    | VRN2CKPX5002        | VRN2CKSX5002    | VRN2CKPD002         | VRN2CKSD002     |
|                     |                                |      |                                        | 9            | VRN2CLPX4002        | VRN2CLSX4002    | VRN2CLPX002         | VRN2CLSXC002    | VRN2CLPX5002        | VRN2CLSX5002    | VRN2CLPD002         | VRN2CLSXD002    |
|                     |                                |      |                                        | 10           | VRN2CMPX4002        | VRN2CMSX4002    | VRN2CMPX002         | VRN2CMSXC002    | VRN2CMPX5002        | VRN2CMSX5002    | VRN2CMPXD002        | VRN2CMSXD002    |
| 1-1/4"              | 4.0                            | 50   | 100                                    | 15           | VRN2CNPX4002        | VRN2CNSX4002    | VRN2CNPX002         | VRN2CNSXC002    | VRN2CNPX5002        | VRN2CNSX5002    | VRN2CNPXD002        | VRN2CNSXD002    |
|                     |                                |      |                                        | 20           | VRN2CPPX4002        | VRN2CPSX4002    | VRN2CPPX002         | VRN2CPSXC002    | VRN2CPPX5002        | VRN2CPSX5002    | VRN2CPPXD002        | VRN2CPSXD002    |
|                     |                                |      |                                        | 10           | VRN2DMPX4002        | VRN2DMXS4002    | VRN2DMPX002         | VRN2DMXSC002    | VRN2DMPX5002        | VRN2DMXS5002    | VRN2DMPXD002        | VRN2DMXS002     |
|                     |                                |      |                                        | 15           | VRN2DNXP4002        | VRN2DNXS4002    | VRN2DNXP002         | VRN2DNXSC002    | VRN2DNXP5002        | VRN2DNXS5002    | VRN2DNXP002         | VRN2DNXS002     |
|                     | 5.0                            | 50   | 100                                    | 20           | VRN2DPXP4002        | VRN2DPXS4002    | VRN2DPXP002         | VRN2DPXSC002    | VRN2DPXP5002        | VRN2DPXS5002    | VRN2DPXP002         | VRN2DPXS002     |
|                     |                                |      |                                        | 25           | VRN2DQXP4002        | VRN2DQXS4002    | VRN2DQXP002         | VRN2DQXSC002    | VRN2DQXP5002        | VRN2DQXS5002    | VRN2DQXP002         | VRN2DQXS002     |
|                     |                                |      |                                        | 30           | VRN2DRXP4002        | VRN2DRXS4002    | VRN2DRXP002         | VRN2DRXSC002    | VRN2DRXP5002        | VRN2DRXS5002    | VRN2DRXP002         | VRN2DRXS002     |
| 6.5                 | 50                             | 100  | 35*                                    | VRN2DSXP4002 | VRN2DSXS4002        | VRN2DSXP002     | VRN2DSXSC002        | VRN2DSXP5002    | VRN2DSXS5002        | VRN2DSXP002     | VRN2DSXS002         |                 |

\* Full port ball

\*\* Differential pressure regulator operating range, ±5%

## Product Selection - Valves

## Pressure Independent Control Valves, NPT ½"-1¼" NEMA 3R

| Actuator Features                      | Fail Safe           |                 |                     |                 |
|----------------------------------------|---------------------|-----------------|---------------------|-----------------|
| Actuator O.S Number                    | MS7505A2030         |                 | MS7505A2130         |                 |
| Power Supply Voltage                   | 24 VAC/DC           |                 | 24 VAC/DC           |                 |
| Frequency                              | 50 / 60 Hz          |                 | 50 / 60 Hz          |                 |
| Power                                  | 6 VA                |                 | 6 VA                |                 |
| Actuator Torque (lb.-in.)              | 44                  |                 | 44                  |                 |
| Control (0)2-10Vdc                     | •                   |                 | •                   |                 |
| 4-20 mA (w/ external 500 Ohm Resistor) | •                   |                 | •                   |                 |
| Floating                               | •                   |                 | •                   |                 |
| Two-Position SPDT                      | •                   |                 | •                   |                 |
| Two-Position SPST                      | •                   |                 | •                   |                 |
| Actuator Stroke (degrees)              | 95° ± 3°            |                 | 95° ± 3°            |                 |
| Timing (drive/spring return, seconds)  | 90 / 25             |                 | 90 / 25             |                 |
| Aux Switch                             | 0                   |                 | 1                   |                 |
| Feedback 2-10 Vdc Built In             | •                   |                 | •                   |                 |
| Fail Safe Action                       | Closed              |                 | Open                |                 |
| Normal Position (no signal)            | Closed              |                 | Open                |                 |
| Valve Features Trim                    | Nickel-Plated Brass | Stainless Steel | Nickel-Plated Brass | Stainless Steel |

| Valve Size (inches) | Differential Pressure** (psid) |      | Close-off Pressure (psid) | Max. GPM | Short Order Codes |              |              |              |              |              |              |              |  |  |
|---------------------|--------------------------------|------|---------------------------|----------|-------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--|--|
|                     | Min.                           | Max. |                           |          |                   |              |              |              |              |              |              |              |  |  |
| 1/2"                | 3.0                            | 35   | 100                       | 1        | VRN2ABPX6202      | VRN2ABSX6202 | VRN2ABPX6102 | VRN2ABSX6102 | VRN2ABPX6202 | VRN2ABSX6202 | VRN2ABPX6102 | VRN2ABSX6102 |  |  |
|                     |                                |      |                           | 2        | VRN2ADPX6202      | VRN2ADSX6202 | VRN2ADPX6102 | VRN2ADSX6102 | VRN2ADPX6202 | VRN2ADSX6202 | VRN2ADPX6102 | VRN2ADSX6102 |  |  |
|                     |                                |      |                           | 3        | VRN2AEPX6202      | VRN2AESX6202 | VRN2AEPX6102 | VRN2AESX6102 | VRN2AEPX6202 | VRN2AESX6202 | VRN2AEPX6102 | VRN2AESX6102 |  |  |
|                     |                                |      |                           | 4        | VRN2AFPX6202      | VRN2AFSX6202 | VRN2AFPX6102 | VRN2AFSX6102 | VRN2AFPX6202 | VRN2AFSX6202 | VRN2AFPX6102 | VRN2AFSX6102 |  |  |
|                     |                                |      |                           | 5        | VRN2AGPX6202      | VRN2AGSX6202 | VRN2AGPX6102 | VRN2AGSX6102 | VRN2AGPX6202 | VRN2AGSX6202 | VRN2AGPX6102 | VRN2AGSX6102 |  |  |
|                     |                                |      |                           | 6        | VRN2AHPX6202      | VRN2AHSX6202 | VRN2AHPX6102 | VRN2AHSX6102 | VRN2AHPX6202 | VRN2AHSX6202 | VRN2AHPX6102 | VRN2AHSX6102 |  |  |
|                     |                                |      |                           | 7        | VRN2AJPX6202      | VRN2AJSX6202 | VRN2AJPX6102 | VRN2AJSX6102 | VRN2AJPX6202 | VRN2AJSX6202 | VRN2AJPX6102 | VRN2AJSX6102 |  |  |
| 3/4"                | 3.0                            | 35   | 100                       | 1        | VRN2BBPX6202      | VRN2BBSX6202 | VRN2BBPX6102 | VRN2BBSX6102 | VRN2BBPX6202 | VRN2BBSX6202 | VRN2BBPX6102 | VRN2BBSX6102 |  |  |
|                     |                                |      |                           | 2        | VRN2BDPX6202      | VRN2BDSX6202 | VRN2BDPX6102 | VRN2BDSX6102 | VRN2BDPX6202 | VRN2BDSX6202 | VRN2BDPX6102 | VRN2BDSX6102 |  |  |
|                     |                                |      |                           | 3        | VRN2BEPX6202      | VRN2BESX6202 | VRN2BEPX6102 | VRN2BESX6102 | VRN2BEPX6202 | VRN2BESX6202 | VRN2BEPX6102 | VRN2BESX6102 |  |  |
|                     |                                |      |                           | 4        | VRN2BFPX6202      | VRN2BFSX6202 | VRN2BFPX6102 | VRN2BFSX6102 | VRN2BFPX6202 | VRN2BFSX6202 | VRN2BFPX6102 | VRN2BFSX6102 |  |  |
|                     |                                |      |                           | 5        | VRN2BGPX6202      | VRN2BGSX6202 | VRN2BGPX6102 | VRN2BGSX6102 | VRN2BGPX6202 | VRN2BGSX6202 | VRN2BGPX6102 | VRN2BGSX6102 |  |  |
|                     |                                |      |                           | 6        | VRN2BHPX6202      | VRN2BHSX6202 | VRN2BHPX6102 | VRN2BHSX6102 | VRN2BHPX6202 | VRN2BHSX6202 | VRN2BHPX6102 | VRN2BHSX6102 |  |  |
|                     |                                |      |                           | 7        | VRN2BJPX6202      | VRN2BJSX6202 | VRN2BJPX6102 | VRN2BJSX6102 | VRN2BJPX6202 | VRN2BJSX6202 | VRN2BJPX6102 | VRN2BJSX6102 |  |  |
|                     | 6.0                            | 35   | 100                       | 8        | VRN2BKPX6202      | VRN2BKSX6202 | VRN2BKPX6102 | VRN2BKSX6102 | VRN2BKPX6202 | VRN2BKSX6202 | VRN2BKPX6102 | VRN2BKSX6102 |  |  |
|                     |                                |      |                           | 9        | VRN2BLPX6202      | VRN2BLSX6202 | VRN2BLPX6102 | VRN2BLSX6102 | VRN2BLPX6202 | VRN2BLSX6202 | VRN2BLPX6102 | VRN2BLSX6102 |  |  |
|                     |                                |      |                           | 10*      | VRN2BMPX6202      | VRN2BMSX6202 | VRN2BMPX6102 | VRN2BMSX6102 | VRN2BMPX6202 | VRN2BMSX6202 | VRN2BMPX6102 | VRN2BMSX6102 |  |  |
| 1"                  | 3.0                            | 35   | 100                       | 1        | VRN2CBPX6202      | VRN2CBSX6202 | VRN2CBPX6102 | VRN2CBSX6102 | VRN2CBPX6202 | VRN2CBSX6202 | VRN2CBPX6102 | VRN2CBSX6102 |  |  |
|                     |                                |      |                           | 2        | VRN2CDPX6202      | VRN2CDSX6202 | VRN2CDPX6102 | VRN2CDSX6102 | VRN2CDPX6202 | VRN2CDSX6202 | VRN2CDPX6102 | VRN2CDSX6102 |  |  |
|                     |                                |      |                           | 3        | VRN2CEPX6202      | VRN2CESX6202 | VRN2CEPX6102 | VRN2CESX6102 | VRN2CEPX6202 | VRN2CESX6202 | VRN2CEPX6102 | VRN2CESX6102 |  |  |
|                     |                                |      |                           | 4        | VRN2CFPX6202      | VRN2CFSX6202 | VRN2CFPX6102 | VRN2CFSX6102 | VRN2CFPX6202 | VRN2CFSX6202 | VRN2CFPX6102 | VRN2CFSX6102 |  |  |
|                     |                                |      |                           | 5        | VRN2CGPX6202      | VRN2CGSX6202 | VRN2CGPX6102 | VRN2CGSX6102 | VRN2CGPX6202 | VRN2CGSX6202 | VRN2CGPX6102 | VRN2CGSX6102 |  |  |
|                     |                                |      |                           | 6        | VRN2CHPX6202      | VRN2CHSX6202 | VRN2CHPX6102 | VRN2CHSX6102 | VRN2CHPX6202 | VRN2CHSX6202 | VRN2CHPX6102 | VRN2CHSX6102 |  |  |
|                     |                                |      |                           | 7        | VRN2CJPX6202      | VRN2CJSX6202 | VRN2CJPX6102 | VRN2CJSX6102 | VRN2CJPX6202 | VRN2CJSX6202 | VRN2CJPX6102 | VRN2CJSX6102 |  |  |
|                     | 6.0                            | 35   | 100                       | 8        | VRN2CKPX6202      | VRN2CKSX6202 | VRN2CKPX6102 | VRN2CKSX6102 | VRN2CKPX6202 | VRN2CKSX6202 | VRN2CKPX6102 | VRN2CKSX6102 |  |  |
|                     |                                |      |                           | 9        | VRN2CLPX6202      | VRN2CLSX6202 | VRN2CLPX6102 | VRN2CLSX6102 | VRN2CLPX6202 | VRN2CLSX6202 | VRN2CLPX6102 | VRN2CLSX6102 |  |  |
|                     |                                |      |                           | 10       | VRN2CMPX6202      | VRN2CMSX6202 | VRN2CMPX6102 | VRN2CMSX6102 | VRN2CMPX6202 | VRN2CMSX6202 | VRN2CMPX6102 | VRN2CMSX6102 |  |  |
|                     | 4.0                            | 50   | 100                       | 15       | VRN2CNPX6202      | VRN2CNSX6202 | VRN2CNPX6102 | VRN2CNSX6102 | VRN2CNPX6202 | VRN2CNSX6202 | VRN2CNPX6102 | VRN2CNSX6102 |  |  |
|                     |                                |      |                           | 20       | VRN2CPPX6202      | VRN2CPSX6202 | VRN2CPPX6102 | VRN2CPSX6102 | VRN2CPPX6202 | VRN2CPSX6202 | VRN2CPPX6102 | VRN2CPSX6102 |  |  |
| 1-1/4"              | 4.0                            | 50   | 100                       | 10       | VRN2DMPX6202      | VRN2DMSX6202 | VRN2DMPX6102 | VRN2DMSX6102 | VRN2DMPX6202 | VRN2DMSX6202 | VRN2DMPX6102 | VRN2DMSX6102 |  |  |
|                     |                                |      |                           | 15       | VRN2DNPX6202      | VRN2DNSX6202 | VRN2DNPX6102 | VRN2DNSX6102 | VRN2DNPX6202 | VRN2DNSX6202 | VRN2DNPX6102 | VRN2DNSX6102 |  |  |
|                     |                                |      |                           | 20       | VRN2DPPX6202      | VRN2DPSX6202 | VRN2DPPX6102 | VRN2DPSX6102 | VRN2DPPX6202 | VRN2DPSX6202 | VRN2DPPX6102 | VRN2DPSX6102 |  |  |
|                     |                                |      |                           | 25       | VRN2DQPX6202      | VRN2DQSX6202 | VRN2DQPX6102 | VRN2DQSX6102 | VRN2DQPX6202 | VRN2DQSX6202 | VRN2DQPX6102 | VRN2DQSX6102 |  |  |
|                     |                                |      |                           | 30       | VRN2DRPX6202      | VRN2DRSX6202 | VRN2DRPX6102 | VRN2DRSX6102 | VRN2DRPX6202 | VRN2DRSX6202 | VRN2DRPX6102 | VRN2DRSX6102 |  |  |
|                     |                                |      |                           | 35*      | VRN2DSPX6202      | VRN2DSSX6202 | VRN2DSPX6102 | VRN2DSSX6102 | VRN2DSPX6202 | VRN2DSSX6202 | VRN2DSPX6102 | VRN2DSSX6102 |  |  |

\* Full port ball

\*\* Differential pressure regulator operating range, ±5%

# Product Selection - Valves

## Pressure Independent Control Valves, NPT ½"-1¼" NEMA 3R

| Actuator Features                      | Fail Safe   |                     |                 |                     |
|----------------------------------------|-------------|---------------------|-----------------|---------------------|
| Actuator O.S Number                    | MS8105A1030 |                     | MS8105A1130     |                     |
| Power Supply Voltage                   | 24 VAC/DC   |                     | 24 VAC/DC       |                     |
| Frequency                              | 50 / 60 Hz  |                     | 50 / 60 Hz      |                     |
| Power                                  | 6 VA        |                     | 6 VA            |                     |
| Actuator Torque (lb.-in.)              | 44          |                     | 44              |                     |
| Control (0)2-10Vdc                     |             |                     |                 |                     |
| 4-20 mA (w/ external 500 Ohm Resistor) |             |                     |                 |                     |
| Floating                               |             |                     |                 |                     |
| Two-Position SPDT                      |             |                     |                 |                     |
| Two-Position SPST                      | •           |                     | •               |                     |
| Actuator Stroke (degrees)              | 95° ± 3°    |                     | 95° ± 3°        |                     |
| Timing (drive/spring return, seconds)  | 45 / 25     |                     | 45 / 25         |                     |
| Aux Switch                             | 0           |                     | 1               |                     |
| Feedback 2-10 Vdc Built In             |             |                     |                 |                     |
| Fail Safe Action                       | Closed      |                     | Open            |                     |
| Normal Position (no signal)            | Closed      |                     | Open            |                     |
| Valve Features                         | Trim        | Nickel-Plated Brass | Stainless Steel | Nickel-Plated Brass |
|                                        |             |                     | Stainless Steel | Nickel-Plated Brass |
|                                        |             |                     |                 | Stainless Steel     |

| Valve Size (inches) | Differential Pressure** (psid) |      | Close-off Pressure (psid) | Max. GPM | Short Order Codes |              |              |              |              |              |             |              |  |  |
|---------------------|--------------------------------|------|---------------------------|----------|-------------------|--------------|--------------|--------------|--------------|--------------|-------------|--------------|--|--|
|                     | Min.                           | Max. |                           |          |                   |              |              |              |              |              |             |              |  |  |
| 1/2"                | 3.0                            | 35   | 100                       | 1        | VRN2ABPX7202      | VRN2ABSX7202 | VRN2ABPX7102 | VRN2ABSX7102 | VRN2ABPX7102 | VRN2ABSXA202 | VRN2ABPX102 | VRN2ABSXA102 |  |  |
|                     |                                |      |                           | 2        | VRN2ADPX7202      | VRN2ADSX7202 | VRN2ADPX7102 | VRN2ADSX7102 | VRN2ADPX7102 | VRN2ADSXA202 | VRN2ADPX102 | VRN2ADSXA102 |  |  |
|                     |                                |      |                           | 3        | VRN2AEPX7202      | VRN2AESX7202 | VRN2AEPX7102 | VRN2AESX7102 | VRN2AEPX7102 | VRN2AESXA202 | VRN2AEPX102 | VRN2AESXA102 |  |  |
|                     |                                |      |                           | 4        | VRN2AFPX7202      | VRN2AFSX7202 | VRN2AFPX7102 | VRN2AFSX7102 | VRN2AFPX7102 | VRN2AFSXA202 | VRN2AFPX102 | VRN2AFSXA102 |  |  |
|                     |                                |      |                           | 5        | VRN2AGPX7202      | VRN2AGSX7202 | VRN2AGPX7102 | VRN2AGSX7102 | VRN2AGPX7102 | VRN2AGSXA202 | VRN2AGPX102 | VRN2AGSXA102 |  |  |
|                     |                                |      |                           | 6        | VRN2AHPX7202      | VRN2AHSX7202 | VRN2AHPX7102 | VRN2AHSX7102 | VRN2AHPX7102 | VRN2AHSXA202 | VRN2AHPX102 | VRN2AHSXA102 |  |  |
|                     |                                |      |                           | 7        | VRN2AJPX7202      | VRN2AJSX7202 | VRN2AJPX7102 | VRN2AJSX7102 | VRN2AJPX7102 | VRN2AJSXA202 | VRN2AJPX102 | VRN2AJSXA102 |  |  |
| 3/4"                | 3.0                            | 35   | 100                       | 1        | VRN2BBPX7202      | VRN2BBSX7202 | VRN2BBPX7102 | VRN2BBSX7102 | VRN2BBPX7102 | VRN2BBSXA202 | VRN2BBPX102 | VRN2BBSXA102 |  |  |
|                     |                                |      |                           | 2        | VRN2BDPX7202      | VRN2BDSX7202 | VRN2BDPX7102 | VRN2BDSX7102 | VRN2BDPX7102 | VRN2BDSXA202 | VRN2BDPX102 | VRN2BDSXA102 |  |  |
|                     |                                |      |                           | 3        | VRN2BEPX7202      | VRN2BESX7202 | VRN2BEPX7102 | VRN2BESX7102 | VRN2BEPX7102 | VRN2BESXA202 | VRN2BEPX102 | VRN2BESXA102 |  |  |
|                     |                                |      |                           | 4        | VRN2BFPX7202      | VRN2BFSX7202 | VRN2BFPX7102 | VRN2BFSX7102 | VRN2BFPX7102 | VRN2BFSXA202 | VRN2BFPX102 | VRN2BFSXA102 |  |  |
|                     |                                |      |                           | 5        | VRN2BGPX7202      | VRN2BGSX7202 | VRN2BGPX7102 | VRN2BGSX7102 | VRN2BGPX7102 | VRN2BGSXA202 | VRN2BGPX102 | VRN2BGSXA102 |  |  |
|                     |                                |      |                           | 6        | VRN2BHPX7202      | VRN2BHSX7202 | VRN2BHPX7102 | VRN2BHSX7102 | VRN2BHPX7102 | VRN2BHSXA202 | VRN2BHPX102 | VRN2BHSXA102 |  |  |
|                     | 6.0                            | 35   | 100                       | 7        | VRN2BJPX7202      | VRN2BJSX7202 | VRN2BJPX7102 | VRN2BJSX7102 | VRN2BJPX7102 | VRN2BJSXA202 | VRN2BJPX102 | VRN2BJSXA102 |  |  |
|                     |                                |      |                           | 8        | VRN2BKPX7202      | VRN2BKSX7202 | VRN2BKPX7102 | VRN2BKSX7102 | VRN2BKPX7102 | VRN2BKSXA202 | VRN2BKPX102 | VRN2BKSXA102 |  |  |
|                     |                                |      |                           | 9        | VRN2BLPX7202      | VRN2BLSX7202 | VRN2BLPX7102 | VRN2BLSX7102 | VRN2BLPX7102 | VRN2BLSXA202 | VRN2BLPX102 | VRN2BLSXA102 |  |  |
|                     |                                |      |                           | 10*      | VRN2BMPX7202      | VRN2BMSX7202 | VRN2BMPX7102 | VRN2BMSX7102 | VRN2BMPX7102 | VRN2BMSXA202 | VRN2BMPX102 | VRN2BMSXA102 |  |  |
| 1"                  | 3.0                            | 35   | 100                       | 1        | VRN2CBPX7202      | VRN2CBSX7202 | VRN2CBPX7102 | VRN2CBSX7102 | VRN2CBPX7102 | VRN2CBSXA202 | VRN2CBPX102 | VRN2CBSXA102 |  |  |
|                     |                                |      |                           | 2        | VRN2CDPX7202      | VRN2CDSX7202 | VRN2CDPX7102 | VRN2CDSX7102 | VRN2CDPX7102 | VRN2CDSXA202 | VRN2CDPX102 | VRN2CDSXA102 |  |  |
|                     |                                |      |                           | 3        | VRN2CEPX7202      | VRN2CESX7202 | VRN2CEPX7102 | VRN2CESX7102 | VRN2CEPX7102 | VRN2CESXA202 | VRN2CEPX102 | VRN2CESXA102 |  |  |
|                     |                                |      |                           | 4        | VRN2CFPX7202      | VRN2CFSX7202 | VRN2CFPX7102 | VRN2CFSX7102 | VRN2CFPX7102 | VRN2CFSXA202 | VRN2CFPX102 | VRN2CFSXA102 |  |  |
|                     |                                |      |                           | 5        | VRN2CGPX7202      | VRN2CGSX7202 | VRN2CGPX7102 | VRN2CGSX7102 | VRN2CGPX7102 | VRN2CGSXA202 | VRN2CGPX102 | VRN2CGSXA102 |  |  |
|                     |                                |      |                           | 6        | VRN2CHPX7202      | VRN2CHSX7202 | VRN2CHPX7102 | VRN2CHSX7102 | VRN2CHPX7102 | VRN2CHSXA202 | VRN2CHPX102 | VRN2CHSXA102 |  |  |
|                     | 6.0                            | 35   | 100                       | 7        | VRN2CJPX7202      | VRN2CJSX7202 | VRN2CJPX7102 | VRN2CJSX7102 | VRN2CJPX7102 | VRN2CJSXA202 | VRN2CJPX102 | VRN2CJSXA102 |  |  |
|                     |                                |      |                           | 8        | VRN2CKPX7202      | VRN2CKSX7202 | VRN2CKPX7102 | VRN2CKSX7102 | VRN2CKPX7102 | VRN2CKSXA202 | VRN2CKPX102 | VRN2CKSXA102 |  |  |
|                     |                                |      |                           | 9        | VRN2CLPX7202      | VRN2CLSX7202 | VRN2CLPX7102 | VRN2CLSX7102 | VRN2CLPX7102 | VRN2CLSXA202 | VRN2CLPX102 | VRN2CLSXA102 |  |  |
|                     |                                |      |                           | 10       | VRN2CMPX7202      | VRN2CMSX7202 | VRN2CMPX7102 | VRN2CMSX7102 | VRN2CMPX7102 | VRN2CMSXA202 | VRN2CMPX102 | VRN2CMSXA102 |  |  |
| 1-1/4"              | 4.0                            | 50   | 100                       | 15       | VRN2CNPX7202      | VRN2CNSX7202 | VRN2CNPX7102 | VRN2CNSX7102 | VRN2CNPX7102 | VRN2CNSXA202 | VRN2CNPX102 | VRN2CNSXA102 |  |  |
|                     |                                |      |                           | 20       | VRN2CPPX7202      | VRN2CPSX7202 | VRN2CPPX7102 | VRN2CPSX7102 | VRN2CPPX7102 | VRN2CPSXA202 | VRN2CPPX102 | VRN2CPSXA102 |  |  |
|                     |                                |      |                           | 10       | VRN2DMPX7202      | VRN2DMSX7202 | VRN2DMPX7102 | VRN2DMSX7102 | VRN2DMPX7102 | VRN2DMSXA202 | VRN2DMPX102 | VRN2DMSXA102 |  |  |
|                     |                                |      |                           | 15       | VRN2DNPX7202      | VRN2DNSX7202 | VRN2DNPX7102 | VRN2DNSX7102 | VRN2DNPX7102 | VRN2DNSXA202 | VRN2DNPX102 | VRN2DNSXA102 |  |  |
|                     |                                |      |                           | 20       | VRN2DPPX7202      | VRN2DPSX7202 | VRN2DPPX7102 | VRN2DPSX7102 | VRN2DPPX7102 | VRN2DPSXA202 | VRN2DPPX102 | VRN2DPSXA102 |  |  |
|                     |                                |      |                           | 25       | VRN2DQPX7202      | VRN2DQSX7202 | VRN2DQPX7102 | VRN2DQSX7102 | VRN2DQPX7102 | VRN2DQSXA202 | VRN2DQPX102 | VRN2DQSXA102 |  |  |
| 1-1/4"              | 5.0                            | 50   | 100                       | 30       | VRN2DRPX7202      | VRN2DRSX7202 | VRN2DRPX7102 | VRN2DRSX7102 | VRN2DRPX7102 | VRN2DRSXA202 | VRN2DRPX102 | VRN2DRSXA102 |  |  |
|                     |                                |      |                           | 35*      | VRN2DSPX7202      | VRN2DSSX7202 | VRN2DSPX7102 | VRN2DSSX7102 | VRN2DSPX7102 | VRN2DSSXA202 | VRN2DSPX102 | VRN2DSSXA102 |  |  |

\* Full port ball

\*\* Differential pressure regulator operating range, ±5%

## Product Selection - Valves

## Pressure Independent Control Valves, NPT ½"-1¼" NEMA 3R

| Actuator Features                      | Fail Safe   |                     |                 |                     |
|----------------------------------------|-------------|---------------------|-----------------|---------------------|
| Actuator O.S Number                    | MS4105A1030 |                     | MS4105A1130     |                     |
| Power Supply Voltage                   | 100-250 VAC |                     | 100-250 VAC     |                     |
| Frequency                              | 50 / 60 Hz  |                     | 50 / 60 Hz      |                     |
| Power                                  | 6 VA        |                     | 6 VA            |                     |
| Actuator Torque (lb.-in.)              | 44          |                     | 44              |                     |
| Control (0)2-10Vdc                     |             |                     |                 |                     |
| 4-20 mA (w/ external 500 Ohm Resistor) |             |                     |                 |                     |
| Floating                               |             |                     |                 |                     |
| Two-Position SPDT                      |             |                     |                 |                     |
| Two-Position SPST                      | •           |                     | •               |                     |
| Actuator Stroke (degrees)              | 95° ± 3°    |                     | 95° ± 3°        |                     |
| Timing (drive/spring return, seconds)  | 45 / 25     |                     | 45 / 25         |                     |
| Aux Switch                             | 0           |                     | 1               |                     |
| Feedback 2-10 Vdc Built In             |             |                     |                 |                     |
| Fail Safe Action                       | Closed      |                     | Open            |                     |
| Normal Position (no signal)            | Closed      |                     | Open            |                     |
| Valve Features                         | Trim        | Nickel-Plated Brass | Stainless Steel | Nickel-Plated Brass |
|                                        |             |                     | Stainless Steel | Nickel-Plated Brass |
|                                        |             |                     |                 | Stainless Steel     |

| Valve Size (inches) | Differential Pressure** (psid) |      | Close-off Pressure (psid) | Max. GPM | Short Order Codes |              |              |              |              |              |              |              |  |  |
|---------------------|--------------------------------|------|---------------------------|----------|-------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--|--|
|                     | Min.                           | Max. |                           |          |                   |              |              |              |              |              |              |              |  |  |
| 1/2"                | 3.0                            | 35   | 100                       | 1        | VRN2ABPX8202      | VRN2ABSX8202 | VRN2ABPX8102 | VRN2ABSX8102 | VRN2ABPX9202 | VRN2ABSX9202 | VRN2ABPX9102 | VRN2ABSX9102 |  |  |
|                     |                                |      |                           | 2        | VRN2ADPX8202      | VRN2ADSX8202 | VRN2ADPX8102 | VRN2ADSX8102 | VRN2ADPX9202 | VRN2ADSX9202 | VRN2ADPX9102 | VRN2ADSX9102 |  |  |
|                     |                                |      |                           | 3        | VRN2AEPX8202      | VRN2AESX8202 | VRN2AEPX8102 | VRN2AESX8102 | VRN2AEPX9202 | VRN2AESX9202 | VRN2AEPX9102 | VRN2AESX9102 |  |  |
|                     |                                |      |                           | 4        | VRN2AFPX8202      | VRN2AFSX8202 | VRN2AFPX8102 | VRN2AFSX8102 | VRN2AFPX9202 | VRN2AFSX9202 | VRN2AFPX9102 | VRN2AFSX9102 |  |  |
|                     |                                |      |                           | 5        | VRN2AGPX8202      | VRN2AGSX8202 | VRN2AGPX8102 | VRN2AGSX8102 | VRN2AGPX9202 | VRN2AGSX9202 | VRN2AGPX9102 | VRN2AGSX9102 |  |  |
|                     |                                |      |                           | 6        | VRN2AHPX8202      | VRN2AHSX8202 | VRN2AHPX8102 | VRN2AHSX8102 | VRN2AHPX9202 | VRN2AHSX9202 | VRN2AHPX9102 | VRN2AHSX9102 |  |  |
|                     |                                |      |                           | 7        | VRN2AJPX8202      | VRN2AJSX8202 | VRN2AJPX8102 | VRN2AJSX8102 | VRN2AJPX9202 | VRN2AJSX9202 | VRN2AJPX9102 | VRN2AJSX9102 |  |  |
| 3/4"                | 3.0                            | 35   | 100                       | 1        | VRN2BBPX8202      | VRN2BBSX8202 | VRN2BBPX8102 | VRN2BBSX8102 | VRN2BBPX9202 | VRN2BBSX9202 | VRN2BBPX9102 | VRN2BBSX9102 |  |  |
|                     |                                |      |                           | 2        | VRN2BDPX8202      | VRN2BDSX8202 | VRN2BDPX8102 | VRN2BDSX8102 | VRN2BDPX9202 | VRN2BDSX9202 | VRN2BDPX9102 | VRN2BDSX9102 |  |  |
|                     |                                |      |                           | 3        | VRN2BEPX8202      | VRN2BESX8202 | VRN2BEPX8102 | VRN2BESX8102 | VRN2BEPX9202 | VRN2BESX9202 | VRN2BEPX9102 | VRN2BESX9102 |  |  |
|                     |                                |      |                           | 4        | VRN2BFPX8202      | VRN2BFSX8202 | VRN2BFPX8102 | VRN2BFSX8102 | VRN2BFPX9202 | VRN2BFSX9202 | VRN2BFPX9102 | VRN2BFSX9102 |  |  |
|                     |                                |      |                           | 5        | VRN2BGPX8202      | VRN2BGSX8202 | VRN2BGPX8102 | VRN2BGSX8102 | VRN2BGPX9202 | VRN2BGSX9202 | VRN2BGPX9102 | VRN2BGSX9102 |  |  |
|                     |                                |      |                           | 6        | VRN2BHPX8202      | VRN2BHSX8202 | VRN2BHPX8102 | VRN2BHSX8102 | VRN2BHPX9202 | VRN2BHSX9202 | VRN2BHPX9102 | VRN2BHSX9102 |  |  |
|                     |                                |      |                           | 7        | VRN2BJPX8202      | VRN2BJSX8202 | VRN2BJPX8102 | VRN2BJSX8102 | VRN2BJPX9202 | VRN2BJSX9202 | VRN2BJPX9102 | VRN2BJSX9102 |  |  |
|                     | 6.0                            | 35   | 100                       | 8        | VRN2BKPX8202      | VRN2BKSX8202 | VRN2BKPX8102 | VRN2BKSX8102 | VRN2BKPX9202 | VRN2BKSX9202 | VRN2BKPX9102 | VRN2BKSX9102 |  |  |
|                     |                                |      |                           | 9        | VRN2BLPX8202      | VRN2BLSX8202 | VRN2BLPX8102 | VRN2BLSX8102 | VRN2BLPX9202 | VRN2BLSX9202 | VRN2BLPX9102 | VRN2BLSX9102 |  |  |
|                     |                                |      |                           | 10*      | VRN2BMPX8202      | VRN2BMSX8202 | VRN2BMPX8102 | VRN2BMSX8102 | VRN2BMPX9202 | VRN2BMSX9202 | VRN2BMPX9102 | VRN2BMSX9102 |  |  |
| 1"                  | 3.0                            | 35   | 100                       | 1        | VRN2CBPX8202      | VRN2CBSX8202 | VRN2CBPX8102 | VRN2CBSX8102 | VRN2CBPX9202 | VRN2CBSX9202 | VRN2CBPX9102 | VRN2CBSX9102 |  |  |
|                     |                                |      |                           | 2        | VRN2CDPX8202      | VRN2CDSX8202 | VRN2CDPX8102 | VRN2CDSX8102 | VRN2CDPX9202 | VRN2CDSX9202 | VRN2CDPX9102 | VRN2CDSX9102 |  |  |
|                     |                                |      |                           | 3        | VRN2CEPX8202      | VRN2CESX8202 | VRN2CEPX8102 | VRN2CESX8102 | VRN2CEPX9202 | VRN2CESX9202 | VRN2CEPX9102 | VRN2CESX9102 |  |  |
|                     |                                |      |                           | 4        | VRN2CFPX8202      | VRN2CFSX8202 | VRN2CFPX8102 | VRN2CFSX8102 | VRN2CFPX9202 | VRN2CFSX9202 | VRN2CFPX9102 | VRN2CFSX9102 |  |  |
|                     |                                |      |                           | 5        | VRN2CGPX8202      | VRN2CGSX8202 | VRN2CGPX8102 | VRN2CGSX8102 | VRN2CGPX9202 | VRN2CGSX9202 | VRN2CGPX9102 | VRN2CGSX9102 |  |  |
|                     |                                |      |                           | 6        | VRN2CHPX8202      | VRN2CHSX8202 | VRN2CHPX8102 | VRN2CHSX8102 | VRN2CHPX9202 | VRN2CHSX9202 | VRN2CHPX9102 | VRN2CHSX9102 |  |  |
|                     |                                |      |                           | 7        | VRN2CJPX8202      | VRN2CJSX8202 | VRN2CJPX8102 | VRN2CJSX8102 | VRN2CJPX9202 | VRN2CJSX9202 | VRN2CJPX9102 | VRN2CJSX9102 |  |  |
|                     | 6.0                            | 35   | 100                       | 8        | VRN2CKPX8202      | VRN2CKSX8202 | VRN2CKPX8102 | VRN2CKSX8102 | VRN2CKPX9202 | VRN2CKSX9202 | VRN2CKPX9102 | VRN2CKSX9102 |  |  |
|                     |                                |      |                           | 9        | VRN2CLPX8202      | VRN2CLSX8202 | VRN2CLPX8102 | VRN2CLSX8102 | VRN2CLPX9202 | VRN2CLSX9202 | VRN2CLPX9102 | VRN2CLSX9102 |  |  |
|                     |                                |      |                           | 10       | VRN2CMPX8202      | VRN2CMSX8202 | VRN2CMPX8102 | VRN2CMSX8102 | VRN2CMPX9202 | VRN2CMSX9202 | VRN2CMPX9102 | VRN2CMSX9102 |  |  |
| 1-1/4"              | 4.0                            | 50   | 100                       | 15       | VRN2CNPX8202      | VRN2CNSX8202 | VRN2CNPX8102 | VRN2CNSX8102 | VRN2CNPX9202 | VRN2CNSX9202 | VRN2CNPX9102 | VRN2CNSX9102 |  |  |
|                     |                                |      |                           | 20       | VRN2CPPX8202      | VRN2CPSX8202 | VRN2CPPX8102 | VRN2CPSX8102 | VRN2CPPX9202 | VRN2CPSX9202 | VRN2CPPX9102 | VRN2CPSX9102 |  |  |
|                     |                                |      |                           | 10       | VRN2DMPX8202      | VRN2DMSX8202 | VRN2DMPX8102 | VRN2DMSX8102 | VRN2DMPX9202 | VRN2DMSX9202 | VRN2DMPX9102 | VRN2DMSX9102 |  |  |
|                     |                                |      |                           | 15       | VRN2DNPX8202      | VRN2DNSX8202 | VRN2DNPX8102 | VRN2DNSX8102 | VRN2DNPX9202 | VRN2DNSX9202 | VRN2DNPX9102 | VRN2DNSX9102 |  |  |
|                     |                                |      |                           | 20       | VRN2DPPX8202      | VRN2DPSX8202 | VRN2DPPX8102 | VRN2DPSX8102 | VRN2DPPX9202 | VRN2DPSX9202 | VRN2DPPX9102 | VRN2DPSX9102 |  |  |
|                     |                                |      |                           | 25       | VRN2DQPX8202      | VRN2DQSX8202 | VRN2DQPX8102 | VRN2DQSX8102 | VRN2DQPX9202 | VRN2DQSX9202 | VRN2DQPX9102 | VRN2DQSX9102 |  |  |
|                     |                                |      |                           | 30       | VRN2DRPX8202      | VRN2DRSX8202 | VRN2DRPX8102 | VRN2DRSX8102 | VRN2DRPX9202 | VRN2DRSX9202 | VRN2DRPX9102 | VRN2DRSX9102 |  |  |
|                     | 6.5                            |      |                           | 35*      | VRN2DSPX8202      | VRN2DSSX8202 | VRN2DSPX8102 | VRN2DSSX8102 | VRN2DSPX9202 | VRN2DSSX9202 | VRN2DSPX9102 | VRN2DSSX9102 |  |  |

\* Full port ball

\*\* Differential pressure regulator operating range, ±5%

# Product Selection - Valves

## Pressure Independent Control Valves, NPT 1½"-3" NEMA 3R

|                     |    |                                |              | Actuator Features                      |              |                     |              | Non Fail Safe   |              |                     |              |                 |              |             |
|---------------------|----|--------------------------------|--------------|----------------------------------------|--------------|---------------------|--------------|-----------------|--------------|---------------------|--------------|-----------------|--------------|-------------|
|                     |    |                                |              | Actuator O.S Number                    |              | MN6105A1011         |              | MN6105A1201     |              | MN7505A2001         |              | MN7505A2209     |              |             |
| Power Supply        |    |                                |              | Voltage                                |              | 24 VAC/DC           |              | 24 VAC/DC       |              | 24 VAC/DC           |              | 24 VAC/DC       |              |             |
|                     |    |                                |              | Frequency                              |              | 50 / 60 Hz          |              | 50 / 60 Hz      |              | 50 / 60 Hz          |              | 50 / 60 Hz      |              |             |
|                     |    |                                |              | Power                                  |              | 5 VA                |              | 5 VA            |              | 5 VA                |              | 5 VA            |              |             |
| Actuator Torque     |    |                                |              | (lb.-in.)                              |              | 44                  |              | 44              |              | 44                  |              | 44              |              |             |
| Control             |    |                                |              | (0)2-10Vdc                             |              |                     |              |                 |              | •                   |              | •               |              |             |
|                     |    |                                |              | 4-20 mA (w/ external 500 Ohm Resistor) |              |                     |              |                 |              | •                   |              | •               |              |             |
|                     |    |                                |              | Floating                               |              | •                   |              | •               |              | •                   |              | •               |              |             |
|                     |    |                                |              | Two-Position SPDT                      |              | •                   |              | •               |              | •                   |              | •               |              |             |
|                     |    |                                |              | Two-Position SPST                      |              |                     |              |                 |              | •                   |              | •               |              |             |
| Actuator Stroke     |    |                                |              | (degrees)                              |              | 95° ± 3°            |              | 95° ± 3°        |              | 95° ± 3°            |              | 95° ± 3°        |              |             |
| Timing              |    |                                |              | (drive/spring return, seconds)         |              | 90                  |              | 90              |              | 90                  |              | 90              |              |             |
| Aux Switch          |    |                                |              |                                        |              | 0                   |              | 2               |              | 0                   |              | 2               |              |             |
| Feedback            |    |                                |              | 2-10 Vdc Built In                      |              | -                   |              | -               |              | •                   |              | •               |              |             |
| Fail Safe Action    |    |                                |              |                                        |              | Stay in Place       |              | Stay in Place   |              | Stay in Place       |              | Stay in Place   |              |             |
| Normal Position     |    |                                |              | (no signal)                            |              | Stay in Place       |              | Stay in Place   |              | Closed              |              | Closed          |              |             |
| Valve Features      |    |                                |              | Trim                                   |              | Nickel-Plated Brass |              | Stainless Steel |              | Nickel-Plated Brass |              | Stainless Steel |              |             |
|                     |    |                                |              |                                        |              |                     |              |                 |              |                     |              |                 |              |             |
| Valve Size (inches) |    | Differential Pressure** (psid) |              | Close-off Pressure (psid)              | Max. GPM     | Short Order Codes   |              |                 |              |                     |              |                 |              |             |
|                     |    |                                |              |                                        |              |                     |              |                 |              |                     |              |                 |              |             |
| 1-1/2"              | 4  | 50                             | 100          | 10                                     | VRN2EMPX4002 | VRN2EMSX4002        | VRN2EMPXC002 | VRN2EMSCX002    | VRN2EMPX5002 | VRN2EMSX5002        | VRN2EMPXD002 | VRN2EMSXD002    |              |             |
|                     |    |                                |              | 15                                     | VRN2ENPX4002 | VRN2ENSX4002        | VRN2ENPXC002 | VRN2ENSXC002    | VRN2ENPX5002 | VRN2ENSX5002        | VRN2ENPXD002 | VRN2ENSXD002    |              |             |
|                     | 5  |                                |              | 20                                     | VRN2EPPX4002 | VRN2EPSX4002        | VRN2EPPXC002 | VRN2EPSXC002    | VRN2EPPX5002 | VRN2EPSX5002        | VRN2EPPXD002 | VRN2EPSXD002    |              |             |
|                     |    |                                |              | 25                                     | VRN2EQPX4002 | VRN2EQSX4002        | VRN2EQPXC002 | VRN2EQSXC002    | VRN2EQPX5002 | VRN2EQSX5002        | VRN2EQPXD002 | VRN2EQSX002     |              |             |
|                     | 6  |                                |              | 30                                     | VRN2ERPX4002 | VRN2ERSX4002        | VRN2ERPXC002 | VRN2ERSXC002    | VRN2ERPX5002 | VRN2ERSX5002        | VRN2ERPXD002 | VRN2ERSXD002    |              |             |
|                     |    |                                |              | 35                                     | VRN2ESPX4002 | VRN2ESSX4002        | VRN2ESPCX002 | VRN2ESSXC002    | VRN2ESPX5002 | VRN2ESSX5002        | VRN2ESPXD002 | VRN2ESSXD002    |              |             |
|                     | 7  |                                |              | 40                                     | VRN2ETPX4002 | VRN2ETSX4002        | VRN2ETPXC002 | VRN2ETSXC002    | VRN2ETPX5002 | VRN2ETSX5002        | VRN2ETPXD002 | VRN2ETSD002     |              |             |
|                     |    |                                |              | 45                                     | VRN2EUPX4002 | VRN2EUSX4002        | VRN2EUPXC002 | VRN2EUSXC002    | VRN2EUPX5002 | VRN2EUSX5002        | VRN2EUPXD002 | VRN2EUSXD002    |              |             |
|                     |    |                                |              | 50                                     | VRN2E1PX4002 | VRN2E1SX4002        | VRN2E1PXC002 | VRN2E1SCX002    | VRN2E1PX5002 | VRN2E1SX5002        | VRN2E1PXD002 | VRN2E1SD002     |              |             |
|                     |    |                                |              | 55                                     | VRN2E2PX4002 | VRN2E2SX4002        | VRN2E2PXC002 | VRN2E2SCX002    | VRN2E2PX5002 | VRN2E2SX5002        | VRN2E2PXD002 | VRN2E2SD002     |              |             |
|                     |    |                                |              | 60                                     | VRN2E3PX4002 | VRN2E3SX4002        | VRN2E3PXC002 | VRN2E3SCX002    | VRN2E3PX5002 | VRN2E3SX5002        | VRN2E3PXD002 | VRN2E3SD002     |              |             |
|                     |    |                                |              | 65                                     | VRN2E4PX4002 | VRN2E4SX4002        | VRN2E4PXC002 | VRN2E4SCX002    | VRN2E4PX5002 | VRN2E4SX5002        | VRN2E4PXD002 | VRN2E4SD002     |              |             |
|                     |    |                                |              | 70                                     | VRN2E5PX4002 | VRN2E5SX4002        | VRN2E5PXC002 | VRN2E5SCX002    | VRN2E5PX5002 | VRN2E5SX5002        | VRN2E5PXD002 | VRN2E5SD002     |              |             |
|                     |    |                                |              | 75                                     | VRN2E6PX4002 | VRN2E6SX4002        | VRN2E6PXC002 | VRN2E6SCX002    | VRN2E6PX5002 | VRN2E6SX5002        | VRN2E6PXD002 | VRN2E6SD002     |              |             |
|                     |    |                                |              | 80                                     | VRN2E7PX4002 | VRN2E7SX4002        | VRN2E7PXC002 | VRN2E7SCX002    | VRN2E7PX5002 | VRN2E7SX5002        | VRN2E7PXD002 | VRN2E7SD002     |              |             |
|                     | 2" | 4                              |              | 58                                     | 100          | 85                  | VRN2E8PX4002 | VRN2E8SX4002    | VRN2E8PXC002 | VRN2E8SCX002        | VRN2E8PX5002 | VRN2E8SX5002    | VRN2E8PXD002 | VRN2E8SD002 |
|                     |    |                                |              |                                        |              | 95                  | VRN2E9PX4002 | VRN2E9SX4002    | VRN2E9PXC002 | VRN2E9SCX002        | VRN2E9PX5002 | VRN2E9SX5002    | VRN2E9PXD002 | VRN2E9SD002 |
| 25                  |    |                                | VRN2FQPX4002 |                                        |              | VRN2FQSX4002        | VRN2FQPXC002 | VRN2FQSCX002    | VRN2FQPX5002 | VRN2FQSX5002        | VRN2FQPD002  | VRN2FQSD002     |              |             |
| 30                  |    |                                | VRN2FRPX4002 |                                        |              | VRN2FRSX4002        | VRN2FRPXC002 | VRN2FRSCX002    | VRN2FRPX5002 | VRN2FRSX5002        | VRN2FRPXD002 | VRN2FRSD002     |              |             |
| 6                   |    |                                | 35           |                                        |              | VRN2FSPX4002        | VRN2FSSX4002 | VRN2FSPXC002    | VRN2FSSXC002 | VRN2FSPX5002        | VRN2FSSX5002 | VRN2FSPXD002    | VRN2FSSXD002 |             |
|                     |    |                                | 40           |                                        |              | VRN2FTPX4002        | VRN2FTSX4002 | VRN2FTPXC002    | VRN2FTSCX002 | VRN2FTPX5002        | VRN2FTSX5002 | VRN2FTPD002     | VRN2FTSD002  |             |
| 7                   |    |                                | 45           |                                        |              | VRN2FUPX4002        | VRN2FUSX4002 | VRN2FUPXC002    | VRN2FUSXC002 | VRN2FUPX5002        | VRN2FUSX5002 | VRN2FUPXD002    | VRN2FUSD002  |             |
|                     |    |                                | 50           |                                        |              | VRN2F1PX4002        | VRN2F1SX4002 | VRN2F1PXC002    | VRN2F1SCX002 | VRN2F1PX5002        | VRN2F1SX5002 | VRN2F1PXD002    | VRN2F1SD002  |             |
|                     |    |                                | 55           |                                        |              | VRN2F2PX4002        | VRN2F2SX4002 | VRN2F2PXC002    | VRN2F2SCX002 | VRN2F2PX5002        | VRN2F2SX5002 | VRN2F2PXD002    | VRN2F2SD002  |             |
|                     |    |                                | 60           |                                        |              | VRN2F3PX4002        | VRN2F3SX4002 | VRN2F3PXC002    | VRN2F3SCX002 | VRN2F3PX5002        | VRN2F3SX5002 | VRN2F3PXD002    | VRN2F3SD002  |             |
|                     |    |                                | 65           |                                        |              | VRN2F4PX4002        | VRN2F4SX4002 | VRN2F4PXC002    | VRN2F4SCX002 | VRN2F4PX5002        | VRN2F4SX5002 | VRN2F4PXD002    | VRN2F4SD002  |             |
|                     |    |                                | 70           |                                        |              | VRN2F5PX4002        | VRN2F5SX4002 | VRN2F5PXC002    | VRN2F5SCX002 | VRN2F5PX5002        | VRN2F5SX5002 | VRN2F5PXD002    | VRN2F5SD002  |             |
| 2-1/2"              | 4  | 58                             | 100          | 75                                     | VRN2F6PX4002 | VRN2F6SX4002        | VRN2F6PXC002 | VRN2F6SCX002    | VRN2F6PX5002 | VRN2F6SX5002        | VRN2F6PXD002 | VRN2F6SD002     |              |             |
|                     |    |                                |              | 25                                     | VRN2GQPX4002 | VRN2GQSX4002        | VRN2GQPXC002 | VRN2GQSCX002    | VRN2GQPX5002 | VRN2GQSX5002        | VRN2GQPD002  | VRN2GQSD002     |              |             |
|                     |    |                                |              | 30                                     | VRN2GRPX4002 | VRN2GRSX4002        | VRN2GRPXC002 | VRN2GRSCX002    | VRN2GRPX5002 | VRN2GRSX5002        | VRN2GRPXD002 | VRN2GRSD002     |              |             |
|                     |    |                                |              | 35                                     | VRN2GSPX4002 | VRN2GSSX4002        | VRN2GSPXC002 | VRN2GSSXC002    | VRN2GSPX5002 | VRN2GSSX5002        | VRN2GSPXD002 | VRN2GSSXD002    |              |             |
|                     | 6  |                                |              |                                        | 40           | VRN2GTPX4002        | VRN2GTSX4002 | VRN2GTPXC002    | VRN2GTSXC002 | VRN2GTPX5002        | VRN2GTSX5002 | VRN2GTPXD002    | VRN2GTSD002  |             |
|                     |    |                                |              |                                        | 45           | VRN2GUPX4002        | VRN2GUSX4002 | VRN2GUPXC002    | VRN2GUSXC002 | VRN2GUPX5002        | VRN2GUSX5002 | VRN2GUPXD002    | VRN2GUSD002  |             |
|                     | 7  |                                |              |                                        | 50           | VRN2G1PX4002        | VRN2G1SX4002 | VRN2G1PXC002    | VRN2G1SCX002 | VRN2G1PX5002        | VRN2G1SX5002 | VRN2G1PXD002    | VRN2G1SD002  |             |
|                     |    |                                |              |                                        | 55           | VRN2G2PX4002        | VRN2G2SX4002 | VRN2G2PXC002    | VRN2G2SCX002 | VRN2G2PX5002        | VRN2G2SX5002 | VRN2G2PXD002    | VRN2G2SD002  |             |
|                     |    |                                |              |                                        | 60           | VRN2G3PX4002        | VRN2G3SX4002 | VRN2G3PXC002    | VRN2G3SCX002 | VRN2G3PX5002        | VRN2G3SX5002 | VRN2G3PXD002    | VRN2G3SD002  |             |
|                     |    |                                |              |                                        | 65           | VRN2G4PX4002        | VRN2G4SX4002 | VRN2G4PXC002    | VRN2G4SCX002 | VRN2G4PX5002        | VRN2G4SX5002 | VRN2G4PXD002    | VRN2G4SD002  |             |
|                     |    |                                |              |                                        | 70           | VRN2G5PX4002        | VRN2G5SX4002 | VRN2G5PXC002    | VRN2G5SCX002 | VRN2G5PX5002        | VRN2G5SX5002 | VRN2G5PXD002    | VRN2G5SD002  |             |
|                     |    |                                |              |                                        | 75           | VRN2G6PX4002        | VRN2G6SX4002 | VRN2G6PXC002    | VRN2G6SCX002 | VRN2G6PX5002        | VRN2G6SX5002 | VRN2G6PXD002    | VRN2G6SD002  |             |
| 3"                  | 4  | 58                             | 100          | 80                                     | VRN2G7PX4002 | VRN2G7SX4002        | VRN2G7PXC002 | VRN2G7SCX002    | VRN2G7PX5002 | VRN2G7SX5002        | VRN2G7PXD002 | VRN2G7SD002     |              |             |
|                     |    |                                |              | 85                                     | VRN2G8PX4002 | VRN2G8SX4002        | VRN2G8PXC002 | VRN2G8SCX002    | VRN2G8PX5002 | VRN2G8SX5002        | VRN2G8PXD002 | VRN2G8SD002     |              |             |
|                     |    |                                |              | 95*                                    | VRN2G9PX4002 | VRN2G9SX4002        | VRN2G9PXC002 | VRN2G9SCX002    | VRN2G9PX5002 | VRN2G9SX5002        | VRN2G9PXD002 | VRN2G9SD002     |              |             |
|                     |    |                                |              | 25                                     | VRN2HQPX4002 | VRN2HQSX4002        | VRN2HQPXC002 | VRN2HQSCX002    | VRN2HQPX5002 | VRN2HQSX5002        | VRN2HQPXD002 | VRN2HQSD002     |              |             |
|                     | 6  |                                |              |                                        | 30           | VRN2HRPX4002        | VRN2HRSX4002 | VRN2HRPXC002    | VRN2HRSCX002 | VRN2HRPX5002        | VRN2HRSX5002 | VRN2HRPXD002    | VRN2HRSD002  |             |
|                     |    |                                |              |                                        | 35           | VRN2HSPX4002        | VRN2HSSX4002 | VRN2HSPXC002    | VRN2HSSXC002 | VRN2HSPX5002        | VRN2HSSX5002 | VRN2HSPXD002    | VRN2HSSXD002 |             |
|                     | 7  |                                |              |                                        | 40           | VRN2HTPX4002        | VRN2HTSX4002 | VRN2HTPXC002    | VRN2HTSCX002 | VRN2HTPX5002        | VRN2HTSX5002 | VRN2HTPXD002    | VRN2HTSD002  |             |
|                     |    |                                |              |                                        | 45           | VRN2HUPX4002        | VRN2HUSX4002 | VRN2HUPXC002    | VRN2HUSXC002 | VRN2HUPX5002        | VRN2HUSX5002 | VRN2HUPXD002    | VRN2HUSD002  |             |
|                     |    |                                |              |                                        | 50           | VRN2H1PX4002        | VRN2H1SX4002 | VRN2H1PXC002    | VRN2H1SCX002 | VRN2H1PX5002        | VRN2H1SX5002 | VRN2H1PXD002    | VRN2H1SD002  |             |
|                     |    |                                |              |                                        | 55           | VRN2H2PX4002        | VRN2H2SX4002 | VRN2H2PXC002    | VRN2H2SCX002 | VRN2H2PX5002        | VRN2H2SX5002 | VRN2H2PXD002    | VRN2H2SD002  |             |
|                     |    |                                |              |                                        | 60           | VRN2H3PX4002        | VRN2H3SX4002 | VRN2H3PXC002    | VRN2H3SCX002 | VRN2H3PX5002        | VRN2H3SX5002 | VRN2H3PXD002    | VRN2H3SD002  |             |
|                     |    |                                |              |                                        | 65           | VRN2H4PX4002        | VRN2H4SX4002 | VRN2H4PXC002    | VRN2H4SCX002 | VRN2H4PX5002        | VRN2H4SX5002 | VRN2H4PXD002    | VRN2H4SD002  |             |
|                     |    |                                |              |                                        | 70           | VRN2H5PX4002        | VRN2H5SX4002 | VRN2H5PXC002    | VRN2H5SCX002 | VRN2H5PX5002        | VRN2H5SX5002 | VRN2H5PXD002    | VRN2H5SD002  |             |
|                     |    |                                |              |                                        | 75           | VRN2H6PX4002        | VRN2H6SX4002 | VRN2H6PXC002    | VRN2H6SCX002 | VRN2H6PX5002        | VRN2H6SX5002 | VRN2H6PXD002    | VRN2H6SD002  |             |
| 11                  |    | 80                             | VRN2H7PX4002 | VRN2H7SX4002                           | VRN2H7PXC002 | VRN2H7SCX002        | VRN2H7PX5002 | VRN2H7SX5002    | VRN2H7PXD002 | VRN2H7SD002         |              |                 |              |             |
|                     |    | 85                             | VRN2H8PX4002 | VRN2H8SX4002                           | VRN2H8PXC002 | VRN2H8SCX002        | VRN2H8PX5002 | VRN2H8SX5002    | VRN2H8PXD002 | VRN2H8SD002         |              |                 |              |             |
|                     |    | 95*                            | VRN2H9PX4002 | VRN2H9SX4002                           | VRN2H9PXC002 | VRN2H9SCX002        | VRN2H9PX5002 | VRN2H9SX5002    | VRN2H9PXD002 | VRN2H9SD002         |              |                 |              |             |

## Product Selection - Valves

## Pressure Independent Control Valves, NPT 1½"-3" NEMA 3R

|  |  |  |  | Actuator Features                      |  |                                |  | Fail Safe           |  |                 |  |
|--|--|--|--|----------------------------------------|--|--------------------------------|--|---------------------|--|-----------------|--|
|  |  |  |  | Actuator O.S Number                    |  |                                |  | MS7505A2030         |  |                 |  |
|  |  |  |  | Power Supply                           |  |                                |  | MS7505A2130         |  |                 |  |
|  |  |  |  | Voltage                                |  | 24 VAC/DC                      |  | 24 VAC/DC           |  |                 |  |
|  |  |  |  | Frequency                              |  | 50 / 60 Hz                     |  | 50 / 60 Hz          |  |                 |  |
|  |  |  |  | Power                                  |  | 6 VA                           |  | 6 VA                |  |                 |  |
|  |  |  |  | Actuator Torque                        |  | (lb.-in.)                      |  | 44                  |  | 44              |  |
|  |  |  |  | Control                                |  | (0)2-10Vdc                     |  | •                   |  | •               |  |
|  |  |  |  | 4-20 mA (w/ external 500 Ohm Resistor) |  | •                              |  | •                   |  | •               |  |
|  |  |  |  | Floating                               |  | •                              |  | •                   |  | •               |  |
|  |  |  |  | Two-Position SPDT                      |  | •                              |  | •                   |  | •               |  |
|  |  |  |  | Two-Position SPST                      |  | •                              |  | •                   |  | •               |  |
|  |  |  |  | Actuator Stroke                        |  | (degrees)                      |  | 95° ± 3°            |  | 95° ± 3°        |  |
|  |  |  |  | Timing                                 |  | (drive/spring return, seconds) |  | 90 / 25             |  | 90 / 25         |  |
|  |  |  |  | Aux Switch                             |  | 0                              |  | 1                   |  |                 |  |
|  |  |  |  | Feedback                               |  | 2-10 Vdc Built In              |  | •                   |  |                 |  |
|  |  |  |  | Fail Safe Action                       |  | Closed                         |  | Open                |  | Closed          |  |
|  |  |  |  | Normal Position                        |  | (no signal)                    |  | Closed              |  | Open            |  |
|  |  |  |  | Valve Features                         |  | Trim                           |  | Nickel-Plated Brass |  | Stainless Steel |  |
|  |  |  |  |                                        |  |                                |  | Nickel-Plated Brass |  | Stainless Steel |  |
|  |  |  |  |                                        |  |                                |  | Nickel-Plated Brass |  | Stainless Steel |  |
|  |  |  |  |                                        |  |                                |  | Nickel-Plated Brass |  | Stainless Steel |  |
|  |  |  |  |                                        |  |                                |  | Nickel-Plated Brass |  | Stainless Steel |  |
|  |  |  |  |                                        |  |                                |  | Nickel-Plated Brass |  | Stainless Steel |  |
|  |  |  |  |                                        |  |                                |  | Nickel-Plated Brass |  | Stainless Steel |  |
|  |  |  |  |                                        |  |                                |  | Nickel-Plated Brass |  | Stainless Steel |  |
|  |  |  |  |                                        |  |                                |  | Nickel-Plated Brass |  | Stainless Steel |  |
|  |  |  |  |                                        |  |                                |  | Nickel-Plated Brass |  | Stainless Steel |  |
|  |  |  |  |                                        |  |                                |  | Nickel-Plated Brass |  | Stainless Steel |  |
|  |  |  |  |                                        |  |                                |  | Nickel-Plated Brass |  | Stainless Steel |  |
|  |  |  |  |                                        |  |                                |  | Nickel-Plated Brass |  | Stainless Steel |  |
|  |  |  |  |                                        |  |                                |  | Nickel-Plated Brass |  | Stainless Steel |  |
|  |  |  |  |                                        |  |                                |  | Nickel-Plated Brass |  | Stainless Steel |  |
|  |  |  |  |                                        |  |                                |  | Nickel-Plated Brass |  | Stainless Steel |  |
|  |  |  |  |                                        |  |                                |  | Nickel-Plated Brass |  | Stainless Steel |  |
|  |  |  |  |                                        |  |                                |  | Nickel-Plated Brass |  | Stainless Steel |  |
|  |  |  |  |                                        |  |                                |  | Nickel-Plated Brass |  | Stainless Steel |  |
|  |  |  |  |                                        |  |                                |  | Nickel-Plated Brass |  | Stainless Steel |  |
|  |  |  |  |                                        |  |                                |  | Nickel-Plated Brass |  | Stainless Steel |  |
|  |  |  |  |                                        |  |                                |  | Nickel-Plated Brass |  | Stainless Steel |  |
|  |  |  |  |                                        |  |                                |  | Nickel-Plated Brass |  | Stainless Steel |  |
|  |  |  |  |                                        |  |                                |  | Nickel-Plated Brass |  | Stainless Steel |  |
|  |  |  |  |                                        |  |                                |  | Nickel-Plated Brass |  | Stainless Steel |  |
|  |  |  |  |                                        |  |                                |  | Nickel-Plated Brass |  | Stainless Steel |  |
|  |  |  |  |                                        |  |                                |  | Nickel-Plated Brass |  | Stainless Steel |  |
|  |  |  |  |                                        |  |                                |  | Nickel-Plated Brass |  | Stainless Steel |  |
|  |  |  |  |                                        |  |                                |  | Nickel-Plated Brass |  | Stainless Steel |  |
|  |  |  |  |                                        |  |                                |  | Nickel-Plated Brass |  | Stainless Steel |  |
|  |  |  |  |                                        |  |                                |  | Nickel-Plated Brass |  | Stainless Steel |  |
|  |  |  |  |                                        |  |                                |  | Nickel-Plated Brass |  | Stainless Steel |  |
|  |  |  |  |                                        |  |                                |  | Nickel-Plated Brass |  | Stainless Steel |  |
|  |  |  |  |                                        |  |                                |  | Nickel-Plated Brass |  | Stainless Steel |  |
|  |  |  |  |                                        |  |                                |  | Nickel-Plated Brass |  | Stainless Steel |  |
|  |  |  |  |                                        |  |                                |  | Nickel-Plated Brass |  | Stainless Steel |  |
|  |  |  |  |                                        |  |                                |  | Nickel-Plated Brass |  | Stainless Steel |  |
|  |  |  |  |                                        |  |                                |  | Nickel-Plated Brass |  | Stainless Steel |  |
|  |  |  |  |                                        |  |                                |  | Nickel-Plated Brass |  | Stainless Steel |  |
|  |  |  |  |                                        |  |                                |  | Nickel-Plated Brass |  | Stainless Steel |  |
|  |  |  |  |                                        |  |                                |  | Nickel-Plated Brass |  | Stainless Steel |  |
|  |  |  |  |                                        |  |                                |  | Nickel-Plated Brass |  | Stainless Steel |  |
|  |  |  |  |                                        |  |                                |  | Nickel-Plated Brass |  | Stainless Steel |  |
|  |  |  |  |                                        |  |                                |  | Nickel-Plated Brass |  | Stainless Steel |  |
|  |  |  |  |                                        |  |                                |  | Nickel-Plated Brass |  | Stainless Steel |  |
|  |  |  |  |                                        |  |                                |  | Nickel-Plated Brass |  | Stainless Steel |  |
|  |  |  |  |                                        |  |                                |  | Nickel-Plated Brass |  | Stainless Steel |  |
|  |  |  |  |                                        |  |                                |  | Nickel-Plated Brass |  | Stainless Steel |  |
|  |  |  |  |                                        |  |                                |  | Nickel-Plated Brass |  | Stainless Steel |  |
|  |  |  |  |                                        |  |                                |  | Nickel-Plated Brass |  | Stainless Steel |  |
|  |  |  |  |                                        |  |                                |  | Nickel-Plated Brass |  | Stainless Steel |  |
|  |  |  |  |                                        |  |                                |  | Nickel-Plated Brass |  | Stainless Steel |  |
|  |  |  |  |                                        |  |                                |  | Nickel-Plated Brass |  | Stainless Steel |  |
|  |  |  |  |                                        |  |                                |  | Nickel-Plated Brass |  | Stainless Steel |  |
|  |  |  |  |                                        |  |                                |  | Nickel-Plated Brass |  | Stainless Steel |  |
|  |  |  |  |                                        |  |                                |  | Nickel-Plated Brass |  | Stainless Steel |  |
|  |  |  |  |                                        |  |                                |  | Nickel-Plated Brass |  | Stainless Steel |  |
|  |  |  |  |                                        |  |                                |  | Nickel-Plated Brass |  | Stainless Steel |  |
|  |  |  |  |                                        |  |                                |  | Nickel-Plated Brass |  | Stainless Steel |  |
|  |  |  |  |                                        |  |                                |  | Nickel-Plated Brass |  | Stainless Steel |  |
|  |  |  |  |                                        |  |                                |  | Nickel-Plated Brass |  | Stainless Steel |  |
|  |  |  |  |                                        |  |                                |  | Nickel-Plated Brass |  | Stainless Steel |  |
|  |  |  |  |                                        |  |                                |  | Nickel-Plated Brass |  | Stainless Steel |  |
|  |  |  |  |                                        |  |                                |  | Nickel-Plated Brass |  | Stainless Steel |  |
|  |  |  |  |                                        |  |                                |  | Nickel-Plated Brass |  | Stainless Steel |  |
|  |  |  |  |                                        |  |                                |  | Nickel-Plated Brass |  | Stainless Steel |  |
|  |  |  |  |                                        |  |                                |  | Nickel-Plated Brass |  |                 |  |

## Product Selection - Valves

## Pressure Independent Control Valves, NPT 1½"-3" NEMA 3R

|                     |                                |      |                           | Actuator Features                      |                   |                     |                 | Fail Safe           |                 |                     |                 |                     |                 |              |              |              |
|---------------------|--------------------------------|------|---------------------------|----------------------------------------|-------------------|---------------------|-----------------|---------------------|-----------------|---------------------|-----------------|---------------------|-----------------|--------------|--------------|--------------|
|                     |                                |      |                           | Actuator O.S Number                    |                   |                     |                 | MS8105A1030         |                 |                     | MS8105A1130     |                     |                 |              |              |              |
| Power Supply        |                                |      |                           | Voltage                                |                   | 24 VAC/DC           |                 |                     | 24 VAC/DC       |                     |                 |                     |                 |              |              |              |
|                     |                                |      |                           | Frequency                              |                   | 50 / 60 Hz          |                 |                     | 50 / 60 Hz      |                     |                 |                     |                 |              |              |              |
|                     |                                |      |                           | Power                                  |                   | 6 VA                |                 |                     | 6 VA            |                     |                 |                     |                 |              |              |              |
| Actuator Torque     |                                |      |                           | (lb.-in.)                              |                   | 44                  |                 |                     | 44              |                     |                 |                     |                 |              |              |              |
| Control             |                                |      |                           | (0)2-10Vdc                             |                   |                     |                 |                     |                 |                     |                 |                     |                 |              |              |              |
|                     |                                |      |                           | 4-20 mA (w/ external 500 Ohm Resistor) |                   |                     |                 |                     |                 |                     |                 |                     |                 |              |              |              |
|                     |                                |      |                           | Floating                               |                   |                     |                 |                     |                 |                     |                 |                     |                 |              |              |              |
|                     |                                |      |                           | Two-Position SPDT                      |                   |                     |                 |                     |                 |                     |                 |                     |                 |              |              |              |
|                     |                                |      |                           | Two-Position SPST                      |                   | •                   |                 |                     | •               |                     |                 |                     |                 |              |              |              |
| Actuator Stroke     |                                |      |                           | (degrees)                              |                   | 95° ± 3°            |                 |                     | 95° ± 3°        |                     |                 |                     |                 |              |              |              |
| Timing              |                                |      |                           | (drive/spring return, seconds)         |                   | 45 / 25             |                 |                     | 45 / 25         |                     |                 |                     |                 |              |              |              |
| Aux Switch          |                                |      |                           |                                        |                   | 0                   |                 |                     | 1               |                     |                 |                     |                 |              |              |              |
| Feedback            |                                |      |                           | 2-10 Vdc Built In                      |                   |                     |                 |                     |                 |                     |                 |                     |                 |              |              |              |
| Fail Safe Action    |                                |      |                           |                                        |                   | Closed              |                 | Open                |                 | Closed              |                 | Open                |                 |              |              |              |
| Normal Position     |                                |      |                           | (no signal)                            |                   | Closed              |                 | Open                |                 | Closed              |                 | Open                |                 |              |              |              |
| Valve Features      |                                |      |                           | Trim                                   |                   | Nickel-Plated Brass | Stainless Steel | Nickel-Plated Brass | Stainless Steel | Nickel-Plated Brass | Stainless Steel | Nickel-Plated Brass | Stainless Steel |              |              |              |
| Valve Size (inches) | Differential Pressure** (psid) |      | Close-off Pressure (psid) | Max. GPM                               | Short Order Codes |                     |                 |                     |                 |                     |                 |                     |                 |              |              |              |
|                     | Min.                           | Max. |                           |                                        |                   |                     |                 |                     |                 |                     |                 |                     |                 |              |              |              |
| 1-1/2"              | 4                              | 50   | 100                       | 10                                     | VRN2EMPX7202      | VRN2EMSX7202        | VRN2EMPX7102    | VRN2EMSX7102        | VRN2EMPXA202    | VRN2EMSA202         | VRN2EMPXA102    | VRN2EMSA102         |                 |              |              |              |
|                     |                                |      |                           | 15                                     | VRN2ENPX7202      | VRN2ENSX7202        | VRN2ENPX7102    | VRN2ENSX7102        | VRN2ENPXA202    | VRN2ENSA202         | VRN2ENPXA102    | VRN2ENSA102         |                 |              |              |              |
|                     | 20                             |      |                           | VRN2EPPX7202                           | VRN2EPSX7202      | VRN2EPPX7102        | VRN2EPSX7102    | VRN2EPPXA202        | VRN2EPSXA202    | VRN2EPPXA102        | VRN2EPSXA102    |                     |                 |              |              |              |
|                     | 25                             |      |                           | VRN2EQPX7202                           | VRN2EQSX7202      | VRN2EQPX7102        | VRN2EQSX7102    | VRN2EQPXA202        | VRN2EQSXA202    | VRN2EQPXA102        | VRN2EQSXA102    |                     |                 |              |              |              |
|                     | 5                              | 58   |                           | 30                                     | VRN2ERPX7202      | VRN2ERSX7202        | VRN2ERPX7102    | VRN2ERSX7102        | VRN2ERPXA202    | VRN2ERSXA202        | VRN2ERPXA102    | VRN2ERSXA102        |                 |              |              |              |
|                     |                                |      |                           | 35                                     | VRN2ESPX7202      | VRN2ESSX7202        | VRN2ESPX7102    | VRN2ESSX7102        | VRN2ESPA202     | VRN2ESSXA202        | VRN2ESPXA102    | VRN2ESSXA102        |                 |              |              |              |
|                     | 40                             |      |                           | VRN2ETPX7202                           | VRN2ETSX7202      | VRN2ETPX7102        | VRN2ETSX7102    | VRN2ETPXA202        | VRN2ETSXA202    | VRN2ETPXA102        | VRN2ETSXA102    |                     |                 |              |              |              |
|                     | 45                             |      |                           | VRN2EUPX7202                           | VRN2EUSX7202      | VRN2EUPX7102        | VRN2EUSX7102    | VRN2EUPXA202        | VRN2EUSXA202    | VRN2EUPXA102        | VRN2EUSXA102    |                     |                 |              |              |              |
|                     | 6                              | 58   |                           | 50                                     | VRN2E1PX7202      | VRN2E1SX7202        | VRN2E1PX7102    | VRN2E1SX7102        | VRN2E1PXA202    | VRN2E1SXA202        | VRN2E1PXA102    | VRN2E1SXA102        |                 |              |              |              |
|                     |                                |      |                           | 55                                     | VRN2E2PX7202      | VRN2E2SX7202        | VRN2E2PX7102    | VRN2E2SX7102        | VRN2E2PXA202    | VRN2E2SXA202        | VRN2E2PXA102    | VRN2E2SXA102        |                 |              |              |              |
|                     | 7                              |      |                           | 58                                     |                   | 60                  | VRN2E3PX7202    | VRN2E3SX7202        | VRN2E3PX7102    | VRN2E3SX7102        | VRN2E3PXA202    | VRN2E3SXA202        | VRN2E3PXA102    | VRN2E3SXA102 |              |              |
|                     |                                |      |                           |                                        |                   | 65                  | VRN2E4PX7202    | VRN2E4SX7202        | VRN2E4PX7102    | VRN2E4SX7102        | VRN2E4PXA202    | VRN2E4SXA202        | VRN2E4PXA102    | VRN2E4SXA102 |              |              |
|                     | 2"                             | 4    |                           |                                        |                   | 58                  | 100             | 70                  | VRN2E5PX7202    | VRN2E5SX7202        | VRN2E5PX7102    | VRN2E5SX7102        | VRN2E5PXA202    | VRN2E5SXA202 | VRN2E5PXA102 | VRN2E5SXA102 |
|                     |                                |      |                           |                                        |                   |                     |                 | 75                  | VRN2E6PX7202    | VRN2E6SX7202        | VRN2E6PX7102    | VRN2E6SX7102        | VRN2E6PXA202    | VRN2E6SXA202 | VRN2E6PXA102 | VRN2E6SXA102 |
|                     |                                | 6    |                           | 58                                     |                   |                     |                 | 80                  | VRN2E7PX7202    | VRN2E7SX7202        | VRN2E7PX7102    | VRN2E7SX7102        | VRN2E7PXA202    | VRN2E7SXA202 | VRN2E7PXA102 | VRN2E7SXA102 |
|                     |                                |      |                           |                                        |                   |                     |                 | 85                  | VRN2E8PX7202    | VRN2E8SX7202        | VRN2E8PX7102    | VRN2E8SX7102        | VRN2E8PXA202    | VRN2E8SXA202 | VRN2E8PXA102 | VRN2E8SXA102 |
| 7                   |                                | 58   |                           |                                        |                   |                     |                 | 95                  | VRN2E9PX7202    | VRN2E9SX7202        | VRN2E9PX7102    | VRN2E9SX7102        | VRN2E9PXA202    | VRN2E9SXA202 | VRN2E9PXA102 | VRN2E9SXA102 |
|                     |                                |      |                           |                                        |                   |                     |                 | 25                  | VRN2FQPX7202    | VRN2FQSX7202        | VRN2FQPX7102    | VRN2FQSX7102        | VRN2FQPXA202    | VRN2FQSA202  | VRN2FQPXA102 | VRN2FQSA102  |
| 6                   |                                |      |                           | 58                                     |                   |                     |                 | 30                  | VRN2FRPX7202    | VRN2FRSX7202        | VRN2FRPX7102    | VRN2FRSX7102        | VRN2FRPXA202    | VRN2FRSXA202 | VRN2FRPXA102 | VRN2FRSXA102 |
|                     |                                |      |                           |                                        |                   |                     |                 | 35                  | VRN2FSPX7202    | VRN2FSSX7202        | VRN2FSPX7102    | VRN2FSSX7102        | VRN2FSPXA202    | VRN2FSSXA202 | VRN2FSPXA102 | VRN2FSSXA102 |
| 7                   |                                | 58   |                           |                                        |                   |                     |                 | 40                  | VRN2FTPX7202    | VRN2FTSX7202        | VRN2FTPX7102    | VRN2FTSX7102        | VRN2FTPXA202    | VRN2FTSXA202 | VRN2FTPXA102 | VRN2FTSXA102 |
|                     |                                |      |                           |                                        |                   |                     |                 | 45                  | VRN2FUPX7202    | VRN2FUSX7202        | VRN2FUPX7102    | VRN2FUSX7102        | VRN2FUPXA202    | VRN2FUSXA202 | VRN2FUPXA102 | VRN2FUSXA102 |
| 2-1/2"              | 4                              |      |                           | 58                                     | 100               | 50                  | VRN2F1PX7202    | VRN2F1SX7202        | VRN2F1PX7102    | VRN2F1SX7102        | VRN2F1PXA202    | VRN2F1SXA202        | VRN2F1PXA102    | VRN2F1SXA102 |              |              |
|                     |                                |      |                           |                                        |                   | 55                  | VRN2F2PX7202    | VRN2F2SX7202        | VRN2F2PX7102    | VRN2F2SX7102        | VRN2F2PXA202    | VRN2F2SXA202        | VRN2F2PXA102    | VRN2F2SXA102 |              |              |
|                     | 6                              | 58   |                           |                                        |                   | 60                  | VRN2F3PX7202    | VRN2F3SX7202        | VRN2F3PX7102    | VRN2F3SX7102        | VRN2F3PXA202    | VRN2F3SXA202        | VRN2F3PXA102    | VRN2F3SXA102 |              |              |
|                     |                                |      |                           |                                        |                   | 65                  | VRN2F4PX7202    | VRN2F4SX7202        | VRN2F4PX7102    | VRN2F4SX7102        | VRN2F4PXA202    | VRN2F4SXA202        | VRN2F4PXA102    | VRN2F4SXA102 |              |              |
|                     | 7                              |      |                           |                                        |                   | 58                  |                 | 70                  | VRN2F5PX7202    | VRN2F5SX7202        | VRN2F5PX7102    | VRN2F5SX7102        | VRN2F5PXA202    | VRN2F5SXA202 | VRN2F5PXA102 | VRN2F5SXA102 |
|                     |                                |      |                           |                                        |                   |                     |                 | 75                  | VRN2F6PX7202    | VRN2F6SX7202        | VRN2F6PX7102    | VRN2F6SX7102        | VRN2F6PXA202    | VRN2F6SXA202 | VRN2F6PXA102 | VRN2F6SXA102 |
|                     | 6                              | 58   |                           |                                        |                   |                     |                 | 25                  | VRN2GQPX7202    | VRN2GQSX7202        | VRN2GQPX7102    | VRN2GQSX7102        | VRN2GQPXA202    | VRN2GQSA202  | VRN2GQPXA102 | VRN2GQSA102  |
|                     |                                |      |                           |                                        |                   |                     |                 | 30                  | VRN2GRPX7202    | VRN2GRSX7202        | VRN2GRPX7102    | VRN2GRSX7102        | VRN2GRPXA202    | VRN2GRSXA202 | VRN2GRPXA102 | VRN2GRSXA102 |
|                     | 7                              |      |                           |                                        |                   | 58                  |                 | 35                  | VRN2GSPX7202    | VRN2GSSX7202        | VRN2GSPX7102    | VRN2GSSX7102        | VRN2GSPXA202    | VRN2GSSXA202 | VRN2GSPXA102 | VRN2GSSXA102 |
|                     |                                |      |                           |                                        |                   |                     |                 | 40                  | VRN2GTPX7202    | VRN2GTSX7202        | VRN2GTPX7102    | VRN2GTSX7102        | VRN2GTPXA202    | VRN2GTSXA202 | VRN2GTPXA102 | VRN2GTSXA102 |
| 3"                  | 4                              | 58   | 100                       | 45                                     | VRN2GUPX7202      |                     |                 | VRN2GUSX7202        | VRN2GUPX7102    | VRN2GUSX7102        | VRN2GUPXA202    | VRN2GUSXA202        | VRN2GUPXA102    | VRN2GUSXA102 |              |              |
|                     |                                |      |                           | 50                                     | VRN2G1PX7202      |                     |                 | VRN2G1SX7202        | VRN2G1PX7102    | VRN2G1SX7102        | VRN2G1PXA202    | VRN2G1SXA202        | VRN2G1PXA102    | VRN2G1SXA102 |              |              |
|                     | 6                              |      |                           | 58                                     |                   | 55                  | VRN2G2PX7202    | VRN2G2SX7202        | VRN2G2PX7102    | VRN2G2SX7102        | VRN2G2PXA202    | VRN2G2SXA202        | VRN2G2PXA102    | VRN2G2SXA102 |              |              |
|                     |                                |      |                           |                                        |                   | 60                  | VRN2G3PX7202    | VRN2G3SX7202        | VRN2G3PX7102    | VRN2G3SX7102        | VRN2G3PXA202    | VRN2G3SXA202        | VRN2G3PXA102    | VRN2G3SXA102 |              |              |
|                     | 7                              |      |                           |                                        |                   | 58                  |                 | 65                  | VRN2G4PX7202    | VRN2G4SX7202        | VRN2G4PX7102    | VRN2G4SX7102        | VRN2G4PXA202    | VRN2G4SXA202 | VRN2G4PXA102 | VRN2G4SXA102 |
|                     |                                |      |                           |                                        |                   |                     |                 | 70                  | VRN2G5PX7202    | VRN2G5SX7202        | VRN2G5PX7102    | VRN2G5SX7102        | VRN2G5PXA202    | VRN2G5SXA202 | VRN2G5PXA102 | VRN2G5SXA102 |
|                     | 6                              |      |                           | 58                                     |                   |                     |                 | 75                  | VRN2G6PX7202    | VRN2G6SX7202        | VRN2G6PX7102    | VRN2G6SX7102        | VRN2G6PXA202    | VRN2G6SXA202 | VRN2G6PXA102 | VRN2G6SXA102 |
|                     |                                |      |                           |                                        |                   |                     |                 | 80                  | VRN2G7PX7202    | VRN2G7SX7202        | VRN2G7PX7102    | VRN2G7SX7102        | VRN2G7PXA202    | VRN2G7SXA202 | VRN2G7PXA102 | VRN2G7SXA102 |
|                     | 7                              |      |                           |                                        |                   | 58                  |                 | 85                  | VRN2G8PX7202    | VRN2G8SX7202        | VRN2G8PX7102    | VRN2G8SX7102        | VRN2G8PXA202    | VRN2G8SXA202 | VRN2G8PXA102 | VRN2G8SXA102 |
|                     |                                |      |                           |                                        |                   |                     |                 | 95*                 | VRN2G9PX7202    | VRN2G9SX7202        | VRN2G9PX7102    | VRN2G9SX7102        | VRN2G9PXA202    | VRN2G9SXA202 | VRN2G9PXA102 | VRN2G9SXA102 |
| 3"                  | 4                              | 58   | 100                       | 25                                     | VRN2HQPX7202      |                     |                 | VRN2HQSX7202        | VRN2HQPX7102    | VRN2HQSX7102        | VRN2HQPXA202    | VRN2HQSA202         | VRN2HQPXA102    | VRN2HQSA102  |              |              |
|                     |                                |      |                           | 30                                     | VRN2HRPX7202      |                     |                 | VRN2HRSX7202        | VRN2HRPX7102    | VRN2HRSX7102        | VRN2HRPXA202    | VRN2HRSXA202        | VRN2HRPXA102    | VRN2HRSXA102 |              |              |
|                     | 6                              |      |                           | 58                                     |                   | 35                  | VRN2HSPX7202    | VRN2HSSX7202        | VRN2HSPX7102    | VRN2HSSX7102        | VRN2HSPXA202    | VRN2HSSXA202        | VRN2HSPXA102    | VRN2HSSXA102 |              |              |
|                     |                                |      |                           |                                        |                   | 40                  | VRN2HTPX7202    | VRN2HTSX7202        | VRN2HTPX7102    | VRN2HTSX7102        | VRN2HTPXA202    | VRN2HTSXA202        | VRN2HTPXA102    | VRN2HTSXA102 |              |              |
|                     | 7                              |      |                           |                                        |                   | 58                  |                 | 45                  | VRN2HUPX7202    | VRN2HUSX7202        | VRN2HUPX7102    | VRN2HUSX7102        | VRN2HUPXA202    | VRN2HUSXA202 | VRN2HUPXA102 | VRN2HUSXA102 |
|                     |                                |      |                           |                                        |                   |                     |                 | 50                  | VRN2H1PX7202    | VRN2H1SX7202        | VRN2H1PX7102    | VRN2H1SX7102        | VRN2H1PXA202    | VRN2H1SXA202 | VRN2H1PXA102 | VRN2H1SXA102 |
|                     | 6                              |      |                           | 58                                     |                   |                     |                 | 55                  | VRN2H2PX7202    | VRN2H2SX7202        | VRN2H2PX7102    | VRN2H2SX7102        | VRN2H2PXA202    | VRN2H2SXA202 | VRN2H2PXA102 | VRN2H2SXA102 |
|                     |                                |      |                           |                                        |                   |                     |                 | 60                  | VRN2H3PX7202    | VRN2H3SX7202        | VRN2H3PX7102    | VRN2H3SX7102        | VRN2H3PXA202    | VRN2H3SXA202 | VRN2H3PXA102 | VRN2H3SXA102 |
|                     | 7                              |      |                           |                                        |                   | 58                  |                 | 65                  | VRN2H4PX7202    | VRN2H4SX7202        | VRN2H4PX7102    | VRN2H4SX7102        | VRN2H4PXA202    | VRN2H4SXA202 | VRN2H4PXA102 | VRN2H4SXA102 |
|                     |                                |      |                           |                                        |                   |                     |                 | 70                  | VRN2H5PX7202    | VRN2H5SX7202        | VRN2H5PX7102    | VRN2H5SX7102        | VRN2H5PXA202    | VRN2H5SXA202 | VRN2H5PXA102 | VRN2H5SXA102 |
| 6                   | 58                             |      | 75                        | VRN2H6PX7202                           | VRN2H6SX7202      |                     |                 | VRN2H6PX7102        | VRN2H6SX7102    | VRN2H6PXA202        | VRN2H6SXA202    | VRN2H6PXA102        | VRN2H6SXA102    |              |              |              |
|                     |                                |      | 80                        | VRN2H7PX7202                           | VRN2H7SX7202      |                     |                 | VRN2H7PX7102        | VRN2H7SX7102    | VRN2H7PXA202        | VRN2H7SXA202    | VRN2H7PXA102        | VRN2H7SXA102    |              |              |              |
| 7                   |                                |      | 58                        |                                        | 85                | VRN2H8PX7202        | VRN2H8SX7202    | VRN2H8PX7102        | VRN2H8SX7102    | VRN2H8PXA202        | VRN2H8SXA202    | VRN2H8PXA102        | VRN2H8SXA102    |              |              |              |
|                     |                                |      |                           |                                        | 95*               | VRN2H9PX7202        | VRN2H9SX7202    | VRN2H9PX7102        | VRN2H9SX7102    | VRN2H9PXA202        | VRN2H9SXA202    | VRN2H9PXA102        | VRN2H9SXA102    |              |              |              |

## Product Selection - Valves

## Pressure Independent Control Valves, NPT 1½"-3" NEMA 3R

| Actuator Features                      |           | Fail Safe   |                     |                 |                     |                 |                     |                 |                     |                 |
|----------------------------------------|-----------|-------------|---------------------|-----------------|---------------------|-----------------|---------------------|-----------------|---------------------|-----------------|
| Actuator O.S Number                    |           | MS4105A1030 |                     |                 |                     | MS4105A1130     |                     |                 |                     |                 |
| Power Supply                           | Voltage   | 100-250 VAC |                     |                 |                     | 100-250 VAC     |                     |                 |                     |                 |
|                                        | Frequency | 50 / 60 Hz  |                     |                 |                     | 50 / 60 Hz      |                     |                 |                     |                 |
|                                        | Power     | 6 VA        |                     |                 |                     | 6 VA            |                     |                 |                     |                 |
| Actuator Torque (lb.-in.)              |           | 44          |                     |                 |                     | 44              |                     |                 |                     |                 |
| Control (0)2-10Vdc                     |           |             |                     |                 |                     |                 |                     |                 |                     |                 |
| 4-20 mA (w/ external 500 Ohm Resistor) |           |             |                     |                 |                     |                 |                     |                 |                     |                 |
| Floating                               |           |             |                     |                 |                     |                 |                     |                 |                     |                 |
| Two-Position SPDT                      |           |             |                     |                 |                     |                 |                     |                 |                     |                 |
| Two-Position SPST                      |           | •           |                     |                 |                     | •               |                     |                 |                     |                 |
| Actuator Stroke (degrees)              |           | 95° ± 3°    |                     |                 |                     | 95° ± 3°        |                     |                 |                     |                 |
| Timing (drive/spring return, seconds)  |           | 45 / 25     |                     |                 |                     | 45 / 25         |                     |                 |                     |                 |
| Aux Switch                             |           | 0           |                     |                 |                     | 1               |                     |                 |                     |                 |
| Feedback 2-10 Vdc Built In             |           |             |                     |                 |                     |                 |                     |                 |                     |                 |
| Fail Safe Action                       |           | Closed      |                     | Open            |                     | Closed          |                     | Open            |                     |                 |
| Normal Position (no signal)            |           | Closed      |                     | Open            |                     | Closed          |                     | Open            |                     |                 |
| Valve Features                         |           | Trim        | Nickel-Plated Brass | Stainless Steel | Nickel-Plated Brass | Stainless Steel | Nickel-Plated Brass | Stainless Steel | Nickel-Plated Brass | Stainless Steel |

| Valve Size (inches) | Differential Pressure** (psid) |              | Close-off Pressure (psid) | Max. GPM     | Short Order Codes |              |              |              |              |              |              |              |              |
|---------------------|--------------------------------|--------------|---------------------------|--------------|-------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
|                     | Min.                           | Max.         |                           |              |                   |              |              |              |              |              |              |              |              |
| 1-1/2"              | 4                              | 50           | 100                       | 10           | VRN2EMPX8202      | VRN2EMSX8202 | VRN2EMPX8102 | VRN2EMSX8102 | VRN2EMPX9202 | VRN2EMSX9202 | VRN2EMPX9102 | VRN2EMSX9102 |              |
|                     |                                |              |                           | 15           | VRN2ENPX8202      | VRN2ENSX8202 | VRN2ENPX8102 | VRN2ENSX8102 | VRN2ENPX9202 | VRN2ENSX9202 | VRN2ENPX9102 | VRN2ENSX9102 |              |
|                     |                                |              |                           | 20           | VRN2EPPX8202      | VRN2EPSX8202 | VRN2EPPX8102 | VRN2EPSX8102 | VRN2EPPX9202 | VRN2EPSX9202 | VRN2EPPX9102 | VRN2EPSX9102 |              |
|                     | 5                              |              |                           | 25           | VRN2EQPX8202      | VRN2EQSX8202 | VRN2EQPX8102 | VRN2EQSX8102 | VRN2EQPX9202 | VRN2EQSX9202 | VRN2EQPX9102 | VRN2EQSX9102 |              |
|                     |                                |              |                           | 6            | 30                | VRN2ERPX8202 | VRN2ERSX8202 | VRN2ERPX8102 | VRN2ERSX8102 | VRN2ERPX9202 | VRN2ERSX9202 | VRN2ERPX9102 | VRN2ERSX9102 |
|                     |                                |              |                           |              | 35                | VRN2ESPX8202 | VRN2ESSX8202 | VRN2ESPX8102 | VRN2ESSX8102 | VRN2ESPX9202 | VRN2ESSX9202 | VRN2ESPX9102 | VRN2ESSX9102 |
|                     | 7                              |              |                           |              | 40                | VRN2ETPX8202 | VRN2ETSX8202 | VRN2ETPX8102 | VRN2ETSX8102 | VRN2ETPX9202 | VRN2ETSX9202 | VRN2ETPX9102 | VRN2ETSX9102 |
|                     |                                |              |                           | 45           | VRN2EUPX8202      | VRN2EUSX8202 | VRN2EUPX8102 | VRN2EUSX8102 | VRN2EUPX9202 | VRN2EUSX9202 | VRN2EUPX9102 | VRN2EUSX9102 |              |
|                     |                                |              |                           | 50           | VRN2E1PX8202      | VRN2E1SX8102 | VRN2E1PX8102 | VRN2E1SX8102 | VRN2E1PX9202 | VRN2E1SX9202 | VRN2E1PX9102 | VRN2E1SX9102 |              |
|                     | 11                             | 55           |                           | VRN2E2PX8202 | VRN2E2SX8202      | VRN2E2PX8102 | VRN2E2SX8102 | VRN2E2PX9202 | VRN2E2SX9202 | VRN2E2PX9102 | VRN2E2SX9102 |              |              |
|                     |                                | 60           |                           | VRN2E3PX8202 | VRN2E3SX8202      | VRN2E3PX8102 | VRN2E3SX8102 | VRN2E3PX9202 | VRN2E3SX9202 | VRN2E3PX9102 | VRN2E3SX9102 |              |              |
|                     |                                | 65           |                           | VRN2E4PX8202 | VRN2E4SX8202      | VRN2E4PX8102 | VRN2E4SX8102 | VRN2E4PX9202 | VRN2E4SX9202 | VRN2E4PX9102 | VRN2E4SX9102 |              |              |
|                     |                                | 70           |                           | VRN2E5PX8202 | VRN2E5SX8202      | VRN2E5PX8102 | VRN2E5SX8102 | VRN2E5PX9202 | VRN2E5SX9202 | VRN2E5PX9102 | VRN2E5SX9102 |              |              |
|                     |                                | 75           |                           | VRN2E6PX8202 | VRN2E6SX8202      | VRN2E6PX8102 | VRN2E6SX8102 | VRN2E6PX9202 | VRN2E6SX9202 | VRN2E6PX9102 | VRN2E6SX9102 |              |              |
|                     |                                | 80           |                           | VRN2E7PX8202 | VRN2E7SX8202      | VRN2E7PX8102 | VRN2E7SX8102 | VRN2E7PX9202 | VRN2E7SX9202 | VRN2E7PX9102 | VRN2E7SX9102 |              |              |
|                     |                                | 85           |                           | VRN2E8PX8202 | VRN2E8SX8202      | VRN2E8PX8102 | VRN2E8SX8102 | VRN2E8PX9202 | VRN2E8SX9202 | VRN2E8PX9102 | VRN2E8SX9102 |              |              |
|                     |                                | 95           |                           | VRN2E9PX8202 | VRN2E9SX8202      | VRN2E9PX8102 | VRN2E9SX8102 | VRN2E9PX9202 | VRN2E9SX9202 | VRN2E9PX9102 | VRN2E9SX9102 |              |              |
| 2"                  |                                | 58           | 100                       | 25           | VRN2FQPX8202      | VRN2FQSX8202 | VRN2FQPX8102 | VRN2FQSX8102 | VRN2FQPX9202 | VRN2FQSX9202 | VRN2FQPX9102 | VRN2FQSX9102 |              |
| 4                   | 30                             |              |                           | VRN2FRPX8202 | VRN2FRSX8202      | VRN2FRPX8102 | VRN2FRSX8102 | VRN2FRPX9202 | VRN2FRSX9202 | VRN2FRPX9102 | VRN2FRSX9102 |              |              |
|                     | 35                             |              |                           | VRN2FSPX8202 | VRN2FSSX8202      | VRN2FSPX8102 | VRN2FSSX8102 | VRN2FSPX9202 | VRN2FSSX9202 | VRN2FSPX9102 | VRN2FSSX9102 |              |              |
|                     | 40                             |              |                           | VRN2FTPX8202 | VRN2FTSX8202      | VRN2FTPX8102 | VRN2FTSX8102 | VRN2FTPX9202 | VRN2FTSX9202 | VRN2FTPX9102 | VRN2FTSX9102 |              |              |
| 6                   | 45                             |              |                           | VRN2FUPX8202 | VRN2FUSX8202      | VRN2FUPX8102 | VRN2FUSX8102 | VRN2FUPX9202 | VRN2FUSX9202 | VRN2FUPX9102 | VRN2FUSX9102 |              |              |
|                     | 50                             |              |                           | VRN2F1PX8202 | VRN2F1SX8202      | VRN2F1PX8102 | VRN2F1SX8102 | VRN2F1PX9202 | VRN2F1SX9202 | VRN2F1PX9102 | VRN2F1SX9102 |              |              |
|                     | 55                             |              |                           | VRN2F2PX8202 | VRN2F2SX8202      | VRN2F2PX8102 | VRN2F2SX8102 | VRN2F2PX9202 | VRN2F2SX9202 | VRN2F2PX9102 | VRN2F2SX9102 |              |              |
| 7                   | 60                             |              |                           | VRN2F3PX8202 | VRN2F3SX8202      | VRN2F3PX8102 | VRN2F3SX8102 | VRN2F3PX9202 | VRN2F3SX9202 | VRN2F3PX9102 | VRN2F3SX9102 |              |              |
|                     | 65                             |              |                           | VRN2F4PX8202 | VRN2F4SX8202      | VRN2F4PX8102 | VRN2F4SX8102 | VRN2F4PX9202 | VRN2F4SX9202 | VRN2F4PX9102 | VRN2F4SX9102 |              |              |
|                     | 70                             | VRN2F5PX8202 |                           | VRN2F5SX8202 | VRN2F5PX8102      | VRN2F5SX8102 | VRN2F5PX9202 | VRN2F5SX9202 | VRN2F5PX9102 | VRN2F5SX9102 |              |              |              |
| 2-1/2"              | 58                             | 100          |                           | 75           | VRN2F6PX8202      | VRN2F6SX8202 | VRN2F6PX8102 | VRN2F6SX8102 | VRN2F6PX9202 | VRN2F6SX9202 | VRN2F6PX9102 | VRN2F6SX9102 |              |
|                     |                                |              |                           | 25           | VRN2GQPX8202      | VRN2GQSX8202 | VRN2GQPX8102 | VRN2GQSX8102 | VRN2GQPX9202 | VRN2GQSX9202 | VRN2GQPX9102 | VRN2GQSX9102 |              |
|                     |                                |              |                           | 4            | 30                | VRN2GRPX8202 | VRN2GRSX8202 | VRN2GRPX8102 | VRN2GRSX8102 | VRN2GRPX9202 | VRN2GRSX9202 | VRN2GRPX9102 | VRN2GRSX9102 |
|                     |                                |              |                           |              | 35                | VRN2GSPX8202 | VRN2GSSX8202 | VRN2GSPX8102 | VRN2GSSX8102 | VRN2GSPX9202 | VRN2GSSX9202 | VRN2GSPX9102 | VRN2GSSX9102 |
|                     |                                |              |                           |              | 40                | VRN2GTPX8202 | VRN2GTSX8202 | VRN2GTPX8102 | VRN2GTSX8102 | VRN2GTPX9202 | VRN2GTSX9202 | VRN2GTPX9102 | VRN2GTSX9102 |
|                     |                                |              |                           | 6            | 45                | VRN2GUPX8202 | VRN2GUSX8202 | VRN2GUPX8102 | VRN2GUSX8102 | VRN2GUPX9202 | VRN2GUSX9202 | VRN2GUPX9102 | VRN2GUSX9102 |
|                     |                                |              |                           |              | 50                | VRN2G1PX8202 | VRN2G1SX8202 | VRN2G1PX8102 | VRN2G1SX8102 | VRN2G1PX9202 | VRN2G1SX9202 | VRN2G1PX9102 | VRN2G1SX9102 |
|                     |                                |              | 55                        |              | VRN2G2PX8202      | VRN2G2SX8202 | VRN2G2PX8102 | VRN2G2SX8102 | VRN2G2PX9202 | VRN2G2SX9202 | VRN2G2PX9102 | VRN2G2SX9102 |              |
|                     |                                |              | 7                         | 60           | VRN2G3PX8202      | VRN2G3SX8202 | VRN2G3PX8102 | VRN2G3SX8102 | VRN2G3PX9202 | VRN2G3SX9202 | VRN2G3PX9102 | VRN2G3SX9102 |              |
|                     | 65                             |              |                           | VRN2G4PX8202 | VRN2G4SX8202      | VRN2G4PX8102 | VRN2G4SX8102 | VRN2G4PX9202 | VRN2G4SX9202 | VRN2G4PX9102 | VRN2G4SX9102 |              |              |
|                     | 70                             |              |                           | VRN2G5PX8202 | VRN2G5SX8202      | VRN2G5PX8102 | VRN2G5SX8102 | VRN2G5PX9202 | VRN2G5SX9202 | VRN2G5PX9102 | VRN2G5SX9102 |              |              |
| 3"                  | 58                             |              | 100                       | 75           | VRN2G6PX8202      | VRN2G6SX8202 | VRN2G6PX8102 | VRN2G6SX8102 | VRN2G6PX9202 | VRN2G6SX9202 | VRN2G6PX9102 | VRN2G6SX9102 |              |
|                     |                                |              |                           | 80           | VRN2G7PX8202      | VRN2G7SX8202 | VRN2G7PX8102 | VRN2G7SX8102 | VRN2G7PX9202 | VRN2G7SX9202 | VRN2G7PX9102 | VRN2G7SX9102 |              |
|                     |                                |              |                           | 85           | VRN2G8PX8202      | VRN2G8SX8202 | VRN2G8PX8102 | VRN2G8SX8102 | VRN2G8PX9202 | VRN2G8SX9202 | VRN2G8PX9102 | VRN2G8SX9102 |              |
|                     |                                |              |                           | 95*          | VRN2G9PX8202      | VRN2G9SX8202 | VRN2G9PX8102 | VRN2G9SX8102 | VRN2G9PX9202 | VRN2G9SX9202 | VRN2G9PX9102 | VRN2G9SX9102 |              |
|                     |                                |              |                           | 4            | 25                | VRN2HQPX8202 | VRN2HQSX8202 | VRN2HQPX8102 | VRN2HQSX8102 | VRN2HQPX9202 | VRN2HQSX9202 | VRN2HQPX9102 | VRN2HQSX9102 |
|                     |                                |              |                           |              | 30                | VRN2HRPX8202 | VRN2HRSX8202 | VRN2HRPX8102 | VRN2HRSX8102 | VRN2HRPX9202 | VRN2HRSX9202 | VRN2HRPX9102 | VRN2HRSX9102 |
|                     |                                | 35           |                           |              | VRN2HSPX8202      | VRN2HSSX8202 | VRN2HSPX8102 | VRN2HSSX8102 | VRN2HSPX9202 | VRN2HSSX9202 | VRN2HSPX9102 | VRN2HSSX9102 |              |
|                     |                                | 6            |                           | 40           | VRN2HTPX8202      | VRN2HTSX8202 | VRN2HTPX8102 | VRN2HTSX8102 | VRN2HTPX9202 | VRN2HTSX9202 | VRN2HTPX9102 | VRN2HTSX9102 |              |
|                     |                                |              |                           | 45           | VRN2HUPX8202      | VRN2HUSX8202 | VRN2HUPX8102 | VRN2HUSX8102 | VRN2HUPX9202 | VRN2HUSX9202 | VRN2HUPX9102 | VRN2HUSX9102 |              |
|                     | 50                             |              |                           | VRN2H1PX8202 | VRN2H1SX8202      | VRN2H1PX8102 | VRN2H1SX8102 | VRN2H1PX9202 | VRN2H1SX9202 | VRN2H1PX9102 | VRN2H1SX9102 |              |              |
|                     | 7                              | 55           |                           | VRN2H2PX8202 | VRN2H2SX8202      | VRN2H2PX8102 | VRN2H2SX8102 | VRN2H2PX9202 | VRN2H2SX9202 | VRN2H2PX9102 | VRN2H2SX9102 |              |              |
| 60                  |                                | VRN2H3PX8202 |                           | VRN2H3SX8202 | VRN2H3PX8102      | VRN2H3SX8102 | VRN2H3PX9202 | VRN2H3SX9202 | VRN2H3PX9102 | VRN2H3SX9102 |              |              |              |
| 65                  |                                | VRN2H4PX8202 |                           | VRN2H4SX8202 | VRN2H4PX8102      | VRN2H4SX8102 | VRN2H4PX9202 | VRN2H4SX9202 | VRN2H4PX9102 | VRN2H4SX9102 |              |              |              |
| 70                  |                                | VRN2H5PX8202 |                           | VRN2H5SX8202 | VRN2H5PX8102      | VRN2H5SX8102 | VRN2H5PX9202 | VRN2H5SX9202 | VRN2H5PX9102 | VRN2H5SX9102 |              |              |              |
| 75                  |                                | VRN2H6PX8202 |                           | VRN2H6SX8202 | VRN2H6PX8102      | VRN2H6SX8102 | VRN2H6PX9202 | VRN2H6SX9202 | VRN2H6PX9102 | VRN2H6SX9102 |              |              |              |
| 80                  |                                | VRN2H7PX8202 |                           | VRN2H7SX8202 | VRN2H7PX8102      | VRN2H7SX8102 | VRN2H7PX9202 | VRN2H7SX9202 | VRN2H7PX9102 | VRN2H7SX9102 |              |              |              |
| 85                  |                                | VRN2H8PX8202 |                           | VRN2H8SX8202 | VRN2H8PX8102      | VRN2H8SX8102 | VRN2H8PX9202 | VRN2H8SX9202 | VRN2H8PX9102 | VRN2H8SX9102 |              |              |              |
| 95*                 |                                | VRN2H9PX8202 | VRN2H9SX8202              | VRN2H9PX8102 | VRN2H9SX8102      | VRN2H9PX9202 | VRN2H9SX9202 | VRN2H9PX9102 | VRN2H9SX9102 |              |              |              |              |
| 11                  |                                |              |                           |              |                   |              |              |              |              |              |              |              |              |

\* Full port ball

\*\* Differential pressure regulator operating range, ±5%

# Product Selection - Valves

## Pressure Independent Control Valves, Flanged 2½"-6"

### Common Features

- Multi-sized bodies from 2-1/2 to 6 inch pipes with wafer flanged connections.
- Combination ANSI/ASME Class 150/300 flange compatibility.
- Controls hot or chilled water with up to 50% glycol, closed loop HVAC systems only, not for use with steam.
- Regulated flow rates available from 40.7 to 468 gpm.
- Stainless steel pressure regulator maintains constant pressure drop across valve seat.
- Positive pressure, rolling diaphragm regulator design provides flow control accuracy of  $\pm 5\%$  over specified pressure range.
- Equal percentage flow characteristic using multi turn, nonrising, characterized plug.
- High close-off rating.
- 50 discrete, selectable flow rates available per valve size.
- Stainless steel trim.
- Six-turn actuator with floating or modulating inputs available with stay-in-place or electronic fail safe action.
- Fail safe actuators field-configurable for normally open or normally closed power failure return position.
- Two Test Ports for venting or pressure gauge attachment.
- Twelve month warranty



| Flanged Pressure Independent Control Valves |            |      |                              |       |                  |                   |                 |
|---------------------------------------------|------------|------|------------------------------|-------|------------------|-------------------|-----------------|
| Actuator Features                           |            |      |                              |       | Non Fail Safe    |                   | Fail Safe       |
| Power Supply                                |            |      | Voltage                      |       | 24 Vac/30 Vdc    |                   | 24 Vac/30 Vdc   |
|                                             |            |      | Frequency                    |       | 50 / 60 Hz       |                   | 50 / 60 Hz      |
|                                             |            |      | Power                        |       | 20 VA            |                   | 20 VA           |
| Enclosure                                   |            |      | (ingress protection)         |       | IP54             |                   | IP54            |
| Control                                     |            |      | 2-10 Vdc                     |       | •                |                   | •               |
|                                             |            |      | 4-20 mA                      |       | •                |                   | •               |
|                                             |            |      | Pulse-width Modulating       |       | •                |                   | •               |
|                                             |            |      | Floating                     |       | •                |                   | •               |
|                                             |            |      | Two-Position SPDT            |       | •                |                   | •               |
| Fail Safe Action                            |            |      | (field configurable)         |       | Stay in Place    |                   | Open/Closed     |
| Normal Position (no signal)                 |            |      | (field configurable)         |       | Open/Closed      |                   | Open/Closed     |
| Actuator Stroke                             |            |      | (degrees)                    |       | 6 x 360°         |                   | 6 x 360°        |
| Timing                                      |            |      | (seconds, 60 Hz)             |       | 150 (maximum)    |                   | 150 (maximum)   |
| Feedback                                    |            |      | 4-20 mA (2-10 Vdc) Built in  |       | •                |                   | •               |
|                                             |            |      |                              |       | Trim             |                   | Stainless Steel |
|                                             |            |      |                              |       | Body             |                   | Cast Iron       |
|                                             |            |      |                              |       | Pressure Ratings |                   | ANSI 150/300    |
| Valve Features                              |            |      |                              |       | Test Ports       |                   | Two - 1/4" ISO  |
| Valve Size                                  | Flow, gpm* |      | Differential Pressure (psid) |       |                  | Valve O.S. Number |                 |
|                                             | Min.       | Max. | Min.*                        | Max.* | Close-off        |                   |                 |
| 2-1/2 and 3 in.<br>[DN65-DN80]              | 40.7       | 113  | 4.5                          | 87    | 100              | VRW2JV4SMB        | VRW2JV4SMD      |
|                                             | 56.3       | 157  | 5.1                          |       |                  | VRW2JW4SMB        | VRW2JW4SMD      |
| 3 and 4 in.<br>[DN80-DN100]                 | 55.4       | 149  | 4.5                          |       |                  | VRW2KV4SMB        | VRW2KV4SMD      |
|                                             | 75         | 225  | 5.1                          |       |                  | VRW2KW4SMB        | VRW2KW4SMD      |
| 5 and 6 in.<br>[DN125-DN150]                | 103        | 369  | 4.5                          |       |                  | VRW2LV4SMB        | VRW2LV4SMD      |
|                                             | 113        | 468  | 5.1                          |       |                  | VRW2LW4SMB        | VRW2LW4SMD      |

\* Differential pressure regulator operating range,  $\pm 5\%$

# Product Selection - Valves

## NPT Globe Valves ½"- 3", With Dedicated Valve Actuators

For more than 50 years, Honeywell Globe Valves (V5011/13, VGF) have provided precise control for many applications.

Globe valves provide the rangeability and close-off needed to keep tight control of the environment.



| Actuator Features                                |                                     | Non Fail Safe    |                  |               |               |               |               |
|--------------------------------------------------|-------------------------------------|------------------|------------------|---------------|---------------|---------------|---------------|
| Actuator O.S. Number                             |                                     | ML798444009      | ML698444000      | ML7420A3055   | ML7420A3063   | ML6420A3049   | ML6420A3066   |
| Power Supply                                     | Voltage                             | 24 Vac / 28 Vdc  | 24 Vac / 28 Vdc  | 24 Vac        | 24 Vac        | 24 Vac        | 24 Vac        |
|                                                  | Frequency                           | 0 / 50 / 60 Hz   | 0 / 50 / 60 Hz   | 50 / 60 Hz    | 50 / 60 Hz    | 50 / 60 Hz    | 50 / 60 Hz    |
|                                                  | Power                               | 12 VA            | 12 VA            | 7 VA          | 7 VA          | 6 VA          | 6 VA          |
| Stem Force (lbs.)                                |                                     | 160              | 160              | 135           | 135           | 135           | 135           |
| Control                                          | (0)2-10 Vdc                         | •                |                  | •             | •             |               |               |
|                                                  | 4-20 mA (external 500 Ohm Resistor) | Built-in         |                  | •             | •             |               |               |
|                                                  | Floating                            |                  | •                |               |               | •             | •             |
|                                                  | Two-Position SPDT                   |                  | •                |               |               | •             | •             |
|                                                  | 135 Ohm                             | •                |                  |               |               |               |               |
| Fail Safe Action                                 |                                     | Stay in place    | Stay in place    | Stay in place | Stay in place | Stay in place | Stay in place |
| Normal Position (no signal) (field configurable) |                                     | Stem Up/Down     | Stay in place    | Stem Up/Down  | Stem Up/Down  | Stay in place | Stay in place |
| Actuator Stroke (inches)                         |                                     | 0.5 - 1 self adj | 0.5 - 1 self adj | 0.75          | 0.75          | 0.75          | 0.75          |
| Timing (seconds at 0.75" stroke)                 |                                     | 63               | 63               | 60            | 30            | 60            | 30            |
| Aux Switch                                       | 1 x SPDT Add-On                     | 272630D          | 272630D          |               |               |               |               |
|                                                  | 2 x SPDT Add-On                     |                  |                  |               |               | 43191680-105  | 43191680-105  |
| Feedback                                         | 2-10 Vdc Built-in                   |                  |                  | •             | •             |               |               |
|                                                  | 2-10 Vdc Add-On                     | 272630D          | 272630D          | •             | •             |               |               |

### 2-Way Water Valves Straight Through

| Valve Size (inches) | Cv   | Max Static Water Pressure | Max Steam Pressure / Temperature | Flow Characteristic        | Valve Action        | Valve OS Number | Close-off Pressure, psid |     |     |     |     |     |
|---------------------|------|---------------------------|----------------------------------|----------------------------|---------------------|-----------------|--------------------------|-----|-----|-----|-----|-----|
| 1/2"                | 0.73 | 217 psi @ 248 F           | 15 psi (2-position)              | Equal %                    | Stem down to close  | V5011N1008      | 230                      | 230 | 230 | 230 | 230 | 230 |
|                     | 1.16 |                           |                                  |                            |                     | V5011N1016      | 230                      | 230 | 230 | 230 | 230 | 230 |
|                     | 1.85 |                           |                                  |                            |                     | V5011N1024      | 230                      | 230 | 230 | 230 | 230 | 230 |
|                     | 2.9  |                           |                                  |                            |                     | V5011N1032      | 230                      | 230 | 230 | 230 | 230 | 230 |
|                     | 4.7  |                           |                                  |                            |                     | V5011N1040      | 230                      | 230 | 230 | 230 | 230 | 230 |
| 3/4"                | 7.3  | 217 psi @ 248 F           | 15 psi (2-position)              | Equal %                    | Stem down to close  | V5011N1057      | 230                      | 230 | 230 | 230 | 230 | 230 |
| 1"                  | 11.7 |                           |                                  |                            |                     | V5011N1065      | 193                      | 193 | 163 | 163 | 163 | 163 |
| 1-1/4"              | 18.7 |                           |                                  |                            |                     | V5011N1073      | 123                      | 123 | 104 | 104 | 104 | 104 |
| 1-1/2"              | 29.3 |                           |                                  |                            |                     | V5011N1081      | 79                       | 79  | 67  | 67  | 67  | 67  |
| 2"                  | 46.8 |                           |                                  |                            |                     | V5011N1099      | 44                       | 44  | 37  | 37  | 37  | 37  |
| 2-1/2"              | 63   | 250 psi @ 100F            | 100 psig / 337 F                 | Linear                     | Stem down to close  | V5011F1105      | 33                       | 33  | 28  | 28  | 28  | 28  |
| 3"                  | 100  |                           |                                  |                            |                     | V5011F1113      | 19                       | 19  | 16  | 16  | 16  | 16  |
| 1/2"                | 0.73 |                           |                                  |                            |                     | V5011N2006      | 100                      | 100 | 100 | 100 | 100 | 100 |
| 1/2"                | 1.16 | 217 psi @ 248 F           | 100 psig / 337 F                 | Linear                     | Stem down to close  | V5011N2014      | 100                      | 100 | 100 | 100 | 100 | 100 |
|                     | 1.85 |                           |                                  |                            |                     | V5011N2022      | 100                      | 100 | 100 | 100 | 100 | 100 |
|                     | 2.9  |                           |                                  |                            |                     | V5011N2030      | 100                      | 100 | 100 | 100 | 100 | 100 |
|                     | 4.7  |                           |                                  |                            |                     | V5011N2048      | 100                      | 100 | 100 | 100 | 100 | 100 |
|                     | 7.3  |                           |                                  |                            |                     | V5011N2055      | 100                      | 100 | 100 | 100 | 100 | 100 |
| 3/4"                | 7.3  | 217 psi @ 248 F           | 100 psig / 337 F                 | Linear                     | Stem down to close  | V5011N2063      | 100                      | 100 | 100 | 100 | 100 | 100 |
| 1"                  | 11.7 |                           |                                  |                            |                     | V5011N2071      | 100                      | 100 | 100 | 100 | 100 | 100 |
| 1-1/4"              | 18.7 |                           |                                  |                            |                     | V5011N2089      | 79                       | 79  | 67  | 67  | 67  | 67  |
| 1-1/2"              | 29.3 |                           |                                  |                            |                     | V5011N2097      | 44                       | 44  | 37  | 37  | 37  | 37  |
| 2"                  | 46.8 |                           |                                  |                            |                     | V5011G1111      | 33                       | 33  | 28  | 28  | 28  | 28  |
| 2-1/2"              | 63   | 250 psi @ 100F            | 100 psig / 337 F                 | Linear                     | Stem down to close  | V5011G1129      | 19                       | 19  | 16  | 16  | 16  | 16  |
| 3"                  | 100  |                           |                                  |                            |                     | V5013N1030      | 230                      | 230 | 230 | 230 | 230 | 230 |
| 1/2"                | 2.9  |                           |                                  |                            |                     | V5013N1048      | 230                      | 230 | 230 | 230 | 230 | 230 |
| 1/2"                | 4.7  | 217 psi @ 248 F           | N / A                            | Linear B-AB / Equal % A-AB | Stem up closes A-AB | V5013N1055      | 230                      | 230 | 230 | 230 | 230 | 230 |
| 3/4"                | 7.3  |                           |                                  |                            |                     | V5013N1063      | 193                      | 193 | 163 | 163 | 163 | 163 |
| 1"                  | 11.7 |                           |                                  |                            |                     | V5013N1071      | 123                      | 123 | 104 | 104 | 104 | 104 |
| 1-1/4"              | 18.7 |                           |                                  |                            |                     | V5013N1089      | 79                       | 79  | 67  | 67  | 67  | 67  |
| 1-1/2"              | 29.3 |                           |                                  |                            |                     | V5013N1097      | 44                       | 44  | 37  | 37  | 37  | 37  |
| 2"                  | 46.8 |                           |                                  |                            |                     |                 |                          |     |     |     |     |     |

### 2-Way Steam Valves Straight Through

### 3-Way Water Valves Mixing

# Product Selection - Valves

## NPT Globe Valves ½" - 3", With Dedicated Valve Actuators

### Common Features

- ANSI body class 150
- Close-off pressure = maximum differential pressure
- Maximum static water pressure (250°F): 240 psi
- Maximum steam pressure
- 2-way steam valves, 337°F: 100 psi
- 2-way water valves: 15 psi
- Stem travel: 0.75"
- Rangeability: 50:1
- Leakage < 0.05% of Cv
- Body material: Red brass, stainless steel stem (steam valve has stainless steel trim.)



| Actuator Features           |                                     | Non Fail Safe |               | Fail Safe    |              |               |               |
|-----------------------------|-------------------------------------|---------------|---------------|--------------|--------------|---------------|---------------|
| Actuator O.S. Number        |                                     | ML7421A1032   | ML6421A1017   | ML7425A3013  | ML7425B3012  | ML6425A3022   | ML6425B3013   |
| Power Supply                | Voltage                             | 24 Vac        | 24 Vac        | 24 Vac       | 24 Vac       | 24 Vac        | 24 Vac        |
|                             | Frequency                           | 50 / 60 Hz    | 50 / 60 Hz    | 50 / 60 Hz   | 50 / 60 Hz   | 50 / 60 Hz    | 50 / 60 Hz    |
|                             | Power                               | 12 VA         | 11 VA         | 12 VA        | 12 VA        | 11 VA         | 11 VA         |
| Stem Force                  | (lbs.)                              | 404           | 404           | 135          | 135          | 135           | 135           |
| Control                     | (0)2-10 Vdc                         | •             |               | •            | •            |               |               |
|                             | 4-20 mA (external 500 Ohm Resistor) | •             |               | •            | •            |               |               |
|                             | Floating                            |               | •             |              |              | •             | •             |
|                             | Two-Position SPDT                   |               | •             |              |              | •             | •             |
|                             | Two-Position SPST                   |               |               |              |              | •             | •             |
| Fail Safe Action            |                                     | Stay in place | Stay in place | Stem Down    | Stem Up      | Stem Down     | Stem Up       |
| Normal Position (no signal) | (field configurable)                | Stem Up/Down  | Stay in place | Stem Up/Down | Stem Up/Down | Stay in place | Stay in place |
| Actuator Stroke             | (inches)                            | 0.75          | 0.75          | 0.75         | 0.75         | 0.75          | 0.75          |
| Timing                      | (seconds at 0.75" stroke)           | 90            | 90            | 90           | 90           | 90            | 90            |
| Aux Switch                  | 2 x SPDT Add-On                     | 43191680-102  | 43191680-102  |              |              | 43191680-105  | 43191680-105  |
| Feedback                    | 2-10 Vdc Built-in                   | •             |               | •            | •            |               |               |
|                             | 220 Ohm Add-On                      |               |               |              |              | 43191679-112  | 43191679-112  |
|                             | 10 kOhm Add-On                      |               | 43191679-101  |              |              | 43191679-111  | 43191679-111  |

|                                        | Valve Size (inches) | Cv   | Max Static Water Pressure | Max Steam Pressure / Temperature | Flow Characteristic        | Valve Action        | Valve OS Number | Close-off Pressure, psid |      |      |       |      |       |
|----------------------------------------|---------------------|------|---------------------------|----------------------------------|----------------------------|---------------------|-----------------|--------------------------|------|------|-------|------|-------|
|                                        |                     |      |                           |                                  |                            |                     |                 |                          |      |      |       |      |       |
| 2-Way Water Valves<br>Straight Through | 1/2"                | 0.73 | 217 psi @ 248 F           | 15 psi (2-position)              | Equal %                    | Stem down to close  | V5011N1008      |                          |      | 230* | 230** | 230* | 230** |
|                                        |                     | 1.16 |                           |                                  |                            |                     | V5011N1016      |                          |      | 230* | 230** | 230* | 230** |
|                                        |                     | 1.85 |                           |                                  |                            |                     | V5011N1024      |                          |      | 230* | 230** | 230* | 230** |
|                                        |                     | 2.9  |                           |                                  |                            |                     | V5011N1032      |                          |      | 230* | 230** | 230* | 230** |
|                                        |                     | 4.7  |                           |                                  |                            |                     | V5011N1040      |                          |      | 230* | 230** | 230* | 230** |
|                                        | 3/4"                | 7.3  |                           |                                  |                            |                     | V5011N1057      |                          |      | 230* | 230** | 230* | 230** |
|                                        | 1"                  | 11.7 |                           |                                  |                            |                     | V5011N1065      | 230                      | 230  | 163* | 163** | 163* | 163** |
|                                        | 1-1/4"              | 18.7 |                           |                                  |                            |                     | V5011N1073      | 230                      | 230  | 104* | 104** | 104* | 104** |
|                                        | 1-1/2"              | 29.3 |                           |                                  |                            |                     | V5011N1081      | 221                      | 221  | 67*  | 67**  | 67*  | 67**  |
|                                        | 2"                  | 46.8 |                           |                                  |                            |                     | V5011N1099      | 126                      | 126  | 37*  | 37**  | 37*  | 37**  |
|                                        | 2-1/2"              | 63   | V5011F1105                | 100                              | 100                        | 28*                 | 28**            | 28*                      | 28** |      |       |      |       |
|                                        | 3"                  | 100  | V5011F1113                | 61                               | 61                         | 16*                 | 16**            | 16*                      | 16** |      |       |      |       |
| 2-Way Steam Valves<br>Straight Through | 1/2"                | 0.73 | 217 psi @ 248 F           | 100 psig / 337 F                 | Linear                     | Stem down to close  | V5011N2006      |                          |      | 100* | 100** | 100* | 100** |
|                                        |                     | 1.16 |                           |                                  |                            |                     | V5011N2014      |                          |      | 100* | 100** | 100* | 100** |
|                                        |                     | 1.85 |                           |                                  |                            |                     | V5011N2022      |                          |      | 100* | 100** | 100* | 100** |
|                                        |                     | 2.9  |                           |                                  |                            |                     | V5011N2030      |                          |      | 100* | 100** | 100* | 100** |
|                                        |                     | 4.7  |                           |                                  |                            |                     | V5011N2048      |                          |      | 100* | 100** | 100* | 100** |
|                                        | 3/4"                | 7.3  |                           |                                  |                            |                     | V5011N2055      |                          |      | 100* | 100** | 100* | 100** |
|                                        | 1"                  | 11.7 |                           |                                  |                            |                     | V5011N2063      | 100                      | 100  | 100* | 100** | 100* | 100** |
|                                        | 1-1/4"              | 18.7 |                           |                                  |                            |                     | V5011N2071      | 100                      | 100  | 100* | 100** | 100* | 100** |
|                                        | 1-1/2"              | 29.3 |                           |                                  |                            |                     | V5011N2089      | 100                      | 100  | 67*  | 67**  | 67*  | 67**  |
|                                        | 2"                  | 46.8 |                           |                                  |                            |                     | V5011N2097      | 100                      | 100  | 37*  | 37**  | 37*  | 37**  |
|                                        | 2-1/2"              | 63   | V5011G1111                | 100                              | 100                        | 28*                 | 28**            | 28*                      | 28** |      |       |      |       |
|                                        | 3"                  | 100  | V5011G1129                | 61                               | 61                         | 16*                 | 16**            | 16*                      | 16** |      |       |      |       |
| 3-Way Water Valves<br>Mixing           | 1/2"                | 2.9  | 217 psi @ 248 F           | N / A                            | Linear B-AB / Equal % A-AB | Stem up closes A-AB | V5013N1030      |                          |      | 230  | 230   | 230  | 230   |
|                                        | 1/2"                | 4.7  |                           |                                  |                            |                     | V5013N1048      |                          |      | 230  | 230   | 230  | 230   |
|                                        | 3/4"                | 7.3  |                           |                                  |                            |                     | V5013N1055      |                          |      | 230  | 230   | 230  | 230   |
|                                        | 1"                  | 11.7 |                           |                                  |                            |                     | V5013N1063      | 230                      | 230  | 163  | 163   | 163  | 163   |
|                                        | 1-1/4"              | 18.7 |                           |                                  |                            |                     | V5013N1071      | 230                      | 230  | 104  | 104   | 104  | 104   |
|                                        | 1-1/2"              | 29.3 |                           |                                  |                            |                     | V5013N1089      | 221                      | 221  | 67   | 67    | 67   | 67    |
|                                        | 2"                  | 46.8 |                           |                                  |                            |                     | V5013N1097      | 126                      | 126  | 37   | 37    | 37   | 37    |

\* valve is Normally Closed on loss of power  
\*\* valve is Normally Open on loss of power.

# Product Selection - Valves

## NPT Globe Valves ½" - 3", With DCA and Valve Linkage

### Common Features

- ANSI body class 150
- Close-Off pressure = maximum differential pressure
- Maximum static water pressure (250°F): 240 psi
- Maximum steam pressure  
2-way steam valves, 337°F: 100 psi  
2-way water valves: 15 psi
- Stem travel: 0.75"
- Rangeability: 50:1
- Leakage < 0.05% of Cv
- Body material: Red brass, stainless steel stem (steam valve has stainless steel trim.)



### Q5020A1003 Required



| Actuator Features                                |                                     | Non Fail Safe              |                            |                            |                            |
|--------------------------------------------------|-------------------------------------|----------------------------|----------------------------|----------------------------|----------------------------|
| Actuator O.S. Number                             |                                     | MN7505A2001<br>MN7505A2209 | MN6105A1011<br>MN6105A1201 | MN7510A2001<br>MN7510A2209 | MN6110A1003<br>MN6110A1201 |
| Power Supply                                     | Voltage                             | 24 Vac                     | 24 Vac                     | 24 Vac                     | 24 Vac                     |
|                                                  | Frequency                           | 50 / 60 Hz                 | 50 / 60 Hz                 | 50 / 60 Hz                 | 50 / 60 Hz                 |
|                                                  | Power                               | 5 VA                       | 5 VA                       | 5 VA                       | 5 VA                       |
| Actuator Torque (lb.-in.)                        |                                     | 44                         | 44                         | 88                         | 88                         |
| Linkage Stem Force (lbs.)                        |                                     | 58                         | 58                         | 117                        | 117                        |
| Control                                          | (0)2-10 Vdc                         | •                          |                            | •                          |                            |
|                                                  | 4-20 mA (external 500 Ohm Resistor) | •                          |                            | •                          |                            |
|                                                  | Floating                            | •                          | •                          | •                          | •                          |
|                                                  | Two-Position SPDT                   | •                          | •                          | •                          | •                          |
| Fail Safe Action                                 | Two-Position SPST                   | •                          | •                          | •                          | •                          |
|                                                  | Fail Safe Action                    | Stay in Place              | Stay in Place              | Stay in Place              | Stay in Place              |
| Normal Position (no signal) (field configurable) |                                     | Stem Up/Down               | Stay in Place              | Stem Up/Down               | Stay in Place              |
| Actuator Stroke (inches)                         |                                     | 95°                        | 95°                        | 95°                        | 95°                        |
| Timing (seconds at 0.75" stroke)                 |                                     | 95                         | 95                         | 95                         | 95                         |
| Aux Switch 2 x SPDT Built In                     |                                     | 0 / 2                      | 0 / 2                      | 0 / 2                      | 0 / 2                      |
| Feedback (0)2-10 Vdc Built In                    |                                     | •                          |                            | •                          |                            |

|                    |                  | Valve Size (inches) | Cv   | Max Static Water Pressure | Max Steam Pressure / Temperature | Flow Characteristic           | Valve Action        | Valve OS Number | Close-off Pressure, psid |     |     |     |
|--------------------|------------------|---------------------|------|---------------------------|----------------------------------|-------------------------------|---------------------|-----------------|--------------------------|-----|-----|-----|
| 2-Way Water Valves | Straight Through | 1/2"                | 0.73 | 217 psi<br>@ 248 F        | 15 psi<br>(2-position)           | Equal %                       | Stem down to close  | V5011N1008      | 230                      | 230 | 230 | 230 |
|                    |                  |                     | 1.16 |                           |                                  |                               |                     | V5011N1016      | 230                      | 230 | 230 | 230 |
|                    |                  |                     | 1.85 |                           |                                  |                               |                     | V5011N1024      | 230                      | 230 | 230 | 230 |
|                    |                  |                     | 2.9  |                           |                                  |                               |                     | V5011N1032      | 230                      | 230 | 230 | 230 |
|                    |                  |                     | 4.7  |                           |                                  |                               |                     | V5011N1040      | 188                      | 188 | 230 | 230 |
|                    |                  | 3/4"                | 7.3  |                           |                                  |                               |                     | V5011N1057      | 91                       | 91  | 192 | 192 |
|                    |                  | 1"                  | 11.7 |                           |                                  |                               |                     | V5011N1065      | 63                       | 63  | 135 | 135 |
|                    |                  | 1-1/4"              | 18.7 |                           |                                  |                               |                     | V5011N1073      | 39                       | 39  | 85  | 85  |
|                    |                  | 1-1/2"              | 29.3 |                           |                                  |                               |                     | V5011N1081      | 24                       | 24  | 55  | 55  |
|                    |                  | 2"                  | 46.8 |                           |                                  |                               |                     | V5011N1099      | 12                       | 12  | 30  | 30  |
|                    |                  | 2-1/2"              | 63   | V5011F1105                | 7                                | 7                             | 19                  | 19              |                          |     |     |     |
|                    |                  | 3"                  | 100  | V5011F1113                | 3                                | 3                             | 11                  | 11              |                          |     |     |     |
| 2-Way Steam Valves | Straight Through | 1/2"                | 0.73 | 217 psi<br>@ 248 F        | 100 psig /<br>337 F              | Linear                        | Stem down to close  | V5011N2006      | 100                      | 100 | 100 | 100 |
|                    |                  |                     | 1.16 |                           |                                  |                               |                     | V5011N2014      | 100                      | 100 | 100 | 100 |
|                    |                  |                     | 1.85 |                           |                                  |                               |                     | V5011N2022      | 100                      | 100 | 100 | 100 |
|                    |                  |                     | 2.9  |                           |                                  |                               |                     | V5011N2030      | 100                      | 100 | 100 | 100 |
|                    |                  |                     | 4.7  |                           |                                  |                               |                     | V5011N2048      | 100                      | 100 | 100 | 100 |
|                    |                  | 3/4"                | 7.3  |                           |                                  |                               |                     | V5011N2055      | 91                       | 91  | 100 | 100 |
|                    |                  | 1"                  | 11.7 |                           |                                  |                               |                     | V5011N2063      | 63                       | 63  | 100 | 100 |
|                    |                  | 1-1/4"              | 18.7 |                           |                                  |                               |                     | V5011N2071      | 39                       | 39  | 85  | 85  |
|                    |                  | 1-1/2"              | 29.3 |                           |                                  |                               |                     | V5011N2089      | 24                       | 24  | 55  | 55  |
|                    |                  | 2"                  | 46.8 |                           |                                  |                               |                     | V5011N2097      | 12                       | 12  | 30  | 30  |
|                    |                  | 2-1/2"              | 63   | V5011G1111                | 7                                | 7                             | 19                  | 19              |                          |     |     |     |
|                    |                  | 3"                  | 100  | V5011G1129                | 3                                | 3                             | 11                  | 11              |                          |     |     |     |
| 3-Way Water Valves | Mixing           | 1/2"                | 2.9  | 217 psi<br>@ 248 F        | N / A                            | Linear B-AB /<br>Equal % A-AB | Stem up closes A-AB | V5013N1030      | 230                      | 230 | 230 | 230 |
|                    |                  | 1/2"                | 4.7  |                           |                                  |                               |                     | V5013N1048      | 188                      | 188 | 230 | 230 |
|                    |                  | 3/4"                | 7.3  |                           |                                  |                               |                     | V5013N1055      | 91                       | 91  | 192 | 192 |
|                    |                  | 1"                  | 11.7 |                           |                                  |                               |                     | V5013N1063      | 63                       | 63  | 135 | 135 |
|                    |                  | 1-1/4"              | 18.7 |                           |                                  |                               |                     | V5013N1071      | 39                       | 39  | 85  | 85  |
|                    |                  | 1-1/2"              | 29.3 |                           |                                  |                               |                     | V5013N1089      | 24                       | 24  | 55  | 55  |
|                    |                  | 2"                  | 46.8 |                           |                                  |                               |                     | V5013N1097      | 12                       | 12  | 30  | 30  |

# Product Selection - Valves

## NPT Globe Valves ½" - 3", With DCA and Valve Linkage

**Q5020A1003  
Required**



| Actuator Features                                |                                     | Non Fail Safe              |                            |               |
|--------------------------------------------------|-------------------------------------|----------------------------|----------------------------|---------------|
| Actuator O.S. Number                             |                                     | MN7220A2007<br>MN7220A2205 | MN6120A1002<br>MN6120A1200 | MN7234A2008   |
| Power Supply                                     | Voltage                             | 24 Vac                     | 24 Vac                     | 24 Vac        |
|                                                  | Frequency                           | 50 / 60 Hz                 | 50 / 60 Hz                 | 50 / 60 Hz    |
|                                                  | Power                               | 6 VA                       | 6 VA                       | 9 VA          |
| Actuator Torque (lb.-in.)                        |                                     | 175                        | 175                        | 300           |
| Linkage Stem Force (lbs.)                        |                                     | 234                        | 234                        | 402           |
| Control                                          | (0)2-10 Vdc                         | •                          |                            | •             |
|                                                  | 4-20 mA (external 500 Ohm Resistor) | •                          |                            | •             |
|                                                  | Floating                            |                            | •                          |               |
|                                                  | Two-Position SPDT                   |                            | •                          |               |
|                                                  | Two-Position SPST                   |                            | •                          |               |
| Fail Safe Action                                 |                                     | Stay in Place              | Stay in Place              | Stay in Place |
| Normal Position (no signal) (field configurable) |                                     | Stem Up/Down               | Stem Up/Down               | Stem Up/Down  |
| Actuator Stroke (inches)                         |                                     | 95°                        | 95°                        | 95°           |
| Timing (seconds at 0.75" stroke)                 |                                     | 95                         | 95                         | 95            |
| Aux Switch                                       | 2 x SPDT Built In                   | 0 / 2                      | 0 / 2                      |               |
|                                                  | 2 x SPDT Add-On                     | SW2-US                     | SW2-US                     | SW2-US        |
| Feedback (0)2-10 Vdc Built In                    |                                     | •                          |                            | •             |

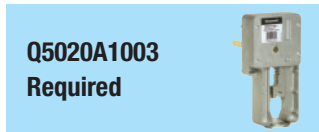
|                                        | Valve Size (inches) | Cv             | Max Static Water Pressure | Max Steam Pressure / Temperature | Flow Characteristic        | Valve Action        | Valve OS Number | Close-off Pressure, psid |     |     |
|----------------------------------------|---------------------|----------------|---------------------------|----------------------------------|----------------------------|---------------------|-----------------|--------------------------|-----|-----|
|                                        |                     |                |                           |                                  |                            |                     |                 |                          |     |     |
| 2-Way Water Valves<br>Straight Through | 1/2"                | 0.73           | 217 psi @ 248 F           | 15 psi (2-position)              | Equal %                    | Stem down to close  | V5011N1008      |                          |     |     |
|                                        |                     | 1.16           |                           |                                  |                            |                     | V5011N1016      |                          |     |     |
|                                        |                     | 1.85           |                           |                                  |                            |                     | V5011N1024      |                          |     |     |
|                                        |                     | 2.9            |                           |                                  |                            |                     | V5011N1032      |                          |     |     |
|                                        |                     | 4.7            |                           |                                  |                            |                     | V5011N1040      |                          |     |     |
|                                        | 3/4"                | 7.3            | 250 psi @ 100F            | 100 psig / 337 F                 | Linear                     | Stem down to close  | V5011N1057      | 230                      | 230 |     |
|                                        | 1"                  | 11.7           |                           |                                  |                            |                     | V5011N1065      | 230                      | 230 |     |
|                                        | 1-1/4"              | 18.7           |                           |                                  |                            |                     | V5011N1073      | 168                      | 168 | 230 |
|                                        | 1-1/2"              | 29.3           |                           |                                  |                            |                     | V5011N1081      | 113                      | 113 | 180 |
|                                        | 2"                  | 46.8           |                           |                                  |                            |                     | V5011N1099      | 63                       | 63  | 103 |
| 2-1/2"                                 | 63                  | 250 psi @ 100F | 100 psig / 337 F          | Linear                           | Stem down to close         | V5011F1105          | 42              | 42                       | 74  |     |
| 3"                                     | 100                 |                |                           |                                  |                            | V5011F1113          | 26              | 26                       | 45  |     |
| 2-Way Steam Valves<br>Straight Through | 1/2"                | 0.73           | 217 psi @ 248 F           | 100 psig / 337 F                 | Linear                     | Stem down to close  | V5011N2006      |                          |     |     |
|                                        |                     | 1.16           |                           |                                  |                            |                     | V5011N2014      |                          |     |     |
|                                        |                     | 1.85           |                           |                                  |                            |                     | V5011N2022      |                          |     |     |
|                                        |                     | 2.9            |                           |                                  |                            |                     | V5011N2030      |                          |     |     |
|                                        |                     | 4.7            |                           |                                  |                            |                     | V5011N2048      |                          |     |     |
|                                        | 3/4"                | 7.3            | 250 psi @ 100F            | 100 psig / 337 F                 | Linear                     | Stem down to close  | V5011N2055      |                          |     |     |
|                                        | 1"                  | 11.7           |                           |                                  |                            |                     | V5011N2063      | 100                      | 100 | 100 |
|                                        | 1-1/4"              | 18.7           |                           |                                  |                            |                     | V5011N2071      | 100                      | 100 | 100 |
|                                        | 1-1/2"              | 29.3           |                           |                                  |                            |                     | V5011N2089      | 100                      | 100 | 100 |
|                                        | 2"                  | 46.8           |                           |                                  |                            |                     | V5011N2097      | 58                       | 58  | 100 |
| 2-1/2"                                 | 63                  | 250 psi @ 100F | 100 psig / 337 F          | Linear                           | Stem down to close         | V5011G1111          | 42              | 42                       | 74  |     |
| 3"                                     | 100                 |                |                           |                                  |                            | V5011G1129          | 26              | 26                       | 45  |     |
| 3-Way Water Valves<br>Mixing           | 1/2"                | 2.9            | 217 psi @ 248 F           | N / A                            | Linear B-AB / Equal % A-AB | Stem up closes A-AB | V5013N1030      | 230                      | 230 | 230 |
|                                        | 1/2"                | 4.7            |                           |                                  |                            |                     | V5013N1048      | 230                      | 230 | 230 |
|                                        | 3/4"                | 7.3            |                           |                                  |                            |                     | V5013N1055      | 230                      | 230 | 230 |
|                                        | 1"                  | 11.7           |                           |                                  |                            |                     | V5013N1063      | 230                      | 230 | 230 |
|                                        | 1-1/4"              | 18.7           |                           |                                  |                            |                     | V5013N1071      | 168                      | 168 | 230 |
|                                        | 1-1/2"              | 29.3           |                           |                                  |                            |                     | V5013N1089      | 105                      | 105 | 180 |
|                                        | 2"                  | 46.8           |                           |                                  |                            |                     | V5013N1097      | 103                      | 103 | 103 |

# Product Selection - Valves

## NPT Globe Valves ½"- 3", With DCA and Valve Linkage

### Common Features

- ANSI body class 150
- Close-Off pressure = maximum differential pressure
- Maximum static water pressure (250°F): 240 psi
- Maximum steam pressure  
2-way steam valves, 337°F: 100 psi  
2-way water valves: 15 psi
- Stem travel: 0.75"
- Rangeability: 50:1
- Leakage < 0.05% of Cv
- Body material: Red brass, stainless steel stem (steam valve has stainless steel trim.)



| Actuator Features                                |                                     | Fail Safe                   |                             |                             |                             |                             |
|--------------------------------------------------|-------------------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
| Actuator O.S. Number                             |                                     | MS7505A2030<br>MS7505A2130  | MS8105A1030<br>MS8105A1130  | MS4105A1030<br>MS4105A1130  | MS7510A2008<br>MS7510A2206  | MS8110A1008<br>MS8110A1206  |
| Power Supply                                     | Voltage                             | 24 Vac                      | 24 Vac                      | 100-250 Vac                 | 24 Vac                      | 24 Vac                      |
|                                                  | Frequency                           | 50 / 60 Hz                  | 50 / 60 Hz                  | 60 Hz                       | 50 / 60 Hz                  | 50 / 60 Hz                  |
|                                                  | Power                               | 7.5VA                       | 8 VA                        | 11VA                        | 14 VA                       | 30 VA                       |
| Actuator Torque                                  | (lb.-in.)                           | 44                          | 44                          | 44                          | 88                          | 88                          |
| Linkage Stem Force                               | (lbs.)                              | 58                          | 58                          | 58                          | 117                         | 117                         |
| Control                                          | (0)2-10 Vdc                         | •                           |                             |                             | •                           |                             |
|                                                  | 4-20 mA (external 500 Ohm Resistor) | •                           |                             |                             | •                           |                             |
|                                                  | Floating                            | •                           |                             |                             | •                           |                             |
| Two-Position SPDT                                |                                     | •                           |                             |                             | •                           |                             |
|                                                  |                                     | •                           |                             |                             | •                           |                             |
|                                                  |                                     | •                           |                             |                             | •                           |                             |
| Fail Safe Action                                 |                                     | Configurable<br>Open/Closed | Configurable<br>Open/Closed | Configurable<br>Open/Closed | Configurable<br>Open/Closed | Configurable<br>Open/Closed |
| Normal Position (no signal) (field configurable) |                                     | Stem Up/Down                | Stem Up/Down                | Stem Up/Down                | Stem Up/Down                | Stem Up/Down                |
| Actuator Stroke                                  | (inches)                            | 95°                         | 95°                         | 95°                         | 95°                         | 95°                         |
| Timing                                           | (seconds at 0.75" stroke)           | 90                          | 90                          | 90                          | 90                          | 90                          |
| Aux Switch                                       | SPDT Built In                       | 0 / 1                       | 0 / 1                       | 0 / 1                       | 0 / 2                       | 0 / 2                       |
|                                                  | 2 x SPDT Add-On                     |                             |                             |                             | SW2-US                      | SW2-US                      |
| Feedback                                         | 2-10 Vdc Built In                   | •                           |                             |                             | •                           |                             |

|                                        | Valve Size (inches) | Cv   | Max Static Water Pressure | Max Steam Pressure / Temperature | Flow Characteristic        | Valve Action        | Valve OS Number | Close-off Pressure, psid |     |     |     |     |
|----------------------------------------|---------------------|------|---------------------------|----------------------------------|----------------------------|---------------------|-----------------|--------------------------|-----|-----|-----|-----|
|                                        |                     |      |                           |                                  |                            |                     |                 |                          |     |     |     |     |
| 2-Way Water Valves<br>Straight Through | 1/2"                | 0.73 | 217 psi @ 248 F           | 15 psi (2-position)              | Equal %                    | Stem down to close  | V5011N1008      | 230                      | 230 | 230 | 230 | 230 |
|                                        |                     | 1.16 |                           |                                  |                            |                     | V5011N1016      | 230                      | 230 | 230 | 230 | 230 |
|                                        |                     | 1.85 |                           |                                  |                            |                     | V5011N1024      | 230                      | 230 | 230 | 230 | 230 |
|                                        |                     | 2.9  |                           |                                  |                            |                     | V5011N1032      | 230                      | 230 | 230 | 230 | 230 |
|                                        |                     | 4.7  |                           |                                  |                            |                     | V5011N1040      | 184                      | 184 | 184 | 230 | 230 |
|                                        | 3/4"                | 7.3  | 250 psi @ 100F            |                                  |                            |                     | V5011N1057      | 79                       | 79  | 79  | 150 | 150 |
|                                        | 1"                  | 11.7 |                           |                                  |                            |                     | V5011N1065      | 66                       | 66  | 66  | 136 | 136 |
|                                        | 1-1/4"              | 18.7 |                           |                                  |                            |                     | V5011N1073      | 40                       | 40  | 40  | 84  | 84  |
|                                        | 1-1/2"              | 29.3 |                           |                                  |                            |                     | V5011N1081      | 26                       | 26  | 26  | 55  | 55  |
|                                        | 2"                  | 46.8 |                           |                                  |                            |                     | V5011N1099      | 13                       | 13  | 13  | 30  | 30  |
| 2-Way Steam Valves<br>Straight Through | 1/2"                | 0.73 | 217 psi @ 248 F           | 100 psig / 337 F                 | Linear                     | Stem down to close  | V5011N2006      | 100                      | 100 | 100 | 100 | 100 |
|                                        |                     | 1.16 |                           |                                  |                            |                     | V5011N2014      | 100                      | 100 | 100 | 100 | 100 |
|                                        |                     | 1.85 |                           |                                  |                            |                     | V5011N2022      | 100                      | 100 | 100 | 100 | 100 |
|                                        |                     | 2.9  |                           |                                  |                            |                     | V5011N2030      | 100                      | 100 | 100 | 100 | 100 |
|                                        |                     | 4.7  |                           |                                  |                            |                     | V5011N2048      | 100                      | 100 | 100 | 100 | 100 |
|                                        | 3/4"                | 7.3  | 250 psi @ 100F            |                                  |                            |                     | V5011N2055      | 79                       | 79  | 79  | 100 | 100 |
|                                        | 1"                  | 11.7 |                           |                                  |                            |                     | V5011N2063      | 66                       | 66  | 66  | 100 | 100 |
|                                        | 1-1/4"              | 18.7 |                           |                                  |                            |                     | V5011N2071      | 40                       | 40  | 40  | 84  | 84  |
|                                        | 1-1/2"              | 29.3 |                           |                                  |                            |                     | V5011N2089      | 26                       | 26  | 26  | 55  | 55  |
|                                        | 2"                  | 46.8 |                           |                                  |                            |                     | V5011N2097      | 13                       | 13  | 13  | 30  | 30  |
| 3-Way Water Valves<br>Mixing           | 1/2"                | 0.73 | 217 psi @ 248 F           | N / A                            | Linear B-AB / Equal % A-AB | Stem up closes A-AB | V5011G1111      | 9                        | 9   | 9   | 21  | 21  |
|                                        |                     | 1.16 |                           |                                  |                            |                     | V5011G1129      | 6                        | 6   | 6   | 13  | 13  |
|                                        |                     | 1.85 |                           |                                  |                            |                     | V5013N1030      | 230                      | 230 | 230 | 230 | 230 |
|                                        |                     | 2.9  |                           |                                  |                            |                     | V5013N1048      | 184                      | 184 | 184 | 230 | 230 |
|                                        |                     | 4.7  |                           |                                  |                            |                     | V5013N1055      | 79                       | 79  | 79  | 150 | 150 |
|                                        | 3/4"                | 7.3  | 217 psi @ 248 F           |                                  |                            |                     | V5013N1063      | 66                       | 66  | 66  | 136 | 136 |
|                                        | 1"                  | 11.7 |                           |                                  |                            |                     | V5013N1071      | 40                       | 40  | 40  | 84  | 84  |
|                                        | 1-1/4"              | 18.7 |                           |                                  |                            |                     | V5013N1089      | 26                       | 26  | 26  | 55  | 55  |
|                                        | 1-1/2"              | 29.3 |                           |                                  |                            |                     | V5013N1097      | 13                       | 13  | 13  | 30  | 30  |
|                                        | 2"                  | 46.8 |                           |                                  |                            |                     |                 |                          |     |     |     |     |

# Product Selection - Valves

## NPT Globe Valves ½" - 3", With DCA and Valve Linkage

**Q5020A1003  
Required**



| Actuator Features                                |                 | Fail Safe                   |                                           |                             |                             |
|--------------------------------------------------|-----------------|-----------------------------|-------------------------------------------|-----------------------------|-----------------------------|
| Actuator O.S. Number                             |                 | MS4110A1002<br>MS4110A1200  | MS7520A2007<br>MS7520A2205<br>MS7520H2208 | MS8120A1007<br>MS8120A1205  | MS4120A1001<br>MS4120A1209  |
| Power Supply                                     | Voltage         | 100-250 Vac                 | 24 Vac                                    | 24 Vac                      | 100-250 Vac                 |
|                                                  | Frequency       | 60 Hz                       | 50 / 60 Hz                                | 50 / 60 Hz                  | 60 Hz                       |
|                                                  | Power           | 45 VA                       | 16 VA                                     | 40 VA                       | 60 VA                       |
| Actuator Torque (lb.-in.)                        |                 | 88                          | 175                                       | 175                         | 175                         |
| Linkage Stem Force (lbs.)                        |                 | 117                         | 234                                       | 234                         | 234                         |
| Control (0)2-10 Vdc                              |                 |                             | •                                         |                             |                             |
| 4-20 mA (external 500 Ohm Resistor)              |                 |                             | •                                         |                             |                             |
| Floating                                         |                 |                             | •                                         |                             |                             |
| Two-Position SPDT                                |                 |                             | •                                         |                             |                             |
| Two-Position SPST                                |                 | •                           | •                                         | •                           | •                           |
| Fail Safe Action                                 |                 | Configurable<br>Open/Closed | Configurable<br>Open/Closed               | Configurable<br>Open/Closed | Configurable<br>Open/Closed |
| Normal Position (no signal) (field configurable) |                 | Stem Up/Down                | Stem Up/Down                              | Stem Up/Down                | Stem Up/Down                |
| Actuator Stroke (inches)                         |                 | 95°                         | 95°                                       | 95°                         | 95°                         |
| Timing (seconds at 0.75" stroke)                 |                 | 90                          | 90                                        | 90                          | 90                          |
| Aux Switch                                       | SPDT Built In   | 0 / 2                       | 0 / 2 / 2                                 | 0 / 2                       | 0 / 2                       |
|                                                  | 2 x SPDT Add-On | SW2-US                      | SW2-US                                    | SW2-US                      | SW2-US                      |
| Feedback 2-10 Vdc Built In                       |                 |                             | •                                         |                             |                             |

|                                           | Valve Size (inches) | Cv   | Max Static Water Pressure | Max Steam Pressure / Temperature | Flow Characteristic        | Valve Action        | Valve OS Number | Close-off Pressure, psid |     |     |     |
|-------------------------------------------|---------------------|------|---------------------------|----------------------------------|----------------------------|---------------------|-----------------|--------------------------|-----|-----|-----|
|                                           |                     |      |                           |                                  |                            |                     |                 |                          |     |     |     |
| 2-Way<br>Water Valves<br>Straight Through | 1/2"                | 0.73 | 217 psi @ 248 F           | 15 psi (2-position)              | Equal %                    | Stem down to close  | V5011N1008      | 230                      |     |     |     |
|                                           |                     | 1.16 |                           |                                  |                            |                     | V5011N1016      | 230                      |     |     |     |
|                                           |                     | 1.85 |                           |                                  |                            |                     | V5011N1024      | 230                      |     |     |     |
|                                           |                     | 2.9  |                           |                                  |                            |                     | V5011N1032      | 230                      |     |     |     |
|                                           |                     | 4.7  |                           |                                  |                            |                     | V5011N1040      | 230                      |     |     |     |
|                                           | 3/4"                | 7.3  | 250 psi @ 100F            |                                  |                            |                     | V5011N1057      | 150                      | 230 | 230 | 230 |
|                                           | 1"                  | 11.7 |                           |                                  |                            |                     | V5011N1065      | 136                      | 230 | 230 | 230 |
|                                           | 1-1/4"              | 18.7 |                           |                                  |                            |                     | V5011N1073      | 84                       | 171 | 171 | 171 |
|                                           | 1-1/2"              | 29.3 |                           |                                  |                            |                     | V5011N1081      | 55                       | 113 | 113 | 113 |
|                                           | 2"                  | 46.8 |                           |                                  |                            |                     | V5011N1099      | 30                       | 63  | 63  | 63  |
| 2-Way<br>Steam Valves<br>Straight Through | 2-1/2"              | 63   | 250 psi @ 100F            | 100 psig / 337 F                 | Linear                     | Stem down to close  | V5011F1105      | 21                       | 45  | 45  | 45  |
|                                           | 3"                  | 100  |                           |                                  |                            |                     | V5011F1113      | 13                       | 27  | 27  | 27  |
|                                           | 1/2"                | 0.73 |                           |                                  |                            |                     | V5011N2006      | 100                      | 100 | 100 | 100 |
|                                           |                     | 1.16 |                           |                                  |                            |                     | V5011N2014      | 100                      | 100 | 100 | 100 |
|                                           |                     | 1.85 |                           |                                  |                            |                     | V5011N2022      | 100                      | 100 | 100 | 100 |
|                                           |                     | 2.9  |                           |                                  |                            |                     | V5011N2030      | 100                      | 100 | 100 | 100 |
|                                           |                     | 4.7  |                           |                                  |                            |                     | V5011N2048      | 100                      | 100 | 100 | 100 |
|                                           | 3/4"                | 7.3  | 250 psi @ 100F            |                                  |                            |                     | V5011N2055      | 100                      | 100 | 100 | 100 |
|                                           | 1"                  | 11.7 |                           |                                  |                            |                     | V5011N2063      | 100                      | 100 | 100 | 100 |
|                                           | 1-1/4"              | 18.7 |                           |                                  |                            |                     | V5011N2071      | 84                       | 100 | 100 | 100 |
|                                           | 1-1/2"              | 29.3 |                           |                                  |                            |                     | V5011N2089      | 55                       | 100 | 100 | 100 |
| 3-Way<br>Water Valves<br>Mixing           | 2"                  | 46.8 |                           |                                  |                            |                     | V5011N2097      | 30                       | 63  | 63  | 63  |
|                                           | 2-1/2"              | 63   |                           |                                  |                            |                     | V5011G1111      | 21                       | 45  | 45  | 45  |
|                                           | 3"                  | 100  |                           |                                  |                            |                     | V5011G1129      | 13                       | 27  | 27  | 27  |
|                                           | 1/2"                | 2.9  | 217 psi @ 248 F           | N / A                            | Linear B-AB / Equal % A-AB | Stem up closes A-AB | V5013N1030      | 230                      | 230 | 230 | 230 |
|                                           | 1/2"                | 4.7  |                           |                                  |                            |                     | V5013N1048      | 230                      | 230 | 230 | 230 |
|                                           | 3/4"                | 7.3  |                           |                                  |                            |                     | V5013N1055      | 150                      | 230 | 230 | 230 |
|                                           | 1"                  | 11.7 |                           |                                  |                            |                     | V5013N1063      | 136                      | 230 | 230 | 230 |
|                                           | 1-1/4"              | 18.7 |                           |                                  |                            |                     | V5013N1071      | 84                       | 171 | 171 | 171 |
|                                           | 1-1/2"              | 29.3 |                           |                                  |                            |                     | V5013N1089      | 55                       | 113 | 113 | 113 |
|                                           | 2"                  | 46.8 |                           |                                  |                            |                     | V5013N1097      | 30                       | 63  | 63  | 63  |

# Product Selection - Valves

## NPT Globe Valves ½" - 3", With Pneumatic Actuator

### Common Features

- Easy installation and attachment to the valve
- Direct or reverse acting
- No positive positioner



**2-Way Water Valves**  
Straight Through

**2-Way Steam Valves**  
Straight Through

**3-Way Water Valves**  
Mixing

|  |      | Actuator Features              |                     |                 | Without Positive Positioner                     |            |            |            |            |            |            |            |            |                |            |   |  |
|------------------------------------------------------------------------------------|------|--------------------------------|---------------------|-----------------|-------------------------------------------------|------------|------------|------------|------------|------------|------------|------------|------------|----------------|------------|---|--|
|                                                                                    |      | Actuator O.S. Number           |                     |                 | MP953C1000                                      | MP953C1018 | MP953C1026 | MP953C1067 | MP953C1075 | MP953C1083 | MP953C1554 | MP953C1562 | MP953D1107 | MP953D1131     | MP953D1172 |   |  |
|                                                                                    |      | Direct Acting / Reverse Acting |                     |                 | Direct Acting                                   |            |            |            |            |            |            |            |            | Reverse Acting |            |   |  |
|                                                                                    |      | Diaphragm Size                 |                     |                 | 5"                                              |            |            | 8"         |            |            | 13"        |            |            | 7-1/8"         |            |   |  |
|                                                                                    |      | Fail Safe Action               |                     |                 | Stem Up                                         |            |            |            |            |            |            |            |            | Stem Down      |            |   |  |
|                                                                                    |      | Actuator Force                 |                     |                 | Low                                             |            |            | Medium     |            |            | High       |            |            | Medium         |            |   |  |
|                                                                                    |      | Spring Range                   |                     | 2-7 psi         | •                                               |            |            | •          |            |            |            | •          |            |                |            |   |  |
|                                                                                    |      |                                |                     | 3-7 psi         |                                                 |            |            |            |            |            |            |            |            |                |            | • |  |
|                                                                                    |      |                                |                     | 8-12 psi        |                                                 | •          |            |            |            | •          |            |            |            |                |            |   |  |
|                                                                                    |      |                                |                     | 8-13 psi        |                                                 |            |            |            |            |            |            |            |            | •              |            |   |  |
|                                                                                    |      | 4-11 psi                       |                     |                 |                                                 | •          |            |            |            | •          |            | •          |            | •              |            |   |  |
| Valve Size (inches)                                                                | Cv   | Flow Characteristic            | Valve Action        | Valve OS Number | Close-off Pressure - See Charts On Page 134-135 |            |            |            |            |            |            |            |            |                |            |   |  |
| 1/2"                                                                               | 0.73 | Equal %                        | Stem down to close  | V5011N1008      | C-NO                                            | C-NO       | C-NO       | B-NO       | B-NO       | B-NO       | N/A        | A-NC       | A-NC       | A-NC           |            |   |  |
|                                                                                    | 1.16 |                                |                     | V5011N1016      | C-NO                                            | C-NO       | C-NO       | B-NO       | B-NO       | B-NO       |            | A-NC       | A-NC       | A-NC           |            |   |  |
|                                                                                    | 1.85 |                                |                     | V5011N1024      | C-NO                                            | C-NO       | C-NO       | B-NO       | B-NO       | B-NO       |            | A-NC       | A-NC       | A-NC           |            |   |  |
|                                                                                    | 2.9  |                                |                     | V5011N1032      | C-NO                                            | C-NO       | C-NO       | B-NO       | B-NO       | B-NO       |            | A-NC       | A-NC       | A-NC           |            |   |  |
|                                                                                    | 4.7  |                                |                     | V5011N1040      | C-NO                                            | C-NO       | C-NO       | B-NO       | B-NO       | B-NO       |            | A-NC       | A-NC       | A-NC           |            |   |  |
|                                                                                    | 7.3  |                                |                     | V5011N1057      | C-NO                                            | C-NO       | C-NO       | B-NO       | B-NO       | B-NO       |            | A-NC       | A-NC       | A-NC           |            |   |  |
|                                                                                    | 11.7 |                                |                     | V5011N1065      | C-NO                                            | C-NO       | C-NO       | B-NO       | B-NO       | B-NO       |            | A-NC       | A-NC       | A-NC           |            |   |  |
|                                                                                    | 18.7 |                                |                     | V5011N1073      | C-NO                                            | C-NO       | C-NO       | B-NO       | B-NO       | B-NO       |            | A-NC       | A-NC       | A-NC           |            |   |  |
|                                                                                    | 29.3 |                                |                     | V5011N1081      | C-NO                                            | C-NO       | C-NO       | B-NO       | B-NO       | B-NO       |            | A-NC       | A-NC       | A-NC           |            |   |  |
|                                                                                    | 46.8 |                                |                     | V5011N1099      | C-NO                                            | C-NO       | C-NO       | B-NO       | B-NO       | B-NO       |            | A-NC       | A-NC       | A-NC           |            |   |  |
|                                                                                    | 63   |                                |                     | V5011F1105      | N/A                                             | H-NO       | H-NO       | H-NO       | J-NO       | J-NO       |            | D-NC       | D-NC       | D-NC           |            |   |  |
|                                                                                    | 100  |                                |                     | V5011F1113      |                                                 | H-NO       | H-NO       | H-NO       | J-NO       | J-NO       |            | D-NC       | D-NC       | D-NC           |            |   |  |
| 1/2"                                                                               | 0.73 | Linear                         | Stem down to close  | V5011N2006      | C*-NO                                           | C*-NO      | C*-NO      | B*-NO      | B*-NO      | B*-NO      | N/A        | A*-NC      | A*-NC      | A*-NC          |            |   |  |
|                                                                                    | 1.16 |                                |                     | V5011N2014      | C*-NO                                           | C*-NO      | C*-NO      | B*-NO      | B*-NO      | B*-NO      |            | A*-NC      | A*-NC      | A*-NC          |            |   |  |
|                                                                                    | 1.85 |                                |                     | V5011N2022      | C*-NO                                           | C*-NO      | C*-NO      | B*-NO      | B*-NO      | B*-NO      |            | A*-NC      | A*-NC      | A*-NC          |            |   |  |
|                                                                                    | 2.9  |                                |                     | V5011N2030      | C*-NO                                           | C*-NO      | C*-NO      | B*-NO      | B*-NO      | B*-NO      |            | A*-NC      | A*-NC      | A*-NC          |            |   |  |
|                                                                                    | 4.7  |                                |                     | V5011N2048      | C*-NO                                           | C*-NO      | C*-NO      | B*-NO      | B*-NO      | B*-NO      |            | A*-NC      | A*-NC      | A*-NC          |            |   |  |
|                                                                                    | 7.3  |                                |                     | V5011N2055      | C*-NO                                           | C*-NO      | C*-NO      | B*-NO      | B*-NO      | B*-NO      |            | A*-NC      | A*-NC      | A*-NC          |            |   |  |
|                                                                                    | 11.7 |                                |                     | V5011N2063      | C*-NO                                           | C*-NO      | C*-NO      | B*-NO      | B*-NO      | B*-NO      |            | A*-NC      | A*-NC      | A*-NC          |            |   |  |
|                                                                                    | 18.7 |                                |                     | V5011N2071      | C*-NO                                           | C*-NO      | C*-NO      | B*-NO      | B*-NO      | B*-NO      |            | A*-NC      | A*-NC      | A*-NC          |            |   |  |
|                                                                                    | 29.3 |                                |                     | V5011N2089      | C*-NO                                           | C*-NO      | C*-NO      | B*-NO      | B*-NO      | B*-NO      |            | A*-NC      | A*-NC      | A*-NC          |            |   |  |
|                                                                                    | 46.8 |                                |                     | V5011N2097      | C*-NO                                           | C*-NO      | C*-NO      | B*-NO      | B*-NO      | B*-NO      |            | A*-NC      | A*-NC      | A*-NC          |            |   |  |
|                                                                                    | 63   |                                |                     | V5011G1111      | N/A                                             | H*-NO      | H*-NO      | H*-NO      | J*-NO      | J*-NO      |            | D*-NC      | D*-NC      | D*-NC          |            |   |  |
|                                                                                    | 100  |                                |                     | V5011G1129      |                                                 | H*-NO      | H*-NO      | H*-NO      | J*-NO      | J*-NO      |            | D*-NC      | D*-NC      | D*-NC          |            |   |  |
| 1/2"                                                                               | 2.9  | Linear B-AB / Equal % A-AB     | Stem up closes A-AB | V5013N1030      | E-NC                                            | E-NC       | E-NC       | F-NC       | F-NC       | F-NC       | N/A        | G-NO       | G-NO       | G-NO           |            |   |  |
|                                                                                    | 4.7  |                                |                     | V5013N1048      | E-NC                                            | E-NC       | E-NC       | F-NC       | F-NC       | F-NC       |            | G-NO       | G-NO       | G-NO           |            |   |  |
|                                                                                    | 7.3  |                                |                     | V5013N1055      | E-NC                                            | E-NC       | E-NC       | F-NC       | F-NC       | F-NC       |            | G-NO       | G-NO       | G-NO           |            |   |  |
|                                                                                    | 11.7 |                                |                     | V5013N1063      | E-NC                                            | E-NC       | E-NC       | F-NC       | F-NC       | F-NC       |            | G-NO       | G-NO       | G-NO           |            |   |  |
|                                                                                    | 18.7 |                                |                     | V5013N1071      | E-NC                                            | E-NC       | E-NC       | F-NC       | F-NC       | F-NC       |            | G-NO       | G-NO       | G-NO           |            |   |  |
|                                                                                    | 29.3 |                                |                     | V5013N1089      | E-NC                                            | E-NC       | E-NC       | F-NC       | F-NC       | F-NC       |            | G-NO       | G-NO       | G-NO           |            |   |  |
|                                                                                    | 46.8 |                                |                     | V5013N1097      | E-NC                                            | E-NC       | E-NC       | F-NC       | F-NC       | F-NC       |            | G-NO       | G-NO       | G-NO           |            |   |  |
|                                                                                    |      |                                |                     |                 |                                                 |            |            |            |            |            |            |            |            |                |            |   |  |

\*The close-off pressure not to exceed rated pressure of steam valve

NC = Normally Closed, A to AB Normally Closed for 3-way valves

NO = Normally Open, A to AB Normally Open for 3-way valves

# Product Selection - Valves

## NPT Globe Valves ½"-3", With Pneumatic Actuator

### Common Features

- Easy installation and attachment to the valve
- Direct or reverse acting
- Integrated positive positioner



| Actuator Features              |  | With Positive Positioner |            |            |            |            |            |            |            |                |            |            |
|--------------------------------|--|--------------------------|------------|------------|------------|------------|------------|------------|------------|----------------|------------|------------|
| Actuator O.S. Number           |  | MP953E1301               | MP953E1319 | MP953E1327 | MP953E1368 | MP953E1376 | MP953E1384 | MP953E1435 | MP953E1443 | MP953F1093     | MP953F1101 | MP953F1119 |
| Direct Acting / Reverse Acting |  | Direct Acting            |            |            |            |            |            |            |            | Reverse Acting |            |            |
| Diaphragm Size                 |  | 5"                       |            |            | 8"         |            |            | 13"        |            | 7-1/8"         |            |            |
| Fail Safe Action               |  | Stem Up                  |            |            |            |            |            |            |            | Stem Down      |            |            |
| Actuator Force                 |  | Low                      |            |            | Medium     |            |            | High       |            | Medium         |            |            |
| Spring Range                   |  | 4–11 psi                 | •          | •          | •          | •          | •          | •          | •          |                |            |            |
|                                |  | 8–13 psi                 |            |            |            |            |            |            |            | •              | •          | •          |
| Positioner Span                |  | 10 psi                   |            | •          |            |            | •          |            | •          |                |            | •          |
|                                |  | 5 psi                    |            | •          |            |            | •          |            | •          |                | •          |            |
|                                |  | 3 psi                    | •          |            |            | •          |            |            |            | •              |            |            |

|                                        | Valve Size (inches) |      | Cv                         | Flow Characteristic | Valve Action | Valve OS Number | Close-off Pressure - See Charts On Page 134-135 |       |       |       |       |       |       |       |       |       |
|----------------------------------------|---------------------|------|----------------------------|---------------------|--------------|-----------------|-------------------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
|                                        |                     |      |                            |                     |              |                 | C-NO                                            | C-NO  | C-NO  | B-NO  | B-NO  | B-NO  | A-NC  | A-NC  | A-NC  |       |
| 2-Way Water Valves<br>Straight Through | 1/2"                | 0.73 | Equal %                    | Stem down to close  | V5011N1008   | C-NO            | C-NO                                            | C-NO  | B-NO  | B-NO  | B-NO  | N/A   | A-NC  | A-NC  | A-NC  |       |
|                                        |                     | 1.16 |                            |                     | V5011N1016   | C-NO            | C-NO                                            | C-NO  | B-NO  | B-NO  | B-NO  |       | A-NC  | A-NC  | A-NC  |       |
|                                        |                     | 1.85 |                            |                     | V5011N1024   | C-NO            | C-NO                                            | C-NO  | B-NO  | B-NO  | B-NO  |       | A-NC  | A-NC  | A-NC  |       |
|                                        |                     | 2.9  |                            |                     | V5011N1032   | C-NO            | C-NO                                            | C-NO  | B-NO  | B-NO  | B-NO  |       | A-NC  | A-NC  | A-NC  |       |
|                                        |                     | 4.7  |                            |                     | V5011N1040   | C-NO            | C-NO                                            | C-NO  | B-NO  | B-NO  | B-NO  |       | A-NC  | A-NC  | A-NC  |       |
|                                        | 3/4"                | 7.3  |                            |                     | V5011N1057   | C-NO            | C-NO                                            | C-NO  | B-NO  | B-NO  | B-NO  |       | A-NC  | A-NC  | A-NC  |       |
|                                        | 1"                  | 11.7 |                            |                     | V5011N1065   | C-NO            | C-NO                                            | C-NO  | B-NO  | B-NO  | B-NO  |       | A-NC  | A-NC  | A-NC  |       |
|                                        | 1-1/4"              | 18.7 |                            |                     | V5011N1073   | C-NO            | C-NO                                            | C-NO  | B-NO  | B-NO  | B-NO  |       | A-NC  | A-NC  | A-NC  |       |
|                                        | 1-1/2"              | 29.3 |                            |                     | V5011N1081   | C-NO            | C-NO                                            | C-NO  | B-NO  | B-NO  | B-NO  |       | A-NC  | A-NC  | A-NC  |       |
|                                        | 2"                  | 46.8 |                            |                     | V5011N1099   | C-NO            | C-NO                                            | C-NO  | B-NO  | B-NO  | B-NO  |       | A-NC  | A-NC  | A-NC  |       |
|                                        | 2-1/2"              | 63   |                            |                     | V5011F1105   | N/A             |                                                 |       | H-NO  | H-NO  | H-NO  | J-NO  | J-NO  | D-NC  | D-NC  | D-NC  |
|                                        | 3"                  | 100  |                            |                     | V5011F1113   | N/A             |                                                 |       | H-NO  | H-NO  | H-NO  | J-NO  | J-NO  | D-NC  | D-NC  | D-NC  |
| 2-Way Steam Valves<br>Straight Through | 1/2"                | 0.73 | Linear                     | Stem down to close  | V5011N2006   | C*-NO           | C*-NO                                           | C*-NO | B*-NO | B*-NO | B*-NO | N/A   | A*-NC | A*-NC | A*-NC |       |
|                                        |                     | 1.16 |                            |                     | V5011N2014   | C*-NO           | C*-NO                                           | C*-NO | B*-NO | B*-NO | B*-NO |       | A*-NC | A*-NC | A*-NC |       |
|                                        |                     | 1.85 |                            |                     | V5011N2022   | C*-NO           | C*-NO                                           | C*-NO | B*-NO | B*-NO | B*-NO |       | A*-NC | A*-NC | A*-NC |       |
|                                        |                     | 2.9  |                            |                     | V5011N2030   | C*-NO           | C*-NO                                           | C*-NO | B*-NO | B*-NO | B*-NO |       | A*-NC | A*-NC | A*-NC |       |
|                                        |                     | 4.7  |                            |                     | V5011N2048   | C*-NO           | C*-NO                                           | C*-NO | B*-NO | B*-NO | B*-NO |       | A*-NC | A*-NC | A*-NC |       |
|                                        | 3/4"                | 7.3  |                            |                     | V5011N2055   | C*-NO           | C*-NO                                           | C*-NO | B*-NO | B*-NO | B*-NO |       | A*-NC | A*-NC | A*-NC |       |
|                                        | 1"                  | 11.7 |                            |                     | V5011N2063   | C*-NO           | C*-NO                                           | C*-NO | B*-NO | B*-NO | B*-NO |       | A*-NC | A*-NC | A*-NC |       |
|                                        | 1-1/4"              | 18.7 |                            |                     | V5011N2071   | C*-NO           | C*-NO                                           | C*-NO | B*-NO | B*-NO | B*-NO |       | A*-NC | A*-NC | A*-NC |       |
|                                        | 1-1/2"              | 29.3 |                            |                     | V5011N2089   | C*-NO           | C*-NO                                           | C*-NO | B*-NO | B*-NO | B*-NO |       | A*-NC | A*-NC | A*-NC |       |
|                                        | 2"                  | 46.8 |                            |                     | V5011N2097   | C*-NO           | C*-NO                                           | C*-NO | B*-NO | B*-NO | B*-NO |       | A*-NC | A*-NC | A*-NC |       |
|                                        | 2-1/2"              | 63   |                            |                     | V5011G1111   | N/A             |                                                 |       | H*-NO | H*-NO | H*-NO | J*-NO | J*-NO | D*-NC | D*-NC | D*-NC |
|                                        | 3"                  | 100  |                            |                     | V5011G1129   | N/A             |                                                 |       | H*-NO | H*-NO | H*-NO | J*-NO | J*-NO | D*-NC | D*-NC | D*-NC |
| 3-Way Water Valves<br>Mixing           | 1/2"                | 2.9  | Linear B-AB / Equal % A-AB | Stem up closes A-AB | V5013N1030   | E-NC            | E-NC                                            | E-NC  | F-NC  | F-NC  | F-NC  | N/A   | G-NO  | G-NO  | G-NO  |       |
|                                        |                     | 4.7  |                            |                     | V5013N1048   | E-NC            | E-NC                                            | E-NC  | F-NC  | F-NC  | F-NC  |       | G-NO  | G-NO  | G-NO  |       |
|                                        | 3/4"                | 7.3  |                            |                     | V5013N1055   | E-NC            | E-NC                                            | E-NC  | F-NC  | F-NC  | F-NC  |       | G-NO  | G-NO  | G-NO  |       |
|                                        | 1"                  | 11.7 |                            |                     | V5013N1063   | E-NC            | E-NC                                            | E-NC  | F-NC  | F-NC  | F-NC  |       | G-NO  | G-NO  | G-NO  |       |
|                                        | 1-1/4"              | 18.7 |                            |                     | V5013N1071   | E-NC            | E-NC                                            | E-NC  | F-NC  | F-NC  | F-NC  |       | G-NO  | G-NO  | G-NO  |       |
|                                        | 1-1/2"              | 29.3 |                            |                     | V5013N1089   | E-NC            | E-NC                                            | E-NC  | F-NC  | F-NC  | F-NC  |       | G-NO  | G-NO  | G-NO  |       |
|                                        | 2"                  | 46.8 |                            |                     | V5013N1097   | E-NC            | E-NC                                            | E-NC  | F-NC  | F-NC  | F-NC  |       | G-NO  | G-NO  | G-NO  |       |

\*The close-off pressure not to exceed rated pressure of steam valve.

NC = Normally Closed, A to AB Normally Closed for 3-way valves

NO = Normally Open, A to AB Normally Open for 3-way valves

# Close-off Pressure Charts - Valves

## NPT Globe Valves ½" - 3"

Chart A

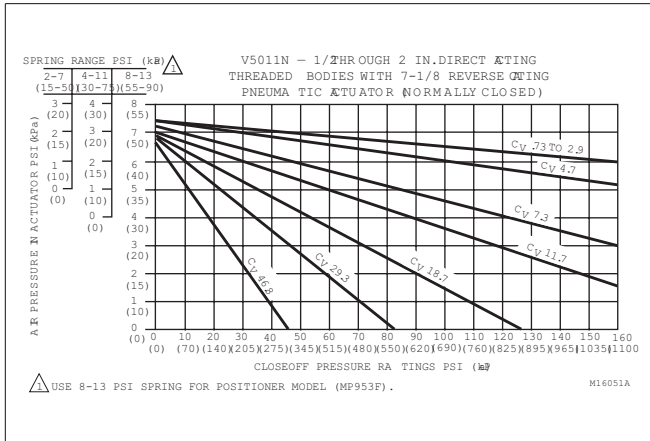


Chart B

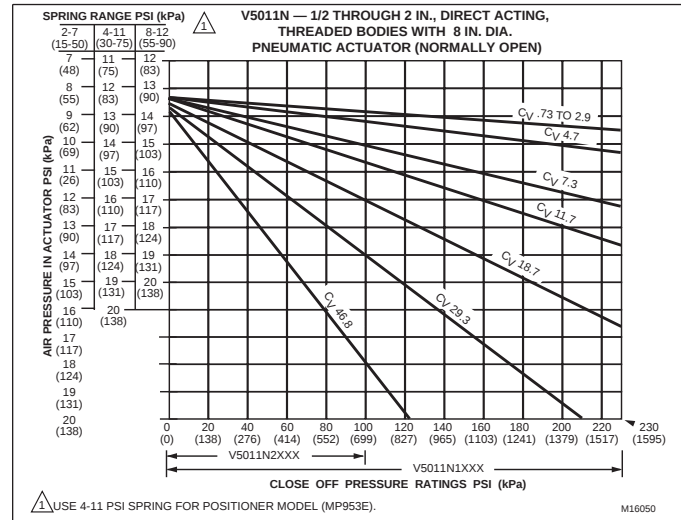


Chart C

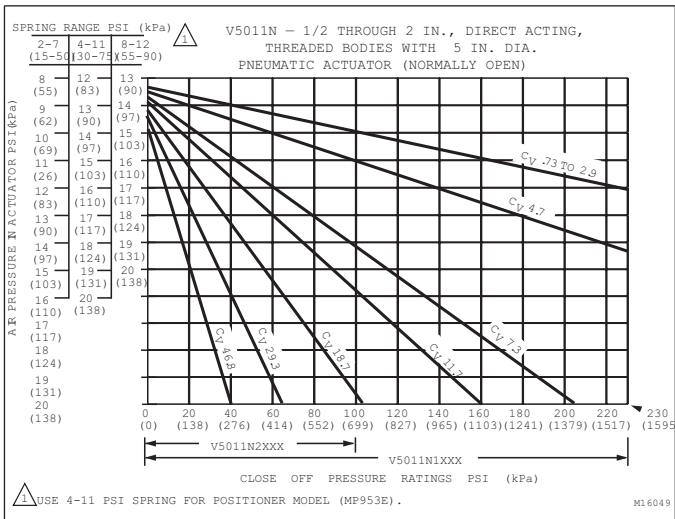


Chart D

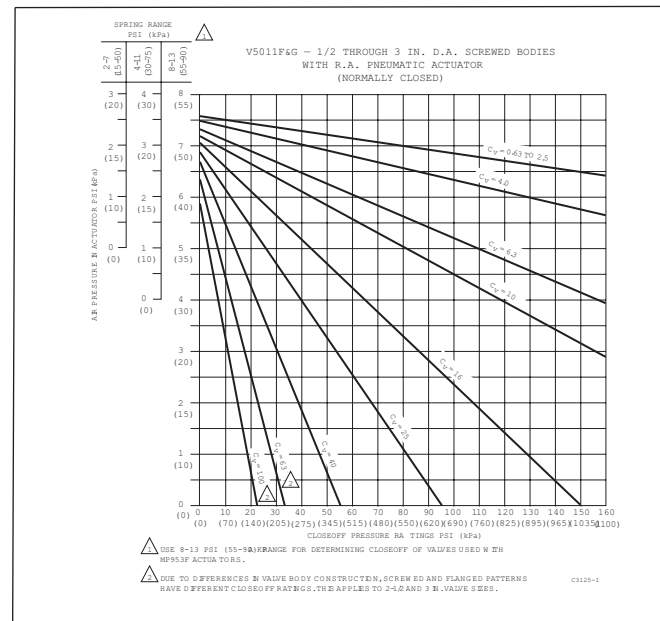
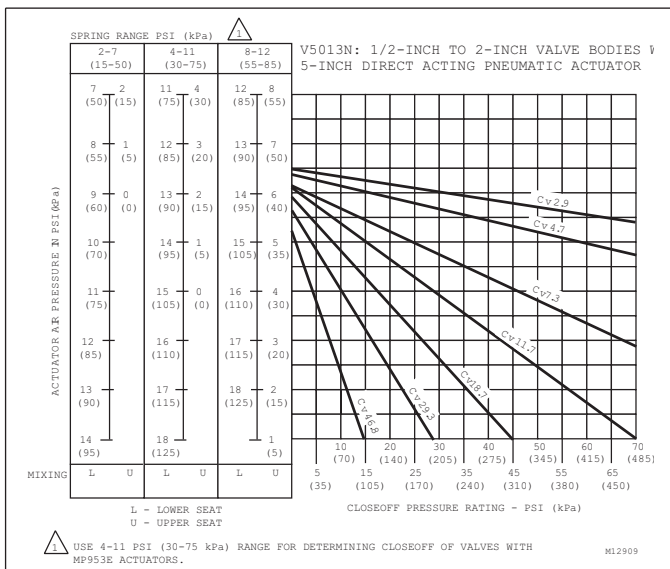


Chart E



# Close-off Pressure Charts - Valves

## NPT Globe Valves 1/2" - 3"

Chart F

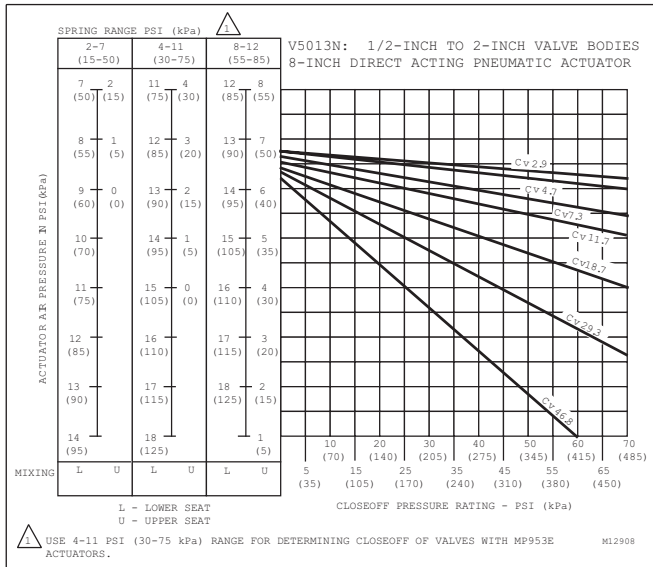


Chart G

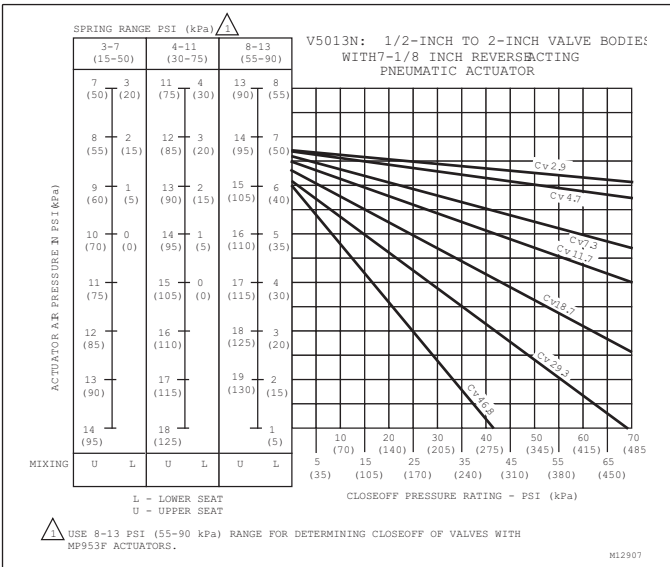


Chart H

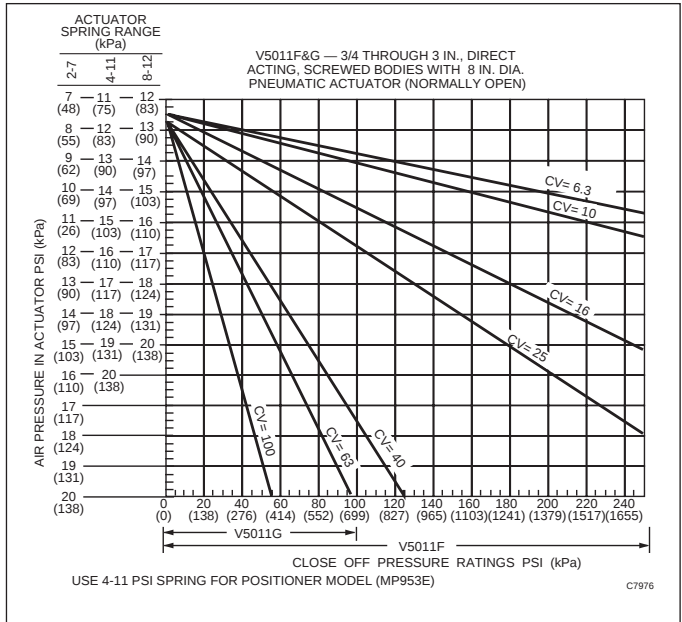
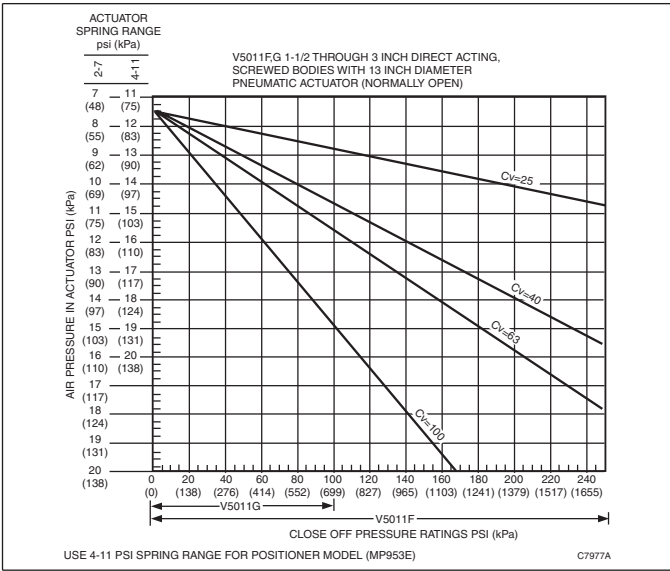


Chart J



# Product Selection - Valves

## Flanged Globe Valves 2½" - 3", With Non Fail Safe DCA and Valve Linkage

### Common Features

- For closed loop HVAC systems with up to 50% glycol
- ANSI Class 125 and 250 flanged cast iron bodies
- Close-off pressure = Maximum differential pressure
- Maximum static water pressure: Up to 400 psi
- Stem travel: 0.75"
- Rangeability: 50:1
- Valve trim: Stainless steel stem and plug. Integrated (cast iron) seat on VGF mixing valves, stainless steel seat on all other VGF valves)

**Q5020A1003  
Required**



| Actuator Features                                |                                     | Non Fail Safe              |                            |               |
|--------------------------------------------------|-------------------------------------|----------------------------|----------------------------|---------------|
| Actuator O.S. Number                             |                                     | MN7220A2007<br>MN7220A2205 | MN6120A1002<br>MN6120A1200 | MN7234A2008   |
| Power Supply                                     | Voltage                             | 24 Vac                     | 24 Vac                     | 24 Vac        |
|                                                  | Frequency                           | 50 / 60 Hz                 | 50 / 60 Hz                 | 50 / 60 Hz    |
|                                                  | Power                               | 6 VA                       | 6 VA                       | 9 VA          |
| Actuator Torque (lb.-in.)                        |                                     | 175                        | 175                        | 300           |
| Linkage Stem Force (lbs.)                        |                                     | 234                        | 234                        | 402           |
| Control                                          | (0)2-10 Vdc                         | •                          |                            | •             |
|                                                  | 4-20 mA (external 500 Ohm Resistor) | •                          |                            | •             |
|                                                  | Floating                            |                            | •                          |               |
|                                                  | Two-Position SPDT                   |                            | •                          |               |
|                                                  | Two-Position SPST                   |                            | •                          |               |
| Fail Safe Action                                 |                                     | Stay in Place              | Stay in Place              | Stay in Place |
| Normal Position (no signal) (field configurable) |                                     | Stem Up/Down               | Stay in Place              | Stem Up/Down  |
| Actuator Stroke (degrees)                        |                                     | 95°                        | 95°                        | 95°           |
| Timing (seconds)                                 |                                     | 95                         | 95                         | 95            |
| High Temperature Kit Steam Application           |                                     | 43196000-001               | 43196000-001               | 43196000-001  |
| Aux Switch                                       | SPDT Built In                       | 0 / 2                      | 0 / 2                      |               |
|                                                  | 2 x SPDT Add-On                     | SW2-US                     | SW2-US                     | SW2-US        |
| Feedback (0)2-10 Vdc Built In                    |                                     | •                          |                            | •             |

| Valve Size (inches)                               | Cv  | Valve Type        | ANSI Class             | Max Static Water Pressure | Max Steam Pressure / Temperature | Flow Characteristic | Valve Action       | Valve OS Number | Close-off Pressure, psid |       |              |                     |           |    |    |    |
|---------------------------------------------------|-----|-------------------|------------------------|---------------------------|----------------------------------|---------------------|--------------------|-----------------|--------------------------|-------|--------------|---------------------|-----------|----|----|----|
| ANSI Class III (<0.05% Cv) seat leakage           |     |                   |                        |                           |                                  |                     |                    |                 |                          |       |              |                     |           |    |    |    |
| 2-1/2"                                            | 70  | Standard          | 125                    | 175 psi @ 130 F           | 100 psig / 337 F                 | Equal %             | Stem down to close | VGF21ES25       | 39                       | 39    | 68           |                     |           |    |    |    |
|                                                   |     |                   | 250                    | 400 psi @ 130 F           |                                  | Linear              |                    | VGF21LS25       | 39                       | 39    | 68           |                     |           |    |    |    |
|                                                   |     |                   |                        |                           |                                  | Equal %             |                    | VGF22ES25       | 39                       | 39    | 68           |                     |           |    |    |    |
| 3"                                                | 125 |                   | 125                    | 175 psi @ 130 F           |                                  | Equal %             |                    | VGF21ES30       | 19                       | 19    | 33           |                     |           |    |    |    |
|                                                   |     |                   |                        |                           |                                  | Linear              |                    | VGF21LS30       | 19                       | 19    | 33           |                     |           |    |    |    |
|                                                   |     |                   |                        |                           |                                  | Equal %             |                    | VGF22ES30       | 19                       | 19    | 33           |                     |           |    |    |    |
| 120                                               |     | 250               | 400 psi @ 130 F        |                           |                                  |                     |                    |                 |                          |       |              |                     |           |    |    |    |
| ANSI Class IV (<0.01% Cv) seat leakage            |     |                   |                        |                           |                                  |                     |                    |                 |                          |       |              |                     |           |    |    |    |
| 2-1/2"                                            | 70  | Pressure Balanced | 125                    | 175 psi @ 130 F           | 100 psig / 337 F                 | Equal %             | Stem down to close | VGF21EP25       | 175                      | 175   | 175          |                     |           |    |    |    |
|                                                   |     |                   |                        |                           |                                  | Linear              |                    | VGF21LP25       | 175                      | 175   | 175          |                     |           |    |    |    |
| 3"                                                | 115 |                   |                        |                           |                                  |                     |                    | Equal %         | VGF21EP30                | 175   | 175          | 175                 |           |    |    |    |
|                                                   |     |                   |                        |                           |                                  |                     |                    | Linear          | VGF21LP30                | 175   | 175          | 175                 |           |    |    |    |
| ANSI Class III (<0.05% Cv) seat leakage (A to AB) |     |                   |                        |                           |                                  |                     |                    |                 |                          |       |              |                     |           |    |    |    |
| 2-1/2"                                            | 70  |                   |                        |                           |                                  | Mixing              |                    | 125             | 175 psi @ 130 F          | N / A | Equal % A-AB | Stem up closes A-AB | VGF31EM25 | 55 | 55 | 94 |
|                                                   |     | Diverting         | Linear, Constant Total | Stem up closes B-AB       | VGF31LD25                        | 55                  | 55                 |                 |                          |       | 94           |                     |           |    |    |    |
|                                                   |     | Mixing            | 250                    | 400 psi @ 130 F           | Equal % A-AB                     | Stem up closes A-AB | VGF32EM25          |                 |                          |       | 55           | 55                  | 94        |    |    |    |
| 3"                                                | 120 | Mixing            | 125                    | 175 psi @ 130 F           | Equal % A-AB                     | Stem up closes A-AB | VGF31EM30          | 34              | 34                       |       | 58           |                     |           |    |    |    |
|                                                   |     | Diverting         |                        |                           | Linear, Constant Total           | Stem up closes B-AB | VGF31LD30          | 19              | 19                       |       | 33           |                     |           |    |    |    |
|                                                   |     |                   |                        |                           | Equal % A-AB                     | Stem up closes A-AB | VGF32EM30          | 34              | 34                       |       | 58           |                     |           |    |    |    |
| 115                                               | 250 | 400 psi @ 130 F   |                        |                           |                                  |                     |                    |                 |                          |       |              |                     |           |    |    |    |

# Product Selection - Valves

## Flanged Globe Valves 2½"-3", With Fail Safe DCA and Valve Linkage

### Common Features

- For closed loop HVAC systems with up to 50% glycol
- ANSI Class 125 and 250 flanged cast iron bodies
- Close-off pressure = Maximum differential pressure
- Maximum static water pressure: Up to 400 psi
- Stem travel: 0.75"
- Rangeability: 50:1
- Valve trim: Stainless steel stem and plug. Integrated (cast iron) seat on VGF mixing valves, stainless steel seat on all other VGF valves)



### Q5020A1003 Required



| Actuator Features                                |                                     | Fail Safe                                 |                            |                            |
|--------------------------------------------------|-------------------------------------|-------------------------------------------|----------------------------|----------------------------|
| Actuator O.S. Number                             |                                     | MS7520A2007<br>MS7520A2205<br>MS7520H2208 | MS8120A1007<br>MS8120A1205 | MS4120A1001<br>MS4120A1209 |
| Power Supply                                     | Voltage                             | 24 Vac                                    | 24 Vac                     | 100-250 Vac                |
|                                                  | Frequency                           | 50 / 60 Hz                                | 50 / 60 Hz                 | 60 Hz                      |
| Actuator Torque                                  | Power                               | 16 VA                                     | 40 VA                      | 60 VA                      |
|                                                  | (lb.-in.)                           | 175                                       | 175                        | 175                        |
| Linkage Stem Force (lbs.)                        |                                     | 234                                       | 234                        | 234                        |
| Control                                          | (0)2-10 Vdc                         | •                                         |                            |                            |
|                                                  | 4-20 mA (external 500 Ohm Resistor) | •                                         |                            |                            |
|                                                  | Floating                            | •                                         |                            |                            |
|                                                  | Two-Position SPDT                   | •                                         |                            |                            |
|                                                  | Two-Position SPST                   | •                                         | •                          | •                          |
| Fail Safe Action                                 |                                     | Configurable Open/Closed                  | Configurable Open/Closed   | Configurable Open/Closed   |
| Normal Position (no signal) (field configurable) |                                     | Stem Up/Down                              | Stem Up/Down               | Stem Up/Down               |
| Actuator Stroke (degrees)                        |                                     | 95°                                       | 95°                        | 95°                        |
| Timing (seconds)                                 |                                     | 90                                        | 90                         | 90                         |
| High Temperature Kit Steam Application           |                                     | 43196000-001                              | 43196000-001               | 43196000-001               |
| Aux Switch                                       | SPDT Built In                       | 0 / 2 / 2                                 | 0 / 2                      | 0 / 2                      |
|                                                  | 2 x SPDT Add-On                     | SW2-US                                    | SW2-US                     | SW2-US                     |
| Feedback (0)2-10 Vdc Built In                    |                                     | •                                         |                            |                            |

| Valve Size (inches)                               | Cv              | Valve Type        | ANSI Class             | Max Static Water Pressure | Max Steam Pressure / Temperature | Flow Characteristic    | Valve Action        | Valve OS Number | Close-off Pressure, psid |     |     |
|---------------------------------------------------|-----------------|-------------------|------------------------|---------------------------|----------------------------------|------------------------|---------------------|-----------------|--------------------------|-----|-----|
| ANSI Class III (<0.05% Cv) seat leakage           |                 |                   |                        |                           |                                  |                        |                     |                 |                          |     |     |
| 2-1/2"                                            | 70              | Standard          | 125                    | 175 psi @ 130 F           | 100 psig / 337 F                 | Equal %                | Stem down to close  | VGF21ES25       | 39                       | 39  | 39  |
|                                                   |                 |                   | 250                    | 400 psi @ 130 F           |                                  | Linear                 |                     | VGF21LS25       | 39                       | 39  | 39  |
| 125                                               | 175 psi @ 130 F |                   |                        |                           |                                  | Equal %                |                     | VGF22ES25       | 39                       | 39  | 39  |
|                                                   |                 |                   | 250                    | 400 psi @ 130 F           |                                  | Linear                 |                     | VGF21ES30       | 19                       | 19  | 19  |
| 120                                               | 250             | 400 psi @ 130 F   |                        |                           |                                  | Equal %                |                     | VGF21LS30       | 19                       | 19  | 19  |
|                                                   |                 |                   | 250                    | 400 psi @ 130 F           |                                  | Linear                 |                     | VGF22ES30       | 19                       | 19  | 19  |
| ANSI Class IV (<0.01% Cv) seat leakage            |                 |                   |                        |                           |                                  |                        |                     |                 |                          |     |     |
| 2-1/2"                                            | 70              | Pressure Balanced | 125                    | 175 psi @ 130 F           | 100 psig / 337 F                 | Equal %                | Stem down to close  | VGF21EP25       | 175                      | 175 | 175 |
|                                                   |                 |                   |                        |                           |                                  | Linear                 |                     | VGF21LP25       | 175                      | 175 | 175 |
| 3"                                                | 115             |                   |                        |                           |                                  | Linear                 |                     | VGF21EP30       | 175                      | 175 | 175 |
|                                                   |                 |                   |                        |                           |                                  |                        |                     | VGF21LP30       | 175                      | 175 | 175 |
| ANSI Class III (<0.05% Cv) seat leakage (A to AB) |                 |                   |                        |                           |                                  |                        |                     |                 |                          |     |     |
| 2-1/2"                                            | 70              | Mixing            | 125                    | 175 psi @ 130 F           | N / A                            | Equal % A-AB           | Stem up closes A-AB | VGF31EM25       | 55                       | 55  | 55  |
|                                                   |                 | Diverting         |                        |                           |                                  | Linear, Constant Total | Stem up closes B-AB | VGF31LD25       | 39                       | 39  | 39  |
| Mixing                                            | 250             | 400 psi @ 130 F   | Equal % A-AB           | Stem up closes A-AB       |                                  | VGF32EM25              | 55                  | 55              | 55                       |     |     |
| 3"                                                | 120             | Mixing            | 125                    | 175 psi @ 130 F           |                                  | Equal % A-AB           | Stem up closes A-AB | VGF31EM30       | 34                       | 34  | 34  |
|                                                   |                 | Diverting         | Linear, Constant Total | Stem up closes B-AB       |                                  | VGF31LD30              | 19                  | 19              | 19                       |     |     |
| 115                                               | 250             | 400 psi @ 130 F   | Equal % A-AB           | Stem up closes A-AB       |                                  | VGF32EM30              | 34                  | 34              | 34                       |     |     |

# Product Selection - Valves

## Threaded/Flanged Globe Valves 2"-3", With Tandem Non Fail Safe DCA and Valve Linkage

### Common Features

- For closed loop HVAC systems with up to 50% glycol
- ANSI Class 125 and 250 flanged cast iron bodies (VGF), brass body (V5011/13)
- Close-off pressure = Maximum differential pressure
- Maximum static water pressure: Up to 400 psi
- Stem travel: 0.75"
- Rangeability: 50:1
- Valve trim
  - VGF: Stainless steel stem and plug. Integrated (cast iron) seat on VGF mixing valves, stainless steel seat on all other VGF valves
  - V5011F/G/N1 & V5013: Stainless steel stem and brass seat
  - V5011N2: Stainless steel stem and seat
- Use Q5020 linkage on VGF\_LP and VGF\_EP pressure balanced valves



**Q5024B2230 and  
HU5024-001  
Required**



| Actuator Features                                        |                                     | Non Fail Safe              |                            |                  |
|----------------------------------------------------------|-------------------------------------|----------------------------|----------------------------|------------------|
| Actuator O.S. Number<br>(Two required per linkage/valve) |                                     | MN7220A2007<br>MN7220A2205 | MN6120A1002<br>MN6120A1200 | MN7234A2008      |
| Power Supply                                             | Voltage                             | 24 Vac                     | 24 Vac                     | 24 Vac           |
|                                                          | Frequency                           | 60 Hz                      | 60 Hz                      | 60 Hz            |
|                                                          | Power                               | 6 VA                       | 6 VA                       | 9 VA             |
| Actuator Torque                                          | (lb.-in.)                           | 175                        | 175                        | 300              |
| Linkage Stem Force, Two Actuators                        | (lbs.)                              | 360                        | 360                        | 667              |
| Stem & Bonnet Adapter Kit                                |                                     | HU5024-001                 |                            |                  |
| Control                                                  | (0)2-10 Vdc                         | •                          |                            | •                |
|                                                          | 4-20 mA (external 500 Ohm Resistor) | •                          |                            | •                |
|                                                          | Floating                            |                            | •                          |                  |
|                                                          | Two-Position SPDT                   |                            | •                          |                  |
|                                                          | Two-Position SPST                   |                            | •                          |                  |
| Fail Safe Action                                         |                                     | Stay in Place              | Stay in Place              | Stay in Place    |
| Normal Position<br>(no signal)                           | (field configurable)                | Stem Up/<br>Down           | Stem Up/<br>Down           | Stem Up/<br>Down |
| Actuator Stroke                                          | (inches)                            | 0.75                       | 0.75                       | 0.75             |
| Timing                                                   | (seconds)                           | 95                         | 95                         | 95               |
| Aux Switch                                               | 2 x SPDT Add-On                     | SW2-US                     | SW2-US                     | SW2-US           |
|                                                          | SPDT Built In                       | 0/2                        | 0/2                        |                  |
| Feedback                                                 | (0)2-10 Vdc Built In                | •                          |                            | •                |

| 2-Way Water & Steam Valves                        |                |                 |                   |                  |                           |                                  |                            |                     |                 |                                |                     |           |    |
|---------------------------------------------------|----------------|-----------------|-------------------|------------------|---------------------------|----------------------------------|----------------------------|---------------------|-----------------|--------------------------------|---------------------|-----------|----|
| Valve Size (inches)                               | Pipe Fitting   | Cv              | Valve Type        | ANSI Class       | Max Static Water Pressure | Max Steam Pressure / Temperature | Flow Characteristic        | Valve Action        | Valve OS Number | Close-off Pressure, psid       |                     |           |    |
| ANSI Class III (<0.05% Cv) seat leakage           |                |                 |                   |                  |                           |                                  |                            |                     |                 |                                |                     |           |    |
| 2"                                                | f NPT          | 47              | Standard          | N/A              | 217 psi @ 248 F           | 15 psi (2-position)              | Equal %                    | Stem down to close  | V5011N1099      | 162                            | 162                 | 240       |    |
| 2-1/2"                                            |                | 63              |                   |                  | 125                       | 100 psig / 337 F                 | Linear                     |                     | V5011N2097      | 100                            | 100                 | 100       |    |
|                                                   | 250 psi @ 100F |                 |                   |                  |                           | 15 psi (2-position)              | Equal %                    |                     | V5011F1105      | 130                            | 130                 | 225       |    |
|                                                   | 70             | 175 psi @ 130 F |                   |                  | 100 psig / 337 F          | Equal %                          | V5011G1111                 |                     | 100             | 100                            | 100                 |           |    |
|                                                   |                |                 |                   | VGF21ES25        |                           |                                  | 61                         |                     | 61              | 105                            |                     |           |    |
|                                                   |                |                 |                   | VGF21LS25        |                           |                                  | 61                         |                     | 61              | 105                            |                     |           |    |
|                                                   |                |                 |                   | VGF22ES25        |                           |                                  | 61                         |                     | 61              | 105                            |                     |           |    |
| 3"                                                | f NPT          | 100             |                   | N/A              | 250 psi @ 100F            | 15 psi (2-position)              | Equal %                    |                     | V5011F1113      | 65                             | 65                  | 115       |    |
|                                                   |                |                 |                   |                  |                           |                                  |                            |                     | V5011G1129      | 65                             | 65                  | 100       |    |
|                                                   |                |                 |                   |                  |                           |                                  |                            |                     | VGF21ES30       | 30                             | 30                  | 52        |    |
|                                                   |                |                 |                   |                  |                           |                                  |                            |                     | VGF21LS30       | 30                             | 30                  | 52        |    |
| 120                                               | 125            | 175 psi @ 130 F |                   | 100 psig / 337 F | Equal %                   | VGF22ES30                        | 30                         |                     | 30              | 52                             |                     |           |    |
|                                                   |                |                 |                   |                  |                           | 250                              | 400 psi @ 130 F            |                     | Equal %         | VGF22ES30                      | 30                  | 30        | 52 |
| ANSI Class IV (<0.01% Cv) seat leakage            |                |                 |                   |                  |                           |                                  |                            |                     |                 |                                |                     |           |    |
| 2-1/2"                                            | Flanged        | 70              | Pressure Balanced | 125              | 175 psi @ 130 F           | 125 psig / 353 F                 | Equal %                    | Stem down to close  | VGF21EP25       | Use Q5020A1003 linkage and DCA |                     |           |    |
| 3"                                                |                | 115             |                   |                  |                           |                                  | Linear                     |                     | VGF21LP25       |                                |                     |           |    |
|                                                   |                |                 |                   |                  |                           |                                  | Equal %                    |                     | VGF21EP30       |                                |                     |           |    |
|                                                   |                |                 | Linear            | VGF21LP30        |                           |                                  |                            |                     |                 |                                |                     |           |    |
| ANSI Class III (<0.05% Cv) seat leakage (A to AB) |                |                 |                   |                  |                           |                                  |                            |                     |                 |                                |                     |           |    |
| 2"                                                | f NPT          | 47              | Mixing            | N/A              | 217 psi @ 248 F           | N / A                            | Linear B-AB / Equal % A-AB | Stem up closes A-AB | V5013N1097      | 162                            | 162                 | 240       |    |
| 2-1/2"                                            | Flanged        | 70              | Mixing            | 125              | 175 psi @ 130 F           |                                  | Linear B-AB / Equal % A-AB | Stem up closes A-AB | VGF31EM25       | 77                             | 77                  | 133       |    |
|                                                   |                |                 | Diverting         | 250              | 400 psi @ 130 F           |                                  | Linear, Constant Total     | Stem up closes B-AB | VGF31LD25       | 61                             | 61                  | 105       |    |
|                                                   |                |                 | Mixing            |                  |                           |                                  | Linear B-AB / Equal % A-AB | Stem up closes A-AB | VGF32EM25       | 77                             | 77                  | 133       |    |
|                                                   |                |                 | 3"                | Flanged          | 120                       |                                  | Mixing                     | 125                 | 175 psi @ 130 F | Linear B-AB / Equal % A-AB     | Stem up closes A-AB | VGF31EM30 | 52 |
| Diverting                                         | 250            | 400 psi @ 130 F |                   |                  |                           |                                  | Linear, Constant Total     | Stem up closes B-AB | VGF31LD30       | 30                             | 30                  | 52        |    |
| Mixing                                            |                |                 |                   |                  |                           |                                  | Linear B-AB / Equal % A-AB | Stem up closes A-AB | VGF32EM30       | 52                             | 52                  | 89        |    |
|                                                   |                | 115             |                   |                  |                           |                                  |                            |                     |                 |                                |                     |           |    |

| 3-Way Water Valves                                |              |                 |            |            |                           |                                  |                            |                     |                 |                            |                     |           |    |
|---------------------------------------------------|--------------|-----------------|------------|------------|---------------------------|----------------------------------|----------------------------|---------------------|-----------------|----------------------------|---------------------|-----------|----|
| Valve Size (inches)                               | Pipe Fitting | Cv              | Valve Type | ANSI Class | Max Static Water Pressure | Max Steam Pressure / Temperature | Flow Characteristic        | Valve Action        | Valve OS Number | Close-off Pressure, psid   |                     |           |    |
| ANSI Class III (<0.05% Cv) seat leakage (A to AB) |              |                 |            |            |                           |                                  |                            |                     |                 |                            |                     |           |    |
| 2"                                                | f NPT        | 47              | Mixing     | N/A        | 217 psi @ 248 F           | N / A                            | Linear B-AB / Equal % A-AB | Stem up closes A-AB | V5013N1097      | 162                        | 162                 | 240       |    |
| 2-1/2"                                            | Flanged      | 70              | Mixing     | 125        | 175 psi @ 130 F           |                                  | Linear B-AB / Equal % A-AB | Stem up closes A-AB | VGF31EM25       | 77                         | 77                  | 133       |    |
|                                                   |              |                 | Diverting  | 250        | 400 psi @ 130 F           |                                  | Linear, Constant Total     | Stem up closes B-AB | VGF31LD25       | 61                         | 61                  | 105       |    |
|                                                   |              |                 | Mixing     |            |                           |                                  | Linear B-AB / Equal % A-AB | Stem up closes A-AB | VGF32EM25       | 77                         | 77                  | 133       |    |
|                                                   |              |                 | 3"         | Flanged    | 120                       |                                  | Mixing                     | 125                 | 175 psi @ 130 F | Linear B-AB / Equal % A-AB | Stem up closes A-AB | VGF31EM30 | 52 |
| Diverting                                         | 250          | 400 psi @ 130 F |            |            |                           |                                  | Linear, Constant Total     | Stem up closes B-AB | VGF31LD30       | 30                         | 30                  | 52        |    |
| Mixing                                            |              |                 |            |            |                           |                                  | Linear B-AB / Equal % A-AB | Stem up closes A-AB | VGF32EM30       | 52                         | 52                  | 89        |    |
|                                                   |              | 115             |            |            |                           |                                  |                            |                     |                 |                            |                     |           |    |

# Product Selection - Valves

## Threaded/Flanged Globe Valves 2"- 3", With Tandem Fail Safe DCA and Valve Linkage

### Common Features

- For closed loop HVAC systems with up to 50% glycol
- ANSI Class 125 and 250 flanged cast iron bodies (VGF), brass body (V5011/13)
- Close-off pressure = Maximum differential pressure
- Maximum static water pressure: Up to 400 psi
- Stem travel: 0.75"
- Rangeability: 50:1
- Valve trim
  - VGF: Stainless steel stem and plug. Integrated (cast iron) seat on VGF mixing valves, stainless steel seat on all other VGF valves
  - V5011F/G/N1 & V5013: Stainless steel stem and brass seat
  - V5011N2: Stainless steel stem and seat
- Use Q5020 linkage on VGF\_LP and VGF\_EP pressure balanced valves



**Q5024B2230 and HU5024-001 Required**



| Actuator Features                                     |                 | Fail Safe                                 |                            |                            |
|-------------------------------------------------------|-----------------|-------------------------------------------|----------------------------|----------------------------|
| Actuator O.S. Number (Two required per linkage/valve) |                 | MS7520A2007<br>MS7520A2205<br>MS7520H2208 | MS8120A1007<br>MS8120A1205 | MS4120A1001<br>MS4120A1209 |
| Power Supply                                          | Voltage         | 24 Vac                                    | 24 Vac                     | 100-250 Vac                |
|                                                       | Frequency       | 60 Hz                                     | 60 Hz                      | 60 Hz                      |
|                                                       | Power           | 16 VA                                     | 40 VA                      | 60 VA                      |
| Actuator Torque (lb.-in.)                             |                 | 175                                       | 175                        | 175                        |
| Linkage Stem Force, Two Actuators (lbs.)              |                 | 360                                       | 360                        | 360                        |
| Stem & Bonnet Adapter Kit                             |                 | HU5024-001                                |                            |                            |
| Control (0)-10 Vdc                                    |                 | •                                         |                            |                            |
| 4-20 mA (external 500 Ohm Resistor)                   |                 | •                                         |                            |                            |
| Floating                                              |                 | •                                         |                            |                            |
| Two-Position SPDT                                     |                 | •                                         |                            |                            |
| Two-Position SPST                                     |                 | •                                         | •                          | •                          |
| Fail Safe Action                                      |                 | Configurable Open/Closed                  | Configurable Open/Closed   | Configurable Open/Closed   |
| Normal Position (no signal) (field configurable)      |                 | Stem Up/Down                              | Stem Up/Down               | Stem Up/Down               |
| Actuator Stroke (inches)                              |                 | 0.75                                      | 0.75                       | 0.75                       |
| Timing (seconds)                                      |                 | 90                                        | 90                         | 90                         |
| Aux Switch                                            | 2 x SPDT Add-On | SW2-US                                    | SW2-US                     | SW2-US                     |
|                                                       | SPDT Built In   | 0 / 2 / 2                                 | 0 / 2                      | 0 / 2                      |
| Feedback (0)-10 Vdc Built In                          |                 | •                                         |                            |                            |

| Valve Size (inches)                               | Pipe Fitting                           | Cv              | Valve Type        | ANSI Class      | Max Static Water Pressure  | Max Steam Pressure / Temperature | Flow Characteristic        | Valve Action               | Valve OS Number     | Close-off Pressure, psid       |            |     |           |     |
|---------------------------------------------------|----------------------------------------|-----------------|-------------------|-----------------|----------------------------|----------------------------------|----------------------------|----------------------------|---------------------|--------------------------------|------------|-----|-----------|-----|
| ANSI Class III (<0.05% Cv) seat leakage           |                                        |                 |                   |                 |                            |                                  |                            |                            |                     |                                |            |     |           |     |
| 2"                                                | f NPT                                  | 47              | Standard          | N/A             | 217 psi @ 248 F            | 15 psi (2-position)              | Equal %                    | Stem down to close         | V5011N1099          | 162                            | 162        | 162 |           |     |
| 2-1/2"                                            |                                        | 63              |                   |                 | 250 psi @ 100F             | 100 psig / 337 F                 | Linear                     |                            | V5011N2097          | 100                            | 100        | 20  |           |     |
|                                                   | Flanged                                | 70              |                   |                 |                            | 125                              | 175 psi @ 130 F            |                            | 100 psig / 337 F    | Equal %                        | V5011F1105 | 130 | 130       | 130 |
|                                                   |                                        | 250             |                   |                 | 400 psi @ 130 F            |                                  | Equal %                    |                            | V5011G1111          | 100                            | 100        | 100 |           |     |
|                                                   |                                        | 3"              |                   | f NPT           | 100                        | N/A                              | 250 psi @ 100F             |                            | 15 psi (2-position) | Equal %                        | VGF21ES25  | 61  | 61        | 61  |
|                                                   |                                        |                 |                   |                 | 125                        |                                  | 175 psi @ 130 F            |                            | 100 psig / 337 F    | Linear                         | VGF21LS25  | 61  | 61        | 61  |
|                                                   | Flanged                                |                 |                   | 120             | 250                        | 400 psi @ 130 F                  | Equal %                    |                            | VGF22ES25           | 61                             | 61         | 61  |           |     |
| 3"                                                |                                        |                 |                   | f NPT           | 100                        | N/A                              | 250 psi @ 100F             |                            | 15 psi (2-position) | Equal %                        | V5011F1113 | 65  | 65        | 65  |
|                                                   | 125                                    | 175 psi @ 130 F |                   |                 | 100 psig / 337 F           |                                  | Linear                     |                            | V5011G1129          | 65                             | 65         | 65  |           |     |
|                                                   | Flanged                                | 120             |                   | 250             | 400 psi @ 130 F            | Equal %                          | VGF21ES30                  |                            | 30                  | 30                             | 30         |     |           |     |
|                                                   |                                        | Flanged         |                   | 120             | 250                        | 400 psi @ 130 F                  | Equal %                    |                            | VGF21LS30           | 30                             | 30         | 30  |           |     |
| Flanged                                           | 120                                    |                 |                   | 250             | 400 psi @ 130 F            | Equal %                          | VGF22ES30                  |                            | 30                  | 30                             | 30         |     |           |     |
|                                                   | ANSI Class IV (<0.01% Cv) seat leakage |                 |                   |                 |                            |                                  |                            |                            |                     |                                |            |     |           |     |
| 2-1/2"                                            | Flanged                                | 70              | Pressure Balanced | 125             | 175 psi @ 130 F            | 125 psig / 353 F                 | Equal %                    | Stem down to close         | VGF21EP25           | Use Q5020A1003 linkage and DCA |            |     |           |     |
| 3"                                                |                                        | 115             |                   |                 |                            |                                  | Linear                     |                            | VGF21LP25           |                                |            |     |           |     |
|                                                   |                                        | 115             |                   |                 |                            |                                  | Equal %                    |                            | VGF21EP30           |                                |            |     |           |     |
|                                                   |                                        |                 |                   |                 |                            |                                  | 115                        |                            | Linear              |                                |            |     | VGF21LP30 |     |
| ANSI Class III (<0.05% Cv) seat leakage (A to AB) |                                        |                 |                   |                 |                            |                                  |                            |                            |                     |                                |            |     |           |     |
| 2"                                                | f NPT                                  | 47              | Mixing            | N/A             | 217 psi @ 248 F            | N / A                            | Linear B-AB / Equal % A-AB | Stem up closes A-AB        | V5013N1097          | 162                            | 162        | 162 |           |     |
| 2-1/2"                                            | Flanged                                | 70              |                   | 125             | 175 psi @ 130 F            |                                  | Linear B-AB / Equal % A-AB | Stem up closes A-AB        | VGF31EM25           | 77                             | 77         | 77  |           |     |
|                                                   |                                        | 70              | 250               | 400 psi @ 130 F | Linear, Constant Total     |                                  | Stem up closes B-AB        | VGF31LD25                  | 61                  | 61                             | 61         |     |           |     |
|                                                   |                                        |                 | Mixing            | 250             | 400 psi @ 130 F            |                                  | Linear B-AB / Equal % A-AB | Stem up closes A-AB        | VGF32EM25           | 77                             | 77         | 77  |           |     |
|                                                   |                                        | 3"              | Flanged           | 120             | 125                        |                                  | 175 psi @ 130 F            | Linear B-AB / Equal % A-AB | Stem up closes A-AB | VGF31EM30                      | 52         | 52  | 52        |     |
| 120                                               | 250                                    |                 |                   | 400 psi @ 130 F | Linear, Constant Total     |                                  | Stem up closes B-AB        | VGF31LD30                  | 30                  | 30                             | 30         |     |           |     |
|                                                   | 115                                    |                 |                   | Mixing          | 250                        |                                  | 400 psi @ 130 F            | Linear B-AB / Equal % A-AB | Stem up closes A-AB | VGF32EM30                      | 52         | 52  | 52        |     |
| 115                                               |                                        |                 |                   | Diverting       | 250                        |                                  | 400 psi @ 130 F            | Linear B-AB / Equal % A-AB | Stem up closes A-AB |                                |            |     |           |     |
|                                                   | 115                                    | Mixing          | 250               | 400 psi @ 130 F | Linear B-AB / Equal % A-AB |                                  | Stem up closes A-AB        |                            |                     |                                |            |     |           |     |
| 115                                               |                                        | Diverting       | 250               | 400 psi @ 130 F | Linear B-AB / Equal % A-AB |                                  | Stem up closes A-AB        |                            |                     |                                |            |     |           |     |
|                                                   | 115                                    | Mixing          | 250               | 400 psi @ 130 F | Linear B-AB / Equal % A-AB |                                  | Stem up closes A-AB        |                            |                     |                                |            |     |           |     |
| 115                                               |                                        | Diverting       | 250               | 400 psi @ 130 F | Linear B-AB / Equal % A-AB | Stem up closes A-AB              |                            |                            |                     |                                |            |     |           |     |

VALVES

# Product Selection - Valves

## Flanged Globe Valves 2½"- 3", With Dedicated Valve Actuators



### Common Features

- ANSI Class 125 and 250 flanged cast iron bodies
- Close-off pressure = Maximum differential pressure
- Maximum static water pressure: Up to 400 psi
- Stem travel: 0.75"
- Rangeability: 50:1
- Valve trim: Stainless steel stem and plug. Integrated (cast iron) seat on VGF mixing valves, stainless steel seat on all other VGF valves



| Actuator Features                                |                   | Non Fail Safe |               |               |               |
|--------------------------------------------------|-------------------|---------------|---------------|---------------|---------------|
| Actuator O.S. Number                             |                   | ML6420A3049   | ML6420A3056   | ML7420A3055   | ML7420A3063   |
| Power Supply                                     | Voltage           | 24 Vac        | 24 Vac        | 24 Vac        | 24 Vac        |
|                                                  | Frequency         | 50 / 60 Hz    | 50 / 60 Hz    | 50 / 60 Hz    | 50 / 60 Hz    |
|                                                  | Power             | 6 VA          | 6 VA          | 7 VA          | 7 VA          |
| Stem Force (lbs.)                                |                   | 135           | 135           | 135           | 135           |
| Control (0)2-10 Vdc                              |                   |               |               | •             | •             |
| 4-20 mA (external 500 Ohm Resistor)              |                   |               |               | •             | •             |
| Floating                                         |                   | •             | •             |               |               |
| Two-Position SPDT                                |                   | •             | •             |               |               |
| Two-Position SPST                                |                   |               |               |               |               |
| 135 Ohm                                          |                   |               |               |               |               |
| Fail Safe Action                                 |                   | Stay in place | Stay in place | Stay in place | Stay in place |
| Normal Position (no signal) (field configurable) |                   | Stay in place | Stay in place | Stem Up       | Stem Up       |
| Actuator Stroke (inches)                         |                   | 0.75          | 0.75          | 0.75          | 0.75          |
| Timing (seconds at 0.75" stroke)                 |                   | 60            | 30            | 60            | 30            |
| High Temperature Kit Steam Application           |                   | 43196000-001  | 43196000-001  | 43196000-001  | 43196000-001  |
| Aux Switch                                       | 1 x SPDT Add-On   |               |               |               |               |
|                                                  | 2 x SPDT Add-On   | 43191680-105  | 43191680-105  | 43191680-105  | 43191680-105  |
| Feedback                                         | 2-10 Vdc Built In |               |               | •             | •             |
|                                                  | 2-10 Vdc Add-On   |               |               |               |               |
|                                                  | 220 Ohm Add-On    | 43191679-112  | 43191679-112  |               |               |
|                                                  | 10 kOhm Add-On    | 43191679-111  | 43191679-111  |               |               |

| Valve Size (inches)                               | Cv              | Valve Type        | ANSI Class      | Max Static Water Pressure | Max Steam Pressure / Temperature | Flow Characteristic    | Valve Action        | Valve OS Number     | Close-off Pressure, psid |     |     |     |
|---------------------------------------------------|-----------------|-------------------|-----------------|---------------------------|----------------------------------|------------------------|---------------------|---------------------|--------------------------|-----|-----|-----|
| ANSI Class III (<0.05% Cv) seat leakage           |                 |                   |                 |                           |                                  |                        |                     |                     |                          |     |     |     |
| 2-1/2"                                            | 70              | Standard          | 125             | 175 psi @ 130 F           | 100 psig / 337 F                 | Equal %                | Stem down to close  | VG21ES25            | 17                       | 17  | 17  | 17  |
|                                                   |                 |                   |                 | Linear                    |                                  | VG21LS25               |                     | 17                  | 17                       | 17  | 17  |     |
| 250                                               | 400 psi @ 130 F |                   | Equal %         | VG22ES25                  |                                  | 17                     |                     | 17                  | 17                       | 17  |     |     |
| 125                                               | 175 psi @ 130 F |                   | Equal %         | VG21ES30                  |                                  | 7                      |                     | 7                   | 7                        | 7   |     |     |
| 125                                               |                 | Linear            | VG21LS30        | 7                         |                                  | 7                      |                     | 7                   | 7                        |     |     |     |
| 3"                                                | 120             | 250               | 400 psi @ 130 F | Equal %                   |                                  | VG22ES30               |                     | 7                   | 7                        | 7   | 7   |     |
| ANSI Class IV (<0.01% Cv) seat leakage            |                 |                   |                 |                           |                                  |                        |                     |                     |                          |     |     |     |
| 2-1/2"                                            | 70              | Pressure Balanced | 125             | 175 psi @ 130 F           | 100 psig / 337 F                 | Equal %                | Stem down to close  | VG21EP25            | 175                      | 175 | 175 | 175 |
|                                                   |                 |                   |                 |                           |                                  |                        |                     | Linear              | VG21LP25                 | 175 | 175 | 175 |
| 3"                                                | 115             |                   |                 |                           |                                  | Equal %                |                     | VG21EP30            | 175                      | 175 | 175 | 175 |
|                                                   |                 |                   |                 |                           |                                  | Linear                 |                     | VG21LP30            | 175                      | 175 | 175 | 175 |
| ANSI Class III (<0.05% Cv) seat leakage (A to AB) |                 |                   |                 |                           |                                  |                        |                     |                     |                          |     |     |     |
| 2-1/2"                                            | 70              | Mixing            | 125             | 175 psi @ 130 F           | N/A                              | Equal % A-AB           | Stem up closes A-AB | VG31EM25            | 23                       | 23  | 23  | 23  |
|                                                   |                 | Diverting         |                 |                           |                                  | Linear, Constant Total | Stem up closes B-AB | VG31LD25            | 17                       | 17  | 17  | 17  |
|                                                   |                 | Mixing            | 250             | 400 psi @ 130 F           |                                  | Equal % A-AB           | Stem up closes A-AB | VG32EM25            | 23                       | 23  | 23  | 23  |
| 3"                                                | 120             | Mixing            | 125             | 175 psi @ 130 F           |                                  | Equal % A-AB           | Stem up closes A-AB | VG31EM30            | 15                       | 15  | 15  | 15  |
|                                                   |                 | Diverting         |                 |                           |                                  | Linear, Constant Total | Stem up closes B-AB | VG31LD30            | 7                        | 7   | 7   | 7   |
|                                                   |                 | 115               | Mixing          | 250                       |                                  | 400 psi @ 130 F        | Equal % A-AB        | Stem up closes A-AB | VG32EM30                 | 19  | 19  | 15  |

# Product Selection - Valves

## Flanged Globe Valves 2½"- 3", With Dedicated Valve Actuators

### Common Features

- ANSI Class 125 and 250 flanged cast iron bodies
- Close-off pressure = Maximum differential pressure
- Maximum static water pressure: Up to 400 psi
- Maximum steam pressure (V5011, 2-pos): 15 psi
- Stem travel: 0.75"
- Rangeability: 50:1
- Valve trim: Stainless steel stem and plug. Integrated (cast iron) seat on VGF mixing valves, stainless steel seat on all other VGF valves



| Actuator Features           |                                     | Non Fail Safe   |               |
|-----------------------------|-------------------------------------|-----------------|---------------|
| Actuator O.S. Number        |                                     | ML7421A1032     | ML6421A1017   |
| Power Supply                | Voltage                             | 24 Vac          | 24 Vac        |
|                             | Frequency                           | 50 / 60 Hz      | 50 / 60 Hz    |
|                             | Power                               | 12 VA           | 11 VA         |
| Stem Force                  | (lbs.)                              | 404             | 404           |
| Control                     | (0)2-10 Vdc                         | •               |               |
|                             | 4-20 mA (external 500 Ohm Resistor) | •               |               |
|                             | Floating                            |                 | •             |
|                             | Two-Position SPDT                   |                 | •             |
|                             | Fail Safe Action                    | Stay in place   | Stay in place |
| Normal Position (no signal) | (field configurable)                | Stem Up         | Stay in place |
|                             | Actuator Stroke (inches)            | 0.75            | 0.75          |
| Timing                      | (seconds at 0.75" stroke)           | 90              | 90            |
| High Temperature Kit        | Steam Application                   | 43196000-001    | 43196000-001  |
|                             | Aux Switch                          | 2 x SPDT Add-On | 43191680-102  |
| Feedback                    | 2-10 Vdc Built In                   | •               |               |
|                             | 220 Ohm Add-On                      |                 | 43191679-101  |
|                             | 10 kOhm Add-On                      |                 |               |

| Valve Size (inches)                               | Cv      | Valve Type             | ANSI Class | Max Static Water Pressure | Max Steam Pressure / Temperature | Flow Characteristic | Valve Action        | Valve OS Number | Close-off Pressure, psid |              |                     |           |    |    |
|---------------------------------------------------|---------|------------------------|------------|---------------------------|----------------------------------|---------------------|---------------------|-----------------|--------------------------|--------------|---------------------|-----------|----|----|
| ANSI Class III (<0.05% Cv) seat leakage           |         |                        |            |                           |                                  |                     |                     |                 |                          |              |                     |           |    |    |
| 2-1/2"                                            | 70      | Standard               | 125        | 175 psi @ 130 F           | 100 psig / 337 F                 | Equal %             | Stem down to close  | VGF21ES25       | 68                       | 68           |                     |           |    |    |
|                                                   |         |                        | 3"         | 125                       |                                  | 250                 |                     | 400 psi @ 130 F | Linear                   | VGF21LS25    | 68                  | 68        |    |    |
| 120                                               | 125     |                        |            |                           |                                  | 175 psi @ 130 F     |                     | Equal %         | VGF22ES25                | 68           | 68                  |           |    |    |
|                                                   | 250     |                        |            | 400 psi @ 130 F           |                                  | Linear              |                     | VGF21ES30       | 33                       | 33           |                     |           |    |    |
| 250                                               |         | 400 psi @ 130 F        |            | Equal %                   |                                  | VGF21LS30           |                     | 33              | 33                       |              |                     |           |    |    |
|                                                   | 250     | 400 psi @ 130 F        | Linear     | VGF22ES30                 |                                  | 33                  |                     | 33              |                          |              |                     |           |    |    |
| ANSI Class IV (<0.01% Cv) seat leakage            |         |                        |            |                           |                                  |                     |                     |                 |                          |              |                     |           |    |    |
| 2-1/2"                                            | 70      | Pressure Balanced      | 125        | 175 psi @ 130 F           | 100 psig / 337 F                 | Equal %             | Stem down to close  | VGF21EP25       | 175                      | 175          |                     |           |    |    |
|                                                   |         |                        |            |                           |                                  | 3"                  |                     | 115             | Linear                   | VGF21LP25    | 175                 | 175       |    |    |
| 115                                               | Equal % |                        |            |                           |                                  |                     |                     |                 | VGF21EP30                | 175          | 175                 |           |    |    |
|                                                   | 115     |                        |            |                           |                                  |                     |                     | Linear          | VGF21LP30                | 175          | 175                 |           |    |    |
| ANSI Class III (<0.05% Cv) seat leakage (A to AB) |         |                        |            |                           |                                  |                     |                     |                 |                          |              |                     |           |    |    |
| 2-1/2"                                            | 70      | Mixing                 |            |                           |                                  | 125                 |                     | 175 psi @ 130 F | N / A                    | Equal % A-AB | Stem up closes A-AB | VGF31EM25 | 94 | 94 |
|                                                   |         | Diverting              | 250        | 400 psi @ 130 F           | Linear, Constant Total           |                     | Stem up closes B-AB |                 |                          | VGF31LD25    | 68                  | 68        |    |    |
|                                                   |         | Mixing                 |            |                           | Equal % A-AB                     |                     | Stem up closes A-AB |                 |                          | VGF32EM25    | 94                  | 94        |    |    |
| 3"                                                | 120     | Diverting              | 125        | 175 psi @ 130 F           | Equal % A-AB                     | Stem up closes A-AB | VGF31EM30           | 58              |                          | 58           |                     |           |    |    |
|                                                   |         | Linear, Constant Total |            |                           | Stem up closes B-AB              | VGF31LD30           | 33                  | 33              |                          |              |                     |           |    |    |
|                                                   | 115     | Mixing                 | 250        | 400 psi @ 130 F           | Equal % A-AB                     | Stem up closes A-AB | VGF32EM30           | 58              |                          | 58           |                     |           |    |    |
|                                                   |         | Diverting              |            |                           | Stem up closes B-AB              |                     |                     |                 |                          |              |                     |           |    |    |

2-Way Water & Steam Valves  
3-Way Water Valves

VALVES

# Product Selection - Valves

## Flanged Globe Valves 2½"- 3", With Dedicated Fail Safe Valve Actuators



### Common Features

- ANSI Class 125 and 250 flanged cast iron bodies
- Close-off pressure = Maximum differential pressure
- Maximum static water pressure: Up to 400 psi
- Stem travel: 0.75"
- Rangeability: 50:1
- Valve trim: Stainless steel stem and plug. Integrated (cast iron) seat on VGF mixing valves, stainless steel seat on all other VGF valves



| Actuator Features                                | Fail Safe              |                      |                        |                      |
|--------------------------------------------------|------------------------|----------------------|------------------------|----------------------|
| Actuator O.S. Number                             | ML7425A3013            | ML7425B3012          | ML6425A3022            | ML6425B3013          |
| Power Supply Voltage                             | 24 Vac                 | 24 Vac               | 24 Vac                 | 24 Vac               |
| Frequency                                        | 50 / 60 Hz             | 50 / 60 Hz           | 50 / 60 Hz             | 50 / 60 Hz           |
| Power                                            | 12 VA                  | 12 VA                | 11 VA                  | 11 VA                |
| Stem Force (lbs.)                                | 135                    | 135                  | 135                    | 135                  |
| Control (0)2-10 Vdc                              | •                      | •                    |                        |                      |
| 4-20 mA (external 500 Ohm Resistor)              | •                      | •                    |                        |                      |
| Floating                                         |                        |                      | •                      | •                    |
| Two-Position SPDT                                |                        |                      | •                      | •                    |
| Fail Safe Action                                 | Stem Down (2-way N.C.) | Stem Up (2-way N.O.) | Stem Down (2-way N.C.) | Stem Up (2-way N.O.) |
| Normal Position (no signal) (field configurable) | Stem Up                | Stem Up              | Stay in Place          | Stay in Place        |
| Actuator Stroke (inches)                         | 0.75                   | 0.75                 | 0.75                   | 0.75                 |
| Timing (seconds at 0.75" stroke)                 | 90                     | 90                   | 90                     | 90                   |
| High Temperature Kit Steam Application           | 43196000-001           | 43196000-001         | 43196000-001           | 43196000-001         |
| Aux Switch 2 x SPDT Add-On                       | 43191680-105           | 43191680-105         | 43191680-105           | 43191680-105         |
| Feedback 2-10 Vdc Built In                       | •                      | •                    |                        |                      |
| 220 Ohm Add-On                                   | 43191679-112           | 43191679-112         | 43191679-112           | 43191679-112         |
| 10 kOhm Add-On                                   | 43191679-111           | 43191679-111         | 43191679-111           | 43191679-111         |

| Valve Size (inches)                               | Cv  | Valve Type        | ANSI Class | Max Static Water Pressure | Max Steam Pressure / Temperature | Flow Characteristic | Valve Action       | Valve OS Number | Close-off Pressure, psid |       |              |                     |           |           |     |     |     |
|---------------------------------------------------|-----|-------------------|------------|---------------------------|----------------------------------|---------------------|--------------------|-----------------|--------------------------|-------|--------------|---------------------|-----------|-----------|-----|-----|-----|
| ANSI Class III (<0.05% Cv) seat leakage           |     |                   |            |                           |                                  |                     |                    |                 |                          |       |              |                     |           |           |     |     |     |
| 2-1/2"                                            | 70  | Standard          | 125        | 175 psi @ 130 F           | 100 psig / 337 F                 | Equal %             | Stem down to close | VGF21ES25       | 17                       | 17    | 17           | 17                  |           |           |     |     |     |
|                                                   |     |                   | 250        | 400 psi @ 130 F           |                                  | Linear              |                    | VGF21LS25       | 17                       | 17    | 17           | 17                  |           |           |     |     |     |
|                                                   |     |                   |            |                           |                                  | Equal %             |                    | VGF22ES25       | 17                       | 17    | 17           | 17                  |           |           |     |     |     |
| 3"                                                | 125 |                   | 125        | 175 psi @ 130 F           |                                  | Equal %             |                    | VGF21ES30       | 7                        | 7     | 7            | 7                   |           |           |     |     |     |
|                                                   |     |                   | 250        | 400 psi @ 130 F           |                                  | Linear              |                    | VGF21LS30       | 7                        | 7     | 7            | 7                   |           |           |     |     |     |
|                                                   |     |                   |            |                           |                                  | Equal %             |                    | VGF22ES30       | 7                        | 7     | 7            | 7                   |           |           |     |     |     |
| ANSI Class IV (<0.01% Cv) seat leakage            |     |                   |            |                           |                                  |                     |                    |                 |                          |       |              |                     |           |           |     |     |     |
| 2-1/2"                                            | 70  | Pressure Balanced | 125        | 175 psi @ 130 F           | 100 psig / 337 F                 | Equal %             | Stem down to close | VGF21EP25       | 175                      | 175   | 175          | 175                 |           |           |     |     |     |
|                                                   |     |                   |            |                           |                                  | Linear              |                    | VGF21LP25       | 175                      | 175   | 175          | 175                 |           |           |     |     |     |
| 3"                                                | 115 |                   |            |                           |                                  | Equal %             |                    | VGF21EP30       | 175                      | 175   | 175          | 175                 |           |           |     |     |     |
|                                                   |     |                   |            |                           |                                  |                     |                    |                 |                          |       |              |                     | Linear    | VGF21LP30 | 175 | 175 | 175 |
| ANSI Class III (<0.05% Cv) seat leakage (A to AB) |     |                   |            |                           |                                  |                     |                    |                 |                          |       |              |                     |           |           |     |     |     |
| 2-1/2"                                            | 70  |                   |            |                           |                                  | Mixing              |                    | 125             | 175 psi @ 130 F          | N / A | Equal % A-AB | Stem up closes A-AB | VGF31EM25 | 23        | 23  | 23  | 23  |
|                                                   |     | Diverting         | 250        | 400 psi @ 130 F           | Linear, Constant Total           | Stem up closes B-AB | VGF31LD25          | 23              | 23                       |       | 23           | 23                  |           |           |     |     |     |
|                                                   |     | Mixing            |            |                           | Equal % A-AB                     | Stem up closes A-AB | VGF32EM25          | 23              | 23                       |       | 23           | 23                  |           |           |     |     |     |
| 3"                                                | 120 | Mixing            | 125        | 175 psi @ 130 F           | Equal % A-AB                     | Stem up closes A-AB | VGF31EM30          | 15              | 15                       |       | 15           | 15                  |           |           |     |     |     |
|                                                   |     | Diverting         | 250        | 400 psi @ 130 F           | Linear, Constant Total           | Stem up closes B-AB | VGF31LD30          | 7               | 7                        |       | 7            | 7                   |           |           |     |     |     |
|                                                   | 115 | Mixing            |            |                           | Equal % A-AB                     | Stem up closes A-AB | VGF32EM30          | 15              | 15                       |       | 15           | 15                  |           |           |     |     |     |

2-Way Water & Steam Valves  
3-Way Water Valves

# Product Selection - Valves

## Flanged Globe Valves 4"- 6", With Tandem DCA and Valve Linkage

### Common Features

- ANSI Class 125 and 250 flanged cast iron bodies
- Close-off pressure = Maximum differential pressure
- Maximum static water pressure: Up to 400 psi
- Stem travel: 1.5"
- Rangeability: 50:1
- Valve trim: Stainless steel stem and plug. Integrated (cast iron) seat on VGF mixing valves, stainless steel seat on all other VGF valves



**Q5024B2240 and  
HU5024-002  
Required**



| Actuator Features                                         |                                     | Non Fail Safe              |                            |               |
|-----------------------------------------------------------|-------------------------------------|----------------------------|----------------------------|---------------|
| Actuator O.S. Number<br>(Two Actuators per valve/linkage) |                                     | MN7220A2007<br>MN7220A2205 | MN6120A1002<br>MN6120A1200 | MN7234A2008   |
| Power Supply                                              | Voltage                             | 24 Vac                     | 24 Vac                     | 24 Vac        |
|                                                           | Frequency                           | 60 Hz                      | 60 Hz                      | 60 Hz         |
|                                                           | Power                               | 6 VA                       | 6 VA                       | 9 VA          |
| Actuator Torque (lb.-in.)                                 |                                     | 175                        | 175                        | 300           |
| Linkage Stem Force, Two Actuators (lbs.)                  |                                     | 272                        | 272                        | 467           |
| Stem & Bonnet Adapter Kit                                 |                                     | HU5024-002                 |                            |               |
| Control                                                   | (0)2-10 Vdc                         | •                          |                            | •             |
|                                                           | 4-20 mA (external 500 Ohm Resistor) | •                          |                            | •             |
|                                                           | Floating                            |                            | •                          |               |
|                                                           | Two-Position SPDT                   |                            | •                          |               |
|                                                           | Two-Position SPST                   |                            | •                          |               |
| Fail Safe Action                                          |                                     | Stay in Place              | Stay in Place              | Stay in Place |
| Normal Position (no signal) (field configurable)          |                                     | Stem Up/Down               | Stem Up/Down               | Stem Up/Down  |
| Actuator Stroke (inches)                                  |                                     | 1.5                        | 1.5                        | 1.5           |
| Timing (seconds)                                          |                                     | 95                         | 95                         | 95            |
| Aux Switch                                                | 2 x SPDT Add-On                     | SW2-US                     | SW2-US                     | SW2-US        |
|                                                           | SPDT Built In                       | 0 / 2                      | 0 / 2                      |               |
| Feedback (0)2-10 Vdc Built In                             |                                     | •                          |                            | •             |

| Valve Size (inches)                     | Cv                                     | Valve Type        | Max Static Water Pressure | ANSI Class      | Max Steam Pressure | Flow Characteristic    | Valve Action        | Valve OS Number | Close-off Pressure, psid |     |                               |
|-----------------------------------------|----------------------------------------|-------------------|---------------------------|-----------------|--------------------|------------------------|---------------------|-----------------|--------------------------|-----|-------------------------------|
| ANSI Class III (<0.05% Cv) Seat Leakage |                                        |                   |                           |                 |                    |                        |                     |                 |                          |     |                               |
| 4"                                      | 155                                    | Standard          | 175 psi @ 130 F           | 125             | 100 psig / 337 F   | Equal %                | Stem down to close  | VGF21ES40       | 22                       | 22  | 39                            |
|                                         | 150                                    |                   | 400 psi @ 130 F           | 250             |                    | Linear                 |                     | VGF21LS40       | 22                       | 22  | 39                            |
| 5"                                      |                                        |                   | 175 psi @ 130 F           | 125             |                    | Equal %                |                     | VGF22ES40       | 22                       | 22  | 39                            |
|                                         | 320                                    |                   | 400 psi @ 130 F           | 250             |                    | Linear                 |                     | VGF21ES50       | 9                        | 9   | 15                            |
|                                         |                                        |                   | 370                       | 175 psi @ 130 F |                    | 125                    |                     | Equal %         | VGF21LS50                | 9   | 9                             |
|                                         | 6"                                     |                   |                           | 400 psi @ 130 F |                    | 250                    |                     | Linear          | VGF22ES50                | 9   | 9                             |
|                                         |                                        | 175 psi @ 130 F   | 125                       | Equal %         |                    | VGF21ES60              |                     | 9               | 9                        | 15  |                               |
|                                         |                                        | 400 psi @ 130 F   | 250                       | Linear          |                    | VGF21LS60              |                     | 9               | 9                        | 15  |                               |
|                                         |                                        |                   |                           |                 | Equal %            | VGF22ES60              | 9                   | 9               | 15                       |     |                               |
|                                         | ANSI Class IV (<0.01% Cv) Seat Leakage |                   |                           |                 |                    |                        |                     |                 |                          |     |                               |
| 4"                                      | 150                                    | Pressure Balanced | 175 psi @ 130 F           | 125             | 100 psig / 337 F   | Equal %                | Stem down to close  | VGF21EP40       | 175                      | 175 | Use Tandem 175 in lb actuator |
| 5"                                      | 285                                    |                   |                           |                 |                    | Linear                 |                     | VGF21LP40       | 175                      | 175 |                               |
|                                         |                                        |                   |                           |                 |                    | Equal %                |                     | VGF21EP50       | 175                      | 175 |                               |
|                                         |                                        |                   |                           |                 |                    | Linear                 |                     | VGF21LP50       | 175                      | 175 |                               |
|                                         |                                        |                   |                           |                 |                    | Equal %                |                     | VGF21EP60       | 175                      | 175 |                               |
| 6"                                      | 370                                    | Linear            | VGF21LP60                 | 175             | 175                |                        |                     |                 |                          |     |                               |
| ANSI Class III (<0.05% Cv) Seat Leakage |                                        |                   |                           |                 |                    |                        |                     |                 |                          |     |                               |
| 4"                                      | 150                                    | Mixing            | 175 psi @ 130 F           | 125             | N / A              | Equal % A-AB           | Stem up closes A-AB | VGF31EM40       | 22                       | 22  | 39                            |
|                                         | 160                                    | Diverting         | 400 psi @ 130 F           | 250             |                    | Linear, Constant Total | Stem up closes B-AB | VGF31LD40       | 22                       | 22  | 39                            |
|                                         | 170                                    | Mixing            | 175 psi @ 130 F           | 125             |                    | Equal % A-AB           | Stem up closes A-AB | VGF32EM40       | 22                       | 22  | 39                            |
| 5"                                      | 320                                    | Mixing            | 175 psi @ 130 F           | 125             |                    | Equal % A-AB           | Stem up closes A-AB | VGF31EM50       | 9                        | 9   | 15                            |
|                                         | 285                                    | Diverting         | 400 psi @ 130 F           | 250             |                    | Linear, Constant Total | Stem up closes B-AB | VGF31LD50       | 9                        | 9   | 15                            |
|                                         | 320                                    | Mixing            | 175 psi @ 130 F           | 125             |                    | Equal % A-AB           | Stem up closes A-AB | VGF32EM50       | 9                        | 9   | 15                            |
| 6"                                      | 370                                    | Mixing            | 175 psi @ 130 F           | 125             |                    | Equal % A-AB           | Stem up closes A-AB | VGF31EM60       | 9                        | 9   | 15                            |
|                                         | 380                                    | Diverting         | 400 psi @ 130 F           | 250             |                    | Linear, Constant Total | Stem up closes B-AB | VGF31LD60       | 9                        | 9   | 15                            |
|                                         | 370                                    | Mixing            | 175 psi @ 130 F           | 125             |                    | Equal % A-AB           | Stem up closes A-AB | VGF32EM60       | 9                        | 9   | 15                            |

VALVES

# Product Selection - Valves

## Flanged Globe Valves 4"- 6", With Tandem DCA and Valve Linkage

### Common Features

- ANSI Class 125 and 250 flanged cast iron bodies
- Close-off pressure = Maximum differential pressure
- Maximum static water pressure: Up to 400 psi
- Stem travel: 1.5"
- Rangeability: 50:1
- Valve trim: Stainless steel stem and plug. Integrated (cast iron) seat on VGF mixing valves, stainless steel seat on all other VGF valves

**Q5024B2240 and  
HU5024-002  
Required**



| Actuator Features                                         |                                     | Fail Safe                                 |                            |                            |
|-----------------------------------------------------------|-------------------------------------|-------------------------------------------|----------------------------|----------------------------|
| Actuator O.S. Number<br>(Two Actuators per valve/linkage) |                                     | MS7520A2007<br>MS7520A2205<br>MS7520H2208 | MS8120A1007<br>MS8120A1205 | MS4120A1001<br>MS4120A1209 |
| Power Supply                                              | Voltage                             | 24 Vac                                    | 24 Vac                     | 100-250 Vac                |
|                                                           | Frequency                           | 60 Hz                                     | 60 Hz                      | 60 Hz                      |
| Actuator Torque                                           | (lb.-in.)                           | 175                                       | 175                        | 175                        |
|                                                           | (lbs.)                              | 325                                       | 325                        | 272                        |
| Linkage Stem Force, Two Actuators                         |                                     |                                           |                            |                            |
| Stem & Bonnet Adapter Kit                                 |                                     | HU5024-002                                |                            |                            |
| Control                                                   | (0)2-10 Vdc                         | •                                         |                            |                            |
|                                                           | 4-20 mA (external 500 Ohm Resistor) | •                                         |                            |                            |
| Floating                                                  |                                     | •                                         |                            |                            |
|                                                           | Two-Position SPDT                   | •                                         |                            |                            |
| Two-Position SPST                                         |                                     | •                                         | •                          | •                          |
|                                                           |                                     |                                           |                            |                            |
| Fail Safe Action                                          |                                     | Configurable Open/Closed                  | Configurable Open/Closed   | Configurable Open/Closed   |
| Normal Position<br>(no signal)<br>(field configurable)    |                                     | Stem Up/Down                              | Stem Up/Down               | Stem Up/Down               |
| Actuator Stroke                                           |                                     | (inches)                                  | 1.5                        | 1.5                        |
| Timing                                                    |                                     | (seconds)                                 | 90                         | 90                         |
| Aux Switch                                                | 2 x SPDT Add-On                     | SW2-US                                    | SW2-US                     | SW2-US                     |
|                                                           | SPDT Built In                       | 0 / 2 / 2                                 | 0 / 2                      | 0 / 2                      |
| Feedback                                                  |                                     | (0)2-10 Vdc Built In                      | •                          |                            |

| Valve Size (inches)                     | Cv              | Valve Type        | Max Static Water Pressure | ANSI Class | Max Steam Pressure | Flow Characteristic    | Valve Action        | Valve OS Number | Close-off Pressure, psid |     |     |  |  |  |  |
|-----------------------------------------|-----------------|-------------------|---------------------------|------------|--------------------|------------------------|---------------------|-----------------|--------------------------|-----|-----|--|--|--|--|
| ANSI Class III (<0.05% Cv) Seat Leakage |                 |                   |                           |            |                    |                        |                     |                 |                          |     |     |  |  |  |  |
| 4"                                      | 155             | Standard          | 175 psi @ 130 F           | 125        | 100 psig / 337 F   | Equal %                | Stem down to close  | VGF21ES40       | 22                       | 22  | 22  |  |  |  |  |
|                                         | 150             |                   | 400 psi @ 130 F           | 250        |                    | Linear                 |                     | VGF21LS40       | 22                       | 22  | 22  |  |  |  |  |
| 5"                                      | 175 psi @ 130 F |                   | 125                       | Equal %    |                    | VGF22ES40              |                     | 22              | 22                       | 22  |     |  |  |  |  |
|                                         | 400 psi @ 130 F |                   | 250                       | Linear     |                    | VGF21ES50              |                     | 9               | 9                        | 9   |     |  |  |  |  |
| 6"                                      | 175 psi @ 130 F |                   | 125                       | Equal %    |                    | VGF21LS50              |                     | 9               | 9                        | 9   |     |  |  |  |  |
|                                         | 400 psi @ 130 F |                   | 250                       | Linear     |                    | VGF22ES50              |                     | 9               | 9                        | 9   |     |  |  |  |  |
|                                         | 175 psi @ 130 F | 125               | Linear                    | VGF21ES60  | 9                  | 9                      | 9                   |                 |                          |     |     |  |  |  |  |
|                                         |                 |                   | 400 psi @ 130 F           | 250        |                    | Equal %                |                     | VGF21LS60       | 9                        | 9   | 9   |  |  |  |  |
|                                         |                 |                   |                           |            |                    | Equal %                |                     | VGF22ES60       | 9                        | 9   | 9   |  |  |  |  |
| ANSI Class IV (<0.01% Cv) Seat Leakage  |                 |                   |                           |            |                    |                        |                     |                 |                          |     |     |  |  |  |  |
| 4"                                      | 150             | Pressure Balanced | 175 psi @ 130 F           | 125        | 100 psig / 337 F   | Equal %                | Stem down to close  | VGF21EP40       | 175                      | 175 | 175 |  |  |  |  |
|                                         | Linear          |                   |                           |            |                    | VGF21LP40              |                     | 175             | 175                      | 175 |     |  |  |  |  |
| 5"                                      | 285             |                   |                           |            |                    | Equal %                |                     | VGF21EP50       | 175                      | 175 | 175 |  |  |  |  |
|                                         |                 |                   |                           |            |                    | Linear                 |                     | VGF21LP50       | 175                      | 175 | 175 |  |  |  |  |
| 6"                                      | 370             |                   |                           |            |                    | Equal %                |                     | VGF21EP60       | 175                      | 175 | 175 |  |  |  |  |
|                                         |                 |                   |                           |            |                    | Linear                 |                     | VGF21LP60       | 175                      | 175 | 175 |  |  |  |  |
| ANSI Class III (<0.05% Cv) Seat Leakage |                 |                   |                           |            |                    |                        |                     |                 |                          |     |     |  |  |  |  |
| 4"                                      | 150             | Mixing            | 175 psi @ 130 F           | 125        | N / A              | Equal % A-AB           | Stem up closes A-AB | VGF31EM40       | 22                       | 22  | 22  |  |  |  |  |
|                                         | 160             | Diverting         | 400 psi @ 130 F           | 250        |                    | Linear, Constant Total | Stem up closes B-AB | VGF31LD40       | 22                       | 22  | 22  |  |  |  |  |
| 5"                                      | 170             | Mixing            | 175 psi @ 130 F           | 125        |                    | Equal % A-AB           | Stem up closes A-AB | VGF32EM40       | 22                       | 22  | 22  |  |  |  |  |
|                                         | 320             | Mixing            | 400 psi @ 130 F           | 250        |                    | Equal % A-AB           | Stem up closes A-AB | VGF31EM50       | 9                        | 9   | 9   |  |  |  |  |
| 6"                                      | 285             | Diverting         | 175 psi @ 130 F           | 125        |                    | Linear, Constant Total | Stem up closes B-AB | VGF31LD50       | 9                        | 9   | 9   |  |  |  |  |
|                                         | 320             | Mixing            | 400 psi @ 130 F           | 250        |                    | Equal % A-AB           | Stem up closes A-AB | VGF32EM50       | 9                        | 9   | 9   |  |  |  |  |
| 6"                                      | 370             | Mixing            | 175 psi @ 130 F           | 125        |                    | Equal % A-AB           | Stem up closes A-AB | VGF31EM60       | 9                        | 9   | 9   |  |  |  |  |
|                                         | 380             | Diverting         | 400 psi @ 130 F           | 250        |                    | Linear, Constant Total | Stem up closes B-AB | VGF31LD60       | 9                        | 9   | 9   |  |  |  |  |
|                                         | 370             | Mixing            | 400 psi @ 130 F           | 250        |                    | Equal % A-AB           | Stem up closes A-AB | VGF32EM60       | 9                        | 9   | 9   |  |  |  |  |

# Product Selection - Valves

## Flanged Globe Valves 4"- 6", With Dedicated Valve Actuators

### Common Features

- ANSI Class 125 and 250 flanged cast iron bodies
- Close-off pressure = Maximum differential pressure
- Maximum static water pressure: Up to 400 psi
- Stem travel: 1.5"
- Rangeability: 50:1
- Valve trim: Stainless steel stem and plug. Integrated (cast iron) seat on VGF mixing valves, stainless steel seat on all other VGF valves



| Actuator Features                           |                                                  | Non Fail Safe |               |
|---------------------------------------------|--------------------------------------------------|---------------|---------------|
| Actuator O.S. Number                        |                                                  | ML7421B1023   | ML6421B1040   |
| Power Supply                                | Voltage                                          | 24 Vac        | 24 Vac        |
|                                             | Frequency                                        | 50 / 60 Hz    | 50 / 60 Hz    |
|                                             | Power                                            | 12 VA         | 11 VA         |
| Stem Force (lbs.)                           |                                                  | 404           | 404           |
| Control                                     | (0)2-10 Vdc                                      | •             |               |
|                                             | 4-20 mA (external 500 Ohm Resistor)              | •             |               |
|                                             | Floating                                         |               | •             |
| Fail Safe Action                            | Two-Position SPDT                                |               | •             |
|                                             | Stay in Place                                    | Stay in Place | Stay in Place |
|                                             | Normal Position (no signal) (field configurable) | Stem up/down  | Stay in Place |
| Actuator Stroke (inches)                    |                                                  | 1.5           | 1.5           |
| Stroke Timing (seconds)                     |                                                  | 175           | 175           |
| High Temperature Kit Steam Application      |                                                  | 43196000-038  | 43196000-038  |
| Aux Switch 2 x SPDT (24 Vac) (add-on)       |                                                  | 43191680-102  | 43191680-102  |
| Feedback 1 x 220 Ohm Potentiometer (add-on) |                                                  | 43191679-102  |               |
| 2-10 Vdc (built in)                         |                                                  | •             |               |

| 2-Way Water & Steam Valves              |        |                   |                           |            |                                  |                        |                     |                 |                          |     |
|-----------------------------------------|--------|-------------------|---------------------------|------------|----------------------------------|------------------------|---------------------|-----------------|--------------------------|-----|
| Valve Size (inches)                     | Cv     | Valve Type        | Max Static Water Pressure | ANSI Class | Max Steam Pressure / Temperature | Flow Characteristic    | Valve Action        | Valve OS Number | Close-off Pressure, psid |     |
| ANSI Class III (<0.05% Cv) Seat Leakage |        |                   |                           |            |                                  |                        |                     |                 |                          |     |
| 4"                                      | 155    | Standard          | 175 psi @ 130 F           | 125        | 100 psig / 337 F                 | Equal %                | Stem down to close  | VGF21ES40       | 22                       | 22  |
|                                         | 150    |                   | 400 psi @ 130 F           | 250        |                                  | Linear                 |                     | VGF21LS40       | 22                       | 22  |
| 5"                                      | 320    |                   | 175 psi @ 130 F           | 125        |                                  | Equal %                |                     | VGF22ES40       | 22                       | 22  |
|                                         |        |                   | 400 psi @ 130 F           | 250        |                                  | Linear                 |                     | VGF21ES50       | 9                        | 9   |
| 6"                                      | 370    |                   | 175 psi @ 130 F           | 125        |                                  | Equal %                |                     | VGF21LS50       | 9                        | 9   |
|                                         |        |                   | 400 psi @ 130 F           | 250        |                                  | Linear                 |                     | VGF22ES50       | 9                        | 9   |
|                                         |        | 175 psi @ 130 F   | 125                       | Equal %    | VGF21ES60                        | 9                      | 9                   |                 |                          |     |
|                                         |        | 400 psi @ 130 F   | 250                       | Linear     | VGF21LS60                        | 9                      | 9                   |                 |                          |     |
| ANSI Class IV (<0.01% Cv) Seat Leakage  |        |                   |                           |            |                                  |                        |                     |                 |                          |     |
| 4"                                      | 150    | Pressure Balanced | 175 psi @ 130 F           | 125        | 100 psig / 337 F                 | Equal %                | Stem down to close  | VGF21EP40       | 175                      | 175 |
|                                         | Linear |                   |                           |            |                                  | VGF21LP40              |                     | 175             | 175                      |     |
| 5"                                      | 285    |                   |                           |            |                                  | Equal %                |                     | VGF21EP50       | 175                      | 175 |
|                                         |        |                   |                           |            |                                  | Linear                 |                     | VGF21LP50       | 175                      | 175 |
| 6"                                      | 370    |                   |                           |            |                                  | Equal %                |                     | VGF21EP60       | 175                      | 175 |
|                                         |        |                   |                           |            |                                  | Linear                 |                     | VGF21LP60       | 175                      | 175 |
| ANSI Class III (<0.05% Cv) Seat Leakage |        |                   |                           |            |                                  |                        |                     |                 |                          |     |
| 4"                                      | 150    | Mixing            | 175 psi @ 130 F           | 125        | N/A                              | Equal % A-AB           | Stem up closes A-AB | VGF31EM40       | 34                       | 34  |
|                                         | 160    | Diverting         | 175 psi @ 130 F           | 125        |                                  | Linear, Constant Total | Stem up closes B-AB | VGF31LD40       | 34                       | 34  |
|                                         | 170    | Mixing            | 400 psi @ 130 F           | 250        |                                  | Equal % A-AB           | Stem up closes A-AB | VGF32EM40       | 34                       | 34  |
| 5"                                      | 320    | Mixing            | 175 psi @ 130 F           | 125        |                                  | Equal % A-AB           | Stem up closes A-AB | VGF31EM50       | 9                        | 9   |
|                                         | 285    | Diverting         | 175 psi @ 130 F           | 125        |                                  | Linear, Constant Total | Stem up closes B-AB | VGF31LD50       | 9                        | 9   |
|                                         | 320    | Mixing            | 400 psi @ 130 F           | 250        |                                  | Equal % A-AB           | Stem up closes A-AB | VGF32EM50       | 9                        | 9   |
| 6"                                      | 370    | Mixing            | 175 psi @ 130 F           | 125        |                                  | Equal % A-AB           | Stem up closes A-AB | VGF31EM60       | 9                        | 9   |
|                                         | 380    | Diverting         | 175 psi @ 130 F           | 125        |                                  | Linear, Constant Total | Stem up closes B-AB | VGF31LD60       | 9                        | 9   |
|                                         | 370    | Mixing            | 400 psi @ 130 F           | 250        |                                  | Equal % A-AB           | Stem up closes A-AB | VGF32EM60       | 9                        | 9   |

# Product Selection - Valves

## Flanged Globe Valves 2½" - 3", With Pneumatic Actuators

### Common Features

- Easy installation and attachment to the valve
- Direct or reverse acting
- No positive positioner



| Actuator Features                |  | Without Positive Positioner |            |            |            |            |                |            |            |
|----------------------------------|--|-----------------------------|------------|------------|------------|------------|----------------|------------|------------|
| Actuator O.S. Number             |  | MP953C1067                  | MP953C1075 | MP953C1083 | MP953C1554 | MP953C1562 | MP953D1107     | MP953D1131 | MP953D1172 |
| Direct Acting/<br>Reverse Acting |  | Direct Acting               |            |            |            |            | Reverse Acting |            |            |
| Diaphragm Size                   |  | 8"                          |            |            | 13"        |            | 7-1/8"         |            |            |
| Fail Safe Action                 |  | Stem Up                     |            |            |            |            | Stem Down      |            |            |
| Actuator Force                   |  | Medium                      |            |            | High       |            | Medium         |            |            |
| Spring Range                     |  | 2-7 psi                     | •          |            |            | •          |                |            |            |
|                                  |  | 3-7 psi                     |            |            |            |            |                |            | •          |
|                                  |  | 8-12 psi                    |            | •          |            |            |                |            |            |
|                                  |  | 8-13 psi                    |            |            |            |            | •              |            |            |
|                                  |  | 4-11 psi                    |            |            | •          |            |                | •          |            |

| Valve Size (inches)                     |     | Cv                     | Valve Type      | Max Static Water Pressure | ANSI Class       | Max Steam Pressure  | Flow Characteristic | Valve Action | Valve OS Number | Close-off Pressure - See Charts On Page 149 |       |       |       |       |       |       |       |       |       |       |  |
|-----------------------------------------|-----|------------------------|-----------------|---------------------------|------------------|---------------------|---------------------|--------------|-----------------|---------------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--|
| ANSI Class III (<0.05% Cv) Seat Leakage |     |                        |                 |                           |                  |                     |                     |              |                 |                                             |       |       |       |       |       |       |       |       |       |       |  |
| 2-1/2"                                  | 70  | Standard               | 175 psi @ 130 F | 125                       | 100 psig / 337 F | Equal %             | Stem down to close  | VGF21ES25    | K*-NO           | K*-NO                                       | K*-NO | L*-NO | L*-NO | M*-NC | M*-NC | M*-NC | M*-NC | M*-NC | M*-NC |       |  |
|                                         |     |                        | Linear          | VGF21LS25                 |                  | K*-NO               |                     | K*-NO        | K*-NO           | L*-NO                                       | L*-NO | M*-NC | M*-NC | M*-NC | M*-NC | M*-NC | M*-NC |       |       |       |  |
| 400 psi @ 130 F                         | 250 |                        | Equal %         | VGF22ES25                 |                  | K*-NO               |                     | K*-NO        | K*-NO           | L*-NO                                       | L*-NO | M*-NC | M*-NC | M*-NC | M*-NC | M*-NC | M*-NC |       |       |       |  |
| 3"                                      | 125 |                        | 175 psi @ 130 F | 125                       |                  | Equal %             |                     | VGF21ES30    | K*-NO           | K*-NO                                       | K*-NO | L*-NO | L*-NO | M*-NC | M*-NC | M*-NC | M*-NC | M*-NC | M*-NC | M*-NC |  |
|                                         | 120 |                        | 400 psi @ 130 F | 250                       |                  | Linear              |                     | VGF21LS30    | K*-NO           | K*-NO                                       | K*-NO | L*-NO | L*-NO | M*-NC | M*-NC | M*-NC | M*-NC | M*-NC | M*-NC | M*-NC |  |
| ANSI Class IV (<0.01% Cv) Seat Leakage  |     |                        |                 |                           |                  |                     |                     |              |                 |                                             |       |       |       |       |       |       |       |       |       |       |  |
| 2-1/2"                                  | 70  | Pressure Balanced      | 175 psi @ 130 F | 125                       | 100 psig / 337 F | Equal %             | Stem down to close  | VGF21EP25    | L*-NO           | L*-NO                                       | L*-NO | L*-NO | L*-NO | N/A   |       |       |       |       |       |       |  |
|                                         |     |                        |                 |                           |                  | Linear              |                     | VGF21LP25    | L*-NO           | L*-NO                                       | L*-NO | L*-NO | L*-NO |       |       |       |       |       |       |       |  |
| 3"                                      | 115 |                        |                 |                           |                  | Equal %             |                     | VGF21EP30    | L*-NO           | L*-NO                                       | L*-NO | L*-NO | L*-NO |       |       |       |       |       |       |       |  |
|                                         |     |                        |                 |                           |                  | Linear              |                     | VGF21LP30    | L*-NO           | L*-NO                                       | L*-NO | L*-NO | L*-NO |       |       |       |       |       |       |       |  |
| ANSI Class III (<0.05% Cv) Seat Leakage |     |                        |                 |                           |                  |                     |                     |              |                 |                                             |       |       |       |       |       |       |       |       |       |       |  |
| 2-1/2"                                  | 70  | Mixing                 | 175 psi @ 130 F | 125                       | N/A              | Equal % A-AB        | Stem up closes A-AB | VGF31EM25    | K-NC            | K-NC                                        | K-NC  | L-NC  | L-NC  | M-NO  | M-NO  | M-NO  | M-NO  | M-NO  | M-NO  |       |  |
|                                         |     | Linear, Constant Total |                 |                           |                  | Stem up closes B-AB | VGF31LD25           | K-NO         | K-NO            | K-NO                                        | L-NO  | L-NO  | M-NC  | M-NC  | M-NC  | M-NC  | M-NC  |       |       |       |  |
|                                         |     | Diverting              | 400 psi @ 130 F | 250                       |                  | Equal % A-AB        | Stem up closes A-AB | VGF32EM25    | K-NC            | K-NC                                        | K-NC  | L-NC  | L-NC  | M-NO  | M-NO  | M-NO  | M-NO  | M-NO  |       |       |  |
| 3"                                      | 120 | Mixing                 | 175 psi @ 130 F | 125                       |                  | Equal % A-AB        | Stem up closes A-AB | VGF31EM30    | K-NC            | K-NC                                        | K-NC  | L-NC  | L-NC  | M-NO  | M-NO  | M-NO  | M-NO  | M-NO  |       |       |  |
|                                         |     | Linear, Constant Total |                 |                           |                  | Stem up closes B-AB | VGF31LD30           | K-NO         | K-NO            | K-NO                                        | L-NO  | L-NO  | M-NC  | M-NC  | M-NC  | M-NC  | M-NC  |       |       |       |  |
|                                         | 115 | Mixing                 | 400 psi @ 130 F | 250                       |                  | Equal % A-AB        | Stem up closes A-AB | VGF32EM30    | K-NC            | K-NC                                        | K-NC  | L-NC  | L-NC  | M-NO  | M-NO  | M-NO  | M-NO  | M-NO  |       |       |  |

\*The close-off pressure not to exceed rated pressure of steam valve

†175 psi close-off, see chart for pneumatic air pressure required for operation.

NC = Normally Closed, A to AB Normally Closed for 3-way valves

NO = Normally Open, A to AB Normally Open for 3-way valves

# Product Selection - Valves

## Flanged Globe Valves 2½"- 3", With Positive Positioning Pneumatic Actuators

### Common Features

- Easy installation and attachment to the valve
- Direct or reverse acting
- Integrated positive positioner



| Actuator Features                |  | With Positive Positioner |            |            |            |                |            |            |            |
|----------------------------------|--|--------------------------|------------|------------|------------|----------------|------------|------------|------------|
| Actuator O.S. Number             |  | MP953E1368               | MP953E1376 | MP953E1384 | MP953E1435 | MP953E1443     | MP953F1093 | MP953F1101 | MP953F1119 |
| Direct Acting/<br>Reverse Acting |  | Direct Acting            |            |            |            | Reverse Acting |            |            |            |
| Diaphragm Size                   |  | 8"                       |            |            |            | 13"            |            |            |            |
| Fail Safe Action                 |  | Stem Up                  |            |            |            | Stem Down      |            |            |            |
| Actuator Force                   |  | Medium                   |            |            |            | High           |            |            |            |
| Spring Range                     |  | 4-11 psi                 | •          | •          | •          | •              | •          | •          | •          |
|                                  |  | 8-13 psi                 |            |            |            |                | •          | •          | •          |
| Positioner Span                  |  | 10 psi                   |            | •          |            | •              |            |            | •          |
|                                  |  | 5 psi                    | •          |            | •          |                |            | •          |            |
|                                  |  | 3 psi                    | •          |            |            |                | •          |            |            |

| Valve Size (inches)                     | Cv                                      | Valve Type             | Max Static Water Pressure | ANSI Class   | Max Steam Pressure     | Flow Characteristic | Valve Action       | Valve OS Number | Close-off Pressure - See Charts On Page 149 |           |       |              |                     |       |       |       |      |           |      |      |      |      |      |      |      |      |  |  |
|-----------------------------------------|-----------------------------------------|------------------------|---------------------------|--------------|------------------------|---------------------|--------------------|-----------------|---------------------------------------------|-----------|-------|--------------|---------------------|-------|-------|-------|------|-----------|------|------|------|------|------|------|------|------|--|--|
| ANSI Class III (<0.05% Cv) Seat Leakage |                                         |                        |                           |              |                        |                     |                    |                 |                                             |           |       |              |                     |       |       |       |      |           |      |      |      |      |      |      |      |      |  |  |
| 2-1/2"                                  | 70                                      | Standard               | 175 psi @ 130 F           | 125          | 100 psig / 337 F       | Equal %             | Stem down to close | VGF21ES25       | K*-NO                                       | K*-NO     | K*-NO | L*-NO        | L*-NO               | M*-NC | M*-NC | M*-NC |      |           |      |      |      |      |      |      |      |      |  |  |
|                                         |                                         |                        | 400 psi @ 130 F           | 250          |                        | Linear              |                    | VGF21LS25       | K*-NO                                       | K*-NO     | K*-NO | L*-NO        | L*-NO               | M*-NC | M*-NC | M*-NC |      |           |      |      |      |      |      |      |      |      |  |  |
| 3"                                      | 125                                     |                        | 175 psi @ 130 F           | 125          |                        | Equal %             |                    | VGF22ES25       | K*-NO                                       | K*-NO     | K*-NO | L*-NO        | L*-NO               | M*-NC | M*-NC | M*-NC |      |           |      |      |      |      |      |      |      |      |  |  |
|                                         |                                         |                        | 400 psi @ 130 F           | 250          |                        | Linear              |                    | VGF21ES30       | K*-NO                                       | K*-NO     | K*-NO | L*-NO        | L*-NO               | M*-NC | M*-NC | M*-NC |      |           |      |      |      |      |      |      |      |      |  |  |
|                                         | 120                                     |                        | 175 psi @ 130 F           | 125          |                        | Equal %             |                    | VGF21LS30       | K*-NO                                       | K*-NO     | K*-NO | L*-NO        | L*-NO               | M*-NC | M*-NC | M*-NC |      |           |      |      |      |      |      |      |      |      |  |  |
|                                         |                                         |                        | 400 psi @ 130 F           | 250          |                        | Linear              |                    | VGF22ES30       | K*-NO                                       | K*-NO     | K*-NO | L*-NO        | L*-NO               | M*-NC | M*-NC | M*-NC |      |           |      |      |      |      |      |      |      |      |  |  |
| ANSI Class IV (<0.01% Cv) Seat Leakage  |                                         |                        |                           |              |                        |                     |                    |                 |                                             |           |       |              |                     |       |       |       |      |           |      |      |      |      |      |      |      |      |  |  |
| 2-1/2"                                  | 70                                      | Pressure Balanced      | 175 psi @ 130 F           | 125          | 100 psig / 337 F       | Equal %             | Stem down to close | VGF21EP25       | L*-NO                                       | L*-NO     | L*-NO | L*-NO        | L*-NO               | N/A   |       |       |      |           |      |      |      |      |      |      |      |      |  |  |
|                                         |                                         |                        |                           |              |                        | Linear              |                    | VGF21LP25       | L*-NO                                       | L*-NO     | L*-NO | L*-NO        | L*-NO               |       |       |       |      |           |      |      |      |      |      |      |      |      |  |  |
| 3"                                      | 115                                     |                        |                           |              |                        | Equal %             |                    | VGF21EP30       | L*-NO                                       | L*-NO     | L*-NO | L*-NO        | L*-NO               |       |       |       |      |           |      |      |      |      |      |      |      |      |  |  |
|                                         |                                         |                        |                           |              |                        | Linear              |                    | VGF21LP30       | L*-NO                                       | L*-NO     | L*-NO | L*-NO        | L*-NO               |       |       |       |      |           |      |      |      |      |      |      |      |      |  |  |
|                                         | ANSI Class III (<0.05% Cv) Seat Leakage |                        |                           |              |                        |                     |                    |                 |                                             |           |       |              |                     |       |       |       |      |           |      |      |      |      |      |      |      |      |  |  |
|                                         | 2-1/2"                                  |                        |                           |              |                        | 70                  |                    | Mixing          | 175 psi @ 130 F                             | 125       | N/A   | Equal % A-AB | Stem up closes A-AB |       |       |       |      | VGF31EM25 | K-NC | K-NC | K-NC | L-NC | L-NC | M-NO | M-NO | M-NO |  |  |
| Diverting                               |                                         | Linear, Constant Total | Stem up closes B-AB       | VGF31LD25    | K-NO                   |                     | K-NO               | K-NO            |                                             |           |       | L-NO         | L-NO                | M-NC  | M-NC  | M-NC  |      |           |      |      |      |      |      |      |      |      |  |  |
| Mixing                                  |                                         | 400 psi @ 130 F        | 250                       | Equal % A-AB | Stem up closes A-AB    |                     | VGF32EM25          | K-NC            |                                             |           |       | K-NC         | K-NC                | L-NC  | L-NC  | M-NO  | M-NO | M-NO      |      |      |      |      |      |      |      |      |  |  |
| 3"                                      | 120                                     | Mixing                 | 175 psi @ 130 F           | 125          | Equal % A-AB           | Stem up closes A-AB | VGF31EM30          | K-NC            | K-NC                                        | K-NC      |       | L-NC         | L-NC                | M-NO  | M-NO  | M-NO  |      |           |      |      |      |      |      |      |      |      |  |  |
|                                         |                                         | Diverting              |                           |              | Linear, Constant Total | Stem up closes B-AB | VGF31LD30          | K-NO            | K-NO                                        | K-NO      |       | L-NO         | L-NO                | M-NC  | M-NC  | M-NC  |      |           |      |      |      |      |      |      |      |      |  |  |
|                                         |                                         | 115                    |                           |              | Mixing                 | 400 psi @ 130 F     | 250                | Equal % A-AB    | Stem up closes A-AB                         | VGF32EM30 |       | K-NC         | K-NC                | K-NC  | L-NC  | L-NC  | M-NO | M-NO      | M-NO |      |      |      |      |      |      |      |  |  |

\*The close-off pressure not to exceed rated pressure of steam valve

†175 psi close-off, see chart for pneumatic air pressure required for operation.

NC = Normally Closed, A to AB Normally Closed for 3-way valves

NO = Normally Open, A to AB Normally Open for 3-way valves

# Product Selection - Valves

## Flanged Globe Valves 4"- 6", With Pneumatic Actuators

### Common Features

- Easy installation and attachment to the valve
- Direct acting
- Large 13 inch diaphragm for high stem force



| Actuator Features              | Without Positive Positioner |            | With Positive Positioner |            |
|--------------------------------|-----------------------------|------------|--------------------------|------------|
| Actuator O.S. Number           | MP953C1471                  | MP953C1489 | MP953E1400               | MP953E1418 |
| Direct Acting / Reverse Acting | Direct Acting               |            |                          |            |
| Diaphragm Size                 | 13"                         |            |                          |            |
| Fail Safe Action               | Stem Up                     |            |                          |            |
| Actuator Force                 | High                        |            |                          |            |
| Stroke                         | 1-1/2"                      |            |                          |            |
| Spring Range                   | 2-7 psi                     | •          | •                        | •          |
|                                | 4-11 psi                    | •          | •                        | •          |
| Positioner Span                | 10 psi                      | N/A        |                          | •          |
|                                | 5 psi                       | •          |                          | •          |

| Valve Size (inches)                     | Cv  | Valve Type        | Max Static Water Pressure | ANSI Class | Max Steam Pressure | Flow Characteristic    | Valve Action        | Valve OS Number        | Close-off Pressure - See Charts On Page 149 |           |       |       |       |      |
|-----------------------------------------|-----|-------------------|---------------------------|------------|--------------------|------------------------|---------------------|------------------------|---------------------------------------------|-----------|-------|-------|-------|------|
| ANSI Class III (<0.05% Cv) Seat Leakage |     |                   |                           |            |                    |                        |                     |                        |                                             |           |       |       |       |      |
| 4"                                      | 155 | Standard          | 175 psi @ 130 F           | 125        | 100 psig / 337 F   | Equal %                | Stem down to close  | VGf21ES40              | L*-NO                                       | L*-NO     | L*-NO | L*-NO |       |      |
|                                         | 150 |                   | 400 psi @ 130 F           | 250        |                    | Linear                 |                     | VGf21LS40              | L*-NO                                       | L*-NO     | L*-NO | L*-NO |       |      |
| 5"                                      | 320 |                   | 175 psi @ 130 F           | 125        |                    | Equal %                |                     | VGf22ES40              | L*-NO                                       | L*-NO     | L*-NO | L*-NO |       |      |
|                                         | 320 |                   | 400 psi @ 130 F           | 250        |                    | Linear                 |                     | VGf21ES50              | L*-NO                                       | L*-NO     | L*-NO | L*-NO |       |      |
| 6"                                      | 370 |                   | 175 psi @ 130 F           | 125        |                    | Equal %                |                     | VGf21LS50              | L*-NO                                       | L*-NO     | L*-NO | L*-NO |       |      |
|                                         |     |                   | 400 psi @ 130 F           | 250        |                    | Linear                 |                     | VGf22ES50              | L*-NO                                       | L*-NO     | L*-NO | L*-NO |       |      |
|                                         |     |                   | 175 psi @ 130 F           | 125        |                    | Equal %                |                     | VGf21ES60              | L*-NO                                       | L*-NO     | L*-NO | L*-NO |       |      |
|                                         |     |                   | 400 psi @ 130 F           | 250        |                    | Linear                 |                     | VGf21LS60              | L*-NO                                       | L*-NO     | L*-NO | L*-NO |       |      |
| ANSI Class IV (<0.01% Cv) Seat Leakage  |     |                   |                           |            |                    |                        |                     |                        |                                             |           |       |       |       |      |
| 4"                                      | 150 | Pressure Balanced | 175 psi @ 130 F           | 125        | 100 psig / 337 F   | Equal %                | Stem down to close  | VGf21EP40              | L*-NO                                       | L*-NO     | L*-NO | L*-NO |       |      |
| 5"                                      | 285 |                   |                           |            |                    | Linear                 |                     | VGf21LP40              | L*-NO                                       | L*-NO     | L*-NO | L*-NO |       |      |
|                                         | 370 |                   |                           |            |                    | Equal %                |                     | VGf21EP50              | L*-NO                                       | L*-NO     | L*-NO | L*-NO |       |      |
|                                         |     |                   |                           |            |                    | Linear                 |                     | VGf21LP50              | L*-NO                                       | L*-NO     | L*-NO | L*-NO |       |      |
|                                         | 6"  |                   |                           |            |                    | 370                    |                     | Equal %                | VGf21EP60                                   | L*-NO     | L*-NO | L*-NO | L*-NO |      |
| 370                                     |     |                   |                           |            |                    | Linear                 |                     | VGf21LP60              | L*-NO                                       | L*-NO     | L*-NO | L*-NO |       |      |
| ANSI Class III (<0.05% Cv) Seat Leakage |     |                   |                           |            |                    |                        |                     |                        |                                             |           |       |       |       |      |
| 4"                                      | 150 | Mixing            | 175 psi @ 130 F           | 125        | N/A                | Equal % A-AB           | Stem up closes A-AB | VGf31EM40              | L-NC                                        | L-NC      | L-NC  | L-NC  |       |      |
|                                         | 160 | Diverting         |                           |            |                    | 400 psi @ 130 F        | 250                 | Linear, Constant Total | Stem up closes B-AB                         | VGf31LD40 | L-NC  | L-NC  | L-NC  | L-NC |
|                                         | 170 | Mixing            |                           |            |                    | 400 psi @ 130 F        | 250                 | Equal % A-AB           | Stem up closes A-AB                         | VGf32EM40 | L-NC  | L-NC  | L-NC  | L-NC |
| 5"                                      | 320 | Mixing            | 175 psi @ 130 F           | 125        |                    | Equal % A-AB           | Stem up closes A-AB | VGf31EM50              | L-NC                                        | L-NC      | L-NC  | L-NC  |       |      |
|                                         | 285 | Diverting         | 175 psi @ 130 F           | 125        |                    | Linear, Constant Total | Stem up closes B-AB | VGf31LD50              | L-NC                                        | L-NC      | L-NC  | L-NC  |       |      |
|                                         | 320 | Mixing            | 400 psi @ 130 F           | 250        |                    | Equal % A-AB           | Stem up closes A-AB | VGf32EM50              | L-NC                                        | L-NC      | L-NC  | L-NC  |       |      |
| 6"                                      | 370 | Mixing            | 175 psi @ 130 F           | 125        |                    | Equal % A-AB           | Stem up closes A-AB | VGf31EM60              | L-NC                                        | L-NC      | L-NC  | L-NC  |       |      |
|                                         | 380 | Diverting         | 175 psi @ 130 F           | 125        |                    | Linear, Constant Total | Stem up closes B-AB | VGf31LD60              | L-NC                                        | L-NC      | L-NC  | L-NC  |       |      |
|                                         | 370 | Mixing            | 400 psi @ 130 F           | 250        |                    | Equal % A-AB           | Stem up closes A-AB | VGf32EM60              | L-NC                                        | L-NC      | L-NC  | L-NC  |       |      |
|                                         | 370 | Mixing            | 400 psi @ 130 F           | 250        |                    | Linear, Constant Total | Stem up closes B-AB | VGf32EM60              | L-NC                                        | L-NC      | L-NC  | L-NC  |       |      |

\*The close-off pressure not to exceed rated pressure of steam valve

†175 psi close-off, see chart for pneumatic air pressure required for operation.

NC = Normally Closed, A to AB Normally Closed for 3-way valves

NO = Normally Open, A to AB Normally Open for 3-way valves

# Close-off Pressure Charts - Valves

## Flanged Globe Valves 2½"- 6", With Pneumatic Actuators

Chart K

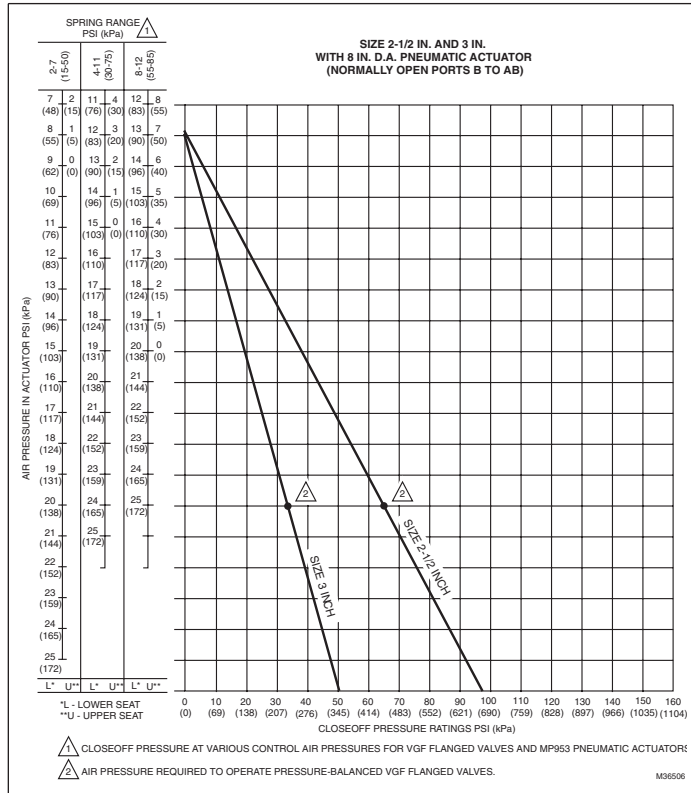


Chart L

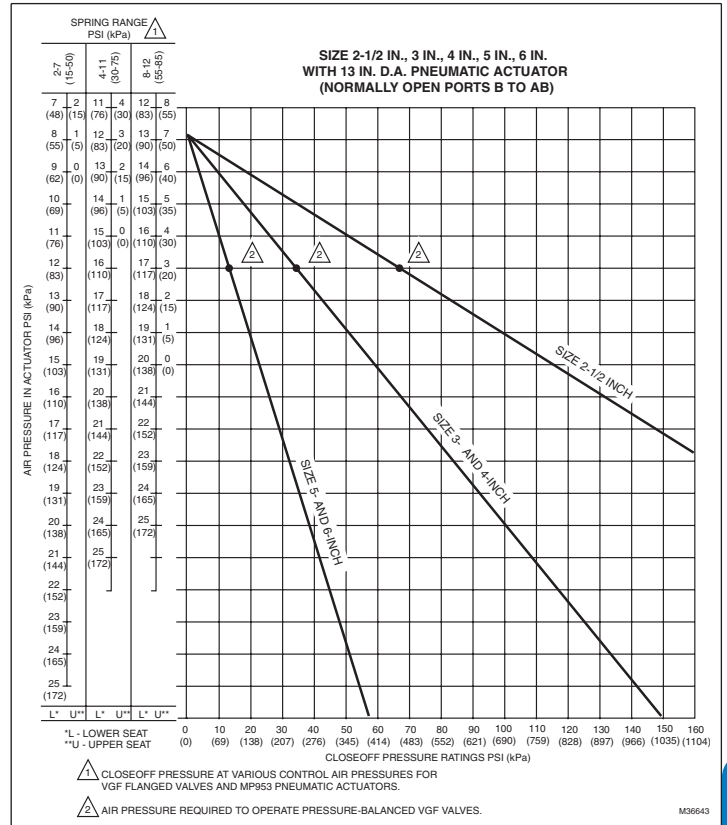
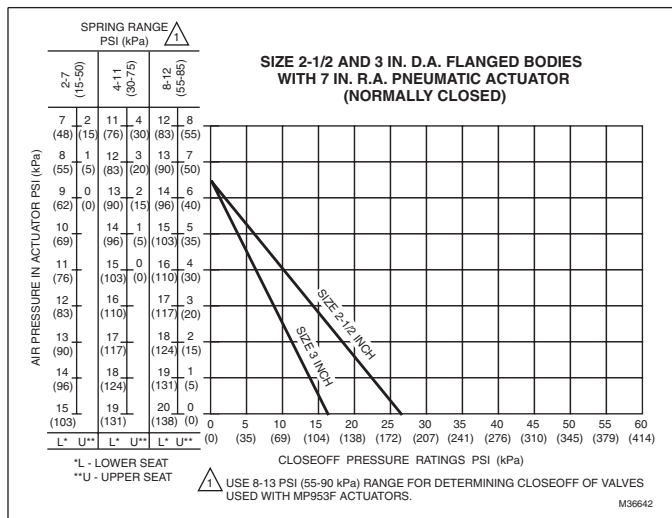


Chart M



# Product Selection - Valves

## Resilient Seat Butterfly Valves, 2-Way Fail-in-place

### VR2 – 2 to 5 inch

#### Common Features

- Fail-In-Place Actuators
- 5-Year Warranty
- Heater Option – Must be ordered with the assembly. Cannot be field installed.
- Aux Switch – Can be field installed.
- Max static pressure 232 psi CWP

|                     |          |          |                 | Actuator Features                           | Fail-In-Place      |                 |                 |                 |
|---------------------|----------|----------|-----------------|---------------------------------------------|--------------------|-----------------|-----------------|-----------------|
|                     |          |          |                 | Control Signal                              | Floating           | •               | •               |                 |
|                     |          |          |                 |                                             | 2-Position SPDT    | •               | •               |                 |
|                     |          |          |                 |                                             | Modulating 2-10Vdc |                 |                 | •               |
|                     |          |          |                 | Enclosure Rating                            | NEMA2              | •               | •               |                 |
|                     |          |          |                 |                                             | NEMA4X             |                 | •               | •               |
|                     |          |          |                 | Heater Option                               | (for NEMA4X)       |                 | MB-NSR-N4HEAT/U | MB-NSR-N4HEAT/U |
|                     |          |          |                 | Power Supply Voltage                        | 24Vac/Vdc          | •               | •               | •               |
|                     |          |          |                 |                                             | 24-240Vac          |                 |                 |                 |
|                     |          |          |                 | Aux Switch                                  | Add-On             | MB-NSR-SWITCH/U | MB-NSR-SWITCH/U | MB-NSR-SWITCH/U |
|                     |          |          |                 | Feedback                                    | 2-10Vdc            |                 | •               | •               |
| Valve Size (inches) | Cv @ 60° | Cv @ 90° | Close-off (psi) |                                             |                    |                 |                 |                 |
| 2                   | 44       | 115      | 200             | Valve/Actuator Assembly                     | VR2F6LPN2/M        | VR2F6LPN4/M     | VR2F7LPF2/M     | VR2F7LPF4/M     |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBP6L2N2/U         | MBP6L4N4/U      | MBP7L2F2/U      | MBP7L4F4/U      |
| 2-1/2               | 75       | 196      | 200             | Valve/Actuator Assembly                     | VR2G6LPN2/M        | VR2G6LPN4/M     | VR2G7LPF2/M     | VR2G7LPF4/M     |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBP6L2N2/U         | MBP6L4N4/U      | MBP7L2F2/U      | MBP7L4F4/U      |
| 3                   | 116      | 302      | 200             | Valve/Actuator Assembly                     | VR2H6LPN2/M        | VR2H6LPN4/M     | VR2H7LPF2/M     | VR2H7LPF4/M     |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBP6L4N2/U         | MBP6L4N4/U      | MBP7L4F2/U      | MBP7L4F4/U      |
| 4                   | 230      | 600      | 200             | Valve/Actuator Assembly                     | VR2J6LPN2/M        | VR2J6LPN4/M     | VR2J7LPF2/M     | VR2J7LPF4/M     |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBP6L5N2/U         | MBP6L5N4/U      | MBP7L5F2/U      | MBP7L5F4/U      |
| 5                   | 392      | 1022     | 200             | Valve/Actuator Assembly                     | VR2K6LPN2/M        | VR2K6LPN4/M     | VR2K7LPF2/M     | VR2K7LPF4/M     |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBP6L5N2/U         | MBP6L5N4/U      | MBP7L5F2/U      | MBP7L5F4/U      |

### VR2 – 6 to 2 inch

#### Common Features

- Fail-In-Place Actuators
- 5-Year Warranty
- Max static pressure 232 psi CWP

|                     |          |          |                 | Actuator Features                           | Fail-In-Place      |                     |
|---------------------|----------|----------|-----------------|---------------------------------------------|--------------------|---------------------|
|                     |          |          |                 | Control Signal                              | Floating           | •                   |
|                     |          |          |                 |                                             | 2-Position SPDT    | •                   |
|                     |          |          |                 |                                             | Modulating 2-10Vdc | •                   |
|                     |          |          |                 | Enclosure Rating                            | NEMA4X             | •                   |
|                     |          |          |                 | Heater Option                               | (for NEMA4X)       | Built in (Standard) |
|                     |          |          |                 | Power Supply Voltage                        | 24-240Vac          | •                   |
|                     |          |          |                 | Aux Switch                                  | Built-In           | 2 x SPDT            |
|                     |          |          |                 | Feedback                                    | 2-10Vdc            | •                   |
| Valve Size (inches) | Cv @ 60° | Cv @ 90° | Close-off (psi) |                                             |                    |                     |
| 6                   | 605      | 1,579    | 200             | Valve/Actuator Assembly                     | VR2L6UPSH/M        | VR2L7UPBH/M         |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBP6U6SH/U         | MBP7U6BH/U          |
| 8                   | 1,202    | 3,136    | 200             | Valve/Actuator Assembly                     | VR2M6UPSH/M        | VR2M7UPBH/M         |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBP6U7SH/U         | MBP7U7BH/U          |
| 10                  | 2,047    | 5,340    | 200             | Valve/Actuator Assembly                     | VR2N6UPSH/M        | VR2N7UPBH/M         |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBP6U8SH/U         | MBP7U8BH/U          |
| 12                  | 3,162    | 8,250    | 200             | Valve/Actuator Assembly                     | VR2P6UPSH/M        | VR2P7UPBH/M         |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBP6U6SH/U         | MBP7U6BH/U          |

# Product Selection - Valves

## Resilient Seat Butterfly Valves, 2-Way Fail-in-place and Spring Return

### VR2 – 14 to 24 inch

#### Common Features

- Fail-In-Place Actuators
- 2-Year Warranty
- Max static pressure 232 psi CWP

|                     |          |          |                 | Actuator Features                           | Fail-In-Place      |                     |                     |                     |
|---------------------|----------|----------|-----------------|---------------------------------------------|--------------------|---------------------|---------------------|---------------------|
|                     |          |          |                 | Control Signal                              | Floating           | •                   |                     | •                   |
|                     |          |          |                 |                                             | 2-Position SPDT    | •                   |                     | •                   |
|                     |          |          |                 |                                             | Modulating 2-10Vdc |                     | •                   | •                   |
|                     |          |          |                 | Enclosure Rating                            | NEMA4X             | •                   | •                   | •                   |
|                     |          |          |                 | Heater Option                               | (for NEMA4X)       | Built in (Standard) | Built in (Standard) | Built in (Standard) |
|                     |          |          |                 | Power Supply Voltage                        | 24Vac              | •                   | •                   | •                   |
|                     |          |          |                 |                                             | 120Vac             |                     | •                   | •                   |
|                     |          |          |                 | Aux Switch                                  | Built-In           | 2 x SPDT            | 2 x SPDT            | 2 x SPDT            |
|                     |          |          |                 | Feedback                                    | 2-10Vdc            |                     | •                   | •                   |
| Valve Size (inches) | Cv @ 60° | Cv @ 90° | Close-off (psi) |                                             |                    |                     |                     |                     |
| 14                  | 4,658    | 11,917   | 150             | Valve/Actuator Assembly                     | VR2R6LP SH/M       | VR2R7LPBH/M         |                     |                     |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBP6LBSH/U         | MBP7LBBH/U          |                     |                     |
| 16                  | 6,282    | 16,388   | 150             | Valve/Actuator Assembly                     |                    |                     | VR2S6HPSH/M         | VR2S7HPBH/M         |
|                     |          |          |                 | Replacement Actuator (included in assembly) |                    |                     | MBP6HCSH/U          | MBP7HCBH/U          |
| 18                  | 8,320    | 21,705   | 150             | Valve/Actuator Assembly                     |                    |                     | VR2T6HPSH/M         | VR2T7HPBH/M         |
|                     |          |          |                 | Replacement Actuator (included in assembly) |                    |                     | MBP6HESH/U          | MBP7HEBH/U          |
| 20                  | 10,698   | 27,908   | 150             | Valve/Actuator Assembly                     |                    |                     | VR2U6HPSH/M         | VR2U7HPBH/M         |
|                     |          |          |                 | Replacement Actuator (included in assembly) |                    |                     | MBP6HESH/U          | MBP7HEBH/U          |
| 24                  | 16,528   | 43,116   | 150             | Valve/Actuator Assembly                     |                    |                     | VR2V6HPSH/M         | VR2V7HPBH/M         |
|                     |          |          |                 | Replacement Actuator (included in assembly) |                    |                     | MBP6HHSH/U          | MBP7HHBH/U          |

### VR2 – 2 and 2.5 inch

#### Common Features

- Spring Return Actuators
- 5-Year Warranty
- Heater Option – Must be ordered with the assembly. Cannot be field installed.
- Max static pressure 232 psi CWP

|                        |          |          |                 | Actuator Features                              |                 | Spring Return |             |                |             |                |             |             |                |  |   |                |   |
|------------------------|----------|----------|-----------------|------------------------------------------------|-----------------|---------------|-------------|----------------|-------------|----------------|-------------|-------------|----------------|--|---|----------------|---|
|                        |          |          |                 | Control Signal                                 | 2-Position SPST |               |             |                |             |                | •           |             | •              |  | • |                | • |
|                        |          |          |                 | Modulating 2-10Vdc                             |                 | •             | •           | •              | •           |                |             |             |                |  |   |                |   |
|                        |          |          |                 | Enclosure Rating                               | NEMA2           |               | •           |                | •           |                | •           |             | •              |  |   |                |   |
|                        |          |          |                 | NEMA4X                                         |                 |               | •           |                | •           |                | •           |             |                |  |   | •              |   |
|                        |          |          |                 | Heater Option                                  | (for NEMA4X)    |               |             | MB-SR-N4HEAT/U |             | MB-SR-N4HEAT/U |             |             | MB-SR-N4HEAT/U |  |   | MB-SR-N4HEAT/U |   |
|                        |          |          |                 | Power Supply Voltage                           |                 | 24Vac/Vdc     | •           |                | •           |                | •           |             |                |  |   |                |   |
|                        |          |          |                 | 24-240Vac                                      |                 |               |             |                |             |                | •           |             | •              |  | • |                | • |
|                        |          |          |                 | Aux Switch                                     | Built-In        |               | 2 x SPDT    | 2 x SPDT       |             |                | 2 x SPDT    | 2 x SPDT    |                |  |   |                |   |
|                        |          |          |                 | Feedback                                       |                 | 2-10Vdc       | •           | •              | •           | •              |             |             |                |  |   |                |   |
| Valve Size<br>(inches) | Cv @ 60° | Cv @ 90° | Close-off (psi) | Fail-Safe Open                                 |                 |               |             |                |             |                |             |             |                |  |   |                |   |
|                        |          |          |                 | Valve/Actuator Assembly                        | VR2F7LSB2/M     | VR2F7LSB4/M   | VR2F7LSF2/M | VR2F7LSF4/M    | VR2F8USS2/M | VR2F8USS4/M    | VR2F8USN2/M | VR2F8USN4/M |                |  |   |                |   |
|                        |          |          |                 | Replacement Actuator<br>(included in assembly) | MBS7L3B2/U      | MBS7L3B4/U    | MBS7L3F2/U  | MBS7L3F4/U     | MBS8U3S2/U  | MBS8U3S4/U     | MBS8U3N2/U  | MBS8U3N4/U  |                |  |   |                |   |
| 2                      | 44       | 115      | 200             | Valve/Actuator Assembly                        | VR2G7LSB2/M     | VR2G7LSB4/M   | VR2G7LSF2/M | VR2G7LSF4/M    | VR2G8USS2/M | VR2G8USS4/M    | VR2G8USN2/M | VR2G8USN4/M |                |  |   |                |   |
|                        |          |          |                 | Replacement Actuator<br>(included in assembly) | MBS7L3B2/U      | MBS7L3B4/U    | MBS7L3F2/U  | MBS7L3F4/U     | MBS8U3S2/U  | MBS8U3S4/U     | MBS8U3N2/U  | MBS8U3N4/U  |                |  |   |                |   |
| 2-1/2                  | 75       | 196      | 200             | Valve/Actuator Assembly                        | VR2G7LTB2/M     | VR2G7LTB4/M   | VR2G7LTF2/M | VR2G7LTF4/M    | VR2G8UTS2/M | VR2G8UTS4/M    | VR2G8UTN2/M | VR2G8UTN4/M |                |  |   |                |   |
|                        |          |          |                 | Replacement Actuator<br>(included in assembly) | MBS7L3B2/U      | MBS7L3B4/U    | MBS7L3F2/U  | MBS7L3F4/U     | MBS8U3S2/U  | MBS8U3S4/U     | MBS8U3N2/U  | MBS8U3N4/U  |                |  |   |                |   |
|                        |          |          |                 | Fail-Safe Closed                               |                 |               |             |                |             |                |             |             |                |  |   |                |   |
| 2                      | 44       | 115      | 200             | Valve/Actuator Assembly                        | VR2F7LTB2/M     | VR2F7LTB4/M   | VR2F7LTF2/M | VR2F7LTF4/M    | VR2F8UTS2/M | VR2F8UTS4/M    | VR2F8UTN2/M | VR2F8UTN4/M |                |  |   |                |   |
|                        |          |          |                 | Replacement Actuator<br>(included in assembly) | MBS7L3B2/U      | MBS7L3B4/U    | MBS7L3F2/U  | MBS7L3F4/U     | MBS8U3S2/U  | MBS8U3S4/U     | MBS8U3N2/U  | MBS8U3N4/U  |                |  |   |                |   |
| 2-1/2                  | 75       | 196      | 200             | Valve/Actuator Assembly                        | VR2G7LTB2/M     | VR2G7LTB4/M   | VR2G7LTF2/M | VR2G7LTF4/M    | VR2G8UTS2/M | VR2G8UTS4/M    | VR2G8UTN2/M | VR2G8UTN4/M |                |  |   |                |   |
|                        |          |          |                 | Replacement Actuator<br>(included in assembly) | MBS7L3B2/U      | MBS7L3B4/U    | MBS7L3F2/U  | MBS7L3F4/U     | MBS8U3S2/U  | MBS8U3S4/U     | MBS8U3N2/U  | MBS8U3N4/U  |                |  |   |                |   |

# Product Selection - Valves

## Resilient Seat Butterfly Valves, 2-Way Electronic Fail-safe

### VR2 – 3 and 4 inch

#### Common Features

- Electronic Fail-Safe Actuators
- 5-Year Warranty
- Fail-Safe Position Field Selectable
- Factory Configured to Normally Closed / Fail Closed
- Heater Option – Must be ordered with the assembly. Cannot be field installed.
- Aux Switch – Can be field installed.
- Max static pressure 232 psi CWP

|                         |          |          |                 | Actuator Features                           | Electronic Fail-Safe |                 |                 |                 |
|-------------------------|----------|----------|-----------------|---------------------------------------------|----------------------|-----------------|-----------------|-----------------|
| Valve Size (inches)     | Cv @ 60° | Cv @ 90° | Close-off (psi) | Control Signal                              | Floating             | •               | •               |                 |
|                         |          |          |                 | 2-Position SPDT                             |                      | •               | •               |                 |
| 3                       | 116      | 302      | 200             | Modulating                                  | 2-10Vdc              |                 | •               | •               |
|                         |          |          |                 | Enclosure Rating                            | NEMA2                | •               | •               |                 |
| 4                       | 230      | 600      | 200             | NEMA4X                                      |                      | •               |                 | •               |
|                         |          |          |                 | Heater Option                               | (for NEMA4X)         | MB-NSR-N4HEAT/U |                 | MB-NSR-N4HEAT/U |
|                         |          |          |                 | Power Supply Voltage                        | 24Vac/Vdc            | •               | •               | •               |
|                         |          |          |                 | Aux Switch                                  | Add-On               | MB-NSR-SWITCH/U | MB-NSR-SWITCH/U | MB-NSR-SWITCH/U |
|                         |          |          |                 | Feedback                                    | 2-10Vdc              |                 | •               | •               |
|                         |          |          |                 |                                             |                      |                 |                 |                 |
| Valve/Actuator Assembly |          |          |                 | VR2H6LEN2/M                                 | VR2H6LEN4/M          | VR2H7LEF2/M     | VR2H7LEF4/M     |                 |
|                         |          |          |                 | Replacement Actuator (included in assembly) | MBE6L4N2/U           | MBE6L4N4/U      | MBE7L4F2/U      | MBE7L4F4/U      |
| Valve/Actuator Assembly |          |          |                 | VR2J6LEN2/M                                 | VR2J6LEN4/M          | VR2J7LEF2/M     | VR2J7LEF4/M     |                 |
|                         |          |          |                 | Replacement Actuator (included in assembly) | MBE6L5N2/U           | MBE6L5N4/U      | MBE7L5F2/U      | MBE7L5F4/U      |

### VR2 – 5 to 12 inch

#### Common Features

- Electronic Fail-Safe Actuators
- 5-Year Warranty
- Fail-Safe Position Field Selectable
- Factory Configured to Normally Closed / Fail Closed
- Max static pressure 232 psi CWP

|                         |          |          |                 | Actuator Features                           | Electronic Fail-Safe |                     |
|-------------------------|----------|----------|-----------------|---------------------------------------------|----------------------|---------------------|
| Valve Size (inches)     | Cv @ 60° | Cv @ 90° | Close-off (psi) | Control Signal                              | Floating             | •                   |
|                         |          |          |                 | 2-Position SPDT                             |                      | •                   |
| 5                       | 392      | 1,022    | 200             | Modulating                                  | 2-10Vdc              | •                   |
|                         |          |          |                 | Enclosure Rating                            | NEMA4X               | •                   |
| 6                       | 605      | 1,579    | 200             | Heater Option                               | (for NEMA4X)         | Built in (Standard) |
|                         |          |          |                 | Power Supply Voltage                        | 24-240Vac            | •                   |
| 8                       | 1,202    | 3,136    | 200             | Aux Switch                                  | Built-In             | 2 x SPDT            |
|                         |          |          |                 | Feedback                                    | 2-10Vdc              | •                   |
| Valve/Actuator Assembly |          |          |                 | VR2K6UESH/M                                 | VR2K7UEBH/M          |                     |
|                         |          |          |                 | Replacement Actuator (included in assembly) | MBE6U6SH/U           | MBE7U6BH/U          |
| Valve/Actuator Assembly |          |          |                 | VR2L6UESH/M                                 | VR2L7UEBH/M          |                     |
|                         |          |          |                 | Replacement Actuator (included in assembly) | MBE6U6SH/U           | MBE7U6BH/U          |
| Valve/Actuator Assembly |          |          |                 | VR2M6UESH/M                                 | VR2M7UEBH/M          |                     |
|                         |          |          |                 | Replacement Actuator (included in assembly) | MBE6U7SH/U           | MBE7U7BH/U          |
| Valve/Actuator Assembly |          |          |                 | VR2N6UESH/M                                 | VR2N7UEBH/M          |                     |
|                         |          |          |                 | Replacement Actuator (included in assembly) | MBE6U8SH/U           | MBE7U8BH/U          |
| Valve/Actuator Assembly |          |          |                 | VR2P6UESH/M                                 | VR2P7UEBH/M          |                     |
|                         |          |          |                 | Replacement Actuator (included in assembly) | MBE6U6SH/U           | MBE7U6BH/U          |

# Product Selection - Valves

## Resilient Seat Butterfly Valves, 3-Way Fail-in-place

### VR3 / VR4 / VR5 – 2 to 3 inch

#### Common Features

- Fail-In-Place Actuators
- 5-Year Warranty
- Heater Option – Must be ordered with the assembly. Cannot be field installed.
- Aux Switch – Can be field installed.
- Max static pressure 232 psi CWP

|                     |          |          |                 | Actuator Features                           |                    | Fail-In-Place   |                 |                 |                 |
|---------------------|----------|----------|-----------------|---------------------------------------------|--------------------|-----------------|-----------------|-----------------|-----------------|
|                     |          |          |                 | Control Signal                              | Floating           | •               | •               |                 |                 |
|                     |          |          |                 |                                             | 2-Position SPDT    | •               | •               |                 |                 |
|                     |          |          |                 |                                             | Modulating 2-10Vdc |                 |                 | •               | •               |
|                     |          |          |                 | Enclosure Rating                            | NEMA2              | •               |                 | •               |                 |
|                     |          |          |                 |                                             | NEMA4X             |                 | •               |                 | •               |
|                     |          |          |                 | Heater Option                               | (for NEMA4X)       |                 | MB-SR-N4HEAT/U  |                 | MB-SR-N4HEAT/U  |
|                     |          |          |                 | Power Supply Voltage                        | 24Vac/Vdc          | •               | •               | •               | •               |
|                     |          |          |                 | Aux Switch                                  | Add-On             | MB-NSR-SWITCH/U | MB-NSR-SWITCH/U | MB-NSR-SWITCH/U | MB-NSR-SWITCH/U |
|                     |          |          |                 | Feedback                                    | 2-10Vdc            |                 |                 | •               | •               |
| Valve Size (inches) | Cv @ 60° | Cv @ 90° | Close-off (psi) | VR3 3-Way Configuration*                    |                    |                 |                 |                 |                 |
| 2                   | 44       | 115      | 200             | Valve/Actuator Assembly                     | VR3F6LPN2/M        | n/a             | VR3F7LPF2/M     | VR3F7LPF4/M     |                 |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBP6LAN2/U         | n/a             | MBP7L3F2/U      | MBP7LRN4/U      |                 |
| 2-1/2               | 75       | 196      | 200             | Valve/Actuator Assembly                     | VR3G6LPN2/M        | VR3G6LPN4/M     | VR3G7LPF2/M     | VR3G7LPF4/M     |                 |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBP6LRN2/U         | MBP6LRN4/U      | MBP7LRF2/U      | MBP7LRN4/U      |                 |
| 3                   | 116      | 302      | 200             | Valve/Actuator Assembly                     | (next page)        | (next page)     | VR3H7LPF2/M     | VR3H7LPF4/M     |                 |
|                     |          |          |                 | Replacement Actuator (included in assembly) | (next page)        | (next page)     | MBP7LRF2/U      | MBP7LRN4/U      |                 |
|                     |          |          |                 | VR4 3-Way Configuration*                    |                    |                 |                 |                 |                 |
| 2                   | 44       | 115      | 200             | Valve/Actuator Assembly                     | VR4F6LPN2/M        | n/a             | VR4F7LPF2/M     | VR4F7LPF4/M     |                 |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBP6LAN2/U         | n/a             | MBP7L3F2/U      | MBP7LRN4/U      |                 |
| 2-1/2               | 75       | 196      | 200             | Valve/Actuator Assembly                     | VR4G6LPN2/M        | VR4G6LPN4/M     | VR4G7LPF2/M     | VR4G7LPF4/M     |                 |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBP6LRN2/U         | MBP6LRN4/U      | MBP7LRF2/U      | MBP7LRN4/U      |                 |
| 3                   | 116      | 302      | 200             | Valve/Actuator Assembly                     | (next page)        | (next page)     | VR4H7LPF2/M     | VR4H7LPF4/M     |                 |
|                     |          |          |                 | Replacement Actuator (included in assembly) | (next page)        | (next page)     | MBP7LRF2/U      | MBP7LRN4/U      |                 |
|                     |          |          |                 | VR5 3-Way Configuration*                    |                    |                 |                 |                 |                 |
| 2                   | 44       | 115      | 200             | Valve/Actuator Assembly                     | VR5F6LPN2/M        | n/a             | VR5F7LPF2/M     | VR5F7LPF4/M     |                 |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBP6LAN2/U         | n/a             | MBP7L3F2/U      | MBP7LRN4/U      |                 |
| 2-1/2               | 75       | 196      | 200             | Valve/Actuator Assembly                     | VR5G6LPN2/M        | VR5G6LPN4/M     | VR5G7LPF2/M     | VR5G7LPF4/M     |                 |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBP6LRN2/U         | MBP6LRN4/U      | MBP7LRF2/U      | MBP7LRN4/U      |                 |
| 3                   | 116      | 302      | 200             | Valve/Actuator Assembly                     | (next page)        | (next page)     | VR5H7LPF2/M     | VR5H7LPF4/M     |                 |
|                     |          |          |                 | Replacement Actuator (included in assembly) | (next page)        | (next page)     | MBP7LRF2/U      | MBP7LRN4/U      |                 |

\* See diagram on page 193 for port configurations.

# Product Selection - Valves

## Resilient Seat Butterfly Valves, 3-Way Fail-in-place

### VR3 / VR4 / VR5 – 3 to 12 inch

#### Common Features

- Fail-In-Place Actuators
- 5-Year Warranty
- Max static pressure 232 psi CWP

|                     |          |          |                 | Actuator Features                           | Fail-In-Place            |                 |
|---------------------|----------|----------|-----------------|---------------------------------------------|--------------------------|-----------------|
|                     |          |          |                 | Control Signal                              | Floating                 | •               |
|                     |          |          |                 |                                             | 2-Position SPDT          | •               |
|                     |          |          |                 |                                             | Modulating 2-10Vdc       | •               |
|                     |          |          |                 | Enclosure Rating                            | NEMA4X                   | •               |
|                     |          |          |                 | Heater Option                               | (for NEMA4X)             | Built in        |
|                     |          |          |                 | Power Supply Voltage                        | 24-240Vac                | •               |
|                     |          |          |                 | Aux Switch                                  | Built-In                 | 2 x SPDT        |
|                     |          |          |                 | Feedback                                    | 2-10Vdc                  | •               |
| Valve Size (inches) | Cv @ 60° | Cv @ 90° | Close-off (psi) |                                             | VR3 3-Way Configuration* |                 |
| 3                   | 116      | 302      | 200             | Valve/Actuator Assembly                     | VR3H6UPNH/M              | (previous page) |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBP6U6SH/U               | (previous page) |
| 4                   | 230      | 600      | 200             | Valve/Actuator Assembly                     | VR3J6UPSH/M              | VR3J7UPBH/M     |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBP6U6SH/U               | MBP7U6BH/U      |
| 5                   | 392      | 1,022    | 200             | Valve/Actuator Assembly                     | VR3K6UPSH/M              | VR3K7UPBH/M     |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBP6U6SH/U               | MBP7U6BH/U      |
| 6                   | 605      | 1,579    | 200             | Valve/Actuator Assembly                     | VR3L6UPSH/M              | VR3L7UPBH/M     |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBP6U6SH/U               | MBP7U6BH/U      |
| 8                   | 1,202    | 3,136    | 200             | Valve/Actuator Assembly                     | VR3M6UPSH/M              | VR3M7UPBH/M     |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBP6U7SH/U               | MBP7U7BH/U      |
| 10                  | 2,047    | 5,340    | 200             | Valve/Actuator Assembly                     | VR3N6UPSH/M              | VR3N7UPBH/M     |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBP6U8SH/U               | MBP7U8BH/U      |
| 12                  | 3,162    | 8,250    | 200             | Valve/Actuator Assembly                     | VR3P6UPSH/M              | VR3P7UPBH/M     |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBP6U6SH/U               | MBP7U6BH/U      |
|                     |          |          |                 | VR4 3-Way Configuration*                    |                          |                 |
| 3                   | 116      | 302      | 200             | Valve/Actuator Assembly                     | VR4H6UPNH/M              | (previous page) |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBP6U6SH/U               | (previous page) |
| 4                   | 230      | 600      | 200             | Valve/Actuator Assembly                     | VR4J6UPSH/M              | VR4J7UPBH/M     |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBP6U6SH/U               | MBP7U6BH/U      |
| 5                   | 392      | 1,022    | 200             | Valve/Actuator Assembly                     | VR4K6UPSH/M              | VR4K7UPBH/M     |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBP6U6SH/U               | MBP7U6BH/U      |
| 6                   | 605      | 1,579    | 200             | Valve/Actuator Assembly                     | VR4L6UPSH/M              | VR4L7UPBH/M     |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBP6U6SH/U               | MBP7U6BH/U      |
| 8                   | 1,202    | 3,136    | 200             | Valve/Actuator Assembly                     | VR4M6UPSH/M              | VR4M7UPBH/M     |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBP6U7SH/U               | MBP7U7BH/U      |
| 10                  | 2,047    | 5,340    | 200             | Valve/Actuator Assembly                     | VR4N6UPSH/M              | VR4N7UPBH/M     |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBP6U8SH/U               | MBP7U8BH/U      |
| 12                  | 3,162    | 8,250    | 200             | Valve/Actuator Assembly                     | VR4P6UPSH/M              | VR4P7UPBH/M     |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBP6U6SH/U               | MBP7U6BH/U      |
|                     |          |          |                 | VR5 3-Way Configuration*                    |                          |                 |
| 3                   | 116      | 302      | 200             | Valve/Actuator Assembly                     | VR5H6UPNH/M              | (previous page) |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBP6U6SH/U               | (previous page) |
| 4                   | 230      | 600      | 200             | Valve/Actuator Assembly                     | VR5J6UPSH/M              | VR5J7UPBH/M     |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBP6U6SH/U               | MBP7U6BH/U      |
| 5                   | 392      | 1,022    | 200             | Valve/Actuator Assembly                     | VR5K6UPSH/M              | VR5K7UPBH/M     |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBP6U6SH/U               | MBP7U6BH/U      |
| 6                   | 605      | 1,579    | 200             | Valve/Actuator Assembly                     | VR5L6UPSH/M              | VR5L7UPBH/M     |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBP6U6SH/U               | MBP7U6BH/U      |
| 8                   | 1,202    | 3,136    | 200             | Valve/Actuator Assembly                     | VR5M6UPSH/M              | VR5M7UPBH/M     |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBP6U7SH/U               | MBP7U7BH/U      |
| 10                  | 2,047    | 5,340    | 200             | Valve/Actuator Assembly                     | VR5N6UPSH/M              | VR5N7UPBH/M     |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBP6U8SH/U               | MBP7U8BH/U      |
| 12                  | 3,162    | 8,250    | 200             | Valve/Actuator Assembly                     | VR5P6UPSH/M              | VR5P7UPBH/M     |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBP6U6SH/U               | MBP7U6BH/U      |

\* See diagram on page 193 for port configurations.

# Product Selection - Valves

## Resilient Seat Butterfly Valves, 3-way Fail-in-place

### VR3 / VR4 / VR5 – 14 to 18 inch

#### Common Features

- Fail-In-Place Actuators
- 2-Year Warranty
- Max static pressure 232 psi CWP

|                     |          |          |                 | Actuator Features                           | Fail-In-Place      |             |
|---------------------|----------|----------|-----------------|---------------------------------------------|--------------------|-------------|
|                     |          |          |                 | Control Signal                              | Floating           | •           |
|                     |          |          |                 |                                             | 2-Position SPDT    | •           |
|                     |          |          |                 |                                             | Modulating 2-10Vdc | •           |
|                     |          |          |                 | Enclosure Rating                            | NEMA4X             | •           |
|                     |          |          |                 | Heater Option                               | (for NEMA4X)       | Built in    |
|                     |          |          |                 | Power Supply Voltage                        | 120Vac             | •           |
|                     |          |          |                 | Aux Switch                                  | Built-In           | 2 x SPDT    |
|                     |          |          |                 | Feedback                                    | 2-10Vdc            | •           |
| Valve Size (inches) | Cv @ 60° | Cv @ 90° | Close-off (psi) | VR3 3-Way Configuration*                    |                    |             |
| 14                  | 4,658    | 11,917   | 150             | Valve/Actuator Assembly                     | VR3R6HPSH/M        | VR3R7HPBH/M |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBP6HCSH/U         | MBP7HCBH/U  |
| 16                  | 6,282    | 16,388   | 150             | Valve/Actuator Assembly                     | VR3S6HPSH/M        | VR3S7HPBH/M |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBP6HDSH/U         | MBP7HDBH/U  |
| 18                  | 8,320    | 21,705   | 150             | Valve/Actuator Assembly                     | VR3T6HPSH/M        | VR3T7HPBH/M |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBP6HESH/U         | MBP7HEBH/U  |
|                     |          |          |                 | VR4 3-Way Configuration*                    |                    |             |
| 14                  | 4,658    | 11,917   | 150             | Valve/Actuator Assembly                     | VR4R6HPSH/M        | VR4R7HPBH/M |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBP6HCSH/U         | MBP7HCBH/U  |
| 16                  | 6,282    | 16,388   | 150             | Valve/Actuator Assembly                     | VR4S6HPSH/M        | VR4S7HPBH/M |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBP6HDSH/U         | MBP7HDBH/U  |
| 18                  | 8,320    | 21,705   | 150             | Valve/Actuator Assembly                     | VR4T6HPSH/M        | VR4T7HPBH/M |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBP6HESH/U         | MBP7HEBH/U  |
|                     |          |          |                 | VR5 3-Way Configuration*                    |                    |             |
| 14                  | 4,658    | 11,917   | 150             | Valve/Actuator Assembly                     | VR5R6HPSH/M        | VR5R7HPBH/M |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBP6HCSH/U         | MBP7HCBH/U  |
| 16                  | 6,282    | 16,388   | 150             | Valve/Actuator Assembly                     | VR5S6HPSH/M        | VR5S7HPBH/M |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBP6HDSH/U         | MBP7HDBH/U  |
| 18                  | 8,320    | 21,705   | 150             | Valve/Actuator Assembly                     | VR5T6HPSH/M        | VR5T7HPBH/M |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBP6HESH/U         | MBP7HEBH/U  |

\* See diagram on page 193 for port configurations.

# Product Selection - Valves

## Resilient Seat Butterfly Valves, 3-Way Spring Return and Electronic Fail-Safe

### VR3 / VR4 / VR5 – 2 inch

#### Common Features

- Spring Return Actuators
- 5-Year Warranty
- Max static pressure 232 psi CWP

| Features<br>in Actuators<br>nty<br>essure 232 psi CWP |          |          |                 | Actuator Features                                      |                    | Spring Return |  |
|-------------------------------------------------------|----------|----------|-----------------|--------------------------------------------------------|--------------------|---------------|--|
|                                                       |          |          |                 | Control Signal                                         | 2-Position SPST    | •             |  |
|                                                       |          |          |                 |                                                        | Modulating 2-10Vdc | •             |  |
|                                                       |          |          |                 | Enclosure Rating                                       | NEMA2              | •             |  |
|                                                       |          |          |                 | Power Supply Voltage                                   | 24Vac/Vdc          | •             |  |
|                                                       |          |          |                 | Aux Switch                                             |                    | n/a           |  |
|                                                       |          |          |                 | Feedback                                               | 2-10Vdc            | •             |  |
| Valve Size (inches)                                   | Cv @ 60° | Cv @ 90° | Close-off (psi) | Master Actuator Fail Open / VR3 3-Way Configuration*   |                    |               |  |
| 2                                                     | 44       | 115      | 200             | Valve/Actuator Assembly                                | VR3F8USN2/M        | VR3F7LSF2/M   |  |
|                                                       |          |          |                 | Replacement Actuator (included in assembly)            | MBS8U1N2/U         | MBS7L1F2/U    |  |
|                                                       |          |          |                 | Master Actuator Fail Closed / VR3 3-Way Configuration* |                    |               |  |
| 2                                                     | 44       | 115      | 200             | Valve/Actuator Assembly                                | VR3F8UTN2/M        | VR3F7LTF2/M   |  |
|                                                       |          |          |                 | Replacement Actuator (included in assembly)            | MBS8U1N2/U         | MBS7L1F2/U    |  |
|                                                       |          |          |                 | Master Actuator Fail Open / VR4 3-Way Configuration*   |                    |               |  |
| 2                                                     | 44       | 115      | 200             | Valve/Actuator Assembly                                | VR4F8USN2/M        | VR4F7LSF2/M   |  |
|                                                       |          |          |                 | Replacement Actuator (included in assembly)            | MBS8U1N2/U         | MBS7L1F2/U    |  |
|                                                       |          |          |                 | Master Actuator Fail Closed / VR4 3-Way Configuration* |                    |               |  |
| 2                                                     | 44       | 115      | 200             | Valve/Actuator Assembly                                | VR4F8UTN2/M        | VR4F7LTF2/M   |  |
|                                                       |          |          |                 | Replacement Actuator (included in assembly)            | MBS8U1N2/U         | MBS7L1F2/U    |  |
|                                                       |          |          |                 | Master Actuator Fail Open / VR5 3-Way Configuration*   |                    |               |  |
| 2                                                     | 44       | 115      | 200             | Valve/Actuator Assembly                                | VR5F8USN2/M        | VR5F7LSF2/M   |  |
|                                                       |          |          |                 | Replacement Actuator (included in assembly)            | MBS8U1N2/U         | MBS7L1F2/U    |  |
|                                                       |          |          |                 | Master Actuator Fail Closed / VR5 3-Way Configuration* |                    |               |  |
| 2                                                     | 44       | 115      | 200             | Valve/Actuator Assembly                                | VR5F8UTN2/M        | VR5F7LTF2/M   |  |
|                                                       |          |          |                 | Replacement Actuator (included in assembly)            | MBS8U1N2/U         | MBS7L1F2/U    |  |

\* See diagram on page 193 for port configurations.

### VR3 / VR4 / VR5 – 2.5 and 3 inch

#### Common Features

- Electronic Fail-Safe Actuators
- Fail-Safe Position Field Selectable
- Factory Configured to Normally Closed / Fail Closed
- Aux Switch – Can be field installed.
- Max static pressure 232 psi CWP

Safe Actuators

tion Field Selectable

gured to

sed / Fail Closed

Can be field installed.

essure 232 psi CWP

|                     |          |          |                 | Actuator Features                           | Electronic Fail-Safe |                 |
|---------------------|----------|----------|-----------------|---------------------------------------------|----------------------|-----------------|
|                     |          |          |                 | Control Signal                              | Floating             | •               |
|                     |          |          |                 |                                             | 2-Position SPDT      | •               |
|                     |          |          |                 |                                             | Modulating 2-10Vdc   | •               |
|                     |          |          |                 | Enclosure Rating                            | NEMA2                | •               |
|                     |          |          |                 | Power Supply Voltage                        | 24Vac/Vdc            | •               |
|                     |          |          |                 | Aux Switch                                  | Add-On               | MB-NSR-SWITCH/U |
|                     |          |          |                 | Feedback                                    | 2-10Vdc              | •               |
| Valve Size (inches) | Cv @ 60° | Cv @ 90° | Close-off (psi) | VR3 3-Way Configuration*                    |                      |                 |
| 2-1/2               | 75       | 196      | 200             | Valve/Actuator Assembly                     | VR3G8LEN2/M          | VR3G7LEF2/M     |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBE6LRN2/U           | MBE7LRF2/U      |
| 3                   | 116      | 302      | 200             | Valve/Actuator Assembly                     | VR3H6LEN2/M          | VR3H7LEF2/M     |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBE6LRN2/U           | MBE7LRF2/U      |
|                     |          |          |                 | VR4 3-Way Configuration*                    |                      |                 |
| 2-1/2               | 75       | 196      | 200             | Valve/Actuator Assembly                     | VR4G8LEN2/M          | VR4G7LEF2/M     |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBE6LRN2/U           | MBE7LRF2/U      |
| 3                   | 116      | 302      | 200             | Valve/Actuator Assembly                     | VR4H6LEN2/M          | VR4H7LEF2/M     |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBE6LRN2/U           | MBE7LRF2/U      |
|                     |          |          |                 | VR5 3-Way Configuration*                    |                      |                 |
| 2-1/2               | 75       | 196      | 200             | Valve/Actuator Assembly                     | VR5G8LEN2/M          | VR5G7LEF2/M     |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBE6LRN2/U           | MBE7LRF2/U      |
| 3                   | 116      | 302      | 200             | Valve/Actuator Assembly                     | VR5H6LEN2/M          | VR5H7LEF2/M     |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBE6LRN2/U           | MBE7LRF2/U      |

\* See diagram on page 193 for port configurations.

# Product Selection - Valves

## Resilient Seat Butterfly Valves, 3-Way Electronic Fail-Safe

### VR3 / VR4 / VR5 – 4 to 12 inch

#### Common Features

- Electronic Fail-Safe Actuators
- 5-Year Warranty
- Fail-Safe Position Field Selectable
- Factory Configured to  
Normally Closed / Fail Closed
- Max static pressure 232 psi CWP

| Actuator Features    |                    | Electronic Fail-Safe |          |
|----------------------|--------------------|----------------------|----------|
| Control Signal       | Floating           | •                    |          |
|                      | 2-Position SPDT    | •                    |          |
|                      | Modulating 2-10Vdc |                      | •        |
| Enclosure Rating     | NEMA4X             | •                    | •        |
| Heater Option        | (for NEMA4X)       | Built in             | Built in |
| Power Supply Voltage | 24-240Vac          | •                    | •        |
| Aux Switch           | Built-In           | 2 x SPDT             | 2 x SPDT |
| Feedback             | 2-10Vdc            |                      | •        |

| Valve Size (inches) | Cv @ 60° | Cv @ 90° | Close-off (psi) |                                             | VR3 3-Way Configuration* |             |
|---------------------|----------|----------|-----------------|---------------------------------------------|--------------------------|-------------|
| 4                   | 230      | 600      | 200             | Valve/Actuator Assembly                     | VR3J6UESH/M              | VR3J7UEBH/M |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBE6U6SH/U               | MBE7U6BH/U  |
| 5                   | 392      | 1,022    | 200             | Valve/Actuator Assembly                     | VR3K6UESH/M              | VR3K7UEBH/M |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBE6U6SH/U               | MBE7U6BH/U  |
| 6                   | 605      | 1,579    | 200             | Valve/Actuator Assembly                     | VR3L6UESH/M              | VR3L7UEBH/M |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBE6U6SH/U               | MBE7U6BH/U  |
| 8                   | 1,202    | 3,136    | 200             | Valve/Actuator Assembly                     | VR3M6UESH/M              | VR3M7UEBH/M |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBE6U7SH/U               | MBE7U7BH/U  |
| 10                  | 2,047    | 5,340    | 200             | Valve/Actuator Assembly                     | VR3N6UESH/M              | VR3N7UEBH/M |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBE6U8SH/U               | MBE7U8BH/U  |
| 12                  | 3,162    | 8,250    | 200             | Valve/Actuator Assembly                     | VR3P6UESH/M              | VR3P7UEBH/M |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBE6U6SH/U               | MBE7U6BH/U  |
|                     |          |          |                 |                                             | VR4 3-Way Configuration* |             |
| 4                   | 230      | 600      | 200             | Valve/Actuator Assembly                     | VR4J6UESH/M              | VR4J7UEBH/M |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBE6U6SH/U               | MBE7U6BH/U  |
| 5                   | 392      | 1,022    | 200             | Valve/Actuator Assembly                     | VR4K6UESH/M              | VR4K7UEBH/M |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBE6U6SH/U               | MBE7U6BH/U  |
| 6                   | 605      | 1,579    | 200             | Valve/Actuator Assembly                     | VR4L6UESH/M              | VR4L7UEBH/M |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBE6U6SH/U               | MBE7U6BH/U  |
| 8                   | 1,202    | 3,136    | 200             | Valve/Actuator Assembly                     | VR4M6UESH/M              | VR4M7UEBH/M |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBE6U7SH/U               | MBE7U7BH/U  |
| 10                  | 2,047    | 5,340    | 200             | Valve/Actuator Assembly                     | VR4N6UESH/M              | VR4N7UEBH/M |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBE6U8SH/U               | MBE7U8BH/U  |
| 12                  | 3,162    | 8,250    | 200             | Valve/Actuator Assembly                     | VR4P6UESH/M              | VR4P7UEBH/M |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBE6U6SH/U               | MBE7U6BH/U  |
|                     |          |          |                 |                                             | VR5 3-Way Configuration* |             |
| 4                   | 230      | 600      | 200             | Valve/Actuator Assembly                     | VR5J6UESH/M              | VR5J7UEBH/M |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBE6U6SH/U               | MBE7U6BH/U  |
| 5                   | 392      | 1,022    | 200             | Valve/Actuator Assembly                     | VR5K6UESH/M              | VR5K7UEBH/M |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBE6U6SH/U               | MBE7U6BH/U  |
| 6                   | 605      | 1,579    | 200             | Valve/Actuator Assembly                     | VR5L6UESH/M              | VR5L7UEBH/M |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBE6U6SH/U               | MBE7U6BH/U  |
| 8                   | 1,202    | 3,136    | 200             | Valve/Actuator Assembly                     | VR5M6UESH/M              | VR5M7UEBH/M |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBE6U7SH/U               | MBE7U7BH/U  |
| 10                  | 2,047    | 5,340    | 200             | Valve/Actuator Assembly                     | VR5N6UESH/M              | VR5N7UEBH/M |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBE6U8SH/U               | MBE7U8BH/U  |
| 12                  | 3,162    | 8,250    | 200             | Valve/Actuator Assembly                     | VR5P6UESH/M              | VR5P7UEBH/M |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBE6U6SH/U               | MBE7U6BH/U  |

\* See diagram on page 193 for port configurations.

# Product Selection - Valves

## High Performance Butterfly Valves, 2-way Fail-in-place and Spring Return

### VH2 – 2 to 4 inch

#### Common Features

- Fail-In-Place Actuators
- 5-Year Warranty
- Aux Switch – Can be field installed.
- ASME/ANSI Class 150 Flanges
- Max static pressure 285 psi (100°F)

|                     |          |          |                 | Actuator Features                           |                    | Fail-In-Place   |                 |
|---------------------|----------|----------|-----------------|---------------------------------------------|--------------------|-----------------|-----------------|
|                     |          |          |                 | Control Signal                              | Floating           | •               |                 |
|                     |          |          |                 |                                             | 2-Position SPDT    | •               |                 |
|                     |          |          |                 |                                             | Modulating 2-10Vdc |                 | •               |
|                     |          |          |                 | Enclosure Rating                            | NEMA2              | •               | •               |
|                     |          |          |                 | Power Supply Voltage                        | 24Vac/Vdc          | •               | •               |
|                     |          |          |                 | Aux Switch                                  | Add-On             | MB-NSR-SWITCH/U | MB-NSR-SWITCH/U |
|                     |          |          |                 | Feedback                                    | 2-10Vdc            |                 | •               |
| Valve Size (inches) | Cv @ 60° | Cv @ 90° | Close-off (psi) |                                             |                    |                 |                 |
| 2                   | 56       | 102      | 150             | Valve/Actuator Assembly                     |                    | VH2F6LPN2/M     | VH2F7LPF2/M     |
|                     |          |          |                 | Replacement Actuator (included in assembly) |                    | MBP6LRN2/U      | MBP7LRF2/U      |
| 2-1/2               | 80       | 146      | 150             | Valve/Actuator Assembly                     |                    | VH2G6LPN2/M     | VH2G7LPF2/M     |
|                     |          |          |                 | Replacement Actuator (included in assembly) |                    | MBP6LRN2/U      | MBP7LRF2/U      |
| 3                   | 125      | 228      | 150             | Valve/Actuator Assembly                     |                    | VH2H6LPN2/M     | VH2H7LPF2/M     |
|                     |          |          |                 | Replacement Actuator (included in assembly) |                    | MBP6LRN2/U      | MBP7LRF2/U      |
| 4                   | 248      | 451      | 150             | Valve/Actuator Assembly                     |                    | VH2J6LPN2/M     | VH2J7LPF2/M     |
|                     |          |          |                 | Replacement Actuator (included in assembly) |                    | MBP6LRN2/U      | MBP7LRF2/U      |

### VH2 – 2 to 4 inch

#### Common Features

- Spring Return Actuators
- 5-Year Warranty
- ASME/ANSI Class 150 Flanges
- Max static pressure 285 psi (100°F)

|                                                                               |          |          |                    |                                             |                    |               |   |
|-------------------------------------------------------------------------------|----------|----------|--------------------|---------------------------------------------|--------------------|---------------|---|
| Turn Actuators<br>arranty<br>SI Class 150 Flanges<br>pressure 285 psi (100°F) |          |          |                    | Actuator Features                           |                    | Spring Return |   |
|                                                                               |          |          |                    | Control Signal                              | 2-Position SPDT    | •             |   |
|                                                                               |          |          |                    |                                             | Modulating 2-10Vdc |               | • |
|                                                                               |          |          |                    | Enclosure Rating                            | NEMA2              | •             | • |
|                                                                               |          |          |                    | Power Supply Voltage                        | 24Vac/Vdc          | •             | • |
|                                                                               |          |          |                    | Feedback                                    | 2-10Vdc            |               | • |
| Valve Size<br>(inches)                                                        | Cv @ 60° | Cv @ 90° | Close-off<br>(psi) |                                             | Fail-Safe Open     |               |   |
| 2                                                                             | 56       | 102      | 150                | Valve/Actuator Assembly                     | VH2F8LSN2/M        | VH2F7LSF2/M   |   |
|                                                                               |          |          |                    | Replacement Actuator (included in assembly) | MBS8L1N2/U         | MBS7L1F2/U    |   |
| 2-1/2                                                                         | 80       | 146      | 150                | Valve/Actuator Assembly                     | VH2G8LSN2/M        | VH2G7LSF2/M   |   |
|                                                                               |          |          |                    | Replacement Actuator (included in assembly) | MBS8L1N2/U         | MBS7L1F2/U    |   |
| 3                                                                             | 125      | 228      | 150                | Valve/Actuator Assembly                     | VH2H8LSN2/M        | VH2H7LSF2/M   |   |
|                                                                               |          |          |                    | Replacement Actuator (included in assembly) | MBS8L1N2/U         | MBS7L1F2/U    |   |
| 4                                                                             | 248      | 451      | 150                | Valve/Actuator Assembly                     | VH2J8LSN2/M        | VH2J7LSF2/M   |   |
|                                                                               |          |          |                    | Replacement Actuator (included in assembly) | MBS8L1N2/U         | MBS7L1F2/U    |   |
|                                                                               |          |          |                    |                                             | Fail-Safe Closed   |               |   |
| 2                                                                             | 56       | 102      | 150                | Valve/Actuator Assembly                     | VH2F8LTN2/M        | VH2F7LTF2/M   |   |
|                                                                               |          |          |                    | Replacement Actuator (included in assembly) | MBS8L1N2/U         | MBS7L1F2/U    |   |
| 2-1/2                                                                         | 80       | 146      | 150                | Valve/Actuator Assembly                     | VH2G8LTN2/M        | VH2G7LTF2/M   |   |
|                                                                               |          |          |                    | Replacement Actuator (included in assembly) | MBS8L1N2/U         | MBS7L1F2/U    |   |
| 3                                                                             | 125      | 228      | 150                | Valve/Actuator Assembly                     | VH2H8LTN2/M        | VH2H7LTF2/M   |   |
|                                                                               |          |          |                    | Replacement Actuator (included in assembly) | MBS8L1N2/U         | MBS7L1F2/U    |   |
| 4                                                                             | 248      | 451      | 150                | Valve/Actuator Assembly                     | VH2J8LTN2/M        | VH2J7LTF2/M   |   |
|                                                                               |          |          |                    | Replacement Actuator (included in assembly) | MBS8L1N2/U         | MBS7L1F2/U    |   |

# Product Selection - Valves

## High Performance Butterfly Valves, 2-way Electronic Fail-safe and Fail-in-place

### VH2 – 5 to 6 inch

#### Common Features

- Electronic Fail-Safe Actuators
- 5-Year Warranty
- Fail-Safe Position Field Selectable
- Factory set to Normally Closed / Fail Closed
- ASME/ANSI Class 150 Flanges
- Max static pressure 285 psi (100°F)

|                     |          |          |                 | Actuator Features                           | Electronic Fail-Safe |             |
|---------------------|----------|----------|-----------------|---------------------------------------------|----------------------|-------------|
| Valve Size (inches) | Cv @ 60° | Cv @ 90° | Close-off (psi) | Control Signal                              | Floating             | •           |
|                     |          |          |                 | 2-Position SPDT                             |                      | •           |
|                     |          |          |                 | Modulating                                  | 2-10Vdc              | •           |
|                     |          |          |                 | Enclosure Rating                            | NEMA4X               | •           |
|                     |          |          |                 | Heater Option                               | (for NEMA4X)         | Built in    |
|                     |          |          |                 | Power Supply Voltage                        | 24-240Vac            | •           |
|                     |          |          |                 | Aux Switch                                  | Built-In             | •           |
|                     |          |          |                 | Feedback                                    | 2-10Vdc              | •           |
| 5                   | 393      | 714      | 150             | Valve/Actuator Assembly                     | VH2K6UESH/M          | VH2K7UEBH/M |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBE6U6SH/U           | MBE7U6BH/U  |
| 6                   | 607      | 1,103    | 150             | Valve/Actuator Assembly                     | VH2L6UESH/M          | VH2L7UEBH/M |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBE6U6SH/U           | MBE7U6BH/U  |

### VH2 – 8 to 12 inch

#### Common Features

- Fail-In-Place Actuators
- 2-Year Warranty
- ASME/ANSI Class 150 Flanges
- Max static pressure 285 psi (100°F)

|                     |          |          |                 | Actuator Features                           | Fail-In-Place |                     |                     |                     |
|---------------------|----------|----------|-----------------|---------------------------------------------|---------------|---------------------|---------------------|---------------------|
| Valve Size (inches) | Cv @ 60° | Cv @ 90° | Close-off (psi) | Control Signal                              | Floating      | •                   | •                   | •                   |
|                     |          |          |                 | 2-Position SPDT                             |               | •                   | •                   | •                   |
|                     |          |          |                 | Modulating                                  | 2-10Vdc       | •                   | •                   | •                   |
|                     |          |          |                 | Enclosure Rating                            | NEMA4X        | •                   | •                   | •                   |
|                     |          |          |                 | Heater Option                               | (for NEMA4X)  | Built in (Standard) | Built in (Standard) | Built in (Standard) |
|                     |          |          |                 | Power Supply Voltage                        | 24Vac         | •                   | •                   | •                   |
|                     |          |          |                 | 120Vac                                      |               | •                   | •                   | •                   |
|                     |          |          |                 | Aux Switch                                  | Built-In      | •                   | •                   | •                   |
|                     |          |          |                 | Feedback                                    | 2-10Vdc       | •                   | •                   | •                   |
| 8                   | 1,135    | 2,064    | 150             | Valve/Actuator Assembly                     | VH2M6LPSH/M   | VH2M7LPBH/M         |                     |                     |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBP6L9SH/U    | MBP7L9SH/U          |                     |                     |
| 10                  | 1,934    | 3,517    | 150             | Valve/Actuator Assembly                     | VH2N6LPSH/M   | VH2N7LPBH/M         |                     |                     |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBP6L9SH/U    | MBP7L9SH/U          |                     |                     |
| 12                  | 2,660    | 4,837    | 150             | Valve/Actuator Assembly                     | VH2P6LPSH/M   | VH2P7LPBH/M         |                     |                     |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBP6L9SH/U    | MBP7L9SH/U          |                     |                     |
| 14                  | 3,592    | 6,857    | 150             | Valve/Actuator Assembly                     | VH2R6LPSH/M   | VH2R7LPBH/M         |                     |                     |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBP6LBSH/U    | MBP7LBBH/U          |                     |                     |
| 16                  | 4,865    | 9,287    | 150             | Valve/Actuator Assembly                     |               |                     | VH2S6HPSH/M         | VH2S7HPBH/M         |
|                     |          |          |                 | Replacement Actuator (included in assembly) |               |                     | MBP6HDSH/U          | MBP7HDBH/U          |
| 18                  | 6,270    | 11,400   | 150             | Valve/Actuator Assembly                     |               |                     | VH2T6HPSH/M         | VH2T7HPBH/M         |
|                     |          |          |                 | Replacement Actuator (included in assembly) |               |                     | MBP6HDSH/U          | MBP7HDBH/U          |
| 20                  | 7,590    | 14,420   | 150             | Valve/Actuator Assembly                     |               |                     | VH2U6HPSH/M         | VH2U7HPBH/M         |
|                     |          |          |                 | Replacement Actuator (included in assembly) |               |                     | MBP6HFSH/U          | MBP7HFBH/U          |
| 24                  | 11,550   | 22,050   | 150             | Valve/Actuator Assembly                     |               |                     | VH2V6HPSH/M         | VH2V7HPBH/M         |
|                     |          |          |                 | Replacement Actuator (included in assembly) |               |                     | MBP6HGSU/U          | MBP7HGBH/U          |

# Product Selection - Valves

## High Performance Butterfly Valves, 3-way MIXING Fail-in-place

### VH3 / VH4 / VH5 – 2 to 3 inch

#### Common Features

- Fail-in-Place Actuators
- 5-Year Warranty
- ASME/ANSI Class 150 Flanges
- Max static pressure 285 psi (100°F)

| <div>ce Actuators</div> <div>arranty</div> <div>SI Class 150 Flanges</div> <div>pressure 285 psi (100°F)</div> |          |          |                 | Actuator Features                           |                                 | Fail-In-Place   |                 |
|----------------------------------------------------------------------------------------------------------------|----------|----------|-----------------|---------------------------------------------|---------------------------------|-----------------|-----------------|
|                                                                                                                |          |          |                 | Control Signal                              | Floating                        | •               |                 |
|                                                                                                                |          |          |                 |                                             | 2-Position SPDT                 | •               |                 |
|                                                                                                                |          |          |                 |                                             | Modulating 2-10Vdc              |                 | •               |
|                                                                                                                |          |          |                 | Enclosure Rating                            | NEMA2                           | •               | •               |
|                                                                                                                |          |          |                 | Power Supply Voltage                        | 24Vac/Vdc                       | •               | •               |
|                                                                                                                |          |          |                 | Aux Switch                                  | Add-On                          | MB-NSR-SWITCH/U | MB-NSR-SWITCH/U |
|                                                                                                                |          |          |                 | Feedback                                    | 2-10Vdc                         |                 | •               |
| Valve Size (inches)                                                                                            | Cv @ 60° | Cv @ 90° | Close-off (psi) |                                             | VH3 3-Way MIXING Configuration* |                 |                 |
| 2                                                                                                              | 52       | 102      | 150             | Valve/Actuator Assembly                     | VH3F6LPN2/M                     | VH3F7LPF2/M     |                 |
|                                                                                                                |          |          |                 | Replacement Actuator (included in assembly) | MBP6LRN2/U                      | MBP7LRF2/U      |                 |
| 2-1/2                                                                                                          | 75       | 143      | 150             | Valve/Actuator Assembly                     | VH3G6LPN2/M                     | VH3G7LPF2/M     |                 |
|                                                                                                                |          |          |                 | Replacement Actuator (included in assembly) | MBP6LRN2/U                      | MBP7LRF2/U      |                 |
| 3                                                                                                              | 117      | 223      | 150             | Valve/Actuator Assembly                     | VH3H6LPN2/M                     | VH3H7LPF2/M     |                 |
|                                                                                                                |          |          |                 | Replacement Actuator (included in assembly) | MBP6LRN2/U                      | MBP7LRF2/U      |                 |
|                                                                                                                |          |          |                 |                                             | VH4 3-Way MIXING Configuration* |                 |                 |
| 2                                                                                                              | 52       | 102      | 150             | Valve/Actuator Assembly                     | VH4F6LPN2/M                     | VH4F7LPF2/M     |                 |
|                                                                                                                |          |          |                 | Replacement Actuator (included in assembly) | MBP6LRN2/U                      | MBP7LRF2/U      |                 |
| 2-1/2                                                                                                          | 75       | 143      | 150             | Valve/Actuator Assembly                     | VH4G6LPN2/M                     | VH4G7LPF2/M     |                 |
|                                                                                                                |          |          |                 | Replacement Actuator (included in assembly) | MBP6LRN2/U                      | MBP7LRF2/U      |                 |
| 3                                                                                                              | 117      | 223      | 150             | Valve/Actuator Assembly                     | VH4H6LPN2/M                     | VH4H7LPF2/M     |                 |
|                                                                                                                |          |          |                 | Replacement Actuator (included in assembly) | MBP6LRN2/U                      | MBP7LRF2/U      |                 |
|                                                                                                                |          |          |                 |                                             | VH5 3-Way MIXING Configuration* |                 |                 |
| 2                                                                                                              | 52       | 102      | 150             | Valve/Actuator Assembly                     | VH5F6LPN2/M                     | VH5F7LPF2/M     |                 |
|                                                                                                                |          |          |                 | Replacement Actuator (included in assembly) | MBP6LRN2/U                      | MBP7LRF2/U      |                 |
| 2-1/2                                                                                                          | 75       | 143      | 150             | Valve/Actuator Assembly                     | VH5G6LPN2/M                     | VH5G7LPF2/M     |                 |
|                                                                                                                |          |          |                 | Replacement Actuator (included in assembly) | MBP6LRN2/U                      | MBP7LRF2/U      |                 |
| 3                                                                                                              | 117      | 223      | 150             | Valve/Actuator Assembly                     | VH5H6LPN2/M                     | VH5H7LPF2/M     |                 |
|                                                                                                                |          |          |                 | Replacement Actuator (included in assembly) | MBP6LRN2/U                      | MBP7LRF2/U      |                 |

\* See diagram on page 195 for port configurations.

### VH3 / VH4 / VH5 – 4 inch

#### Common Features

- Fail-in-Place Actuators
- 5-Year Warranty
- ASME/ANSI Class 150 Flanges
- Max static pressure 285 psi (100°F)

|                     |          |          |                 | Actuator Features                           | Fail-In-Place      |             |
|---------------------|----------|----------|-----------------|---------------------------------------------|--------------------|-------------|
|                     |          |          |                 | Control Signal                              | Floating           | •           |
|                     |          |          |                 |                                             | 2-Position SPDT    | •           |
|                     |          |          |                 |                                             | Modulating 2-10Vdc | •           |
|                     |          |          |                 | Enclosure Rating                            | NEMA4X             | •           |
|                     |          |          |                 | Heater Option                               | (for NEMA4X)       | Built In    |
|                     |          |          |                 | Power Supply Voltage                        | 24-240Vac/Vdc      | •           |
|                     |          |          |                 | Aux Switch                                  | Built In           | •           |
|                     |          |          |                 | Feedback                                    | 2-10Vdc            | •           |
| Valve Size (inches) | Cv @ 60° | Cv @ 90° | Close-off (psi) | VH3 3-Way MIXING Configuration*             |                    |             |
| 4                   | 224      | 435      | 150             | Valve/Actuator Assembly                     | VH3J6UPSH/M        | VH3J7UPBH/M |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBP6U6SH/U         | MBP7U6BH/U  |
|                     |          |          |                 | VH4 3-Way MIXING Configuration*             |                    |             |
| 4                   | 224      | 435      | 150             | Valve/Actuator Assembly                     | VH4J6UPSH/M        | VH4J7UPBH/M |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBP6U6SH/U         | MBP7U6BH/U  |
|                     |          |          |                 | VH5 3-Way MIXING Configuration*             |                    |             |
| 4                   | 224      | 435      | 150             | Valve/Actuator Assembly                     | VH5J6UPSH/M        | VH5J7UPBH/M |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBP6U6SH/U         | MBP7U6BH/U  |

\* See diagram on page 195 for port configurations.

# Product Selection - Valves

## High Performance Butterfly Valves, 3-way MIXING Fail-in-place

### VH3 / VH4 / VH5 – 5 to 16 inch

#### Common Features

- Fail-In-Place Actuators
- 2-Year Warranty
- ASME/ANSI Class 150 Flanges
- Max static pressure 285 psi (100°F)

| 3-Port Actuators<br>Modulating<br>SI Class 150 Flanges<br>Pressure 285 psi (100°F) |          |          |                 | Actuator Features                           |                                 | Fail-In-Place |             |             |          |
|------------------------------------------------------------------------------------|----------|----------|-----------------|---------------------------------------------|---------------------------------|---------------|-------------|-------------|----------|
|                                                                                    |          |          |                 | Control Signal                              | Floating                        | •             |             | •           |          |
|                                                                                    |          |          |                 |                                             | 2-Position SPDT                 | •             |             | •           |          |
|                                                                                    |          |          |                 |                                             | Modulating 2-10Vdc              |               | •           |             | •        |
|                                                                                    |          |          |                 | Enclosure Rating                            | NEMA4X                          | •             | •           | •           | •        |
|                                                                                    |          |          |                 | Heater Option                               | (for NEMA4X)                    | Built in      | Built in    | Built in    | Built in |
|                                                                                    |          |          |                 | Power Supply Voltage                        | 24Vac/Vdc                       | •             | •           |             |          |
|                                                                                    |          |          |                 |                                             | 120Vac                          |               |             | •           | •        |
|                                                                                    |          |          |                 | Aux Switch                                  | Built-In                        | •             | •           | •           | •        |
|                                                                                    |          |          |                 | Feedback                                    | 2-10Vdc                         |               | •           |             | •        |
| Valve Size (inches)                                                                | Cv @ 60° | Cv @ 90° | Close-off (psi) |                                             | VH3 3-Way MIXING Configuration* |               |             |             |          |
| 5                                                                                  | 361      | 688      | 150             | Valve/Actuator Assembly                     | VH3K6UPSH/M                     | VH3K7UPBH/M   |             |             |          |
|                                                                                    |          |          |                 | Replacement Actuator (included in assembly) | MBP6L9SH/U                      | MBP7L9SH/U    |             |             |          |
| 6                                                                                  | 546      | 1,041    | 150             | Valve/Actuator Assembly                     | VH3L6LPSH/M                     | VH3L7LPBH/M   |             |             |          |
|                                                                                    |          |          |                 | Replacement Actuator (included in assembly) | MBP6L9SH/U                      | MBP7L9SH/U    |             |             |          |
| 8                                                                                  | 1,001    | 1,911    | 150             | Valve/Actuator Assembly                     | VH3M6LPSH/M                     | VH3M7LPBH/M   |             |             |          |
|                                                                                    |          |          |                 | Replacement Actuator (included in assembly) | MBP6L9SH/U                      | MBP7L9SH/U    |             |             |          |
| 10                                                                                 | 1,673    | 3,194    | 150             | Valve/Actuator Assembly                     | VH3N6LPSH/M                     | VH3N7LPBH/M   |             |             |          |
|                                                                                    |          |          |                 | Replacement Actuator (included in assembly) | MBP6L9SH/U                      | MBP7L9SH/U    |             |             |          |
| 12                                                                                 | 2,319    | 4,428    | 150             | Valve/Actuator Assembly                     | VH3P6LPSH/M                     | VH3P7LPBH/M   |             |             |          |
|                                                                                    |          |          |                 | Replacement Actuator (included in assembly) | MBP6LBSH/U                      | MBP7LBBH/U    |             |             |          |
| 14                                                                                 | 2,986    | 5,702    | 150             | Valve/Actuator Assembly                     |                                 |               | VH3R6HPSH/M | VH3R7HPBH/M |          |
|                                                                                    |          |          |                 | Replacement Actuator (included in assembly) |                                 |               | MBP6HDSH/U  | MBP7HDBH/U  |          |
| 16                                                                                 | 3,988    | 8,243    | 150             | Valve/Actuator Assembly                     |                                 |               | VH3S6HPSH/M | VH3S7HPBH/M |          |
|                                                                                    |          |          |                 | Replacement Actuator (included in assembly) |                                 |               | MBP6HDSH/U  | MBP7HDBH/U  |          |
|                                                                                    |          |          |                 | VH4 3-Way MIXING Configuration*             |                                 |               |             |             |          |
| 5                                                                                  | 361      | 688      | 150             | Valve/Actuator Assembly                     | VH4K6UPSH/M                     | VH4K7UPBH/M   |             |             |          |
|                                                                                    |          |          |                 | Replacement Actuator (included in assembly) | MBP6L9SH/U                      | MBP7L9SH/U    |             |             |          |
| 6                                                                                  | 546      | 1,041    | 150             | Valve/Actuator Assembly                     | VH4L6LPSH/M                     | VH4L7LPBH/M   |             |             |          |
|                                                                                    |          |          |                 | Replacement Actuator (included in assembly) | MBP6L9SH/U                      | MBP7L9SH/U    |             |             |          |
| 8                                                                                  | 1,001    | 1,911    | 150             | Valve/Actuator Assembly                     | VH4M6LPSH/M                     | VH4M7LPBH/M   |             |             |          |
|                                                                                    |          |          |                 | Replacement Actuator (included in assembly) | MBP6L9SH/U                      | MBP7L9SH/U    |             |             |          |
| 10                                                                                 | 1,673    | 3,194    | 150             | Valve/Actuator Assembly                     | VH4N6LPSH/M                     | VH4N7LPBH/M   |             |             |          |
|                                                                                    |          |          |                 | Replacement Actuator (included in assembly) | MBP6L9SH/U                      | MBP7L9SH/U    |             |             |          |
| 12                                                                                 | 2,319    | 4,428    | 150             | Valve/Actuator Assembly                     | VH4P6LPSH/M                     | VH4P7LPBH/M   |             |             |          |
|                                                                                    |          |          |                 | Replacement Actuator (included in assembly) | MBP6LBSH/U                      | MBP7LBBH/U    |             |             |          |
| 14                                                                                 | 2,986    | 5,702    | 150             | Valve/Actuator Assembly                     |                                 |               | VH4R6HPSH/M | VH4R7HPBH/M |          |
|                                                                                    |          |          |                 | Replacement Actuator (included in assembly) |                                 |               | MBP6HDSH/U  | MBP7HDBH/U  |          |
| 16                                                                                 | 3,988    | 8,243    | 150             | Valve/Actuator Assembly                     |                                 |               | VH4S6HPSH/M | VH4S7HPBH/M |          |
|                                                                                    |          |          |                 | Replacement Actuator (included in assembly) |                                 |               | MBP6HDSH/U  | MBP7HDBH/U  |          |
|                                                                                    |          |          |                 | VH5 3-Way MIXING Configuration*             |                                 |               |             |             |          |
| 5                                                                                  | 361      | 688      | 150             | Valve/Actuator Assembly                     | VH5K6UPSH/M                     | VH5K7UPBH/M   |             |             |          |
|                                                                                    |          |          |                 | Replacement Actuator (included in assembly) | MBP6L9SH/U                      | MBP7L9SH/U    |             |             |          |
| 6                                                                                  | 546      | 1,041    | 150             | Valve/Actuator Assembly                     | VH5L6LPSH/M                     | VH5L7LPBH/M   |             |             |          |
|                                                                                    |          |          |                 | Replacement Actuator (included in assembly) | MBP6L9SH/U                      | MBP7L9SH/U    |             |             |          |
| 8                                                                                  | 1,001    | 1,911    | 150             | Valve/Actuator Assembly                     | VH5M6LPSH/M                     | VH5M7LPBH/M   |             |             |          |
|                                                                                    |          |          |                 | Replacement Actuator (included in assembly) | MBP6L9SH/U                      | MBP7L9SH/U    |             |             |          |
| 10                                                                                 | 1,673    | 3,194    | 150             | Valve/Actuator Assembly                     | VH5N6LPSH/M                     | VH5N7LPBH/M   |             |             |          |
|                                                                                    |          |          |                 | Replacement Actuator (included in assembly) | MBP6L9SH/U                      | MBP7L9SH/U    |             |             |          |
| 12                                                                                 | 2,319    | 4,428    | 150             | Valve/Actuator Assembly                     | VH5P6LPSH/M                     | VH5P7LPBH/M   |             |             |          |
|                                                                                    |          |          |                 | Replacement Actuator (included in assembly) | MBP6LBSH/U                      | MBP7LBBH/U    |             |             |          |
| 14                                                                                 | 2,986    | 5,702    | 150             | Valve/Actuator Assembly                     |                                 |               | VH5R6HPSH/M | VH5R7HPBH/M |          |
|                                                                                    |          |          |                 | Replacement Actuator (included in assembly) |                                 |               | MBP6HDSH/U  | MBP7HDBH/U  |          |
| 16                                                                                 | 3,988    | 8,243    | 150             | Valve/Actuator Assembly                     |                                 |               | VH5S6HPSH/M | VH5S7HPBH/M |          |
|                                                                                    |          |          |                 | Replacement Actuator (included in assembly) |                                 |               | MBP6HDSH/U  | MBP7HDBH/U  |          |

\* See diagram on page 195 for port configurations.

# Product Selection - Valves

## High Performance Butterfly Valves, 3-way MIXING Electronic Fail-Safe

### VH3 / VH4 / VH5 – 2 to 3 inch

#### Common Features

- Electronic Fail-Safe Actuators
- 5-Year Warranty
- Fail-Safe Position Field Selectable
- Factory set to Normally Closed / Fail Closed
- ASME/ANSI Class 150 Flanges
- Max static pressure 285 psi (100°F)

| Warranty<br>Position Field Selectable<br>Fail to Normally Closed / Fail Closed<br>ANSI Class 150 Flanges<br>Maximum Pressure 285 psi (100°F) |          |          |                 | Actuator Features                           |                    | Electronic Fail-Safe |                 |
|----------------------------------------------------------------------------------------------------------------------------------------------|----------|----------|-----------------|---------------------------------------------|--------------------|----------------------|-----------------|
|                                                                                                                                              |          |          |                 | Control Signal                              | Floating           | •                    |                 |
|                                                                                                                                              |          |          |                 |                                             | 2-Position SPDT    | •                    |                 |
|                                                                                                                                              |          |          |                 |                                             | Modulating 2-10Vdc |                      | •               |
|                                                                                                                                              |          |          |                 | Enclosure Rating                            | NEMA2              | •                    |                 |
|                                                                                                                                              |          |          |                 | Power Supply Voltage                        | 24Vac/Vdc          | •                    |                 |
|                                                                                                                                              |          |          |                 | Aux Switch                                  | Add-On             | MB-NSR-SWITCH/U      | MB-NSR-SWITCH/U |
|                                                                                                                                              |          |          |                 | Feedback                                    | 2-10Vdc            |                      | •               |
| Valve Size (inches)                                                                                                                          | Cv @ 60° | Cv @ 90° | Close-off (psi) | VH3 3-Way MIXING Configuration*             |                    |                      |                 |
| 2                                                                                                                                            | 52       | 102      | 150             | Valve/Actuator Assembly                     |                    | VH3F8LEN2/M          | VH3F7LEF2/M     |
|                                                                                                                                              |          |          |                 | Replacement Actuator (included in assembly) |                    | MBE6LRN2/U           | MBE7LRF2/U      |
| 2-1/2                                                                                                                                        | 75       | 143      | 150             | Valve/Actuator Assembly                     |                    | VH3G8LEN2/M          | VH3G7LEF2/M     |
|                                                                                                                                              |          |          |                 | Replacement Actuator (included in assembly) |                    | MBE6LRN2/U           | MBE7LRF2/U      |
| 3                                                                                                                                            | 117      | 223      | 150             | Valve/Actuator Assembly                     |                    | VH3H8LEN2/M          | VH3H7LEF2/M     |
|                                                                                                                                              |          |          |                 | Replacement Actuator (included in assembly) |                    | MBE6LRN2/U           | MBE7LRF2/U      |
|                                                                                                                                              |          |          |                 | VH4 3-Way MIXING Configuration*             |                    |                      |                 |
| 2                                                                                                                                            | 52       | 102      | 150             | Valve/Actuator Assembly                     |                    | VH4F8LEN2/M          | VH4F7LEF2/M     |
|                                                                                                                                              |          |          |                 | Replacement Actuator (included in assembly) |                    | MBE6LRN2/U           | MBE7LRF2/U      |
| 2-1/2                                                                                                                                        | 75       | 143      | 150             | Valve/Actuator Assembly                     |                    | VH4G8LEN2/M          | VH4G7LEF2/M     |
|                                                                                                                                              |          |          |                 | Replacement Actuator (included in assembly) |                    | MBE6LRN2/U           | MBE7LRF2/U      |
| 3                                                                                                                                            | 117      | 223      | 150             | Valve/Actuator Assembly                     |                    | VH4H8LEN2/M          | VH4H7LEF2/M     |
|                                                                                                                                              |          |          |                 | Replacement Actuator (included in assembly) |                    | MBE6LRN2/U           | MBE7LRF2/U      |
|                                                                                                                                              |          |          |                 | VH5 3-Way MIXING Configuration*             |                    |                      |                 |
| 2                                                                                                                                            | 52       | 102      | 150             | Valve/Actuator Assembly                     |                    | VH5F8LEN2/M          | VH5F7LEF2/M     |
|                                                                                                                                              |          |          |                 | Replacement Actuator (included in assembly) |                    | MBE6LRN2/U           | MBE7LRF2/U      |
| 2-1/2                                                                                                                                        | 75       | 143      | 150             | Valve/Actuator Assembly                     |                    | VH5G8LEN2/M          | VH5G7LEF2/M     |
|                                                                                                                                              |          |          |                 | Replacement Actuator (included in assembly) |                    | MBE6LRN2/U           | MBE7LRF2/U      |
| 3                                                                                                                                            | 117      | 223      | 150             | Valve/Actuator Assembly                     |                    | VH5H8LEN2/M          | VH5H7LEF2/M     |
|                                                                                                                                              |          |          |                 | Replacement Actuator (included in assembly) |                    | MBE6LRN2/U           | MBE7LRF2/U      |

\* See diagram on page 195 for port configurations.

# Product Selection - Valves

## High Performance Butterfly Valves, 3-way DIVERTING Fail-in-place

### VH6 / VH7 / VH8 – 2 to 3 inch

#### Common Features

- Fail-in-Place Actuators
- 5-Year Warranty
- ASME/ANSI Class 150 Flanges
- Max static pressure 285 psi (100°F)

| Warranty<br>SI Class 150 Flanges<br>pressure 285 psi (100°F) |          |          |                 | Actuator Features                           |                    | Fail-In-Place   |                 |
|--------------------------------------------------------------|----------|----------|-----------------|---------------------------------------------|--------------------|-----------------|-----------------|
|                                                              |          |          |                 | Control Signal                              | Floating           | •               |                 |
|                                                              |          |          |                 |                                             | 2-Position SPDT    | •               |                 |
|                                                              |          |          |                 |                                             | Modulating 2-10Vdc |                 | •               |
|                                                              |          |          |                 | Enclosure Rating                            | NEMA2              | •               | •               |
|                                                              |          |          |                 | Power Supply Voltage                        | 24Vac/Vdc          | •               | •               |
|                                                              |          |          |                 | Aux Switch                                  | Add-On             | MB-NSR-SWITCH/U | MB-NSR-SWITCH/U |
|                                                              |          |          |                 | Feedback                                    | 2-10Vdc            |                 | •               |
| Valve Size (inches)                                          | Cv @ 60° | Cv @ 90° | Close-off (psi) | VH6 3-Way DIVERTING Configuration*          |                    |                 |                 |
| 2                                                            | 52       | 102      | 150             | Valve/Actuator Assembly                     | VH6F6LPN2/M        | VH6F7LPF2/M     |                 |
|                                                              |          |          |                 | Replacement Actuator (included in assembly) | MBP6LRN2/U         | MBP7LRF2/U      |                 |
| 2-1/2                                                        | 75       | 143      | 150             | Valve/Actuator Assembly                     | VH6G6LPN2/M        | VH6G7LPF2/M     |                 |
|                                                              |          |          |                 | Replacement Actuator (included in assembly) | MBP6LRN2/U         | MBP7LRF2/U      |                 |
| 3                                                            | 117      | 223      | 150             | Valve/Actuator Assembly                     | VH6H6LPN2/M        | VH6H7LPF2/M     |                 |
|                                                              |          |          |                 | Replacement Actuator (included in assembly) | MBP6LRN2/U         | MBP7LRF2/U      |                 |
|                                                              |          |          |                 | VH7 3-Way DIVERTING Configuration*          |                    |                 |                 |
| 2                                                            | 52       | 102      | 150             | Valve/Actuator Assembly                     | VH7F6LPN2/M        | VH7F7LPF2/M     |                 |
|                                                              |          |          |                 | Replacement Actuator (included in assembly) | MBP6LRN2/U         | MBP7LRF2/U      |                 |
| 2-1/2                                                        | 75       | 143      | 150             | Valve/Actuator Assembly                     | VH7G6LPN2/M        | VH7G7LPF2/M     |                 |
|                                                              |          |          |                 | Replacement Actuator (included in assembly) | MBP6LRN2/U         | MBP7LRF2/U      |                 |
| 3                                                            | 117      | 223      | 150             | Valve/Actuator Assembly                     | VH7H6LPN2/M        | VH7H7LPF2/M     |                 |
|                                                              |          |          |                 | Replacement Actuator (included in assembly) | MBP6LRN2/U         | MBP7LRF2/U      |                 |
|                                                              |          |          |                 | VH8 3-Way DIVERTING Configuration*          |                    |                 |                 |
| 2                                                            | 52       | 102      | 150             | Valve/Actuator Assembly                     | VH8F6LPN2/M        | VH8F7LPF2/M     |                 |
|                                                              |          |          |                 | Replacement Actuator (included in assembly) | MBP6LRN2/U         | MBP7LRF2/U      |                 |
| 2-1/2                                                        | 75       | 143      | 150             | Valve/Actuator Assembly                     | VH8G6LPN2/M        | VH8G7LPF2/M     |                 |
|                                                              |          |          |                 | Replacement Actuator (included in assembly) | MBP6LRN2/U         | MBP7LRF2/U      |                 |
| 3                                                            | 117      | 223      | 150             | Valve/Actuator Assembly                     | VH8H6LPN2/M        | VH8H7LPF2/M     |                 |
|                                                              |          |          |                 | Replacement Actuator (included in assembly) | MBP6LRN2/U         | MBP7LRF2/U      |                 |

\* See diagram on page 195 for port configurations.

### VH6 / VH7 / VH8 – 4 inch

#### Common Features

- Fail-in-Place Actuators
- 5-Year Warranty
- ASME/ANSI Class 150 Flanges

|                        |          |          |                    | Actuator Features                           |                    | Fail-In-Place |             |
|------------------------|----------|----------|--------------------|---------------------------------------------|--------------------|---------------|-------------|
|                        |          |          |                    | Control Signal                              | Floating           | •             |             |
|                        |          |          |                    |                                             | 2-Position SPDT    | •             |             |
|                        |          |          |                    |                                             | Modulating 2-10Vdc |               | •           |
|                        |          |          |                    | Enclosure Rating                            | NEMA4X             | •             | •           |
|                        |          |          |                    | Heater Option                               | (for NEMA4X)       | Built In      | Built In    |
|                        |          |          |                    | Power Supply Voltage                        | 24-240Vac/Vdc      | •             | •           |
|                        |          |          |                    | Aux Switch                                  | Built In           | •             | •           |
|                        |          |          |                    | Feedback                                    | 2-10Vdc            |               | •           |
| Valve Size<br>(inches) | Cv @ 60° | Cv @ 90° | Close-off<br>(psi) | VH6 3-Way DIVERTING Configuration*          |                    |               |             |
| 4                      | 224      | 435      | 150                | Valve/Actuator Assembly                     |                    | VH6J6UPSH/M   | VH6J7UPBH/M |
|                        |          |          |                    | Replacement Actuator (included in assembly) |                    | MBP6U6SH/U    | MBP7U6BH/U  |
|                        |          |          |                    | VH7 3-Way DIVERTING Configuration*          |                    |               |             |
| 4                      | 224      | 435      | 150                | Valve/Actuator Assembly                     |                    | VH7J6UPSH/M   | VH7J7UPBH/M |
|                        |          |          |                    | Replacement Actuator (included in assembly) |                    | MBP6U6SH/U    | MBP7U6BH/U  |
|                        |          |          |                    | VH8 3-Way DIVERTING Configuration*          |                    |               |             |
| 4                      | 224      | 435      | 150                | Valve/Actuator Assembly                     |                    | VH8J6UPSH/M   | VH8J7UPBH/M |
|                        |          |          |                    | Replacement Actuator (included in assembly) |                    | MBP6U6SH/U    | MBP7U6BH/U  |

\* See diagram on page 195 for port configurations.

# Product Selection - Valves

## High Performance Butterfly Valves, 3-way DIVERTING Fail-in-place

### VH6 / VH7 / VH8 – 5 to 16 inch

#### Common Features

- Fail-In-Place Actuators
- 2-Year Warranty
- ASME/ANSI Class 150 Flanges
- Max static pressure 285 psi (100°F)

|                     |          |          |                 | Actuator Features                           |                    | Fail-In-Place |             |             |          |
|---------------------|----------|----------|-----------------|---------------------------------------------|--------------------|---------------|-------------|-------------|----------|
|                     |          |          |                 | Control Signal                              | Floating           | •             |             | •           |          |
|                     |          |          |                 |                                             | 2-Position SPDT    | •             |             | •           |          |
|                     |          |          |                 |                                             | Modulating 2-10Vdc |               | •           |             | •        |
|                     |          |          |                 | Enclosure Rating                            | NEMA4X             | •             | •           | •           | •        |
|                     |          |          |                 | Heater Option                               | (for NEMA4X)       | Built In      | Built In    | Built In    | Built In |
|                     |          |          |                 | Power Supply Voltage                        | 24Vac/Vdc          | •             | •           |             |          |
|                     |          |          |                 |                                             | 120Vac             |               |             | •           | •        |
|                     |          |          |                 | Aux Switch                                  | Built-In           | •             | •           | •           | •        |
|                     |          |          |                 | Feedback                                    | 2-10Vdc            |               | •           |             | •        |
| Valve Size (inches) | Cv @ 60° | Cv @ 90° | Close-off (psi) | VH6 3-Way DIVERTING Configuration*          |                    |               |             |             |          |
| 5                   | 361      | 688      | 150             | Valve/Actuator Assembly                     | VH6K6UPSH/M        | VH6K7UPBH/M   |             |             |          |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBP6L9SH/U         | MBP7L9SH/U    |             |             |          |
| 6                   | 546      | 1,041    | 150             | Valve/Actuator Assembly                     | VH6L6LPSH/M        | VH6L7LPBH/M   |             |             |          |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBP6L9SH/U         | MBP7L9SH/U    |             |             |          |
| 8                   | 1,001    | 1,911    | 150             | Valve/Actuator Assembly                     | VH6M6LPSH/M        | VH6M7LPBH/M   |             |             |          |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBP6L9SH/U         | MBP7L9SH/U    |             |             |          |
| 10                  | 1,673    | 3,194    | 150             | Valve/Actuator Assembly                     | VH6N6LPSH/M        | VH6N7LPBH/M   |             |             |          |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBP6L9SH/U         | MBP7L9SH/U    |             |             |          |
| 12                  | 2,319    | 4,428    | 150             | Valve/Actuator Assembly                     | VH6P6LPSH/M        | VH6P7LPBH/M   |             |             |          |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBP6LBSH/U         | MBP7LBBH/U    |             |             |          |
| 14                  | 2,986    | 5,702    | 150             | Valve/Actuator Assembly                     |                    |               | VH6R6HPSH/M | VH6R7HPBH/M |          |
|                     |          |          |                 | Replacement Actuator (included in assembly) |                    |               | MBP6HDSH/U  | MBP7HDBH/U  |          |
| 16                  | 3,988    | 8,243    | 150             | Valve/Actuator Assembly                     |                    |               | VH6S6HPSH/M | VH6S7HPBH/M |          |
|                     |          |          |                 | Replacement Actuator (included in assembly) |                    |               | MBP6HDSH/U  | MBP7HDBH/U  |          |
|                     |          |          |                 | VH7 3-Way DIVERTING Configuration*          |                    |               |             |             |          |
| 5                   | 361      | 688      | 150             | Valve/Actuator Assembly                     | VH7K6UPSH/M        | VH7K7UPBH/M   |             |             |          |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBP6L9SH/U         | MBP7L9SH/U    |             |             |          |
| 6                   | 546      | 1,041    | 150             | Valve/Actuator Assembly                     | VH7L6LPSH/M        | VH7L7LPBH/M   |             |             |          |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBP6L9SH/U         | MBP7L9SH/U    |             |             |          |
| 8                   | 1,001    | 1,911    | 150             | Valve/Actuator Assembly                     | VH7M6LPSH/M        | VH7M7LPBH/M   |             |             |          |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBP6L9SH/U         | MBP7L9SH/U    |             |             |          |
| 10                  | 1,673    | 3,194    | 150             | Valve/Actuator Assembly                     | VH7N6LPSH/M        | VH7N7LPBH/M   |             |             |          |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBP6L9SH/U         | MBP7L9SH/U    |             |             |          |
| 12                  | 2,319    | 4,428    | 150             | Valve/Actuator Assembly                     | VH7P6LPSH/M        | VH7P7LPBH/M   |             |             |          |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBP6LBSH/U         | MBP7LBBH/U    |             |             |          |
| 14                  | 2,986    | 5,702    | 150             | Valve/Actuator Assembly                     |                    |               | VH7R6HPSH/M | VH7R7HPBH/M |          |
|                     |          |          |                 | Replacement Actuator (included in assembly) |                    |               | MBP6HDSH/U  | MBP7HDBH/U  |          |
| 16                  | 3,988    | 8,243    | 150             | Valve/Actuator Assembly                     |                    |               | VH7S6HPSH/M | VH7S7HPBH/M |          |
|                     |          |          |                 | Replacement Actuator (included in assembly) |                    |               | MBP6HDSH/U  | MBP7HDBH/U  |          |
|                     |          |          |                 | VH8 3-Way DIVERTING Configuration*          |                    |               |             |             |          |
| 5                   | 361      | 688      | 150             | Valve/Actuator Assembly                     | VH8K6UPSH/M        | VH8K7UPBH/M   |             |             |          |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBP6L9SH/U         | MBP7L9SH/U    |             |             |          |
| 6                   | 546      | 1,041    | 150             | Valve/Actuator Assembly                     | VH8L6LPSH/M        | VH8L7LPBH/M   |             |             |          |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBP6L9SH/U         | MBP7L9SH/U    |             |             |          |
| 8                   | 1,001    | 1,911    | 150             | Valve/Actuator Assembly                     | VH8M6LPSH/M        | VH8M7LPBH/M   |             |             |          |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBP6L9SH/U         | MBP7L9SH/U    |             |             |          |
| 10                  | 1,673    | 3,194    | 150             | Valve/Actuator Assembly                     | VH8N6LPSH/M        | VH8N7LPBH/M   |             |             |          |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBP6L9SH/U         | MBP7L9SH/U    |             |             |          |
| 12                  | 2,319    | 4,428    | 150             | Valve/Actuator Assembly                     | VH8P6LPSH/M        | VH8P7LPBH/M   |             |             |          |
|                     |          |          |                 | Replacement Actuator (included in assembly) | MBP6LBSH/U         | MBP7LBBH/U    |             |             |          |
| 14                  | 2,986    | 5,702    | 150             | Valve/Actuator Assembly                     |                    |               | VH8R6HPSH/M | VH8R7HPBH/M |          |
|                     |          |          |                 | Replacement Actuator (included in assembly) |                    |               | MBP6HDSH/U  | MBP7HDBH/U  |          |
| 16                  | 3,988    | 8,243    | 150             | Valve/Actuator Assembly                     |                    |               | VH8S6HPSH/M | VH8S7HPBH/M |          |
|                     |          |          |                 | Replacement Actuator (included in assembly) |                    |               | MBP6HDSH/U  | MBP7HDBH/U  |          |

\* See diagram on page 195 for port configurations.

# Product Selection - Valves

## High Performance Butterfly Valves, 3-way **DIVERTING** Electronic Fail-Safe

### VH6 / VH7 / VH8 – 2 to 3 inch

#### Common Features

- Electronic Fail-Safe Actuators
- 5-Year Warranty
- Fail-Safe Position Field Selectable
- Factory set to Normally Closed / Fail Closed
- ASME/ANSI Class 150 Flanges
- Max static pressure 285 psi (100°F)

| Warranty<br>Position Field Selectable<br>Fail to Normally Closed / Fail Closed<br>ANSI Class 150 Flanges<br>Maximum Pressure 285 psi (100°F) |          |          |                 | Actuator Features                           |           | Electronic Fail-Safe |                 |
|----------------------------------------------------------------------------------------------------------------------------------------------|----------|----------|-----------------|---------------------------------------------|-----------|----------------------|-----------------|
|                                                                                                                                              |          |          |                 | Control Signal                              | Floating  | •                    |                 |
|                                                                                                                                              |          |          |                 | 2-Position SPDT                             |           | •                    |                 |
|                                                                                                                                              |          |          |                 | Modulating 2-10Vdc                          |           |                      | •               |
|                                                                                                                                              |          |          |                 | Enclosure Rating                            | NEMA2     | •                    |                 |
|                                                                                                                                              |          |          |                 | Power Supply Voltage                        | 24Vac/Vdc | •                    |                 |
|                                                                                                                                              |          |          |                 | Aux Switch                                  | Add-On    | MB-NSR-SWITCH/U      | MB-NSR-SWITCH/U |
|                                                                                                                                              |          |          |                 | Feedback                                    | 2-10Vdc   |                      | •               |
| Valve Size (inches)                                                                                                                          | Cv @ 60° | Cv @ 90° | Close-off (psi) | VH6 3-Way DIVERTING Configuration*          |           |                      |                 |
| 2                                                                                                                                            | 52       | 102      | 150             | Valve/Actuator Assembly                     |           | VH6F8LEN2/M          | VH6F7LEF2/M     |
|                                                                                                                                              |          |          |                 | Replacement Actuator (included in assembly) |           | MBE6LRN2/U           | MBE7LRF2/U      |
| 2-1/2                                                                                                                                        | 75       | 143      | 150             | Valve/Actuator Assembly                     |           | VH6G8LEN2/M          | VH6G7LEF2/M     |
|                                                                                                                                              |          |          |                 | Replacement Actuator (included in assembly) |           | MBE6LRN2/U           | MBE7LRF2/U      |
| 3                                                                                                                                            | 117      | 223      | 150             | Valve/Actuator Assembly                     |           | VH6H8LEN2/M          | VH6H7LEF2/M     |
|                                                                                                                                              |          |          |                 | Replacement Actuator (included in assembly) |           | MBE6LRN2/U           | MBE7LRF2/U      |
|                                                                                                                                              |          |          |                 | VH7 3-Way DIVERTING Configuration*          |           |                      |                 |
| 2                                                                                                                                            | 52       | 102      | 150             | Valve/Actuator Assembly                     |           | VH7F8LEN2/M          | VH7F7LEF2/M     |
|                                                                                                                                              |          |          |                 | Replacement Actuator (included in assembly) |           | MBE6LRN2/U           | MBE7LRF2/U      |
| 2-1/2                                                                                                                                        | 75       | 143      | 150             | Valve/Actuator Assembly                     |           | VH7G8LEN2/M          | VH7G7LEF2/M     |
|                                                                                                                                              |          |          |                 | Replacement Actuator (included in assembly) |           | MBE6LRN2/U           | MBE7LRF2/U      |
| 3                                                                                                                                            | 117      | 223      | 150             | Valve/Actuator Assembly                     |           | VH7H8LEN2/M          | VH7H7LEF2/M     |
|                                                                                                                                              |          |          |                 | Replacement Actuator (included in assembly) |           | MBE6LRN2/U           | MBE7LRF2/U      |
|                                                                                                                                              |          |          |                 | VH8 3-Way DIVERTING Configuration*          |           |                      |                 |
| 2                                                                                                                                            | 52       | 102      | 150             | Valve/Actuator Assembly                     |           | VH8F8LEN2/M          | VH8F7LEF2/M     |
|                                                                                                                                              |          |          |                 | Replacement Actuator (included in assembly) |           | MBE6LRN2/U           | MBE7LRF2/U      |
| 2-1/2                                                                                                                                        | 75       | 143      | 150             | Valve/Actuator Assembly                     |           | VH8G8LEN2/M          | VH8G7LEF2/M     |
|                                                                                                                                              |          |          |                 | Replacement Actuator (included in assembly) |           | MBE6LRN2/U           | MBE7LRF2/U      |
| 3                                                                                                                                            | 117      | 223      | 150             | Valve/Actuator Assembly                     |           | VH8H8LEN2/M          | VH8H7LEF2/M     |
|                                                                                                                                              |          |          |                 | Replacement Actuator (included in assembly) |           | MBE6LRN2/U           | MBE7LRF2/U      |

\* See diagram on page 195 for port configurations.

# Submittal Data - Valves

## Pneumatic Valve Actuators



Pneumatic actuators provide proportional control of steam or hot or cold liquids in HVAC systems by operating V5011, V5013 and VGF valve assemblies. Replacement devices are available for older Honeywell actuators.

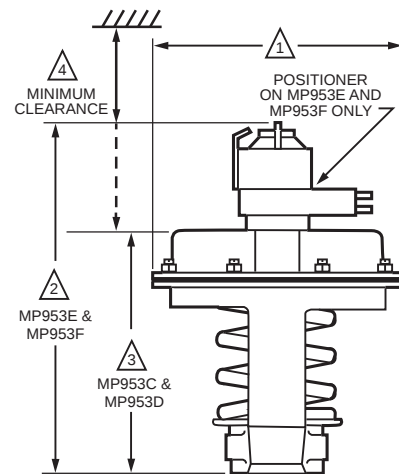
### FEATURES

- Rolling diaphragm for long life and low hysteresis.
- Easily attached to valve.
- Can be installed after piping valve.
- Slide lock feature permits simple engagement to valve stem.
- Direct- or reverse-action control.
- Does not include positive positioner.

### SPECIFICATIONS

|                                  |                                                                       |
|----------------------------------|-----------------------------------------------------------------------|
| Actuator Type .....              | Valve                                                                 |
| Fail Safe Mode .....             | Spring Return                                                         |
| Air Connections .....            | Dual barbed fitting for 5/32 in. O.D. and 1/4 in. O.D. plastic tubing |
| Temperature Range .....          | 0 F to 140 F (-18 C to +60 C)                                         |
| Maximum Operating Pressure ..... | (172 kPa) 25 psi                                                      |
| Humidity Range .....             | 5 to 95% RH                                                           |

### DIMENSIONS DIAGRAM



| OPERATION SIZE<br>NOMINAL DIA. | 1            | 2            | 3           | 4             |
|--------------------------------|--------------|--------------|-------------|---------------|
| 5 INCH                         | 5-1/8 (130)  | 9-1/4 (235)  | 4-5/8 (117) | 4-3/8 (111)   |
| 7-1/8 INCH                     | 7-1/8 (181)  | 10-1/2 (267) | 5-5/8 (143) | 4-3/8 (111)   |
| 8 INCH                         | 8-1/4 (210)  | 11-1/8 (283) | 6-1/2 (165) | 5-3/8 (137)   |
| 13 INCH                        | 13-1/2 (343) | 18-1/8 (460) | 10 (254)    | 7-11/16 (195) |

M13903

# Submittal Data - Valves

## Pneumatic Valve Actuators



Pneumatic actuators provide proportional control of steam or hot or cold liquids in HVAC systems by operating V5011, V5013 and VGF valve assemblies. Replacement devices are available for older Honeywell actuators.

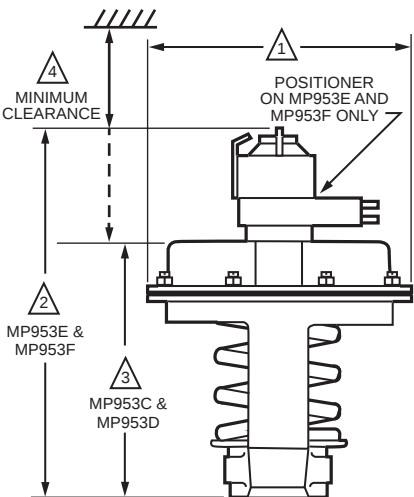
### FEATURES

- Rolling diaphragm for long life and low hysteresis.
- Easily attached to valve.
- Can be installed after piping valve.
- Slide lock feature permits simple engagement to valve stem.
- Direct- or reverse-action control.
- Integral positive positioner relay provides positive positioning under varying load conditions.

### SPECIFICATIONS

|                                 |                                                                                                                      |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------|
| Actuator Type .....             | Valve                                                                                                                |
| Action .....                    | Direct Acting                                                                                                        |
| Fail Safe Mode.....             | Spring Return                                                                                                        |
| Air Connections .....           | Pilot: Barbed fitting for 5/32 in.<br>O.D. plastic tubing<br>Main: Barbed fitting for 1/4 in.<br>O.D. plastic tubing |
| Temperature Range .....         | 0 F to 140 F (-18 C to +60 C)                                                                                        |
| Maximum Operating Pressure..... | (172 kPa) 25 psi                                                                                                     |
| Humidity Range .....            | 5 to 95% RH                                                                                                          |

### DIMENSIONS DIAGRAM



| OPERATION SIZE<br>NOMINAL DIA. | 1            | 2            | 3           | 4             |
|--------------------------------|--------------|--------------|-------------|---------------|
| 5 INCH                         | 5-1/8 (130)  | 9-1/4 (235)  | 4-5/8 (117) | 4-3/8 (111)   |
| 7-1/8 INCH                     | 7-1/8 (181)  | 10-1/2 (267) | 5-5/8 (143) | 4-3/8 (111)   |
| 8 INCH                         | 8-1/4 (210)  | 11-1/8 (283) | 6-1/2 (165) | 5-3/8 (137)   |
| 13 INCH                        | 13-1/2 (343) | 18-1/8 (460) | 10 (254)    | 7-11/16 (195) |

M13903

# Submittal Data - Valves

## Unitary Valve Actuators M6410; M7410



Cartridge Globe Valve Actuators are small electric actuators for individual room control that provide floating or modulating control of V5852, V5862 two-way or V5853, V5863 three-way valves.

### FEATURES

- Suitable for Excel/IRC system or other controllers providing specified signals.
- Magnetic coupling for torque limitation independent of voltage supply and self-adjustment of the close-off port.
- No mounting tools required.
- Small size allows installation in limited space of fan coil units, induction units, and small reheaters or recoolers.
- Visual position indication (red pin).

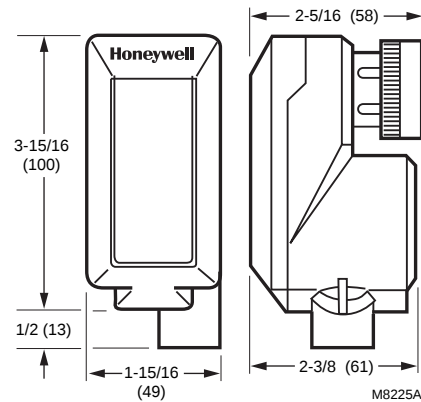
### SPECIFICATIONS

|                                           |                                  |
|-------------------------------------------|----------------------------------|
| Actuator Type .....                       | Valve                            |
| Fail Safe Mode .....                      | Stays in place                   |
| Cable Entry .....                         | Threaded conduit connector       |
| Electrical Protection .....               | Class I Insulation (24 Vac)      |
| Electrical Connections .....              | Plenum-rated cable               |
| Ingress Protection Rating .....           | IP42                             |
| Feedback .....                            | No                               |
| Frequency .....                           | 50 Hz; 60 Hz                     |
| Manual operation .....                    | None (use valve dust cap)        |
| Mounting .....                            | Threads onto V58XX valve bonnet  |
| Number of Internal Auxiliary Switch ..... | 0                                |
| Stroke .....                              | 1/4 in. (6 mm)                   |
| Supply Voltage .....                      | 24 Vac +10/-30%                  |
| Timing; Nominal Driving @ 60 Hz (sec)     | 125 sec                          |
| Materials .....                           | Low Maintenance Plastic Housing  |
| Operating Humidity Range (% RH) .....     | 5 to 95% RH                      |
| Medium Temperature .....                  | 266 F Maximum (130 C Maximum)    |
| Ambient Temperature Range .....           | 32 F to 122 F (0 C to 50 C)      |
| Storage Temperature Range .....           | -40 F to +158 F (-40 C to +70 C) |
| Weight .....                              | 0.3125 lb (0.15 kg)              |
| Includes .....                            | 1/2 in. conduit hub              |

### APPROVALS

Underwriters Laboratories, Inc. .... UL94-5V

### DIMENSIONS DIAGRAM



# Submittal Data - Valves

## Unitary Valve Actuators M6435; M7435



Cartridge Globe Valve Spring Return Actuators are small electric actuators for individual room control that provide floating or modulating control of V5852, V5862 two-way or V5853, V5863 three-way valves.

### FEATURES

- Stem actuator retracts up on power failure. Fail safe mode depends on valve seat rest position.
- Suitable for Excel/IRC system or other controllers providing specified signals.
- Magnetic coupling for torque limitation independent of voltage supply and self-adjustment of the close-off port.
- No mounting tools required.
- Compact size allows installation in limited space of fan coil units, induction units, and small reheaters or recoolers.
- Visual position indication (red disk).

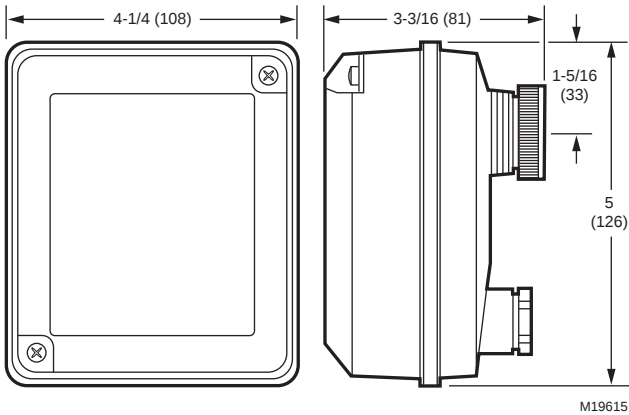
### SPECIFICATIONS

|                                             |                                                                                                                                          |
|---------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| Actuator Type .....                         | Valve                                                                                                                                    |
| Fail Safe Mode .....                        | Spring Return, operator retracts up (Normally open for 1/2 in. and 3/4 in. V5852 and V5862. Normally closed for all other V58XX valves.) |
| Spring Return Direction .....               | Stem up                                                                                                                                  |
| Cable Entry .....                           | Threaded conduit connector                                                                                                               |
| Electrical Protection .....                 | Class I Insulation (24 Vac)                                                                                                              |
| Electrical Connections .....                | Screw terminals                                                                                                                          |
| Ingress Protection Rating .....             | IP54                                                                                                                                     |
| Feedback .....                              | No                                                                                                                                       |
| Frequency .....                             | 50 Hz; 60 Hz                                                                                                                             |
| Manual operation .....                      | None (use valve dust cap)                                                                                                                |
| Mounting .....                              | Threads onto V58XX valve bonnet                                                                                                          |
| Number of Internal Auxiliary Switch .....   | 0                                                                                                                                        |
| Stroke .....                                | 1/4 in. (6 mm)                                                                                                                           |
| Supply Voltage .....                        | 24 Vac +20%, -15%                                                                                                                        |
| Timing; Nominal Driving @ 60 Hz (sec) ..... | 50 sec                                                                                                                                   |
| Spring Return Timing (Nominal (sec)) .....  | 10 sec                                                                                                                                   |
| Materials .....                             | Low Maintenance Plastic Housing                                                                                                          |
| Operating Humidity Range (% RH) .....       | 5 to 95% RH                                                                                                                              |
| Medium Temperature .....                    | 266 F Maximum (130 C Maximum)                                                                                                            |
| Ambient Temperature Range .....             | 32 F to 122 F (0 C to 50 C)                                                                                                              |
| Storage Temperature Range .....             | -40 F to +158 F (-40 C to +70 C)                                                                                                         |
| Weight .....                                | 1.1 lb (0.5 kg)                                                                                                                          |
| Includes .....                              | 1/2 in. conduit hub                                                                                                                      |

### APPROVALS

|                                      |         |
|--------------------------------------|---------|
| Underwriters Laboratories, Inc. .... | UL94-5V |
|--------------------------------------|---------|

### DIMENSIONS DIAGRAM



# Submittal Data - Valves

## Direct Coupled Valve Actuators, MVN



MVN 3Nm (27 lb-in.) Control Valve Actuator is used with the VBN2 2-way and the VBN3 3-way Control Ball Valves to control hot and chilled water with glycol solutions up to 50% in heating, ventilating and air conditioning (HVAC) systems to provide two position or modulating functions.

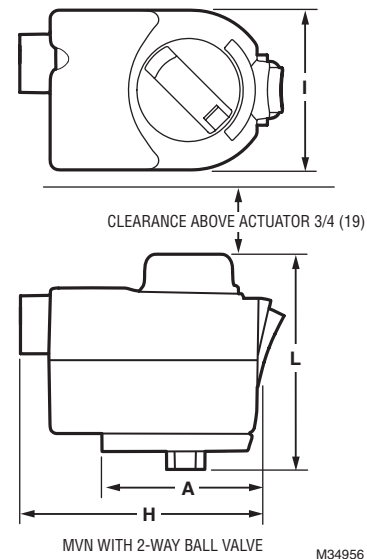
### FEATURES

- Non-spring Return
- Floating and modulating
- Space saving, click-on installation – no tool required
- Extendable position indicator for easy commissioning
- Available with or without cable
- Compatible with control ball valves from 1/2 to 1-1/4 inches.
- Actuator can be mounted on the valve in any of four positions.

### SPECIFICATIONS

Actuator Type .....Valve  
 Rotational Stroke.....90° ±3°  
 Fail Safe Mode.....Non-spring return, Fail in place  
 Torque .....27 lb-in. (3 Nm)  
 External Auxiliary Switches Available...No  
 Supply Voltage .....24 Vac +20%, -15%, 24 Vdc  
 Power Consumption.....5 VA- Modulating; 1.5 VA - Floating;  
 6 VA - Fast Acting SPDT  
 Environmental Rating.....NEMA2  
 Frequency .....50 Hz; 60 Hz  
 Mounting .....Click-on installation – no tool  
 required  
 Noise Rating at 1m (Maximum) .....35 dB(A) max at 1 m [50 dB (A) for  
 MVN643]  
 Materials.....Plenum rated plastic housing  
 Operating Humidity Range (% RH).....5 to 95% RH, noncondensing  
 Ambient Temperature Range .....-4 °F to 131 °F (-20 °C to 55 °C)  
 Storage Temperature Range.....-40 °F to 176 °F (-40 °C to 80 °C)  
 Dimensions.....See page 180  
 Timing .....90 sec. for MVN613 and MVN713;  
 30 sec. for MVN643  
 Electrical Connections .....Field wiring 18 to 20 AWG to  
 screw terminals, located under the  
 removable access cover.  
 Humidity Ratings .....5% to 95% RH noncondensing  
 Design Life (at Rated Voltage) .....60,000 cycles;  
 1 cycle = 0°...90°...0°  
 Cable Specification.....18 AWG, Plenum Rated, 300 V, 10  
 A, 3 ft. length from end of access  
 cover.  
 Environmental Protection Ratings .....IP40  
 Approvals .....UL/cUL; UL60730

### DIMENSIONS DIAGRAM



**Table 1. Actuators and Accessories**

| Actuator    | Description                                  | Accessory            |
|-------------|----------------------------------------------|----------------------|
| MVN613A0000 | Floating control ball valve actuator         | C1- 1 meter<br>cable |
| MVN613L0000 | Floating control ball valve actuator         |                      |
| MVN643A0000 | Fast acting SPDT control ball valve actuator | C3- 3 meter<br>cable |
| MVN643L0000 | Fast acting SPDT control ball valve actuator |                      |
| MVN713A0000 | Modulating control ball valve actuator       |                      |
| MVN713L0000 | Modulating control ball valve actuator       |                      |

To order actuator with accessories order actuator part number + accessory. For example: MVN613A0000 + C1

# Submittal Data - Valves

## Direct Coupled Valve Actuators, ML6420; ML7420



Direct Coupled Globe Valve Actuators provide floating or modulating control of chilled water, hot water or steam, and mount directly on VGF series, V5011 and V5013 globe valves from 1/2 to 3 inches.

### FEATURES

- Easy and quick installation on valves with 1 3/8 in. bonnet and 3/4 in. stroke.
- No separate linkage required.
- Conduit connector standard.
- No adjustments required on linkage.
- Accurate valve positioning.
- Low power consumption.
- High close-off ratings.
- Force limiting end switches.
- Manual operator.
- Synchronous motor.
- Maintenance free.
- ML7420 has an internal selector plug that can be used to reverse the direction of action.

### SPECIFICATIONS

|                                           |                                                                                            |
|-------------------------------------------|--------------------------------------------------------------------------------------------|
| Actuator Type .....                       | Valve                                                                                      |
| Fail Safe Mode .....                      | Stays in place                                                                             |
| Cable Entry .....                         | Conduit connector and one knockout on actuator case                                        |
| Electrical Protection .....               | Class I Insulation (24 Vac)                                                                |
| Electrical Connections .....              | Screw terminals                                                                            |
| Ingress Protection Rating .....           | IP54                                                                                       |
| Frequency .....                           | 50 Hz; 60 Hz                                                                               |
| Manual operation .....                    | Knob                                                                                       |
| Mounting .....                            | Directly on V5011/V5013 Globe Valves and VGF Flanged Globe Valves (3/4 in. or 20mm stroke) |
| Number of Internal Auxiliary Switch ..... | 0                                                                                          |
| Stroke .....                              | 3/4 in. (20 mm)                                                                            |
| Supply Voltage .....                      | 24 Vac $\pm$ 15%                                                                           |
| Materials .....                           | ABS-FR Plastic, aluminum yoke                                                              |
| Operating Humidity Range (% RH) .....     | 5 to 95% RH                                                                                |
| Medium Temperature .....                  | 300 F Maximum (150 C Maximum)                                                              |
| Ambient Temperature Range .....           | 14 F to 122 F (-10 C to +50 C)                                                             |
| Storage Temperature Range .....           | -40 F to +158 F (-40 C to +70 C)                                                           |
| Weight .....                              | 2.9 lb (1.3 kg)                                                                            |
| Includes .....                            | 1/2 in. conduit hub; 1/2 in. flexible conduit adapter                                      |

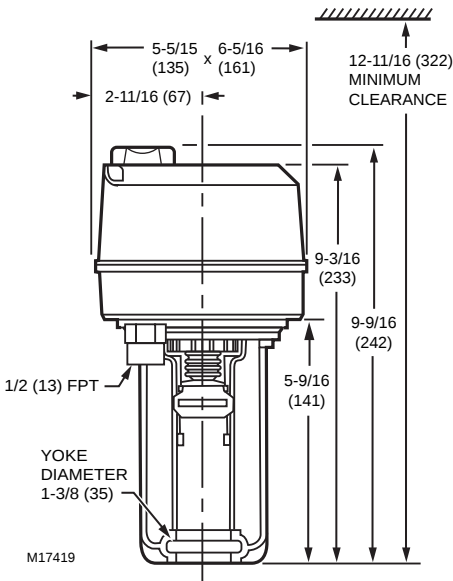
### APPROVALS

|                                      |           |
|--------------------------------------|-----------|
| Canadian Standards Association ..... | Certified |
| CE .....                             | Listed    |
| Underwriters Laboratories, Inc. .... | UL94-5V   |

### ACCESSORIES

- 43196000-001—High Temperature Kit for actuators with 3/4 inch (20 mm) stroke, stem button attachment
- 43191679-111—Potentiometer, 10k ohm, for ML6425, ML7425
- 43191679-112—Potentiometer, 220 ohm for ML6425, ML7425
- 43191680-105—Dual Auxiliary Switch for CREVAL actuators

### DIMENSIONS DIAGRAM



# Submittal Data - Valves

## Direct Coupled Valve Actuators, ML6421; ML7421



Direct Coupled Globe Valve Actuators provide floating or modulating control of chilled water, hot water or steam, and mount directly on VGF series, V5011 and V5013 valves. These Non-Spring Return High Force Actuators will operate 1-1/2 to 6 inch valves.

### FEATURES

- Easy and quick installation on valves with 1 3/8 in. bonnet and 3/4 in. stroke, or with 1 7/8 in. bonnet and 1 1/2 in. stroke.
- High force for VGF Pressure-balanced valves.
- No separate linkage required.
- Conduit connector standard.
- No adjustments required on linkage.
- Accurate valve positioning.
- Low power consumption.
- High close-off ratings.
- Force limiting end switches.
- Manual operator.
- Synchronous motor.
- Maintenance free.

### SPECIFICATIONS

|                                           |                                                                   |
|-------------------------------------------|-------------------------------------------------------------------|
| Actuator Type .....                       | Valve                                                             |
| Fail Safe Mode .....                      | Stays in place                                                    |
| Cable Entry .....                         | Two knockout holes for 1/2 in. conduit standard on actuator case  |
| Electrical Protection .....               | Class I Insulation (24 Vac)                                       |
| Electrical Connections .....              | Screw terminals                                                   |
| Ingress Protection Rating .....           | IP54                                                              |
| Frequency .....                           | 50 Hz; 60 Hz                                                      |
| Manual operation .....                    | Knob                                                              |
| Mounting .....                            | Directly on V5011/V5013 Globe Valves and VGF Flanged Globe Valves |
| Number of Internal Auxiliary Switch ..... | 0                                                                 |
| Materials .....                           | ABS Plastic                                                       |
| Operating Humidity Range (% RH) .....     | 5 to 95% RH                                                       |
| Medium Temperature .....                  | 300 F Maximum (150 C Maximum)                                     |
| Ambient Temperature Range .....           | 14 F to 122 F (-10 C to +50 C)                                    |
| Storage Temperature Range .....           | -40 F to +158 F (-40 C to +70 C)                                  |
| Weight .....                              | 5.1 lb (2.3 kg)                                                   |
| Includes .....                            | 1/2 in. conduit hub; 1/2 in. flexible conduit adapter             |

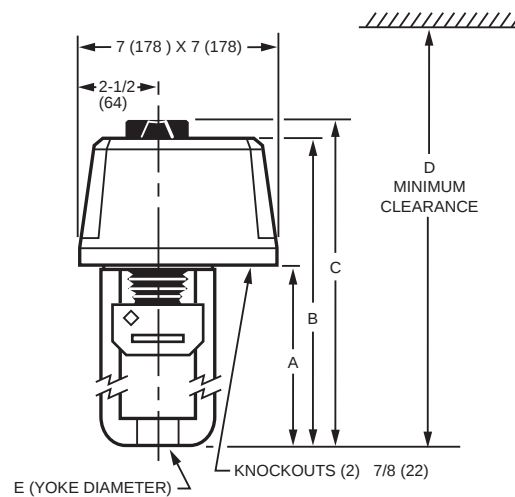
### APPROVALS

|                                      |            |
|--------------------------------------|------------|
| Canadian Standards Association ..... | Certified  |
| CE .....                             | Recognized |
| Underwriters Laboratories, Inc. .... | UL94-5V    |

### ACCESSORIES

43191679-101—Auxiliary Potentiometer for ML6421A  
 43191679-102—220 ohm Auxiliary Potentiometer for ML6421B  
 43191680-102—Dual Auxiliary Switch for CREVAL actuators  
 43196000-001—High Temperature Kit for actuators with 3/4 inch (20 mm) stroke, stem button attachment  
 43196000-038—High Temperature Kit for actuators with 1-1/2 inch (38 mm) stroke, stem button attachment

### DIMENSIONS DIAGRAM



|   | ML6421A, ML7421A | ML6421B, ML7421B |
|---|------------------|------------------|
| A | 5-5/8 (142)      | 8 (204)          |
| B | 9-3/8 (239)      | 11-7/8 (301)     |
| C | 10-3/8 (264)     | 12-3/4 (326)     |
| D | 14-1/4 (360)     | 16-7/8 (430)     |
| E | 1-3/8 (35)       | 1-7/8 (48)       |

M16827

# Submittal Data - Valves

## Direct Coupled Valve Actuators, ML6425; ML7425



Direct Coupled Globe Valve Actuators provide floating and modulating control of chilled water, hot water and steam, and mount directly on VGF series, V5011 and V5013 globe valves. These Spring Return Actuators will operate 1/2 to 3 inch valves.

### FEATURES

- Easy and quick installation on valves with 1 3/8 in. bonnet and 3/4 in. stroke.
- No separate linkage required.
- Conduit connector standard.
- No adjustments required on linkage.
- Accurate valve positioning.
- Low power consumption.
- High close-off ratings.
- Force limiting end switches.
- Internal manual operator.
- Synchronous motor.
- Maintenance free.

### SPECIFICATIONS

|                                           |                                                                                            |
|-------------------------------------------|--------------------------------------------------------------------------------------------|
| Actuator Type .....                       | Valve                                                                                      |
| Fail Safe Mode .....                      | Stem down on power failure                                                                 |
| Cable Entry .....                         | Conduit connector and one knockout on actuator case                                        |
| Electrical Protection .....               | Class I Insulation (24 Vac)                                                                |
| Electrical Connections .....              | Screw terminals                                                                            |
| Ingress Protection Rating .....           | IP54                                                                                       |
| Frequency .....                           | 50 Hz; 60 Hz                                                                               |
| Manual operation .....                    | Manual override winding                                                                    |
| Mounting .....                            | Directly on V5011/V5013 Globe Valves and VGF Flanged Globe Valves (3/4 in. or 20mm stroke) |
| Number of Internal Auxiliary Switch ..... | 0                                                                                          |
| Stroke .....                              | 3/4 in. (20 mm)                                                                            |
| Materials .....                           | ABS-FR Plastic, aluminum yoke                                                              |
| Operating Humidity Range (% RH) .....     | 5 to 95% RH                                                                                |
| Medium Temperature .....                  | 300 F Maximum (150 C Maximum)                                                              |
| Ambient Temperature Range .....           | 14 F to 122 F (-10 C to +50 C)                                                             |
| Storage Temperature Range .....           | -40 F to +158 F (-40 C to +70 C)                                                           |
| Weight .....                              | 5.1 lb (2.3 kg)                                                                            |
| Includes .....                            | 1/2 in. conduit hub; 1/2 in. flexible conduit adapter                                      |

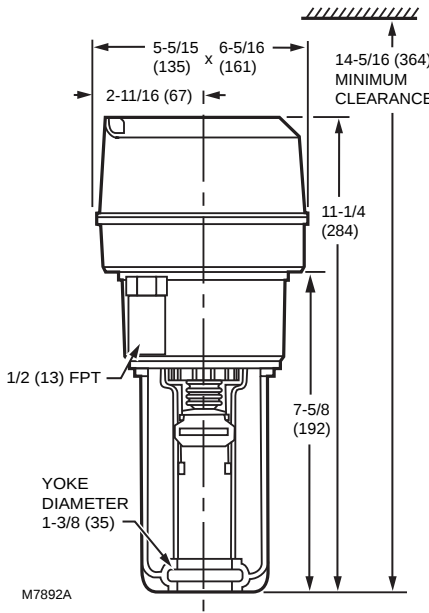
### APPROVALS

|                                      |            |
|--------------------------------------|------------|
| CE .....                             | Recognized |
| Underwriters Laboratories, Inc. .... | UL94-5V    |

### ACCESSORIES

- 43191679-111—Potentiometer, 10k ohm, for ML6425, ML7425
- 43191679-112—Potentiometer, 220 ohm for ML6425, ML7425
- 43191680-105—Dual Auxiliary Switch for CREVAL actuators
- 43196000-001—High Temperature Kit for actuators with 3/4 inch (20 mm) stroke, stem button attachment

### DIMENSIONS DIAGRAM



# Submittal Data - Valves

## Direct Coupled Valve Actuators, ML6984



The ML6984 is a self-contained, self-adjusting, motorized linkage that mounts directly onto V5011 two-way or V5013 three-way valves and provides up to 25 mm (1") of linear travel (stem lift). For use with low voltage 3-wire SPDT Series 20 (on-off); Series 60 (floating) electromechanical (dry) contacts; or electronic (triac output) controllers (3-wire installation).

### FEATURES

- Allows the use of one common transformer power supply for multiple actuators and controllers.
- Self-contained, motorized valve linkage.
- Linkage self-adjusts to valve stroke of 12 to 25 mm (1/2 to 1 in.).
- Multi-pose mounting.
- Strong valve seat closing force 160 lbf (710 N).
- Compact size for easy installation in confined area.
- One device for either 24 Vac or 28 Vdc power supply application.
- Electronic current sensing provides internal protection and positive full closing force.
- Field-addable position feedback/auxiliary switch module available (5-wire control wiring only).
- Compatible with 3-wire control systems.

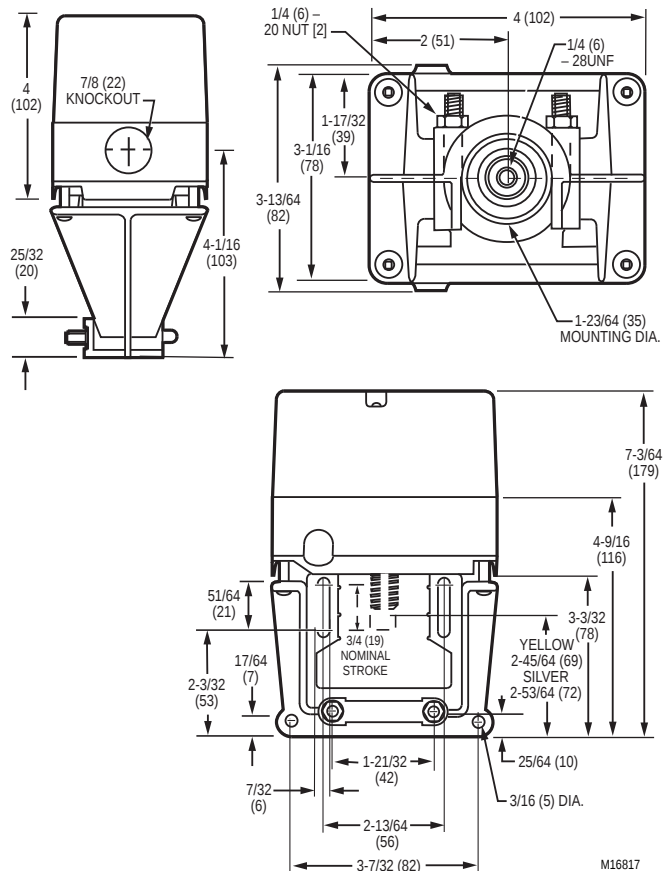
### SPECIFICATIONS

|                                             |                                                               |
|---------------------------------------------|---------------------------------------------------------------|
| Actuator Type .....                         | Valve                                                         |
| Fail Safe Mode .....                        | Stays in place                                                |
| (Rated) Stem Force .....                    | 160 lbf (710 N)                                               |
| Cable Entry .....                           | 7/8 in. hole for 1/2 in. conduit                              |
| External Auxiliary Switches Available ..... | 272630D                                                       |
| Electrical Protection .....                 | NEMA 3R                                                       |
| Electrical Connections .....                | Screw terminals                                               |
| Ingress Protection Rating .....             | NEMA 3R, IP54 (mounted in vertical position)                  |
| Feedback .....                              | Position feedback available w/ 272630D; 2-10 Vdc              |
| Frequency .....                             | 50 Hz; 60 Hz                                                  |
| Manual operation .....                      | None                                                          |
| Mounting .....                              | Screws onto 1/4-28 UNF threaded valve stem                    |
| Number of Internal Auxiliary Switch .....   | 0                                                             |
| Stroke .....                                | 1/2 to 1 in. (13 to 25 mm)                                    |
| Supply Voltage .....                        | 24 Vac; 28 Vdc                                                |
| Materials .....                             | UV-stabilized plastic cover, aluminum base & yoke             |
| Operating Humidity Range (% RH) .....       | 15 to 95% RH at 104 F (40 C)                                  |
| Medium Temperature .....                    | 300 F Maximum (150 C Maximum)                                 |
| Ambient Temperature Range .....             | 32 F to 130 F (0 C to 50 C)                                   |
| Temperature Ratings (Shipping) .....        | -40 F to +150 F (-40 C to +65 C)                              |
| Storage Temperature Range .....             | -40 F to +150 F (-40 C to +65 C)                              |
| Weight .....                                | 2.2 lb (1 kg)                                                 |
| Includes .....                              | Screw terminals                                               |
| Comments .....                              | 3 or 5-wire operation. (3-wire required for XL10 controllers) |

### ACCESSORIES

272629A—Adapter Kit for mounting ML6984/ML7984 to V5045  
 272630D—Position feedback and SPDT pilot duty auxiliary switch

### DIMENSIONS DIAGRAM



M16817

## Direct Coupled Valve Actuators, ML7984



The ML7984 is a self-contained, self-adjusting, motorized linkage that mounts directly onto V5011 two-way or V5013 three-way valves and provides up to 25 mm (1") of linear stem travel. For use with Series 70 2-10Vdc, 4-20mA; Series 90 135 ohm; and Electronic (Super Mod) modulating signals controllers.

## FEATURES

- Allows the use of one common transformer power supply for multiple actuators and controllers.
- Self-contained, motorized valve linkage.
- Linkage self-adjusts to valve stroke from 12 to 25 mm (1/2 - 1 in.).
- Multi-pose mounting.
- Strong valve seat closing force 160 lbf (710 N).
- Compact size for easy installation in confined area.
- One device for either Vac or Vdc power supply application.
- Electronic current sensing provides internal protection and positive full closing force.
- Field-addable position feedback/auxiliary switch module available.

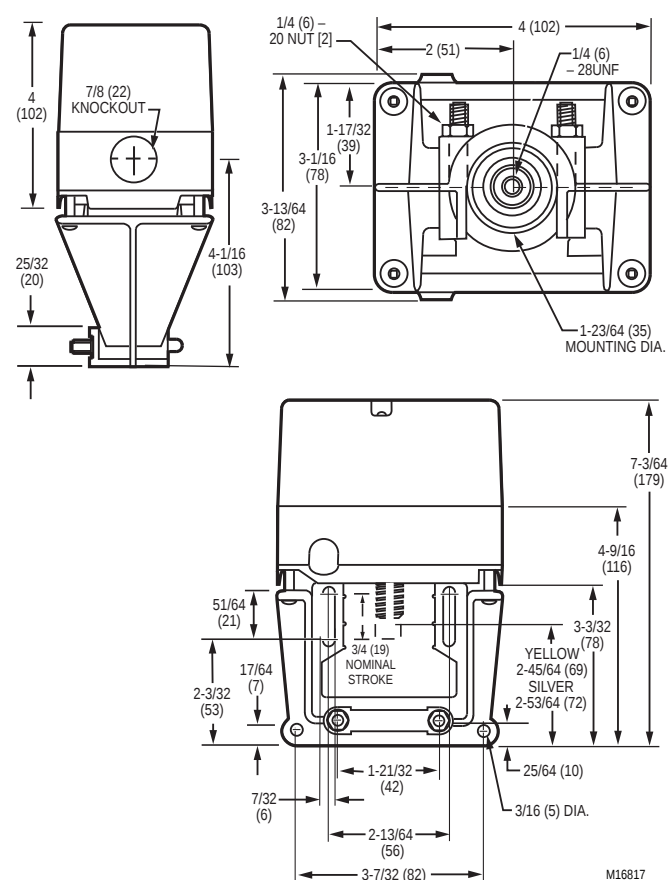
## SPECIFICATIONS

|                                            |                                                   |
|--------------------------------------------|---------------------------------------------------|
| Actuator Type .....                        | Valve                                             |
| Fail Safe Mode .....                       | Stays in place                                    |
| Cable Entry .....                          | 7/8 in. hole for 1/2 in. conduit                  |
| External Auxiliary Switches Available..... | 272630D                                           |
| Electrical Protection .....                | NEMA 3R                                           |
| Electrical Connections .....               | Screw terminals                                   |
| Ingress Protection Rating.....             | NEMA 3R, IP54 (mounted in vertical position)      |
| Feedback .....                             | Position feedback available w/ 272630D; 2-10 Vdc  |
| Frequency .....                            | 50 Hz; 60 Hz                                      |
| Manual operation .....                     | None                                              |
| Mounting .....                             | Screws onto 1/4-28 UNF threaded valve stem        |
| Number of Internal Auxiliary Switch.....   | 0                                                 |
| Stroke .....                               | 1/2 to 1 in. (13 to 25 mm)                        |
| Supply Voltage .....                       | 24 Vac; 28 Vdc                                    |
| Materials.....                             | UV-stabilized plastic cover, aluminum base & yoke |
| Operating Humidity Range (% RH).....       | 15 to 95% RH at 104 F (40 C)                      |
| Ambient Temperature Range .....            | 32 F to 130 F (0 C to 55 C)                       |
| Temperature Ratings (Shipping) .....       | -40 F to +150 F (-40 C to +65 C)                  |
| Storage Temperature Range .....            | -40 F to +150 F (-40 C to +65 C)                  |
| Weight .....                               | 2.2 lb (1 kg)                                     |
| Includes.....                              | Screw terminals                                   |
| Comments .....                             | Direct/Reverse Acting Switch                      |

### ACCESSORIES:

272629A—Adapter Kit for mounting ML6984/ML7984 to V5045  
272630D—Position feedback and SPDT pilot duty auxiliary switch

### DIMENSIONS DIAGRAM



# Submittal Data - Valves

## Zone Valve and Actuator, VN Series



### SPECIFICATIONS

|                              |                                                                              |
|------------------------------|------------------------------------------------------------------------------|
| Valve type.....              | Zone Valve                                                                   |
| Body Pattern .....           | Two-way or Three-way                                                         |
| Connection Type.....         | Female NPT                                                                   |
| Controlled Fluid .....       | Chilled or hot water with up to 50% Glycol. Not for use with steam or fuels. |
| Leakage Rating .....         | 0.05% of Cv                                                                  |
| Maximum Safe .....           | 290psi (2000 kPa)                                                            |
| Operating Pressure           |                                                                              |
| Fluid Temperature Range..    | 32 F to 200 F (0 °C to 94 °C)                                                |
| Materials                    |                                                                              |
| (Body).....                  | Forged Brass                                                                 |
| (Ball) .....                 | Nickel Plated Brass                                                          |
| (Seat).....                  | TFE with EPDM O-rings                                                        |
| (Stem).....                  | Stainless Steel                                                              |
| Actuator Type .....          | Valve                                                                        |
| Rotational Stroke.....       | 90° ±3°                                                                      |
| Fail Safe Mode.....          | Electronic Fail Safe, Fail in place                                          |
| Torque .....                 | 27 lb-in. (3 Nm)                                                             |
| Supply Voltage .....         | 24 Vac/dc ±10%, 110 Vac ±10%, 230 Vac ±10%                                   |
| Power Consumption.....       | 3 VA to 7.5 VA                                                               |
| Environmental Rating .....   | IP54                                                                         |
| Frequency.....               | 50/60 Hz                                                                     |
| Operating Humidity.....      | 5 to 95% RH, noncondensing                                                   |
| Range (% RH)                 |                                                                              |
| Ambient Temperature .....    | 32 °F to 150 °F (0 °C to 65 °C)                                              |
| Range                        |                                                                              |
| Storage Temperature .....    | -40 °F to 150 °F (-40 °C to 65 °C)                                           |
| Range                        |                                                                              |
| Operating Time.....          | ≤40 s                                                                        |
| Electrical Connections ..... | 3 ft. Cable                                                                  |
| Approvals.....               | UL/cUL, UL60730-1, UL60730-2-14, CSA E60730-1:15, CSA E60730-2-14            |

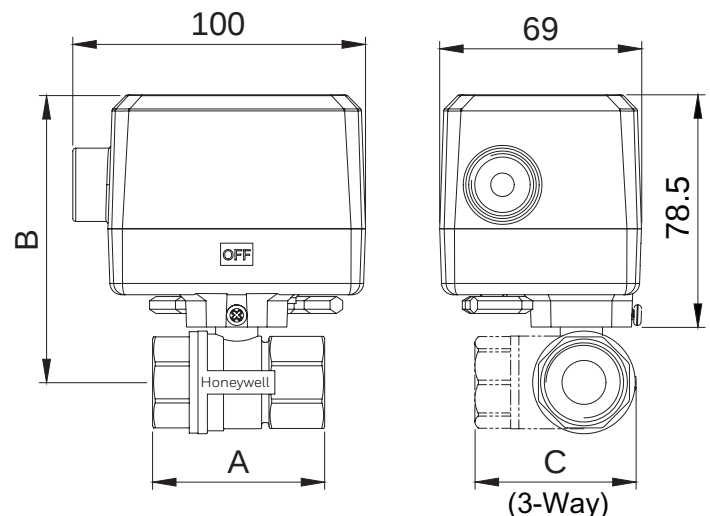
### APPLICATION

The VN Series Zone Valves control hot and chilled water with glycol solutions up to 50% in closed loop fluid applications with either two-position or modulating control. These valve assemblies can be ordered with factory-mounted electronic fail safe or fail in place actuators.

### FEATURES

- Class leading specifications for temperature, close-off pressure, static pressure and leakage.
- Extremely compact design with removable actuator
- Modulating or 2-position, fail in place or EFS.
- 1/2 inch to 1 inch offering designed for optimum flow-rates.
- Quick response actuators, available in EFS and Non-EFS versions.
- Offered in two-wire, two -position with electronic fail safe in 24V and line voltage.
- Removable manual operating wrench to control valve during installation or in event of power failure.

### DIMENSIONS DIAGRAM



| Pattern | Size     | Dimensions (in) |     |     |
|---------|----------|-----------------|-----|-----|
|         |          | A               | B   | C   |
| 2-way   | 1/2 inch | 2.0             | 3.9 | -   |
|         | 3/4 inch | 2.4             | 3.9 | -   |
|         | 1 inch   | 2.6             | 4.1 | -   |
| 3-way   | 1/2 inch | 2.2             | 3.9 | 1.7 |
|         | 3/4 inch | 2.6             | 3.9 | 1.7 |
|         | 1 inch   | 3.3             | 4.1 | 2.4 |

# Submittal Data - Valves

## Unitary Valve, V5852; V5862



Two-way Cartridge Globe Valves control hot and/or chilled water for VAV terminal units, fan coil units, small reheaters and recoolers in electric/electronic temperature control systems. Used with the M6410 3-position floating Non-Spring Return Valve Actuator and the M7410 selectable 0 to 10 Vdc or 2 to 10 Vdc Non-Spring Return Actuator. The 1/2 in. and 3/4 in. valves are compatible with the

M6435 floating Spring Return Actuator, and the M7435 selectable 0 to 10 Vdc or 2 to 10 Vdc Spring Return Actuator. Larger valves (1 in. through 1-1/2 in.) are pressure balanced, which results in higher close-off pressures.

### SPECIFICATIONS

|                                      |                                                                                                                                               |
|--------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| Valve Type .....                     | Cartridge Globe Valve                                                                                                                         |
| Body Pattern .....                   | Two-way                                                                                                                                       |
| Controlled Fluid .....               | Chilled or hot water with up to 50% Glycol. Not for use with steam or fuels.                                                                  |
| Leakage Rating .....                 | 1/2 in. and 3/4 in. valves: ANSI Class IV (0.01% of Cv maximum)<br>1 in., 1-1/4 in., 1-1/2 in. valves: ANSI Class III (less than 0.02% of Cv) |
| Maximum Safe Operating Pressure..... | 235 psi (1620 kPa)                                                                                                                            |
| Fluid Temperature Range .....        | 36 F to 230 F (2 C to 110 C)                                                                                                                  |
| Stem Travel .....                    | 1/4 in. (6.4 mm)                                                                                                                              |
| Actuation: .....                     | Must be purchased separately                                                                                                                  |
| Materials                            |                                                                                                                                               |
| (Body) .....                         | Brass                                                                                                                                         |
| (Stem) .....                         | Stainless Steel                                                                                                                               |
| (Seat) .....                         | Brass                                                                                                                                         |
| (Cartridge) .....                    | Brass                                                                                                                                         |
| (Plug/Ball/Disc) .....               | Brass                                                                                                                                         |

### ACCESSORIES

|                                                             |                                        |
|-------------------------------------------------------------|----------------------------------------|
| 0902807—Replacement Insert for 1/2 in. V5852/V5862, 1.9Cv   | Interchangeable with 0902808           |
| 0902808—Replacement Insert for 1/2 in. V5852/V5862, 1.2 Cv  | Interchangeable with 0902807           |
| 0902809—Replacement Insert for 1/2 in. V5852/V5862, 0.74 Cv | Interchangeable with 0902810 or 090212 |
| 0902810—Replacement Insert for 1/2 in. V5852/V5862, 0.47 Cv | Interchangeable with 0902809 or 090212 |

### REPLACEMENT PARTS

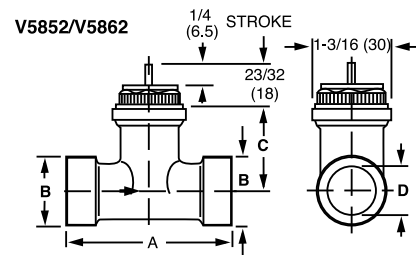
|                                                             |                                        |
|-------------------------------------------------------------|----------------------------------------|
| 0902812—Replacement Insert for 1/2 in. V5852/V5862, 0.19 Cv | Interchangeable with 0902809 or 090210 |
| 0902814—Replacement Insert for 3/4 in. V5852/V5862, 2.9 Cv  | Interchangeable with 0902815           |
| 0902815—Replacement Insert for 3/4 in. V5852/V5862, 4.9 Cv  | Interchangeable with 0902814           |
| 0903827—Replacement Packing for 1 in. V5862/63              |                                        |
| 0903828—Replacement Packing for 1-1/4 in. V5862/63          |                                        |
| 0903829—Replacement Packing for 1-1/2 in. V5862/63          |                                        |

### FEATURES

Long stroke allows wider range of control.

- Soft valve seat provides low leakage rate.
- Inserts for 1/2 in. and 3/4 in. valves are changeable without draining valve when used with an insert replacement tool.
- Brass body and Stainless Steel stem.
- Threaded plastic cover/manual handle allows manual operation.
- Easily installed in areas where space is limited.

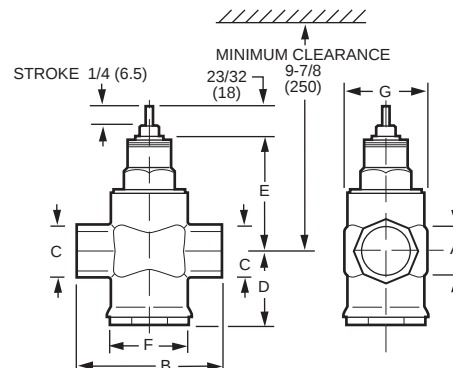
### DIMENSIONS DIAGRAM



| VALVE SIZE | A          | B        | C           | D (NPT)  | D (SWEAT) |
|------------|------------|----------|-------------|----------|-----------|
| 1/2 (13)   | 3 (77)     | 3/4 (19) | 1-5/16 (34) | 1/2 (13) | 5/8 (16)  |
| 3/4 (19)   | 3-1/2 (88) | 1 (25)   | 1-1/4 (32)  | 3/4 (19) | 7/8 (22)  |

NOTE: SOLDER ENDS CONFORM TO ANSI B16-18.

M18917



| VALVE SIZE<br>A (NPT) | B             | C           | D           | E          | F           | G          |
|-----------------------|---------------|-------------|-------------|------------|-------------|------------|
| 1 (25)                | 4-1/8 (105)   | 1-5/8 (41)  | 2-1/16 (53) | 3-5/8 (92) | 2 (50)      | 1-3/4 (44) |
| 1-1/4 (32)            | 4-15/16 (125) | 2 (50)      | 2-7/16 (62) | 3-5/8 (92) | 2-3/16 (55) | 2-1/4 (57) |
| 1-1/2 (38)            | 5-1/8 (130)   | 2-3/16 (55) | 2-9/16 (65) | 3-7/8 (98) | 2-3/8 (60)  | 2-5/8 (67) |

# Submittal Data - Valves

## Unitary Valve, V5853; V5863



Three-way Cartridge Globe Valves control hot and/or chilled water for VAV terminal units, fan coil units, small reheaters and recoolers in electric/ electronic temperature control systems. Used with the M6410 3-position floating Non-Spring Return Valve Actuator and the M7410 selectable 0 to 10 Vdc or 2 to 10 Vdc Non-Spring Return Actuator. The 1/2 in. and 3/4 in. valves are also compatible with the M6435 floating Spring Return

Actuator, and the M7435 selectable 0 to 10 Vdc or 2 to 10 Vdc Spring Return Actuator.

### SPECIFICATIONS

|                                                         |                                                                                                                                               |
|---------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| Valve Type .....                                        | Cartridge Globe Valve                                                                                                                         |
| Body Pattern .....                                      | Three-way                                                                                                                                     |
| Controlled Fluid .....                                  | Chilled or hot water with up to 50% Glycol. Not for use with steam or fuels.                                                                  |
| Leakage Rating .....                                    | 1/2 in. and 3/4 in. valves: ANSI Class IV (0.01% of Cv maximum)<br>1 in., 1-1/4 in., 1-1/2 in. valves: ANSI Class III (less than 0.02% of Cv) |
| Maximum Safe Operating Pressure .....                   | 235 psi (1620 kPa)                                                                                                                            |
| Maximum Differential Pressure Ratings (Close-off) ..... | 34 psi (234 kPa)                                                                                                                              |
| Fluid Temperature Range .....                           | 36 F to 230 F (2 C to 110 C)                                                                                                                  |
| Stem Travel .....                                       | 1/4 in. (6.4 mm)                                                                                                                              |
| Actuation: .....                                        | Must be purchased separately                                                                                                                  |

### Materials

|                        |                 |
|------------------------|-----------------|
| (Body) .....           | Brass           |
| (Stem) .....           | Stainless Steel |
| (Seat) .....           | Brass           |
| (Cartridge) .....      | Brass           |
| (Plug/Ball/Disc) ..... | Brass           |

### ACCESSORIES

0903827—Replacement Packing for 1 in. V5862/63

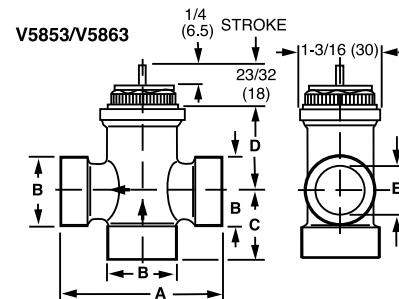
### REPLACEMENT PARTS

0902821—Replacement Insert for 1/2 in. V5853/V5863, 0.29 Cv  
Interchangeable with 0902822 or 0902823 or 0902824  
0902822—Replacement Insert for 1/2 in. V5853/V5863, 0.47 Cv  
Interchangeable with 0902821 or 0902823 or 0902824  
0902823—Replacement Insert for 1/2 in. V5853/V5863, 0.74 Cv  
Interchangeable with 0902821 or 0902822 or 0902824  
0902824—Replacement Insert for 1/2 in. V5853/V5863, 1.2 Cv  
Interchangeable with 0902821 or 0902822 or 0902823  
0902825—Replacement Insert for 1/2 in. V5853/V5863, 1.9 Cv  
Interchangeable with 0902827  
0902827—Replacement Insert for 3/4 in. V5853/V5863, 4.9 Cv  
Interchangeable with 0902825  
0903827—Replacement Packing for 1 in. V5862/63  
0903828—Replacement Packing for 1-1/4 in. V5862/63  
0903829—Replacement Packing for 1-1/2 in. V5862/63

### FEATURES

- Long stroke allows wider range of control.
- Soft valve seat provides low leakage rate.
- Inserts for 1/2 in. and 3/4 in. valves are changeable without draining valve when used with an insert replacement tool.
- Brass body and stainless steel stem.
- Threaded plastic cover/manual handle allows manual operation.
- Easily installed in areas where space is limited.

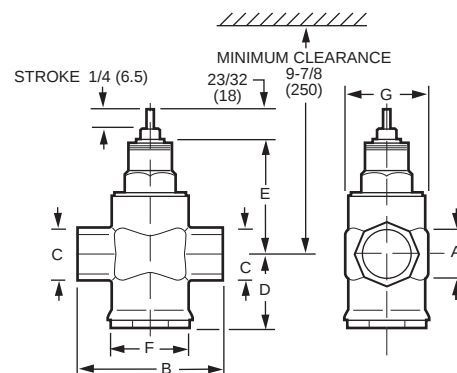
### DIMENSIONS DIAGRAM



| VALVE SIZE | A          | B        | C           | D           | E (NPT)  | E (SWEAT) |
|------------|------------|----------|-------------|-------------|----------|-----------|
| 1/2 (13)   | 3 (77)     | 3/4 (19) | 1-5/16 (34) | 1-5/16 (34) | 1/2 (13) | 5/8 (16)  |
| 3/4 (19)   | 3-1/2 (88) | 1 (25)   | 1-1/2 (38)  | 1-1/4 (32)  | 3/4 (19) | 7/8 (22)  |

NOTE: SOLDER ENDS CONFORM TO ANSI B16-18.

M18919



| VALVE SIZE<br>A (NPT) | B             | C           | D           | E          | F           | G          |
|-----------------------|---------------|-------------|-------------|------------|-------------|------------|
| 1 (25)                | 4-1/8 (105)   | 1-5/8 (41)  | 2-1/16 (53) | 3-5/8 (92) | 2 (50)      | 1-3/4 (44) |
| 1-1/4 (32)            | 4-15/16 (125) | 2 (50)      | 2-7/16 (62) | 3-5/8 (92) | 2-3/16 (55) | 2-1/4 (57) |
| 1-1/2 (38)            | 5-1/8 (130)   | 2-3/16 (55) | 2-9/16 (65) | 3-7/8 (98) | 2-3/8 (60)  | 2-5/8 (67) |

# Submittal Data - Valves

## NPT Control Ball Valve, VBN2



The VBN2 Two-Way Control Ball Valves control hot and chilled water with glycol solutions up to 50% in heating, ventilating and air conditioning (HVAC) systems to provide two-position or modulating functions. These valve assemblies can be ordered with or without factory-mounted non-spring return or spring return actuators.

### SPECIFICATIONS

|                                       |                                                                              |
|---------------------------------------|------------------------------------------------------------------------------|
| Valve Type .....                      | Control Ball Valve                                                           |
| Body Pattern .....                    | Two-way                                                                      |
| Connection Type .....                 | Female NPT                                                                   |
| Controlled Fluid .....                | Chilled or hot water with up to 50% Glycol. Not for use with steam or fuels. |
| Leakage Rating .....                  | ANSI Class IV (0.01% of Cv maximum)                                          |
| Maximum Safe Operating Pressure ..... | 360 psi (2482 kPa)                                                           |
| Fluid Temperature Range .....         | -22 F to +250 F (-30 C to +121 F)                                            |
| Materials                             |                                                                              |
| (Body) .....                          | Brass                                                                        |
| (Seat) .....                          | Teflon® seals with EPDM O-rings                                              |
| (Flow Control Insert) .....           | Noryl®                                                                       |

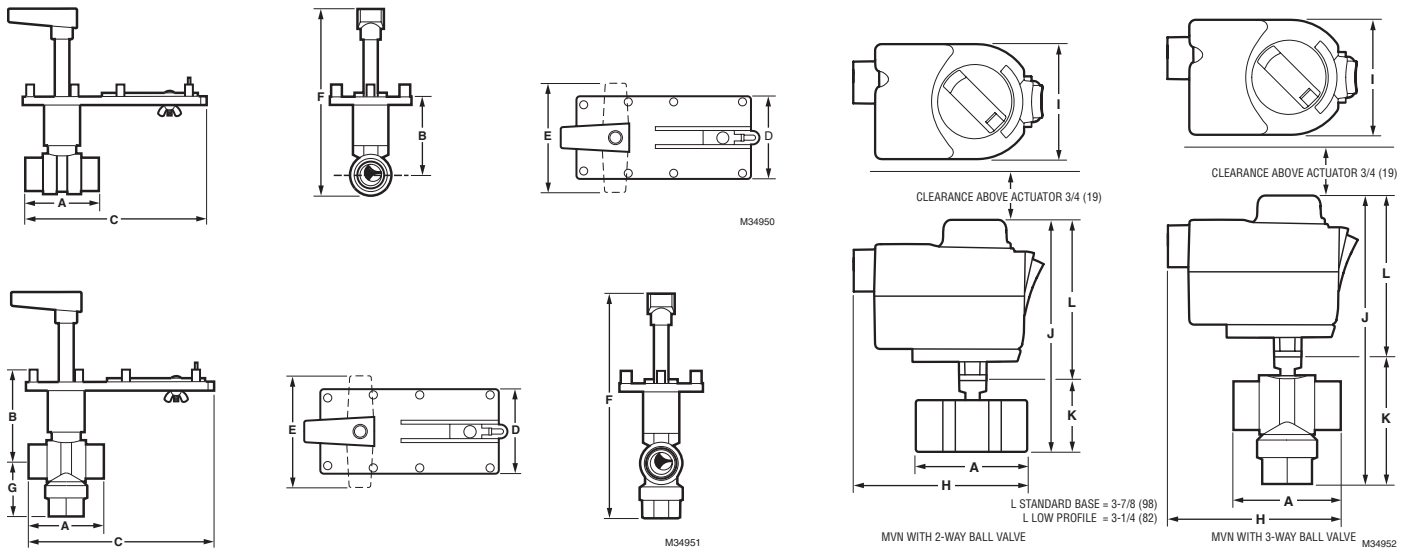
### FEATURES

- Sizes from 1/2 to 3 in. with internal (female) NPT connections.
- Equal percentage flow characteristic.
- Reduced B port CV for constant loop flow.
- Choice of factory-installed actuation: modulating or 2-position, fail in place or EFS
- 2-Position, Spring Return Modulating/Floating.
- Field configurable for normally open or normally closed fail-safe position.
- Removable manual operating handle to control valve during installation or in an event of power failure.
- Actuator can be mounted on the valve in any of four orientations.
- Field-serviceable stem assembly.
- Wide range of CV choices from 0.33 to 266.
- Nickel-chrome plated brass or 316 stainless steel ball and stem.
- Valve installs in a globe valve “T” pattern, no extra elbows or piping required.
- Mixing or Diverting control for 3-way valves.
- ANSI Class IV seat leakage specification (0.01% of CV) for 3-way A port and ANSI Class III seat leakage specification (0.1% of CV) for 3-way B port.

# Dimensional Diagrams - Valves

## NPT Control Ball Valve, VBN2

### DIMENSIONS DIAGRAM



VBN2 dimensions in inches (millimeters).

| Pipe Size |      |       | C <sub>v</sub><br>Designators                    | MVN, MN, AND MS ACTUATORS WITH 2-WAY BALL VALVE<br>Dimensions in in. (mm) |                  |                      |           |            |                       |                      |                 |                |                 |                      |                     | Weight<br>(valve only)<br>lbs. | Replacement<br>Stem<br>Assembly** |
|-----------|------|-------|--------------------------------------------------|---------------------------------------------------------------------------|------------------|----------------------|-----------|------------|-----------------------|----------------------|-----------------|----------------|-----------------|----------------------|---------------------|--------------------------------|-----------------------------------|
| In.       | (DN) | Code  |                                                  | A                                                                         | B                | C                    | D         | E          | Fms <sup>a</sup>      | Fmn <sup>b</sup>     | H               | I              | J<br>(w/std)    | J<br>(w/low)         | K                   |                                |                                   |
| 1/2       | 15   | VBN2A | 0.38, 0.68, 1.30,<br>2.00, 2.60, 4.70,<br>11.70* | 2-3/8<br>(60)                                                             | 3-7/16<br>(87)   | 6-5/8<br>(168)       | 3<br>(76) | 4<br>(102) | 8-1/8<br>(206)        | 6-7/8<br>(175)       | 4-9/16<br>(116) | 2-3/16<br>(71) | 5-7/16<br>(139) | 4-<br>13/16<br>(123) | 1-5/8<br>(41)       | 1                              | 5112-19<br>5112-22 (SS)           |
| 3/4       | 20   | VBN2B | 4.30, 7.40                                       | 2-3/8<br>(60)                                                             | 3-7/16<br>(87)   | 6-7/16<br>(164)      | 3<br>(76) | 4<br>(102) | 8-1/8<br>(206)        | 6-7/8<br>(175)       |                 |                | 5-7/16<br>(139) | 4-<br>13/16<br>(123) | 1-5/8<br>(41)       | 1                              |                                   |
|           |      |       | 10.10, 29.00*                                    | 2-5/8<br>(67)                                                             | 3-11/16<br>(94)  | 6-1/2<br>(165)       | 3<br>(76) | 4<br>(102) | 8-5/16<br>(211)       | 7-1/16<br>(180)      |                 |                | 5-5/8<br>(143)  | 5 (127)              | 1-<br>13/16<br>(45) | 1                              |                                   |
| 1         | 25   | VBN2C | 9.00                                             | 3-3/4<br>(95)                                                             | 3-11/16<br>(94)  | 7-1/16<br>(179)      | 3<br>(76) | 4<br>(102) | 8-5/16<br>(211)       | 7-1/16<br>(180)      |                 |                | 5-5/8<br>(143)  | 5 (127)              | 1-<br>13/16<br>(45) | 1                              | 5112-20<br>5112-23 (SS)           |
|           |      |       | 15.30, 26.00,<br>54.00*                          | 3-1/16<br>(77)                                                            | 3-15/16<br>(100) | 6-3/4<br>(171)       | 3<br>(76) | 4<br>(102) | 8-<br>11/16<br>(221)  | 7-7/16<br>(189)      |                 |                | 6 (153)         | 5-3/8<br>(137)       | 2-3/16<br>(55)      | 1.4                            |                                   |
| 1-1/4     | 32   | VBN2D | 14.90, 25.00                                     | 3 (76)                                                                    | 3-15/16<br>(100) | 6-<br>11/16<br>(170) | 3<br>(76) | 4<br>(102) | 8-<br>11/16<br>(221)  | 7-7/16<br>(189)      |                 |                | 6<br>(152)      | 5-3/8<br>(137)       | 2-1/8<br>(54)       | 1.4                            |                                   |
|           |      |       | 37.00, 102.00*                                   | 3-5/8<br>(92)                                                             | 4-7/16<br>(113)  | 7<br>(178)           | 3<br>(76) | 4<br>(102) | 9-1/16<br>(231)       | 7-<br>13/16<br>(198) |                 |                | 6-3/8<br>(162)  | 5-3/4<br>(146)       | 2-9/16<br>(64)      | 2.4                            |                                   |
| 1-1/2     | 40   | VBN2E | 74.00*                                           | 3-7/16<br>(87)                                                            | 3-15/16<br>(100) | 6-<br>15/16<br>(176) | 3<br>(76) | 4<br>(102) | 9-1/16<br>(231)       | 7-<br>13/16<br>(198) |                 |                |                 |                      |                     | 2.4                            | 5112-21<br>5112-24 (SS)           |
|           |      |       | 41.00, 172.00*                                   | 4-1/16<br>(103)                                                           | 5-3/16<br>(132)  | 7-1/16<br>(179)      | 3<br>(76) | 4<br>(102) | 8-7/8<br>(225)        | 7-5/8<br>(194)       |                 |                |                 |                      |                     | 3.2                            |                                   |
| 2         | 50   | VBN2F | 42.00                                            | 4 (101)                                                                   | 3-3/4<br>(95)    | 7-3/16<br>(183)      | 3<br>(76) | 4<br>(102) | 8-7/8<br>(225)        | 7-5/8<br>(194)       |                 |                |                 |                      |                     | 3.2                            |                                   |
|           |      |       | 57.00, 71.00,<br>100.00, 266.00*                 | 4-15/16<br>(125)                                                          | 4-1/16<br>(103)  | 7-7/16<br>(188)      | 3<br>(76) | 4<br>(102) | 10-1/2<br>(267)       | 9-1/4<br>(235)       |                 |                |                 |                      |                     | 5                              |                                   |
| 2-1/2     | 65   | VBN2G | 72.00, 101.00,<br>202.00*                        | 5-5/16<br>(135)                                                           | 4-1/16<br>(103)  | 7-9/16<br>(192)      | 3<br>(76) | 4<br>(102) | 10-1/2<br>(267)       | 9-1/4<br>(235)       |                 |                |                 |                      |                     | 5.5                            |                                   |
| 3         | 80   | VBN2H | 124.00, 145.00*                                  | 5 (127)                                                                   | 5-7/8<br>(149)   | 7-<br>11/16<br>(196) | 3<br>(76) | 4<br>(102) | 10-<br>11/16<br>(271) | 9-7/16<br>(240)      |                 |                |                 |                      |                     | 5.9                            |                                   |

<sup>a</sup> For models using the MS direct coupled actuator.

<sup>b</sup> For models using the MN direct coupled actuator.

\* Indicates full port valve: no flow characterizing insert.

\*\* Replacement stems available in brass or stainless steel—use accordingly to valve part number.

# Submittal Data - Valves

## NPT Control Ball Valve, VBN3



The VBN3 Three-Way Control Ball Valves control hot and chilled water with glycol solutions up to 50% in heating, ventilating and air conditioning (HVAC) systems to provide two-position or modulating functions. These valve assemblies can be ordered with or without factory-mounted non-spring return or spring return actuators.

### SPECIFICATIONS

|                                       |                                                                                    |
|---------------------------------------|------------------------------------------------------------------------------------|
| Valve Type .....                      | Control Ball Valve                                                                 |
| Body Pattern .....                    | Three-way                                                                          |
| Flow Characteristic: .....            | Linear (B-AB); Equal<br>Percentage (A-AB)                                          |
| Connection Type .....                 | Female NPT                                                                         |
| Controlled Fluid .....                | Chilled or hot water with up to<br>50% Glycol. Not for use with<br>steam or fuels. |
| Leakage Rating .....                  | ANSI Class IV (0.01% of Cv<br>maximum)                                             |
| Maximum Safe Operating Pressure ..... | 360 psi (2482 kPa)                                                                 |
| Fluid Temperature Range .....         | -22 F to +250 F (-30 C to +121 F)                                                  |
| Materials                             |                                                                                    |
| (Body) .....                          | Brass                                                                              |
| (Stem): .....                         | Brass                                                                              |
| (Seat) .....                          | Teflon® seals with EPDM O-<br>rings                                                |
| (Plug/Ball/Disc): .....               | Nickel-plated brass ball                                                           |
| (Flow Control Insert) .....           | Noryl®                                                                             |

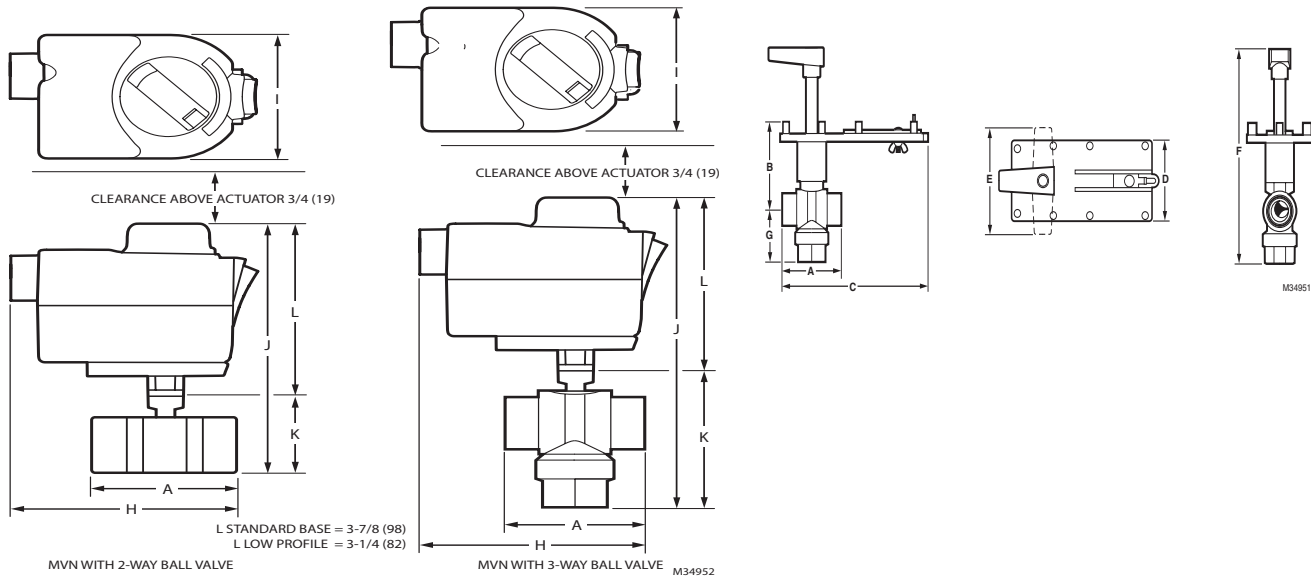
### FEATURES

- Sizes from 1/2 to 2-1/2 inches with internal (female) NPT connections.
- Equal percentage or linear flow characteristics.
- Reduced B-port Cv for constant loop flow.
- Choice of four, factory-installed actuation control schemes: Floating, Modulating (2-10 V), Spring Return 2-Position, Spring Return Modulating/Floating.
- Field configurable for normally open or normally closed fail safe position.
- Removable manual operating handle to control valve during installation or in an event of power failure.
- ANSI Class IV seat leakage specification (0.01% of Cv).
- Optional NEMA 3R (IP54) rated enclosure for outdoor applications.
- Actuator can be mounted on the valve in any of four orientations.
- Wide Cv choices from 0.33 to 109.
- Valve installs in a globe valve "T" pattern, no extra elbows or piping required.
- Field-serviceable stem assembly.
- Nickel-chrome plated brass ball and stem.
- Mixing or Diverting control.

# Dimensional Diagrams - Valves

## NPT Control Ball Valve, VBN3

### DIMENSIONS DIAGRAM



VBN3 dimensions in inches (millimeters).

| Pipe Size |      |       | MVN, MN, AND MS ACTUATORS WITH 3-WAY BALL VALVE |                 |                  |                  |           |            |                       |                  |               |                     |                     |                  |                 |                     | Weight<br>(valve only)<br>lbs. | Replacement<br>Stem<br>Assembly |
|-----------|------|-------|-------------------------------------------------|-----------------|------------------|------------------|-----------|------------|-----------------------|------------------|---------------|---------------------|---------------------|------------------|-----------------|---------------------|--------------------------------|---------------------------------|
| In.       | (DN) | Code  | C <sub>v</sub> Designators                      | A               | B                | C                | D         | E          | Fms <sup>a</sup>      | Fmn <sup>b</sup> | G             | H                   | I                   | J<br>(w/ std)    | J<br>(w/ low)   | K                   |                                |                                 |
| 1/2       | 15   | VBN3A | 0.33, 0.59, 1.00,<br>2.40, 4.30, 8.00           | 3-1/2<br>(89)   | 3-5/16<br>(84)   | 7 (178)          | 3<br>(76) | 4<br>(102) | 9-3/8<br>(238)        | 8-1/8<br>(206)   | 2-3/8<br>(60) | 4-<br>9/16<br>(116) | 2-<br>13/16<br>(71) | 6-11/16<br>(170) | 6-1/16<br>(154) | 2-7/8<br>(72)       | 2.4                            | 5112-19                         |
| 3/4       | 20   | VBN3B | 3.80, 7.00,<br>11.00*                           | 2-13/16<br>(71) | 3-5/16<br>(84)   | 6-1/2<br>(165)   | 3<br>(76) | 4<br>(102) | 8-13/16<br>(224)      | 7-9/16<br>(192)  | 2 (51)        |                     |                     | 6-1/8<br>(156)   | 5-1/2<br>(140)  | 2-5/16<br>(58)      | 2                              |                                 |
| 1         | 25   | VBN3C | 8.60, 22.00                                     | 3 (76)          | 3-13/16<br>(97)  | 6-13/16<br>(173) | 3<br>(76) | 4<br>(102) | 9-13/16<br>(249)      | 8-9/16<br>(217)  | 2-5/8<br>(67) |                     |                     | 7-1/8<br>(181)   | 6-1/2<br>(165)  | 3-5/16<br>(83)      | 2.6                            | 5112-20                         |
|           |      |       | 14.90, 31.00                                    | 4-5/16<br>(114) | 4 (102)          | 7-13/16<br>(198) | 3<br>(76) | 4<br>(102) | 10-<br>13/16<br>(275) | 9-9/16<br>(243)  | 3-1/4<br>(83) |                     |                     | 8-1/8<br>(206)   | 7-1/2<br>(191)  | 4-5/16<br>(109)     | 3.3                            |                                 |
| 1-1/4     | 32   | VBN3D | 19.40*                                          | 3 (76)          | 3-13/16<br>(97)  | 6-13/16<br>(173) | 3<br>(76) | 4<br>(102) | 9-13/16<br>(249)      | 8-9/16<br>(217)  | 2-1/2<br>(64) |                     |                     | 7-1/8<br>(181)   | 6-1/2<br>(165)  | 3-5/16<br>(83)      | 2.5                            |                                 |
|           |      |       | 12.70, 27.00,<br>34.00*                         | 3-5/8<br>(91)   | 4 (102)          | 7-5/16<br>(185)  | 3<br>(76) | 4<br>(102) | 10-5/16<br>(262)      | 9-1/16<br>(230)  | 2-3/4<br>(70) |                     |                     | 7-5/8<br>(194)   | 7 (178)         | 3-<br>13/16<br>(96) | 2.8                            |                                 |
| 1-1/2     | 40   | VBN3E | 32.00*                                          | 4-5/16<br>(114) | 4 (102)          | 7-13/16<br>(198) | 3<br>(76) | 4<br>(102) | 10-<br>13/16<br>(275) | 9-9/16<br>(243)  | 3-1/4<br>(83) |                     |                     |                  |                 |                     | 3.3                            |                                 |
|           |      |       | 24.00, 61.00                                    | 4 (102)         | 4-1/2<br>(114)   | 7-5/16<br>(185)  | 3<br>(76) | 4<br>(102) | 11 (279)              | 9-3/4<br>(248)   | 3-1/4<br>(83) |                     |                     |                  |                 |                     | 3.3                            | 5112-21                         |
| 2         | 50   | VBN3F | 38.00, 57.00                                    | 4 (102)         | 4-1/2<br>(114)   | 7-5/16<br>(185)  | 3<br>(76) | 4<br>(102) | 11 (279)              | 9-3/4<br>(248)   | 3-1/4<br>(83) |                     |                     |                  |                 |                     | 3.3                            |                                 |
|           |      |       | 83.00, 109.00                                   | 5 (127)         | 5-13/16<br>(147) | 7-13/16<br>(198) | 3<br>(76) | 4<br>(102) | 12-5/16<br>(313)      | 11-1/16<br>(281) | 3-3/4<br>(95) |                     |                     |                  |                 |                     | 3.8                            |                                 |
| 2-1/2     | 65   | VBN3G | 74.00, 100.00                                   | 5 (127)         | 5-13/16<br>(147) | 7-13/16<br>(198) | 3<br>(76) | 4<br>(102) | 12-5/16<br>(313)      | 11-1/16<br>(281) | 3-3/4<br>(95) |                     |                     |                  |                 |                     | 3.8                            |                                 |

<sup>a</sup> For models using the MS direct coupled actuator.

<sup>b</sup> For models using the MN direct coupled actuator.

\* Indicates full A-port: no flow characterizing insert.

# Submittal Data - Valves

## Flanged Control Ball Valve, VBF2



The VBF2 Two-Way Ball Valve Assemblies, with and without actuators, control hot and chilled water with glycol solutions up to 50% in closed loop heating, ventilating and air conditioning (HVAC) systems to provide two-position or modulating functions. These valve assemblies can be ordered with or without factory-mounted non-spring return or spring return direct-coupled actuators (DCA).

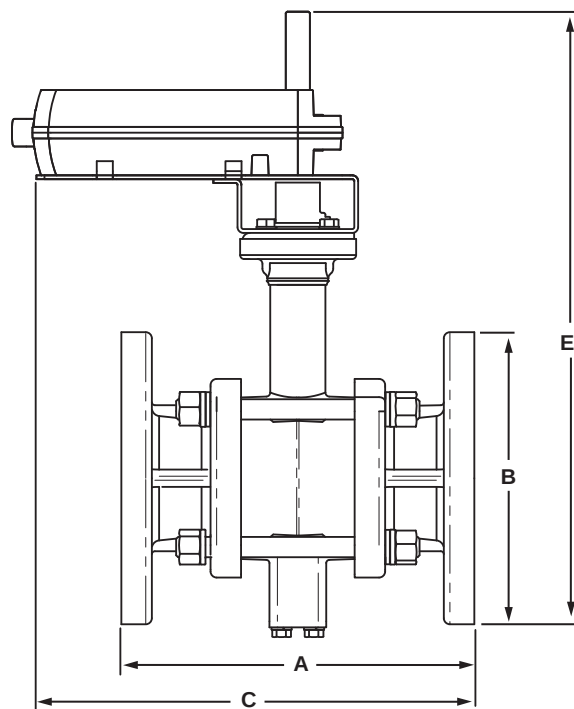
### FEATURES

- Sizes from 4 to 6 inch with ANSI Class 125 flanged connections.
- Equal percentage or linear flow characteristics.
- Choice of four, factory-installed actuation control schemes: Floating, Modulating (2-10 V), Spring Return 24V 2-Position, Spring Return Modulating/Floating.
- Field configurable for normally open or normally closed fail safe position.
- Removable manual operating handle to control valve during installation or in an event of power failure.
- ANSI Class IV leakage specification (0.01% of Cv).
- Optional NEMA 3R (IP54) rated enclosure for outdoor applications.
- Option of four actuator mounting positions on the valve.
- Wide range of Cv choices from 91 to 650.
- Valve ball and stem 316 stainless steel.

### SPECIFICATIONS

|                                       |                                                                              |
|---------------------------------------|------------------------------------------------------------------------------|
| Valve Type .....                      | Control Ball Valve                                                           |
| Body Pattern .....                    | Two-way                                                                      |
| Connection Type .....                 | Flanged                                                                      |
| Flow Characteristic:.....             | Equal Percentage                                                             |
| Controlled Fluid .....                | Chilled or hot water with up to 50% Glycol. Not for use with steam or fuels. |
| Leakage Rating .....                  | ANSI Class IV (0.01% of Cv maximum)                                          |
| Maximum Safe Operating Pressure ..... | 240 psi (1655 kPa)                                                           |
| Maximum Differential Pressure .....   |                                                                              |
| Ratings (Close-off) .....             | 70 psi (483 kPa)                                                             |
| Fluid Temperature Range .....         | -22 F to +250 F (-30 C to +121 F)                                            |
| Materials .....                       |                                                                              |
| (Body).....                           | Cast Iron                                                                    |
| (Stem).....                           | 316 Stainless Steel                                                          |
| (Seat).....                           | Teflon®                                                                      |
| (Plug/Ball/Disc).....                 | 316 stainless steel                                                          |

### DIMENSIONS DIAGRAM



| Size (in.) | Model Number | A in. (mm)   | B in. (mm) | C in. (mm)   | D (depth) (not shown) in. (mm) | E in. (mm)   | Wt. lb (kg) |
|------------|--------------|--------------|------------|--------------|--------------------------------|--------------|-------------|
| 4          | VBF2J        | 11 (278)     | 9 (229)    | 13-1/4 (337) | 9 (229)                        | 18-3/4 (476) | 65 (31)     |
| 5          | VBF2K        | 12-3/8 (352) | 10 (254)   | 14-1/4 (362) | 10 (254)                       | 19 (483)     | 75 (34)     |
| 6          | VBF2L        | 13-7/8 (352) | 11 (278)   | 15-1/8 (384) | 11 (278)                       | 19-7/8 (505) | 90 (41)     |

M13732

Flanged Control Ball Valve, VBF3



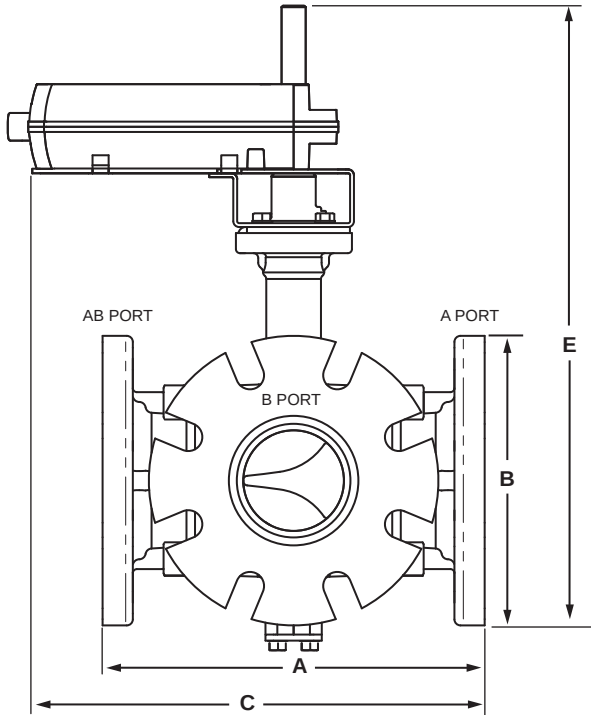
The VBF3 Three-Way Ball Valve Assemblies, with and without actuators, control hot and chilled water with glycol solutions up to 50% in closed loop heating, ventilating and air conditioning (HVAC) systems to provide two-position or modulating functions. These valve assemblies can be ordered with or without factory-mounted non-spring return or spring return direct-coupled actuators (DCA).

- FEATURES
- Sizes from 4 to 6 inch with ANSI Class 125 flanged connections.
  - Equal percentage or linear flow characteristics.
  - Choice of four, factory-installed actuation control schemes: Floating, Modulating (2-10 V), Spring Return 24V 2-Position, Spring Return Modulating/Floating.
  - Field configurable for normally open or normally closed fail safe position.
  - Removable manual operating handle to control valve during installation or in an event of power failure.
  - ANSI Class IV A-port seat leakage (0.01% of Cv).
  - Optional NEMA 3R (IP54) rated enclosure for outdoor applications.
  - Option of four actuator mounting positions on the valve.
  - Wide range of Cv choices from 91 to 650.
  - Valve ball and stem 316 stainless steel.
  - Non-isolating mixing or diverting control.

SPECIFICATIONS

|                                      |                                                                              |
|--------------------------------------|------------------------------------------------------------------------------|
| Valve Type .....                     | Control Ball Valve                                                           |
| Body Pattern.....                    | Three-way                                                                    |
| Connection Type.....                 | Flanged                                                                      |
| Flow Characteristic:.....            | Linear (B-AB); Equal Percentage (A-AB)                                       |
| Controlled Fluid .....               | Chilled or hot water with up to 50% Glycol. Not for use with steam or fuels. |
| Leakage Rating .....                 | ANSI Class IV (A port only) B port ~2% leakage                               |
| Maximum Safe Operating Pressure..... | 240 psi (1655 kPa)                                                           |
| Maximum Differential Pressure .....  |                                                                              |
| Ratings (Close-off).....             | 70 psi (483 kPa)                                                             |
| Fluid Temperature Range .....        | -22 F to +250 F (-30 C to +121 F)                                            |
| Materials                            |                                                                              |
| (Body) .....                         | Cast Iron                                                                    |
| (Stem) .....                         | 316 Stainless Steel                                                          |
| (Seat) .....                         | Teflon®                                                                      |
| (Plug/Ball/Disc) .....               | 316 stainless steel                                                          |

DIMENSIONS DIAGRAM

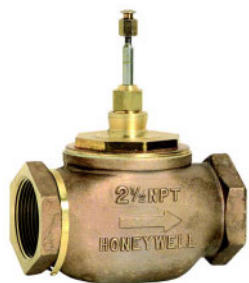


| Size (in.) | Model Number | A in. (mm)   | B in. (mm) | C in. (mm)   | D (depth) (not shown) in. (mm) | E in. (mm)   | Wt. lb (kg) |
|------------|--------------|--------------|------------|--------------|--------------------------------|--------------|-------------|
| 4          | VBF3J        | 11-7/8 (278) | 9 (229)    | 14-1/8 (337) | 10-3/8 (229)                   | 18-1/2 (470) | 75 (34)     |
| 5          | VBF3K        | 13-7/8 (352) | 10 (254)   | 15-1/8 (362) | 12 (254)                       | 19-3/8 (483) | 90 (41)     |
| 6          | VBF3L        | 15-7/8 (403) | 11 (278)   | 16-1/8 (410) | 13-3/8 (521)                   | 20-1/2 (521) | 105 (48)    |

M13733A

# Submittal Data - Valves

## NPT Globe Valve, V5011F; V5011G



Used for two-position or modulating control of steam and water and glycol solutions (to 50 percent concentration) in heating or cooling systems.

### FEATURES

- Sizes range from 2-1/2 to 3 inches.
- Direct acting
- High pressure steam models with stainless steel trim.
- Spring-loaded, self-adjusting packing.
- Stainless steel stem prevents corrosion.
- Valve designs provide equal percentage characteristics of flow for close control of water, and linear characteristic of flow for close control of steam or chilled water.
- Valves utilize direct mounting, electric or pneumatic linear valve actuators; Q5001 linkage with Modutrol Motor; or Q5020/Q5024 linkages with Direct Coupled Actuators to operate the valve.

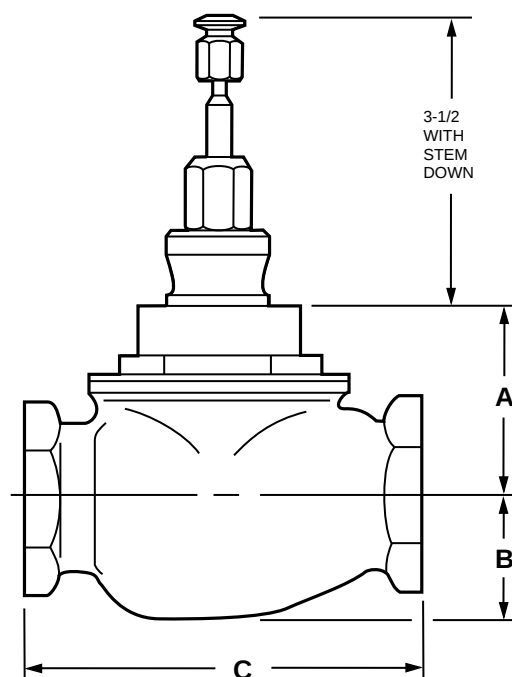
### SPECIFICATIONS

|                                                    |                                                                                  |
|----------------------------------------------------|----------------------------------------------------------------------------------|
| Valve Type .....                                   | Globe Valve                                                                      |
| Body Pattern .....                                 | Two-way, Straight-through                                                        |
| Connection Type .....                              | Female NPT                                                                       |
| Leakage Rating .....                               | 0.5% of Cv                                                                       |
| Maximum Differential for Quiet Water Service ..... | 20 psid (138 kPa)                                                                |
| Fluid Temperature Range .....                      | 40 F to 337 F (4 C to 169 C)                                                     |
| Stem Travel .....                                  | 3/4 in. (20 mm)                                                                  |
| Bonnet Size: .....                                 | 1-3/8 in. (35 mm)                                                                |
| Valve Action: .....                                | Stem down to close                                                               |
| ANSI/ASME Rating: .....                            | 150                                                                              |
| Actuation: .....                                   | Must be purchased separately                                                     |
| Materials                                          |                                                                                  |
| (Body) .....                                       | Red Brass                                                                        |
| (Stem) .....                                       | Stainless Steel                                                                  |
| (Seat): .....                                      | V5011F: Brass; V5011G: Stainless Steel                                           |
| (Plug/Ball/Disc): .....                            | V5011F: Teflon disc; V5011G: Stainless steel plug with carbon-loaded Teflon disc |
| (Packing): .....                                   | V5011F: Teflon and Nitrile; V5011G: Teflon Cone                                  |

### APPROVALS

|                  |                |
|------------------|----------------|
| CRN Number ..... | 0C0861.9087YTN |
|------------------|----------------|

### DIMENSIONS DIAGRAM



V5011F,G

| BODY STYLE                             | PIPE SIZE (in.) | DIMENSIONS |    |       |    |       |     |
|----------------------------------------|-----------------|------------|----|-------|----|-------|-----|
|                                        |                 | A          |    | B     |    | C     |     |
| V5011F,G<br>THREADED<br>DIRECT<br>BODY | 1/2             | 2          | 51 | 1-3/4 | 45 | 3-3/8 | 86  |
|                                        | 3/4             | 1-3/4      | 45 | 1-3/4 | 45 | 3-3/8 | 86  |
|                                        | 1               | 1-7/8      | 48 | 1-3/4 | 45 | 4-1/4 | 108 |
|                                        | 1-1/4           | 2          | 51 | 1-5/8 | 42 | 4-7/8 | 124 |
|                                        | 1-1/2           | 2-7/8      | 73 | 1-5/8 | 42 | 5-5/8 | 143 |
|                                        | 2               | 3-1/8      | 80 | 2     | 51 | 5-5/8 | 143 |
|                                        | 2-1/2           | 2-3/4      | 70 | 2-3/8 | 61 | 7-1/2 | 191 |
|                                        | 3               | 3-1/8      | 80 | 2-5/8 | 67 | 8-7/8 | 226 |

M2804A

# Submittal Data - Valves

## NPT Globe Valve, V5011N



Used for two-position or modulating control of steam and water and glycol solutions (to 50 percent concentration) in heating or cooling systems.

### FEATURES

- Sizes range from 1/2 to 2 inches.
- Direct and reverse acting
- High pressure steam models with stainless steel trim
- Spring-loaded, self-adjusting packing.
- Stainless steel stem prevents corrosion.
- Valve designs provide equal percentage characteristics of flow for close control of water, and linear characteristic of flow for close control of steam or chilled water.
- Valves utilize direct mounting, electric or pneumatic linear valve actuators; Q5001 linkage with Modutrol Motor; or Q5020/Q5024 linkages with direct coupled rotary actuators to operate the valve.
- Not suitable for combustible gases.

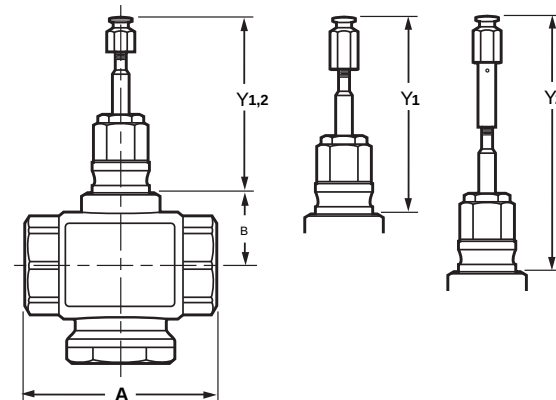
### SPECIFICATIONS

|                                                       |                                             |
|-------------------------------------------------------|---------------------------------------------|
| Valve Type .....                                      | Globe Valve                                 |
| Body Pattern.....                                     | Two-way                                     |
| Connection Type.....                                  | Female NPT                                  |
| Leakage Rating .....                                  | Seat: 0.05% of Cv                           |
| Maximum Differential f<br>or Quiet Water Service..... | 20 psid (138 kPa)                           |
| Maximum Differential Pressure                         |                                             |
| Ratings (Close-off).....                              | 240 psi (1655 kPa)                          |
| Ambient Temperature Range .....                       | 36 F to 248 F water<br>(2 C to 120 C water) |
| Stem Travel .....                                     | 3/4 in. (20 mm)                             |
| Bonnet Size: .....                                    | 1-3/8 in. (35 mm)                           |
| ANSI/ASME Rating: .....                               | 150                                         |
| Actuation: .....                                      | Must be purchased separately                |
| Materials                                             |                                             |
| (Body).....                                           | Red Brass                                   |
| (Stem).....                                           | Stainless Steel                             |
| (Packing).....                                        | Teflon                                      |

### APPROVALS

CRN Number .....0C0861.9087YTN/0C0861.99

### DIMENSIONS DIAGRAM



| VALVE<br>SIZE (IN) | A<br>in. (mm) | B<br>in. (mm) |
|--------------------|---------------|---------------|
| 1/2                | 3-1/4 (83)    | 1-9/16 (40)   |
| 3/4                |               |               |
| 1                  | 4-1/16 (103)  |               |
| 1-1/4              | 4-3/16 (106)  |               |
| 1-1/2              | 4-3/4 (120)   | 1-13/16 (47)  |
| 2                  | 5-1/4 (134)   |               |

| VALVE                          | Y1<br>in. (mm) | Y2 <sup>a</sup><br>in. (mm) |
|--------------------------------|----------------|-----------------------------|
| V5011N1XXX<br>OR<br>V5011N2XXX | 3-1/2 (89)     | 5-1/4 (133)                 |
| V5011N3XXX                     | 4-3/16 (107)   | 5-15/16 (151)               |
|                                | STEM FULLY UP  |                             |

<sup>a</sup>Y2 WITH STEM EXTENSION FOR MP953C,E (8 IN. ONLY)

M17378A

# Submittal Data - Valves

## NPT Globe Valve, V5013N



The V5013N is a three-way threaded globe valve that controls hot water, cold water and glycol solutions (up to 50 percent concentration) in heating or cooling HVAC applications. The valves are used for mixing service to direct flow from one or two inlets to a common outlet in two-position or modulating control systems.

### FEATURES

- Red brass body with NPT-threaded connections.
- Stainless steel stem and brass plug.
- Low seat leakage rating, < 0.05%.
- Spring-loaded, self adjusting packing.
- 50:1 rangeability per VDI/VDE 2173.
- Constant total flow throughout full stem travel.
- Accurate positioning to ensure state-of-the-art temperature control.
- Sizes range from 1/2 inch to 2 inches.
- Valves utilize direct mounting, electric or pneumatic valve actuators; Q5001 linkage with Modutrol Motor; or Q5020/Q5024 linkages with Direct Coupled Actuators to operate the valve.
- Repack and rebuild kits available for field servicing.
- Not suitable for combustible gases.

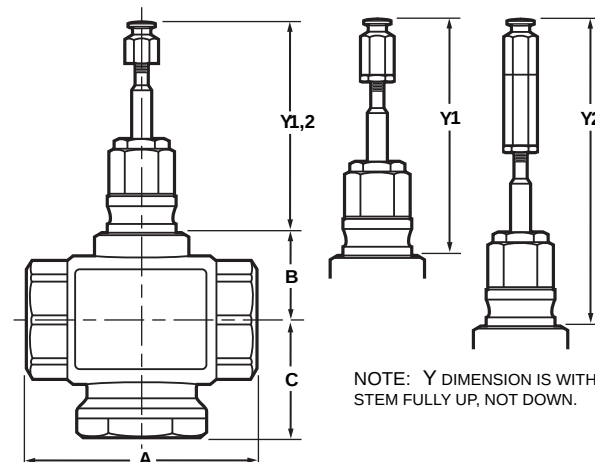
### SPECIFICATIONS

|                                                    |                                                                              |
|----------------------------------------------------|------------------------------------------------------------------------------|
| Valve Type .....                                   | Globe Valve                                                                  |
| Body Pattern .....                                 | Three-way mixing, A-B-AB porting                                             |
| Flow Characteristic:.....                          | Linear (B-AB), Equal Percentage (A-AB)                                       |
| Connection Type .....                              | Female NPT                                                                   |
| Controlled Fluid .....                             | Chilled or hot water with up to 50% Glycol. Not for use with steam or fuels. |
| Leakage Rating .....                               | 0.05% of Cv                                                                  |
| Maximum Safe Operating Pressure .....              | 217 psi at 248 F (1500 kPa at 120 C)                                         |
| Maximum Differential for Quiet Water Service ..... | 20 psid (138 kPa)                                                            |
| Maximum Differential Pressure .....                |                                                                              |
| Ratings (Close-off) .....                          | 240 psi (1655 kPa)                                                           |
| Ambient Temperature Range .....                    | 36 F to 248 F water (2 C to 120 C water)                                     |
| Stem Travel.....                                   | 3/4 in. (20 mm)                                                              |
| Bonnet Size: .....                                 | 1-3/8 in. (35 mm)                                                            |
| Valve Action:.....                                 | Mixing                                                                       |
| ANSI/ASME Rating: .....                            | 150                                                                          |
| Actuation: .....                                   | Must be purchased separately                                                 |
| Materials .....                                    |                                                                              |
| (Body).....                                        | Red Brass                                                                    |
| (Stem).....                                        | Stainless Steel                                                              |
| (Plug/Ball/Disc).....                              | Brass                                                                        |
| (Packing) .....                                    | Teflon/EPDM                                                                  |

### APPROVALS

|                 |                           |
|-----------------|---------------------------|
| CRN Number..... | 0C0861.9087YTN/0C0861.123 |
|-----------------|---------------------------|

### DIMENSIONS DIAGRAM



| VALVE SIZE | A            | B              | C             | STEM UP      |                  |
|------------|--------------|----------------|---------------|--------------|------------------|
|            |              |                |               | Y 1          | Y 2 <sup>a</sup> |
| 1/2 (15)   | 3-1/4 (83)   | 1-9/16 (39.7)  | 2-9/16 (65)   | 4-3/16 (106) | 5-15/16 (151)    |
| 3/4 (20)   | 3-1/4 (83)   | 1-9/16 (39.7)  | 2-9/16 (65)   |              |                  |
| 1 (25)     | 4-1/16 (103) | 1-9/16 (39.7)  | 2-5/8 (66.5)  |              |                  |
| 1-1/4 (32) | 4-3/16 (106) | 1-9/16 (39.7)  | 2-7/8 (72.5)  |              |                  |
| 1-1/2 (40) | 4-3/4 (120)  | 1-13/16 (46.5) | 3 (77)        |              |                  |
| 2 (50)     | 5-1/4 (134)  | 1-13/16 (46.5) | 3-5/16 (83.5) |              |                  |

<sup>a</sup> Y2 WITH STEM EXTENSION FOR MP953C,E (8 IN. ONLY)

M12901A

# Submittal Data - Valves

## Flanged Globe Valve, VGF2



VGF Flanged Globe Valves are used for 2-position or modulating control of steam, hot water or chilled water-glycol solutions up to 50 percent concentration in closed loop heating, ventilation and air conditioning (HVAC) systems. They can be operated by ML6420/6425, ML6421/7421 Electric Linear Actuators, MP953 Pneumatic Actuators, Modutrol™ Motors with Q5001 valve linkage or MN/MS Series

### FEATURES

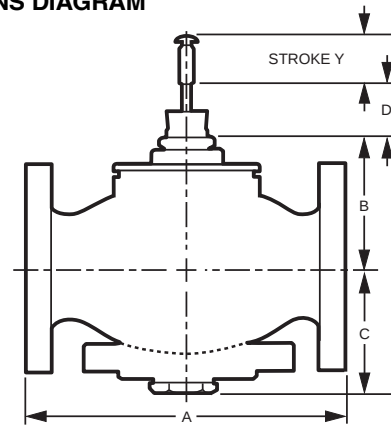
ANSI Class 125 and Class 250 cast iron bodies with flanged end connections

- Equal percentage and linear flow characteristics
- Face-to-face flange dimensions per ANSI/ISA S75.03 standard
- Sizes from 2-1/2 to 6 in.
- Stainless steel trim standard for long life span
- ANSI Class III or IV seat leakage
- Steam inlet pressure up to 100 psig and 337 F maximum temperature
- Self-adjusting packing
- Accurate positioning with equal percentage and linear flow characteristics to ensure precise temperature control
- Universal bonnet for direct-coupled electric and pneumatic actuators for easy mounting, or linkage coupled Modutrol™ Motors and MN/MS Series direct coupled actuators.
- Not suitable for combustible gasses.
- Valves utilize direct mounting valve actuators, Q5020/ Q5024 linkages with Direct Coupled Actuators or Pneumatic Valve Actuators to operate the valve.

### SPECIFICATIONS

|                               |                                                                           |
|-------------------------------|---------------------------------------------------------------------------|
| Valve Type .....              | Globe Valve                                                               |
| Valve Action: .....           | Stem down to close                                                        |
| Body Pattern .....            | Two-way                                                                   |
| Connection Type .....         | Flanged                                                                   |
| Controlled Fluid .....        | Steam; Chilled or hot water with up to 50% Glycol. Not for use with fuels |
| Fluid Temperature Range ..... | 20 F to 250 F, steam 337 F (-7 C to +120 C, steam 180 C)                  |
| Actuation: .....              | Must be purchased separately                                              |
| Stem Travel                   |                                                                           |
| 2-1/2 and 3 inch valves ..... | 3/4 in. (20 mm)                                                           |
| 4 to 6 inch valves: .....     | 1-1/2 in. (39 mm)                                                         |
| Bonnet Size                   |                                                                           |
| 2-1/2 and 3 inch valves ..... | 1-3/8 in. (35 mm)                                                         |
| 4 to 6 inch valves: .....     | 1-7/8 in. (47.6 mm)                                                       |
| Materials                     |                                                                           |
| (Body) .....                  | Cast Iron ASTM A126 Class B                                               |
| (Stem) .....                  | Stainless Steel                                                           |
| (Seat) .....                  | Stainless Steel                                                           |
| (Cartridge) .....             | Stainless Steel                                                           |
| (Plug/Ball/Disc): .....       | Stainless Steel                                                           |
| (Packing) .....               | Spring-loaded PTFE cone rings                                             |

### DIMENSIONS DIAGRAM



① DOTTED LINE REPRESENTS ANSI 125 VALVE BONNET.

| MODEL NUMBER                                                                                                        | DIMENSIONS, IN. (MM) |              |              |             |            |
|---------------------------------------------------------------------------------------------------------------------|----------------------|--------------|--------------|-------------|------------|
|                                                                                                                     | A                    | B            | C            | E           | Y          |
| 2-WAY VALVES, ANSI CLASS 125. STEM DOWN TO CLOSE. EQUAL PERCENTAGE OR LINEAR FLOW CHARACTERISTIC                    |                      |              |              |             |            |
| VGF21_S25                                                                                                           | 10-7/8 (276)         | 4-3/8 (112)  | 7 (178)      | 3-1/2 (89)  | 13/16 (20) |
| VGF21_S30                                                                                                           | 11-3/4 (298)         | 6-3/8 (161)  | 7-1/2 (191)  |             |            |
| VGF21_S40                                                                                                           | 13-7/8 (352)         | 5-7/8 (150)  | 9 (229)      | 5-1/4 (133) | 1-1/2 (38) |
| VGF21_S50                                                                                                           | 15-3/4 (400)         | 6-3/16 (157) | 10 (254)     |             |            |
| VGF21_S60                                                                                                           | 17-3/4 (451)         | 6-3/16 (157) | 11 (279)     |             |            |
| 2-WAY VALVES, ANSI CLASS 250. STEM DOWN TO CLOSE. EQUAL PERCENTAGE FLOW CHARACTERISTIC                              |                      |              |              |             |            |
| VGF22ES25                                                                                                           | 11-1/2 (292)         | 4-3/8 (112)  | 7-1/2 (191)  | 3-1/2 (89)  | 13/16 (20) |
| VGF22ES30                                                                                                           | 12-1/2 (318)         | 6-3/8 (161)  | 8-1/4 (210)  |             |            |
| VGF22ES40                                                                                                           | 14-1/2 (368)         | 5-7/8 (150)  | 10 (254)     | 5-1/4 (133) | 1-1/2 (38) |
| VGF22ES50                                                                                                           | 16-5/8 (422)         | 6-3/16 (157) | 11 (279)     |             |            |
| VGF22ES60                                                                                                           | 18-5/8 (473)         | 6-3/16 (157) | 12-1/2 (318) |             |            |
| 2-WAY VALVES, PRESSURE-BALANCED, ANSI CLASS 125. STEM DOWN TO CLOSE. EQUAL PERCENTAGE OR LINEAR FLOW CHARACTERISTIC |                      |              |              |             |            |
| VGF21_P25                                                                                                           | 10-7/8 (276)         | 4-3/16 (107) | 7 (178)      | 3-1/2 (89)  | 13/16 (20) |
| VGF21_P30                                                                                                           | 11-3/4 (298)         | 5-7/8 (150)  | 7-1/2 (191)  |             |            |
| VGF21_P40                                                                                                           | 13-7/8 (352)         | 5-7/8 (150)  | 9 (229)      | 5-1/4 (133) | 1-1/2 (38) |
| VGF21_P50                                                                                                           | 15-3/4 (400)         | 6-1/8 (156)  | 10 (254)     |             |            |
| VGF21_P60                                                                                                           | 17-3/4 (451)         | 6-1/8 (156)  | 11 (279)     |             |            |

M27603

# Submittal Data - Valves

## Flanged Globe Valve, VGF3



VGF Flanged Globe Valves are used for 2-position or modulating control of hot water or chilled water-glycol solutions up to 50% concentration in closed loop heating, ventilation and air conditioning (HVAC) systems. They can be operated by ML6984/7984, ML6420/6425, ML6421/7421 Electric Linear Actuators, MP953 Pneumatic Actuators, Modutrol™ Motors with Q5001 valve linkage or MN/MS Series Direct Coupled Actuators with Q5020 or Q5024 valve linkages. Three-way bodies are available in mixing or diverting style with equal percentage and

linear flow characteristics, respectively. For boiler/chiller bypass applications requiring tight close-off, use VGF31/32LD diverting valves. For outdoor temperature compensation of building supply water or modulating control of heat exchangers, use VGF31/32EM mixing valves.

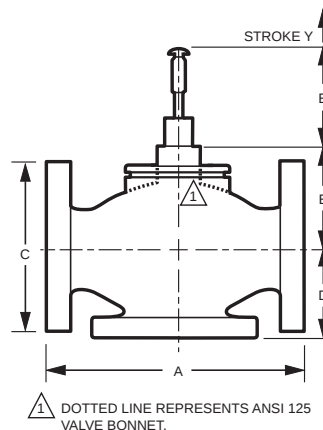
### SPECIFICATIONS

|                                                         |                                                                              |
|---------------------------------------------------------|------------------------------------------------------------------------------|
| Valve Type .....                                        | Globe Valve                                                                  |
| Body Pattern .....                                      | Three-way                                                                    |
| Connection Type .....                                   | Flanged                                                                      |
| Controlled Fluid .....                                  | Chilled or hot water with up to 50% Glycol. Not for use with steam or fuels. |
| Leakage Rating .....                                    | Port A seat leakage: 0.5%; Port B seat leakage 1.0%.                         |
| Maximum Safe Operating Pressure .....                   | 175 psig at 130 F (66 C) (1206 kPa at 66 C (130 F))                          |
| Maximum Differential Pressure Ratings (Close-off) ..... | 87 psi (599 kPa)                                                             |
| Fluid Temperature Range .....                           | 20 F to 250 F (-7 C to +120 C)                                               |
| Actuation: .....                                        | Must be purchased separately                                                 |
| Stem Travel                                             |                                                                              |
| 2-1/2 and 3 inch valves .....                           | 3/4 in. (20 mm)                                                              |
| 4 to 6 inch valves: .....                               | 1-1/2 in. (39 mm)                                                            |
| Bonnet Size                                             |                                                                              |
| 2-1/2 and 3 inch valves .....                           | 1-3/8 in. (35 mm)                                                            |
| 4 to 6 inch valves: .....                               | 1-7/8 in. (47.6 mm)                                                          |
| Materials                                               |                                                                              |
| (Body) .....                                            | Cast Iron ASTM A126 Class B                                                  |
| (Stem) .....                                            | Stainless Steel                                                              |
| (Seat) .....                                            | Stainless Steel                                                              |
| (Cartridge) .....                                       | Stainless Steel                                                              |
| (Plug/Ball/Disc) .....                                  | Stainless Steel                                                              |
| (Packing) .....                                         | Spring-loaded PTFE cone rings                                                |

### FEATURES

- ANSI Class 125 and Class 250 cast iron bodies with flanged end connections.
- Face-to-face flange dimensions per ANSI/ISA S75.03 standard.
- Sizes from 2-1/2 to 6 inches.
- Stainless steel trim standard for long life span.
- Self-adjusting packing.
- Accurate positioning with equal percentage and linear flow characteristics to ensure precise temperature control.
- Universal bonnet for direct-coupled electric and pneumatic actuators for easy mounting, or linkage coupled Modutrol™ Motors and MN/MS Series direct coupled actuators.
- Constant total flow throughout full plug travel (3-way diverting models).
- Not suitable for combustible gasses.
- Valves utilize direct mounting valve actuators, Q5020/ Q5024 linkages with Direct Coupled Actuators or Pneumatic Valve Actuators.

### DIMENSIONS DIAGRAM



▲ DOTTED LINE REPRESENTS ANSI 125 VALVE BONNET.

| MODEL NUMBER                                                    | DIMENSIONS, IN. (MM) |               |              |             |               |            |
|-----------------------------------------------------------------|----------------------|---------------|--------------|-------------|---------------|------------|
|                                                                 | A                    | B             | C            | D           | E             | Y          |
| 3-WAY MIXING VALVES, ANSI CLASS 125. STEM UP TO CLOSE A-AB      |                      |               |              |             |               |            |
| VGF31EM25                                                       | 10-7/8 (276)         | 3 (76)        | 7 (178)      | 3-3/4 (95)  | 4-3/16 (107)  | 13/16 (20) |
| VGF31EM30                                                       | 11-3/4 (298)         | 4-3/16 (107)  | 7-1/2 (191)  | 4-3/8 (111) |               |            |
| VGF31EM40                                                       | 13-7/8 (352)         | 5-8/16 (140)  | 9 (229)      | 5-1/8 (130) | 6-11/16 (170) | 1-1/2 (38) |
| VGF31EM50                                                       | 15-3/4 (400)         | 5-3/8 (137)   | 10 (254)     | 5-3/4 (146) |               |            |
| VGF31EM60                                                       | 17-3/4 (451)         | 5-11/16 (145) | 11 (279)     | 6-5/8 (168) |               |            |
| 3-WAY MIXING VALVES, ANSI CLASS 250. STEM UP TO CLOSE A-AB      |                      |               |              |             |               |            |
| VGF32EM25                                                       | 11-1/2 (292)         | 4-3/8 (112)   | 7-1/2 (191)  | 3-3/4 (95)  | 4-3/16 (107)  | 13/16 (20) |
| VGF32EM30                                                       | 12-1/2 (318)         | 6-3/8 (161)   | 8-1/4 (210)  | 4-3/8 (111) |               |            |
| VGF32EM40                                                       | 14-1/2 (368)         | 5-7/8 (150)   | 10 (254)     | 5-1/8 (130) | 6-11/16 (170) | 1-1/2 (38) |
| VGF32EM50                                                       | 16-5/8 (422)         | 6-3/16 (157)  | 11 (279)     | 5-3/4 (146) |               |            |
| VGF32EM60                                                       | 18-5/8 (473)         | 6-3/16 (157)  | 12-1/2 (318) | 6-5/8 (168) |               |            |
| 3-WAY DIVERTING VALVES, ANSI CLASS 125. STEM DOWN TO CLOSE AB-A |                      |               |              |             |               |            |
| VGF31LD25                                                       | 10-7/8 (276)         | 3 (76)        | 7 (178)      | 3-3/4 (95)  | 4-3/16 (107)  | 13/16 (20) |
| VGF31LD30                                                       | 11-3/4 (298)         | 4-3/16 (107)  | 7-1/2 (191)  | 4-3/8 (111) |               |            |
| VGF31LD40                                                       | 13-7/8 (352)         | 5-8/16 (140)  | 9 (229)      | 5-1/8 (130) | 6-11/16 (170) | 1-1/2 (38) |
| VGF31LD50                                                       | 15-3/4 (400)         | 5-3/8 (137)   | 10 (254)     | 5-3/4 (146) |               |            |
| VGF31LD60                                                       | 17-3/4 (451)         | 5-11/16 (145) | 11 (279)     | 6-5/8 (168) |               |            |
| 3-WAY DIVERTING VALVES, ANSI CLASS 250. STEM DOWN TO CLOSE AB-A |                      |               |              |             |               |            |
| VGF32LD25                                                       | 11-1/2 (292)         | 4-3/8 (112)   | 7-1/2 (191)  | 3-3/4 (95)  | 4-3/16 (107)  | 13/16 (20) |
| VGF32LD30                                                       | 12-1/2 (318)         | 6-3/8 (161)   | 8-1/4 (210)  | 4-3/8 (111) |               |            |
| VGF32LD40                                                       | 14-1/2 (368)         | 5-7/8 (150)   | 10 (254)     | 5-1/8 (130) | 6-11/16 (170) | 1-1/2 (38) |
| VGF32LD50                                                       | 16-5/8 (422)         | 6-3/16 (157)  | 11 (279)     | 5-3/4 (146) |               |            |
| VGF32LD60                                                       | 18-5/8 (473)         | 6-3/16 (157)  | 12-1/2 (318) | 6-5/8 (168) |               |            |

M27604

# Submittal Data - Valves

## Pressure Independent Control Valves, VRN



The VRN2 two-way pressure independent control ball valves maintain constant flow of hot or chilled water in closed loop heating, ventilating and air conditioning (HVAC) systems regardless of head pressure fluctuations above the minimum specified pressure drop. These valve assemblies can be used with Honeywell non-spring return or spring return direct coupled actuators (DCA) with minimum torque of 35 lb-in (4 Nm) on valve sizes up to 3 inches (DN80). The built-in differential pressure regulator makes fluid flow through the valve independent of changes in supply pressure, eliminating "hunting" by the control system, even at low coil flow. The pressure regulator virtually eliminates cavitation in the valve, and decouples the control valve from the effects of piping components such as reducers and elbows.

Pressure independent control valves are sized to match design coil flow regardless of coil size. VRN2 valves eliminate the need to balance the system for proper flow, and allow chillers to be operated at design temperature differential for maximum efficiency at every load condition. When used in a system with variable speed pump drives, 3-way valves and coil bypass lines are not required. In new construction, VRN2 valves perform better than reverse return piping designs without the extra materials these systems need.

Systems that utilize the capabilities of properly installed and monitored pressure independent control valves may qualify for LEED points. Pressure independent control requires less flow, enabling use of smaller piping, pumps and chillers.

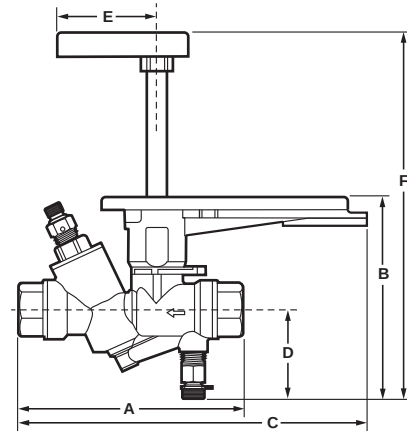
### SPECIFICATIONS

|                                         |                                                                              |
|-----------------------------------------|------------------------------------------------------------------------------|
| Valve Type .....                        | Dynamic pressure independent control valve                                   |
| Body Pattern .....                      | 2-way, straight-through                                                      |
| Pipe Connection Type .....              | Female-NPT                                                                   |
| Controlled Fluid .....                  | Chilled or hot water with up to 50% Glycol. Not for use with steam or fuels. |
| Valve Action.....                       | Quarter-turn rotary                                                          |
| Maximum Safe Operating Pressure .....   | 360 psi (2500 kPa)                                                           |
| Maximum Safe Operating Temperature..... | 248 F (120 C)                                                                |
| Maximum Close-off Pressure .....        | 100 psid (690 kPa)                                                           |
| Fluid Temperature Range .....           | -22 F to 250 F (-30 C to 121 C)                                              |
| Ambient Temperature Range .....         | 14 F to 131 F (-10 C to 55 C)                                                |
| Accuracy .....                          | ±5% over specified pressure range                                            |
| Stem Travel.....                        | 90 deg. rotation                                                             |
| Materials                               |                                                                              |
| (Body).....                             | Forged Brass ASTM B584                                                       |
| (Seat).....                             | Teflon seals/EPDM O-rings                                                    |
| (Regulator) .....                       | Stainless Steel                                                              |
| (Packing) .....                         | Teflon seals/EPDM O-rings                                                    |
| (Diaphragm).....                        | Hydrogenated Acrylonitrile Butadiene Rubber                                  |
| Comments .....                          | No feedback signal<br>Full port ball; No feedback                            |

### FEATURES

- Sizes from 1/2 to 3 in. with internal (female) NPT connections.
- Controls hot or chilled water with up to 50% glycol.
- Regulated flow rates available from 1 to 95 gpm.
- Differential pressure regulator for constant pressure drop across valve seat.
- Positive pressure, rolling diaphragm regulator design for long service life for flow control accuracy of ±5% over specified control range.
- Equal percentage flow characteristic using patented flow control ball insert.
- Multiple regulated flow rates available per valve size.
- Patented ball seals require low operating torque.
- Nickel-chrome plated brass or stainless steel trim.
- Choice of factory-installed actuation using Honeywell N05/S05-series direct-coupled actuators: Floating, Modulating (2-10 V), Spring Return Modulating/Floating.
- Spring return actuators field-configurable for normally open or normally closed fail safe position.
- Actuators available with optional auxiliary switches.
- Removable, manual operating handle to control valve during installation or in an event of power failure.
- Upstream Test Port for venting or pressure gauge attachment.
- Three actuator orientations on the valve for cramped spaces.

### DIMENSIONS DIAGRAM



| VALVE SIZE (IN.) | DIMENSIONS IN INCHES (MM) |               |                |             |            |                             |                             |
|------------------|---------------------------|---------------|----------------|-------------|------------|-----------------------------|-----------------------------|
|                  | A                         | B             | C              | D           | E          | F <sub>z</sub> <sup>a</sup> | F <sub>s</sub> <sup>a</sup> |
| 1/2              | 5-11/16 (145)             | 4-5/16 (109)  | 8-19/32 (218)  | 1 (26)      | 2-1/2 (64) | 8-13/32 (213)               | 7-3/16 (182)                |
| 3/4              | 5-29/32 (150)             |               | 8-45/64 (221)  |             |            |                             |                             |
| 1                | 9 (229)                   | 4-19/32 (117) | 10-57/64 (277) | 1-5/8 (41)  |            | 9-13/32 (239)               | 8-3/16 (207)                |
| 1-1/4            | 8-3/32 (213)              |               | 10-19/32 (269) |             |            |                             |                             |
| 1-1/2            | 8-3/16 (208)              |               | 10-1/2 (267)   |             |            |                             |                             |
|                  | 10 (254)                  | 5-3/16 (132)  | 12-3/32 (307)  | 2-3/32 (53) |            | 10-13/32 (264)              | 9-3/16 (232)                |
| 2                | 9-29/32 (251)             |               | 12 (305)       |             |            |                             |                             |
| 2-1/2            | 10-9/32 (263)             |               | 12-3/16 (310)  |             |            |                             |                             |
| 3                | 10-13/16 (274)            |               | 12-13/32 (314) |             |            |                             |                             |

<sup>a</sup> LONG SHAFT SUPPLIED WITH "ZELIX" (Z) DIRECT COUPLED ACTUATORS;  
SHORT SHAFT SUPPLIED WITH "SALT" (S) NON-SPRING RETURN DCAS.

M31310A

# Submittal Data - Valves

## Pressure Independent Control Valves, VRW



The VRW2 two-way pressure independent control valves maintain constant flow of hot and chilled water in closed-loop heating, ventilating and air conditioning (HVAC) systems regardless of head pressure fluctuations above minimum specified pressure drop. These valves come complete with proportional, stay-in-place or electronic fail safe actuators.

The built-in differential pressure regulator makes fluid flow through the valve independent of changes

in supply pressure, eliminating "hunting" by the control system, even at low coil flow. The pressure regulator virtually eliminates cavitation in the valve, and decouples the control valve from the effects of piping components such as reducers and elbows.

Pressure independent control valves are sized to match design coil flow regardless of coil size. VRW2 valves eliminate the need to balance the system for proper flow, and allow chillers to be operated at design temperature differential for maximum efficiency at every load condition. When used in a system with variable speed pump drives, 3-way valves and coil bypass lines are not required.

Systems that utilize the capabilities of properly installed, adjusted, and monitored pressure independent control valves may qualify for LEED points.

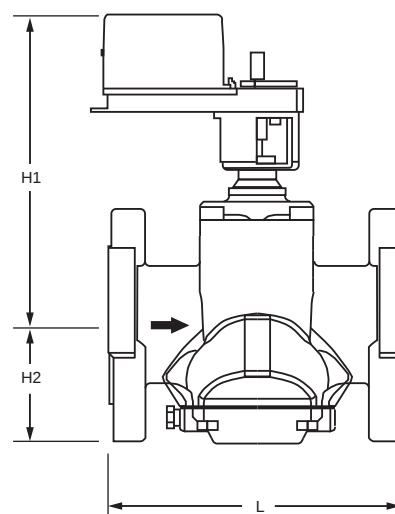
### FEATURES

- Multi-sized bodies from 2-1/2 to 6 inch pipes with wafer flanged connections.
- Combination ANSI/ASME Class 150/300 flange connections.
- Controls hot or chilled water with up to 50% glycol.
- Regulated flow rates available from 40.7 to 468 gpm.
- Stainless steel pressure regulator maintains constant pressure drop across valve seat.
- Positive pressure, rolling diaphragm regulator design provides flow control accuracy of  $\pm 5\%$  over specified pressure range.
- Equal percentage flow characteristic using multi turn, non-rising, characterized plug.
- High close-off rating.
- 50 discrete, selectable flow rates available per valve size.
- Stainless steel trim.
- Six-turn actuator with floating or modulating inputs available with stay-in-place or electronic fail safe action.
- Fail safe actuators field-configurable for normally open or normally closed power failure return position.
- Two Test Ports for venting or pressure gauge attachment.

### SPECIFICATIONS

|                                          |                                                                              |
|------------------------------------------|------------------------------------------------------------------------------|
| Valve Type .....                         | Wafer flanged dynamic pressure independent control valve                     |
| Body Pattern .....                       | 2-way, straight-through                                                      |
| Flow Characteristic .....                | Equal Percentage                                                             |
| Pipe Connection Type .....               | Wafer flange                                                                 |
| Controlled Fluid .....                   | Chilled or hot water with up to 50% Glycol. Not for use with steam or fuels. |
| Valve Action .....                       | Multi-turn linear                                                            |
| Leakage Rating .....                     | 0.2% max.                                                                    |
| Maximum Safe Operating Pressure .....    | 580 psig (4000 kPa)                                                          |
| Maximum Safe Operating Temperature ..... | 248 F (120 C)                                                                |
| Maximum Close-off Pressure .....         | 100 psid (700 kPa)                                                           |
| Fluid Temperature Range .....            | -4 F to 248 F (-20 C to 120 C)                                               |
| Ambient Temperature Range .....          | 14 F to 131 F (-10 C to 55 C)                                                |
| Accuracy .....                           | $\pm 5\%$ over specified pressure range                                      |
| Stem Travel .....                        | 1 to 6 Rotations in 51 equal, field-selectable increments                    |
| ANSI/ ASME Class .....                   | 150/300                                                                      |
| Comments .....                           | 2 - 10V position feedback signal                                             |
| Materials                                |                                                                              |
| (Body) .....                             | Ductile Iron, ASTM A536-65T, Class 60-45-18                                  |
| (Stem) .....                             | Stainless Steel                                                              |
| (Seat) .....                             | 316 Stainless steel                                                          |
| (Regulator) .....                        | 316 Stainless steel                                                          |
| (Plug/Ball/Disc) .....                   | 316 stainless steel                                                          |
| (Packing) .....                          | EPDM and Nitrile O-rings                                                     |
| (Diaphragm) .....                        | EPDM                                                                         |

### DIMENSIONS DIAGRAM



| L      |     | H <sub>1</sub> |     | H <sub>2</sub> |     |
|--------|-----|----------------|-----|----------------|-----|
| in.    | mm  | in.            | mm  | in.            | mm  |
| 8 3/4  | 224 | 9 3/4          | 246 | 3 3/4          | 95  |
| 12 5/8 | 320 | 11 3/8         | 290 | 5 1/4          | 135 |
| 16 5/8 | 422 | 13 1/4         | 338 | 7 1/8          | 180 |

M31311

# Submittal Data - Valves

## Resilient Seat Butterfly Valves, VR2



Resilient seat two-way valves provide control for HVAC applications including chilled water, hot water, cooling tower water and thermal storage systems. Valves are available in 2 in. to 24 in. assemblies with electric actuators. Spring return fail-safe actuators available on 2 in. and 2.5 in. assemblies, electronic fail-safe actuators available on 3 in. to 12 in. assemblies. NEMA 2 and NEMA 4X enclosures available on 5 in. and smaller assemblies, NEMA 4X standard on 6 in. and larger assemblies.

### SPECIFICATIONS

|                                              |                                                                                                                                                     |
|----------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| Body Pattern .....                           | 2 way                                                                                                                                               |
| Valve Action.....                            | Quarter-turn rotary                                                                                                                                 |
| Connection Type .....                        | Lugged                                                                                                                                              |
| Controlled Fluid .....                       | Chilled or hot water with up to 60% Glycol. Not for use with steam or fuels.                                                                        |
| Flow Characteristic.....                     | Modified Equal Percentage                                                                                                                           |
| Mounting .....                               | ANSI 125/150 Flanges                                                                                                                                |
| Cold Working Pressure.....                   | 232 psi (1600 kPa)                                                                                                                                  |
| Fluid Temperature Range.....                 | -22 F to 250 F (-30 C to 121 C)                                                                                                                     |
| Number of Flange Bolts                       |                                                                                                                                                     |
| For 2 in., 2-1/2 in., 3 in. valves: .....    | 4                                                                                                                                                   |
| For 4 in., 5 in., 6 in., 8 in., valves:..... | 8                                                                                                                                                   |
| For 10 in., 12 in., 14 in. valves:.....      | 12                                                                                                                                                  |
| For 16 in., 18 in. valves: .....             | 16                                                                                                                                                  |
| For 20 in., 24 in. valves: .....             | 20                                                                                                                                                  |
| Flange Bolt Thread                           |                                                                                                                                                     |
| For 2 in., 2-1/2 in., 3 in. valves: .....    | 5/8 in.-11 pitch                                                                                                                                    |
| For 4 in., 5 in., 6 in., 8 in., valves:..... | 3/4 in.-10 pitch                                                                                                                                    |
| For 10 in., 12 in., 14 in. valves:.....      | 7/8 in.-9 pitch                                                                                                                                     |
| For 16 in., 18 in., 20 in., 24 in. valves:.. | 1-1/8 in.-7 pitch                                                                                                                                   |
| Materials                                    |                                                                                                                                                     |
| (Body).....                                  | 2 in. to 6 in. and 14 in. to 24 in.: epoxy powder coated ductile iron ASTM A536.<br>8 in. to 12 in.: polyester powder coated ductile iron ASTM A536 |
| (Shaft).....                                 | 2 in. to 6 in. and 14 in. to 24 in.: 416 stainless steel<br>8 in. to 12 in.: 420 stainless steel                                                    |
| (Seat).....                                  | EPDM                                                                                                                                                |
| (Disc).....                                  | 304 stainless steel                                                                                                                                 |

### APPROVALS

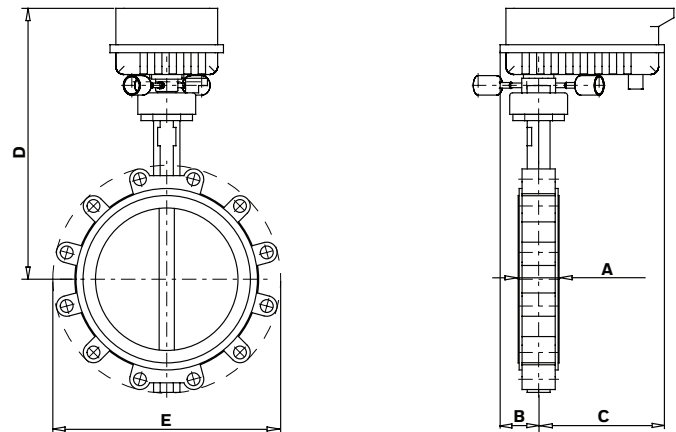
|                                     |                                              |
|-------------------------------------|----------------------------------------------|
| CE.....                             | Compliant                                    |
| Underwriters Laboratories, Inc..... | C/US Listed, up to 12 in. assemblies         |
| Canadian Standards Association..... | C/US Certified, 14 in. and larger assemblies |

### ACCESSORIES

MB-IND-1 Position Indicator Small  
MB-IND-2 Position Indicator Large  
MB-NSR-SWITCH NSR DCA Aux Switch  
MB-NSR-N4HEAT NSR NEMA4 DCA Heater Kit  
(Must be ordered with valve, factory installed)  
MB-SR-N4HEAT SR NEMA4 DCA Heater Kit  
(Must be ordered with valve, factory installed)

### DIMENSIONS DIAGRAM

(see Honeywell publication 31-00190EF for complete set of drawings)



| Size |     | Dimensions, in. (mm) |           |            |             |             |
|------|-----|----------------------|-----------|------------|-------------|-------------|
| in.  | DN  | A                    | B         | C          | D           | E           |
| 6    | 150 | 2.20 (56)            | 2.65 (67) | 9.30 (236) | 16.03 (407) | 10.76 (273) |
| 8    | 200 | 2.36 (60)            | 2.65 (67) | 9.30 (236) | 17.37 (441) | 13.02 (331) |
| 10   | 250 | 2.68 (68)            | 2.65 (67) | 9.30 (236) | 18.63 (473) | 15.68 (398) |
| 12   | 300 | 3.07 (78)            | 2.65 (67) | 9.30 (236) | 20.40 (518) | 18.40 (467) |

# Submittal Data - Valves

## Resilient Seat Butterfly Valves, VR3,4,5



Resilient seat three-way valves provide control for HVAC applications including chilled water, hot water, cooling tower water and thermal storage systems. Valves are available in 2 in. to 18 in. assemblies with electric actuators. Spring return fail-safe actuators available on 2 in. assemblies, electronic fail-safe actuators available on 2.5 in. to 12 in. assemblies. NEMA 2 and NEMA 4X enclosures available on 3 in. and smaller assemblies, NEMA 4X standard on 4 in. and larger assemblies.

### SPECIFICATIONS

|                                             |                                                                                                                                                     |
|---------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| Body Pattern.....                           | 3 way Mixing/Diverting                                                                                                                              |
| Valve Action.....                           | Quarter-turn rotary                                                                                                                                 |
| Connection Type.....                        | Lugged                                                                                                                                              |
| Controlled Fluid .....                      | Chilled or hot water with up to 60% Glycol. Not for use with steam or fuels.                                                                        |
| Flow Characteristic.....                    | Modified Linear                                                                                                                                     |
| Mounting.....                               | ANSI 125/150 Flanges                                                                                                                                |
| Cold Working Pressure.....                  | 232 psi (1600 kPa)                                                                                                                                  |
| Fluid Temperature Range .....               | -22 F to 250 F (-30 C to 121 C)                                                                                                                     |
| Number of Flange Bolts                      |                                                                                                                                                     |
| For 2 in., 2-1/2 in., 3 in. valves:.....    | 4                                                                                                                                                   |
| For 4 in., 5 in., 6 in., 8 in. valves:..... | 8                                                                                                                                                   |
| For 10 in., 12 in., 14 in. valves:.....     | 12                                                                                                                                                  |
| For 16 in., 18 in. valves:.....             | 16                                                                                                                                                  |
| Flange Bolt Thread                          |                                                                                                                                                     |
| For 2 in., 2-1/2 in., 3 in. valves:.....    | 5/8 in.-11 pitch                                                                                                                                    |
| For 4 in., 5 in., 6 in., 8 in. valves:..... | 3/4 in.-10 pitch                                                                                                                                    |
| For 10 in., 12 in., 14 in. valves:.....     | 7/8 in.-9 pitch                                                                                                                                     |
| For 16 in., 18 in. valves:.....             | 1-1/8 in.-7 pitch                                                                                                                                   |
| Materials                                   |                                                                                                                                                     |
| (Body).....                                 | 2 in. to 6 in. and 14 in. to 24 in.: epoxy powder coated ductile iron ASTM A536.<br>8 in. to 12 in.: polyester powder coated ductile iron ASTM A536 |
| (Shaft).....                                | 2 in. to 6 in. and 14 in. to 24 in.: 416 stainless steel<br>8 in. to 12 in.: 420 stainless steel                                                    |
| (Seat).....                                 | EPDM                                                                                                                                                |
| (Disc).....                                 | 304 stainless steel                                                                                                                                 |

### APPROVALS

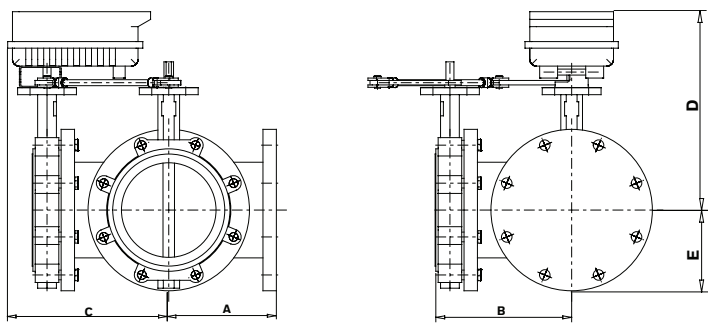
|                                      |                          |
|--------------------------------------|--------------------------|
| CE.....                              | Compliant                |
| Underwriters Laboratories, Inc. .... | C/US UL873, Plenum Rated |

### ACCESSORIES

MB-IND-1 Position Indicator Small  
MB-IND-2 Position Indicator Large  
MB-NSR-SWITCH NSR DCA Aux Switch  
MB-NSR-N4HEAT NSR NEMA4 DCA Heater Kit (Must be ordered with valve, factory installed)  
MB-SR-N4HEAT SR NEMA4 DCA Heater Kit (Must be ordered with valve, factory installed)

### DIMENSIONS DIAGRAM

(see Honeywell publication 31-00190EF for complete set of drawings)

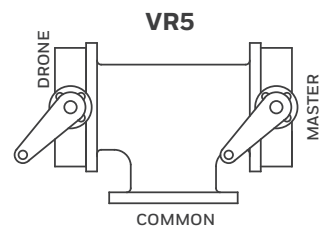
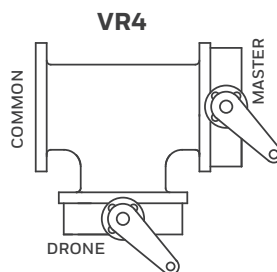
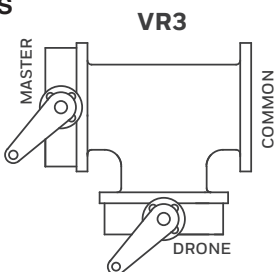


| Size |     | Dimensions, in. (mm) |             |             |             |            |
|------|-----|----------------------|-------------|-------------|-------------|------------|
| in.  | DN  | A                    | B           | C           | D           | E          |
| 3    | 80  | 5.50 (140)           | 7.56 (192)  | 8.89 (226)  | 14.97 (380) | 3.75 (95)  |
| 4    | 100 | 6.50 (165)           | 8.55 (217)  | 11.13 (283) | 14.22 (361) | 4.50 (114) |
| 5    | 125 | 7.50 (191)           | 9.70 (246)  | 12.05 (306) | 14.74 (374) | 5.00 (127) |
| 6    | 150 | 8.00 (203)           | 10.20 (256) | 12.55 (319) | 15.25 (387) | 5.50 (140) |
| 8    | 200 | 9.00 (229)           | 11.36 (289) | 13.47 (342) | 16.59 (421) | 6.75 (172) |
| 10   | 250 | 11.00 (279)          | 13.68 (348) | 15.31 (389) | 17.85 (453) | 8.00 (203) |
| 12   | 300 | 12.00 (305)          | 15.07 (383) | 16.12 (409) | 19.62 (498) | 9.50 (241) |

VALVES

### 3-WAY VALVE CONFIGURATIONS

(VR3, VR4 and VR5 valves are not flow directional. Can be used in both **MIXING** and **DIVERTING** applications.)



# Submittal Data - Valves

## High Performance Butterfly Valves, VH2



High performance two-way valves provide control for HVAC applications including chilled water, hot water, cooling tower water, thermal storage systems and steam up to 50 psi. Valves are available in 2 in. to 24 in. assemblies with electric actuators. Spring return fail-safe actuators available on 2 in. to 4 in. assemblies, electronic fail-safe actuators available on 5 in. and 6 in. assemblies. NEMA 2 and NEMA 4X enclosures available on 4 in. and smaller assemblies, NEMA 4X standard on 5 in. and larger assemblies.

### SPECIFICATIONS

|                                                  |                                                                                         |
|--------------------------------------------------|-----------------------------------------------------------------------------------------|
| Body Pattern .....                               | 2 way                                                                                   |
| Valve Action.....                                | Quarter-turn rotary                                                                     |
| Connection Type .....                            | Lugged                                                                                  |
| Controlled Fluid .....                           | Chilled or hot water with up to 60% Glycol, steam up to 50 psi. Not for use with fuels. |
| Flow Characteristic.....                         | Modified Equal Percent, unidirectional                                                  |
| Mounting .....                                   | ASME/ANSI Class 150                                                                     |
| Static Pressure Rating (max).....                | 285 psi at 100 F (1965 kPa at 38 C)                                                     |
| Fluid Temperature Range.....                     | -22 F to 400 F (-30 C to 204 C)                                                         |
| Number of Flange Bolts                           |                                                                                         |
| For 2 in., 2-1/2 in., 3 in. valves: .....        | 4                                                                                       |
| For 4 in., 5 in., 6 in., 8 in., valves: .....    | 8                                                                                       |
| For 10 in., 12 in., 14 in. valves:.....          | 12                                                                                      |
| For 16 in., 18 in. valves: .....                 | 16                                                                                      |
| For 20 in., 24 in. valves: .....                 | 20                                                                                      |
| Flange Bolt Thread                               |                                                                                         |
| For 2 in., 2-1/2 in., 3 in. valves: .....        | 5/8 in.-11 pitch                                                                        |
| For 4 in., 5 in., 6 in., 8 in., valves:.....     | 3/4 in.-10 pitch                                                                        |
| For 10 in., 12 in., 14 in. valves:.....          | 7/8 in.-9 pitch                                                                         |
| For 16 in., 18 in., 20 in., 24 in. valves: ..... | 1-1/8 in.-7 pitch                                                                       |
| Materials                                        |                                                                                         |
| (Body).....                                      | Carbon steel full lug                                                                   |
| (Shaft).....                                     | 17-4 PH stainless                                                                       |
| (Seat).....                                      | RTFE                                                                                    |
| (Disc).....                                      | 316 stainless steel                                                                     |

### APPROVALS

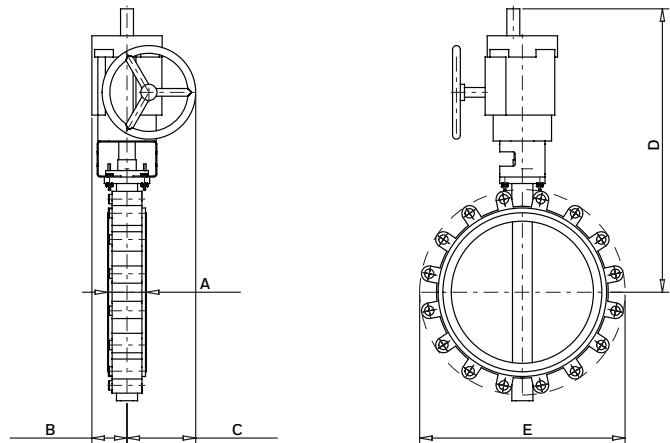
|                                     |                                             |
|-------------------------------------|---------------------------------------------|
| CE.....                             | Compliant                                   |
| Underwriters Laboratories, Inc..... | C/US Listed, up to 6 in. assemblies         |
| Canadian Standards Association..... | C/US Certified, 8 in. and larger assemblies |

### ACCESSORIES

MB-NSR-SWITCH NSR DCA Aux Switch

### DIMENSIONS DIAGRAM

(see Honeywell publication 31-00191EF for complete set of drawings)



| Size |     | Dimensions, in. (mm) |              |              |                |               |
|------|-----|----------------------|--------------|--------------|----------------|---------------|
| in.  | DN  | A                    | B            | C            | D              | E             |
| 8    | 200 | 2.48 (63.0)          | 4.40 (111.8) | 7.13 (181.1) | 23.14 (587.8)  | 13.17 (334.5) |
| 10   | 250 | 2.81 (71.4)          | 4.40 (111.8) | 7.13 (181.1) | 23.89 (606.8)  | 15.89 (403.6) |
| 12   | 300 | 3.22 (81.8)          | 4.40 (111.8) | 7.13 (181.1) | 27.49 (698.2)  | 18.62 (472.9) |
| 14   | 350 | 3.22 (81.8)          | 4.40 (111.8) | 7.13 (181.1) | 28.10 (713.7)  | 20.75 (527.1) |
| 16   | 400 | 4.22 (107.2)         | 4.27 (108.5) | 8.35 (212.1) | 33.13 (841.5)  | 22.89 (581.4) |
| 18   | 450 | 4.71 (119.6)         | 4.27 (108.5) | 8.35 (212.1) | 34.44 (874.8)  | 24.96 (634.0) |
| 20   | 500 | 5.25 (133.4)         | 8.59 (218.2) | 7.20 (182.9) | 41.32 (1049.5) | 26.89 (683.0) |
| 24   | 600 | 6.36 (161.5)         | 8.59 (218.2) | 7.20 (182.9) | 43.44 (1103.4) | 31.28 (794.5) |

# Submittal Data - Valves

## High Performance Butterfly Valves, VH3,4,5 Mixing and VH6,7,8 Diverting



High performance three-way valves provide control for HVAC applications including chilled water, hot water, cooling tower water and thermal storage systems. Valves are available in 2 in. to 16 in. assemblies with electric actuators. Electronic fail-safe actuators available on 2 in. to 3 in. assemblies. NEMA 2 and NEMA 4X enclosures available on 3 in. and smaller assemblies, NEMA 4X standard on 4 in. and larger assemblies.

### SPECIFICATIONS

|                                             |                                                                              |
|---------------------------------------------|------------------------------------------------------------------------------|
| Body Pattern.....                           | 3 way Mixing (VH3,4,5)<br>3 way Diverting (VH6,7,8)                          |
| Valve Action.....                           | Quarter-turn rotary                                                          |
| Connection Type.....                        | Lugged                                                                       |
| Controlled Fluid .....                      | Chilled or hot water with up to 60% Glycol. Not for use with steam or fuels. |
| Flow Characteristic.....                    | Modified linear, unidirectional                                              |
| Mounting.....                               | ASME/ANSI Class 150                                                          |
| Static Pressure Rating (max) .....          | 285 psi at 100 F<br>(1965 kPa at 38 C)                                       |
| Fluid Temperature Range .....               | -22 F to 400 F (-30 C to 204 C)                                              |
| Number of Flange Bolts                      |                                                                              |
| For 2 in., 2-1/2 in., 3 in. valves:.....    | 4                                                                            |
| For 4 in., 5 in., 6 in., 8 in. valves:..... | 8                                                                            |
| For 10 in., 12 in., 14 in. valves:.....     | 12                                                                           |
| For 16 in. valves:.....                     | 16                                                                           |
| Flange Bolt Thread                          |                                                                              |
| For 2 in., 2-1/2 in., 3 in. valves:.....    | 5/8 in.-11 pitch                                                             |
| For 4 in., 5 in., 6 in., 8 in. valves:..... | 3/4 in.-10 pitch                                                             |
| For 10 in., 12 in., 14 in. valves:.....     | 7/8 in.-9 pitch                                                              |
| For 16 in. valves:.....                     | 1-1/8 in.-7 pitch                                                            |
| Materials                                   |                                                                              |
| (Body).....                                 | Carbon steel full lug                                                        |
| (Shaft).....                                | 17-4 PH Stainless steel                                                      |
| (Seat).....                                 | RTFE                                                                         |
| (Disc).....                                 | 316 Stainless steel                                                          |

### APPROVALS

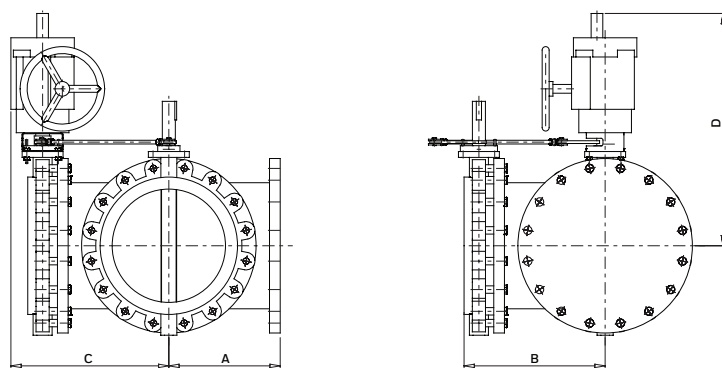
|                                     |                                             |
|-------------------------------------|---------------------------------------------|
| CE.....                             | Compliant                                   |
| Underwriters Laboratories, Inc..... | C/US Listed, up to 4 in. assemblies         |
| Canadian Standards Association..... | C/US Certified, 5 in. and larger assemblies |

### ACCESSORIES

MB-NSR-SWITCH NSR DCA Aux Switch

### DIMENSIONS DIAGRAM

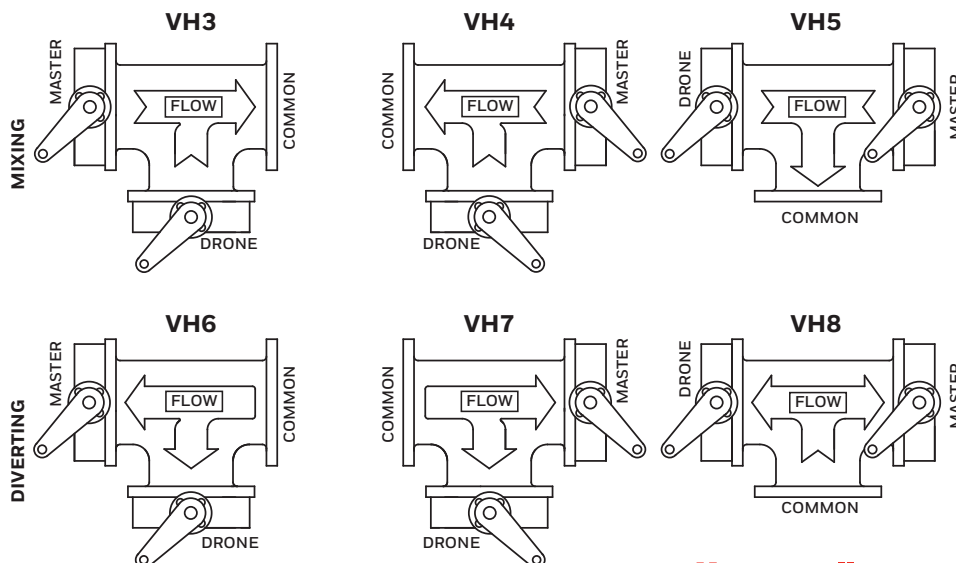
(see Honeywell publication 31-00191EF for complete set of drawings)



| Size |     | Dimensions, in. (mm) |               |               |               |
|------|-----|----------------------|---------------|---------------|---------------|
| in.  | DN  | A                    | B             | C             | D             |
| 6    | 150 | 8.00 (203)           | 18.29 (465)   | 11.25 (286)   | 17.92 (455)   |
| 8    | 200 | 9.00 (228.6)         | 11.50 (292.1) | 14.65 (372.1) | 23.14 (587.8) |
| 10   | 250 | 11.00 (279.4)        | 13.81 (350.8) | 16.80 (426.7) | 23.90 (607.1) |
| 12   | 300 | 12.00 (304.8)        | 15.22 (386.6) | 18.01 (457.5) | 25.65 (651.5) |
| 14   | 350 | 14.00 (355.6)        | 17.62 (447.5) | 20.08 (510.0) | 29.84 (757.9) |
| 16   | 400 | 15.00 (381.0)        | 19.00 (482.6) | 21.27 (540.3) | 31.29 (794.8) |

### 3-WAY VALVE CONFIGURATIONS

(Valves are flow directional. **VH3**, **VH4** and **VH5** valves are for **MIXING** applications only. **VH6**, **VH7** and **VH8** are for **DIVERTING** applications only.)



# Submittal Data - Valves

## Valve Linkage, Q5001



The Q5001 Valve Linkage connects a Modutrol® Motor to a 2- or 3-way valve. It is used primarily on V5011 or V5013 steam and water valves.

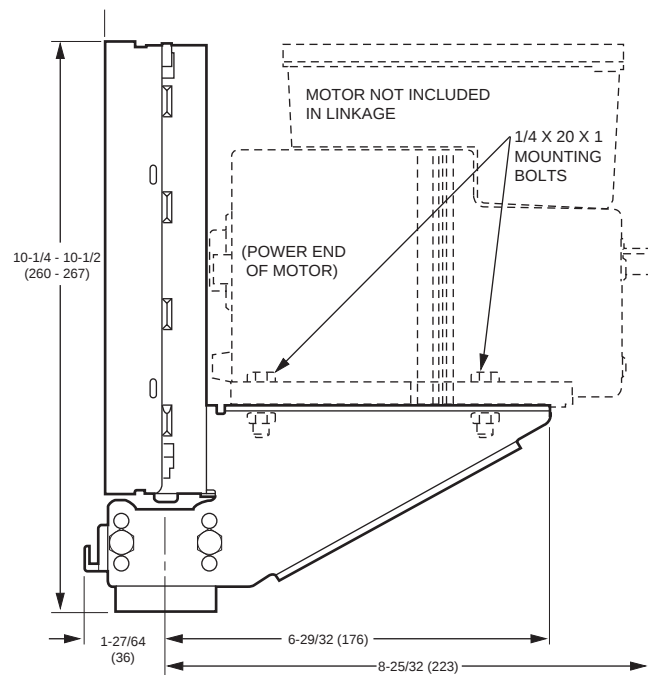
### SPECIFICATIONS

|                                 |                                                                               |
|---------------------------------|-------------------------------------------------------------------------------|
| Linkage Type .....              | Valve                                                                         |
| Mounting .....                  | Linkage mounts directly to the valve bonnet; motor mounts on linkage bracket. |
| Used with Actuator .....        | Modutrol Motor                                                                |
| Stem Force Rating .....         | 80 or 160 lbf (356 N or 712 N)                                                |
| Ambient Temperature Range ..... | -40 F to +150 F (-40 C to +66 C)                                              |

### FEATURES

- Q5001 Valve Linkage is applicable to 2-Way or 3-Way valves in modulating or two-position service.
- Linkage requires no adjustment when used with Honeywell valves and Modutrol IV™ Motors.
- Q5001 Valve Linkage replaces Q601 and Q618 Valve Linkages.
- Linkage mounts directly to the valve bonnet; motor mounts to linkage bracket.
- Easy-to-read position indicator.
- Valve stem lift height cam selectable.
- Overtravel permits tight close-off without excessive motor strain.
- Available brackets make linkages adaptable to many valve bodies.
- Models available with 80 lb, 160 lb, and 320 lb stem force.
- Reversible cams on the Q5001 allow field selection of normally open or normally closed valve operation.
- All models have anti-spin clips.

### DIMENSIONS DIAGRAM



M13993

# Submittal Data - Valves

## Globe Valve Linkage, Q5020



The Q5020 Globe Valve Linkages connect a Honeywell direct coupled actuator (DCA) to a steam or water globe valve. The Q5020 Linkages are compatible with two-way and three-way globe valves up to 3 inch (DN80).

### FEATURES

- Used with two-way and three-way globe valves in modulating or two-position service.
- Used with 25, 50, and 142 lb-in. spring return and 35, 70, 150, and 300 lb-in. non-spring return DCA.
- Quick and simple installation with no disassembly required.
- Heavy-duty steel rack and pinion construction and aluminum die-cast housing.
- Maintenance-free construction.
- Precision roller-bearing rack construction prevents premature valve packing wear and leakage.
- Flexible actuator mounting orientation.
- Adjustable manual override lever and valve position indicator.
- Can be mounted on specific non-Honeywell valves using a 32004629 Bonnet Adapter Kit.

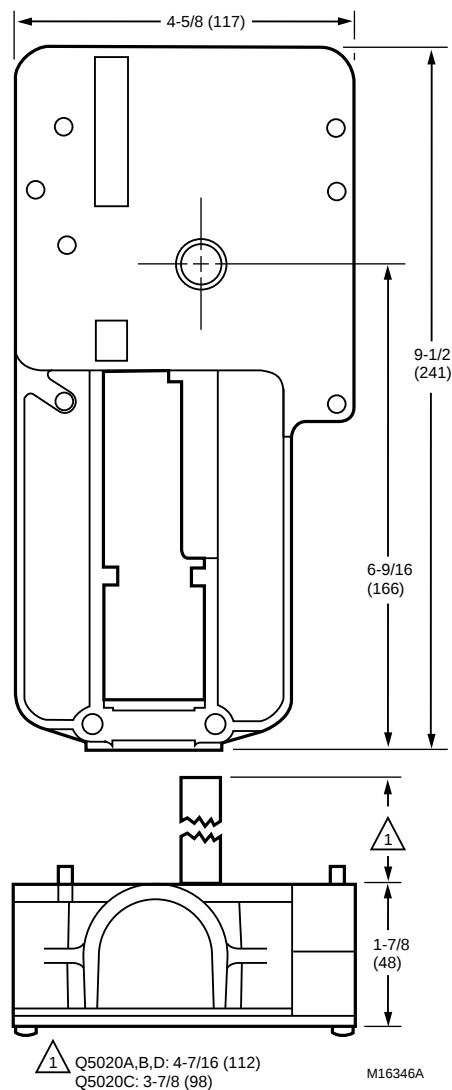
### SPECIFICATIONS

Linkage Type ..... Valve  
 Mounting ..... Linkage mounts directly to the valve bonnet; actuator mounts on linkage  
 Used with Actuator ..... Direct Coupled Actuator

### ACCESSORIES

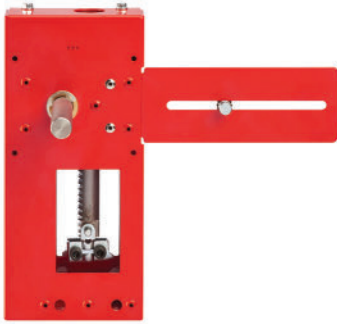
32004629-001—Bonnet adapter kit to adapt Siemens (Landis/Power) Flowrite 599 1/2 inch to 3 inch globe valves with Q5020A or Q5009B  
 32004629-003—Bonnet adapter kit to adapt Johnson VG7000 1 inch to 2 inch globe valves with Q5020A, Q5020B or Q5020D  
 32004629-004—Bonnet adapter kit to adapt Siebe VB7000 1/2 inch to 2 inch globe valves with Q5020D

### DIMENSIONS DIAGRAM



# Submittal Data - Valves

## Globe Valve Linkage, Q5024



These easy to install linkage and bonnet/stem adapter combinations fit easily into most globe valve installations. Save time and money by replacing outdated electrical or pneumatic actuators with Honeywell MS and MN spring and non-spring return DCAs. When an expensive valve changeout isn't necessary, these retrofit linkages are used to modernize existing HVAC installations with high preforming DCAs. This enables integration of these components with a Building Management System.

### FEATURES

- For use with 2-way and 3-way globe valves in modulating or two-position service.
- Models for single or dual actuators for higher close-off pressures.
- Heavy-duty steel rack and pinion construction and aluminum die-cast housing.
- Maintenance-free construction.
- Available for 1/2" through 6" globe valves made by most manufacturers.
- Used with Honeywell MS and MN Spring and Non-Spring Actuators.

### SPECIFICATIONS

Linkage Type ..... Valve  
 Mounting.....Linkage mounts on the valve bonnet; actuator(s) mount on linkage  
 Used with Actuator .....Direct Coupled Actuator  
 Includes.....Anti-rotation pins  
 Comments .....This linkage is not compatible with the 43196000 high temperature kits

### ACCESSORIES

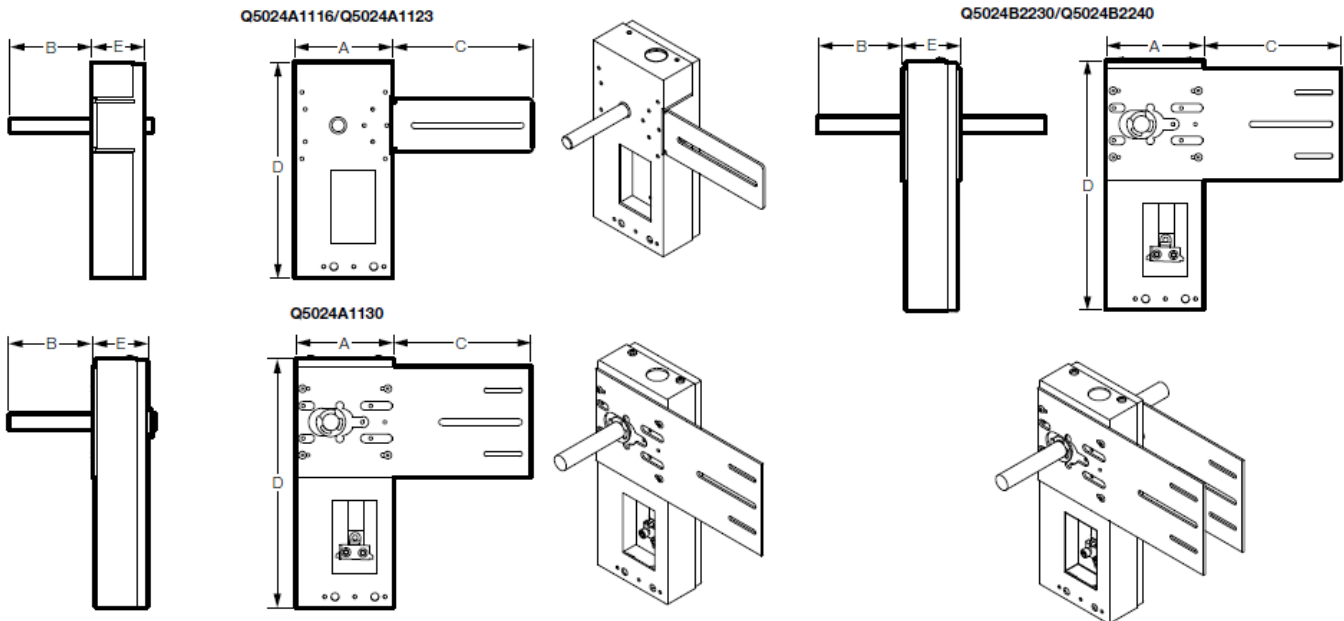
Stem and bonnet adapter needed for most valves, see form 38-00020

### Models

| Linkage    | Actuator Qty | Valve Stroke  |
|------------|--------------|---------------|
| Q5024A1116 | 1            | 0.63" / 16 mm |
| Q5024A1123 | 1            | 0.91" / 23 mm |
| Q5024A1130 | 1            | 1.18" / 30 mm |
| Q5024B2230 | 2            | 1.18" / 30 mm |
| Q5024B2240 | 2            | 1.57" / 40 mm |

Note: If the exact stroke is not available than round up to the next higher stroke.

### DIMENSIONS DIAGRAM



### Dimensions in Inches.

| Linkage                                | A      | B      | C      | D      | D      | Shaft Dia. |
|----------------------------------------|--------|--------|--------|--------|--------|------------|
| Q5024A1116<br>Q5024A1123               | 4-3/8" | 3-1/2" | 6-1/4" | 9-1/2" | 2-1/2" | 16mm       |
| Q5024A1130<br>Q5024B2230<br>Q5024B2240 | 4-3/8" | 4"     | 6"     | 11"    | 2-3/8" | 19mm       |

# Submittal Data - Valves

## Globe Valve Linkage, Q5024

### LINKAGE SELECTION INSTRUCTION

When selecting your linkage look at the table below for the valve model list. Select the correct valve size to see the recommended linkage and bonnet adapter. Choose the correct actuator torque based on necessary close-off pressure. If model you are looking for is not listed fill out the Special Order Form located on page 208.

If you do not have the exact part number or valve size, measure the valve stroke and select the corresponding linkage from the table on the previous page. Next, select the appropriate bonnet adapter kit from the list on page 223. This kit includes variety of bonnet adapters for you to choose from at the job site.

### Linkage and Actuator Selection.

| Manufacturer                 | Valve Model     | Single Actuator Linkage         |                                                                                 |                         |  |
|------------------------------|-----------------|---------------------------------|---------------------------------------------------------------------------------|-------------------------|--|
| Honeywell                    | V5011<br>V5013  | Valve Connection Size (inch)    | Linkage                                                                         |                         |  |
|                              |                 | 0.5                             | Use Q5020A1003 for single actuator applications on Honeywell valves 1/2" to 3". |                         |  |
|                              |                 | 0.75                            |                                                                                 |                         |  |
|                              |                 | 1                               |                                                                                 |                         |  |
|                              |                 | 1.25                            |                                                                                 |                         |  |
|                              |                 | 1.5                             |                                                                                 |                         |  |
|                              |                 | 2                               |                                                                                 |                         |  |
|                              |                 | 2.5                             |                                                                                 |                         |  |
|                              |                 | 3                               |                                                                                 |                         |  |
|                              |                 | Dual Actuator Linkage           |                                                                                 |                         |  |
|                              |                 | Valve Connection Size (inch)    | Linkage and Bonnet Adapter                                                      | Actuator Torque (lb-in) |  |
|                              | 350 (2 x 175)   |                                 |                                                                                 | 600 (2 x 300)           |  |
|                              | Close-Off (psi) |                                 |                                                                                 |                         |  |
|                              | 2               | Q5024B2230<br>and<br>HU5024-001 | 118                                                                             |                         |  |
|                              | 2.5             |                                 | 75                                                                              | 123                     |  |
|                              | 3               |                                 | 50                                                                              | 80                      |  |
|                              | 4               | Q5024B2240<br>and<br>HU5024-002 | 18                                                                              | 38                      |  |
|                              | 5               |                                 | 12                                                                              | 21                      |  |
|                              | 6               |                                 | 10                                                                              | 16                      |  |
|                              |                 |                                 |                                                                                 |                         |  |
|                              | VGF             | Single Actuator Linkage         |                                                                                 |                         |  |
|                              |                 | Valve Connection Size (inch)    | Linkage                                                                         |                         |  |
|                              |                 | 2.5                             | Use Q5020A1003 for single actuator applications on Honeywell valves 1/2" to 3". |                         |  |
| 3                            |                 |                                 |                                                                                 |                         |  |
| Dual Actuator Linkage        |                 |                                 |                                                                                 |                         |  |
| Valve Connection Size (inch) |                 | Linkage and Bonnet Adapter      | Actuator Torque (lb-in)                                                         |                         |  |
|                              |                 |                                 | 350 (2 x 175)                                                                   | 600 (2 x 300)           |  |
| Close-Off (psi)              |                 |                                 |                                                                                 |                         |  |
| 2.5                          |                 | Q5024B2230<br>and<br>HU5024-001 | 61                                                                              | 105                     |  |
| 3                            |                 |                                 | 30                                                                              | 52                      |  |
| 4                            |                 | Q5024B2240<br>and<br>HU5024-002 | 22                                                                              | 39                      |  |
| 5                            |                 |                                 | 9                                                                               | 15                      |  |
| 6                            | 9               |                                 | 15                                                                              |                         |  |

# Submittal Data - Valves

## Globe Valve Linkage, Q5024

### Linkage and Actuator Selection. (Continued)

| Manufacturer             | Valve Model                          | Dual Actuator Linkage              |                                 |                              |     |               |     |  |
|--------------------------|--------------------------------------|------------------------------------|---------------------------------|------------------------------|-----|---------------|-----|--|
| Honeywell<br>(continued) | VGF Pressure Balanced                | Valve<br>Connection<br>Size (inch) | Linkage and<br>Bonnet Adapter   | Actuator Torque (lb-in)      |     |               |     |  |
|                          |                                      |                                    |                                 | 350 (2 x 175)                |     | 600 (2 x 300) |     |  |
|                          |                                      |                                    |                                 | Close-Off (psi)              |     |               |     |  |
|                          |                                      | 2.5                                | Q5024B2230<br>and<br>HU5024-001 | 175                          |     | 175           |     |  |
|                          |                                      | 3                                  |                                 | 175                          |     | 175           |     |  |
|                          |                                      | 4                                  | Q5024B2240<br>and<br>HU5024-002 | 175                          |     | 175           |     |  |
|                          |                                      | 5                                  |                                 | 175                          |     | 175           |     |  |
|                          |                                      | 6                                  |                                 | 175                          |     | 175           |     |  |
| Johnson<br>Control       | V90AD-1C thru 7C<br>V90DD-1C thru 7C | Single Actuator Linkage            |                                 |                              |     |               |     |  |
|                          |                                      | Valve<br>Connection<br>Size (inch) | Linkage and<br>Bonnet Adapter   | Actuator Torque (lb-in)      |     |               |     |  |
|                          |                                      |                                    |                                 | 44                           | 88  | 175           | 300 |  |
|                          |                                      |                                    |                                 | Close-Off (psi)              |     |               |     |  |
|                          |                                      | 0.5                                | Q5024A1116<br>and JU5024-005    | 230                          | 230 |               |     |  |
|                          |                                      | 0.75                               |                                 | 165                          | 230 |               |     |  |
|                          |                                      | 1                                  | Q5024A1123<br>and JU5024-005    | 80                           | 140 |               |     |  |
|                          |                                      | 1.5                                |                                 |                              | 65  | 140           |     |  |
|                          |                                      | V90CA-1 thru 8                     | 0.5                             | Q5024A1123<br>and JU5024-005 | 230 | 230           |     |  |
|                          |                                      |                                    | 0.75                            |                              | 130 | 230           |     |  |
|                          | 1                                    |                                    | 80                              |                              | 140 | 230           |     |  |
|                          | 1.25                                 |                                    | 50                              |                              | 90  | 200           |     |  |
|                          | 1.5                                  |                                    |                                 |                              | 65  | 140           |     |  |
|                          | 2                                    |                                    |                                 |                              | 35  | 80            | 140 |  |
|                          | 2.5                                  |                                    | Q5024A1123<br>and JU5024-002    |                              |     | 55            | 90  |  |
|                          | Dual Actuator Linkage                |                                    |                                 |                              |     |               |     |  |
|                          | Valve<br>Connection<br>Size (inch)   |                                    | Linkage and<br>Bonnet Adapter   | Actuator Torque (lb-in)      |     |               |     |  |
|                          |                                      |                                    |                                 | 350 (2 x 175)                |     | 600 (2 x 300) |     |  |
|                          |                                      | Close-Off (psi)                    |                                 |                              |     |               |     |  |
|                          | 3                                    | Q5024B2230<br>and JU5024-002       | 50                              |                              | 80  |               |     |  |

# Submittal Data - Valves

## Globe Valve Linkage, Q5024

Linkage and Actuator Selection. (Continued)

| Manufacturer                       | Valve Model           | Single Actuator Linkage            |                               |                         |               |               |     |
|------------------------------------|-----------------------|------------------------------------|-------------------------------|-------------------------|---------------|---------------|-----|
| Johnson<br>Control<br>(continued)  | VG7000/2000 Series    | Valve<br>Connection<br>Size (inch) | Linkage and<br>Bonnet Adapter | Actuator Torque (lb-in) |               |               |     |
|                                    |                       |                                    |                               | 44                      | 88            | 175           | 300 |
|                                    |                       |                                    |                               | Close-Off (psi)         |               |               |     |
|                                    |                       | 0.5                                | Q5024A1116<br>and JU5024-001  | 230                     | 230           |               |     |
|                                    |                       | 0.75                               |                               | 165                     | 230           |               |     |
|                                    |                       | 1                                  | Q5024A1116<br>and JU5024-003  | 100                     | 190           |               |     |
|                                    |                       | 1.25                               |                               | 65                      | 120           |               |     |
|                                    |                       | 1.5                                | Q5024A1123<br>and JU5024-003  |                         | 65            | 140           |     |
|                                    |                       | 2                                  |                               |                         | 35            | 80            | 140 |
|                                    |                       | 2.5                                | Q5024A1123<br>and JU5024-004  |                         |               | 55            | 90  |
|                                    |                       | Dual Actuator Linkage              |                               |                         |               |               |     |
|                                    |                       | Valve<br>Connection<br>Size (inch) | Linkage and<br>Bonnet Adapter | Actuator Torque (lb-in) |               |               |     |
|                                    |                       |                                    |                               | 350 (2 x 175)           |               | 600 (2 x 300) |     |
|                                    |                       |                                    |                               | Close-Off (psi)         |               |               |     |
|                                    |                       | 3                                  | Q5024B2230<br>and JU5024-004  | 50                      |               | 80            |     |
|                                    |                       | 4                                  |                               | 18                      |               | 48            |     |
|                                    |                       | 5                                  | Q5024B2240and<br>JU5024-004   | 12                      |               | 21            |     |
|                                    |                       | 6                                  |                               | 10                      |               | 16            |     |
|                                    | VTM Series<br>VB-3752 | Single Actuator Linkage            |                               |                         |               |               |     |
|                                    |                       | Valve<br>Connection<br>Size (inch) | Linkage and<br>Bonnet Adapter | Actuator Torque (lb-in) |               |               |     |
|                                    |                       |                                    |                               | 44                      | 88            | 175           | 300 |
|                                    |                       |                                    |                               | Close-Off (psi)         |               |               |     |
|                                    |                       | 0.5                                | Q5024A1116<br>and JU5024-005  | 230                     | 230           |               |     |
| 0.75                               |                       | 165                                |                               | 230                     |               |               |     |
| 1                                  |                       | Q5024A1123<br>and JU5024-005       | 100                           | 190                     |               |               |     |
| 1.25                               |                       |                                    | 50                            | 90                      |               |               |     |
| 1.5                                |                       | Q5024A1123<br>and JU5024-005       |                               | 65                      | 140           |               |     |
| 2                                  |                       |                                    |                               | 35                      | 80            | 140           |     |
| 2.5                                |                       | Q5024A1123<br>and JU5024-002       |                               |                         | 55            | 90            |     |
| Dual Actuator Linkage              |                       |                                    |                               |                         |               |               |     |
| Valve<br>Connection<br>Size (inch) |                       | Linkage and<br>Bonnet Adapter      | Actuator Torque (lb-in)       |                         |               |               |     |
|                                    |                       |                                    | 350 (2 x 175)                 |                         | 600 (2 x 300) |               |     |
|                                    |                       |                                    | Close-Off (psi)               |                         |               |               |     |
| 3                                  |                       | Q5024B2230<br>and JU5024-002       | 50                            |                         | 80            |               |     |
| 4                                  |                       |                                    | 18                            |                         | 48            |               |     |
| 5                                  |                       | Q5024B2240<br>and JU5024-006       | 12                            |                         | 21            |               |     |
| 6                                  |                       | Q5024B2240<br>and JU5024-004       | 10                            |                         | 16            |               |     |

# Submittal Data - Valves

## Globe Valve Linkage, Q5024

### Linkage and Actuator Selection. (Continued)

| Manufacturer                       | Valve Model                                     | Single Actuator Linkage            |                                    |                               |                         |               |     |     |
|------------------------------------|-------------------------------------------------|------------------------------------|------------------------------------|-------------------------------|-------------------------|---------------|-----|-----|
| Johnson<br>Control<br>(continued)  | VB-3754-1 thru 8<br>VB-3970                     | Valve<br>Connection<br>Size (inch) | Linkage and<br>Bonnet Adapter      | Actuator Torque (lb-in)       |                         |               |     |     |
|                                    |                                                 |                                    |                                    | 44                            | 88                      | 175           | 300 |     |
|                                    |                                                 |                                    |                                    | Close-Off (psi)               |                         |               |     |     |
|                                    |                                                 | 0.5                                | Q5024A1116<br>and JU5024-005       | 230                           | 230                     |               |     |     |
|                                    |                                                 | 0.75                               |                                    | 165                           | 230                     |               |     |     |
|                                    |                                                 | 1                                  | Q5024A1123<br>and JU5024-005       | 80                            | 140                     |               |     |     |
|                                    |                                                 | 1.25                               |                                    | 50                            | 90                      | 200           |     |     |
|                                    |                                                 | 1.5                                |                                    |                               | 65                      | 140           |     |     |
|                                    |                                                 | 2                                  |                                    |                               | 35                      | 80            | 140 |     |
|                                    |                                                 | 2.5                                | Q5024A1123<br>and JU5024-002       |                               |                         | 55            | 90  |     |
|                                    |                                                 | Dual Actuator Linkage              |                                    |                               |                         |               |     |     |
|                                    |                                                 | Valve<br>Connection<br>Size (inch) | Linkage and<br>Bonnet Adapter      | Actuator Torque (lb-in)       |                         |               |     |     |
|                                    |                                                 |                                    |                                    | 350 (2 x 175)                 |                         | 600 (2 x 300) |     |     |
|                                    |                                                 |                                    |                                    | Close-Off (psi)               |                         |               |     |     |
|                                    |                                                 | 3                                  | Q5024B2230<br>and JU5024-002       | 50                            |                         | 80            |     |     |
|                                    |                                                 | 4                                  |                                    | 18                            |                         | 48            |     |     |
|                                    |                                                 | 5                                  | Q5024B2240<br>and JU5024-006       | 12                            |                         | 21            |     |     |
|                                    |                                                 | 6                                  |                                    | 10                            |                         | 16            |     |     |
|                                    | VB-3954-1 thru 7<br>VB-4324-1 thru 7<br>VB-4322 |                                    | Single Actuator Linkage            |                               |                         |               |     |     |
|                                    |                                                 |                                    | Valve<br>Connection<br>Size (inch) | Linkage and<br>Bonnet Adapter | Actuator Torque (lb-in) |               |     |     |
|                                    |                                                 |                                    |                                    |                               | 44                      | 88            | 175 | 300 |
|                                    |                                                 |                                    |                                    |                               | Close-Off (psi)         |               |     |     |
|                                    |                                                 |                                    | 0.5                                | Q5024A1116<br>and JU5024-005  | 230                     | 230           |     |     |
|                                    |                                                 |                                    | 0.75                               |                               | 165                     | 230           |     |     |
|                                    |                                                 |                                    | 1                                  | Q5024A1123<br>and JU5024-005  | 80                      | 140           |     |     |
|                                    |                                                 |                                    | 1.25                               |                               | 50                      | 90            | 200 |     |
|                                    |                                                 |                                    | 1.5                                |                               |                         | 65            | 140 |     |
| 2                                  |                                                 |                                    |                                    |                               | 35                      | 80            | 140 |     |
| 2.5                                |                                                 |                                    | Q5024A1123<br>and JU5024-002       |                               |                         | 55            | 90  |     |
| Dual Actuator Linkage              |                                                 |                                    |                                    |                               |                         |               |     |     |
| Valve<br>Connection<br>Size (inch) |                                                 |                                    | Linkage and<br>Bonnet Adapter      | Actuator Torque (lb-in)       |                         |               |     |     |
|                                    |                                                 |                                    |                                    | 350 (2 x 175)                 |                         | 600 (2 x 300) |     |     |
|                                    |                                                 |                                    |                                    | Close-Off (psi)               |                         |               |     |     |
| 3                                  |                                                 |                                    | Q5024B2230<br>and JU5024-002       | 50                            |                         | 80            |     |     |
| 4                                  |                                                 |                                    |                                    | 18                            |                         | 48            |     |     |
| 5                                  |                                                 |                                    | Q5024B2240<br>and JU5024-006       | 12                            |                         | 21            |     |     |
| 6                                  |                                                 |                                    |                                    | 10                            |                         | 16            |     |     |

# Submittal Data - Valves

## Globe Valve Linkage, Q5024

Linkage and Actuator Selection. (Continued)

| Manufacturer                      | Valve Model | Single Actuator Linkage            |                                 |                         |    |               |     |
|-----------------------------------|-------------|------------------------------------|---------------------------------|-------------------------|----|---------------|-----|
| Johnson<br>Control<br>(continued) | V-5462      | Valve<br>Connection<br>Size (inch) | Linkage and<br>Bonnet Adapter   | Actuator Torque (lb-in) |    |               |     |
|                                   |             |                                    |                                 | 44                      | 88 | 175           | 300 |
|                                   |             |                                    |                                 | Close-Off (psi)         |    |               |     |
|                                   |             | 2.5                                | Q5024A1123<br>and JU5024-006    |                         |    | 55            | 90  |
|                                   |             | Dual Actuator Linkage              |                                 |                         |    |               |     |
|                                   |             | Valve<br>Connection<br>Size (inch) | Linkage and<br>Bonnet Adapter   | Actuator Torque (lb-in) |    |               |     |
|                                   |             |                                    |                                 | 350 (2 x 175)           |    | 600 (2 x 300) |     |
|                                   |             |                                    |                                 | Close-Off (psi)         |    |               |     |
|                                   |             | 3                                  | Q5024B2230<br>and JU5024-006    | 50                      |    | 80            |     |
|                                   |             | 4                                  |                                 | 18                      |    | 48            |     |
|                                   |             | 5                                  | Q5024B2240<br>and JU5024-006    | 12                      |    | 21            |     |
| 6                                 | 10          |                                    |                                 | 16                      |    |               |     |
| Siemens<br>Landis<br>Powers       | 591 (3 way) | Single Actuator Linkage            |                                 |                         |    |               |     |
|                                   |             | Valve<br>Connection<br>Size (inch) | Linkage and<br>Bonnet Adapter   | Actuator Torque (lb-in) |    |               |     |
|                                   |             |                                    |                                 | 44                      | 88 | 175           | 300 |
|                                   |             |                                    |                                 | Close-Off (psi)         |    |               |     |
|                                   |             | 1.5                                | Q5024A1116<br>and<br>GU5024-002 |                         | 85 |               |     |
|                                   |             | 2                                  |                                 |                         | 45 |               |     |
|                                   |             | 2.5                                | Q5024A1123<br>and<br>GU5024-003 |                         |    | 55            | 90  |
|                                   |             | 3                                  |                                 |                         |    | 35            | 65  |
|                                   |             | Dual Actuator Linkage              |                                 |                         |    |               |     |
|                                   |             | Valve<br>Connection<br>Size (inch) | Linkage and<br>Bonnet Adapter   | Actuator Torque (lb-in) |    |               |     |
|                                   |             |                                    |                                 | 350 (2 x 175)           |    | 600 (2 x 300) |     |
|                                   |             |                                    |                                 | Close-Off (psi)         |    |               |     |
|                                   |             | 4                                  | Q5024B2230<br>and<br>GU5024-003 | 18                      |    | 48            |     |
|                                   |             | 5                                  | Q5024B2240<br>and<br>GU5024-003 | 12                      |    | 21            |     |
|                                   |             | 6                                  |                                 | 10                      |    | 16            |     |

# Submittal Data - Valves

## Globe Valve Linkage, Q5024

### Linkage and Actuator Selection. (Continued)

| Manufacturer                               | Valve Model                                    | Single Actuator Linkage            |                                    |                                    |                               |                         |               |     |  |
|--------------------------------------------|------------------------------------------------|------------------------------------|------------------------------------|------------------------------------|-------------------------------|-------------------------|---------------|-----|--|
| Siemens<br>Landis<br>Powers<br>(continued) | 591 (2 way)                                    | Valve<br>Connection<br>Size (inch) | Linkage and<br>Bonnet Adapter      | Actuator Torque (lb-in)            |                               |                         |               |     |  |
|                                            |                                                |                                    |                                    | 44                                 | 88                            | 175                     | 300           |     |  |
|                                            |                                                |                                    |                                    | Close-Off (psi)                    |                               |                         |               |     |  |
|                                            |                                                | 1.5                                | Q5024A1130<br>and<br>GU5024-002    |                                    | 50                            | 105                     |               |     |  |
|                                            |                                                | 2                                  |                                    |                                    | 30                            | 60                      | 105           |     |  |
|                                            |                                                | 2.5                                | Q5024A1123<br>and<br>GU5024-003    |                                    |                               | 55                      | 90            |     |  |
|                                            |                                                | 3                                  |                                    |                                    |                               | 35                      | 65            |     |  |
|                                            |                                                | Dual Actuator Linkage              |                                    |                                    |                               |                         |               |     |  |
|                                            |                                                | Valve<br>Connection<br>Size (inch) | Linkage and<br>Bonnet Adapter      | Actuator Torque (lb-in)            |                               |                         |               |     |  |
|                                            |                                                |                                    |                                    | 350 (2 x 175)                      |                               | 600 (2 x 300)           |               |     |  |
|                                            |                                                |                                    |                                    | Close-Off (psi)                    |                               |                         |               |     |  |
|                                            |                                                | 4                                  | Q5024B2230<br>and<br>GU5024-003    | 18                                 |                               | 48                      |               |     |  |
|                                            |                                                | 5                                  | Q5024B2240<br>and<br>GU5024-003    | 12                                 |                               | 21                      |               |     |  |
|                                            |                                                | 6                                  |                                    | 10                                 |                               | 16                      |               |     |  |
|                                            | (Linkage Only: No Bonnet<br>Adapter Necessary) | 599                                | Single Actuator Linkage            |                                    |                               |                         |               |     |  |
|                                            |                                                |                                    | Valve<br>Connection<br>Size (inch) | Linkage and<br>Bonnet Adapter      | Actuator Torque (lb-in)       |                         |               |     |  |
|                                            |                                                |                                    |                                    |                                    | 44                            | 88                      | 175           | 300 |  |
|                                            |                                                |                                    |                                    |                                    | Close-Off (psi)               |                         |               |     |  |
|                                            |                                                |                                    | 0.5                                | Q5024A1123                         | 230                           | 230                     |               |     |  |
|                                            |                                                |                                    | 0.75                               |                                    | 130                           | 230                     |               |     |  |
|                                            |                                                |                                    | 1                                  |                                    | 80                            | 140                     | 230           |     |  |
|                                            |                                                |                                    | 1.25                               |                                    | 50                            | 90                      | 200           |     |  |
|                                            |                                                |                                    | 1.5                                |                                    |                               | 65                      | 140           |     |  |
|                                            |                                                |                                    | 2                                  |                                    |                               | 35                      | 80            | 140 |  |
|                                            |                                                |                                    | 2.5                                |                                    |                               |                         | 55            | 90  |  |
|                                            |                                                |                                    | 3                                  |                                    |                               |                         | 35            | 65  |  |
|                                            |                                                |                                    | Dual Actuator Linkage              |                                    |                               |                         |               |     |  |
|                                            |                                                |                                    | Valve<br>Connection<br>Size (inch) | Linkage and<br>Bonnet Adapter      | Actuator Torque (lb-in)       |                         |               |     |  |
|                                            |                                                |                                    |                                    |                                    | 350 (2 x 175)                 |                         | 600 (2 x 300) |     |  |
|                                            |                                                |                                    |                                    |                                    | Close-Off (psi)               |                         |               |     |  |
|                                            |                                                |                                    | 4                                  | Q5024B2240                         | 18                            |                         | 38            |     |  |
| 5                                          |                                                |                                    | 12                                 |                                    | 21                            |                         |               |     |  |
| 6                                          |                                                |                                    | 10                                 |                                    | 16                            |                         |               |     |  |
| 658                                        |                                                |                                    |                                    | Single Actuator Linkage            |                               |                         |               |     |  |
|                                            |                                                |                                    |                                    | Valve<br>Connection<br>Size (inch) | Linkage and<br>Bonnet Adapter | Actuator Torque (lb-in) |               |     |  |
|                                            | 44                                             | 88                                 |                                    |                                    |                               | 175                     | 300           |     |  |
|                                            | Close-Off (psi)                                |                                    |                                    |                                    |                               |                         |               |     |  |
|                                            | 0.5                                            | Q5024A1116<br>and<br>GU5024-001    |                                    | 230                                | 230                           |                         |               |     |  |
|                                            | 0.75                                           |                                    |                                    | 165                                | 230                           |                         |               |     |  |
|                                            | 1                                              |                                    |                                    | 100                                | 190                           |                         |               |     |  |
| 1.25                                       | 65                                             |                                    | 120                                |                                    |                               |                         |               |     |  |

# Submittal Data - Valves

## Globe Valve Linkage, Q5024

Linkage and Actuator Selection. (Continued)

| Manufacturer                       | Valve Model                        | Single Actuator Linkage                         |                               |                         |               |               |     |
|------------------------------------|------------------------------------|-------------------------------------------------|-------------------------------|-------------------------|---------------|---------------|-----|
| Siebe<br>Barber Colman<br>Invensys | VB-111 Series                      | Valve<br>Connection<br>Size (inch)              | Linkage and<br>Bonnet Adapter | Actuator Torque (lb-in) |               |               |     |
|                                    |                                    |                                                 |                               | 44                      | 88            | 175           | 300 |
|                                    |                                    |                                                 |                               | Close-Off (psi)         |               |               |     |
|                                    |                                    | 0.5                                             | Q5024A1116<br>and BU5024-001  | 230                     | 230           |               |     |
|                                    |                                    | 0.75                                            |                               | 165                     | 230           |               |     |
|                                    |                                    | 1                                               |                               | 100                     | 190           |               |     |
|                                    |                                    | 1.25                                            |                               | 65                      | 120           |               |     |
|                                    | VB-921 Series                      | Single Actuator Linkage                         |                               |                         |               |               |     |
|                                    |                                    | Valve<br>Connection<br>Size (inch)              | Linkage and<br>Bonnet Adapter | Actuator Torque (lb-in) |               |               |     |
|                                    |                                    |                                                 |                               | 44                      | 88            | 175           | 300 |
|                                    |                                    |                                                 |                               | Close-Off (psi)         |               |               |     |
|                                    |                                    | 0.5                                             | Q5024A1116<br>and BU5024-001  | 230                     | 230           |               |     |
|                                    |                                    | 0.75                                            |                               | 165                     | 230           |               |     |
|                                    |                                    | 1                                               |                               | 100                     | 190           |               |     |
|                                    |                                    | 1.25                                            |                               | 65                      | 120           |               |     |
|                                    |                                    | 1.5                                             | Q5024A1130<br>and BU5024-002  |                         | 50            | 105           |     |
|                                    |                                    | 2                                               |                               |                         | 30            | 60            | 105 |
|                                    |                                    | Dual Actuator Linkage                           |                               |                         |               |               |     |
|                                    |                                    | Valve<br>Connection<br>Size (inch)              | Linkage and<br>Bonnet Adapter | Actuator Torque (lb-in) |               |               |     |
|                                    |                                    |                                                 |                               | 350 (2 x 175)           |               | 600 (2 x 300) |     |
|                                    |                                    |                                                 |                               | Close-Off (psi)         |               |               |     |
|                                    |                                    | 2.5                                             | Q5024B2230<br>and BU5024-003  | 75                      |               | 123           |     |
|                                    |                                    | 3                                               | Q5024B2240<br>and BU5024-003  | 37                      |               | 60            |     |
|                                    |                                    | VB-922 Series<br>VB-925 Series<br>VB-926 Series | Single Actuator Linkage       |                         |               |               |     |
|                                    | Valve<br>Connection<br>Size (inch) |                                                 | Linkage and<br>Bonnet Adapter | Actuator Torque (lb-in) |               |               |     |
|                                    |                                    |                                                 |                               | 44                      | 88            | 175           | 300 |
|                                    |                                    |                                                 |                               | Close-Off (psi)         |               |               |     |
|                                    | 0.5                                |                                                 | Q5024A1116<br>and BU5024-001  | 230                     | 230           |               |     |
| 0.75                               | 165                                |                                                 |                               | 230                     |               |               |     |
| 1                                  | 100                                |                                                 |                               | 190                     |               |               |     |
| 1.25                               | 65                                 |                                                 |                               | 120                     |               |               |     |
| 1.5                                | Q5024A1130<br>and BU5024-002       |                                                 |                               | 50                      | 105           |               |     |
| 2                                  |                                    |                                                 |                               | 30                      | 60            | 105           |     |
| Dual Actuator Linkage              |                                    |                                                 |                               |                         |               |               |     |
| Valve<br>Connection<br>Size (inch) | Linkage and<br>Bonnet Adapter      |                                                 | Actuator Torque (lb-in)       |                         |               |               |     |
|                                    |                                    |                                                 | 350 (2 x 175)                 |                         | 600 (2 x 300) |               |     |
|                                    |                                    |                                                 | Close-Off (psi)               |                         |               |               |     |
| 2.5                                | Q5024B2230<br>and BU5024-003       |                                                 | 75                            |                         | 123           |               |     |
| 3                                  | and BU5024-003                     |                                                 | 50                            |                         | 80            |               |     |

# Submittal Data - Valves

## Globe Valve Linkage, Q5024

### Linkage and Actuator Selection. (Continued)

| Manufacturer                                      | Valve Model                    | Single Actuator Linkage            |                               |                         |               |     |     |
|---------------------------------------------------|--------------------------------|------------------------------------|-------------------------------|-------------------------|---------------|-----|-----|
| Siebe<br>Barber Colman<br>Invensys<br>(continued) | VB-927 Series<br>VB-928 Series | Valve<br>Connection<br>Size (inch) | Linkage and<br>Bonnet Adapter | Actuator Torque (lb-in) |               |     |     |
|                                                   |                                |                                    |                               | 44                      | 88            | 175 | 300 |
|                                                   |                                |                                    |                               | Close-Off (psi)         |               |     |     |
|                                                   |                                | 0.5                                | Q5024A1116<br>and BU5024-001  | 230                     | 230           |     |     |
|                                                   |                                | 0.75                               |                               | 165                     | 230           |     |     |
|                                                   |                                | 1                                  |                               | 100                     | 190           |     |     |
|                                                   |                                | 1.25                               |                               | 65                      | 120           |     |     |
|                                                   |                                | 1.5                                | Q5024A1130<br>and BU5024-002  |                         | 50            | 105 |     |
|                                                   |                                | 2                                  |                               |                         | 30            | 60  | 105 |
|                                                   | VB-931 Series                  | Single Actuator Linkage            |                               |                         |               |     |     |
|                                                   |                                | Valve<br>Connection<br>Size (inch) | Linkage and<br>Bonnet Adapter | Actuator Torque (lb-in) |               |     |     |
|                                                   |                                |                                    |                               | 44                      | 88            | 175 | 300 |
|                                                   |                                |                                    |                               | Close-Off (psi)         |               |     |     |
|                                                   |                                | 0.5                                | Q5024A1116<br>and BU5024-001  | 230                     | 230           |     |     |
|                                                   |                                | 0.75                               |                               | 165                     | 230           |     |     |
|                                                   |                                | 1                                  |                               | 100                     | 190           |     |     |
|                                                   |                                | 1.25                               |                               | 65                      | 120           |     |     |
| 1.5                                               |                                | Q5024A1130<br>and BU5024-002       |                               | 50                      | 105           |     |     |
| 2                                                 |                                |                                    |                               | 30                      | 60            | 105 |     |
| Dual Actuator Linkage                             |                                |                                    |                               |                         |               |     |     |
| Valve<br>Connection<br>Size (inch)                |                                | Linkage and<br>Bonnet Adapter      | Actuator Torque (lb-in)       |                         |               |     |     |
|                                                   |                                |                                    | 350 (2 x 175)                 |                         | 600 (2 x 300) |     |     |
|                                                   |                                |                                    | Close-Off (psi)               |                         |               |     |     |
| 2.5                                               |                                | Q5024B2230<br>and BU5024-003       | 75                            |                         | 123           |     |     |
| 3                                                 |                                |                                    | 50                            |                         | 80            |     |     |
| 4                                                 |                                | Q5024B2240<br>and BU5024-003       | 18                            |                         | 38            |     |     |

# Submittal Data - Valves

## Globe Valve Linkage, Q5024

Linkage and Actuator Selection. (Continued)

| Manufacturer                                      | Valve Model        | Single Actuator Linkage            |                                    |                               |                               |                         |     |  |  |
|---------------------------------------------------|--------------------|------------------------------------|------------------------------------|-------------------------------|-------------------------------|-------------------------|-----|--|--|
| Siebe<br>Barber Colman<br>Invensys<br>(continued) | VB-932 Series      | Valve<br>Connection<br>Size (inch) | Linkage and<br>Bonnet Adapter      | Actuator Torque (lb-in)       |                               |                         |     |  |  |
|                                                   |                    |                                    |                                    | 44                            | 88                            | 175                     | 300 |  |  |
|                                                   |                    |                                    |                                    | Close-Off (psi)               |                               |                         |     |  |  |
|                                                   |                    | 0.5                                | Q5024A1116<br>and BU5024-001       | 230                           | 230                           |                         |     |  |  |
|                                                   |                    | 0.75                               |                                    | 165                           | 230                           |                         |     |  |  |
|                                                   |                    | 1                                  |                                    | 100                           | 190                           |                         |     |  |  |
|                                                   |                    | 1.25                               |                                    | 65                            | 120                           |                         |     |  |  |
|                                                   |                    | 1.5                                | Q5024A1130<br>and BU5024-002       |                               | 50                            | 105                     |     |  |  |
|                                                   |                    | 2                                  |                                    |                               | 30                            | 60                      | 105 |  |  |
|                                                   |                    | 2.5                                | Q5024A1123<br>and<br>WU5024-001    |                               |                               | 55                      | 90  |  |  |
|                                                   |                    | 3                                  |                                    |                               |                               | 35                      | 65  |  |  |
|                                                   |                    | Dual Actuator Linkage              |                                    |                               |                               |                         |     |  |  |
|                                                   |                    | Valve<br>Connection<br>Size (inch) | Linkage and<br>Bonnet Adapter      | Actuator Torque (lb-in)       |                               |                         |     |  |  |
|                                                   |                    |                                    |                                    | 350 (2 x 175)                 |                               | 600 (2 x 300)           |     |  |  |
|                                                   | Close-Off (psi)    |                                    |                                    |                               |                               |                         |     |  |  |
|                                                   | 4                  | Q5024B2230<br>and<br>WU5024-001    | 25                                 |                               | 48                            |                         |     |  |  |
|                                                   | 5                  |                                    | 18                                 |                               | 27                            |                         |     |  |  |
|                                                   | 6                  | Q5024B2240<br>and<br>WU5024-001    | 11                                 |                               | 16                            |                         |     |  |  |
|                                                   | VB-7213<br>VB-7313 | VB-7213<br>VB-7313                 | Single Actuator Linkage            |                               |                               |                         |     |  |  |
|                                                   |                    |                                    | Valve<br>Connection<br>Size (inch) | Linkage and<br>Bonnet Adapter | Actuator Torque (lb-in)       |                         |     |  |  |
| 44                                                |                    |                                    |                                    |                               | 88                            | 175                     | 300 |  |  |
| Close-Off (psi)                                   |                    |                                    |                                    |                               |                               |                         |     |  |  |
| 0.5                                               |                    |                                    | Q5024A1116<br>and BU5024-001       | 230                           | 230                           |                         |     |  |  |
| 0.75                                              |                    |                                    |                                    | 165                           | 230                           |                         |     |  |  |
| 1                                                 |                    |                                    |                                    | 100                           | 190                           |                         |     |  |  |
| 1.25                                              |                    |                                    |                                    | 65                            | 120                           |                         |     |  |  |
| 1.5                                               |                    |                                    |                                    |                               | 85                            |                         |     |  |  |
| 2                                                 |                    |                                    |                                    |                               | 45                            |                         |     |  |  |
| Belimo                                            |                    |                                    |                                    | G- series                     | Single Actuator Linkage       |                         |     |  |  |
|                                                   |                    |                                    | Valve<br>Connection<br>Size (inch) |                               | Linkage and<br>Bonnet Adapter | Actuator Torque (lb-in) |     |  |  |
|                                                   | 44                 | 88                                 |                                    |                               |                               | 175                     | 300 |  |  |
|                                                   | Close-Off (psi)    |                                    |                                    |                               |                               |                         |     |  |  |
|                                                   | 0.5                | Q5024A1116<br>and<br>BU5024-001    | 230                                |                               | 230                           |                         |     |  |  |
|                                                   | 0.75               |                                    | 165                                |                               | 230                           |                         |     |  |  |
|                                                   | 1                  |                                    | 100                                |                               | 190                           |                         |     |  |  |
|                                                   | 1.25               |                                    | 65                                 |                               | 120                           |                         |     |  |  |
| 1.5                                               |                    |                                    | 85                                 |                               |                               |                         |     |  |  |
| 2                                                 |                    |                                    | 45                                 |                               |                               |                         |     |  |  |

NOTE: If your valve is not listed above fill out Special Order Form located below.

NOTE: The listed close-off pressures are estimated numbers only.

NOTE: The information in this table is based on publicly available information as of the date of this publication. Honeywell is not liable if information is found to be incorrect

# Submittal Data - Valves

## SPECIAL ORDER FORM

This form is to be used if your existing valve is not listed in the selection chart located in the Globe Valve Linkage literature. Make photocopies of this form as needed and e-mail completed forms to Honeywell's Take off Service at [takeoff.service@honeywell.com](mailto:takeoff.service@honeywell.com) to ensure proper linkage compatibility. A separate form should be used for each valve when information is different for valve size or manufacturer. Please fill out form completely. Draw your own diagram using the space provided below if necessary.

Quantity: \_\_\_\_\_  
 Valve Body Information: \_\_\_\_\_  
 Figure No. (choose 1, 2, or 3 below): \_\_\_\_\_  
 Manufacturer (if known): \_\_\_\_\_  
 Model No. (if known): \_\_\_\_\_  
 Valve Size: \_\_\_\_\_  
 \_\_\_\_\_ 2 Way \_\_\_\_\_ 3 Way

Actuator (Mark all that apply):  
 \_\_\_\_\_ On/Off \_\_\_\_\_ Tri-State ..... \_\_\_\_\_ Modulating  
 \_\_\_\_\_ Spring Return  
 \_\_\_\_\_ 24 V \_\_\_\_\_ 120 V  
 \_\_\_\_\_ Weather Proof Enclosure  
 Approximate Close-Off Required: \_\_\_\_\_ (PSI)

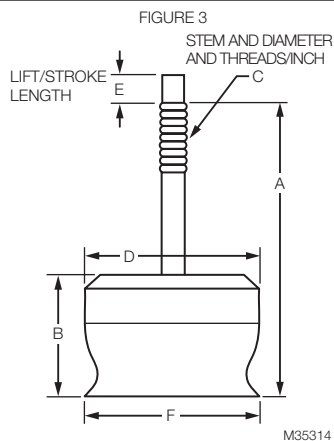
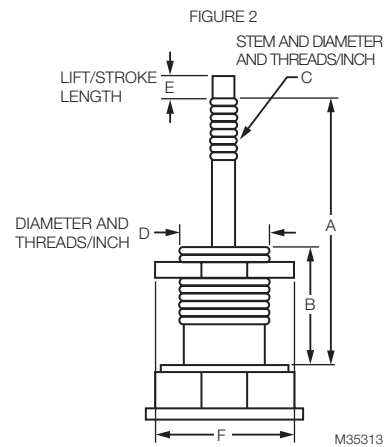
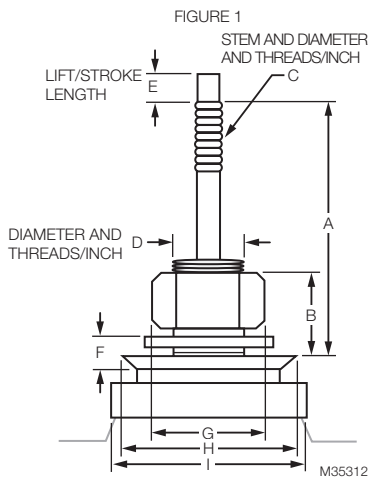
Valve Body Dimensions (see below for letter designations):

A = \_\_\_\_\_  
 B = \_\_\_\_\_  
 C = \_\_\_\_\_, \_\_\_\_\_ th/in  
 D = \_\_\_\_\_, \_\_\_\_\_ th/in  
 E = \_\_\_\_\_  
 F = \_\_\_\_\_  
 G = \_\_\_\_\_  
 H = \_\_\_\_\_  
 I = \_\_\_\_\_  
 J = \_\_\_\_\_

Letter Designations (for above):

A = Height with stem down  
 B = Length of neck  
 C = Stem diameter and threads/inch  
 D = Major diameter and threads/inch  
 E = Lift (Stroke Length)  
 F, G, H, I = Neck dimensions

Comments:

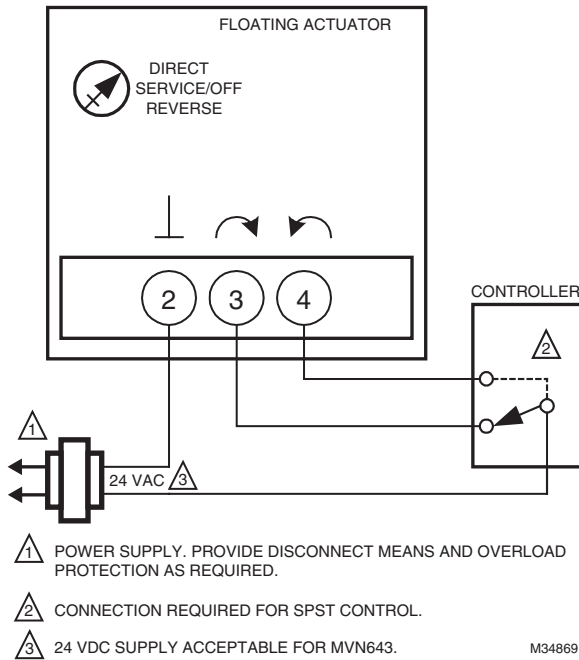


Draw your own

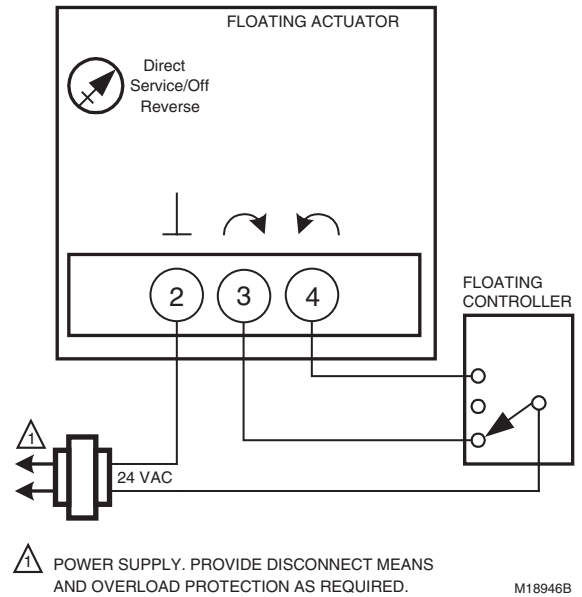
# Wiring Diagrams - Valves

## Ball Valve Actuators

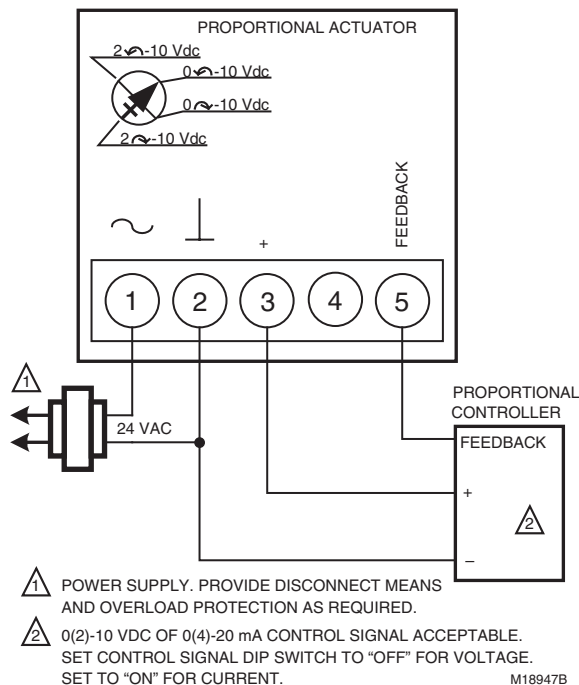
**MN6105 with On/Off Control.**



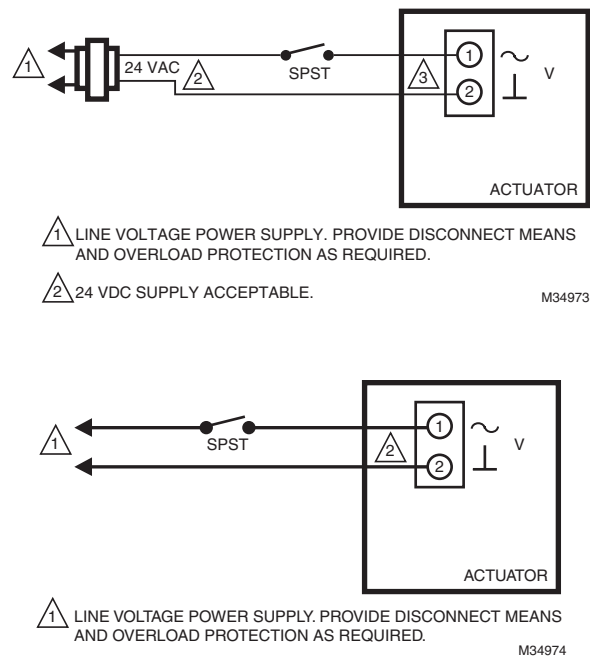
**MN6105 with Floating Control.**



**MN7505 with Modulating Control.**



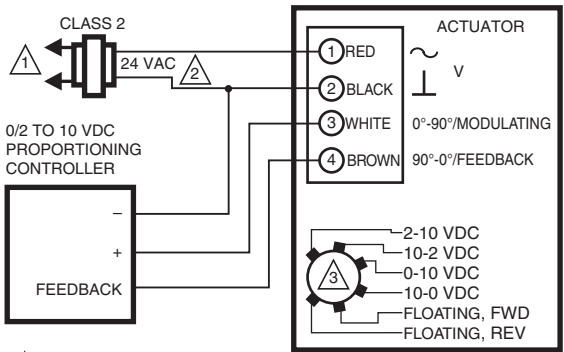
**MS8105 with On/Off Control.**



# Wiring Diagrams - Valves

## Ball Valve Actuators

### MS7103 with 2-10 Vdc Control (MS7503 shown, ignore selection switch)



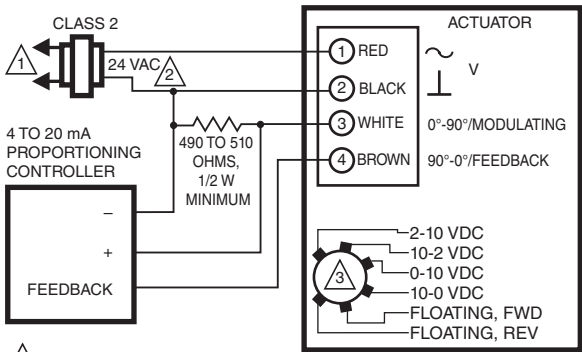
1 LINE VOLTAGE POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED.

2 24 VDC SUPPLY ACCEPTABLE.

3 SET SWITCH TO MODULATING IF AVAILABLE.

M37320

### MS7103 with 4-20 mA Control (MS7503 shown, ignore selection switch).



1 LINE VOLTAGE POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED.

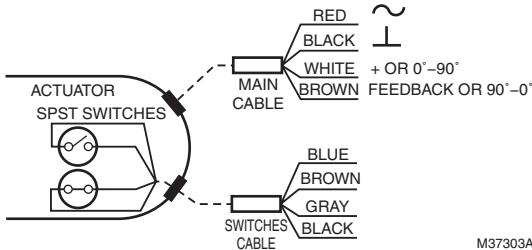
2 24 VDC SUPPLY ACCEPTABLE.

3 SET SWITCH TO MODULATING IF AVAILABLE.

M37321

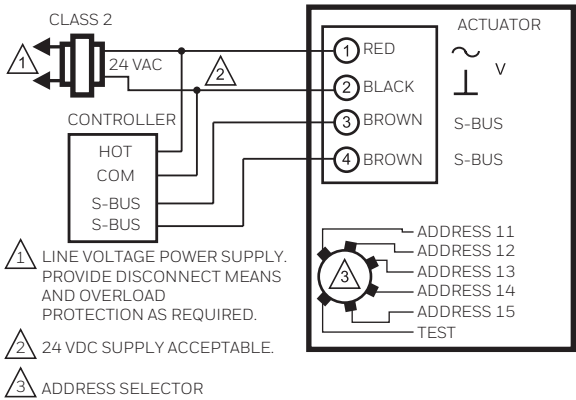
### Wiring for MS7103 and MS3103 Auxiliary Switches

Gray/Black = Normally Open. Closed in range 80 degrees to Fully Open. Blue/Brown = Normally Closed. Open in range 10 degrees to Fully Open.



M37303A

### MS3103 with Sylk Bus control



1 LINE VOLTAGE POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED.

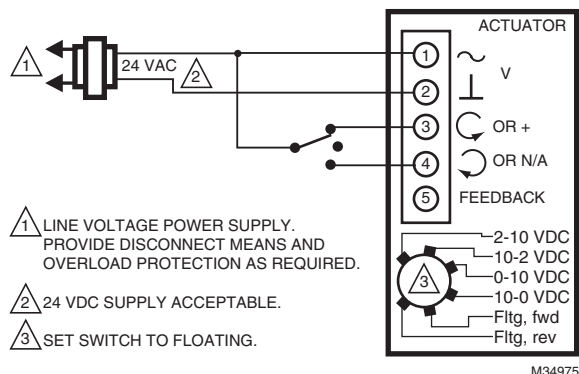
2 24 VDC SUPPLY ACCEPTABLE.

3 ADDRESS SELECTOR

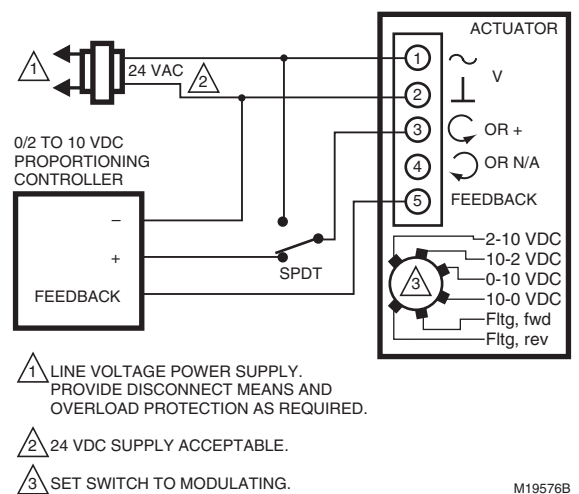
# Wiring Diagrams - Valves

## Ball Valve Actuators

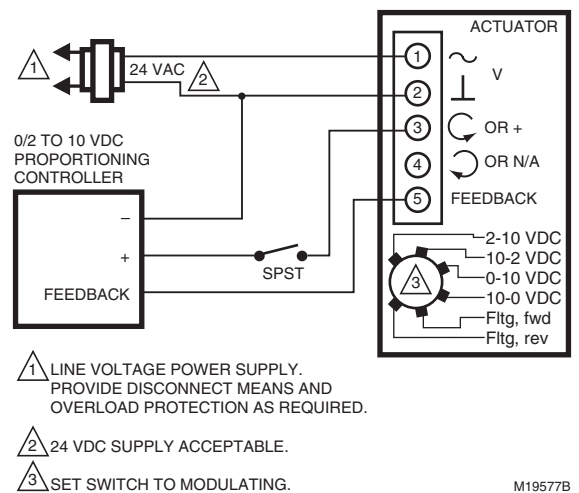
### MS7505 with Floating Control (Floating mode setting).



### MS7505 with override to full open (Modulating mode setting).



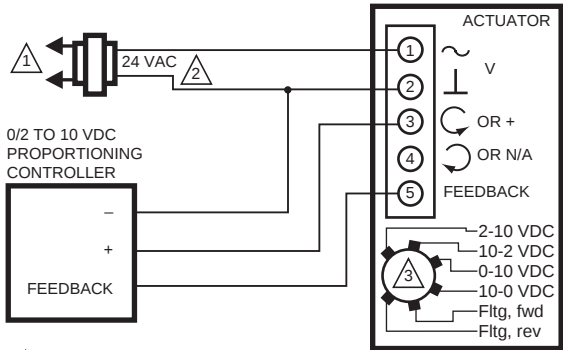
### MS7505 with override to full closed (Modulating mode setting).



# Wiring Diagrams - Valves

## Ball Valve Actuators

### MS7505 with Proportioning Controllers (Modulating mode setting).

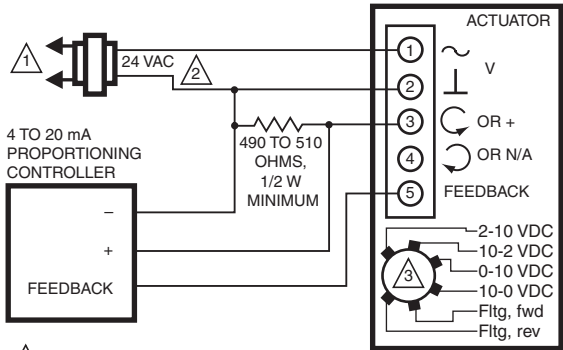


1 LINE VOLTAGE POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED.

2 24 VDC SUPPLY ACCEPTABLE.

3 SET SWITCH TO MODULATING.

M34976



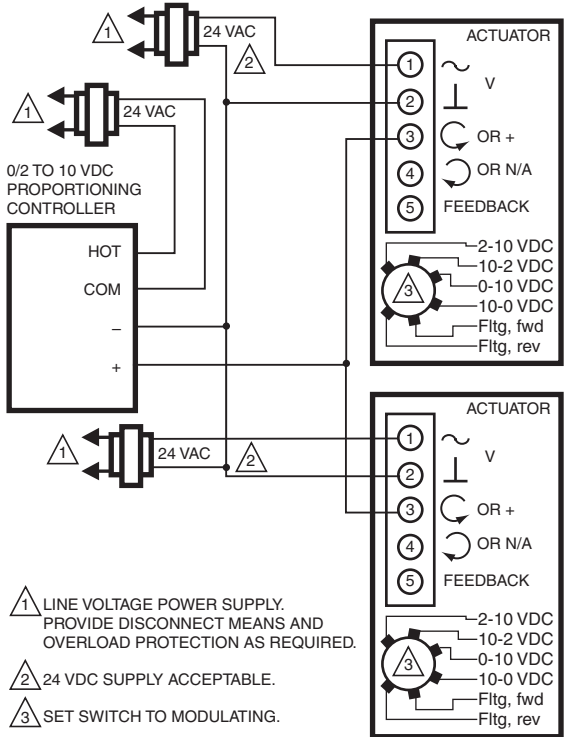
1 LINE VOLTAGE POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED.

2 24 VDC SUPPLY ACCEPTABLE.

3 SET SWITCH TO MODULATING.

M34977

### MS7505 with Proportioning controllers operating multiple actuators (Modulating mode setting).



1 LINE VOLTAGE POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED.

2 24 VDC SUPPLY ACCEPTABLE.

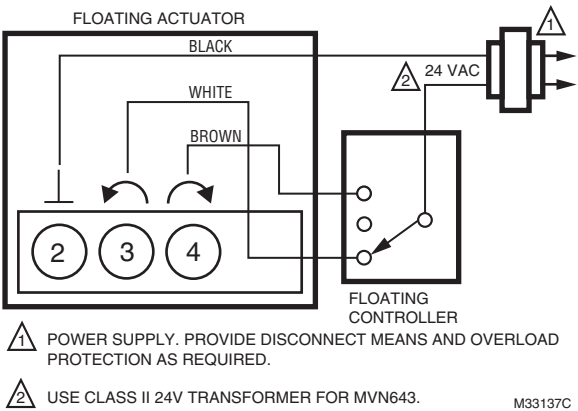
3 SET SWITCH TO MODULATING.

M34978

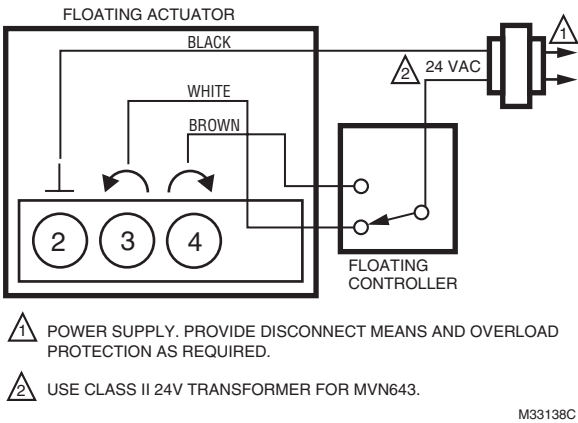
# Wiring Diagrams - Valves

## MVN Actuator

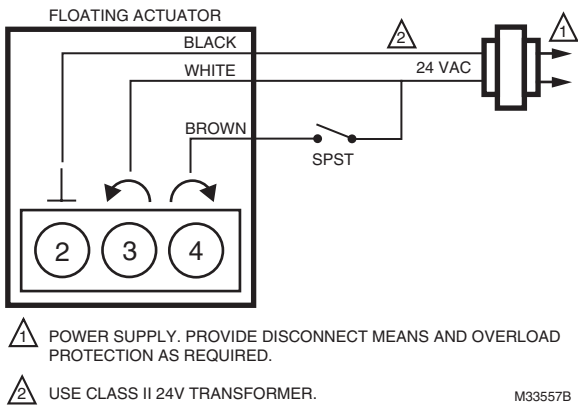
### MVN613 or MVN643 with Floating Control.



### MVN613 or MVN643 with 2 position or Floating Control.

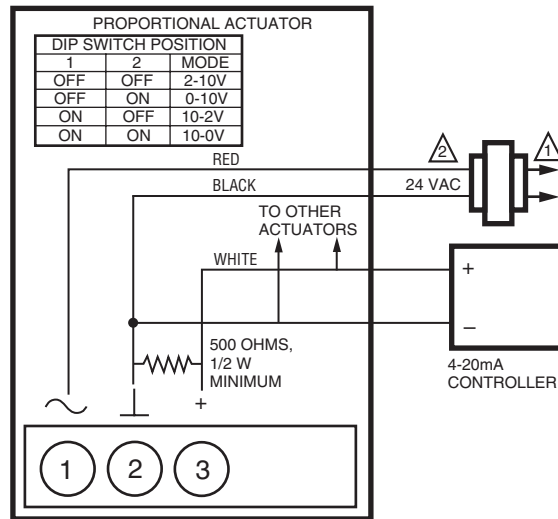


### MVN643 with Two Position SPST Control.



### MVN713 with 4-20mA Control.

PROPORTIONAL/MODULATING: 4-20mA CONTROLLER OUTPUT WITH 500Ω SERIES RESISTOR



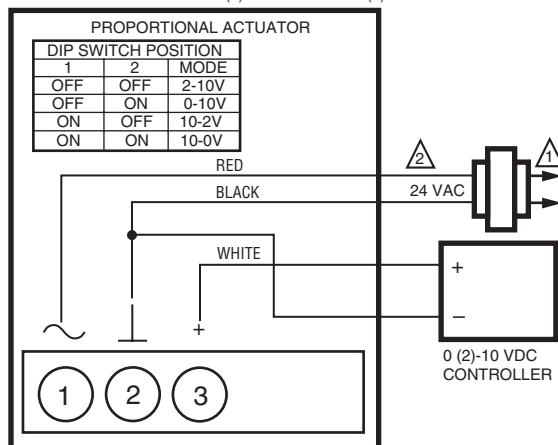
△1 POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED.

△2 USE CLASS II 24V TRANSFORMER.

M33141B

### MVN713 with 0 (2)-10 VDC Control.

PROPORTIONAL/MODULATING: 0(2)...10 VDC OR 10...0(2) VDC CONTROLLER OUTPUT



△1 POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED.

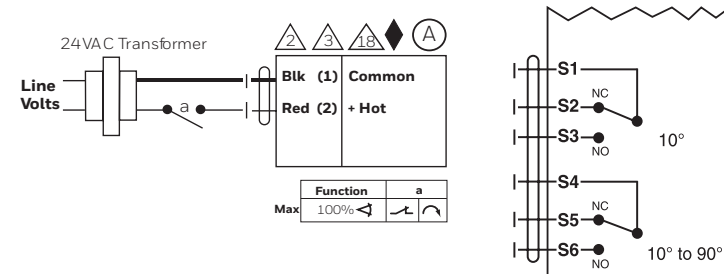
△2 24 VDC SUPPLY ACCEPTABLE.

M33140A

# Wiring Diagrams - Valves

## Butterfly Valve Actuators

### Wiring for MBS8 actuators (Not all models have switches)



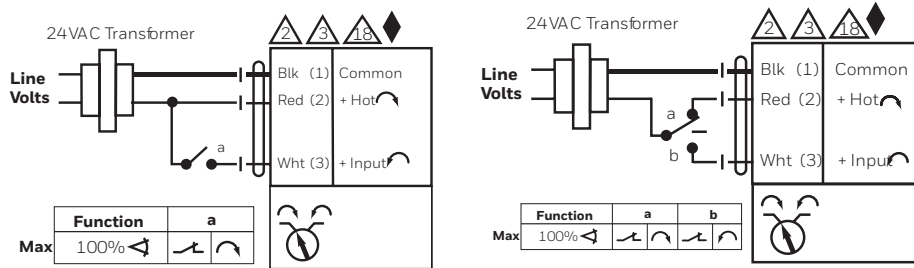
On/Off

Auxiliary Switches

#### Notes:

- Meets cULus requirements without the need of an electrical ground connection
- Actuators with appliance cables are numbered.
- Actuators may be connected in parallel. Power consumption and input impedance must be observed.
- Actuators may also be powered by 24 VDC.
- Actuators with plenum rated cable do not have numbers on wires; use color codes instead.

### Wiring for MBP6...2,4,5,A,R



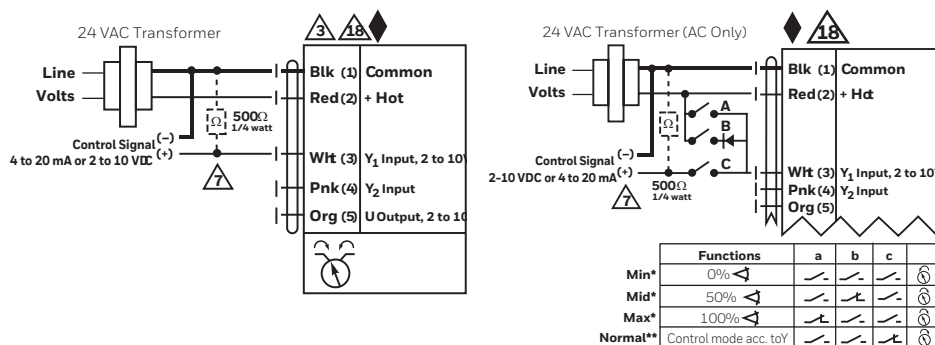
On/Off

Floating Point

#### Notes:

- Meets cULus requirements without the need of an electrical ground connection
- Actuators may be connected in parallel. Power consumption and input impedance must be observed.
- Actuators may also be powered by 24 VDC.
- Actuators with plenum rated cable do not have numbers on wires; use color codes instead.

### Wiring for MBS7...1,3 and MBP7...2,3,4,5,R actuators (Not all models have Switches)



VDC / 4 to 20 mA

Override Control Min, Mid, Max Postions

#### Notes:

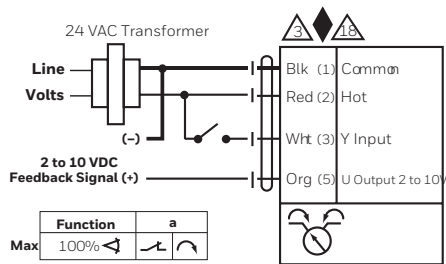
- Meets cULus requirements without the need of an electrical ground connection
- Actuators may also be powered by 24 VDC.
- A 500Ω resistor converts the 4 to 20 mA control signal to 2 to 10 VDC.
- Actuators with plenum rated cable do not have numbers on wires; use color codes instead.

\* Default selectable 0-100%. See Configuration Data Sheet  
\*\* Customizable. See Configuration Data Sheet

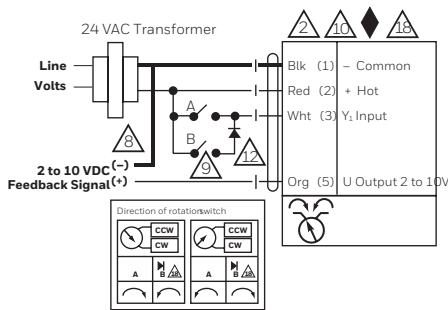
# Wiring Diagrams - Valves

## Butterfly Valve Actuators

### Wiring for MBE6...4,5,R actuators



On/Off



Floating Point

| FC          | FO            |
|-------------|---------------|
| A - AB = 0% | A - AB = 100% |
|             |               |

On/Off

24V AC/DC

Notes:

- Meets cULus requirements without the need of an electrical ground connection
- Actuators may be connected in parallel. Power consumption and input impedance must be observed.
- Actuators may also be powered by 24 VDC.
- Control signal may be pulsed from either the Hot (Source) or Common (Sink) 24 VAC line.
- Contact closures A & B also can be triacs. A & B should both be closed for the triac source and open for triac sink.
- For triac sink the Common connection from the actuator must be connected to the Hot connection of the controller. Position feedback cannot be used with a triac sink controller. The actuator internal common reference is not compatible.
- IN4004 or IN4007 diode. (IN4007 supplied)
- Actuators with plenum rated cable do not have numbers on wires; use color codes instead.

|      |      | FC          | FO            |
|------|------|-------------|---------------|
|      |      | A - AB = 0% | A - AB = 100% |
| 3    | 4    |             |               |
| a    | b    |             |               |
| (Y1) | (Y2) |             |               |
|      |      |             |               |
|      |      |             |               |
|      |      |             |               |
|      |      |             |               |

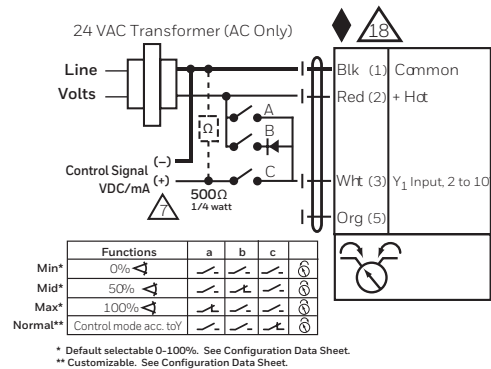
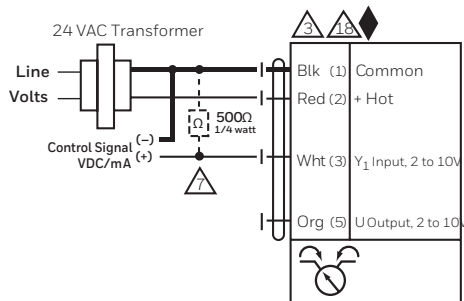
Floating Point

24V AC/DC

# Wiring Diagrams - Valves

## Butterfly Valve Actuators

### Wiring for MBE7...4,5,R actuators

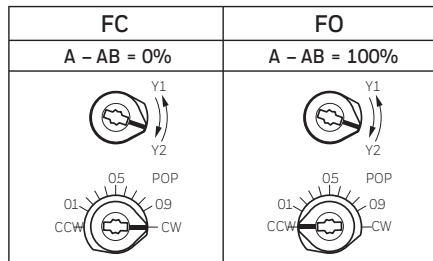


#### Notes:

- Meets cULus requirements without the need of an electrical ground connection
- Actuators may also be powered by 24 VDC.
- A 500Ω resistor converts the 4 to 20 mA control signal to 2 to 10 VDC.
- For triac sink the Common connection from the actuator must be connected to the Hot connection of the controller. Position feedback cannot be used with a triac sink controller. The actuator internal common reference is not compatible.
- Actuators with plenum rated cable do not have numbers on wires; use color codes instead.

VDC / 4 to 20 mA

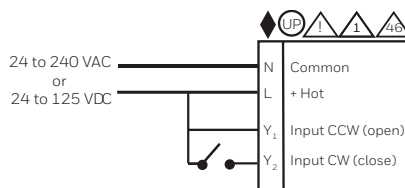
Override Control Min, Mid, Max Postions



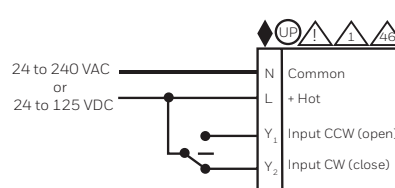
Modulating

24V AC/DC

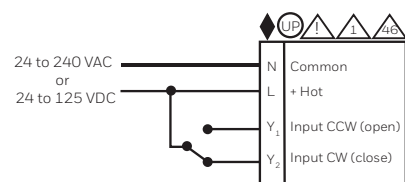
### Wiring for MBP, E6...6,7,8 actuators



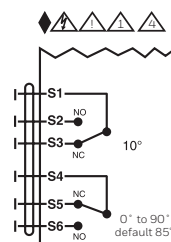
On/Off



Floating Point



On/Off



End Switches

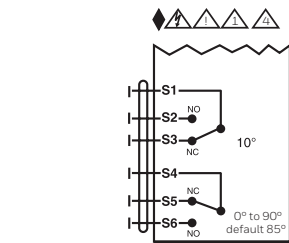
#### Notes:

- Meets cULus requirements without the need of an electrical ground connection.
- Provide overload protection and disconnect as required.
- Two built-in auxiliary switches (2x SPDT), for end position indication, interlock control, fan startup, etc.
- Actuators may be controlled in parallel. Current draw and input impedance must be observed.
- Universal Power Supply (UP) models can be supplied with 24 VAC up to 240 VAC, or 24 VDC up to 125 VDC.
- During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.

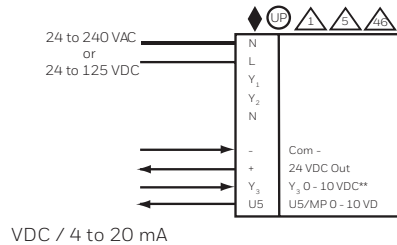
# Wiring Diagrams - Valves

## Butterfly Valve Actuators

### Wiring for MBP, E7...6,7,8 actuators



End Switches



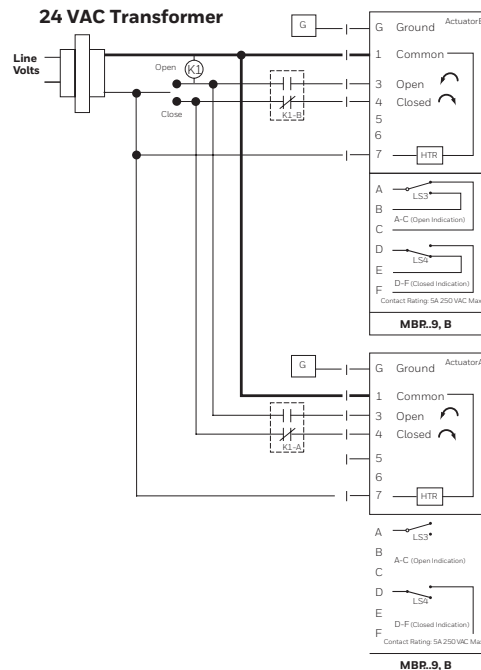
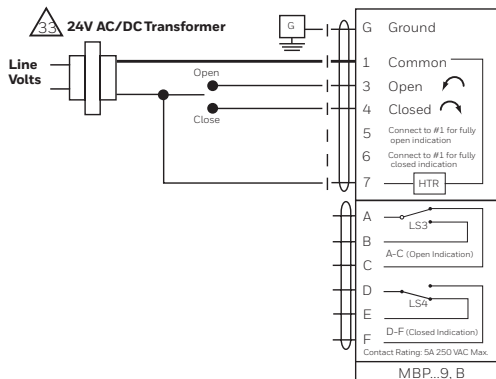
VDC / 4 to 20 mA

#### Notes:

- ◆ Meets cULus requirements without the need of an electrical ground connection.
- ⚠ Provide overload protection and disconnect as required.
- ⚠ Only connect common to neg. (-) leg of control circuits.
- ⚠ Two built-in auxiliary switches (2x SPDT), for end position indication, interlock control, fan startup, etc.
- ⚠ Actuators may be controlled in parallel. Current draw and input impedance must be observed.
- ⚠ Universal Power Supply (UP) models can be supplied with 24 VAC up to 240 VAC, or 24 VDC up to 125 VDC.
- ⚠ During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.

### Wiring for MBP6...9,B

24V AC/DC Transformer  
On/Off



⚠ Each actuator should be powered by a single, isolated control transformer.

#### INSTALLATION NOTES

- Observe class 1 and class 2 wiring restrictions.
- Transformer sizing = MBP actuator draw X 1.25 (safety margin)

#### INSTALLATION NOTES

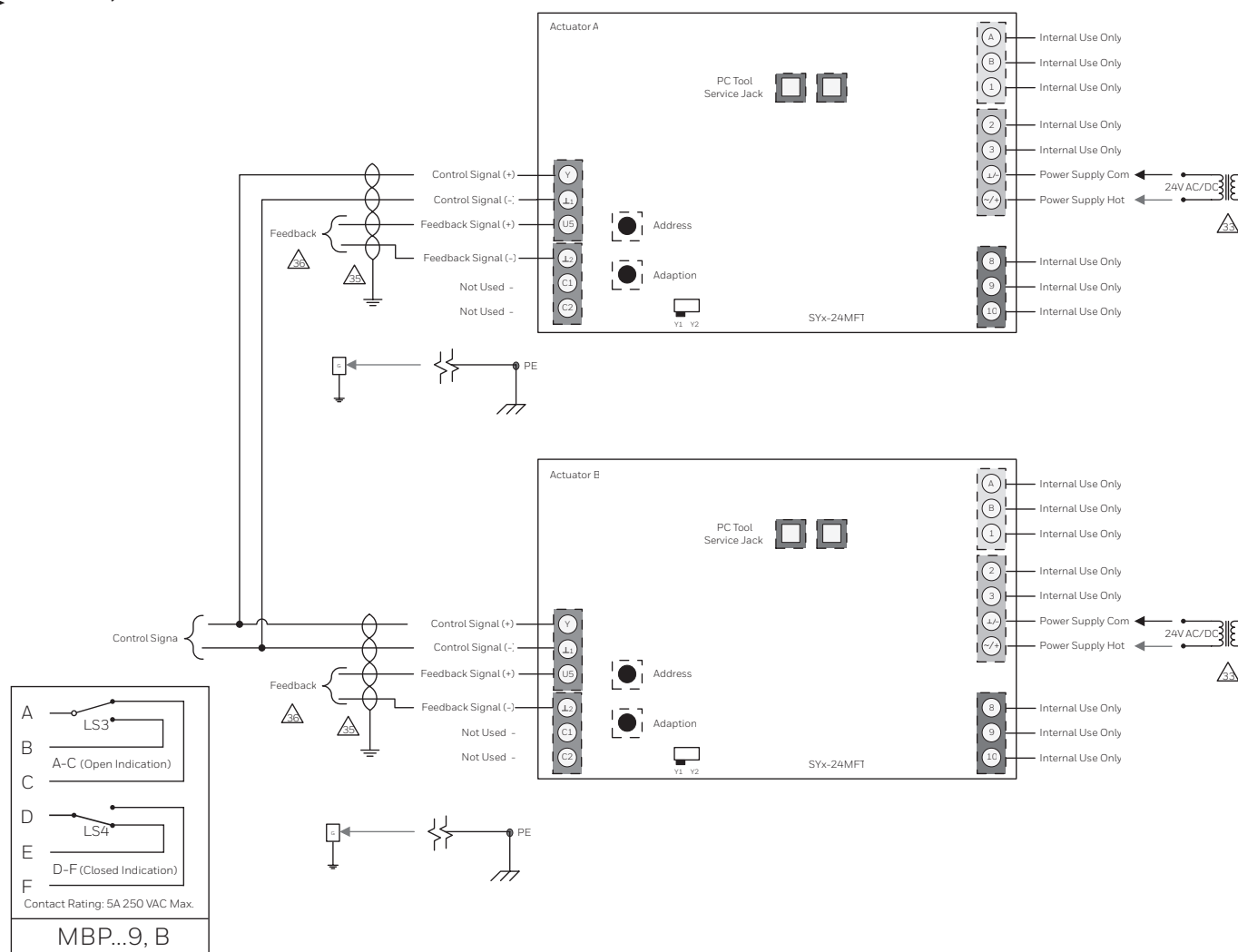
- Isolation relays must be used in parallel connection of multiple actuators using a common control signal input.
- "H" (L2) cannot be connected to terminal #3 and #4 simultaneously.
- Required: Terminal #7 needs to be field wired to enable heater circuit.

# Wiring Diagrams - Valves

## Butterfly Valve Actuators

Proportional, Multiple Wiring, 24V  
MBP...9, B

### Wiring for MBP7...9,B actuators



### INSTALLATION NOTES



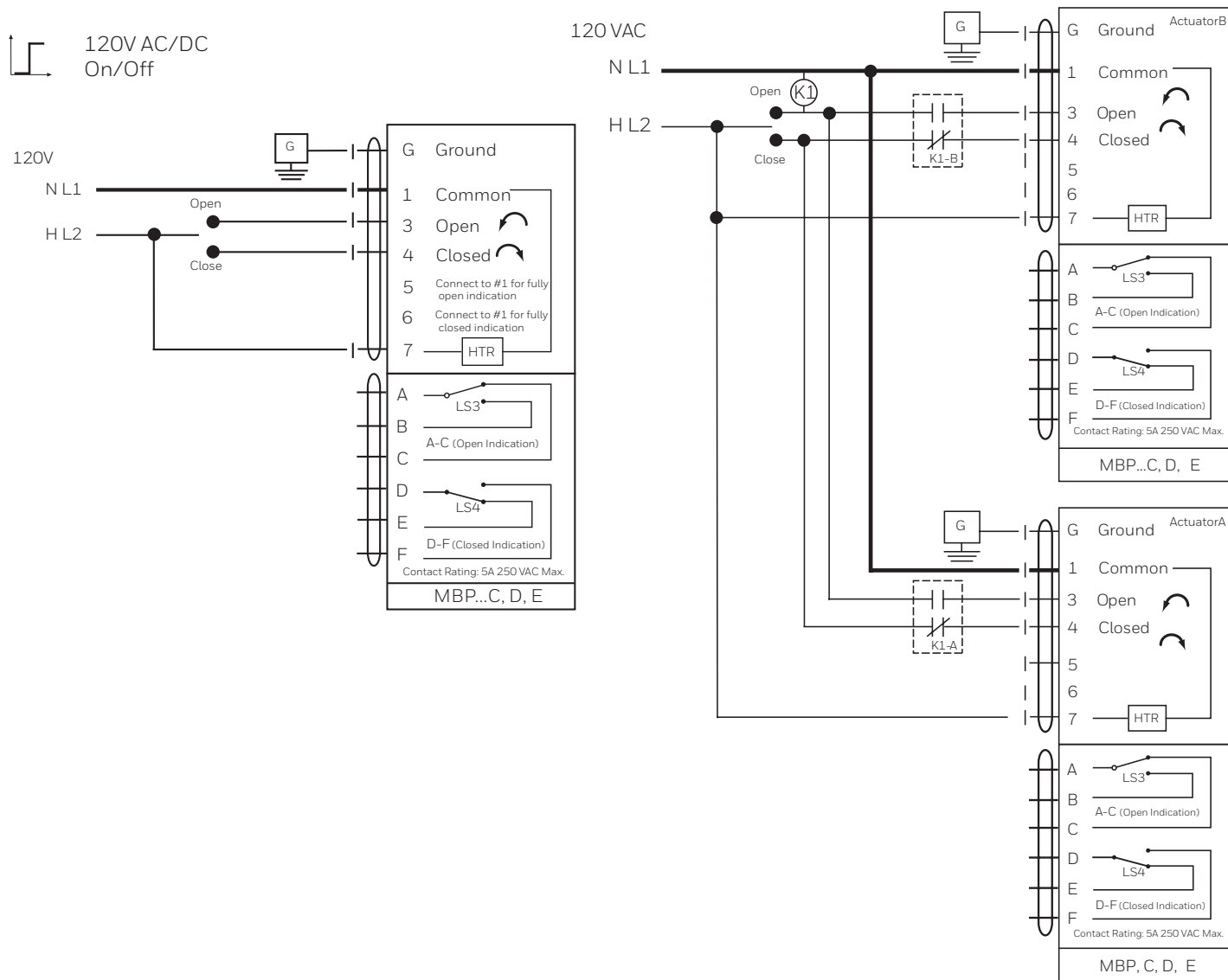
Each actuator should be powered by a single, isolated control transformer.

- Observe class 1 and class 2 wiring restrictions.
- Transformer sizing = MBP actuator draw X 1.25 (safety margin)

# Wiring Diagrams - Valves

## Butterfly Valve Actuators

### Wiring for MBP6...C,D,E,F,G,H actuators



### ✂ INSTALLATION NOTES

- Observe class 1 and class 2 wiring restrictions.
- Transformer sizing = MBP actuator draw X 1.25 (safety margin)

### ✂ INSTALLATION NOTES

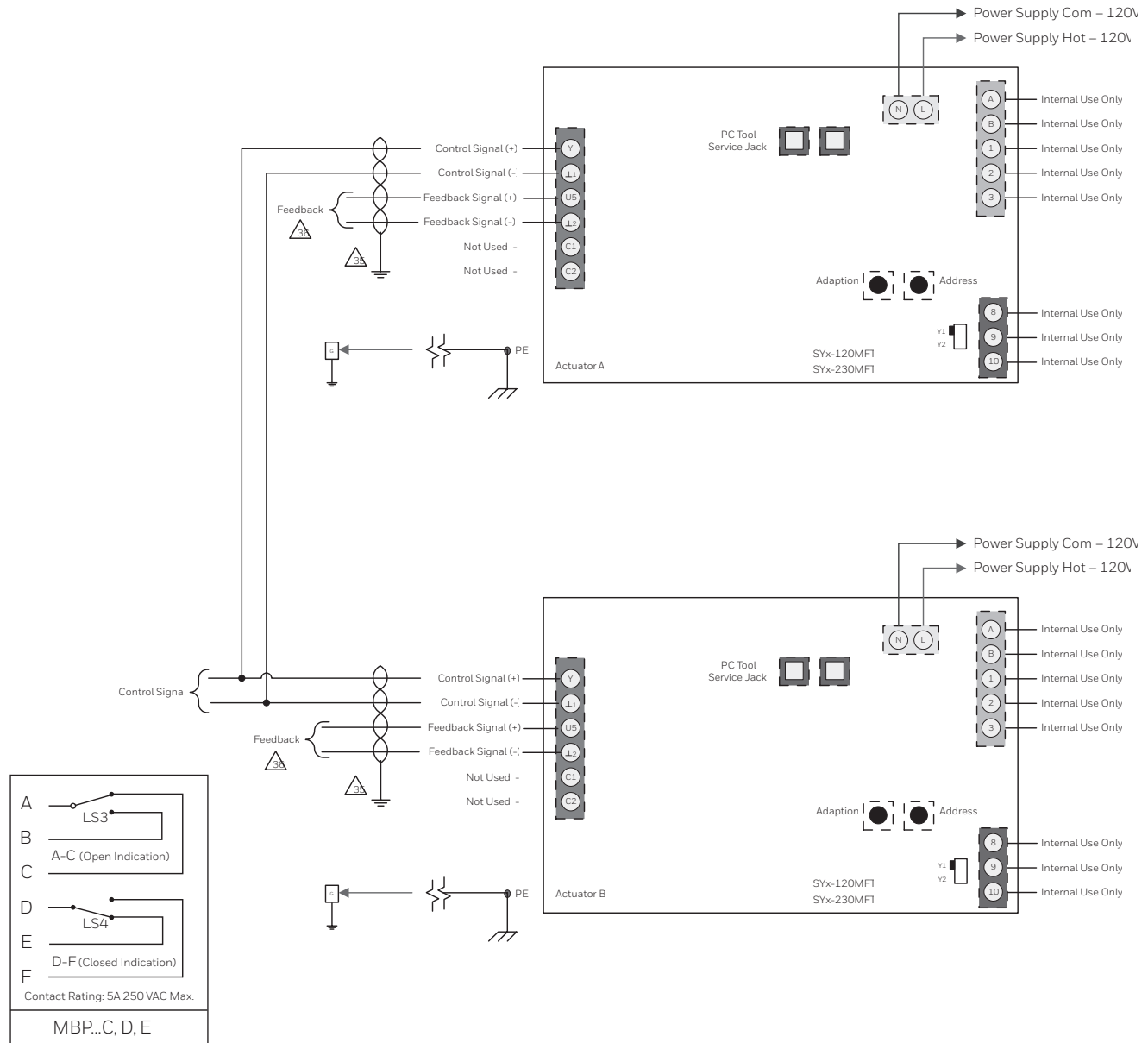
- Isolation relays must be used in parallel connection of multiple actuators using a common control signal input.
- "H" (L2) cannot be connected to terminal #3 and #4 simultaneously.
- Required: Terminal #7 needs to be field wired to enable heater circuit.

# Wiring Diagrams - Valves

## Butterfly Valve Actuators

### Wiring for MBP7...C,D,E,F,G,H actuators

Proportional, Multiple Wiring, 120V  
MBP...C, D, E



Each actuator should be powered by a single, isolated control transformer.

### INSTALLATION NOTES

- Observe class 1 and class 2 wiring restrictions.
- Transformer sizing = MBP actuator draw X 1.25 (safety margin)

# Accessories - Valves

## Valve Actuator Accessories

| Product Number      | Description                                                                               | Used With                                                                                     |
|---------------------|-------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|
| <b>272629A/U</b>    | Adapter Kit for mounting ML6984/ML7984 to V5045                                           | ML6984 or ML7984, V5045                                                                       |
| <b>43191679-102</b> | 220 ohm Auxiliary Potentiometer for ML6421B                                               | ML6421B                                                                                       |
| <b>43191679-112</b> | Potentiometer, 220 ohm for ML6425 only                                                    | ML6425                                                                                        |
| <b>43191680-102</b> | Dual Auxiliary Switch for ML6421, ML7421                                                  | ML6421, ML7421                                                                                |
| <b>43191680-105</b> | Dual Auxiliary Switch for ML6425 Only                                                     | ML6425                                                                                        |
| <b>43196000-001</b> | High Temperature Kit for actuators with 3/4 inch (20 mm) stroke, stem button attachment   | ML6420, ML6421, ML6425, ML7420, ML7421, or ML7425; ML6984; ML7984; Not compatible with Q502 4 |
| <b>43196000-038</b> | High Temperature Kit for actuators with 1-1/2 inch (38 mm) stroke, stem button attachment | ML6421, ML7421; Not compatible with Q5024                                                     |
| <b>5112-3R</b>      | Weather Enclosure Assembly                                                                | MN6105A1011, MN7505A2001, MS7505A2030, MS8105A1030                                            |
| <b>5112-24/U</b>    | Replacement SS Stem Kit                                                                   | For VBN & VRN Valves. Refer to Table 7 on page 157 for specific models                        |
| <b>5112-23/U</b>    | Replacement SS Stem Kit                                                                   | For VBN & VRN Valves. Refer to Table 7 on page 157 for specific models                        |
| <b>5112-22/U</b>    | Replacement Stem Kit                                                                      | For VBN & VRN Valves. Refer to Table 7 on page 157 for specific models                        |
| <b>5112-21/U</b>    | Replacement Stem Kit                                                                      | For VBN & VRN Valves. Refer to Table 7 on page 157 for specific models                        |
| <b>5112-20/U</b>    | Replacement Stem Kit                                                                      | For VBN & VRN Valves. Refer to Table 7 on page 157 for specific models                        |
| <b>5112-19/U</b>    | Replacement Stem Kit                                                                      | For VBN & VRN Valves. Refer to Table 7 on page 157 for specific models                        |
| <b>MVNAAA/U</b>     | Replacement Valve Adaptor                                                                 | MVN613A0000, MVN643A0000, MVN713A0000                                                         |
| <b>MVNAAL/U</b>     | Replacement Valve Adaptor, Low Profile                                                    | MVN613L0000, MVN643L0000, MVN713L0000                                                         |
| <b>MVNAC7131/U</b>  | Replacement Cable with Terminal 1m, Modulation (RED, BLACK, WHITE)                        | MVN713A0000, MVN713L0000                                                                      |
| <b>MVNAC6131/U</b>  | Replacement Cable with Terminal 1m, Floating (RED, BLACK, WHITE)                          | MVN613A0000, MVN613L0000, MVN643A0000, MVN643L0000                                            |
| <b>5112-11/U</b>    | Replacement DCA Mounting Bracket for VBN2/3 Ball Valves                                   | MN6105A1011, MN7505A2001, MS7505A2030, MS8105A1030                                            |

## Valve Linkage Accessories

| Product Number         | Description                                                                                                                                                                                         | Used With                                      |
|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|
| <b>32004629-001/U</b>  | Bonnet adapter kit to adapt Seimens (Landis/Power) Flowrite 599 1/2 inch to 3 inch globe valves with Q5020A                                                                                         | Siemens valves; Q5020                          |
| <b>32004629-003/U</b>  | Bonnet Adapter Kit, Johnson Controls 1 to 2 in., Q5020                                                                                                                                              | Johnson valves; Q5020                          |
| <b>32004629-004/U</b>  | Bonnet Adapter Kit, Siebe 1/2 to 2 in., Q5020                                                                                                                                                       | Siebe valves; Q5020                            |
| <b>BU5024-001/U</b>    | Bonnet adapter 1-1/4" diameter-16 TPI with 1/4"-28 TPI stem adapter                                                                                                                                 | Q5024 on Siebe, Barber Colman, Invensys Valves |
| <b>BU5024-002/U</b>    | Bonnet adapter 1" diameter - 16 TPI with 1/4"-28 TPI and 5/16"-24 TPI stem adapters                                                                                                                 | Q5024 on Siebe, Barber Colman, Invensys Valves |
| <b>BU5024-003/U</b>    | Bonnet adapter 1-1/4" diameter - 16 TPI with 1/2"-20 TPI stem adapter                                                                                                                               | Q5024 on Siebe, Barber Colman, Invensys Valves |
| <b>WU5024-001/U</b>    | Bonnet adapter 1-3/8" diameter -18 TPI with 3/8"-24 TPI stem adapter                                                                                                                                | Q5024 on Siebe, Barber Colman, Invensys Valves |
| <b>BU5024-NPTKIT/U</b> | Globe Valve Adapter kit for Siebe, Barber Coleman, Invensys NPT Valves (1/2" - 2") includes: BU5024-001, BU5024-002 bonnet adapters only and 1 of each 1/4" - 28 TPI) and 5/16"-24 TPI stem adapter | Q5024 on Siebe, Barber Colman, Invensys Valves |
| <b>BU5024-FLGKIT/U</b> | Globe Valve Adapter kit for Siebe, Barber Coleman, Invensys Flange Valves (2.5"-6") Includes BU5024-003, WU5024-001 bonnet adapters only and 1 of each 3/8"-24 TPI and 1/4"-28 adapters             | Q5024 on Siebe, Barber Colman, Invensys Valves |
| <b>GU5024-001/U</b>    | Bonnet adapter 1-5/16" diameter with 1/4"-28 TPI stem adapter                                                                                                                                       | Q5024 on Siemens, Landis Powers Valves         |
| <b>GU5024-002/U</b>    | Bonnet adapter 1-3/32" diameter-14 with 3/8"-24 TPI and 1/4"-28 TPI stem adapters                                                                                                                   | Q5024 on Siemens, Landis Powers Valves         |
| <b>GU5024-003/U</b>    | Bonnet adapter 1-3/8" diameter - 20 TPI with 3/8"-24 and 1/4"-28 TPI stem adapters                                                                                                                  | Q5024 on Siemens, Landis Powers Valves         |
| <b>GU5024-KIT/U</b>    | Globe Valve Adapter kit for Siemens, Landis Powers (1/2" - 6") Includes GU5024-001, GU5024-002, GU5024-003 bonnet adapters only and 1 of each 1/4"-28 TPI and 3/8"-24 TPI stem adapter              | Q5024 on Siemens, Landis Powers Valves         |
| <b>HU5024-001/U</b>    | Bonnet adapter 1-3/8" diameter with 1/4"-28 TPI stem adapter                                                                                                                                        | Q5024 on Honeywell Valves                      |
| <b>HU5024-002/U</b>    | Bonnet adapter 1-7/8" diameter with 7/8" "-20 TPI stem adapter                                                                                                                                      | Q5024 on Honeywell Valves                      |
| <b>JU5024-001/U</b>    | Bonnet adapter 20mm diameter -1.5mm thread pitch with 1/4"-28 TPI stem adapter                                                                                                                      | Q5024 on Johnson Controls Valves               |
| <b>JU5024-002/U</b>    | Bonnet adapter 1-1/16" diameter-16 TPI with 3/8"-24 TPI stem adapter                                                                                                                                | Q5024 on Johnson Controls Valves               |
| <b>JU5024-003/U</b>    | Bonnet adapter 28mm diameter-1.5mm thread pitch with 1/4"-28 TPI stem adapter                                                                                                                       | Q5024 on Johnson Controls Valves               |
| <b>JU5024-004/U</b>    | Bonnet adapter 3/4" diameter-16 TPI with 3/8"-24 TPI stem adapter                                                                                                                                   | Q5024 on Johnson Controls Valves               |
| <b>JU5024-005/U</b>    | Bonnet adapter 3/4" diameter- 18 TPI with 1/4"-28 TPI stem adapter                                                                                                                                  | Q5024 on Johnson Controls Valves               |
| <b>JU5024-006/U</b>    | Bonnet adapter 1.59" diameter-14 TPI with 1/2"-20 TPI and 3/8"-24 TPI stem adapter                                                                                                                  | Q5024 on Johnson Controls Valves               |
| <b>JU5024-NPTKIT/U</b> | Globe Valve Adapter kit for JCI NPT Valves (1/2" - 2") Includes JU5024-001, JU5024-003, JU5024-005 bonnet adapters only and 1 of 1/4"-28 TPI stem adapter                                           | Q5024 on Johnson Controls Valves               |
| <b>JU5024-FLGKIT/U</b> | Globe Valve Adapter kit for JCI Flange Valves (2.5" - 6") Includes JU5024-002, JU5024-004 bonnet adapters only and 1 of 3/8"-24 TPI and 1/2"-20 TPI stem adapter                                    | Q5024 on Johnson Controls Valves               |

# Accessories - Valves

## Pneumatic Valve Actuator Accessories

| Product Number        | Description                                                                                                                | Used With                    |
|-----------------------|----------------------------------------------------------------------------------------------------------------------------|------------------------------|
| <b>14002039-001/U</b> | MP953D Diaphragm Sleeve                                                                                                    | MP953B,D,F                   |
| <b>14002040-002/U</b> | MP953D Diaphragm                                                                                                           | MP953B,D,F                   |
| <b>14003124-002/U</b> | MP953B,D,F Diaphragm Repair Kit (includes 14002039-001 and 14002040-002)                                                   | MP953B,D,F                   |
| <b>14004138-001/U</b> | MP953B,F (Reverse Acting) Positive Positioner Retrofit Kit                                                                 | MP953B,F                     |
| <b>14004139-001/U</b> | MP953A,E (Direct Acting, 8 in. and 13 in. diameter, 3/4 in. stroke) Positive Positioner Retrofit Kit                       | MP953A,E                     |
| <b>14004140-001/U</b> | MP953A,E (Direct Acting, 8 in. and 13 in. diameter, 1-1/2 in. stroke) Positive Positioner Retrofit Kit                     | MP953A,E                     |
| <b>14004211-001/U</b> | MP953E (8 in. and 13 in. diameter, 3/4 in. stroke) Feedback Spring Kit                                                     | MP953E                       |
| <b>14004212-001/U</b> | MP953E (8 in. and 13 in. diameter, 1-1/2 in. stroke) Feedback Spring Kit                                                   | MP953E                       |
| <b>14004213-001/U</b> | MP953F (Reverse Acting) Feedback Spring Kit                                                                                | MP953F                       |
| <b>14004214-001/U</b> | MP953A,E (5 in. diameter) 3/4 inch stroke Positive Positioner Retrofit Kit                                                 | MP953A,E                     |
| <b>14004298-001/U</b> | Thread forming Screw, Size 4-40                                                                                            | MP953D,F                     |
| <b>14004298-003/U</b> | MP953C,E (5 in. dia.) and MP953B,D,F (7-1/8 in. dia.) Actuator Base Screw, size 1/4-20                                     | MP953B,D,F; MP953C,E (5 in.) |
| <b>14004577-001/U</b> | MP953 A, C, and E (Direct Acting, 5 in. diameter) Yoke/Base Assembly                                                       | MP953A,C,E                   |
| <b>14004578-001/U</b> | MP953 B, D, and F (Reverse Acting, 7-1/8 in. diameter) Yoke/Base Assembly                                                  | MP953B,D,F                   |
| <b>14004660-001/U</b> | Cup, aluminum die cast alloy 7 1/64 inch                                                                                   | MP953D                       |
| <b>14004667-001/U</b> | Offset Crank arm assembly with 2 screws (304725-062), nuts (14004102-001), crank arm (14004655-001) for 1/2 in. Drive Axle | Pneumatic Actuators          |
| <b>14004697-001/U</b> | Stem extension for 13 in. MP953C,E with 3/4 in. Stroke                                                                     | MP953C,E                     |
| <b>310664/U</b>       | MP953A, C and E (5 in. and 8 in. models only) Tension Spring                                                               | MP953A,C,E                   |
| <b>310665/0062/U</b>  | Spring Support for MP 953                                                                                                  | MP953A,C,E (5 in.)           |
| <b>310668/U</b>       | MP953A, C and E (5 in. diameter) High Temperature Silicone Diaphragm - Old Style                                           | MP953A,C,E                   |
| <b>311393/U</b>       | White Spring, 4- 11 psi                                                                                                    | MP953C,E                     |
| <b>311616/U</b>       | MP953A, C and E (5 in. diameter) Main Spring (2-7 psi sp ring range - Brown)                                               | MP953A,C,E (5 in.)           |
| <b>311618/U</b>       | MP953A, C and E (5 in. diameter) Main Spring (8-12 psi sp ring range - Gray)                                               | MP953A,C,E (5 in.)           |
| <b>311749/0605/U</b>  | Cup diaphragm, 8 in. for MP95 3A, C, E                                                                                     | MP953A,C,E (8 in.)           |
| <b>311750/U</b>       | MP953A, C and E (8 in. diameter) Regular Temperature Neoprene Diaphragm - New Style                                        | MP953A,C,E                   |
| <b>311851/0062/U</b>  | Stem extension for 8 in. dia. 3/4 in. stroke MP953A,C,E                                                                    | MP953A,C,E (8 in.)           |

# Accessories - Valves

## Pneumatic Valve Actuator Accessories

| Product Number        | Description                                                                               | Used With                 |
|-----------------------|-------------------------------------------------------------------------------------------|---------------------------|
| <b>311852/U</b>       | Brown Spring for MP953A,C 3/4 inch stroke (8 inch diameter), 2-7 psi range                | MP953A,C (8 in., 2-7 psi) |
| <b>311855/U</b>       | Gray spring for MP953C (8 inch diameter), 8-12 psi range                                  | MP953C                    |
| <b>311863/U</b>       | Stem Retainer for the MP953C,E (8 in. diameter)                                           | MP953C,E                  |
| <b>312099/U</b>       | 1-1/2 in. stroke Spider for 13 in. MP953C and E                                           | MP953C,E                  |
| <b>312203/U</b>       | Black Spring for MP953D,F for 8-13 psi range                                              | MP953D,F                  |
| <b>312466/0605/U</b>  | Stem Extension for MP953C1489, MP953C1471, MP953E1392, MP953E1400, and MP953E1418         | MP953C,E                  |
| <b>312471/U</b>       | White Spring for MP953C,E (13 in. dia. 1/2 in. stroke)                                    | MP953C,E (13 in.)         |
| <b>312505/U</b>       | MP953A,C,E (13 in. diameter) regular temperature Neoprene diaphragm - New style           | MP953A,C,E                |
| <b>312817/U</b>       | MP953A,C,E (5 in. diameter) regular temperature Neoprene diaphragm - New style            | MP953A,C,E                |
| <b>313745/U</b>       | MP953 (5 in. diameter) Cover                                                              | MP953C (5 in.)            |
| <b>314153/U</b>       | MP953A, C and E (8 in. diameter) High Temperature Silicone Diaphragm - New Style          | MP953A,C,E                |
| <b>314646A/0062/U</b> | Plate, Spring for 13 in. diameter MP953A,C,E                                              | MP953A,C,E                |
| <b>314683/0062/U</b>  | Stem Retainer for 13 in. diameter MP953A,C,E (Latches on Stem Button)                     | MP953A,C,E (13 in.)       |
| <b>315020/U</b>       | Cup for MP953C,E (13 inch diameter)                                                       | MP953C,E (13 in.)         |
| <b>316059A/U</b>      | MP953B, D and F (Reverse Acting) Yoke Assembly for Support Assembly- with helicoil insert | MP953B,D,F                |



# Economizer Selection

The JADE™ economizer doesn't heat or cool anything. It simply brings in outdoor air to naturally lower a building's interior temperature. You don't need a certified programmer or installer to set up and operate the JADE economizer. JADE is designed to work seamlessly with existing and future roof top systems. The LCD screen delivers continuous messages, important diagnostics and system status.

## Section 3: Economizers

JADE™ Economizer Controller W7220

|                         |     |
|-------------------------|-----|
| Product Selection ..... | 228 |
| Submittal Data .....    | 229 |
| Wiring Diagrams .....   | 230 |

# Product Selection - JADE™ Economizer

## W7220



JADE economizers make energy saving easier for your customers. For buildings with less than 100,000 sq ft and stand-alone rooftop unit applications JADE delivers fresh air ventilation and energy savings. It is packed with features you'd expect in more expensive units, but it can be installed and configured by technicians without significant training.

- LCD screen delivers continuous messages, diagnostics and system status
- Color-coded wiring terminals make wiring easy
- Built-in freeze protection closes outdoor dampers to protect coils when outdoor temperatures drop
- Two-wire Sylk® bus communications enable simple wiring and enhanced diagnostics
- Demand control ventilation (DCV) saves energy with clean outside air without over ventilating and conditioning excess air
- UL Listed
- Title 24 and IECC2015 compliant

| CONFIGURATION                                                              | Y-PACK PART NUMBER | CONTAINED IN Y-PACK |                 |               |                 |                 |
|----------------------------------------------------------------------------|--------------------|---------------------|-----------------|---------------|-----------------|-----------------|
|                                                                            |                    | ACTUATOR            | JADE ECONOMIZER | MOUNTING KIT  | DRY BULB SENSOR | ENTHALPY SENSOR |
| Diamond Communicating Actuator 27 lb-in (3 Nm), Foot-mount, Dry Bulb(Bulb) | Y7220AJ3104        | MS3103J1022         | W7220A1000      | DIAM-CRK-01   | C7250A1001 X 2  | -               |
| Diamond Communicating Actuator 27 lb-in (3 Nm), Foot-mount, Enthalpy       | Y7220SJ3104        | MS3103J1022         | W7220A1000      | DIAM-CRK-01   | C7250A1001 X 1  | C7400S1000 X 1  |
| Diamond Communicating Actuator 27 lb-in (3 Nm), Direct Coupled, Dry Bulb   | YL7220AJ3104       | MS3103J1022         | W7220A1000      | 32336707-001* | C7250A1001 X 2  | -               |
| Diamond Communicating Actuator 27 lb-in (3 Nm), Direct Coupled, Enthalpy   | YL7220SJ3104       | MS3103J1022         | W7220A1000      | 32336707-001* | C7250A1001 X 1  | C7400S1000 X 1  |
| Communicating Actuator 44 lb-in (5 Nm), Direct Coupled, Dry Bulb           | YL7220AJ3105       | MS3105J3030         | W7220A1000      | -             | C7250A1001 X 2  | -               |
| Communicating Actuator 44 lb-in (5 Nm), Direct Coupled, Enthalpy           | YL7220SJ3105       | MS3105J3030         | W7220A1000      | -             | C7250A1001 X 1  | C7400S1000 X 1  |

\*Not for sale separately

| CONTROLLER             | PART NUMBER |
|------------------------|-------------|
| PCMOD Interface Module | W7220-PCMOD |



PCMOD Interface Module

| ECONOMIZER SENSORS                          | PART NUMBER |
|---------------------------------------------|-------------|
| Mixed Air or Outdoor Air Temperature Sensor | C7250A1001  |
| Outdoor Air or Return Air Enthalpy Sensor   | C7400S1000  |



Economizer Sensors

| DEMAND CONTROLLED VENTILATION SENSORS | PART NUMBER |
|---------------------------------------|-------------|
| CO2 - Wall Mount w/Display            | C7233A1008  |
| CO2 - Wall Mount, no Display          | C7233A1016  |
| CO2 - Duct Mount w/Display            | C7232B1006  |
| CO2 - Duct Mount, no Display          | C7232B1014  |



C7233A/C7263A CO<sub>2</sub> Sensors

The JADE™ Economizer System is an expandable economizer control system, which includes a W7220 Economizer controller with an LCD and keypad. The W7220 can be configured with optional sensors. The W7220 controller is used as a standalone economizer wired directly to a commercial set back thermostat and sensors to provide Outdoor Air dry-bulb economizer control. Optional Sylk bus sensors can be connected to the controller for single or differential enthalpy control. An additional Return Air Sylk bus sensor can be added for differential dry bulb control.

### SPECIFICATIONS

#### Electrical

|                                                                                          |                                                                                                   |
|------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|
| Rated Voltage.....                                                                       | 20 to 30 Vac; 50/60 Hz Transformer:<br>100 VA maximum                                             |
| Nominal Power Consumption<br>(at 24 Vac, 60 Hz) .....                                    | 11.5 VA without sensors or actuators                                                              |
| Relay Digital Output Rating at<br>30 Vac (maximum power from Class<br>2 input only)..... | 1.5A run;<br>3.5A inrush @ 0.45PF (200,000<br>cycles) or 7.5A inrush @ 0.45PF<br>(100,000 cycles) |
| External Sensors Power Output.....                                                       | 21 Vdc +/- 5% @ 48mA                                                                              |

#### IMPORTANT

*All inputs and outputs must be Class 2 wiring.*

#### Inputs: sensors

|                                                                             |                                                                                                                                           |
|-----------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| Dry Bulb Temperature (optional) and<br>Mixed Air (required),<br>C7250A..... | 2-wire (18 to 22 AWG);<br>Temperature range -40 to 150 °F<br>(-40 to 65 °C). Temperature accuracy<br>-0°F/+2°F                            |
| Temperature and Humidity,<br>C7400S1000 (optional).....                     | Temperature: range -40 to 150 °F<br>(-40 to 65 °C)<br>Temperature accuracy -0°F/+2°F<br>Humidity: range 0 to 100% RH with<br>5% accuracy. |

**NOTE: Up to three (3) SYLK Bus sensors may be connected to the JADE™ Economizer controller: outdoor air (OA), return air (RA) and discharge (supply) air (DA).**

|                                                         |                                                             |
|---------------------------------------------------------|-------------------------------------------------------------|
| DCV (CO <sub>2</sub> ) Sensor (C7232 or<br>C7632) ..... | 2-10 Vdc control signal;                                    |
| 4 Binary Inputs .....                                   | 1-wire 24 Vac + common GND<br>24 Vac power supply: 50/60Hz; |

#### Outputs

|                                         |                                                                                 |
|-----------------------------------------|---------------------------------------------------------------------------------|
| Actuator signal .....                   | 2-10 Vdc; Sylkbus output for<br>Honeywell Sylkbus communicating<br>actuators.   |
| Exhaust fan, Y1, Y2 and<br>AUX1 O ..... | All Relay Outputs (at 30 Vac):<br>Running: 1.5A maximum Inrush:<br>7.5A maximum |

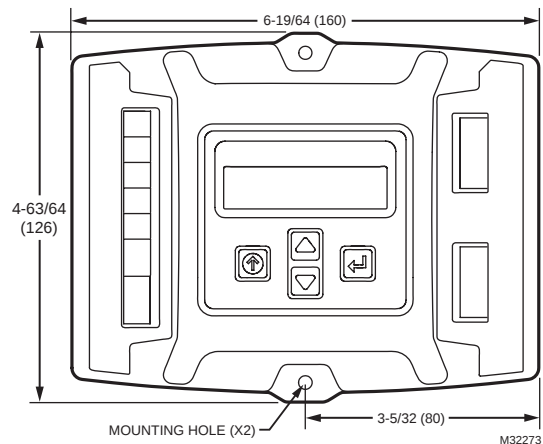
#### Environmental

|                             |                                                                                            |
|-----------------------------|--------------------------------------------------------------------------------------------|
| Operating Temperature ..... | -40 to 150 °F (-40 to 65 °C).                                                              |
| Storage Temperature .....   | -40 to 150 °F (-40 to 65 °C)                                                               |
| Shipping Temperature.....   | -40 to 150 °F (-40 to 65 °C)                                                               |
| Relative Humidity.....      | 5% to 95% RH non-condensing                                                                |
| Dimensions.....             | Height: 4.98 inches (126.4 mm)<br>Width: 6.3 inches (160 mm)<br>Depth: 1.34 inches (34 mm) |
| Weight.....                 | 0.58 lb. (0.265 kg)                                                                        |
| Approvals .....             | UL listed (XAPX) for USA and<br>Canada.                                                    |

### FEATURES

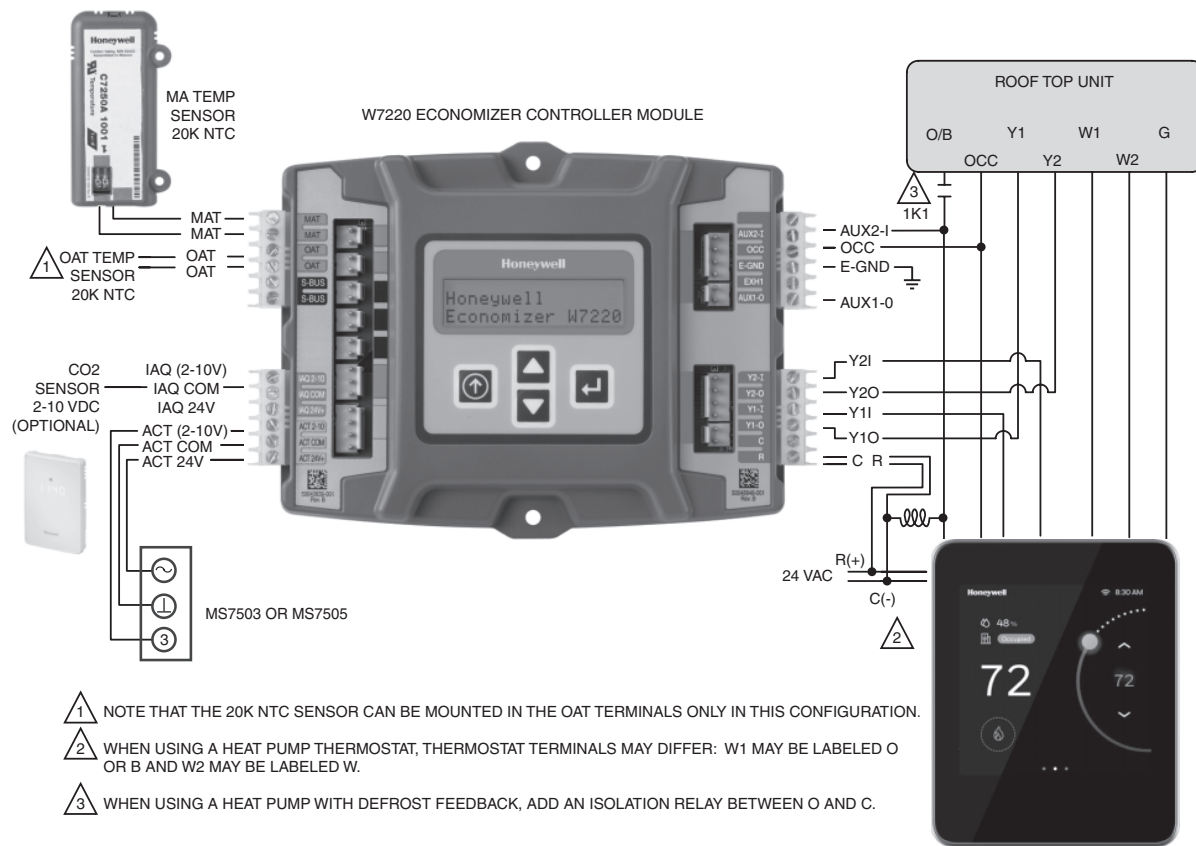
- LCD Screen delivers continuous messages, important diagnostics feedback and system status.
- Color-coded wiring terminals help with easy installation.
- Built-in freeze protection closes the outdoor dampers to protect coils when temperatures drop.
- Two-wire Sylk™ bus communications enable simple integration and future expansion.
- On-board fault detection and diagnostics quickly identify sensor failures or loss of communication, saving time on service and commissioning.

### DIMENSIONS DIAGRAM



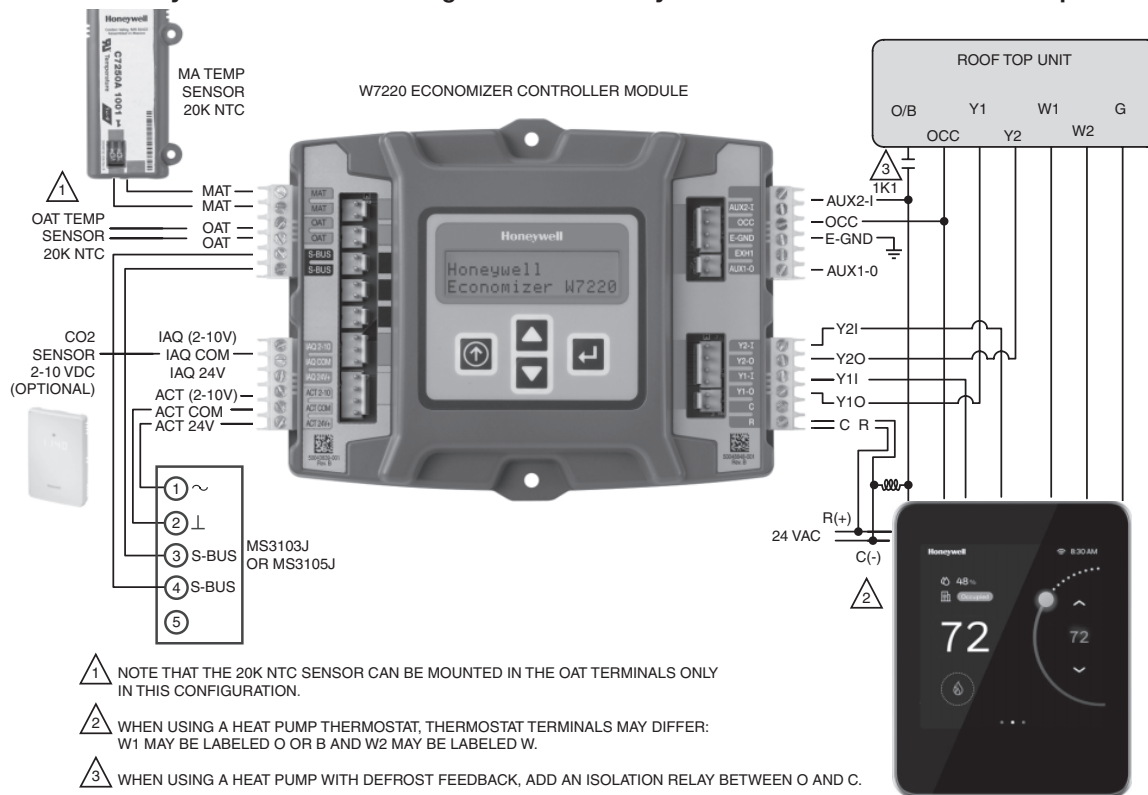
# Wiring Diagrams - JADE Economizer

## W7220



M32564F

**Fig 1. Standalone dry bulb Economizer configuration with Honeywell MS7503 or MS7505 Direct Coupled Actuator.**



M32650F

**Fig 2. Standalone dry bulb Economizer configuration with Honeywell MS3103J or MS3105J communicating actuators.**

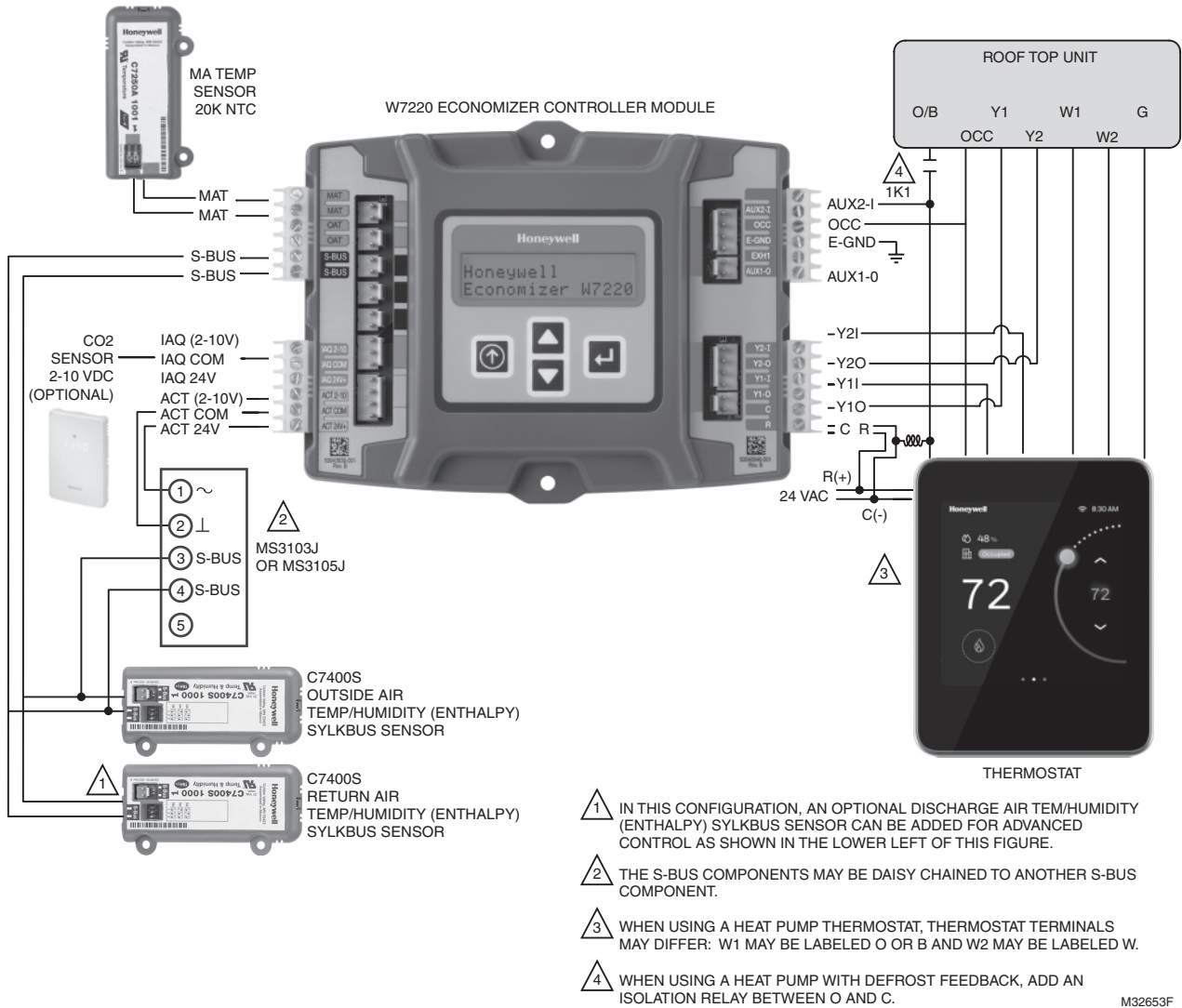


Fig 3. Economizer with Sylk bus sensor for enthalpy configuration with Honeywell MS3103 or MS3105 communicating actuators.

# Wiring Diagrams - JADE Economizer

## W7220

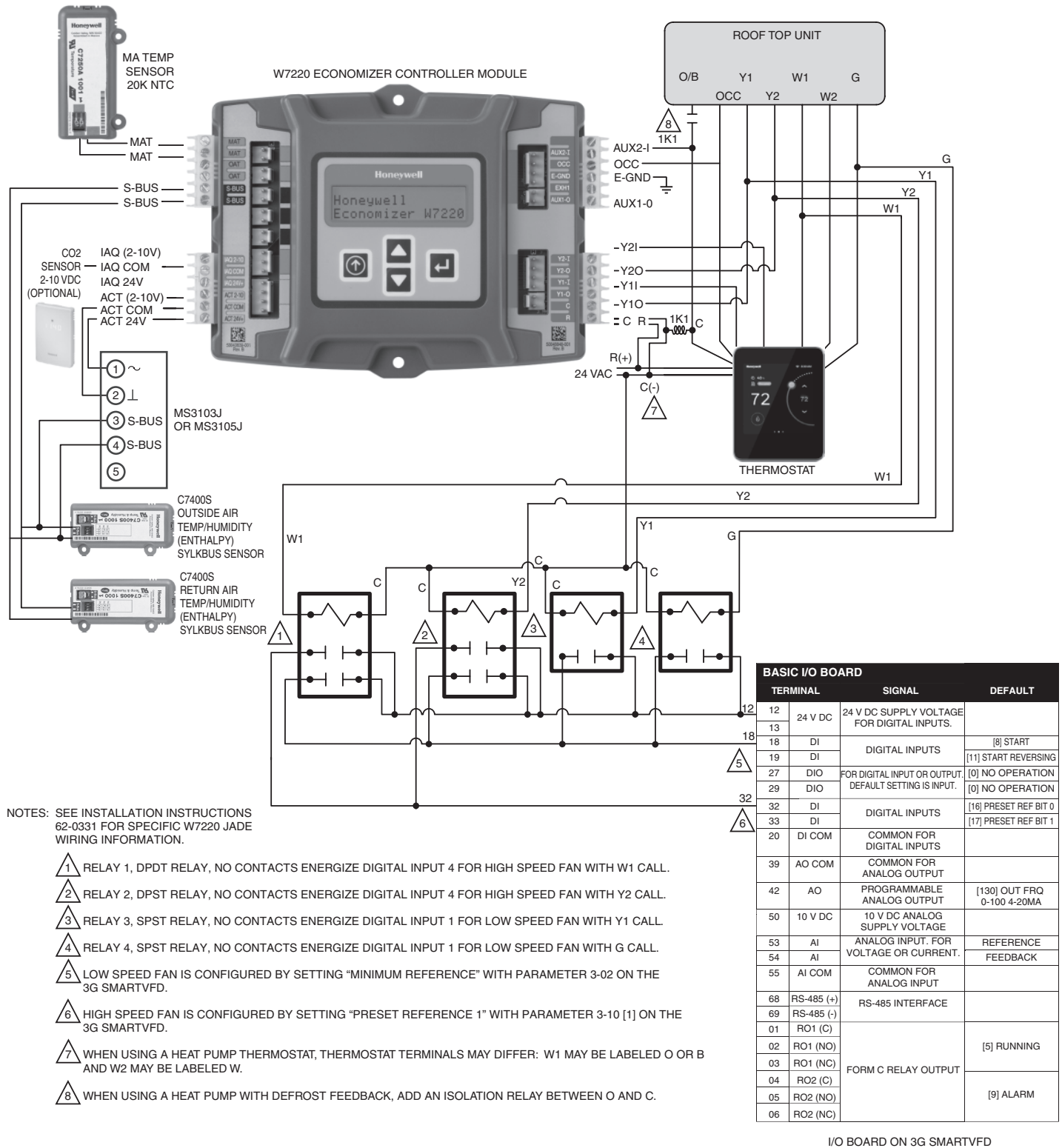


Fig 4. W7220 JADE™ wired to a TC500, communicating actuator, CO2 and 3G SmartVFD.

# Variable Frequency Drives Selection

To pick the right drive for your motor application, first make sure that the motor is capable of handling the additional heat that is created when varying the speed of the drive with a frequency drive. Check the motor nameplate to make sure that the insulation class is F, H or higher. Older motors with class A or B insulation should not be used with a VFD.

From the motor nameplate you will need the following information: Hertz (50 or 60), Volts, Full Load Amps, Phases of power (single or 3-phase), and RPM.

## Pick the Right VFD for the Application

- Drives are typically sized to match the horsepower rating of the motor, which will be accurate 95 percent of the time. But for greatest accuracy, drives should be sized based on the Full Load Amps or current draw of the motor. The VFD must have a slightly larger output current rating.
- The environment the drive will operate in is critical for selection. Honeywell offers NEMA 1 and NEMA 12 (for dusty, dirtier environments).
- Because of the complexity of VFDs, a clean, conditioned space with temperatures between 14° F and 104° F provides an environment for ideal operation. Some drives are rated as standard for a slightly larger temperature range as noted herein.
  - o VFDs can be de-rated for operation at higher temperatures and/or high altitudes within limits. See specific drive family for de-rating calculations. De-rating for altitude and ambient temperature is cumulative.

Determine specific building requirements in regards to harmonics, RFI filtration, etc. Local codes and or jobsite requirements will vary driven by building electrical requirements and requirements by the utility for the condition of power at the point of common coupling to the building.

## Section 4: Variable Frequency Drives

|                                  |     |
|----------------------------------|-----|
| 3G SmartVFD                      |     |
| Product Selection .....          | 234 |
| Submittal Data .....             | 235 |
| SmartVFD HVAC2 Standalone Drives |     |
| Product Selection .....          | 239 |
| Submittal Data .....             | 241 |
| Wiring Diagrams .....            | 242 |
| Accessories .....                | 240 |

# Product Selection - VFDs

## 3G SmartVFD



The 3G SmartVFD is the 3rd generation of SmartVFD variable frequency drives designed specifically for use in HVAC applications. Designed to control any HVAC pump or fan application to maximize system reliability and energy efficiency.

SmartVFD will efficiently operate 3-phase induction, permanent magnet, and highefficiency synchronous reluctance motors. The 3G SmartVFD is easy to install, communicates effectively with building control systems to minimize energy consumption.

### FEATURES

#### Easy Communication

- Start-up Wizards
- Graphic Interface
- Embedded Communications
- Dedicated for HVAC
- Built-in logic

#### Built-in Protection

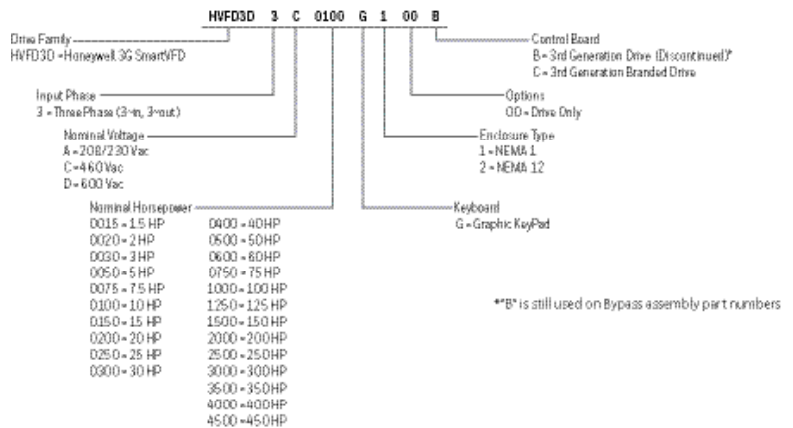
- DC-link reactor
- Fire override mode
- Enclosure classes NEMA 1 or NEMA 12
- Overvoltage/undervoltage trip protection
- Mains and motor phase supervisions
- Overcurrent and overtemperature protection
- Motor overload, stall, and underload protection
- Short-circuit protection

#### Smart Technology

- 6-pulse IGBT, PWM technology
- Back-channel cooling
- Real-Time Clock
- >98% Displacement Power Factor Rating
- 98% Efficiency at full load
- 0-590Hz output frequency capabilities

#### Compliance

- 100KA SCCR (Short-Circuit Current Rating) compliant
- EN 61000-3-12 compliant
- EN 61800-3 Category C1, C2 and C3
- RoHS compliant
- Optional EMC Filter on many models



### 3G SmartVFD Technical Data

| POWER CHARACTERISTICS                     |                                                                                                                                                                                                        |
|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| LINE POWER SUPPLY (L1, L2, L3)            |                                                                                                                                                                                                        |
| Supply Voltage                            | Nominal 208/230 V AC: 200 to 240 V AC $\pm 10\%$<br>Nominal 460 V AC: 380 to 280 V AC $\pm 10\%$<br>Nominal 600 V AC: 525 to 600 V AC $\pm 10\%$ (Frame A, B, C), 525 to 690 V AC $\pm 10\%$ (Frame D) |
| Supply Frequency                          | 50/60 Hz $\pm 5\%$                                                                                                                                                                                     |
| True Power Factor ( $\lambda$ )           | $\geq 0.9$ nominal at rated load                                                                                                                                                                       |
| Displacement power factor ( $\cos \phi$ ) | Near unity ( $> 0.98$ )                                                                                                                                                                                |
| Switching on input supply L1, L2, L3      | Frame A, B, C: up to 10 HP maximum 2 times/min, greater than 10 HP maximum 1 time/min<br>Frame D: maximum 1 time/2 min                                                                                 |
| Environment according to EN60664-1        | Overvoltage category III/pollution degree 2                                                                                                                                                            |
| MOTOR OUTPUT (U, V, W)                    |                                                                                                                                                                                                        |
| Output voltage                            | 0-100% of supply voltage                                                                                                                                                                               |
| Output frequency                          | 0-590 Hz                                                                                                                                                                                               |
| Switching on output                       | Unlimited                                                                                                                                                                                              |
| Ramp times                                | 1-3600 s                                                                                                                                                                                               |

| AMBIENT ENVIRONMENT                                     |                                                                  |
|---------------------------------------------------------|------------------------------------------------------------------|
| OPERATING ENVIRONMENT                                   |                                                                  |
| Ambient temperature                                     | Max 122°F [50°C]<br>(24-hour average maximum 113°F [45°C])       |
| Minimum ambient temperature during full-scale operation | 32°F [0°C]                                                       |
| Minimum ambient temperature at reduced performance      | 14°F [-10°C]                                                     |
| Temperature during storage/transport                    | -13°-+149/158°F [-25°-+65/70°C]                                  |
| Max. relative Humidity                                  | 5%-93% (IEC 721-3-3; Class 3K3 (noncondensing) during operation) |
| Maximum altitude above sea level without derating       | 3,300 ft [1000 m]                                                |
| Vibration Test                                          | 1.0 g                                                            |
| Enclosure Ratings NEMA1/IP21 (All Frame Sizes)          | NEMA12/IP55 (Frame A, B, C) NEMA12/IP54 (Frame D)                |
| Aggressive environment (IEC 60068-2-43) H2S test        | class Kd                                                         |
| EMC Standards, Emission                                 | EN 61800-3                                                       |
| EMC standards, Immunity                                 | EN 61800-3                                                       |

| I/O CHARACTERISTICS                   |                                                                                       |
|---------------------------------------|---------------------------------------------------------------------------------------|
| DIGITAL INPUTS                        |                                                                                       |
| Programmable digital inputs           | 4 fixed DI, 2 configurable DIO (6) total                                              |
| Terminal number                       | 18, 19, 27, 29, 32, 33                                                                |
| Logic                                 | PNP or NPN                                                                            |
| Voltage level                         | 0-24 V DC                                                                             |
| Voltage level, logic '0' PNP          | <5 V DC                                                                               |
| Voltage level, logic '1' PNP          | >10 V DC                                                                              |
| Voltage level, logic '0' NPN          | >19 V DC                                                                              |
| Voltage level, logic '1' NPN          | <14 V DC                                                                              |
| Maximum voltage on input              | 28 V DC                                                                               |
| Input resistance, Ri                  | Approx. 4 kΩ                                                                          |
| ANALOG INPUTS                         |                                                                                       |
| Number of analog inputs               | 2                                                                                     |
| Terminal number                       | 53, 54                                                                                |
| Modes                                 | Voltage or current                                                                    |
| Mode select                           | Frame A, B, C: Switch S201 and switch S202 Frame D: Switch A53 and A54                |
| Voltage mode                          | Switch = OFF (U)                                                                      |
| Voltage level                         | -10 to +10 V (scalable)                                                               |
| Input resistance, Ri                  | Approximately 10 kΩ                                                                   |
| Max. voltage                          | ±20 V                                                                                 |
| Current mode                          | Switch = ON (I)                                                                       |
| Current level                         | 0/4 to 20 mA (scalable)                                                               |
| Input resistance, Ri                  | Approximately 200 Ω                                                                   |
| Max. current                          | 30 mA                                                                                 |
| Resolution for analog inputs          | 10 bit (+ sign)                                                                       |
| Accuracy of analog inputs             | Max. error 0.5% of full scale                                                         |
| Bandwidth                             | 100 Hz                                                                                |
| PULSE INPUTS                          |                                                                                       |
| Programmable pulse                    | 2                                                                                     |
| Terminal number pulse                 | 29, 33                                                                                |
| Max. Frequency at terminal 29, 33     | 110 kHz (pushpull driven)                                                             |
| Max. Frequency at terminal 29, 33     | 5 kHz (open collector)                                                                |
| Max. Frequency at terminal 29, 33     | 4 Hz                                                                                  |
| Voltage level                         | See digital inputs                                                                    |
| Maximum voltage on input              | 28 V DC                                                                               |
| Input resistance, Ri                  | Approx. 4 kΩ                                                                          |
| Pulse input accuracy (0.1-1 kHz)      | Max. error: 0.1% of full scale                                                        |
| ANALOG OUTPUTS                        |                                                                                       |
| Number of programmable analog outputs | 1                                                                                     |
| Terminal number                       | 42                                                                                    |
| Current range at analog output        | 0/4-20 mA                                                                             |
| Max. load GND - analog output         | 500 Ω                                                                                 |
| Accuracy on analog output             | Frame A, B, C: Max. error: 0.5% of full scale Frame D: Max. error: 0.8% of full scale |
| Resolution on analog output           | 8 bit                                                                                 |

| DIGITAL OUTPUT                                           |                                                                                                               |
|----------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|
| Programmable digital/pulse outputs                       | 2 configurable DIO                                                                                            |
| Terminal number                                          | 27, 29                                                                                                        |
| Voltage level at digital/frequency output                | 0-24 V                                                                                                        |
| Max. output current (sink or source)                     | 40 mA                                                                                                         |
| Max. load at frequency output                            | 1 kΩ                                                                                                          |
| Max. capacitive load at frequency output                 | 10 nF                                                                                                         |
| Minimum output frequency at frequency output             | 0 Hz                                                                                                          |
| Maximum output frequency at frequency output             | 32 kHz                                                                                                        |
| Accuracy of frequency output                             | Max. error: 0.1% of full scale                                                                                |
| Resolution of frequency outputs                          | 12 bit                                                                                                        |
| RELAY OUTPUTS                                            |                                                                                                               |
| Programmable relay outputs                               | 2                                                                                                             |
| Environment according to EN 60664-1                      | Overvoltage category III/pollution degree 2                                                                   |
| Relay 01 (Frame A, B, C)                                 |                                                                                                               |
| Terminal number                                          | 1-2 (NO), 1-3 (NC)                                                                                            |
| Maximum terminal load, 1-2 (NO) and 1-3 (NC)             | 240 V AC, 2A, Resistive 240 V AC, 0.2A, Inductive @ cosφ 0.4 60 V DC, 1 A, Resistive 24 V DC, 0.1A, Inductive |
| Minimum terminal load, 1-2 (NO) and 1-3 (NC)             | 24 V DC, 10 mA 24 V AC, 2 mA                                                                                  |
| Relay 01 (Frame D)                                       |                                                                                                               |
| Terminal number                                          | 1-2 (NO), 1-3 (NC)                                                                                            |
| Maximum terminal load, 1-2 (NO)                          | 400 V AC, 2A, Resistive 240 V AC, 0.2A, Inductive @ cosφ 0.4 80 V DC, 1 A, Resistive 24 V DC, 0.1A, Inductive |
| Maximum terminal load, 1-3 (NC)                          | 240 V AC, 2A, Resistive 240 V AC, 0.2A, Inductive @ cosφ 0.4 60 V DC, 1 A, Resistive 24 V DC, 0.1A, Inductive |
| Minimum terminal load, 1-2 (NO) and 1-3 (NC)             | 24 V DC, 10 mA 24 V AC, 2 mA                                                                                  |
| Relay 02 (All Frame Sizes)                               |                                                                                                               |
| Terminal number                                          | 4-5 (NO), 4-6 (NC)                                                                                            |
| Maximum terminal load, 4-5 (NO)                          | 400 V AC, 2A, Resistive 240 V AC, 0.2A, Inductive @ cosφ 0.4 80 V DC, 1 A, Resistive 24 V DC, 0.1A, Inductive |
| Maximum terminal load, 4-6 (NC)                          | 240 V AC, 2A, Resistive 240 V AC, 0.2A, Inductive @ cosφ 0.4 60 V DC, 1 A, Resistive 24 V DC, 0.1A, Inductive |
| Minimum terminal load, 4-5 (NO) and 4-6 (NC)             | 24 V DC, 10 mA 24 V AC, 2 mA                                                                                  |
| CONTROL CARD                                             |                                                                                                               |
| RS-485 serial communication                              |                                                                                                               |
| Terminal number 68                                       | (P,TX+, RX+), 69 (N,TX-, RX-)                                                                                 |
| Terminal number 61                                       | Common for terminals 68 and 69                                                                                |
| 24 V DC output                                           |                                                                                                               |
| Terminal number                                          | 12, 13                                                                                                        |
| Output voltage                                           | 24 V +1, -3 V                                                                                                 |
| Max. load                                                | 200 mA                                                                                                        |
| 10 V DC output                                           |                                                                                                               |
| Terminal number                                          | 50                                                                                                            |
| Output voltage                                           | 10.5 V ±0.5 V                                                                                                 |
| Max. load                                                | 15 mA                                                                                                         |
| USB serial communication                                 |                                                                                                               |
| USB standard                                             | 1.1 (full speed)                                                                                              |
| USB plug                                                 | USB type B device plug                                                                                        |
| CONTROL CHARACTERISTICS                                  |                                                                                                               |
| Resolution of output frequency at 0-590 Hz               | ± 0.003 Hz                                                                                                    |
| Repeat accuracy of Precise start/stop (terminals 18, 19) | ≤± 0.1 ms                                                                                                     |
| System response time (terminals 18, 19, 27, 29, 32, 33)  | ≤ 2 ms                                                                                                        |
| Speed control range (open-loop)                          | 1:100 of synchronous speed                                                                                    |
| Speed accuracy (open-loop)                               | 30-4000 rpm: error ± 8 rpm                                                                                    |

# Product Selection - VFDs

## 3G SmartVFD

### Weight And Dimensions

| 208/230 V AC MODELS WEIGHTS AND DIMENSIONS |             |                   |           |       |                    |              |             |             |
|--------------------------------------------|-------------|-------------------|-----------|-------|--------------------|--------------|-------------|-------------|
| HP                                         | CURRENT (A) | MODEL             | ENCLOSURE | FRAME | OVERALL DIMENSIONS |              |             |             |
|                                            |             |                   |           |       | WIDTH (IN.)        | HEIGHT (IN.) | DEPTH (IN.) | WEIGHT (LB) |
| 1.5                                        | 6.6         | HVFDSD3A0015G100C | NEMA 1    | A2    | 3.5                | 14.7         | 8.1         | 11.7        |
| 2                                          | 7.5         | HVFDSD3A0020G100C |           |       |                    |              |             |             |
| 3                                          | 10.6        | HVFDSD3A0030G100C |           |       |                    |              |             |             |
| 5                                          | 16.7        | HVFDSD3A0050G100C |           | A3    | 5.3                | 14.7         | 8.1         | 15.5        |
| 7.5                                        | 24.2        | HVFDSD3A0075G100C |           |       |                    |              |             |             |
| 10                                         | 30.8        | HVFDSD3A0100G100C |           | B1    | 9.6                | 19.5         | 10.3        | 51.0        |
| 15                                         | 46.2        | HVFDSD3A0150G100C |           |       |                    |              |             |             |
| 20                                         | 59.4        | HVFDSD3A0200G100C |           | B2    | 9.6                | 26.1         | 10.3        | 59.6        |
| 25                                         | 74.8        | HVFDSD3A0250G100C |           |       |                    |              |             |             |
| 30                                         | 88          | HVFDSD3A0300G100C |           | C1    | 12.2               | 27.3         | 12.2        | 99.2        |
| 40                                         | 115         | HVFDSD3A0400G100C |           |       |                    |              |             |             |
| 50                                         | 143         | HVFDSD3A0500G100C |           | C2    | 14.6               | 30.7         | 13.2        | 143.3       |
| 60                                         | 170         | HVFDSD3A0600G100C |           |       |                    |              |             |             |
| 75                                         | 190         | HVFDSD3A0750G100C |           | D1    | 12.8               | 35.2         | 14.9        | 137.0       |
| 100                                        | 240         | HVFDSD3A1000G100C |           |       |                    |              |             |             |
| 125                                        | 302         | HVFDSD3A1250G100C |           | D2    | 16.5               | 41.3         | 14.9        | 276.0       |
| 150                                        | 361         | HVFD3D3A1500G100C |           |       |                    |              |             |             |
| 200                                        | 443         | HVFD3D3A2000G100C |           |       |                    |              |             |             |
| 1.5                                        | 6.6         | HVFDSD3A0015G200C | NEMA 12   | A5    | 9.5                | 16.5         | 7.9         | 29.8        |
| 2                                          | 7.5         | HVFDSD3A0020G200C |           |       |                    |              |             |             |
| 3                                          | 10.6        | HVFDSD3A0030G200C |           |       |                    |              |             |             |
| 5                                          | 16.7        | HVFDSD3A0050G200C |           | B1    | 9.6                | 19.0         | 10.3        | 51.0        |
| 7.5                                        | 24.2        | HVFDSD3A0075G200C |           |       |                    |              |             |             |
| 10                                         | 30.8        | HVFDSD3A0100G200C |           |       |                    |              |             |             |
| 15                                         | 46.2        | HVFDSD3A0150G200C |           | B2    | 9.6                | 25.7         | 10.3        | 59.6        |
| 20                                         | 59.4        | HVFDSD3A0200G200C |           |       |                    |              |             |             |
| 25                                         | 74.8        | HVFDSD3A0250G200C |           |       |                    |              |             |             |
| 30                                         | 88          | HVFDSD3A0300G200C |           | C1    | 12.2               | 27.0         | 12.2        | 99.2        |
| 40                                         | 115         | HVFDSD3A0400G200C |           |       |                    |              |             |             |
| 50                                         | 143         | HVFDSD3A0500G200C |           |       |                    |              |             |             |
| 60                                         | 170         | HVFDSD3A0600G200C |           | C2    | 14.6               | 30.2         | 13.2        | 143.3       |
| 75                                         | 190         | HVFDSD3A0750G200C |           |       |                    |              |             |             |
| 100                                        | 240         | HVFDSD3A1000G200C |           |       |                    |              |             |             |
| 125                                        | 302         | HVFDSD3A1250G200C |           | D1    | 12.8               | 35.2         | 14.9        | 137.0       |
| 150                                        | 361         | HVFD3D3A1500G200C |           |       |                    |              |             |             |
| 200                                        | 443         | HVFD3D3A2000G200C |           |       |                    |              |             |             |

| 460 V AC MODELS WEIGHTS AND DIMENSIONS |             |                   |           |         |                    |              |             |             |
|----------------------------------------|-------------|-------------------|-----------|---------|--------------------|--------------|-------------|-------------|
| HP                                     | CURRENT (A) | MODEL             | ENCLOSURE | FRAME   | OVERALL DIMENSIONS |              |             |             |
|                                        |             |                   |           |         | WIDTH (IN.)        | HEIGHT (IN.) | DEPTH (IN.) | WEIGHT (LB) |
| 1.5                                    | 2.7         | HVFD3D3C0015G100C | NEMA 1    | A2      | 3.5                | 14.7         | 8.1         | 12.1        |
| 2                                      | 3.4         | HVFD3D3C0020G100C |           |         |                    |              |             |             |
| 3                                      | 4.8         | HVFD3D3C0030G100C |           |         |                    |              |             |             |
| 5                                      | 8.2         | HVFD3D3C0050G100C |           |         |                    |              |             |             |
| 7.5                                    | 11          | HVFD3D3C0075G100C |           | A3      | 5.3                | 14.7         | 8.1         | 16.5        |
| 10                                     | 14.5        | HVFD3D3C0100G100C |           |         |                    |              |             |             |
| 15                                     | 21          | HVFD3D3C0150G100C |           | B1      | 9.6                | 19.5         | 10.3        | 50.7        |
| 20                                     | 27          | HVFD3D3C0200G100C |           |         |                    |              |             |             |
| 25                                     | 34          | HVFD3D3C0250G100C |           | B2      | 9.6                | 26.1         | 10.3        | 59.5        |
| 30                                     | 40          | HVFD3D3C0300G100C |           |         |                    |              |             |             |
| 40                                     | 52          | HVFD3D3C0400G100C |           | C1      | 12.2               | 27.3         | 12.2        | 99.2        |
| 50                                     | 65          | HVFD3D3C0500G100C |           |         |                    |              |             |             |
| 60                                     | 80          | HVFD3D3C0600G100C |           | C2      | 14.6               | 30.7         | 13.2        | 143.3       |
| 75                                     | 105         | HVFD3D3C0750G100C |           |         |                    |              |             |             |
| 100                                    | 130         | HVFD3D3C1000G100C |           | D1      | 12.8               | 35.2         | 14.9        | 137         |
| 125                                    | 160         | HVFD3D3C1250G100C |           |         |                    |              |             |             |
| 150                                    | 190         | HVFD3D3C1500G100C |           | D2      | 16.5               | 41.3         | 14.9        | 276         |
| 200                                    | 240         | HVFD3D3C2000G100C |           |         |                    |              |             |             |
| 250                                    | 302         | HVFD3D3C2500G100C |           | NEMA 12 | A5                 | 16.5         | 7.9         | 29.8        |
| 300                                    | 361         | HVFD3D3C3000G100C |           |         |                    |              |             |             |
| 350                                    | 443         | HVFD3D3C3500G100C |           |         |                    |              |             |             |
| 450                                    | 535         | HVFD3D3C4500G100C |           |         |                    |              |             |             |
| 1.5                                    | 2.7         | HVFD3D3C0015G200C |           | A5      | 9.5                | 19           | 10.3        | 51          |
| 2                                      | 3.4         | HVFD3D3C0020G200C |           |         |                    |              |             |             |
| 3                                      | 4.8         | HVFD3D3C0030G200C |           |         |                    |              |             |             |
| 5                                      | 8.2         | HVFD3D3C0050G200C |           |         |                    |              |             |             |
| 7.5                                    | 11          | HVFD3D3C0075G200C |           | B1      | 9.5                | 25.7         | 10.3        | 59.6        |
| 10                                     | 14.5        | HVFD3D3C0100G200C |           |         |                    |              |             |             |
| 15                                     | 21          | HVFD3D3C0150G200C |           | B2      | 9.5                | 27           | 12.2        | 99.2        |
| 20                                     | 27          | HVFD3D3C0200G200C |           |         |                    |              |             |             |
| 25                                     | 34          | HVFD3D3C0250G200C |           | C1      | 12.1               | 30.2         | 13.2        | 143.3       |
| 30                                     | 40          | HVFD3D3C0300G200C |           |         |                    |              |             |             |
| 40                                     | 52          | HVFD3D3C0400G200C |           | C2      | 14.6               | 35.2         | 14.9        | 137         |
| 50                                     | 65          | HVFD3D3C0500G200C |           |         |                    |              |             |             |
| 60                                     | 80          | HVFD3D3C0600G200C |           | D1      | 12.8               | 41.3         | 14.9        | 276         |
| 75                                     | 105         | HVFD3D3C0750G200C |           |         |                    |              |             |             |
| 100                                    | 130         | HVFD3D3C1000G200C |           | D2      | 16.5               | 41.3         | 14.9        | 276         |
| 125                                    | 160         | HVFD3D3C1250G200C |           |         |                    |              |             |             |
| 150                                    | 190         | HVFD3D3C1500G200C |           | NEMA 12 | A5                 | 16.5         | 7.9         | 29.8        |
| 200                                    | 240         | HVFD3D3C2000G200C |           |         |                    |              |             |             |
| 250                                    | 302         | HVFD3D3C2500G200C |           |         |                    |              |             |             |
| 300                                    | 361         | HVFD3D3C3000G200C |           |         |                    |              |             |             |
| 350                                    | 443         | HVFD3D3C3500G200C |           |         |                    |              |             |             |
| 450                                    | 535         | HVFD3D3C4500G200C |           |         |                    |              |             |             |

# Product Selection - VFDs

## 3G SmartVFD

| 600 V AC MODELS WEIGHTS AND DIMENSIONS |             |                   |           |       |                    |              |             |             |
|----------------------------------------|-------------|-------------------|-----------|-------|--------------------|--------------|-------------|-------------|
| HP                                     | CURRENT (A) | MODEL             | ENCLOSURE | FRAME | OVERALL DIMENSIONS |              |             |             |
|                                        |             |                   |           |       | WIDTH (IN.)        | HEIGHT (IN.) | DEPTH (IN.) | WEIGHT (LB) |
| 3                                      | 3.9         | HVFDSD3D0030G100C | NEMA 1    | A3    | 5.3                | 14.7         | 8.1         | 15.5        |
| 5                                      | 6.1         | HVFDSD3D0050G100C |           |       |                    |              |             |             |
| 7.5                                    | 9           | HVFDSD3D0075G100C |           |       |                    |              |             |             |
| 10                                     | 11          | HVFDSD3D0100G100C |           | B1    | 9.6                | 19.5         | 10.3        | 51.0        |
| 15                                     | 18          | HVFDSD3D0150G100C |           |       |                    |              |             |             |
| 20                                     | 22          | HVFDSD3D0200G100C |           |       |                    |              |             |             |
| 25                                     | 27          | HVFDSD3D0250G100C |           | B2    | 9.6                | 26.1         | 10.3        | 59.6        |
| 30                                     | 34          | HVFDSD3D0300G100C |           |       |                    |              |             |             |
| 40                                     | 41          | HVFDSD3D0400G100C |           |       |                    |              |             |             |
| 50                                     | 52          | HVFDSD3D0500G100C |           | C1    | 12.2               | 27.3         | 12.2        | 99.2        |
| 60                                     | 62          | HVFDSD3D0600G100C |           |       |                    |              |             |             |
| 75                                     | 83          | HVFDSD3D0750G100C |           |       |                    |              |             |             |
| 100                                    | 100         | HVFDSD3D1000G100C |           | C2    | 14.6               | 30.7         | 13.2        | 143.3       |
| 125                                    | 131         | HVFDSD3D1250G100C |           |       |                    |              |             |             |
| 150                                    | 155         | HVFDSD3D1500G100C |           |       |                    |              |             |             |
| 200                                    | 192         | HVFDSD3D2000G100C |           | D1    | 12.8               | 35.2         | 14.9        | 137.0       |
| 250                                    | 242         | HVFD3D3D2500G100C |           |       |                    |              |             |             |
| 300                                    | 290         | HVFD3D3D3000G100C |           |       |                    |              |             |             |
| 350                                    | 344         | HVFD3D3D3500G100C | NEMA 12   | D2    | 16.5               | 41.3         | 14.9        | 276         |
| 400                                    | 400         | HVFD3D3D4000G100C |           |       |                    |              |             |             |
| 3                                      | 3.9         | HVFDSD3D0030G200C |           | A5    | 9.5                | 16.5         | 7.9         | 29.8        |
| 5                                      | 6.1         | HVFDSD3D0050G200C |           |       |                    |              |             |             |
| 7.5                                    | 9           | HVFDSD3D0075G200C |           |       |                    |              |             |             |
| 10                                     | 11          | HVFDSD3D0100G200C |           | B1    | 9.5                | 19           | 10.3        | 51.0        |
| 15                                     | 18          | HVFDSD3D0150G200C |           |       |                    |              |             |             |
| 20                                     | 22          | HVFDSD3D0200G200C |           |       |                    |              |             |             |
| 25                                     | 27          | HVFDSD3D0250G200C |           | B2    | 9.5                | 25.7         | 10.3        | 59.6        |
| 30                                     | 34          | HVFDSD3D0300G200C |           |       |                    |              |             |             |
| 40                                     | 41          | HVFDSD3D0400G200C |           |       |                    |              |             |             |
| 50                                     | 52          | HVFDSD3D0500G200C |           | C1    | 12.1               | 27           | 12.2        | 99.2        |
| 60                                     | 62          | HVFDSD3D0600G200C |           |       |                    |              |             |             |
| 75                                     | 83          | HVFDSD3D0750G200C |           |       |                    |              |             |             |
| 100                                    | 100         | HVFDSD3D1000G200C |           | C2    | 14.6               | 30.2         | 13.2        | 143.3       |
| 125                                    | 131         | HVFDSD3D1250G200C |           |       |                    |              |             |             |
| 150                                    | 155         | HVFDSD3D1500G200C |           |       |                    |              |             |             |
| 200                                    | 192         | HVFDSD3D2000G200C |           | D1    | 12.8               | 35.2         | 14.9        | 137.0       |
| 250                                    | 242         | HVFD3D3D2500G200C |           |       |                    |              |             |             |
| 300                                    | 290         | HVFD3D3D3000G200C |           |       |                    |              |             |             |
| 350                                    | 344         | HVFD3D3D3500G200C | NEMA 12   | D2    | 16.5               | 41.3         | 14.9        | 276         |
| 400                                    | 400         | HVFD3D3D4000G200C |           |       |                    |              |             |             |

## SmartVFD HVAC2 Standalone Drives



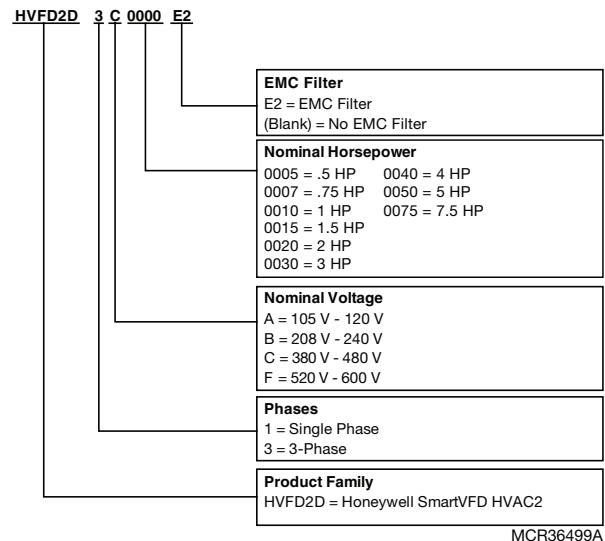
The SmartVFD HVAC2 is a micro drive that lets you make the most of the available space in your control cabinet or it can be converted to a NEMA 1 enclosure. In addition, you choose only the features you require.

- 1 x 115 Vac input, 3 x 208/230 Vac output: 0.5 to 1.5 Nominal HP
- 1 x 208/230 Vac input, 3 x 208/230 Vac output: 0.5 to 3 Nominal HP
- 3 x 208/230 Vac: 0.5 to 3 Nominal HP
- 3 x 460 Vac: 0.5 to 7.5 Nominal HP
- 3 x 600 Vac: 1 to 5 Nominal HP
- NEMA 1 enclosure option

SmartVFD HVAC2 drives are designed to operate between 14 °F to 122 °F and 0-95% relative humidity, non-condensing.

### Model Nomenclature

Select the voltage, amps, control input/output, and filters you require.



# Product Selection and Accessories - VFDs

## SmartVFD HVAC2 Standalone Drives

### SmartVFD HVAC2 Standalone Drives

| Part Number                                                                                                  | Nominal Voltage                            | Nom. HP<br>(Nom. Current)                                                                                        | EMC Filter | Frame Size                                    |
|--------------------------------------------------------------------------------------------------------------|--------------------------------------------|------------------------------------------------------------------------------------------------------------------|------------|-----------------------------------------------|
| HVFD2D1A0005<br>HVFD2D1A0010<br>HVFD2D1A0015                                                                 | 105-120V 1-phase in<br>230V<br>3-phase out | 0.50 HP (2.4 A)<br>1 HP (3.7 A)<br>1.5 HP (4.8 A)                                                                | No Filter  | MI2<br>MI2<br>MI3                             |
| HVFD2D1B0005E2<br>HVFD2D1B0010E2<br>HVFD2D1B0015E2<br>HVFD2D1B0030E2                                         | 208-240V 1-phase in<br>3-phase out         | 0.50 HP (2.4 A)<br>1 HP (3.7 A)<br>1.5 HP (4.8 A)<br>3 HP (9.6A)                                                 | EMC2       | MI1<br>MI2<br>MI2<br>MI3                      |
| HVFD2D3B0005<br>HVFD2D3B0007<br>HVFD2D3B0010<br>HVFD2D3B0015<br>HVFD2D3B0020<br>HVFD2D3B0030                 | 208-240V 3-phase in<br>3-phase out         | 0.50 HP (2.4 A)<br>0.75 HP (2.8 A)<br>1 HP (3.7 A)<br>1.5 HP (4.8 A)<br>2 HP (7 A)<br>3 HP (11 A)                | No Filter  | MI1<br>MI1<br>MI2<br>MI2<br>MI2<br>MI3        |
| HVFD2D3C0005<br>HVFD2D3C0015<br>HVFD2D3C0020<br>HVFD2D3C0030<br>HVFD2D3C0040<br>HVFD2D3C0050<br>HVFD2D3C0075 | 380-480V 3-phase in<br>3-phase out         | 0.50 HP (1.3 A)<br>1.5 HP (3.3 A)<br>2 HP (4.3 A)<br>3 HP (5.6 A)<br>4 HP (7.6 A)<br>5 HP (9 A)<br>7.5 HP (12 A) | No Filter  | MI1<br>MI2<br>MI2<br>MI2<br>MI3<br>MI3<br>MI3 |
| HVFD2D3C0005E2<br>HVFD2D3C0010E2<br>HVFD2D3C0015E2<br>HVFD2D3C0020E2<br>HVFD2D3C0030E2<br>HVFD2D3C0040E2     | 380-480V 3-phase in<br>3-phase out         | 0.50 HP (1.3 A)<br>1 HP (2.4A)<br>1.5 HP (3.3 A)<br>2 HP (4.3 A)<br>3 HP (5.6 A)<br>4 HP (7.6 A)                 | EMC2       | MI1<br>MI1<br>MI2<br>MI2<br>MI2<br>MI3        |
| HVFD2D3F0010<br>HVFD2D3F0030<br>HVFD2D3F0050                                                                 | 520-600V 3-phase in<br>3-phase out         | 1 HP (1.7A)<br>3 HP (3.9A)<br>5 HP (6.1A)                                                                        | No Filter  | MI3<br>MI3<br>MI3                             |

### SmartVFD HVAC2

| Accessories       | Description                                                                                   |
|-------------------|-----------------------------------------------------------------------------------------------|
| HVFD2DOPTFR123    | Option board mounting kit HVAC2 MI1-MI3                                                       |
| HVFDSDOPT6DI/U    | Option board 6 x DI/DO, each I/O can be individually configured                               |
| HVFDSDOPT2R01T/U  | Option board 2 x Relay output + Thermistor                                                    |
| HVFDSDOPT1AI2AO/U | Option board 1 x AI, 2 x AO (isolated)                                                        |
| HVFDSDOPT3RO/U    | Option board 3 x Relay output                                                                 |
| HVFDSDOPT1R05DI/U | Option board 1 x RO, 5 x DI (42-240 VAC)                                                      |
| HVFDOPPTMP        | Option board Temperature measurement (PT100, PT1000, NI1000, KTY84-130, KTY84-150, KTY84-131) |
| 50021579-001/U    | PT1000 Sensor probe (or T775-SENS-WR water resistant or T775-SENS-WT water tight)             |
| HVFDNEMA1FR1      | Nema 1 Kit MI1                                                                                |
| HVFDNEMA1FR2      | Nema 1 Kit MI2                                                                                |
| HVFDNEMA1FR3      | Nema 1 Kit MI3                                                                                |
| HVFD2DMOUNTKIT    | SmartVFD HVAC2 Door Mounting Kit                                                              |
| HVFDCALE/U        | SmartVFD Commissioning Cable and USB Adaptor                                                  |
| HVFDCAU           | Compact Commissioning Device                                                                  |
| HVFDCAKIT/U       | Compact Commissioning Kit (Cable, USB Adaptor, and Device combined)                           |

### SmartVFD HVAC2 Frame Size

| Frame Type | Dimensions, Approximate |                 | Weight |         |
|------------|-------------------------|-----------------|--------|---------|
|            | (inch)                  | (mm)            | (lb)   | (kg)    |
| MI1        | 6.2 x 2.6 x 3.9         | 157 x 66 x 99   | 1.2 lb | 0.54 kg |
| MI2        | 7.7 x 3.5 x 4           | 196 x 90 x 102  | 1.2 lb | 0.54 kg |
| MI3        | 10.2 x 3.9 x 4.3        | 251 x 100 x 109 | 2.2 lb | 1 kg    |



The SmartVFD HVAC2 drive is a micro drive designed to fit in your enclosure or become a NEMA 1 enclosure whichever is required for your smaller frequency drive applications.

### FEATURES

#### Modular Design

- NEMA 1 kit available
- Optional EMC filter
- Accessory PC interface

#### Easy to Install

- DIN-rail or screw mounting
- Zero clearance side-by-side mounting

#### Easy Communication

- Intuitive user interface
- Accessory PC interface
- Free PC Tool with optional adaptor turn your computer into a programming window to setup, control, monitor and diagnose in real time or for off-line editing and backup
- PI control
- Modbus RTU

#### Rugged, High Performance

- Plenum rated
- Optional EMC Filter on many models

#### Warranty

- 3 years

### SmartVFD HVAC2 Technical Data

|                                                            |                                              |                                                                                                                                                                                                                                                                                                                                          |
|------------------------------------------------------------|----------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Mains connection                                           | Input voltage $U_m$                          | 115V, -15%...+10% 1~<br>208...240V, -15%...+10% 1~<br>208...240V, -15%...+10% 3~<br>380 - 480V, -15%...+10% 3~<br>600V, -15%...+10% 3~                                                                                                                                                                                                   |
|                                                            | Input frequency                              | 45...66 Hz                                                                                                                                                                                                                                                                                                                               |
|                                                            | Connection to mains                          | Once per minute or less (normal case)                                                                                                                                                                                                                                                                                                    |
| Supply network                                             | Networks                                     | SmartVFD HVAC2 (400V) cannot be used with corner grounded networks                                                                                                                                                                                                                                                                       |
|                                                            | Short circuit current                        | Maximum short circuit current has to be < 50kA                                                                                                                                                                                                                                                                                           |
| Motor connection                                           | Output voltage                               | 0 - $U_m$                                                                                                                                                                                                                                                                                                                                |
|                                                            | Output current                               | Continuous rated $I_n$ at ambient temperature max. +122 °F (50 °C) (depends on the unit size)<br>overload 1.5 x $I_n$ max.<br>1 min/10 min                                                                                                                                                                                               |
|                                                            | Starting current/torque                      | Current 2 x $I_n$ for 2 secs in every 20 sec period. Torque depends on motor                                                                                                                                                                                                                                                             |
|                                                            | Output frequency                             | 0...320 Hz                                                                                                                                                                                                                                                                                                                               |
| Control connection                                         | Frequency resolution                         | 0,01 Hz                                                                                                                                                                                                                                                                                                                                  |
|                                                            | Digital input                                | Positive, Logic1: 18...+30V, Logic0: 0...5V; Negative, Logic1: 0...10V, Logic0: 18...30V; Ri = 10KΩ (floating)                                                                                                                                                                                                                           |
|                                                            | Analogue input voltage                       | 0...+10V, Ri = 250KΩ                                                                                                                                                                                                                                                                                                                     |
|                                                            | Analogue input current                       | 0(4)...20mA, Ri ≤ 250Ω                                                                                                                                                                                                                                                                                                                   |
|                                                            | Analogue output                              | 0...10V, RL ≥ 1KΩ; 0(4)...20mA, RL ≤ 500Ω, Selectable through microswitch                                                                                                                                                                                                                                                                |
|                                                            | Digital output                               | Open collector, max. load 35V/50mA (floating)                                                                                                                                                                                                                                                                                            |
| Control characteristics                                    | Relay output                                 | Switching load: 250Vac/3A, 24V DC 3A                                                                                                                                                                                                                                                                                                     |
|                                                            | Auxiliary voltage                            | ±20%, max. load 50mA                                                                                                                                                                                                                                                                                                                     |
|                                                            | Control method                               | Frequency Control U/f<br>Open Loop Sensorless Vector Control                                                                                                                                                                                                                                                                             |
|                                                            | Switching frequency                          | 1...16 kHz; Factory default 4 kHz                                                                                                                                                                                                                                                                                                        |
|                                                            | Frequency reference                          | Resolution 0.01 Hz                                                                                                                                                                                                                                                                                                                       |
|                                                            | Field weakening point                        | 30...320 Hz                                                                                                                                                                                                                                                                                                                              |
| Ambient conditions                                         | Acceleration time                            | 0.1...3000 sec                                                                                                                                                                                                                                                                                                                           |
|                                                            | Deceleration time                            | 0.1...3000 sec                                                                                                                                                                                                                                                                                                                           |
|                                                            | Braking torque                               | 100%* $T_n$ with brake option (only in 3~ drives sizes MI2-5)<br>30%* $T_n$ without brake option                                                                                                                                                                                                                                         |
|                                                            | Ambient operating temperature                | 14 °F (-10 °C) (no frost)...+104/122 °F (+40/50 °C) (depends on the unit size); rated loadability $I_n$<br>Side by side installation for MI1-3 it is always 104 °F (40 °C);<br>For IP21/Nema1 option in MI1-3 the maximum temperature is also 104 °F (40 °C)                                                                             |
|                                                            | Storage temperature                          | -40 °F (-40 °C)...+158 °F (+70 °C)                                                                                                                                                                                                                                                                                                       |
|                                                            | Relative humidity                            | 0...95% RH, non-condensing, non-corrosive, no dripping water                                                                                                                                                                                                                                                                             |
|                                                            | Air quality: chemical vapors mech. particles | IEC 721-3-3, unit in operation, class 3C2<br>IEC 721-3-3, unit in operation, class 3S2                                                                                                                                                                                                                                                   |
|                                                            | Altitude                                     | 100% load capacity (no derating) up to 3281 ft. (1000 m).<br>1% derating for each 328 ft. (100 m) above 3281 ft. (1000 m);<br>max. 6562 ft. (2000 m)                                                                                                                                                                                     |
|                                                            | Vibration: EN60068-2-6                       | 3...150 Hz<br>Displacement amplitude 1(peak) mm at 3...15.8 Hz Max<br>acceleration amplitude 1 G at 15.8...150 Hz                                                                                                                                                                                                                        |
|                                                            | Shock IEC 68-2-27                            | UPS Drop Test (for applicable UPS weights)<br>Storage and shipping: max 15 G, 11 ms (in package)                                                                                                                                                                                                                                         |
| EMC                                                        | Enclosure class                              | IP20 for MI1-3, IP21 for MI4-5.<br>With HVFDCDNEMA1xxx kit, IP21/NEMA1 for MI1-5.                                                                                                                                                                                                                                                        |
|                                                            | Pollution degree                             | PD2                                                                                                                                                                                                                                                                                                                                      |
|                                                            | Immunity                                     | Complies with EN50082-1, -2, EN61800-3                                                                                                                                                                                                                                                                                                   |
| Standards                                                  | Emissions                                    | 230V: Complies with EMC category C2; With an internal RFI filter<br>MI4&5 complies C2 with an optional DC choke and CM choke<br>400V: Complies with EMC category C2; With an internal RFI filter<br>MI4&5 complies C2 with an optional DC choke and CM choke<br>Both: No EMC emission protection (Honeywell level N); Without RFI filter |
|                                                            | Emissions                                    | For EMC: EN61800-3,<br>For safety: UL508C, EN61800-5                                                                                                                                                                                                                                                                                     |
| Certificates and manufacturer's declarations of conformity | Emissions                                    | For safety: CE, UL, cUL, KC<br>For EMC: CE, KC<br>(see unit nameplate for more detailed approvals)                                                                                                                                                                                                                                       |

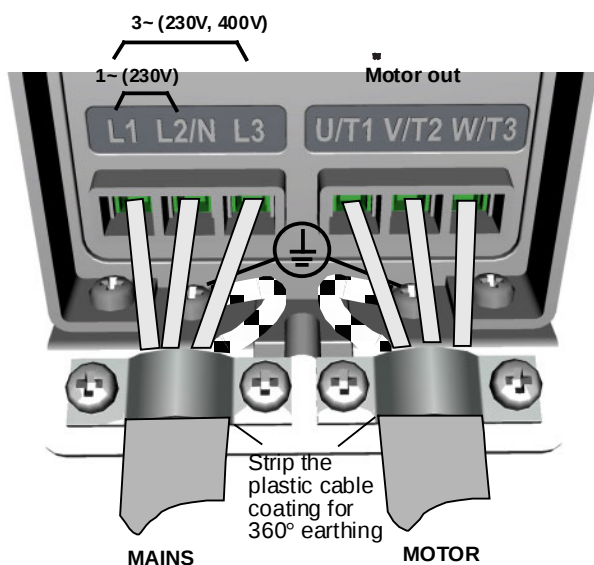
SmartVFD HVAC2 drives can be mounted side by side. Each drive requires 3.0 inches above and 2.0 inches below of free space, for cooling airflow circulation.

# Wiring Diagrams - VFDs

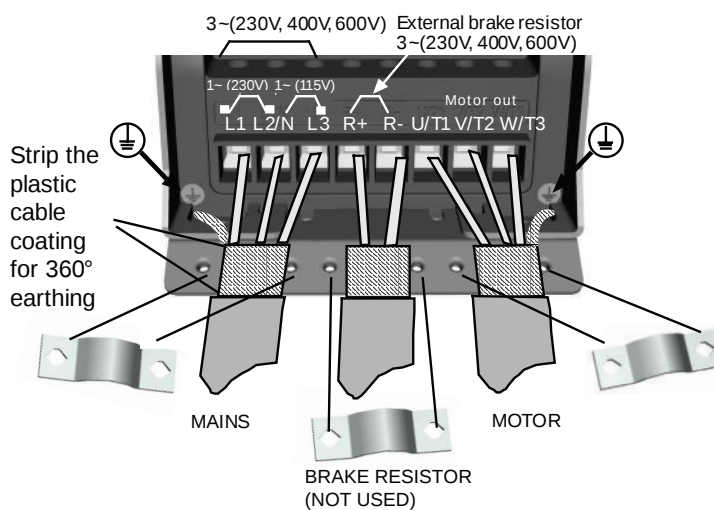
## SmartVFD HVAC2 Standalone Drives

### Power Wiring

#### SmartVFD HVAC2 power connections, MI1



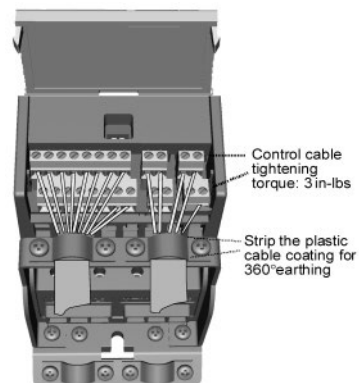
#### SmartVFD HVAC2 power connections, MI2 - MI3



### Control Inputs and Outputs

| 1-10 kΩ | Terminal | Signal   | Factory preset                | Description                                                                     |
|---------|----------|----------|-------------------------------|---------------------------------------------------------------------------------|
|         | 1        | +10 Vref |                               | Ref. voltage out                                                                |
|         | 2        | AI1      |                               | Analog signal in 1                                                              |
|         | 3        | GND      | Freq. reference <sup>P)</sup> | Maximum load 10 mA                                                              |
|         | 6        | 24 Vout  |                               | 0 - 10 V, Ri = 250 kΩ                                                           |
|         | 7        | DI1      |                               | ±20%, max. load 50 mA                                                           |
|         | 8        | DI2      |                               | Digital Input Common for DI1-DI6, refer to Table 22 on page 54 for DI sink type |
|         | 9        | DI3      |                               | Digital input 1                                                                 |
|         | 10       | DI4      | Start forward <sup>P)</sup>   | Digital input 2                                                                 |
|         | 11       | DI5      | Start reverse <sup>P)</sup>   | Digital input 3                                                                 |
|         | 12       | DI6      | Fault reset <sup>P)</sup>     | Digital input 4                                                                 |
|         | 13       | AO       |                               | Digital input 5                                                                 |
|         | 14       | DO       |                               | Digital input 6                                                                 |
|         | 15       | RO1 NO   | RS485 signal A                | As DI1                                                                          |
|         | 16       | RO1 CM   | RS485 signal B                | As DI1, Selectable through microswitch                                          |
|         | 17       | RO2 NC   | FB Communication              | As DI1                                                                          |
|         | 18       | RO2 CM   | FB Communication              | As DI1                                                                          |
|         | 19       | RO2 NO   | FB Communication              | As DI1                                                                          |
|         | 20       | AO       | FB Communication              | As DI1                                                                          |
|         | 21       | DO       | FB Communication              | As DI1                                                                          |
|         | 22       | AO       | FB Communication              | As DI1                                                                          |
|         | 23       | DO       | FB Communication              | As DI1                                                                          |
|         | 24       | AO       | FB Communication              | As DI1                                                                          |
|         | 25       | DO       | FB Communication              | As DI1                                                                          |
|         | 26       | AO       | FB Communication              | As DI1                                                                          |

### Control Wiring



SmartVFD HVAC2 General purpose application default I / O configuration and connections for control board P) = Programmable function



# Sensor Selection

Honeywell's complete line of sensors covers all necessary control applications and mounting options, making Honeywell your best sensor source. From temperature and current sensors to CO2 and enthalpy sensors and more, Honeywell sensors are the smart, cost-effective choice.

## Section 5: Sensors

|                                     |     |                                                    |     |
|-------------------------------------|-----|----------------------------------------------------|-----|
| Spyder Sylk Sensors, TR120 Series   |     | Strap-On Water Temperature Sensors                 |     |
| Submittal Data .....                | 254 | Submittal Data .....                               | 272 |
| Dimensional Diagrams .....          | 254 | Air or Water Temperature Sensor Probe              |     |
| Spyder Sylk Sensors, TR70 Series    |     | Submittal Data .....                               | 273 |
| Product Selection .....             | 246 | Electronic Air Temperature Sensor                  |     |
| Submittal Data .....                | 255 | Submittal Data .....                               | 275 |
| Dimensional Diagrams .....          | 255 | Current Sensors, Transmitters, Switches and Relays |     |
| Spyder Sylk Sensors TR40 Series     |     | Product Selection .....                            | 250 |
| Product Selection .....             | 246 | Submittal Data .....                               | 276 |
| Submittal Data .....                | 257 | Current Sensors, Command Relay Series              |     |
| Dimensional Diagrams .....          | 257 | Product Selection .....                            | 250 |
| TR20 Wireless Sensors and Receivers |     | Submittal Data .....                               | 278 |
| Product Selection .....             | 246 | Humidity and Temperature Sensors                   |     |
| Submittal Data .....                | 258 | Product Selection .....                            | 251 |
| Dimensional Diagrams .....          | 258 | Submittal Data .....                               | 279 |
| TR20 Series Wall Modules            |     | Dimensional Diagrams .....                         | 280 |
| Product Selection .....             | 247 | Humidity Sensors                                   |     |
| Submittal Data .....                | 259 | Product Selection .....                            | 251 |
| Dimensional Diagrams .....          | 259 | Submittal Data .....                               | 284 |
| C7772A Series Wallplate Sensors     |     | Dimensional Diagrams .....                         | 281 |
| Product Selection .....             | 247 | Dew Point Sensors                                  |     |
| Submittal Data .....                | 260 | Product Selection .....                            | 251 |
| Dimensional Diagrams .....          | 260 | Submittal Data .....                               | 283 |
| T7560 Series Sensors                |     | Dimensional Diagrams .....                         | 283 |
| Product Selection .....             | 247 | CO2 Sensors                                        |     |
| T775 Temperature Sensors            |     | Product Selection .....                            | 252 |
| Product Selection .....             | 248 | Submittal Data .....                               | 286 |
| Submittal Data .....                | 261 | Dimensional Diagrams .....                         | 286 |
| Dimensional Diagrams .....          | 262 | Differential Pressure Transducers                  |     |
| Communicating Economizer Sensors    |     | Product Selection .....                            | 252 |
| Product Selection .....             | 248 | Submittal Data .....                               | 285 |
| Submittal Data .....                | 263 | Dimensional Diagrams .....                         | 288 |
| Dimensional Diagrams .....          | 263 | PWT Wet Differential Pressure Transducers          |     |
| General Temperature Sensors         |     | Product Selection .....                            | 252 |
| Product Selection .....             | 249 | Submittal Data .....                               | 287 |
| Immersion Temperature Sensors       |     | Dimensional Diagrams .....                         | 288 |
| Submittal Data .....                | 265 | MLH Gauge Pressure Sensors                         |     |
| Outdoor Air Temperature Sensors     |     | Product Selection .....                            | 252 |
| Submittal Data .....                | 267 | Submittal Data .....                               | 289 |
| Duct Air Temperature Sensors        |     | Dimensional Diagrams .....                         | 290 |
| Submittal Data .....                | 268 |                                                    |     |

# Product Selection - Sensors

## TR120, TR70, TR75, TR42 and TR40 Series, Wireless Sensors and Receivers

### ZIO Wall Modules



|            | Display | Temperature | Humidity | CO2 | Customizable Parameters | Schedule Access |
|------------|---------|-------------|----------|-----|-------------------------|-----------------|
| TR120      | •       | •           |          |     | •                       | •               |
| TR120-H    | •       | •           | •        |     | •                       | •               |
| TR71       | •       | •           |          |     | •                       |                 |
| TR71-H     | •       | •           | •        |     | •                       |                 |
| TR75       | •       | •           |          |     | •                       | •               |
| TR75-H     | •       | •           | •        |     | •                       | •               |
| TR42       | •       | •           |          |     |                         |                 |
| TR42-H     | •       | •           | •        |     |                         |                 |
| TR42-CO2   | •       | •           |          | •   |                         |                 |
| TR42-H-CO2 | •       | •           | •        | •   |                         |                 |
| TR40       |         | •           |          |     |                         |                 |
| TR40-H     |         | •           | •        |     |                         |                 |
| TR40-CO2   |         | •           |          | •   |                         |                 |
| TR40-H-CO2 |         | •           | •        | •   |                         |                 |

### Wireless Sensors and Receivers



| Model Number | Temp | Humidity | Selectable Setpoint | Occupied Override | Comments                                                             | Compatible Controllers                                                                                                          | Compatible Thermostats                                                                           |
|--------------|------|----------|---------------------|-------------------|----------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|
| TR21-WK      | •    |          |                     |                   | Includes one prebound sensor and receiver                            | Honeywell controllers including Spyder, Excel 10, W7750, W7751, W7752, W7753 and non-Honeywell controllers with remote setpoint | T7350, T7351 and TB8575 Honeywell Thermostats and Non Honeywell thermostats with remote setpoint |
| TR21-WKU     | •    |          |                     |                   | Includes one prebound sensor and receiver, No Honeywell logo         |                                                                                                                                 |                                                                                                  |
| TR23-WK      | •    |          | •                   | •                 | Includes one prebound sensor and receiver                            |                                                                                                                                 |                                                                                                  |
| TR23-WKU     | •    |          | •                   | •                 | Includes one prebound sensor and receiver, No Honeywell logo         |                                                                                                                                 |                                                                                                  |
| TR21-WS      | •    |          |                     |                   | Sensor only. For replacement. Requires a wireless receiver           |                                                                                                                                 |                                                                                                  |
| TR23-WS      | •    |          | •                   | •                 | Sensor only. For replacement. Requires a wireless receiver           |                                                                                                                                 |                                                                                                  |
| WRECVR       |      |          |                     |                   | Wireless receiver only. For replacement. Requires a wireless sensor. |                                                                                                                                 |                                                                                                  |

# Product Selection - Sensors

## TR20, C7772A and T7560 Series Sensors

For use in XL10, Excel 10, 15, 50, 100, 500, Spyder, and T7350 applications



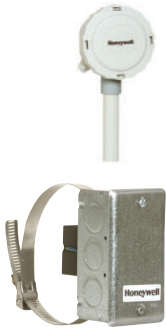
|                                           | Model Number                | Model Number                              | Sensor Element Type                    | Sensor Type | Sensor Type | Selectable Setpoint | Occupied Override | LON Jack | Fan | Comments                    |
|-------------------------------------------|-----------------------------|-------------------------------------------|----------------------------------------|-------------|-------------|---------------------|-------------------|----------|-----|-----------------------------|
| Application                               | Honeywell Wall Module Model | Replaces Honeywell Model                  |                                        | Temp        | Humidity    |                     |                   |          |     |                             |
| Excel 10, 15, 50, 100, 500, Spyder, T7350 | TR21                        | T7770A1006                                | 20K ohms non-linear                    | •           |             |                     |                   |          |     |                             |
| Excel 10, 15, 50, 100, 500, Spyder, T7350 | TR21-A                      | T7770A3002                                | 10K ohms non-linear for averaging only | •           |             |                     |                   |          |     |                             |
| Excel 10, 15, 50, 100, 500, Spyder, T7350 | TR21-H                      | N/A                                       | 20K ohms non-linear                    | •           | •           |                     |                   | •        |     |                             |
| Excel 10, 15, 50, 100, 500, Spyder, T7350 | TR21-J                      | T7770A2004                                | 20K ohms non-linear                    | •           |             |                     |                   | •        |     |                             |
| Excel 10, 15, 50, 100, 500, Spyder, T7350 | TR22                        | T7770B1004<br>T7770B1020<br>T7770B1046    | 20K ohms non-linear                    | •           |             | •                   |                   | •        |     |                             |
| Excel 10, 15, 50, 100, 500, Spyder, T7350 | TR23                        | TR7770C1002<br>TR7770C1028<br>TR7770C1044 | 20K ohms non-linear                    | •           |             | •                   | •                 | •        |     |                             |
| Excel 10, 15, 50, 100, 500, Spyder, T7350 | TR23-H                      | N/A                                       | 20K ohms non-linear                    | •           | •           | •                   | •                 | •        |     |                             |
| Excel 10, 15, 50, 100, 500, Spyder, T7350 | TR24                        | T7770D1000                                | 20K ohms non-linear                    | •           |             |                     | •                 | •        |     |                             |
| Excel 10, 15, 50, 100, 500, Spyder, T7350 | C7772A1004                  | N/A                                       | 20K ohms non-linear                    | •           |             |                     |                   |          |     | No Honeywell logo           |
| Excel 10, 15, 50, 100, 500, Spyder, T7350 | C7772A1012                  | N/A                                       | 20K ohms non-linear                    | •           |             |                     |                   |          |     | With Honeywell logo         |
| Excel 10, 20, 50, 80, 10, 500, 600        | T7560A1018                  | N/A                                       | 20K ohms non-linear                    | •           |             | •                   | •                 | Optional | Yes | LCD Display/ white and blue |
| Excel 10, 20, 50, 80, 10, 500, 600        | T7560A1042                  | N/A                                       | 20K ohms non-linear                    | •           |             | •                   | •                 | Optional | Yes | LCD Display/ all white      |
| Excel 10, 20, 50, 80, 10, 500, 600        | T7560B1032                  | N/A                                       | 20K ohms non-linear                    | •           | •           | •                   | •                 | Optional | Yes | LCD Display/ all white      |
| TR20 Series Sensors                       | KNOB-F                      | N/A                                       | N/A                                    | N/A         | N/A         | N/A                 | N/A               | N/A      | N/A | Replacement Knob (F°)       |
| TR20 Series Sensors                       | KNOB-O                      | N/A                                       | N/A                                    | N/A         | N/A         | N/A                 | N/A               | N/A      | N/A | Replacement Knob +/-        |

Note: For use in XL10, Excel 10, 15, 50, 100, 500, Spyder and T7350 applications.

# Product Selection - Sensors

## T775 Temperature Sensors and Economizer Sensors

### T775 Sensors



| Part Number     | Sensing Element    | Description                                                          | Temperature Range               |
|-----------------|--------------------|----------------------------------------------------------------------|---------------------------------|
| 50021579-001    | 1097 ohms at 77° F | Standard temperature probe                                           | -40° to 350° F (-40° to 177° C) |
| T775-SENS-WR    | 1097 ohms at 77° F | Water-resistant probe with 5-ft. leads                               | -40° to 270° F (-40° to 132° C) |
| T775-SENS-WT    | 1097 ohms at 77° F | Water-tight probe with 6-ft. leads                                   | -40° to 270° F (-40° to 132° C) |
| T775-SENS-OAT   | 1097 ohms at 77° F | Outdoor air temperature sensor                                       | -40° to 158° F (-40° to 70° C)  |
| T775-SENS-STRAP | 1097 ohms at 77° F | Strap-on                                                             | -40° to 250° F (-40° to 121° C) |
| C7031D2003      | 1097 ohms at 77° F | 5-in. immersion sensor with wiring box (well included, 50001774-001) | -40° to 350° F (4° to 177° C)   |
| C7031B2005      | 1097 ohms at 77° F | 6-in duct with wiring box                                            | -40° to 250° F (-40° to 121° C) |
| C7031J2009      | 1097 ohms at 77° F | 12-in. duct averaging sensor with four elements with wiring box      | 40° to 180° F (4° to 82° C)     |
| C7046D1008      | 1097 ohms at 77° F | 8-in. duct probe with mounting flange                                | 40° to 150° F (4° to 66° C)     |
| C7100D1001      | 1097 ohms at 77° F | 12-in. flat response, duct averaging sensor with flange              | 40° to 220° F (4° to 104° C)    |
| C7130B1009      | 1097 ohms at 77° F | Room mount sensor                                                    | -40° to 100° F (-40° to 38° C)  |

### Analog and Communicating Economizer Sensors

|                                   | Part Number | Sensing Element              | Temperature Range              | Insertion Length | Type                   | Mounting & Application                                                                 |
|-----------------------------------|-------------|------------------------------|--------------------------------|------------------|------------------------|----------------------------------------------------------------------------------------|
| Analog Economizer and Spyder      | C7150B1004  | 3K ohms NTC at 77° F         | -40° to 110° F (-40° to 43° C) | N/A              | Duct - Temp Sensor     | Mixed or discharge air sensor                                                          |
|                                   | C7660A1000  | 4 - 20 mA                    | -40° to 149° F (-40° to 65° C) | N/A              | Duct - Temp Sensor     | Dry-bulb temperature sensor                                                            |
|                                   | C7046A1004  | 3K ohms NTC at 77° F         | 40° to 150° F (4° to 66° C)    | 8 in.            | Duct - Temp Sensor     | Mixed or discharge air sensor                                                          |
|                                   | C7046A1038  | 3K ohms NTC at 77° F         | 40° to 150° F (4° to 66° C)    | 12 in.           | Duct - Temp Sensor     | Mixed or discharge air sensor                                                          |
|                                   | C7400A2001  | 4 - 20 mA                    | -40° to 150° F (-40° to 66° C) | NA               | Duct - Enthalpy Sensor | Outdoor or return air sensor, may be used with duct mounting kit 50053060-001          |
| JADE Economizer and TC500         | C7400S1000  | S-bus Temperature & Humidity | -40° to 150° F (-40° to 66° C) | N/A              | Duct - Temp Sensor     | Outdoor, return, discharge air sensor, may be used with duct mounting kit 50053060-001 |
| Spyder and TC500                  | C7400S1010  | S-bus Temperature & Humidity | -40° to 150° F (-40° to 66° C) | N/A              | Duct - Temp Sensor     | Outdoor, return, discharge air sensor, may be used with duct mounting kit 50053060-001 |
| JADE Economizer, Spyder and TC500 | C7250A1001  | 20K NTC                      | -40° to 150° F (-40° to 66° C) | N/A              | Duct - Temp Sensor     | Outdoor, mixed dry bulb sensor, may be used with duct mounting kit 50053060-001        |

# Product Selection - Sensors

## General Temperature Sensors



### General Temperature Sensors

|            | Part Number | Sensing Element       | Resistance             | Operating Range | Mounting and Application                           |
|------------|-------------|-----------------------|------------------------|-----------------|----------------------------------------------------|
| Wall Mount | C7130B1009  | PT1000                | 1,097 Ohms PTC at 77°F | -40° to 100° F  | Wall mount                                         |
| Water      | C7021D2001  | 10K ohms NTC Type II  | 10K ohms NTC at 77°F   | -40° to 250° F  | 5" w/ wiring enclosure, use well 50001774-001      |
| Water      | C7023D2001  | 10K ohms NTC Type III | 10K ohms NTC at 77°F   | -40° to 250° F  | 5" w/ wiring enclosure, use well 50001774-001      |
| Water      | C7031D2003  | PT1000                | 1097 ohms PTC at 77°F  | -40° to 350° F  | 5" w/ wiring enclosure, includes well 50001774-001 |
| Water      | C7041D2001  | 20K ohms NTC          | 20K ohms NTC at 77°F   | -40° to 250° F  | 5" w/ wiring enclosure, use well 50001774-001      |
| Outdoor    | C7021F2009  | 10K ohms NTC Type II  | 10K ohms NTC at 77°F   | -40° to 158° F  | Outdoor weatherproof, connects to 1/2" conduit     |
| Outdoor    | C7023F2009  | 10K ohms NTC Type III | 10K ohms NTC at 77°F   | -40° to 158° F  | Outdoor weatherproof, connects to 1/2" conduit     |
| Outdoor    | C7031G2014  | PT3000                | 3484 ohms at 77°F      | -40° to 120° F  | Outdoor weatherproof, connects to 1/2" conduit     |
| Outdoor    | C7041F2006  | 20K ohms NTC          | 20K ohms NTC at 77°F   | -40° to 158° F  | Outdoor weatherproof, connects to 1/2" conduit     |
| Duct Mount | C7021J2007  | 10K ohms NTC Type II  | 10K ohms NTC at 77°F   | -40° to 250° F  | 12" duct averaging w/ wiring enclosure             |
| Duct Mount | C7021R2000  | 10K ohms NTC Type II  | 10K ohms NTC at 77°F   | -40° to 250° F  | 12" duct averaging flexible copper                 |
| Duct Mount | C7021R2018  | 10K ohms NTC Type II  | 10K ohms NTC at 77°F   | -40° to 250° F  | 24" duct averaging flexible copper                 |
| Duct Mount | C7031J2009  | PT1000                | 1097 ohms PTC at 77°F  | 40° to 180° F   | 12" duct averaging flexible copper                 |
| Duct Mount | C7041J2007  | 20K ohms NTC          | 20K ohms NTC at 77°F   | -40° to 250° F  | 12 ft. Duct (Averaging) w/ wiring enclosure        |
| Duct Mount | C7041R2000  | 20K ohms NTC          | 20K ohms NTC at 77°F   | -40° to 250° F  | 12 ft. Duct flexible copper (Averaging)            |
| Duct Mount | C7041R2018  | 20K ohms NTC          | 20K ohms NTC at 77°F   | -40° to 250° F  | 24 ft. Duct flexible copper (Averaging)            |
| Duct Mount | C7021B2005  | 10K ohms NTC Type II  | 10K ohms NTC at 77°F   | -40° to 250° F  | 6" duct w/ wiring enclosure                        |
| Duct Mount | C7021B2013  | 10K ohms NTC Type II  | 10K ohms NTC at 77°F   | -40° to 250° F  | 12" duct w/ wiring enclosure                       |
| Duct Mount | C7021C2003  | 10K ohms NTC Type II  | 10K ohms NTC at 77°F   | -40° to 250° F  | 18" duct w/wiring enclosure                        |
| Duct Mount | C7023B2005  | 10K ohms NTC Type III | 10K ohms NTC at 77°F   | -40° to 250° F  | 6" duct w/ wiring enclosure                        |
| Duct Mount | C7023B2013  | 10K ohms NTC Type III | 10K ohms NTC at 77°F   | -40° to 250° F  | 12" duct w/ wiring enclosure                       |
| Duct Mount | C7023C2003  | 10K ohms NTC Type III | 10K ohms NTC at 77°F   | -40° to 250° F  | 18" duct w/ wiring enclosure                       |
| Duct Mount | C7031B2005  | PT1000                | 1097K ohms NTC at 77°F | -40° to 250° F  | 6" duct w/wiring enclosure                         |
| Duct Mount | C7041B2005  | 20K ohms NTC          | 20K ohms NTC at 77°F   | -40° to 250° F  | 6" duct w/ wiring enclosure                        |
| Duct Mount | C7041B2013  | 20K ohms NTC          | 20K ohms NTC at 77°F   | -40° to 250° F  | 12" duct w/ wiring enclosure                       |
| Duct Mount | C7041C2003  | 20K ohms NTC          | 20K ohms NTC at 77°F   | -40° to 250° F  | 18" duct w/ wiring enclosure                       |
| Water      | C7021K2005  | 10K ohms NTC Type II  | 10K ohms NTC at 77°F   | -40° to 250° F  | Strap-on pipe sensor with wiring enclosure         |
| Water      | C7023K2005  | 10K ohms NTC Type III | 10K ohms NTC at 77°F   | -40° to 250° F  | Strap-on pipe sensor with wiring enclosure         |
| Water      | C7041K2005  | 20K ohms NTC          | 20K ohms NTC at 77°F   | -40° to 250° F  | Strap-on with wiring enclosure                     |
| Water/Air  | C7021N2001  | 10K ohms NTC Type II  | 10K ohms NTC at 77°F   | -40° to 250° F  | Probe Sensor with 6' Lead                          |
| Water/Air  | C7023N2001  | 10K ohms NTC Type III | 10K ohms NTC at 77°F   | -40° to 250° F  | Probe Sensor with 6' Lead                          |
| Water/Air  | C7041N2020  | 20K ohms NTC          | 20K ohms NTC at 77°F   | -40° to 250° F  | Probe Sensor with 6' Lead                          |
| Wall Mount | C7021P2004  | 10K ohms NTC Type II  | 10K ohms NTC at 77°F   | -40° to 250° F  | Small metal button sensor                          |
| Wall Mount | C7023P2004  | 10K ohms NTC Type III | 10K ohms NTC at 77°F   | -40° to 250° F  | Small metal button sensor                          |
| Wall Mount | C7041P2004  | 20K ohms NTC          | 20K ohms NTC at 77°F   | -40° to 250° F  | Small metal button sensor                          |

# Product Selection - Sensors

## Current Sensors, Transmitters, Switches and Relays

### Current Switches



| Model #          | Trip Point Type                    | Core Type   | Max. Current         | Application                           |
|------------------|------------------------------------|-------------|----------------------|---------------------------------------|
| MCS-NO-A-50A     | Adjustable, 0.75-50FLA             | Micro-Solid | 50A                  | Standard                              |
| CS-NO-F-50A      | Fixed, 0.25A                       | Solid       |                      |                                       |
| CS-NO-A-50A      | Adjustable, 0.75-50FLA             | Split       |                      |                                       |
| CSP-NO-A-50A     | Adjustable, 0.45-50FLA             |             |                      |                                       |
| CSP-NO-A-100A    | Adjustable, 0.50-100FLA            |             | 100A                 |                                       |
| CSP-NO-A-150A    | Adjustable, 0.50-150FLA            |             | 150A                 |                                       |
| CSP-NO-F-200A    | Fixed, 0.35A                       |             | 200A                 |                                       |
| CSP-NO-AVFD-150A | Automatically detected above 40 Hz | 150A        | VFD Controlled Motor |                                       |
| CSP-NO-AECM-200A | Adjustable, 0.25-3A Trip           |             | 200A                 | ECM - Electronically Commutated Motor |

### Current Transmitters



| Model #      | Output Signal* | Selectable Ranges | Max. Current | Core Type |
|--------------|----------------|-------------------|--------------|-----------|
| CTP-5V-20A   | 0-5VDC         | 5/10/20 A         | 100A         | Split     |
| CTP-10V-120A | 0-10VDC        | 30/60/120 A       | 200A         |           |
| CTP-10V-200A |                | Fixed 200 A       |              |           |
| CTP-A-20A    | 4-20mA         | 5/10/20 A         |              |           |
| CTP-A-120A   |                | 30/60/120 A       |              |           |

\*Note: 0 - 5/10 Vdc output (induced power) 4-20 mA output (12-30 Vdc power source required)

### CR Relays



| Part Number     | Coil Rating        | Contact Type/Rating |
|-----------------|--------------------|---------------------|
| CR-24V-NO-10A   | 24VAC/DC, 15mA nom | N.O. / 10A @ 125VAC |
| CR-24V-NC-10A   |                    |                     |
| CR-12VDC-NO-10A | 9-12VDC, 30mA nom  |                     |
| CR-12VDC-NC-10A |                    |                     |

# Product Selection - Sensors

## Humidity and Dew Point Sensors

### Humidity and Temperature Sensors

| Part Number | Output Signal                         | RH Accuracy         | Mounting & Application | Voltage Supply       | Temp Sensor      | Insertion Length      |
|-------------|---------------------------------------|---------------------|------------------------|----------------------|------------------|-----------------------|
| H7725A2010  | Selectable 4-20mA, 0-10Vdc, or 0-5Vdc | ± 2% from 20-95% RH | Wall                   | 18-40 VDC/ 18-28 VAC | 20K ohm at 77° F | 7.5" - "B" model only |
| H7725B2006  |                                       |                     | Duct                   |                      |                  |                       |
| H7726A2020  |                                       |                     | Wall                   |                      | 1097 ohm at 77°F | N/A                   |
| H7726B2024  |                                       |                     | Duct                   |                      |                  | 7.5" - "B" model only |
| H7735A2012  |                                       | ± 3% from 20-95% RH | Wall                   |                      | 20K ohm at 77° F | 7.5" - "B" model only |
| H7735B2018  |                                       |                     | Duct                   |                      |                  |                       |
| H7735C2015  |                                       |                     | Outdoor                |                      | 1097 ohm at 77°F | N/A                   |
| H7736A2022  |                                       |                     | Wall                   |                      |                  |                       |
| H7736B2026  |                                       |                     | Duct                   |                      |                  | 7.5" - "B" model only |
| H7655A1001  | 0-10 Vdc                              | 5%                  | Wall                   | 16-40 VDC/16-30 VAC  | None             |                       |



H77 Series Wall Mount



H77 Series Duct Mount



H77 Series Outdoor Mount



H7655A

### Dew Point Sensors



| Part Number | Response Time | Alarm Contact Rating              | Alarm Hysteresis                                |
|-------------|---------------|-----------------------------------|-------------------------------------------------|
| HCP00-EU    | < 1 second    | Form C (NO + NC), 1 A @ 24 Vac/dc | 1 minute delay on alarm to prevent false alarms |

# Product Selection - Sensors

## CO2 Sensors, and IAQ Sensors

### CO2 Sensors



C7233

| Part Number | Type      | Output Signal                                                                                      | Display Screen | Mounting                   |
|-------------|-----------|----------------------------------------------------------------------------------------------------|----------------|----------------------------|
| C7233A1008  | CO2       | 0/2 - 10VDC or 4 - 20mA with one adjustable SPST relay output                                      | Yes            | Wall                       |
| C7233A1016  |           |                                                                                                    | No             | Wall                       |
| C7233A1024  |           |                                                                                                    | Yes            | Wall (Unbranded)           |
| C7263A1008  | Temp, CO2 | 0/2 - 10VDC or 0/4 - 20mA with one adjustable SPST relay output and 20K ohm NTC temperature sensor | Yes            | Wall                       |
| C7232B1006  | CO2       | 0/2 - 10VDC or 4 - 20mA with one adjustable SPST relay output                                      | Yes            | Duct (8" insertion length) |
| C7232B1014  |           |                                                                                                    | No             | Duct (8" insertion length) |

### IAQ Sensors



TR50

| Part Number | Type                           | Communication Protocol | Display Screen | Power               | Mounting |
|-------------|--------------------------------|------------------------|----------------|---------------------|----------|
| TR50-5D     | Temp, Hum, CO2, PM2.5 and TVOC | BACnet, Modbus, *Sylk™ | Yes            | 24 VAC/VDC          | Wall     |
| TR50-5N     | Temp, Hum, CO2, PM2.5 and TVOC | BACnet, Modbus, *Sylk™ | No             | 24 VAC/VDC          | Wall     |
| TR50-3D     | Temp, Hum, and CO2             | BACnet, Modbus, *Sylk™ | Yes            | 24 VAC/VDC or Sylk™ | Wall     |
| TR50-3N     | Temp, Hum, and CO2             | BACnet, Modbus, *Sylk™ | No             | 24 VAC/VDC or Sylk™ | Wall     |

\*3-in-1 sensors can be used with Sylk™ as an emulated TR40, full Sylk™ compatibility with the Optimizer controllers is coming soon.

### Dry Pressure Sensors



P7660

| Product Number | Configuration       | Pressure Range       | Output       | LCD Display | Probe |
|----------------|---------------------|----------------------|--------------|-------------|-------|
| P7645C0010X    | Panel/DIN Rail      | 0-0.10 "W.C.         | 4-20 mA Loop | No          | No    |
| P7645C0025X    |                     | 0-0.25 "W.C.         |              |             |       |
| P7645C0100X    |                     | 0-1.0 "W.C.          |              |             |       |
| P7645C0500X    |                     | 0-5.0 "W.C.          |              |             |       |
| P7660P0500D    |                     | 0.1/0.25/2.5/5 "W.C. |              |             |       |
| P7660P0500X    |                     | 0.1/0.25/2.5/5 "W.C. | Universal    | No          |       |
| P7660P1000D    |                     | 1.0/2.5/5/10 "W.C.   |              | Yes         |       |
| P7660P1000X    |                     | 1.0/2.5/5/10 "W.C.   |              | No          |       |
| P7660D0500D    | Duct/Panel/DIN Rail | 0.1/0.25/2.5/5 "W.C. |              | Yes         | Yes   |
| P7660D0500X    |                     | 0.1/0.25/2.5/5 "W.C. |              | No          |       |
| P7660D1000D    |                     | 1.0/2.5/5/10 "W.C.   |              | Yes         |       |
| P7660D1000X    |                     | 1.0/2.5/5/10 "W.C.   |              | No          |       |

### Wet Pressure Sensors



P7645

| Part Numbers | Max Sensor Pressure  | 1% Accuracy                                          | 2% Accuracy                             | Cable Length (Feet) |
|--------------|----------------------|------------------------------------------------------|-----------------------------------------|---------------------|
| PWTB50-X     | 50 PSIG<br>345 kPa   | 20/25/30/40/50 PSID<br>138/172/207/276/345 kPa       | 10/15 PSID<br>69/103 kPa                | Installer Provided* |
| PWTB50-PC-9  |                      |                                                      |                                         | Plenum — 9 feet     |
| PWTB50-AC-9  |                      |                                                      |                                         | Armor — 9 feet      |
| PWTB100-X    | 100 PSIG<br>689 kPa  | 40/50/75/100 PSID<br>276/345/517/689 kPa             | 15/20/25/30 PSID<br>103/138/172/207 kPa | Installer Provided* |
| PWTB100-PC-9 |                      |                                                      |                                         | Plenum — 9 feet     |
| PWTB100-AC-9 |                      |                                                      |                                         | Armor — 9 feet      |
| PWTB250-X    | 250 PSIG<br>1724 kPa | 75/100/125/150/250 PSID<br>517/689/862/1034/1724 kPa | 30/40/50 PSID<br>207/276/345 kPa        | Installer Provided* |
| PWTB250-PC-9 |                      |                                                      |                                         | Plenum — 9 feet     |
| PWTB250-AC-9 |                      |                                                      |                                         | Armor — 9 feet      |

\*Shielded cable provided by installer either plenum rated or installed in conduit.



PWTB without Cable



PWTB with Plenum Cable



PWTB with Armoured Cable

### MLH Gauge Pressure Sensors



| Model           | Pressure Range | Pressure Connection      | Output | Excitation        |
|-----------------|----------------|--------------------------|--------|-------------------|
| MLH050PSCDJ1235 | 0-50 psig      | 1/4" -18 NPT             | 4-20mA | 9.5 Vdc to 30 Vdc |
| MLH150PSCDJ1236 | 0-150 psig     | 1/4" -18 NPT             | 4-20mA | 9.5 Vdc to 30 Vdc |
| MLH300PSCDJ1237 | 0-300 psig     | 1/4" -18 NPT             | 4-20mA | 9.5 Vdc to 30 Vdc |
| MLH500PSCDJ1240 | 0-500 psig     | 1/4" SAE Female Schrader | 4-20mA | 9.5 Vdc to 30 Vdc |
| MLH01KPSCDJ1241 | 0-1000 psig    | 1/4" SAE Female Schrader | 4-20mA | 9.5 Vdc to 30 Vdc |

# Submittal Data - Sensors

## Zio Wall Modules, TR120 Series



The TR120/TR120-H are color touch screen wall modules compatible with Spyder, Stryker, and CIPer Model 30 controllers. The wall module communicates and is powered by the Sylk bus, so no additional wiring is needed. All versions include integral temperature and the TR120-H adds a humidity sensor to control comfort. The device enables local controller configuration through an easy to use touch screen interface with menu driven selections.

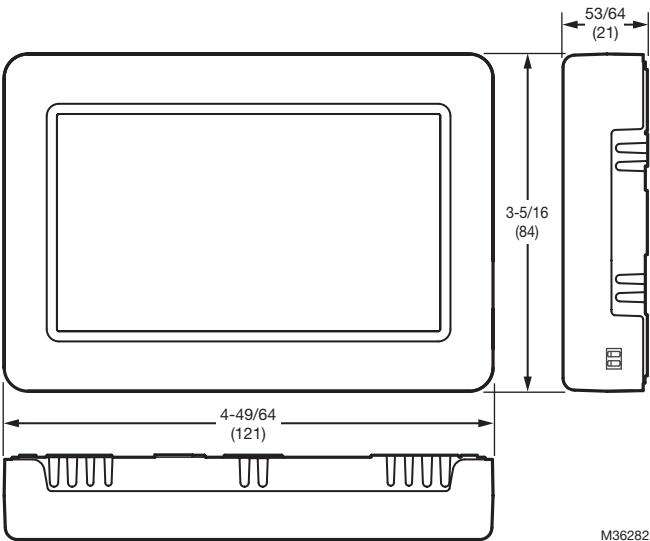
### FEATURES

- Home screen can display one to three of any of the following parameters: Temperature Setpoint, Room Temperature, Room Humidity, Outdoor Humidity, Outdoor Temperature, and Time, or one of virtually any parameter in the controller.
- Vertical or horizontal orientation
- Restricted tenant access to controller parameters or imposed HVAC settings limits via password protection.
- Assign labels for enumerated values.
- Link setpoint limits to a network variable.
- Access and adjust most parameters in the Honeywell controller.
- Access and adjust the controller schedule.
- Balance the VAV system from the wall module.
- Permanent retention of user configuration, including setpoints after a power outage.

### SPECIFICATIONS

|                                  |                                                                                                                                                                                                                   |
|----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Compatibility.....               | The TR120 wall module has been designed for use with Spyder, Stryker, and CIPer Model 30. It can directly accept a TR71 or TR75 application download from the controller with no additional modifications needed. |
| Construction .....               | Two-piece construction, cover and internally wired subbase. Field wiring, 18 to 24 AWG (0.82 to 0.20 sq. mm), connects to a terminal block in the subbase.                                                        |
| Mounting/Installation .....      | Horizontal or vertical orientation<br>82.5 mm junction box 60 mm J-box<br>UK pattress box Direct mount with suitable wall anchors                                                                                 |
| Environmental Ratings.....       | Operating Temperature:<br>32°F to 122°F (-0°C to 50°C)<br>Storage Temperature:<br>-4°F to 158°F (-20°C to 70°C)<br>Relative Humidity:<br>5% to 95% non-condensing                                                 |
| Temperature Setpoint Range.....  | Default range is 55 °F to 85 °F (10 °C to 35 °C); configurable for other ranges.                                                                                                                                  |
| Temperature Sensor Accuracy..... | ±0.36 °F at 77 °F (±0.2 °C at 25 °C)                                                                                                                                                                              |
| Humidity Sensor Accuracy.....    | ±5% RH from 20% to 80% RH (TR120-H only)                                                                                                                                                                          |
| Power.....                       | 18 VDC from controller Sylk bus<br>50 mA maximum<br>Maximum qty. (1) TR120 per Sylk bus                                                                                                                           |
| Display.....                     | Resistive LCD Touch Screen<br>4.3 inch (109 mm) diagonal<br>480 x 272 pixels                                                                                                                                      |
| Approvals .....                  | CE<br>FCC Part 15, Class B for emissions<br>Canadian ICES-003                                                                                                                                                     |

### DIMENSIONS DIAGRAM



M36282



The TR71 and TR75 are two-wire, polarity insensitive, Sylk bus communicating wall modules, which communicate with Spyder® and some ComfortPoint™ programmable controllers.

All models have a space-temperature sensor, network bus jack and an LCD panel with three softkeys and two Up/Down adjustment keys. The TR71-H and TR75-H models include an onboard humidity sensor.

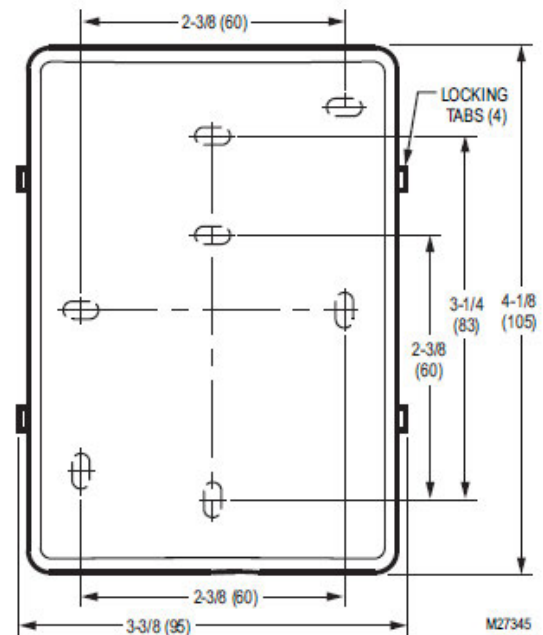
### SPECIFICATIONS

|                                  |                                                                                                                                                                                                                                                                                       |
|----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Compatibility.....               | Full feature set, including scheduling and password protection requires the latest Spyder firmware (field upgradeable with Spyder Flash Tool), Spyder Tool version greater than 5.18, and WEBs-AX Workbench version 3.4.57 or greater.                                                |
| Construction .....               | Two-piece construction, cover and internally wired subbase. Field wiring, 18 to 24 AWG (0.82 to 0.20 sq. mm), connects to a terminal block in the subbase.                                                                                                                            |
| Mounting Options.....            | The LCD wall modules can be mounted on a standard two by four inch junction box or on a 60 mm diameter junction box. The modules may be mounted up to 200 ft. (61 m) from the programmable controller. Twisted pair wiring is recommended for distances longer than 100 ft. (30.5 m). |
| Environmental Ratings.....       | Operating Temperature: 30 °F to 110 °F (-1 °C to 43 °C)<br>Shipping Temperature: -40 °F to 150 °F (-40 °C to 65.5 °C)<br>Relative Humidity: 5% to 95% non-condensing                                                                                                                  |
| Temperature Setpoint Range.....  | Default range is 55 °F to 85 °F (10 °C to 35 °C); configurable for other ranges.                                                                                                                                                                                                      |
| Temperature Sensor Accuracy..... | ±0.36 °F at 77 °F (±0.2 °C at 25 °C)                                                                                                                                                                                                                                                  |
| Humidity Sensor Accuracy.....    | ±5% RH from 20% to 80% RH (TR71-H/TR75-H only)                                                                                                                                                                                                                                        |
| Power.....                       | 18 Vdc power is supplied to the wall module from the two-wire S-BUS connection to the programmable controller.                                                                                                                                                                        |
| Accessories.....                 | 50007298-001 (pack of 12) medium, cover plate; 6-7/8 x 5 in. (175 x 127 mm).                                                                                                                                                                                                          |
| Approvals .....                  | CE; UL94-HB plastic enclosure; FCC Part 15, Class B                                                                                                                                                                                                                                   |

### FEATURES

- Ability to control tenant access to controller parameters via password protection
- Ability to assign labels for enumerated values
- Customized parameter access, by using the Honeywell WEBs-AX Workbench tool
- Ability to link setpoint limits to a network variable
- Programmable for: Home screen options, tenant access, contractor access, optional password protection to contractor mode, access to controller parameters, setpoint, override, fan and other parameters
- Ability to access and adjust most parameters in the programmable controller.
- TR75 can access and adjust the controller schedule
- Ability to balance the VAV system from the wall module
- Home screen can display one to three of any of the following parameters: Temperature Setpoint, Room Temperature, Room Humidity, Outdoor Humidity, Outdoor Temperature and Time, or one of virtually any parameter in the controller
- The TR75 has more than twice the memory capacity for parameters as the TR71
- Network bus jack
- Simple two-wire terminal connection to the programmable controller (includes power) and an optional two-wire terminal connection for the network. All connections are polarity insensitive
- Permanent retention of user configuration, including setpoints after a power outage

### DIMENSIONS DIAGRAM



# Submittal Data - Sensors

## TR50 Indoor Air Quality Sensor

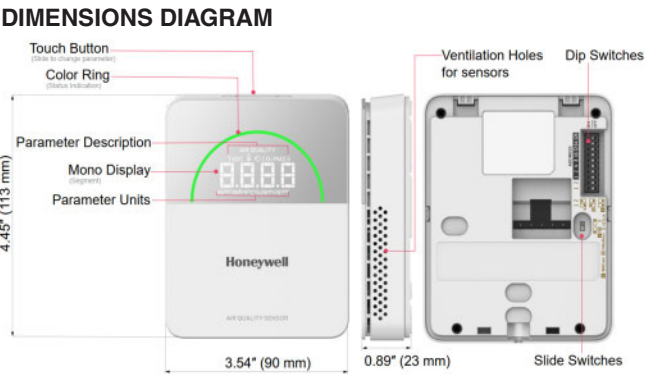


The Honeywell TR50 IAQ Sensor is an advanced, configurable device for commercial buildings. This sensor monitors, Temperature, Relative Humidity, Carbon Dioxide (CO2), Particulate Matter (PM1.0, PM2.5, PM10) and Total Volatile Organic Compound (TVOC). Flexible building automation system integration via BACnet MS/TP, Modbus, Sylk™ Bus (coming soon) protocols. Customizable display and sensor thresholds with stable long-term accuracy for minimal maintenance or recalibration.

| SPECIFICATIONS                  |                                                                                                                                                                                          |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Detection Parameters .....      | Temperature (T)<br>Relative Humidity (RH)<br>Carbon Dioxide (CO2)<br>Particulate Matter (PM1, PM2.5 and PM10)<br>Total Volatile Organic Compound (TVOC).                                 |
| Display.....                    | Mono segment display.                                                                                                                                                                    |
| Power Supply .....              | Direct : 24 VAC/VDC ± 20 %<br>Sylk™ : Honeywell Sylk™ Bus Technology                                                                                                                     |
| Power Consumption .....         | TR50-5D: 24 VAC, 3.8 VA, 24 VDC, 1.5 W<br>TR50-5N: 24 VAC, 3.8 VA, 24 VDC, 1.4 W<br>TR50-3D: 24 VAC, 3.2 VA, 24 VDC Sylk™ Bus, 0.9 W<br>TR50-3N: 24 VAC, 3.2 VA, 24 VDC Sylk™ Bus, 0.8 W |
| Operating Temperature .....     | 32 - 122 °F (0 - 50 °C).                                                                                                                                                                 |
| Operating Humidity .....        | 0-95 % RH, non-condensing                                                                                                                                                                |
| Storage Temperature.....        | -40 to 150 °F (-40 to 65.5 °C)                                                                                                                                                           |
| Communication .....             | BACnet MS/TP, Modbus over RS-485, or Sylk™ Bus                                                                                                                                           |
| Net weight .....                | 0.42 lbs. (189 grams)                                                                                                                                                                    |
| Enclosure.....                  | Polycarbonate                                                                                                                                                                            |
| IP protection level.....        | IP20                                                                                                                                                                                     |
| Junction Box compatibility..... | US single vertical, BS single, ME single, EUR single                                                                                                                                     |
| Surface mount.....              | The device can be mounted on drywall, stone, etc. in retrofit cases.                                                                                                                     |
| Touch Button.....               | Use to switch screens from one parameter to another.                                                                                                                                     |

|                              |                                                                                                                                                                                                                                                                                                                                  |
|------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Temperature .....            | Measuring range 32 - 122 °F (0 - 50 °C).<br>Sensor output resolution - ± 1.8 °F (± 1 °C)<br>Accuracy - ± 1.8 °F (± 1 °C)                                                                                                                                                                                                         |
| Humidity .....               | Measuring range - 0 - 100 % RH<br>Sensor output resolution - 0.1 % RH<br>Accuracy - ±3 % RH @ 20 - 80 % RH in Room Temperature                                                                                                                                                                                                   |
| CO2 .....                    | Measuring range - 0-9999 ppm<br>Sensor output resolution - 1 ppm<br>Accuracy - 75 ppm @ 400- 1000 ppm.<br>± 40 ppm ± 5 % reading @ 1001- 2000 ppm                                                                                                                                                                                |
| PM1.0<br>PM2.5<br>PM10 ..... | Measuring range - 0 - 5000 µg/m3<br>Sensor output resolution - 1 µg/m3<br>Accuracy ((According to GRIMM Technology)-<br>PM1.0 - ± 10 µg/m³, 0-100 µg/m³<br>101-500 µg/m³, ± 10 % reading<br>PM 2.5 - ± 10 µg/m³, 0-100 µg/m³<br>101-500 µg/m³, ± 10 % reading<br>PM 10 - ± 25 µg/m³ 0-100 µg/m³<br>101-500 µg/m³, ± 25 % reading |
| TVOC .....                   | Measuring range - 0-9999 ppb<br>Sensor output resolution - 0.1 ppb<br>Accuracy(According to Alcohol Volatilization) - ± 25 % reading                                                                                                                                                                                             |

- FEATURES**
- Easy integration with Honeywell Optimizer controllers or third-party controllers.
  - Compatible with Healthy Buildings Dashboard or the Intelligent Building Optimizer to help ensure that ventilation and filtrations are always optimized for the best productivity, and energy outcomes.
  - Long Term Stability is ensured by accurate and resilient sensors that come pre-calibrated from the factory and do not need to be recalibrated in the field.
  - Over the wire firmware updates ensures time savings when upgrades are available, useful to enhance existing features, and deploy bug fixes.
  - The LED ring light changes colors from green to yellow to red based on the parameter levels detected. LED can also be switched to a neutral mode with only white light.
  - Show the users which parameters are important by making them always visible and hiding the ones you do not want to see.
  - Sensor provides a novel sixth output, Air Quality Score, giving users in the space and facility managers a simple numerical score out of one hundred that shows them how good the air quality is. This Air Quality Score is calculated based on CO2, PM2.5, and TVOC detected for the TR50-5D and only CO2 for the TR50-3D.



All the dimensions are in inches (mm).

# Submittal Data - Sensors

## Zio Wall Modules, TR40 Series



The TR40 and TR42 are two-wire, non-polarity sensitive, Sylk communicating wall modules, which communicate with Spyder® programmable controllers.

The TR40 and TR42 are simple temperature wall modules with basic setpoint, override and fan options; designed for a broad range of applications.

### SPECIFICATIONS

|                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Environmental Ratings..... | Operating Temperature: 32 °F to 122 °F (0 °C to 50 °C)<br>Shipping Temperature: -40 °F to 150 °F (-40 °C to 65.5 °C)<br>Relative Humidity: 5% to 95% non-condensing                                                                                                                                                                                                                                                                                                              |
| Accessories.....           | 50007298-001 (pack of 12) medium, cover plate; 6-7/8 x 5 in. (175 x 127 mm).                                                                                                                                                                                                                                                                                                                                                                                                     |
| Approvals .....            | CE; UL94-V0 plastic enclosure; FCC Part 15, Class B                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Accuracy .....             | Temperature: ± 0.2 °C at 25 °C (± 0.36°F at 77°F)<br>Humidity: +/-3% RH from 20-80%RH<br>CO2: +/- (30ppm +3% of measured value).<br>Calibrated at the factory.<br>Uses automatic background calibration. No calibration required for the life of the product.<br>Meets CEC Title 24 requirement of +/-75ppm accuracy at 600ppm and 1000ppm ambient levels.<br>For proper CO2 operation, install only in spaces that see at least 4 hours of continuous unoccupied time per week. |

### FEATURES

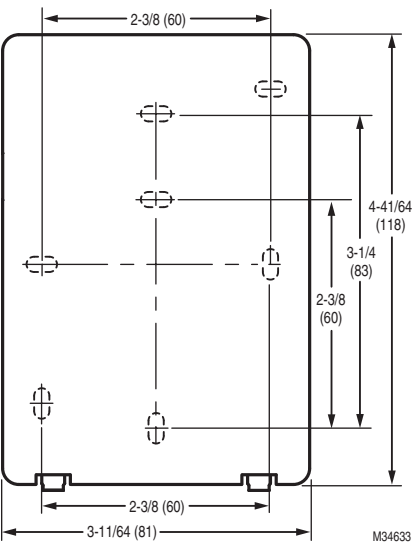
The TR40 and TR42 wall modules include:

- Two-wire, polarity insensitive Sylk provides both power and communication to the device.
- Models available with display (TR42) or without display (TR40).
- Models available with or without built-in humidity or CO2 sensors.

All TR42 display wall modules include:

- Fan speed options: Auto-On, Auto-Off-On, Auto-Off-Low-Med-High (configurable in the Niagara tool)
- Override option (configurable in the Niagara tool)
- Ability for tenant to change between °F and °C
- Ability to provide tenant either a relative "warmer cooler" setpoint adjustment or absolute temperature setpoint adjustment
- An installer mode with optional password protection that allows:
  - Switching between °F and °C
  - Temperature calibration
  - Humidity calibration
  - Numerical or Graphical setpoint adjustment
  - Adjustment of the Setpoint Range Limits
  - Adjustment of override time (Choose Network Time or 1-24 hours)
- Choosing the sensor or setpoint value to be shown in the Home Screen, or choose to scroll through sensor and setpoint values.
- Choosing between English and International icon display.

### DIMENSIONS DIAGRAM



## Wireless Sensors and Receivers



The WRECVR receiver and TR21-WS, TR23-WS, TR21-WK, and TR23-WK are a family of wireless wall modules and receiver for use with:

- Spyder Unitary Controllers: PUL, PVL, etc.
- Excel 10 W7750, W7751, W7752 and W7753 controllers
- T7350, T7351 and TB8575 low-voltage SuitePRO™ thermostats
- Will not work with TB7220, TB8220 or TB line voltage thermostats, XL15s, W7762, W7763 or certain other XL controllers
- Will work with WEBs-AX™ I/O Module products if using a separate transformer
- Compatibility with various other non-Honeywell controllers that accept 10K type2 NTC temperature inputs

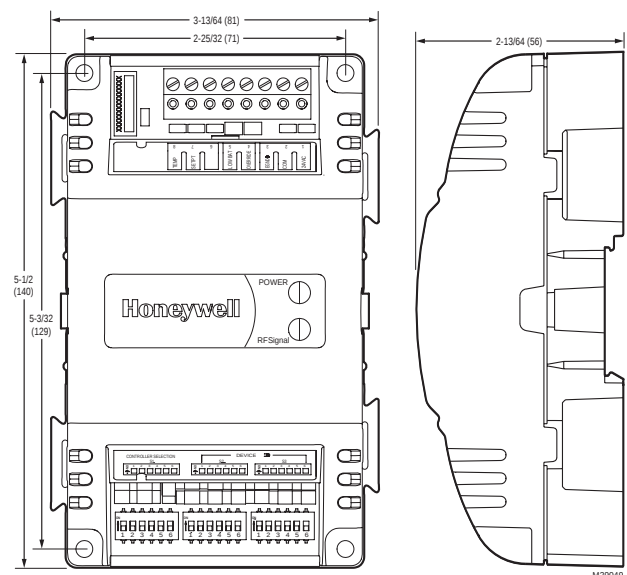
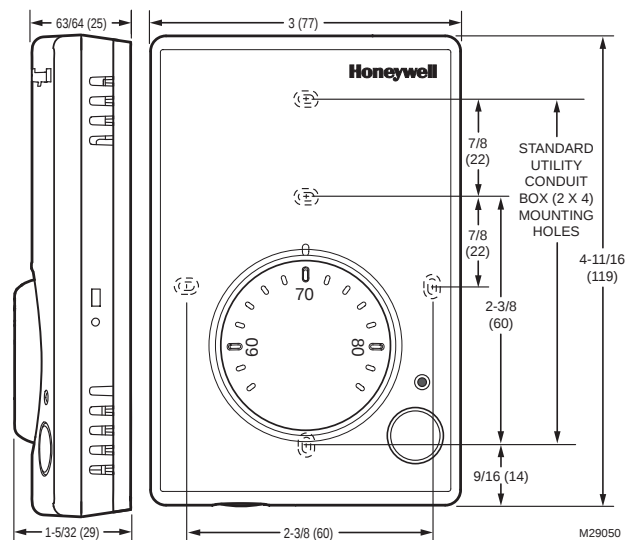
### SPECIFICATIONS

|                               |                                                                                                                                                                                                                                                          |
|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Models.....                   | For specific model information, see Specification Data, form 63-1332.                                                                                                                                                                                    |
| Environmental Ratings.....    | Wall Module Operating Temperature:<br>45° to 99 °F (7° to 37 °C).<br>Receiver Operating Temperature:<br>-40° to 150 °F (-40° to 65.5 °C).<br>Storage Temperature: -40° to 150 °F (-40° to 65.5 °C).<br>Operating Humidity: 5% to 95% RH (non-condensing) |
| Accuracy .....                | +/- 1°F (+/- 0.5°C) across 12 °C to 30°C                                                                                                                                                                                                                 |
| Setpoint Range for TR23 ..... | 56° to 84 °F (13° to 29 °C)                                                                                                                                                                                                                              |
| Accessories.....              | 50007298-001 (pack of 12) medium, cover plate; 6-7/8 x 5 in. (175 x 127 mm).                                                                                                                                                                             |
| Power .....                   | Receiver Voltage: 20 – 30VAC/DC, 50/60Hz; 24VAC typical                                                                                                                                                                                                  |
| Housing .....                 | Wall Module: UL94-HB<br>Receiver: UL94-5VA                                                                                                                                                                                                               |
| Radio Frequency .....         | 2.4 GHz (IEEE Std 802.15.4-2003 compliant)<br>Open Range: 3000 feet<br>Typical Range: 100 feet<br>Output power: 16dBm<br>Receiver power consumption: <1.5 VA@24VAC                                                                                       |

### FEATURES

- Wall module to Receiver (point to point) wireless kits can replace any standard wired sensor
- Wireless Kits (wall module and receiver) are pre-bound at the factory for quick installation
- Signal Strength LED built into the wall module
- Low battery indication
- Optional dip switches available to bind any wall module to any receiver
- Approximate 5-year battery life with AA Alkaline (included), 7.5 years with Lithium
- Locking screw discourages tampering and battery theft

### DIMENSIONS DIAGRAM



# Submittal Data - Sensors

## TR20 Series Wall Modules



- The TR21, TR22, TR23 and TR24 are a family of direct-wired wall modules for use with:
- Spyder Unitary Controllers: PUL, PVL
  - Excel 10 W7750, W7751a, W7752, and W7753 controllers
  - Honeywell Excel 800, 600, 500, 100, and 80 (all fully programmable) controllers
  - W7761 Controller
  - ComfortPoint LON Controllers: CP-UL, CP-VL
  - All models have a space temperature

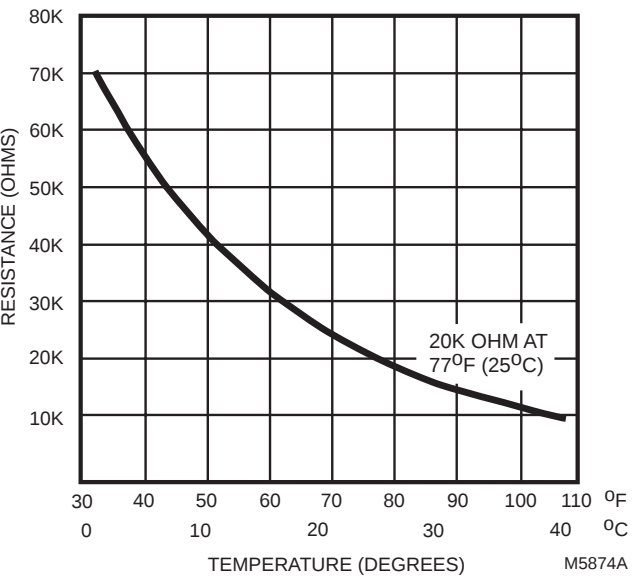
sensor. Some models have a temperature dial, setpoint adjustment, LONWORKS bus jack, override (bypass) with LED, and fan switch.

### SPECIFICATIONS

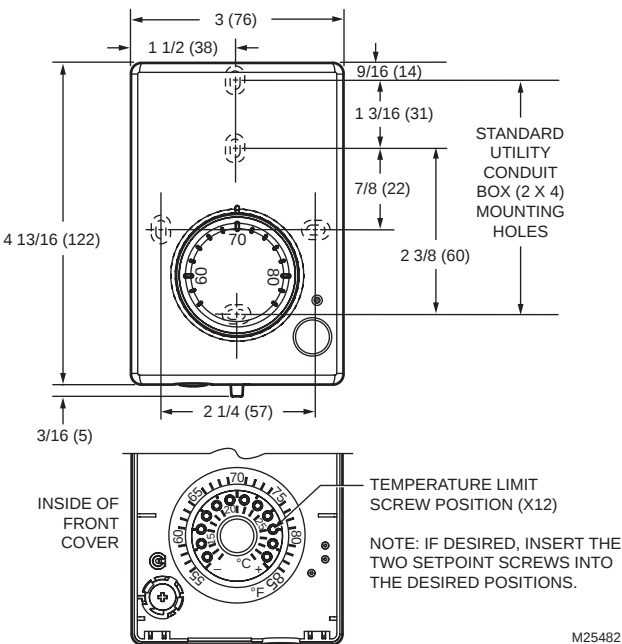
|                            |                                                                                                                                                                                                                                                                                                            |
|----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Models.....                | For specific model information, see TR21, TR22, TR23, and TR24 Wall Modules – Specification Data, form 63-1321.                                                                                                                                                                                            |
| Environmental Ratings..... | Operating Temperature: 45° to 99° F (7° to 37° C).<br>Shipping Temperature: -40° to 150° F (-40° to 65.5° C).                                                                                                                                                                                              |
| Accessories.....           | 50007298-001 (pack of 12) medium, cover plate; 6-7/8 x 5 in. (175 x 127 mm).                                                                                                                                                                                                                               |
| Approvals .....            | CE; UL94 plastic enclosure; FCC Part 15, Class B                                                                                                                                                                                                                                                           |
| Sensor .....               | All models are furnished with a 20K Ohm nonlinear NTC temperature sensor that follows a specific temperature resistance curve.<br>NOTE: The TR21-A wall module model has two (2) 20K Ohm nonlinear NTC temperature sensors in parallel, which provide 10K NTC temperature sensing necessary for averaging. |

### FEATURES

- Models with setpoint adjustment.
- Models with humidity output.
- Models with occupied/unoccupied override (bypass) with LED.
- Models with three-position (auto/0/1) or 5-position (auto/0/1/2/3 speed) fan switch.
- LONWORKS® bus jack on all models except the TR21 and TR21-A models.
- Locking cover on all models.
- Operating range 45° to 99 °F (7° to 37 °C).
- Models (TR22 and TR23) with user-selectable temperature setpoint dials in Fahrenheit, Celsius and Relative (- to +).

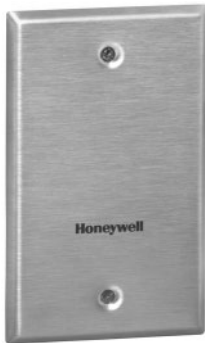


### DIMENSIONS DIAGRAM



M25482

C7772A Series Wallplate Sensors



The C7772A series of Wallplate Temperature Sensors are designed to be used with the Excel 5000 family and other Honeywell controllers. The C7772F Series is designed to be used with the TB7600, TB7300 and TB7200 Series communicating thermostats and other controllers that require a 10K ohm NTC Type II sensor. The C7772G is designed to be used with WEBs-AX I/O modules and other controllers that require a 10K ohm NTC Type III sensor. The C7772 sensors provide a resistive output signal proportional to sensed room or space temperature. The C7772 is well

suited for low-profile wall-mounted applications where durability and tamper-proof construction is desired, such as schools, prisons and institutions.

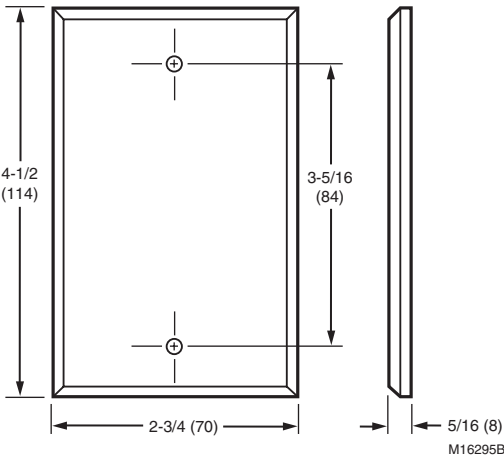
SPECIFICATIONS

|                                                                     |                                                                                                                                                                                                                                                     |
|---------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Temperature Ratings .....                                           | Operating: 45 °F to 99 °F (7 °C to 37 °C).                                                                                                                                                                                                          |
|                                                                     | Shipping: -40 °F to 150 °F (-40 °C to 65 °C).                                                                                                                                                                                                       |
| Long-term temperature sensor drift (for 20K ohm sensors only) ..... | Maximum sensor drift is nominally +/-0.13 °F after 5 years of operation, no appreciable drift thereafter. No calibration of the device is possible. Long term drift calibration/maintenance through controller software is typically not necessary. |
| Humidity Ratings .....                                              | 5 to 95% rh, non-condensing.                                                                                                                                                                                                                        |
| Sensor .....                                                        | C7772A furnished with a 20K non-linear NTC thermister, C7772F with a 10K non-linear NTC type II thermister, and C7772G with a 10K non-linear NTC type III thermister.                                                                               |
| Approvals .....                                                     | National Electrical Code (NEC) Class II                                                                                                                                                                                                             |

FEATURES

- Low profile when mounted on industry standard utility conduit box.
- Rugged, brushed stainless steel wallplate.
- Integral foam pad isolates wallplate sensor from conduit box.
- Insulated screw terminals ensure reliable field wiring connection.
- Models available with a variety of resistive temperature sensor elements.

DIMENSIONS DIAGRAM



C7772 SENSOR RESISTANCE

|                | Typical Resistance (in ohms) | Typical Resistance (in ohms) | Typical Resistance (in ohms) |
|----------------|------------------------------|------------------------------|------------------------------|
|                | C7772A                       | C7772F                       | C7772G                       |
| At 41°F (5°C)  | 54,200                       | 25,392                       | 23,467                       |
| At 50°F (10°C) | 41,758                       | 19,901                       | 18,789                       |
| At 59°F (15°C) | 32,427                       | 15,712                       | 15,137                       |
| At 68°F (20°C) | 25,370                       | 12,493                       | 12,268                       |
| At 77°F (25°C) | 20,000                       | 10,000                       | 10,000                       |
| At 86°F (30°C) | 15,856                       | 8,057                        | 8,196                        |
| At 95°F (35°C) | 12,654                       | 6,531                        | 6,754                        |

# Submittal Data - Sensors

## T775 Sensors



- Used with T775 Series 2000 Electronic Controllers
- Some typical applications for the 50021579-001 and T775-SENS-WT/-WR sensors include:
  - Monitoring return air temperatures
  - Monitoring discharge air temperatures
  - Monitoring mixed air temperatures

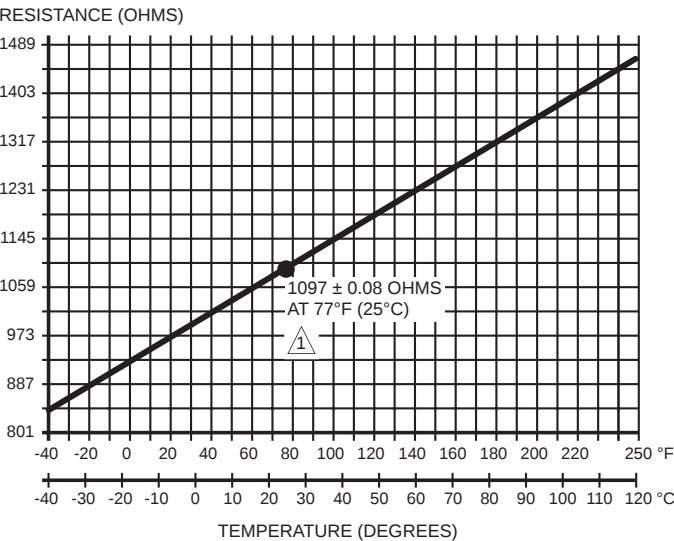
Use the T775-SENS-OAT to measure outside air temperature.

### FEATURES

- Fast response time and highly accurate
- 1/2 in. (6.35 mm) stainless steel probe with a thermally conductive epoxy
- All sensors are 1,097 Ohms PTC at 77°F (25°C)
- The 50021579-001 is a standard temperature sensor for indoor applications
- The T775-SENS-WR is a water resistant sensor with 5 ft leads
- The T775-SENS-WT is a water tight sensor with 6 ft leads
- The T775-SENS-OAT is for sensing outdoor air temperature and is housed in a weatherproof case for outdoor use (knockouts allow for 1/2 in. conduit connection)
- Two-year warranty

### SPECIFICATIONS

|                                   |                                                                                                                                                                                               |
|-----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Operating temperature range ..... | 50021571-001: -40 F to 350 F (-40C to 177C) Short term spikes to 392F (200C) okay.<br>T775-SENS-WR and T775-SENS-WT: -40F to 270F (-40C to 132C)<br>T775-SENS-OAT: -40F to 158F (-40C to 70C) |
| Accuracy .....                    | Meets DIN-IEC-751 Class A standards for overall accuracy of +/- 0.06% at 32°F (0°C)                                                                                                           |
| Self Heating Coefficient.....     | 4 mW/C (Measured in air with velocity of 1m/sec.)                                                                                                                                             |
| Response Time.....                | Air (Velocity = 1 m/s) = 15 sec. max.                                                                                                                                                         |
| Temperature Coefficient .....     | 3,850 ppm/C                                                                                                                                                                                   |
| Environmental Compliance .....    | RoHS-Directive 2002/95/EC                                                                                                                                                                     |
| Applied Current .....             | 1.0 mA Max.                                                                                                                                                                                   |
| Sensor Output .....               | 1 K Ohms at 32 F (0 C)                                                                                                                                                                        |
| Approvals .....                   | RoHS: Compliant                                                                                                                                                                               |



DIMENSIONS DIAGRAM

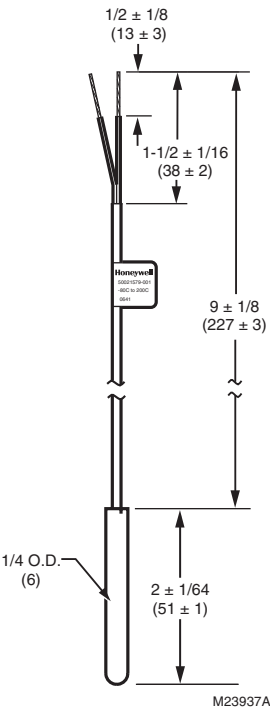


Fig. 1. 50021579-001 Dimensions in Inches (mm).

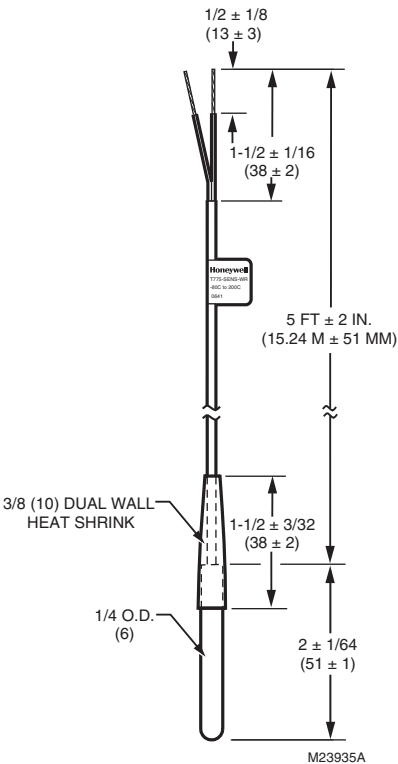


Fig. 2. T775-SENS-WR Dimensions in Inches (mm).

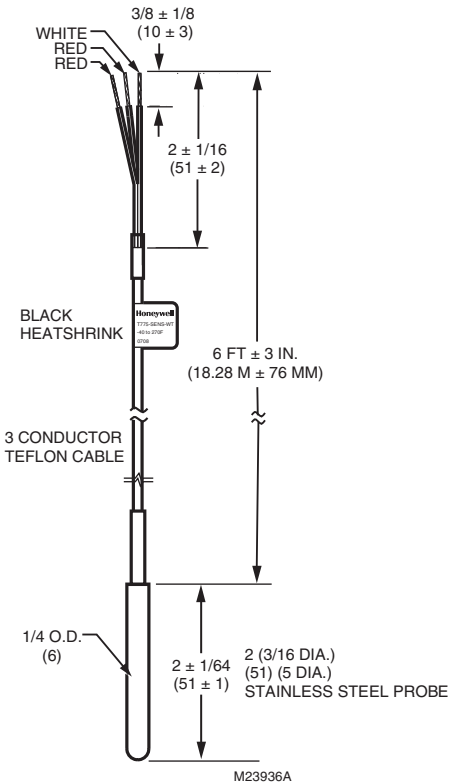


Fig. 3. T775-SENS-WT Dimensions in Inches (mm).

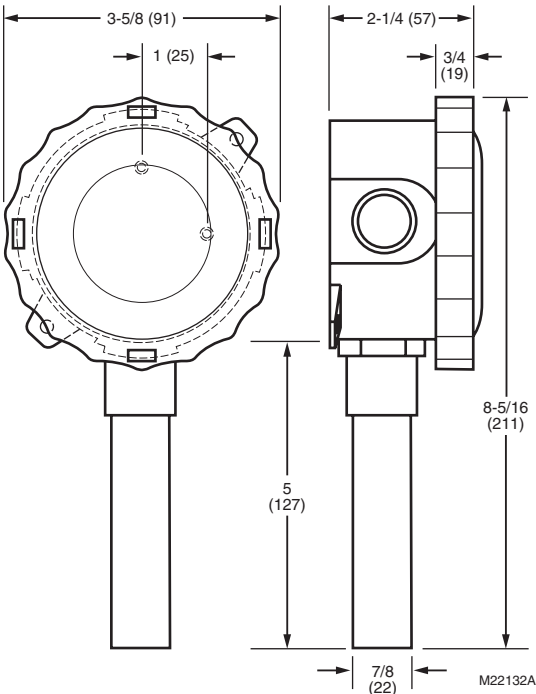


Fig. 4. T775-SENS-OAT Dimensions in Inches (mm).

Communicating Economizer Sensors



The sensors are part of the JADE™ Economizer System (Model W7220) that permit the use of outdoor air as the first stage of cooling in heating, ventilating and air conditioning (HVAC) systems. With Spyder system, the C7400S1010 communicates temperature and humidity via Sylk to the controller.

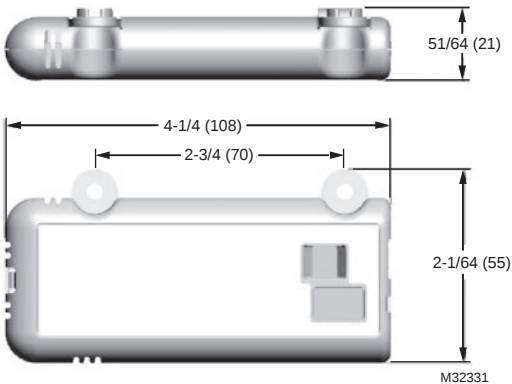
The C7400S Sylk Bus sensor is a combination temperature and humidity sensor, which is intended to be used in commercial rooftop units for sensing air. The sensor is powered by and communicates on the Sylk Bus. The C7400S communicates temperature and humidity separately digitally on the Sylk Bus Communication Protocol. The JADE Economizer controller provides power and communications on the Sylk Bus for the C7400S Sylk Bus sensor.

| SPECIFICATIONS                         |                                                                                                                    |
|----------------------------------------|--------------------------------------------------------------------------------------------------------------------|
| Supply Voltage .....                   | 7 to 21 Vdc                                                                                                        |
| Power Consumption .....                | 5 mA                                                                                                               |
| Output Rating .....                    | 75 ohm load switched at 9600 Baud                                                                                  |
| Wiring: Sylk Bus.....                  | 2-wire (18 to 22 AWG)                                                                                              |
| Operating Temperature range.....       | -40 to 150 °F (-40 to 65 °C)                                                                                       |
| Storage Temperature range .....        | -40 to 150 °F (-40 to 65 °C)                                                                                       |
| Shipping Temperature range.....        | -40 to 150 °F (-40 to 65 °C)                                                                                       |
| Operating Relative Humidity range..... | 5% to 95% RH noncondensing                                                                                         |
| Temperature and Humidity, C7400S:..... | Temperature sensing range: -40 to 150 °F (-40 to 65 °C)                                                            |
|                                        | Humidity sensing range: 0 to 100% RH with 5% accuracy.                                                             |
| Height .....                           | 0.8 inches (20.5 mm)                                                                                               |
| Width .....                            | 2.17 inches (55 mm)                                                                                                |
| Length .....                           | 4.25 inches (108 mm)                                                                                               |
| Weight .....                           | 0.58 lb. (0.265 kg)                                                                                                |
| Approvals .....                        | EN61000-6-3;EN61000-3-2;EN61000-3-3;EN61000-6-1; EN60730-1; Annex H.23 (emissions); Annex H.26 (immunity); CE Mark |

FEATURES

- This unit mounted C7400S enthalpy sensor includes solid state temperature and humidity sensors.
- Outputs a digital communicating signal on a two-wire Sylkbus communications link, reporting the temperature and humidity separately to the controller.
- The controller then determines the enthalpy (total heat), enabling economizer modes of operation when outside air enthalpy is suitable for free cooling.
- Enthalpy sensors are compatible with Honeywell economizer systems.
- The enthalpy boundary curve is programmed via the controller. When the temperature and humidity are determined to be suitable based on the relationship to the boundary, the controller allows outside air for economizing
- Ambient temperature operating range from -40° to 150° F.
- Dual enthalpy sensors in outside air and return switches the controllers to economizer mode of operation anytime the outside enthalpy is less than the return air enthalpy. UL recognized component (Guide info XAPX).
- Select the C7400S1010 for use with the Spyder Controller to communicate temperature and humidity to your building automation system via Sylk.

DIMENSIONS DIAGRAM



## Communicating Economizer Sensors



The C7250 Temperature sensor is designed for use as a 20k input to a controller for mixed air or discharge air temperature in rooftop packaged air conditioning equipment. Compatible with the JADE™ Economizer System (Model W7220) which provides power and communications for the C7250 temperature sensor.

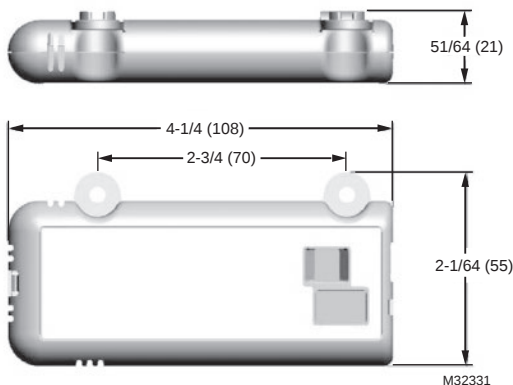
### SPECIFICATIONS

|                                  |                                                                                                                                       |
|----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|
| Output Rating .....              | 20K ohms at 77 °F (25 °C), NTC                                                                                                        |
| Wiring .....                     | 2-wire (18 to 22 AWG)                                                                                                                 |
| Operating Temperature range..... | -40 to 150 °F (-40 to 65 °C)                                                                                                          |
| Storage Temperature range .....  | -40 to 150 °F (-40 to 65 °C)                                                                                                          |
| Shipping Temperature range.....  | -40 to 150 °F (-40 to 65 °C)                                                                                                          |
| Temperature, C7250 .....         | Temperature sensing range: 0 to 150 °F (18 to 65 °C)                                                                                  |
| Height .....                     | 0.8 inches (20.5 mm)                                                                                                                  |
| Width .....                      | 2.17 inches (55 mm)                                                                                                                   |
| Length .....                     | 4.25 inches (108 mm)                                                                                                                  |
| Weight .....                     | 0.58 lb. (0.265 kg)                                                                                                                   |
| Approvals .....                  | EN61000-6-3;EN61000-3-2;<br>EN61000-3-3;EN61000-6-1;<br>EN60730-1 Annex H.23 (emissions);<br>Annex H.26 (immunity);<br>CE Mark FOR EU |

### FEATURES

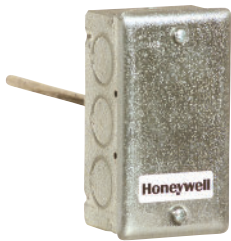
- This unit mounted C7250A temperature sensor utilizes a 20K NTC sensor.
- Compatible with Honeywell W7220 JADE economizer controller

### DIMENSIONS DIAGRAM



# Submittal Data - Sensors

## Immersion Temperature Sensors



### FEATURES

- C7021D, C7023D, C7031D, C7041D for immersion mounted water temperature sensing
- Solid state components not affected by dust or dirt

### SPECIFICATIONS

See Table 1 and 2 for additional specifications.

|                       |                                                                                                                                                                                                                                                                                                                                                                              |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Compatibility.....    | Use Series 2000 C7031, C7041 Temperature Sensors with Excel 10, 15, 80, 100, and 500 controllers. Series 2000 C7031D sensors are compatible with various Honeywell controllers. Series 2000 C7021 temperature sensors are compatible with TB7600, TB7300 and TB7200 communicating thermostats. Series 2000 C7023 temperature sensors are compatible with WEBs-AX I/O modules |
| Sensor Accuracy ..... | ±0.36 °F at 77 °F (±0.2 °C at 25 °C) for 20K ohm NTC sensors and 10K ohm NTC Type II and Type III sensors.                                                                                                                                                                                                                                                                   |

### APPLICATION

The Series 2000 Electronic Temperature Sensors are designed for use with electronic controllers in domestic or commercial heating and cooling systems.

### DIMENSIONS DIAGRAM

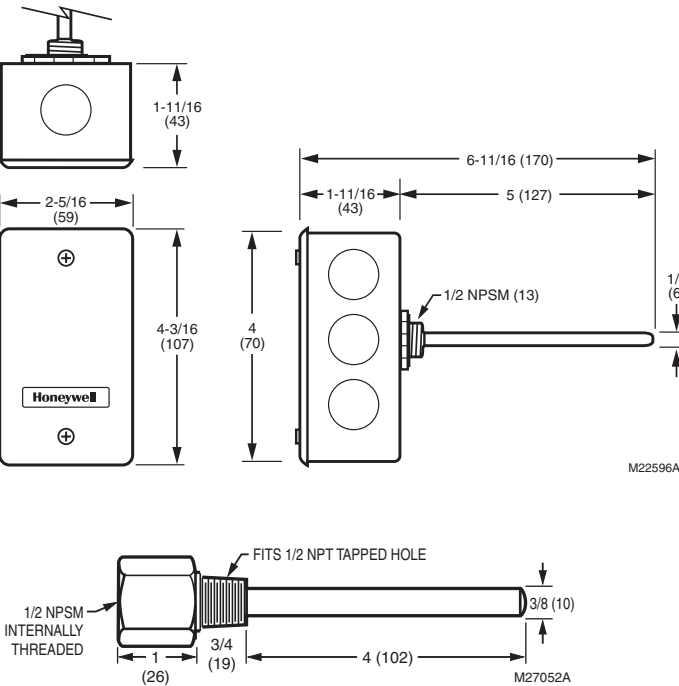


Fig. 1. 5-inch Stainless-Steel Immersion Well.

# Submittal Data - Sensors

## Immersion Temperature Sensors

**Table 1: Specifications**

| Part Number | Sensing Element       | Resistance           | Operating Range | Mounting and Application                     |
|-------------|-----------------------|----------------------|-----------------|----------------------------------------------|
| C7021D2001  | 10K ohms NTC Type II  | 10K ohms NTC at 77°F | -40° to 250° F  | 5" w/wiring enclosure, use well 50001774-001 |
| C7023D2001  | 10K ohms NTC Type III | 10K ohms NTC at 77°F | -40° to 250° F  | 5" w/wiring enclosure, use well 50001774-001 |
| C7031D2003  | PT1000                | 1097K                | 40° to 350° F   | 5" w/wiring enclosure, use well 50001775-001 |
| C7041D2001  | 20K ohms NTC          | 20K ohms NTC at 77°F | -40° to 250° F  | 5" w/wiring enclosure, use well 50001774-001 |

**Table 2: Sensor Resistance**

|                | Typical Resistance (in ohms)        |                                      |                               |                             |
|----------------|-------------------------------------|--------------------------------------|-------------------------------|-----------------------------|
|                | C7021 Sensors (10K Ohm NTC Type II) | C7023 Sensors (10K Ohm NTC Type III) | C7031 Sensors (1097 Ohms PTC) | C7041 Sensors (20K ohm NTC) |
| At 41°F (5°C)  | 25,392                              | 23,467                               | 1,020                         | 54,200                      |
| At 50°F (10°C) | 19,901                              | 18,789                               | 1,039                         | 41,758                      |
| At 59°F (15°C) | 15,712                              | 15,137                               | 1,059                         | 32,427                      |
| At 68°F (20°C) | 12,493                              | 12,268                               | 1,078                         | 25,370                      |
| At 77°F (25°C) | 10,000                              | 10,000                               | 1,097                         | 20,000                      |
| At 86°F (30°C) | 8,057                               | 8,196                                | 1,117                         | 15,856                      |
| At 95°F (35°C) | 6,531                               | 6,754                                | 1,136                         | 12,654                      |

# Submittal Data - Sensors

## Outdoor Air Temperature Sensors



### FEATURES

- C7021F, C7023F, C7031G, C7041F sense outdoor air temperature and are weatherproof for outdoor use (knockouts allow for 1/2 in. conduit connection).
- Solid state components not affected by dust or dirt

### SPECIFICATIONS

See Table 1 and 2 for additional specifications.

Compatibility.....Use Series 2000 C7031, C7041 Temperature Sensors with Excel 10, 15, 80, 100 and 500 controllers. Series 2000 C7031G sensors are compatible with various Honeywell controllers. The C7031F2014 is compatible with the T7350 Commercial Thermostat. Series 2000 C7021 temperature sensors are compatible with TB7600, TB7300 and TB7200 communicating thermostats. Series 2000 C7023 temperature sensors are compatible with WEBs-AX I/O module.

Sensor Accuracy..... $\pm 0.36^{\circ}\text{F}$  at  $77^{\circ}\text{F}$  ( $\pm 0.2^{\circ}\text{C}$  at  $25^{\circ}\text{C}$ ) for 20K ohm NTC sensors and 10K ohm NTC Type II and Type III sensors.

### APPLICATION

The Series 2000 Electronic Temperature Sensors are designed for use with electronic controllers in domestic or commercial heating and cooling systems.

### DIMENSIONS DIAGRAM

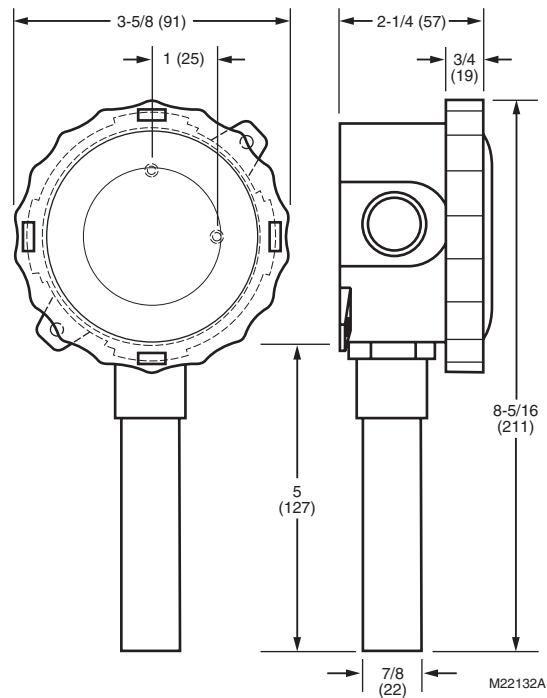


Fig. 1. C7031G, C7021F, C7023F, C7041F Dimensions in Inches (mm).

Table 1: Specifications

| Part Number | Sensing Element       | Resistance                           | Operating Range                        | Mounting and Application                       |
|-------------|-----------------------|--------------------------------------|----------------------------------------|------------------------------------------------|
| C7021F2009  | 10K ohms NTC Type II  | 10K ohms NTC at $77^{\circ}\text{F}$ | $-40^{\circ}$ to $158^{\circ}\text{F}$ | Outdoor weatherproof, connects to 1/2" conduit |
| C7023F2009  | 10K ohms NTC Type III | 10K ohms NTC at $77^{\circ}\text{F}$ | $-40^{\circ}$ to $158^{\circ}\text{F}$ | Outdoor weatherproof, connects to 1/2" conduit |
| C7031G2014  | PT3000                | 3484 ohms at $77^{\circ}\text{F}$    | $-40^{\circ}$ to $120^{\circ}\text{F}$ | Outdoor weatherproof, connects to 1/2" conduit |
| C7041F2006  | 20K ohms NTC          | 20K ohms NTC at $77^{\circ}\text{F}$ | $-40^{\circ}$ to $158^{\circ}\text{F}$ | Outdoor weatherproof, connects to 1/2" conduit |

Table 2: Sensor Resistance

|                                                  | Typical Resistance (in ohms)        |                                      |                               |                             |
|--------------------------------------------------|-------------------------------------|--------------------------------------|-------------------------------|-----------------------------|
|                                                  | C7021 Sensors (10K Ohm NTC Type II) | C7023 Sensors (10K Ohm NTC Type III) | C7031 Sensors (1097 Ohms PTC) | C7041 Sensors (20K ohm NTC) |
| At $41^{\circ}\text{F}$ ( $5^{\circ}\text{C}$ )  | 25,392                              | 23,467                               | 1,020                         | 54,200                      |
| At $50^{\circ}\text{F}$ ( $10^{\circ}\text{C}$ ) | 19,901                              | 18,789                               | 1,039                         | 41,758                      |
| At $59^{\circ}\text{F}$ ( $15^{\circ}\text{C}$ ) | 15,712                              | 15,137                               | 1,059                         | 32,427                      |
| At $68^{\circ}\text{F}$ ( $20^{\circ}\text{C}$ ) | 12,493                              | 12,268                               | 1,078                         | 25,370                      |
| At $77^{\circ}\text{F}$ ( $25^{\circ}\text{C}$ ) | 10,000                              | 10,000                               | 1,097                         | 20,000                      |
| At $86^{\circ}\text{F}$ ( $30^{\circ}\text{C}$ ) | 8,057                               | 8,196                                | 1,117                         | 15,856                      |
| At $95^{\circ}\text{F}$ ( $35^{\circ}\text{C}$ ) | 6,531                               | 6,754                                | 1,136                         | 12,654                      |

Duct Air Temperature Sensors



FEATURES

- C7021J/R, C7023J/R, C7031J, C7041J/R sense average duct air temperature.
- Solid state components not affected by dust or dirt

SPECIFICATIONS

See Table 1 and 2 for additional specifications.

|                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Compatibility.....    | Use Series 2000 C7031, C7041 Temperature Sensors with Excel 10, 15, 80, 100 and 500 controllers. Series 2000 C7031B,D,G,J sensors are compatible with various Honeywell controllers. The C7031G2014 is compatible with the T7350 Commercial Thermostat. Series 2000 C7021 temperature sensors are compatible with TB7600, TB7300 and TB7200 communicating thermostats. Series 2000 C7023 temperature sensors are compatible with WEBs-AX I/O modules |
| Sensor Accuracy ..... | ±0.36°F at 77°F (±0.2°C at 25°C) for 20K ohm NTC sensors and 10K ohm NTC Type II and Type III sensors.                                                                                                                                                                                                                                                                                                                                               |

APPLICATION

The Series 2000 Electronic Temperature Sensors are designed for use with electronic controllers in domestic or commercial heating and cooling systems.

DIMENSIONS DIAGRAM

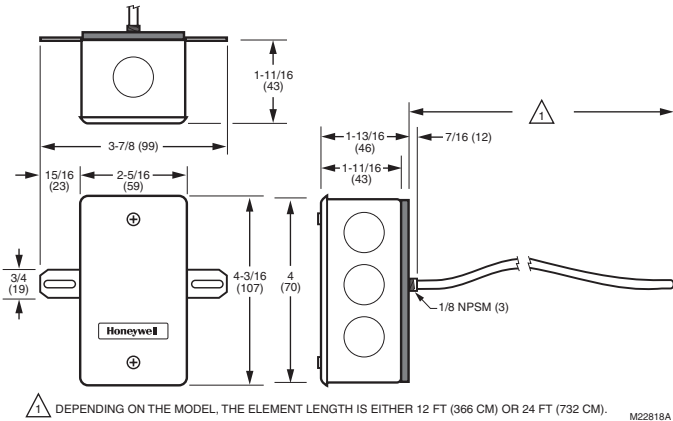


Fig. 1. C7021R, C7023R, C7041R Dimensions in Inches (mm).

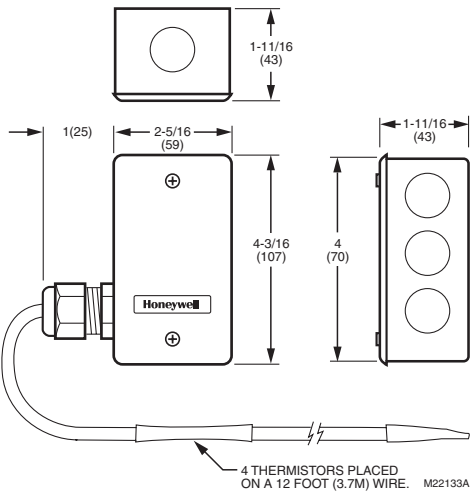


Fig. 2. C7021J, C7023J, C7031J, C7041J Dimensions in Inches (mm).

# Submittal Data - Sensors

## Duct Air Temperature Sensors

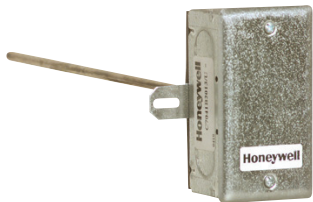
**Table 1: Specifications**

| Part Number | Sensing Element       | Resistance            | Operating Range | Mounting and Application                   |
|-------------|-----------------------|-----------------------|-----------------|--------------------------------------------|
| C7021J2007  | 10K ohms NTC Type II  | 10K ohms NTC at 77°F  | -40° to 250° F  | 12' duct averaging w/wiring enclosure      |
| C7021R2000  | 10K ohms NTC Type II  | 10K ohms NTC at 77°F  | -40° to 250° F  | 12' duct averaging flexible copper         |
| C7021R2018  | 10K ohms NTC Type II  | 10K ohms NTC at 77°F  | -40° to 250° F  | 24' duct averaging flexible copper         |
| C7023J2007  | 10K ohms NTC Type III | 10K ohms NTC at 77°F  | -40° to 250° F  | 12' duct averaging w/wiring enclosure      |
| C7023R2000  | 10K ohms NTC Type III | 10K ohms NTC at 77°F  | -40° to 250° F  | 12' duct averaging flexible copper         |
| C7023R2018  | 10K ohms NTC Type III | 10K ohms NTC at 77°F  | -40° to 250° F  | 24' duct averaging flexible copper         |
| C7031J2009  | PT1000                | 1097 ohms PTC at 77°F | 40° to 180° F   | 12' duct averaging flexible copper         |
| C7041J2007  | 20K ohms NTC          | 20K ohms NTC at 77°F  | -40° to 250° F  | 12 ft. Duct (Averaging) w/wiring enclosure |
| C7041R2000  | 20K ohms NTC          | 20K ohms NTC at 77°F  | -40° to 250° F  | 12 ft. Duct flexible copper (Averaging)    |
| C7041R2018  | 20K ohms NTC          | 20K ohms NTC at 77°F  | -40° to 250° F  | 24 ft. Duct flexible copper (Averaging)    |

**Table 2: Sensor Resistance**

|                | Typical Resistance (in ohms)        |                                      |                               |                             |
|----------------|-------------------------------------|--------------------------------------|-------------------------------|-----------------------------|
|                | C7021 Sensors (10K Ohm NTC Type II) | C7023 Sensors (10K Ohm NTC Type III) | C7031 Sensors (1097 Ohms PTC) | C7041 Sensors (20K ohm NTC) |
| At 41°F (5°C)  | 25,392                              | 23,467                               | 1,020                         | 54,200                      |
| At 50°F (10°C) | 19,901                              | 18,789                               | 1,039                         | 41,758                      |
| At 59°F (15°C) | 15,712                              | 15,137                               | 1,059                         | 32,427                      |
| At 68°F (20°C) | 12,493                              | 12,268                               | 1,078                         | 25,370                      |
| At 77°F (25°C) | 10,000                              | 10,000                               | 1,097                         | 20,000                      |
| At 86°F (30°C) | 8,057                               | 8,196                                | 1,117                         | 15,856                      |
| At 95°F (35°C) | 6,531                               | 6,754                                | 1,136                         | 12,654                      |

## Duct Air Temperature Sensors



### FEATURES

- C7021B/C, C7023B/C, C7031B, C7041B/C sense duct air temperature.
- Solid state components not affected by dust or dirt

### SPECIFICATIONS

See Table 1 and 2 for additional specifications.

|                       |                                                                                                                                                                                                                                                                                                                                                                             |
|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Compatibility.....    | Use Series 2000 C7031, C7041 Temperature Sensors with Excel 10, 15, 80, 100 and 500 controllers. Series 2000 C7031B sensors are compatible with various Honeywell controllers. Series 2000 C7021 temperature sensors are compatible with TB7600, TB7300 and TB7200 communicating thermostats. Series 2000 C7023 temperature sensors are compatible with WEBs-AX I/O modules |
| Sensor Accuracy ..... | $\pm 0.36^{\circ}\text{F}$ at $77^{\circ}\text{F}$ ( $\pm 0.2^{\circ}\text{C}$ at $25^{\circ}\text{C}$ ) for 20K ohm NTC sensors and 10K ohm NTC Type II and Type III sensors.                                                                                                                                                                                              |

### APPLICATION

The Series 2000 Electronic Temperature Sensors are designed for use with electronic controllers in domestic or commercial heating and cooling systems.

### DIMENSIONS DIAGRAM

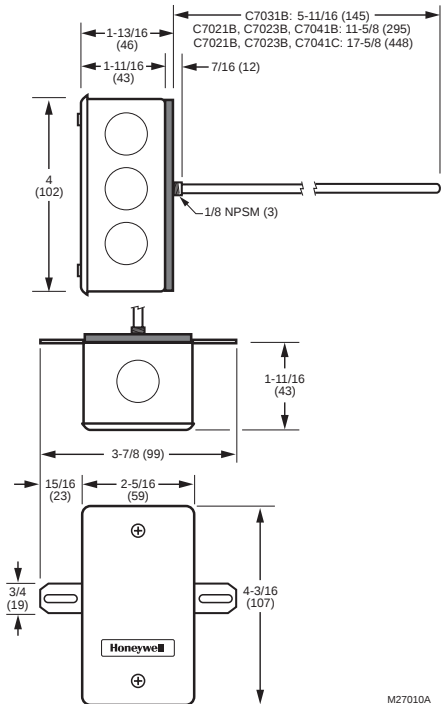


Fig. 1. C7021B/C, C7023B/C Dimensions in Inches (mm).

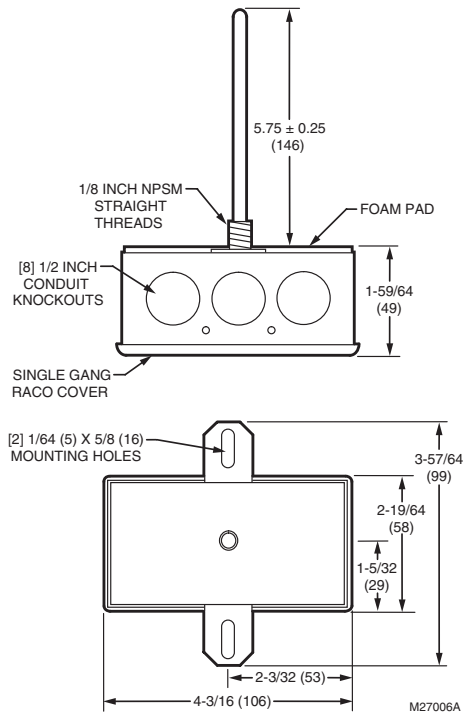


Fig. 2. C7031B Dimensions in Inches (mm).

# Submittal Data - Sensors

## Duct Air Temperature Sensors

**Table 1: Specifications**

| Part Number | Sensing Element       | Resistance             | Operating Range | Mounting and Application    |
|-------------|-----------------------|------------------------|-----------------|-----------------------------|
| C7021B2005  | 10K ohms NTC Type II  | 10K ohms NTC at 77°F   | -40° to 250° F  | 6" duct w/wiring enclosure  |
| C7021B2013  | 10K ohms NTC Type II  | 10K ohms NTC at 77°F   | -40° to 250° F  | 12" duct w/wiring enclosure |
| C7021C2003  | 10K ohms NTC Type II  | 10K ohms NTC at 77°F   | -40° to 250° F  | 18" duct w/wiring enclosure |
| C7023B2005  | 10K ohms NTC Type III | 10K ohms NTC at 77°F   | -40° to 250° F  | 6" duct w/wiring enclosure  |
| C7023B2013  | 10K ohms NTC Type III | 10K ohms NTC at 77°F   | -40° to 250° F  | 12" duct w/wiring enclosure |
| C7023C2003  | 10K ohms NTC Type III | 10K ohms NTC at 77°F   | -40° to 250° F  | 18" duct w/wiring enclosure |
| C7031B2005  | PT1000                | 1097K ohms NTC at 77°F | -40° to 250° F  | 6" duct w/wiring enclosure  |
| C7041B2005  | 20K ohms NTC          | 20K ohms NTC at 77°F   | -40° to 250° F  | 6" duct w/wiring enclosure  |
| C7041B2013  | 20K ohms NTC          | 20K ohms NTC at 77°F   | -40° to 250° F  | 12" duct w/wiring enclosure |
| C7041C2003  | 20K ohms NTC          | 20K ohms NTC at 77°F   | -40° to 250° F  | 18" duct w/wiring enclosure |

**Table 2: Sensor Resistance**

|                | Typical Resistance (in ohms)        |                                      |                               |                             |
|----------------|-------------------------------------|--------------------------------------|-------------------------------|-----------------------------|
|                | C7021 Sensors (10K Ohm NTC Type II) | C7023 Sensors (10K Ohm NTC Type III) | C7031 Sensors (1097 Ohms PTC) | C7041 Sensors (20K ohm NTC) |
| At 41°F (5°C)  | 25,392                              | 23,467                               | 1,020                         | 54,200                      |
| At 50°F (10°C) | 19,901                              | 18,789                               | 1,039                         | 41,758                      |
| At 59°F (15°C) | 15,712                              | 15,137                               | 1,059                         | 32,427                      |
| At 68°F (20°C) | 12,493                              | 12,268                               | 1,078                         | 25,370                      |
| At 77°F (25°C) | 10,000                              | 10,000                               | 1,097                         | 20,000                      |
| At 86°F (30°C) | 8,057                               | 8,196                                | 1,117                         | 15,856                      |
| At 95°F (35°C) | 6,531                               | 6,754                                | 1,136                         | 12,654                      |

# Submittal Data - Sensors

## Strap-On Water Temperature Sensors



### FEATURES

- C7021K, C7023K, C7041K with strap-on mounting senses water temperature.
- Solid state components not affected by dust or dirt

### SPECIFICATIONS

See Table 1 and 2 for additional specifications.

Compatibility.....Use Series 2000 C7041 Temperature Sensors with Excel 10, 15, 80, 100, and 500 controllers. Series 2000 C7021 temperature sensors are compatible with TB7600, TB7300 and TB7200 communicating thermostats. Series 2000 C7023 temperature sensors are compatible with WEBs-AX I/O modules

Sensor Accuracy..... $\pm 0.36^{\circ}\text{F}$  at  $77^{\circ}\text{F}$  ( $\pm 0.2^{\circ}\text{C}$  at  $25^{\circ}\text{C}$ ) for 20K ohm NTC sensors and 10K ohm NTC Type II and Type III sensors.

### APPLICATION

The Series 2000 Electronic Temperature Sensors are designed for use with electronic controllers in domestic or commercial heating and cooling systems.

### DIMENSIONS DIAGRAM

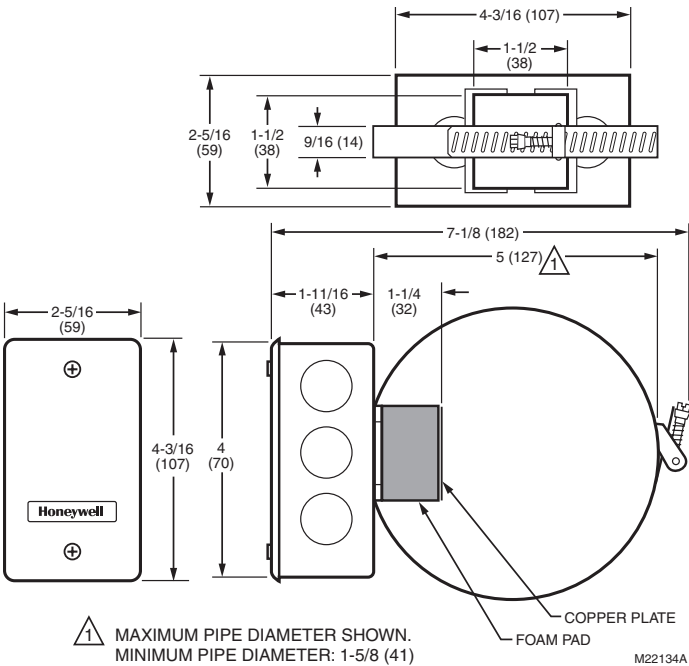


Table 1: Specifications

| Part Number | Sensing Element       | Resistance           | Operating Range | Mounting and Application                   |
|-------------|-----------------------|----------------------|-----------------|--------------------------------------------|
| C7021K2005  | 10K ohms NTC Type II  | 10K ohms NTC at 77°F | -40° to 250° F  | Strap-on pipe sensor with wiring enclosure |
| C7023K2005  | 10K ohms NTC Type III | 10K ohms NTC at 77°F | -40° to 250° F  | Strap-on pipe sensor with wiring enclosure |
| C7041K2005  | 20K ohms NTC          | 20K ohms NTC at 77°F | -40° to 250° F  | Strap-on with wiring enclosure             |

Table 2: Sensor Resistance

|                | Typical Resistance (in ohms)        |                                      |                             |
|----------------|-------------------------------------|--------------------------------------|-----------------------------|
|                | C7021 Sensors (10K Ohm NTC Type II) | C7023 Sensors (10K Ohm NTC Type III) | C7041 Sensors (20K ohm NTC) |
| At 41°F (5°C)  | 25,392                              | 23,467                               | 54,200                      |
| At 50°F (10°C) | 19,901                              | 18,789                               | 41,758                      |
| At 59°F (15°C) | 15,712                              | 15,137                               | 32,427                      |
| At 68°F (20°C) | 12,493                              | 12,268                               | 25,370                      |
| At 77°F (25°C) | 10,000                              | 10,000                               | 20,000                      |
| At 86°F (30°C) | 8,057                               | 8,196                                | 15,856                      |
| At 95°F (35°C) | 6,531                               | 6,754                                | 12,654                      |

# Submittal Data - Sensors

## Air or Water Temperature Sensor Probe



### APPLICATION

The Series 2000 Electronic Temperature Sensors are designed for use with electronic controllers in residential or commercial heating and cooling systems.

### FEATURES

- C7021N, C7023N, C7041N probe senses water or air temperature.
- Solid state components not affected by dust or dirt

### SPECIFICATIONS

See Table 1 and 2 for additional specifications.

|                       |                                                                                                                                                                                                                                                                                        |
|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Compatibility.....    | Use Series 2000 C7041 Temperature Sensors with Excel 10, 15, 80, 100 and 500 controllers. Series 2000 C7021 temperature sensors are compatible with TB7600, TB7300 and TB7200 communicating thermostats. Series 2000 C7023 temperature sensors are compatible with WEBs-AX I/O modules |
| Sensor Accuracy ..... | ±0.36°F at 77°F (±0.2°C at 25°C) for 20K ohm NTC sensors and 10K ohm NTC Type II and Type III sensors.                                                                                                                                                                                 |

Table 1: Specifications

| Part Number | Sensing Element       | Resistance           | Operating Range | Mounting and Application  |
|-------------|-----------------------|----------------------|-----------------|---------------------------|
| C7021N2001  | 10K ohms NTC Type II  | 10K ohms NTC at 77°F | -40° to 250° F  | Probe Sensor with 6' Lead |
| C7023N2001  | 10K ohms NTC Type III | 10K ohms NTC at 77°F | -40° to 250° F  | Probe Sensor with 6' Lead |
| C7041N2020  | 20K ohms NTC          | 20K ohms NTC at 77°F | -40° to 250° F  | Probe Sensor with 6' Lead |

Table 2: Sensor Resistance

|                | Typical Resistance (in ohms)        |                                      |                             |
|----------------|-------------------------------------|--------------------------------------|-----------------------------|
|                | C7021 Sensors (10K Ohm NTC Type II) | C7023 Sensors (10K Ohm NTC Type III) | C7041 Sensors (20K ohm NTC) |
| At 41°F (5°C)  | 25,392                              | 23,467                               | 54,200                      |
| At 50°F (10°C) | 19,901                              | 18,789                               | 41,758                      |
| At 59°F (15°C) | 15,712                              | 15,137                               | 32,427                      |
| At 68°F (20°C) | 12,493                              | 12,268                               | 25,370                      |
| At 77°F (25°C) | 10,000                              | 10,000                               | 20,000                      |
| At 86°F (30°C) | 8,057                               | 8,196                                | 15,856                      |
| At 95°F (35°C) | 6,531                               | 6,754                                | 12,654                      |

DIMENSIONS DIAGRAM

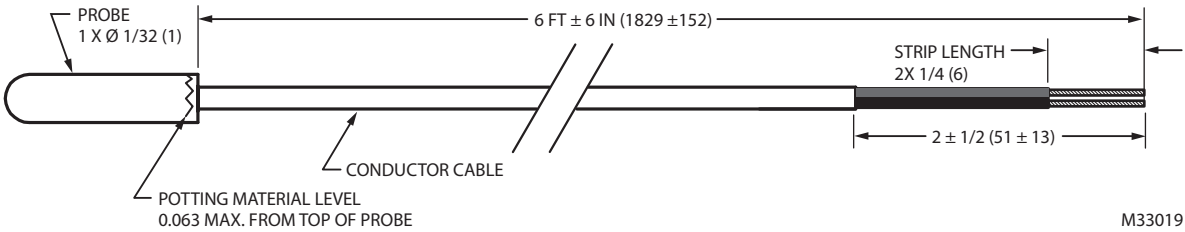
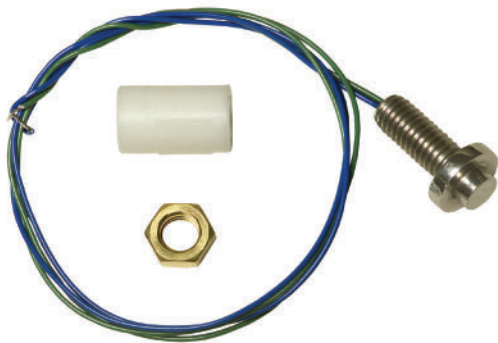


Fig. 1. C7021N, C7023N, C7041N Dimensions in Inches (mm).

# Submittal Data - Sensors

## Air Temperature Sensor



### APPLICATION

The Series 2000 Electronic Temperature Sensors are designed for use with electronic controllers in domestic or commercial heating and cooling systems.

### FEATURES

- C7021P, C7023P, C7041P senses air temperature.
- Solid state components not affected by dust or dirt

### SPECIFICATIONS

See Table 1 and 2 for additional specifications.

Compatibility.....Use Series 2000 C7041 Temperature Sensors with Excel 10, 15, 80, 100 and 500 controllers. Series 2000 C7021 temperature sensors are compatible with TB7600, TB7300 and TB7200 communicating thermostats. Series 2000 C7023 temperature sensors are compatible with WEBs-AX I/O modules

Sensor Accuracy..... $\pm 0.36^{\circ}\text{F}$  at  $77^{\circ}\text{F}$  ( $\pm 0.2^{\circ}\text{C}$  at  $25^{\circ}\text{C}$ ) for 20K ohm NTC sensors and 10K ohm NTC Type II and Type III sensors.

### DIMENSIONS DIAGRAM

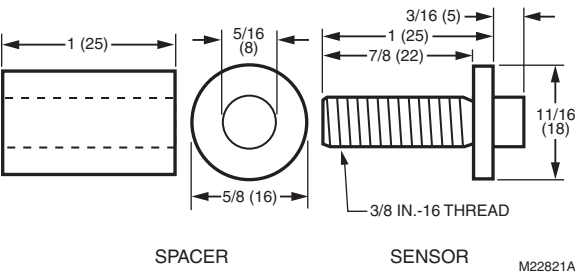


Table 1: Specifications

| Part Number | Sensing Element       | Resistance           | Operating Range | Mounting and Application  |
|-------------|-----------------------|----------------------|-----------------|---------------------------|
| C7021P2004  | 10K ohms NTC Type II  | 10K ohms NTC at 77°F | -40° to 250° F  | Small metal button sensor |
| C7023P2004  | 10K ohms NTC Type III | 10K ohms NTC at 77°F | -40° to 250° F  | Small metal button sensor |
| C7041P2004  | 20K ohms NTC          | 20K ohms NTC at 77°F | -40° to 250° F  | Small metal button sensor |

Table 2: Sensor Resistance

|                | Typical Resistance (in ohms)        |                                      |                             |
|----------------|-------------------------------------|--------------------------------------|-----------------------------|
|                | C7021 Sensors (10K Ohm NTC Type II) | C7023 Sensors (10K Ohm NTC Type III) | C7041 Sensors (20K ohm NTC) |
| At 41°F (5°C)  | 25,392                              | 23,467                               | 54,200                      |
| At 50°F (10°C) | 19,901                              | 18,789                               | 41,758                      |
| At 59°F (15°C) | 15,712                              | 15,137                               | 32,427                      |
| At 68°F (20°C) | 12,493                              | 12,268                               | 25,370                      |
| At 77°F (25°C) | 10,000                              | 10,000                               | 20,000                      |
| At 86°F (30°C) | 8,057                               | 8,196                                | 15,856                      |
| At 95°F (35°C) | 6,531                               | 6,754                                | 12,654                      |



### SPECIFICATIONS

#### Fixed Current Switches

|                          |                                                                                                                                                                                 |
|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Output Type.....         | NO, solid-state FET                                                                                                                                                             |
| Output Rating .....      | 1.0A@30VAC/DC Max.                                                                                                                                                              |
| Temperature Rating ..... | -15~60 ° C                                                                                                                                                                      |
| Insulation Class .....   | 600V RMS. For use on insulated conductors only!                                                                                                                                 |
|                          | Use minimum 75° C insulated conductor                                                                                                                                           |
| Sensor Power .....       | Induced                                                                                                                                                                         |
| Frequency Range .....    | 50/60Hz                                                                                                                                                                         |
| Dimensions (LxWxH) ..... | CSP-NO-F-200A:<br>2.94" x 2.23" x 0.82"<br>CSP-NO-F-200A:<br>1.4" H with optional relay module<br>CS-NO-F-50A: 2.27" x 1.60" x 1.04"<br>CSP-NO-F-200A: 0.75" CS-NO-F-50A: 0.52" |
| Sensor Aperture .....    |                                                                                                                                                                                 |

#### Current Relays

|                          |                                                                                                                                                    |
|--------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| Contact Rating.....      | 10A @ 125 VAC (UL C300 RATED)                                                                                                                      |
| Temperature Rating ..... | -15 to 60 ° C                                                                                                                                      |
| Dimensions (LxWxH) ..... | 2.94" x 2.23" x 0.82" (1.4" H with optional relay module)<br>Maximum surrounding air ambient, 60° C.<br>For use in Pollution Degree 2 Environment. |

#### Adjustable Current Switches

|                          |                                                                                                                                                                                                                             |
|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Turn-on Amperage         |                                                                                                                                                                                                                             |
| CSP-NO-AVFD-150A .....   | 1A (30Hz min), 1.5A (20Hz min), 2.5A (10Hz min)                                                                                                                                                                             |
| Output Type.....         | NO, solid-state FET                                                                                                                                                                                                         |
| Temperature Rating ..... | -15~60° C                                                                                                                                                                                                                   |
| Insulation Class .....   | 600V RMS. For use on insulated conductors only!                                                                                                                                                                             |
|                          | Use minimum 75° C insulated conductor                                                                                                                                                                                       |
| Sensor Power .....       | Induced                                                                                                                                                                                                                     |
| Frequency Range .....    | 50/60Hz CSP-NO-AVFD-150A:<br>10 -120Hz; proof of flow loss alarm at 40Hz+                                                                                                                                                   |
| Dimensions (LxWxH) ..... | MCS-NO-A-50A: 1.78" x 1.32" x 0.66"<br>CS-NO-A-50A: 2.27" x 1.61" x 0.69"<br>*CSP-NO-A-xxxA / *CSP-NO-AECM-200A:<br>2.94" x 2.23" x 0.82"<br>*CSP-NO-AVFD-150A:<br>2.51" x 2.23" x 0.82" *1.4" H with optional relay module |
| Sensor Aperture .....    | MCS-NO-A-50A: 0.3"<br>CS-NO-A-50A: 0.5"<br>CSP-NO-A-xxxA / CSP-NO-AECM-200A / CSP-NO-AVFD150A: 0.75"<br>* Amperage minimum is frequency dependent, see Turn-On Amperage                                                     |

### Features

#### APPLICATION

- Detecting mechanical failure on fans and pumps
- Monitoring status of industrial processes and critical motors

#### CS SERIES

- Same benefits as CSP current switch with a more compact package
- Low amperage detection
- Solid core; fixed and adjustable

#### CSP SERIES

- Prior to installation, the current threshold is preset thereby allowing the installer to avoid electrical hazards when adjusting in presence of line voltage
- Lowest installed cost
- No need to return to job site to calibrate
- Save approximately 30 minutes time for each sensor install
- Split core; fixed and adjustable
- Optional command relay

#### MCS SERIES (MINI-ADJUSTABLE)

- Ultra small, fits almost anywhere
- Low amperage detection
- Solid core; adjustable.

| Model #          | Trip Point Type                    | Core Type   | Max. Current                          | Application |
|------------------|------------------------------------|-------------|---------------------------------------|-------------|
| MCS-NO-A-50A     | Adjustable, 0.75-50FLA             | Micro-Solid | 50A                                   | Standard    |
| CS-NO-F-50A      | Fixed, 0.25A                       | Solid       |                                       |             |
| CS-NO-A-50A      | Adjustable, 0.75-50FLA             | Split       |                                       |             |
| CSP-NO-A-50A     | Adjustable, 0.45-50FLA             |             |                                       |             |
| CSP-NO-A-100A    | Adjustable, 0.50-100FLA            |             |                                       |             |
| CSP-NO-A-150A    | Adjustable, 0.50-150FLA            |             |                                       |             |
| CSP-NO-F-200A    | Fixed, 0.35A                       |             |                                       |             |
| CSP-NO-AVFD-150A | Automatically detected above 40 Hz | 150A        | VFD Controlled Motor                  |             |
| CSP-NO-AECM-200A | Adjustable, 0.25-3A Trip           | 200A        | ECM - Electronically Commutated Motor |             |

Table 1. Operating Specifications

| Model #          | Trip Point Type | Core Type   | Trip Point  |
|------------------|-----------------|-------------|-------------|
| MCS-NO-A-50A     | Adjustable      | Micro-Solid | 0.75-50FLA  |
| CS-NO-F-50A      | Fixed           | Solid       | 0.25A       |
| CS-NO-A-50A      | Adjustable      | Split       | 0.75-50FLA  |
| CSP-NO-A-50A     | Adjustable      | Split       | 0.45-50FLA  |
| CSP-NO-A-100A    | Adjustable      | Split       | 0.50-100FLA |
| CSP-NO-A-150A    | Adjustable      | Split       | 0.50-150FLA |
| CSP-NO-F-200A    | Fixed           | Split       | 0.35A       |
| CSP-NO-AVFD-150A | Automatic       | Split       | Above 40 Hz |
| CSP-NO-AECM-200A | Adjustable      | Split       | 0.25-3A     |

# Submittal Data - Sensors

## Current Transmitters, CTS & CTP 0–5/10Vdc Output Models



### FEATURES

- Split core loop-powered current transmitters for simple installation.
- High accuracy and linearity.
- Selectable scaling on most models for greater measurement accuracy.
- Fast response time.
- Integral DIN rail mounting flange.
- Easy wiring, polarity sensitive output.
- Optional slide on command relay for unitary startstop status.
- Limited 5-year warranty.

### SPECIFICATIONS

|                                 |                                                                                          |
|---------------------------------|------------------------------------------------------------------------------------------|
| Accuracy .....                  | +/-2% F.S. over 10 to 100% range                                                         |
| Ambient Temperature Rating..... | -15~60° C                                                                                |
| Insulation Class                | 600V RMS. For use on insulated conductors only!<br>Use minimum 75° C insulated conductor |
| Sensor Power                    | Induced, 12 to 30 Vdc max for loop powered sensors                                       |
| Frequency Range                 | 50/60Hz                                                                                  |
| Dimensions (LxWxH)              | 2.94" x 2.23" x 0.82"<br>(1.4" H with optional relay module)                             |
| Sensor Aperture                 | 0.75"                                                                                    |
| Environmental                   | Pollution Degree 2<br>(non-conductive/noncondensing)                                     |
| Approvals .....                 | UL/CUL US Listed (UL 508) Ind.<br>Control Equipment (File # E309723),<br>CE, RoHS2, WEEE |

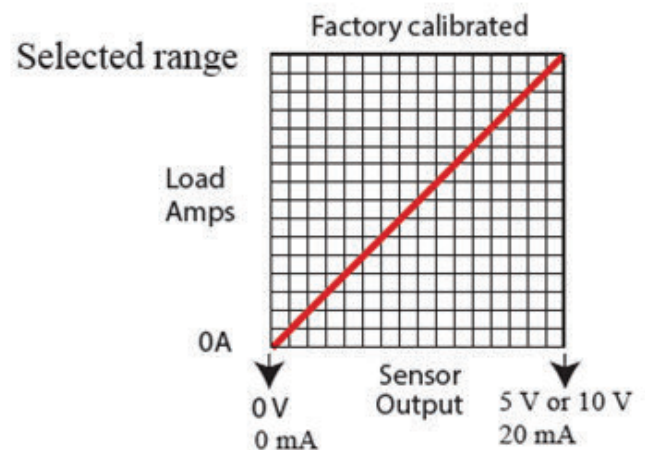
### APPLICATION

The CTP current transmitters monitor the current flow for various electrical equipment. Measured current level is converted into a linear and proportional 0 - 5/10 Vdc or 4-20 mA output signal, which can be monitored by a Building Management, DDC, or PLC controller. Current sensors with switch selectable current ranges provide optimal resolution for greater measuring accuracy. These current sensors should be used in load trending (current monitoring) type applications.

The split core design makes installations easy since no wires need to be disconnected during the installation process. May be mounted directly on the conductor (codes permitting) or fixed mount on DIN rail.

| Model #      | Output* | Range       | Max. Current |
|--------------|---------|-------------|--------------|
| CTP-A-20A    | 4-20mA  | 5/10/20 A   | 200A         |
| CTP-A-120A   |         | 30/60/120 A |              |
| CTP-5V-20A   | 0-5VDC  | 5/10/20 A   | 100A         |
| CTP-10V-120A | 0-10VDC | 30/60/120 A | 200A         |
| CTP-10V-200A |         | Fixed 200 A |              |

\*Note: 0 - 5/10 Vdc output (induced power)  
4-20 mA output (12-30 Vdc power source required)



Analog current sensors output signal proportional to monitored current.

**Linear proportional output.**

**Table 1. Operating Specifications**

| Product Number | Selectable Ranges | Measurement | AC Waveform     | Core (Solid/Split) | Output Signal |
|----------------|-------------------|-------------|-----------------|--------------------|---------------|
| CTS-V-50       | 0 to 10/20/50A    | Average     | Pure Sinusoidal | Solid              | 0 to 5 VDC    |
| CTP-V-50       | 0 to 10/20/50A    | Average     | Pure Sinusoidal | Split              | 0 to 10 VDC   |
| CTS-V-150      | 0 to 50/100/150A  | Average     | Pure Sinusoidal | Solid              | 0 to 10 VDC   |
| CTP-V-150      | 0 to 50/100/150A  | Average     | Pure Sinusoidal | Split              | 0 to 10 VDC   |



### FEATURES

- 35mm DIN-rail mounting flange
- SPDT Form 1C Relay contacts
- Pilot duty rated
- LED status indication
- Stackable for streamlined installation
- Can be used with any Honeywell analog current sensor or switch

### APPLICATION

The CR (Command Relay) Series brings control (start/stop) functionality to your load trending and fan/pump/motor status monitoring applications. Each unit has a Form 1C-SPDT relay which means you have both a N/O and a N/C contact in the same unit. (See Table 1 for output ratings). The 35mm DIN-rail Mounting Flange will allow you to use the CR Series with any Honeywell analog current sensor or switch. The stacking feature will also allow you to reduce the required panel space, since up to two CR Series Command Relays may be stacked together during installation.

The command relays are for use with:

- Motor control
- Lighting applications
- Interposing relay
- Control pumps/compressors
- Appliances/industrial equipment

**Table 1. Operating Specifications**

| Model Number    | Coil Rating         | Contact Type/Rating |
|-----------------|---------------------|---------------------|
| CR-24V-NO-10A   | 24VAC/DC, 15mA nom. | N.O. / 10A @ 125VAC |
| CR-24V-NC-10A   |                     | N.C. / 10A @ 125VAC |
| CR-12VDC-NO-10A | 9-12VDC, 30mA nom.  | N.O. / 10A @ 125VAC |
| CR-12VDC-NC-10A |                     | N.C. / 10A @ 125VAC |

# Submittal Data - Sensors

## H77 Product Family Humidity/Temperature Sensors



### APPLICATION

- HVAC room humidity and temperature measurement and control
- Energy management/building control

### FEATURES

The wall sensors are designed to blend into any room space to provide accuracy for improved occupant comfort.

- Clean looking, low-profile, recessed design
- Comparable accuracy, performance and features as included in duct sensors
- Push-button field calibration – easy adjustment of relative humidity (RH) values

Duct sensors provide interior HVAC zone humidity and temperature measurement and control. Outdoor sensors are designed to be mounted on the building exterior to provide outside air RH measurement.

All humidity sensors provide high accuracy:

- On-board temperature compensation for RH
- Eliminates temperature coefficient errors and achieves an high measurement accuracy and high repeatability
- NIST traceable 3-point calibration, optional duct version with calibration certificate

### Specifications

|                   |                            |                                                                                                                                                                              |
|-------------------|----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Power supply      | AC Supply/DC Supply        | 24VAC, 100mA max.<br>12-30VDC, 50mA max.                                                                                                                                     |
| Outputs           | RH                         | 3-wire 0-5V/10V <sup>1</sup> ,<br>3-wire or 2-wire 4-20mA (Selectable)                                                                                                       |
| Output scaling    | RH                         | 0-100%RH                                                                                                                                                                     |
| Thermistor/RTD    | Nominal resistance @ 25 °C | 20 kOhm 097 kOhm                                                                                                                                                             |
| Media filter      |                            | PBT with water vapor-permeable membrane                                                                                                                                      |
| Relative Humidity | Accuracy                   | 2% models: ±2% max 0 to 100% RH,<br>±1.5% typ 0 to 80% RH @25°C<br>3% models: ±3% max 0 to 100% RH,<br>±2% typ 0 to 100% RH @25°C                                            |
|                   | Resolution                 | 0.01% RH                                                                                                                                                                     |
|                   | Hysteresis                 | ±0.8% RH                                                                                                                                                                     |
|                   | Repeatability              | 0.08% RH                                                                                                                                                                     |
|                   | Non-linearity              | Factory linearized <1%RH                                                                                                                                                     |
|                   | Temperature coefficient    | Fully compensated by on-board sensor                                                                                                                                         |
|                   | Response time <sup>2</sup> | 8s                                                                                                                                                                           |
|                   | Output update              | 0.5s                                                                                                                                                                         |
|                   | Operating range            | 0 to 100% RH (non-condensing)                                                                                                                                                |
|                   | Long term drift            | <0.25% RH per year                                                                                                                                                           |
| Enclosure         | Materials                  | ABS/Polycarbonate                                                                                                                                                            |
|                   | Dimensions                 | Duct/Outdoor: 4.0"h x 4.4"w x 2.1"d<br>Duct: (+6.8" probe)<br>Outdoor: (+2.8" Solar Shield)<br>Wall: 5.66"h x 3.00"w x 0.36"d<br>(1.69" depth including recessed components) |
|                   | Enclosure Rating           | Wall/Duct: IP20/NEMA 1<br>Outdoor: IP20/NEMA 1<br>*Vent bottom of enclosure to achieve NEMA 3R Rating                                                                        |
|                   | Unit Temp Rating           | -40°F to 158°F (-40 to 70°C)                                                                                                                                                 |

<sup>1</sup> One side of transformer secondary is connected to signal common. Dedicated transformer is recommended.

<sup>2</sup> Time for reaching 63% of reading at 25 °C and 1 m/s airflow.

<sup>3</sup> Long term exposures to conditions outside normal range or high humidity may temporarily offset the RH reading (+3%RH after 60 hours).

<sup>4</sup> 15-30 VDC/24VAC power supply voltage required for 10 volt output.

| Model        | Humidity Accuracy | Thermistor | Type    |
|--------------|-------------------|------------|---------|
| H7726A2020   | 2%                | 1097 Ohm   | Wall    |
| H7725A2010   | 2%                | 20 kOhm    | Wall    |
| H7736A2022   | 3%                | 1097 Ohm   | Wall    |
| H7735A2012   | 3%                | 20 kOhm    | Wall    |
| H7725A2010-C | 2% NIST Certified | 20 kOhm    | Wall    |
| H7725B2006   | 2%                | 20 kOhm    | Duct    |
| H7725B2006-C | 2% NIST Certified | 20 kOhm    | Duct    |
| H7726B2024   | 2%                | 1097 Ohm   | Duct    |
| H7735B2018   | 3%                | 20 kOhm    | Duct    |
| H7736B2026   | 3%                | 1097 Ohm   | Duct    |
| H7735C2015   | 3%                | 20 kOhm    | Outdoor |

DIMENSIONS DIAGRAM

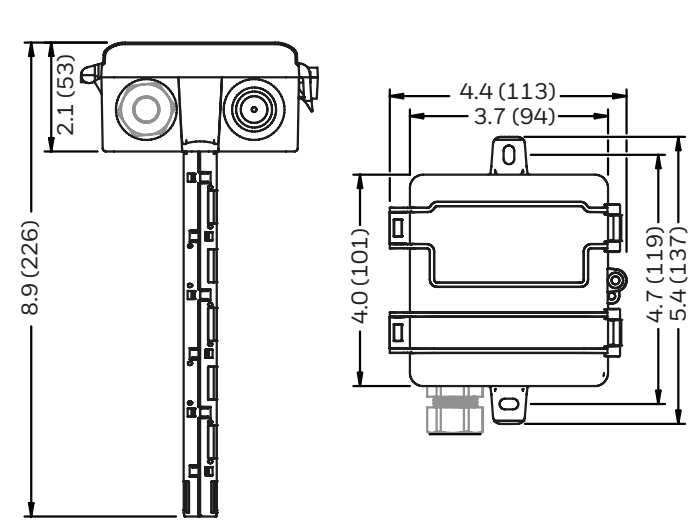


Fig. 1. Duct-mount Sensor Dimensions in In (mm).

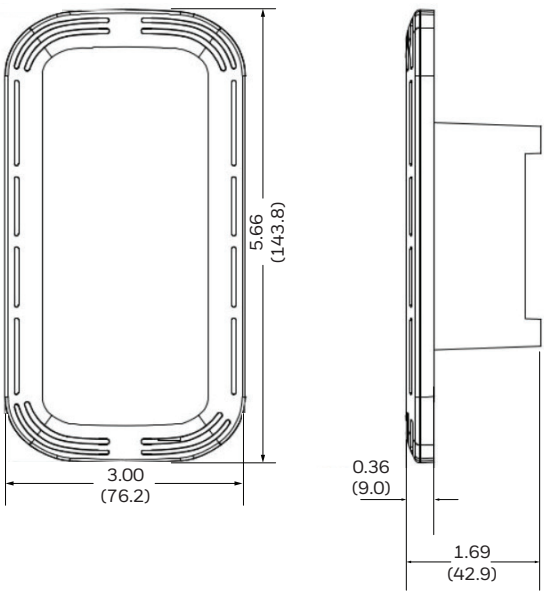


Fig. 3. Wall-mount Sensor Dimensions in In (mm).

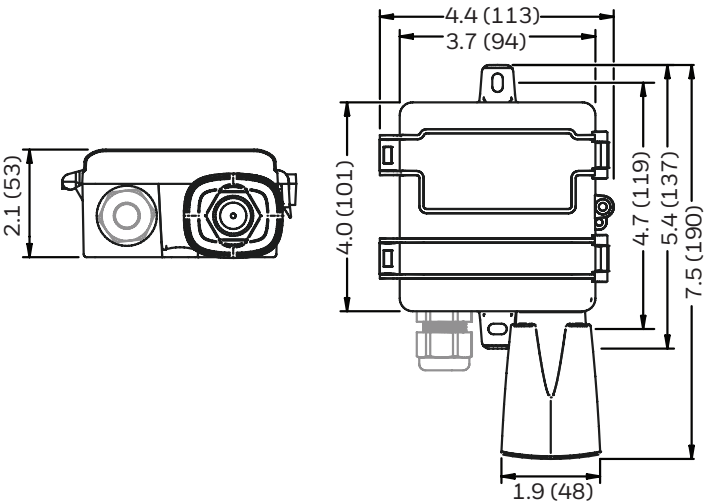


Fig. 2. Outdoor-mount Sensor Dimensions in Inches (mm).

Electronic Humidity Sensors

DIMENSIONS DIAGRAM

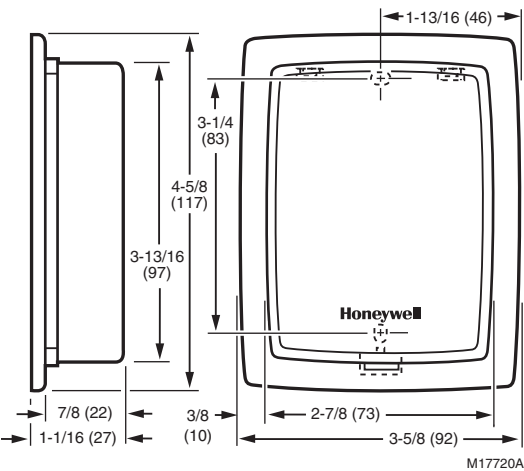


Fig. 1. C7600B, H7665A Dimensions in In (mm).

OUTPUT VOLTAGE CHARTS

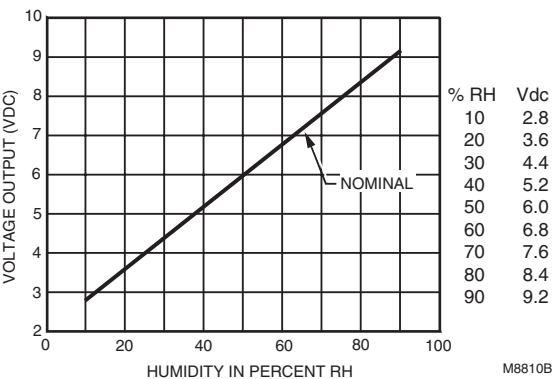


Fig. 2. C7600B Nominal Output Voltage Vs. Relative Humidity.

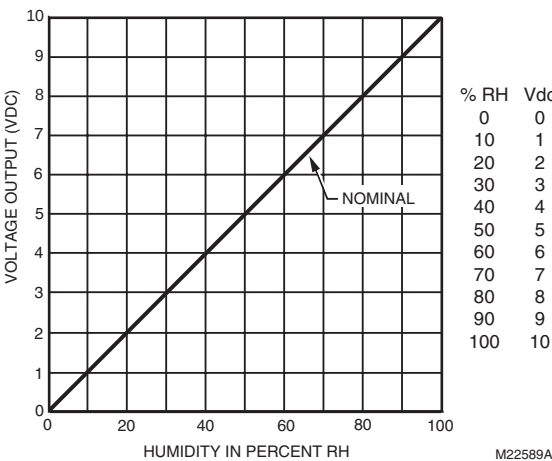


Fig. 3. H7665A Nominal Output Voltage Vs. Relative Humidity.



### APPLICATION

C7233 and C7263 Solid State Humidity Sensors sense the relative humidity level of an area and are used with any controller capable of processing a 0-10 Vdc or 2-10 Vdc signal. C7263 has an integral 20 kOhm NTC temperature sensor.

### SPECIFICATIONS

#### ENVIRONMENTAL AND MOUNTING

|                              |                                                             |
|------------------------------|-------------------------------------------------------------|
| Mounting Positions.....      | Wall Mounted                                                |
| Operating temperature.....   | +32 °F to +122 °F<br>(0 °C to +50 °C)                       |
| Storage temperature.....     | -40 °F to +158 °F<br>(-40 °C to +70 °C)                     |
| Relative Humidity.....       | 0-95% RH (non- condensing)                                  |
| Dimensions for all Models .. | 5-1/16 (128 mm) X 3-5/32                                    |
| (L X W X H) inch (mm)        | (80 mm) X 1 (25 mm)                                         |
| Mounting .....               | Vertical surface with standard<br>single-gang junction box. |

#### SENSOR PERFORMANCE RATING

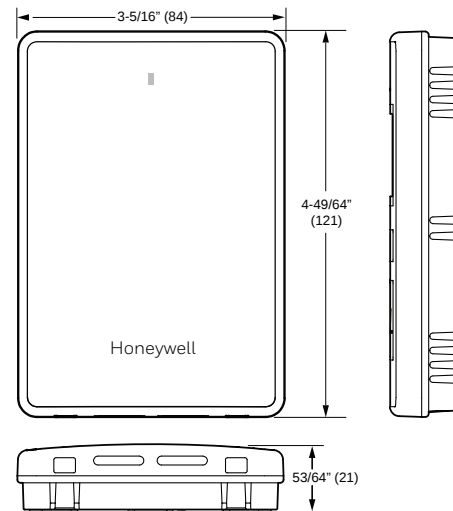
|                           |                                                                                            |
|---------------------------|--------------------------------------------------------------------------------------------|
| Response time .....       | <20 seconds                                                                                |
| Measurement Range .....   | 0-2000 ppm                                                                                 |
| CO2 Relay/LED Alert.....  | 800, 1000, 1100, 1200 ppm                                                                  |
| Threshold Settings        |                                                                                            |
| Temperature sensor .....  | 20K ohm NTC Type<br>(C7263A1008)                                                           |
| Accuracy .....            | ±(30 ppm +3% of reading)* with<br>in the range 400-2000 ppm<br>±75 ppm at 600 - 1000 ppm** |
| Temperature Accuracy..... | ±1.53 °F (±0.85 °C) within the<br>range 55 °F- 85 °F (13 - 29 °C)                          |

#### ELECTRICAL RATINGS

|                            |                                                          |
|----------------------------|----------------------------------------------------------|
| Power Supply .....         | 24 Vac/dc ±20%, 50/60 Hz<br>(Class 2)                    |
| Max.Power Consumption..... | 3 W                                                      |
| Peak Current.....          | (20 ms): 600 mA                                          |
| Relay Contact Rating.....  | 1 A at 50 Vac/24 Vdc                                     |
| Linear Analog .....        | 0/2 - 10 Vdc (resistive load<br>greater than 5000 ohms). |
| Output Voltage             |                                                          |
| Linear Analog .....        | 4-20 mA (resistive load less than<br>500 ohms)           |
| Output Current             |                                                          |
| Wiring Connections.....    | Terminals: 24 AWG Maximum                                |

### FEATURES

- LED Display: Models available with flush face membrane and attractive white LED CO2 ppm display. All variants have red LED notification activated when CO2 level exceeds preset threshold.
- Programmable SPST RELAY: Programmable CO2 threshold setting to activate relay for ventilation signal or damper control.
- Self-Calibration: Automatic Background Calibration (ABC) algorithm ensures accuracy for 10 years or more.
- Selectable Output: Analog output range is selectable 0/2 - 10 VDC and provides accurate proportional linear signal though entire sensing range 0 - 2000 ppm.
- Advanced Sensing: Highly accurate and reliable Non-Dispersion Infrared (NDIR) technology for CO2 sensing.
- Elegant Design: Ultra compact size and elegant design with easy cleaning via smooth front membrane design.
- Improved Ventilation: Effective CO2 sensing supports demand controlled ventilation to balance indoor air quality with energy savings.
- Temperature Sensing: Optional accurate temperature sensor variant is available.



**C7233, C7263 dimensions in In (mm).**

\* This product complies with CA Title 24, Part 6, CEC Standard for Residential and Non-Residential Buildings-2016, when installed according to instructions.

\*\* When measured at sea level and 25 °C. Display are accurate and meet CA Title 24 , Part 6, CEC Standard - CO2.

Dew Point Sensors



FEATURES

- Does not wait to detect when the dew point has already been reached, but rather provides an early warning of the approaching dew point
- Compact design
- Fast response
- Module is coated, thus protected against contamination
- Simple and easy mounting
- Status indication

SPECIFICATIONS

|                            |                                                 |
|----------------------------|-------------------------------------------------|
| Temperature Accuracy ..... | ±0.2°C (±0.4°F), 0 to 50°C (32 to 122°F)        |
| Humidity Accuracy .....    | ±3 %RH @ 90 %RH                                 |
| Response Time.....         | <1 second                                       |
| Setpoint Range.....        | ±2°C (dewpoint)                                 |
| Alarm Contact Rating ..... | Form C (NO + NC), 1 A @ 24 Vac/dc               |
| Alarm Hysteresis .....     | 1 minute delay on alarm to prevent false alarms |
| Dimensions.....            | 56mm x 50mm x 21mm                              |
| Material.....              | Grey ABS                                        |
| Ratings .....              | IP30 (NEMA 1)                                   |
| Weight .....               | 35 grams                                        |
| Power Supply .....         | 5 to 28 Vac/dc                                  |
| Consumption .....          | 3 mA max @ 24 Vdc max                           |
| Operating Conditions ..... | 0 to 50°C (32 to 122°F)                         |
|                            | 5 to 95 %RH non-condensing                      |
| Storage Conditions.....    | -30 to 70°C (-22 to 158°F)                      |
| Wiring Connections .....   | 14-22 AWG terminal block                        |

DIMENSIONS DIAGRAM

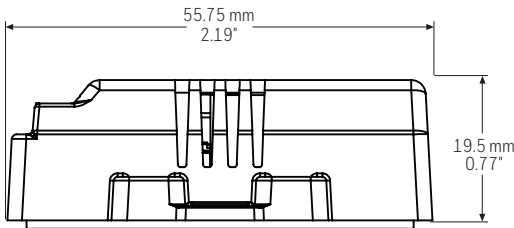
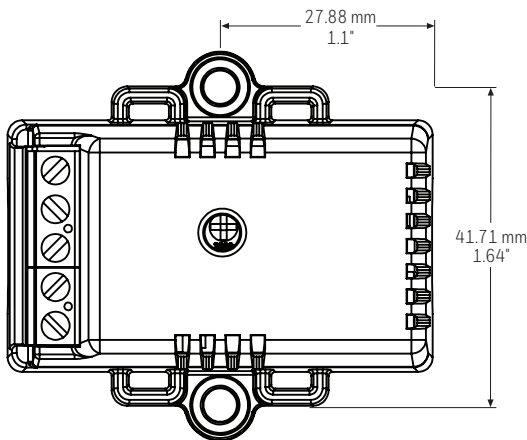


Fig. 1. Mounting (Dimensions in mm).

APPLICATION

The HCP00-EU early-warning dew point switch is used to monitor the formation of condensation on chilled ceilings or to prevent condensation at critical spots of HVAC systems. It is also used as a dew point monitor for systems operating near the dewpoint. The dew point switch measures the relative humidity near the dew point using its high-quality capacitive sensor. At reaching the switching point the output will provide an early warning signal for the initiation of control steps (increasing the initial water temperature, reducing the cooling capacity, switching on the heating, etc.). An additional status light indicates the condensation danger. Thanks to the special protection coating, sensor and electronics are highly insensitive to dust and dirt. HCP00-EU dew point switch can be mounted on walls, ducts and pipes up to 2" (50mm).



### APPLICATION

H7655 and C7600 Solid State Humidity Sensors sense the relative humidity level of an area and is used with any controller capable of processing a 0-10 Vdc or 2-10 Vdc signal.

### FEATURES

- Long-lasting solid state sensing element is accurate and stable over time.
- Enclosed in rugged, wall-mounted plastic case.
- Vents on top and sides of cover allow air flow to humidity sensing element.
- Compact size and lightweight construction provide easy mounting.
- C7600B provides 2-10 Vdc output directly proportional to relative humidity and can be used with the H775 Humidity Controller.
- H7655A provides 0-10 Vdc output directly proportional to relative humidity and can be used with the T7350 Temperature/Humidity Controller.

### SPECIFICATIONS

|                                 |                                                                                                                                                                                                                                                                                                                                              |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Dimensions .....                | See Fig. 1.                                                                                                                                                                                                                                                                                                                                  |
| Case .....                      | Rugged, lightweight, compact plastic, easy to install.                                                                                                                                                                                                                                                                                       |
| Electrical Ratings .....        | Input: 16-40 Vdc or 16-30 Vac.                                                                                                                                                                                                                                                                                                               |
| Output .....                    | C7600B: 2-10 Vdc voltage signal; increases from 2 to 10Vdc as humidity increases. Output voltage is directly proportional to relative humidity increase. See Fig. 2.<br>H7655A: 0-10 Vdc voltage signal; increases from 0 to 10Vdc as humidity increases. Output voltage is directly proportional to relative humidity increase. See Fig. 3. |
| Maximum Power Consumption.....  | 0.3 VA.                                                                                                                                                                                                                                                                                                                                      |
| Mounting .....                  | Wall mount (directly to wall or standard outlet box).                                                                                                                                                                                                                                                                                        |
| Ambient Temperature Ranges..... | Operating: 32 °F to 125 °F (0 °C to 52 °C).<br>Shipping: -40 °F to +150 °F (-40 °C to +66 °C).                                                                                                                                                                                                                                               |
| Humidity Range .....            | 10 to 90 percent RH, noncondensing.                                                                                                                                                                                                                                                                                                          |
| Humidity Accuracy .....         | From 30 to 70% RH: ±5 percent RH.<br>From 10 to 90% RH: ±7 percent RH.                                                                                                                                                                                                                                                                       |

# Submittal Data - Sensors

## Differential Air Pressure Sensors



### APPLICATION

The P7660 dry media pressure sensors feature multiple ranges and multiple output types. The P7645 dry media pressure sensors provides single-range, single output configurations. These are both optimized for building (zone) pressure, filter measurement, and static duct applications. Innovative static probe on P7660 integrates with unit or can be mounted remotely for static pressure measurement.

### FEATURES

#### P7660 Universal Sensor

- Four selectable pressure ranges.
- Uni/bi-directional modes.
- Selectable output type 4-20 mA loop powered, 4-20mA 3-wire, 05 Vdc, 0-10 Vdc.
- Zero calibration push button and remote contact input.
- Designed for duct, filter, and remote probe applications in a single universal unit.
- Optional probe is compatible with both 1/8" and 1/4" ID hose.
- Designed for duct, filter, and remote probe applications in a single universal unit.
- Flexible panel Dual orientation DIN rail mount.
- Optional LCD display shows pressure in PSID.

#### P7645 Sensor

- Budget friendly alternative version with 4-20mA output and single pressure range.
- Uni/bi directional modes.
- Zero calibration push button and remote contact input.
- Designed for duct, filter, and remote probe applications in a single universal unit.
- Flexible panel Dual orientation DIN rail mount.
- Zero calibration push button and remote contact input.

### SPECIFICATIONS

|                           |                                                                                                                               |
|---------------------------|-------------------------------------------------------------------------------------------------------------------------------|
| Optional Probe: .....     | P7600PROBE                                                                                                                    |
| Power Supply .....        | 12-30 Vdc/24 Vac <sup>1</sup> , 30 mA max.                                                                                    |
| Outputs.....              | P7660: 3-wire 0-5 V/10V, 4-20 mA loop powered,<br>3-wire 4-20 mA (selectable) P7645: 4-20 mA loop powered                     |
| Output Scaling.....       | P7660 Selectable Ranges:<br>0-5 in. W.C. (0.1/0.25/2.5/5 in. W.C.)<br>P7645 Models:<br>0-0.1 in. W.C. (1.0/2.5/5/10 in. W.C.) |
| Operating Temperature ... | Operating Range:<br>-4 to 185 °F (-20 to 85 °C)<br>Compensated Range:<br>32 to 122 °F (0 to 50 °C)                            |
| Media Compatibility.....  | Dry, oil-free air. Nitrogen.                                                                                                  |
| Sensor Type.....          | Precision Calibrated: MEMS silicon piezoresistive                                                                             |
| Accuracy .....            | Combined Linearity and Hysteresis:<br>+/- 1.0% of selectable range<br>BFSL: +/- 0.25% BSFL                                    |
| Auto-Zero Input .....     | Push-button and contact closure input                                                                                         |
| Pressure Connection ..... | 0.250" or 0.375"                                                                                                              |
| Enclosure.....            | Material: ABS<br>Dimensions: 4.75" H x 1.82" W x 0.90" D                                                                      |

<sup>1</sup> One side of transformer secondary is connected to signal common. Dedicated transformer is recommended.

| Product Number | Pressure Range (in W.C.) | Output       | LCD Display | Probe |
|----------------|--------------------------|--------------|-------------|-------|
| P7645C0010X    | 0-0.10                   | 4-20 mA Loop | No          | No    |
| P7645C0025X    | 0-0.25                   | 4-20 mA Loop | No          | No    |
| P7645C0100X    | 0-1.0                    | 4-20 mA Loop | No          | No    |
| P7645C0500X    | 0-5.0                    | 4-20 mA Loop | No          | No    |
| P7660P0500D    | 0.1/0.25/2.5/5           | Universal    | Yes         | No    |
| P7660P0500X    | 0.1/0.25/2.5/5           | Universal    | No          | No    |
| P7660P1000D    | 1.0/2.5/5/10             | Universal    | Yes         | No    |
| P7660P1000X    | 1.0/2.5/5/10             | Universal    | No          | No    |
| P766D0500D     | 0.1/0.25/2.5/5           | Universal    | Yes         | Yes   |
| P766D0500X     | 0.1/0.25/2.5/5           | Universal    | No          | Yes   |
| P766D1000D     | 1.0/2.5/5/10             | Universal    | Yes         | Yes   |
| P766D1000X     | 1.0/2.5/5/10             | Universal    | No          | Yes   |

## Carbon Dioxide Sensors

### SPECIFICATIONS

|                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                  |
|----------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Models.....                                                                                                                                              | C7232 Sensor and Controller. A standalone carbon dioxide (CO <sub>2</sub> ) sensor with two jumper-adjustable outputs (one analog and one SPST relay).<br>C7232B: Duct mount model.<br>NOTE: Models are available with or without a 4-digit LCD that indicates the current CO <sub>2</sub> concentration.<br>C7232B: See Fig. 1. |
| Dimensions.....                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                  |
| Sensor Response Time .....                                                                                                                               | 1 min.                                                                                                                                                                                                                                                                                                                           |
| CO <sub>2</sub> Sensor Operation .....                                                                                                                   | Non-dispersive infrared (NDIR).                                                                                                                                                                                                                                                                                                  |
| CO <sub>2</sub> Sensor Sampling .....                                                                                                                    | Diffusion                                                                                                                                                                                                                                                                                                                        |
| CO <sub>2</sub> Sensor Range .....                                                                                                                       | 0 to 2000 ppm                                                                                                                                                                                                                                                                                                                    |
| CO <sub>2</sub> Sensor Accuracy.....                                                                                                                     | ± (30 ppm +2% of reading)*                                                                                                                                                                                                                                                                                                       |
| * This product complies with Title 24 Part 6, CEC Standard for Residential and Non-Residential Buildings—2005, when installed according to instructions. |                                                                                                                                                                                                                                                                                                                                  |
| Power Supply .....                                                                                                                                       | 24 Vac/dc ±20%, 50/60 Hz (Class 2).                                                                                                                                                                                                                                                                                              |
| Maximum Power Consumption.....                                                                                                                           | 3W.                                                                                                                                                                                                                                                                                                                              |
| Peak Current (at 20 ms) .....                                                                                                                            | 600 mA.                                                                                                                                                                                                                                                                                                                          |
| Relay Configuration.....                                                                                                                                 | Shipped N.O.                                                                                                                                                                                                                                                                                                                     |
| Contact Rating.....                                                                                                                                      | 1A at 50 Vac/24 Vdc.                                                                                                                                                                                                                                                                                                             |
| Minimum Permissible Load .....                                                                                                                           | 1 mA at 5 Vdc.                                                                                                                                                                                                                                                                                                                   |
| Linear Analog Output .....                                                                                                                               | Voltage: 0/2-10 Vdc (resistive load greater than 5000 ohms).<br>Current: 0/4-20 mA (resistive load less than 500 ohms).                                                                                                                                                                                                          |
| Outputs.....                                                                                                                                             | Analog: 0-10 Vdc (Default: 2-10 Vdc, 500 to 1500 ppm).<br>Relay: Normally Open SPST (Default: Close at 800 ppm).                                                                                                                                                                                                                 |
| Ambient Ratings .....                                                                                                                                    | Temperature:<br>Operating:<br>+32°F to +122°F (0°C to +50°C).<br>Storage:<br>-4°F to +158°F (-20°C to +70°C).<br>Relative Humidity (non-condensing): 0 to 95 percent.                                                                                                                                                            |
| CO <sub>2</sub> Pressure Dependence .....                                                                                                                | 1.4% change in reading per 1 kPa deviation from 100 kPa.                                                                                                                                                                                                                                                                         |
| Wiring Connections .....                                                                                                                                 | C7232B: 20-gauge cable with six 6 in. leadwires.                                                                                                                                                                                                                                                                                 |
| Mounting.....                                                                                                                                            | C7232B: Sheet metal duct with a sampling tube.<br>Automatic Background Calibration (ABC) default: On.                                                                                                                                                                                                                            |
| Calibration .....                                                                                                                                        | This product is factory calibrated. No field calibration is necessary for the life of this product.                                                                                                                                                                                                                              |
| Approvals .....                                                                                                                                          | CE<br>Underwriters Laboratories Inc. Listed, File No. E4436<br>cUL<br>C7232B: Flammability Rating, UL94-5V.<br>C7232B: NEMA 3.                                                                                                                                                                                                   |



### FEATURES

- Used for CO<sub>2</sub> based ventilation control.
- Models available with LCD that provides sensor readings and status information.
- Non-Dispersion-Infrared (NDIR) technology used to measure carbon dioxide gas.
- Device provides voltage or current output based on CO<sub>2</sub> levels.
- Models available with SPST relay output.
- Automatic Background Calibration (ABC) algorithm based on long-term evaluation reduces required typical zero-drift check maintenance.

### APPLICATION

The C7232 Sensor and Controller is a standalone carbon dioxide (CO<sub>2</sub>) sensor for use in determining ventilation necessity with HVAC controllers. The C7232 measures the CO<sub>2</sub> concentration in the duct. The C7232 is used in ventilation and air conditioning systems to control the amount of fresh outdoor air supplied to maintain acceptable levels of CO<sub>2</sub> in the space.

### DIMENSIONS DIAGRAM

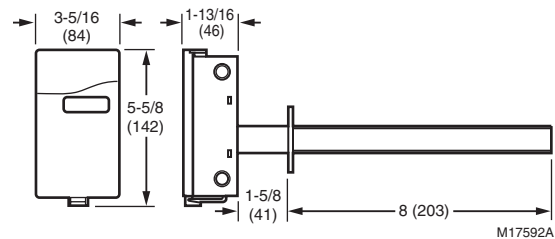


Fig. 1. C7232B Dimensions in In (mm).

# Submittal Data - Sensors

## Differential Pressure Transducers



### APPLICATION

The PWTB series wet/wet differential pressure sensors provide reliable, accurate measurement for proper application control including:

- Monitor and control pump, chiller/boiler, and chilled water/hot water differential pressure.
- Process control systems.
- Monitor pressure differential across pumps, filters, heat exchangers, and other non-corrosive wet media applications.

### FEATURES

#### VERSATILE UNIVERSAL TRANSMITTER

- Up to five selectable ranges plus high resolution mode for lower pressures.
- NEMA 4X rated enclosure.
- Metric and English pressure units.
- Three selectable analog outputs 0-5/10 Vdc, 4-20 mA.
- Sensors protected from water hammer damage with built-in removable pressure snubbers.
- Both pre-wired and field-wired configurations:-Pressure sensor with DIN connector-Plenum or Armored cable

#### SIMPLE AND LOW-COST INSTALLATION

- No bypass required that reduces complexity and cost.
- Pre-wired plenum and armored cable versions saves time and cost and reduces wiring issues.

### SPECIFICATIONS

|                             |                                                                                                                                                                                                                                                                                                                                          |
|-----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Power Supply .....          | Voltage Output (0-5 V): 12-30 VDC/24 VAC <sup>1</sup> , 20 mA max.<br>Voltage Mode (0-10 V): 13-30 VDC/24 VAC required for 10 V FS output<br>Current Mode (4-20 mA): 15-30 VDC(0 ohm)/16-30 VDC (250 Ohm) / 18-30 VDC (500 Ohm), 20 mA max                                                                                               |
| Outputs.....                | Switch Selectable 2-wire 4-20 mA, 3-wire 0-5 V/10 V                                                                                                                                                                                                                                                                                      |
| Operating .....             | Transmitter -22 to 158 °F (-30 to 70 °C)                                                                                                                                                                                                                                                                                                 |
| Temperature                 |                                                                                                                                                                                                                                                                                                                                          |
| Media.....                  | Type: Water, other 316 SS compatible media                                                                                                                                                                                                                                                                                               |
| Compatibility               | (316L diaphragm)                                                                                                                                                                                                                                                                                                                         |
| Zero Adjustment.....        | Temperature: 32 to 250 °F (0 to 125 °C)<br>Automatic: Pushbutton, Remote zero<br>Press the button for 5 seconds to re-zero<br>Hold for 10 seconds to restore factory settings                                                                                                                                                            |
| Sensor Type.....            | Micro-machined silicon strain gauge                                                                                                                                                                                                                                                                                                      |
| Sensor .....                | Accuracy: <± 0.25% BFSL                                                                                                                                                                                                                                                                                                                  |
| Performance                 | Stability (1 year): ± 0.2% FS, typ<br>Over-range Protection: 200 % rated pressure<br>Pressure Cycles: > 100 million<br>Compensated Range: 14 to 158 °F (-10 to 70 °C)<br>Temperature Compensation %FS/C:<br>Zero, <±0.03 (<100 kPa), <±0.02(>100 kPa)<br>Span, <±0.03 (<100 kPa), <±0.02(>100 kPa)<br>Vibration: 10G peak, 20 to 2000 Hz |
| PWTB Transmitter ...        | SENSOR 1% ACCURATE RANGES                                                                                                                                                                                                                                                                                                                |
| Accuracy <sup>2</sup> Range | PWTB50: 20/25/30/40/50 PSID                                                                                                                                                                                                                                                                                                              |
| According to                | 138/172/207/276/345 kPa                                                                                                                                                                                                                                                                                                                  |
| PSID Table in               | PWTB100: 40/50/75/100 PSID                                                                                                                                                                                                                                                                                                               |
| PWTB Transmitter            | 276/345/517/689 kPa                                                                                                                                                                                                                                                                                                                      |
| DIP Switch                  | PWTB250: 75/100/125/150/250 PSID                                                                                                                                                                                                                                                                                                         |
| Configuration Table         | 517/689/862/1034/1724 kPa                                                                                                                                                                                                                                                                                                                |
|                             | 2% ACCURATE RANGES                                                                                                                                                                                                                                                                                                                       |
|                             | PWTB50: 10/15 PSID 69/103 kPa                                                                                                                                                                                                                                                                                                            |
|                             | PWTB100: 15/20/25/30 PSID                                                                                                                                                                                                                                                                                                                |
|                             | 103/138/172/207 kPa                                                                                                                                                                                                                                                                                                                      |
|                             | PWTB250: 30/40/50 PSID 207/276/345 kPa                                                                                                                                                                                                                                                                                                   |
| Enclosure, PWTB....         | Construction: PC/ABS                                                                                                                                                                                                                                                                                                                     |
|                             | Rating: NEMA 4X                                                                                                                                                                                                                                                                                                                          |
| Enclosure, Sensor ..        | Construction: Stainless Steel, 304, 1/4" MNPT, PG9 Conduit Fitting                                                                                                                                                                                                                                                                       |

Table 1. PWTB Models

| Model Number | Max Sensor Pressure | Cable Length (Feet)  |
|--------------|---------------------|----------------------|
| PWTB50-X     | 50 PSIG 345 kPa     | Installer provided * |
| PWTB50-PC-9  |                     | Plenum — 9 feet      |
| PWTB50-AC-9  |                     | Armor — 9 feet       |
| PWTB100-X    | 100 PSIG 689 kPa    | Installer provided * |
| PWTB100-PC-9 |                     | Plenum — 9 feet      |
| PWTB100-AC-9 |                     | Armor — 9 feet       |
| PWTB250-X    | 250 PSIG 1724 kPa   | Installer provided * |
| PWTB250-PC-9 |                     | Plenum — 9 feet      |
| PWTB250-AC-9 |                     | Armor — 9 feet       |

\*Note: Shielded cable provided by installer either plenum rated or installed in conduit.

DIMENSIONS DIAGRAM

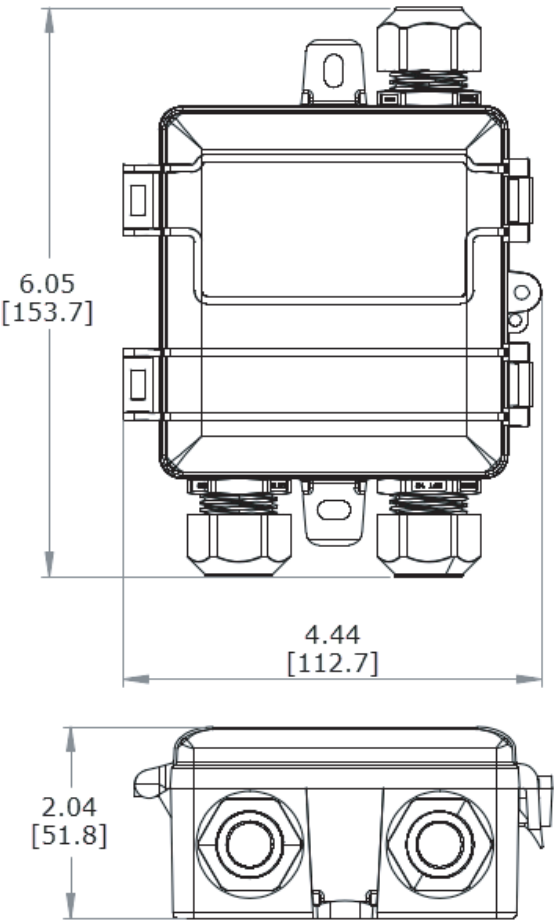


Fig. 1. Dimensional in in. (mm).

# Submittal Data - Sensors

## Gauge Pressure Sensors



### APPLICATION

The MLH Series is a two-wire 4-20mA gauge pressure sensor. This digitally compensated sensor offers an unparalleled value and performance combination, making it the ideal pressure sensing solution for demanding applications. The MLH series is available in pressure ranges up to 1000 psi.

### FEATURES

- Available in 50, 150, 300, 500 and 1000 psi.
- All metal wetted parts for use in a wide variety of fluid applications.
- Suitable for use with refrigerants.
- No internal elastomeric seals mean no o-ring compatibility issues.
- 3 meter cable standard.
- Reverse polarity and overvoltage protection—protects against reversed excitation.
- Less than 2 ms response time provides accurate, high speed measurement.
- Select models available with 1/4-in. SAE female Schrader connection with valve depressor.
- Exceeds CE heavy industrial EMC for use in areas of high RFI/EMI.

### SPECIFICATIONS

(All specifications are measured at 25°C (77°F) and at rated excitation unless otherwise specified.)

|                                     |                                                                                                                     |
|-------------------------------------|---------------------------------------------------------------------------------------------------------------------|
| Operating temperature range .....   | -40° C to 125° C (-40° F to 257° F)                                                                                 |
| Storage temperature range .....     | -40° C to 125° C (-40° F to 257° F)                                                                                 |
| Compensated temperature range.....  | -40° C to 125° C (-40° F to 257° F)                                                                                 |
| Proof Pressure .....                | 3X Working Pressure Range<br>(50-500 psi) 2X Working Pressure<br>Range (1000 psi)                                   |
| Burst Pressure .....                | 10X Working Pressure Range                                                                                          |
| Dimensions.....                     | See Fig. 1 and 2.                                                                                                   |
| Housing Material .....              | Black plastic — Amodel AS-4133<br>HS - PPA                                                                          |
| Material in contact with media..... | Stainless steel 304L and Haynes<br>214 alloy                                                                        |
| Excitation.....                     | 9.5Vdc to 30Vdc                                                                                                     |
| Signal Output.....                  | 4mA to 20mA                                                                                                         |
| Zero Output .....                   | 4.0mA                                                                                                               |
| Full Scale Span (FSS).....          | 16mA (4 to 20mA)                                                                                                    |
| Supply rejection ratio.....         | 90db                                                                                                                |
| Termination .....                   | Cable (3 meter)<br>Red Lead (Excitation) White Lead<br>(Output Signal)                                              |
| Shock.....                          | 50 g peak [5 ms], 100 g peak [11<br>ms]                                                                             |
| Vibration .....                     | MI - STD- 810C. Figure 514.2-5,<br>Curve AK, Table 514.2-V,<br>Random Vibration Test<br>[overall g rms = 20.7 min.] |

**TABLE 1. MLH Specifications**

| Parameter                                    | Specification |
|----------------------------------------------|---------------|
| Response Time                                | <2 ms         |
| Accuracy <sup>1</sup>                        |               |
| <100 psi                                     | ±0.50% FSS    |
| ≥100 psi                                     | ±0.25% FSS    |
| Total error band <sup>2</sup>                |               |
| <300 psig (-40°C to 125°C [-40°F to 257°F])  | ±3% FSS       |
| ≥300 psig (>65°C to 125°C [>149°F to 257°F]) | ±2% FSS       |

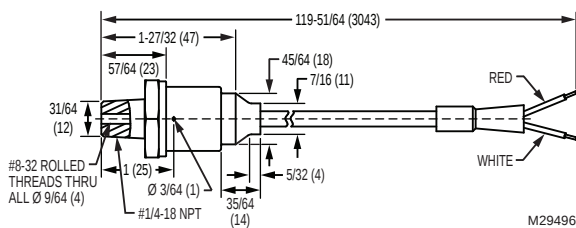
<sup>1</sup> Includes pressure non-linearity (BFS), pressure hysteresis, and non-repeatability. Thermal errors are not included.

<sup>2</sup> Includes zero error, span error, thermal effect on zero, thermal effect on span, thermal hysteresis, pressure-non-linear-ity, pressure hysteresis, and non-repeatability.

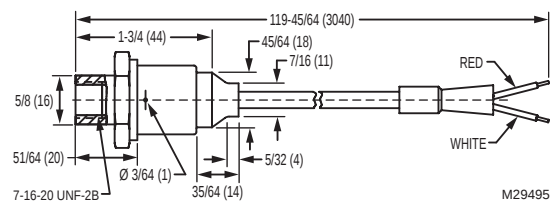
**TABLE 2. MLH Models**

| Old Part Number | New Part Number | Pressure Range | Pressure Connection      |
|-----------------|-----------------|----------------|--------------------------|
| 50035430-050/U  | MLH050PSCDJ1235 | 0-50 psig      | 1/4"-18 NPT              |
| 50035430-150/U  | MLH150PSCDJ1236 | 0-150 psig     | 1/4"-18 NPT              |
| 50035430-300/U  | MLH300PSCDJ1237 | 0-300 psig     | 1/4"-18 NPT              |
| 50035430-500/U  | MLH500PSCDJ1240 | 0-500 psig     | 1/4" SAE female Schrader |
| 50035430-01K/U  | MLH01KPSCDJ1241 | 0-1000 psig    | 1/4" SAE female Schrader |

### DIMENSIONS DIAGRAM



**Fig. 1. MLH050PSCDJ1235/MLH150SCDJ1236/MLH300PSCDJ1237 Dimensions in Inches (mm).**



**Fig. 2. MLH01KPSCDJ1241/MLH500PSCDJ1240 Dimensions in Inches (mm).**

Lined area for notes.

## Section 6: Appendices

### Appendix A:

Valve Selection & Sizing .....293

Technology Comparison of Control Ball and  
Globe Valves .....312

### Appendix B:

NEMA Standard Classification Code for Enclosures .....313

### Appendix C:

Best Practices for Low Power Control Signal Wiring.....314

# Appendix A: Valve Selection and Sizing

## Introduction

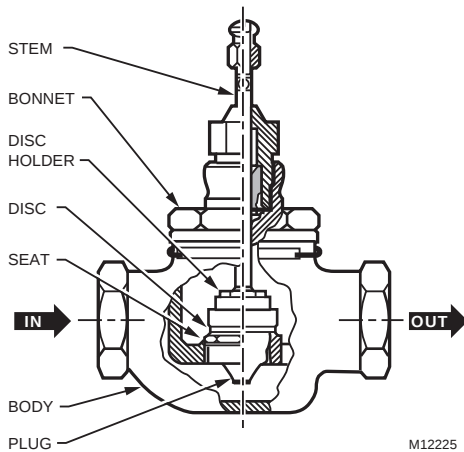
This section provides information on valve selection and sizing. Valves must be selected for ability to meet temperature, pressure, flow control characteristic, and piping connection requirements of the hydronic system. Valve sizing is critical to ensure support for heating and cooling loads with adequate valve capacity, yet able to control system flow to provide stable building conditions efficiently.

## Definitions

### Valve Components

**Actuator:** The part of an automatic control valve that moves the stem based on an electric, electronic, or pneumatic signal from a controller. The actuator and valve can be two separate devices or together they can be one device.

**Body:** The valve casting through which the controlled fluid flows (Fig. 1).



**Fig. 1. Globe Valve Components.**

**Bonnet:** The part that screws to the top of the valve body and contains the packing that seals and guides the valve stem.

**Disc:** The part of the valve assembly that contacts the valve seat to close off flow of the controlled fluid. Some valve assemblies are built so the disc is replaceable. Replaceable discs are usually made of a composition material softer than metal. "Metal trim" valves use precisely-machined metal plugs and seats operated by high force actuators instead of a disk.

**Plug:** The part that varies the opening for the fluid to flow through the valve body. The following describes the three most common types of plugs:

- A contoured plug has a shaped end that is usually end-guided at the top or bottom (or both) of the

valve body. The shaped end controls fluid flow through the valve with respect to stem travel.

- A V-port plug has a cylinder, called a skirt, that rides up and down in the valve seat ring. The skirt guides the plug and varies the flow area with respect to stem travel via its shaped openings.
- A quick-opening plug is flat and is either end-guided or guided by wings riding in the valve seat ring. The flat plug provides maximum flow soon after it lifts from the valve seat.

**Port:** The opening in the valve seat.

**Seat:** The stationary part of the valve body that has a raised lip to contact the valve disc when closing off flow of the controlled fluid.

**Stem:** The shaft that runs through the valve bonnet and connects an actuator to the valve plug.

**Trim:** All parts of the valve that contact the controlled fluid. Trim includes the stem, packing, plug, disc, and seat; it does not include the valve body.

### Valve Flow Characteristics

**Direction of Flow:** The correct flow of the controlled fluid through the valve is usually indicated on the valve body. If the fluid flow through the valve is incorrect, the disc can slam into the seat as it approaches the closed position. The result is poor control, excessive valve wear, and noisy operation. In addition, the actuator must work harder to reopen the closed valve since it must overcome the pressure exerted by the fluid on top of the disc rather than have the fluid assist in opening the valve by exerting pressure under the disc. Gate and butterfly valves may offer bi-directional flow.

**Equal percentage:** A valve which changes flow by an equal percentage (regardless of flow rate) for similar movements in stem travel (at any point in the flow range).

**Linear:** A valve which provides a flow-to-lift relationship that is directly proportional. It provides equal flow changes for equal lift changes, regardless of percentage of valve opening.

**Quick-opening:** A valve which provides maximum possible flow as soon as the stem lifts the disc from the valve seat.

**Valve flow characteristic:** The relationship between the stem travel of a valve, expressed in percent of travel, and the fluid flow through the valve, expressed in percent of full flow.

# Appendix A: Valve Selection and Sizing

## Valve Flow Terms

**Rangeability:** The ratio of maximum flow to minimum controllable flow. Approximate rangeability ratios are 50 to 1 for V-port globe valves and 30 to 1 for contoured plug valves.

**EXAMPLE:**

A valve with a total flow capacity of 100 gpm full open and a rangeability of 30 to 1, can accurately controls flow accurately as low as 3 gpm.

**Tight shut-off/close-off:** A valve condition in which virtually no leakage of the controlled fluid occurs in the closed position. Generally, only single-seated valves provide tight shut-off. Double-seated valves typically have a one to three percent leakage in the closed position.

**Turndown:** The ratio of maximum flow to minimum controllable flow of a valve installed in a system. Turndown is equal to or less than rangeability.

**EXAMPLE:**

For the valve in the rangeability example, if the system requires a 66 gpm maximum flow through the valve and since the minimum accurately controllable flow is 3 gpm, the turndown is 22.

## Valve Ratings

**Flow coefficient (capacity index):** Used to state the flow capacity of a control valve for specified conditions. In the control valve industry currently one of three flow coefficients is used depending upon the location and system of units; British  $A_v$ , European  $k_{vs}$ , or United States  $C_v$ . The flow coefficients have the following relationships:

$$\begin{aligned} A_v &= 0.0000278 k_{vs} \\ A_v &= 0.0000240 C_v \\ k_{vs} &= 0.865 C_v \end{aligned}$$

The flow coefficient  $A_v$  is in cubic meters per second and can be determined from the formula:

$$A_v = Q \sqrt{\frac{\rho}{\Delta p}}$$

Where:

$Q$  = volumetric flow in cubic meters per second.  
 $\rho$  = fluid density in kilograms per cubic meter.  
 $\Delta p$  = static pressure loss across the valve in pascals.

The flow coefficient  $k_{vs}$  is water flow in cubic meters per hour with a static pressure loss across the valve of

$10^5$  pascals (1 bar) within the temperature range of 5 to 40°C and can be determined from the formula:

$$k_{vs} = Q \sqrt{\frac{\Delta p k_{vs}}{\Delta p} \cdot \frac{\rho}{\rho_w}}$$

Where:

$Q$  = volumetric flow in cubic meters per hour.  
 $\rho$  = fluid density in kilograms per cubic meter.  
 $\rho_w$  = density of water in kilograms per cubic meter.  
 $\Delta p k_{vs}$  = static pressure loss of  $10^5$  pascals.  
 $\Delta p$  = static pressure loss across the valve in pascals.

The flow coefficient  $C_v$  is water flow in gallons per minute with a pressure loss across the valve of one pound per square inch within the temperature range of 40 to 100F and can be determined for other conditions from the formula:

$$C_v = Q \sqrt{\frac{1}{\Delta p} \cdot \frac{\rho}{\rho_w}}$$

Where:

$Q$  = volumetric flow in US gallons per minute.  
 $\rho$  = fluid density in pounds per cubic foot.  
 $\rho_w$  = density of water in pounds per cubic foot within the temperature range of 40 to 100F  
 $\Delta p$  = static pressure loss across the valve in pounds per square inch.

**Close-off rating:** The maximum pressure drop that a valve can withstand without leakage while in the full closed position. The close-off rating is a function of actuator power to hold the valve closed against pressure drop, by structural parts such as the stem can be the limiting factor. The construction of gate-style valves, such as ball valves, often allows them to hold back high head pressures in the closed position, although the actuator may not be powerful enough to operate the valve against such forces.

**EXAMPLE:**

A valve with a close-off rating of 10 psi could have 40 psi upstream pressure and 30 psi downstream pressure. Note that in applications where failure of the valve to close is hazardous, the maximum upstream pressure must not exceed the valve close-off rating, regardless of the downstream pressure.

The valve close-off rating is independent of the actual valve body rating. See definition of BODY RATING (ACTUAL).

# Appendix A: Valve Selection and Sizing

**Close-off rating of three-way valves:** The maximum pressure difference between either of the two inlet ports and the outlet port for mixing valves, or the pressure difference between the inlet port and either of the two outlet ports for diverting valves.

**Pressure drop:** The difference in upstream and downstream pressures of the fluid flowing through the valve.

**Pressure drop (critical):** The flow of a gaseous controlled fluid through the valve increases as the pressures drop increases until reaching a critical point. This is the critical pressure drop.

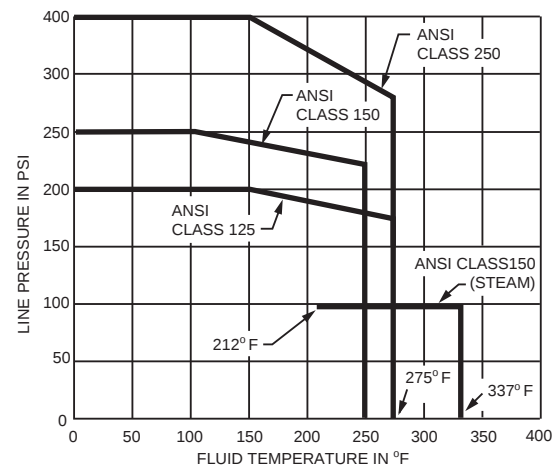
Any increase in pressure drop beyond the critical pressure drop is dissipated as noise and cavitation rather than increasing flow. The noise and cavitation can destroy the valve and adjacent piping components.

**Body rating (nominal):** The theoretical pressure rating, expressed in psi, of the valve body exclusive of packing, disc, etc. The nominal rating is often cast on the valve body and provides a way to classify the valve by pressure. A valve of specified body material and nominal body rating often has characteristics such as pressure-temperature ratings, wall thickness, and end connections which are determined by a society such as ANSI (American National Standards Institute). Figure 2 shows ANSI pressure-temperature ratings for valves. Note that the nominal body rating is not the same as the actual body rating.

**Body rating (actual):** The correlation between safe, permissible flowing fluid pressure and flowing fluid temperature of the valve body (exclusive of the packing, disc, etc.). The nominal valve body rating is the permissible pressure at a specific temperature.

**EXAMPLE:**

From Figure 2, a valve with an ANSI rating of 150 psi (ANSI Class 150) has an actual rating of 225 psi at 250F.



NOTES:

1. FOR HIGH FLUID TEMPERATURES, THE VALVE AND/OR PIPING SHOULD BE INSULATED TO PREVENT AMBIENT TEMPERATURES FROM EXCEEDING ACTUATOR RATINGS.

M12224

**Fig. 2. Sample ANSI Pressure-Temperature Ratings for Valves.**

**Maximum pressure and temperature:** The maximum pressure and temperature limitations of fluid flow that a valve can withstand. These ratings may be due to valve packing, body, or disc material or actuator limitations. The actual valve body ratings are exclusively for the valve body and the maximum pressure and temperature ratings are for the complete valve (body and trim). Note that the maximum pressure and temperature ratings may be less than the actual valve body ratings.

**EXAMPLE:**

The body of a valve, exclusive of packing, disc, etc., has a pressure and temperature rating of 125 psi at 335F. If the valve contains a composition disc that can withstand a temperature of only 240F, then the temperature limit of the disc becomes the maximum temperature rating for the valve.

## Valve Types

**Ball valve:** A ball valve has a precision ball between two seats with a body (Fig. 3). Ball valves have several port sizes for a given body size and go from closed to open with a 90 degree turn of the stem. They are available in both two-way and three-way configurations. For HVAC applications, ball valve construction includes brass and cast iron bodies; stainless steel, chrome plated brass, and cast iron balls; resilient seats with various temperature ratings. Ball valves provide tight shut-off, while full port models have low flow resistance, and models with flow characterizing inserts can be selected for modulating applications.

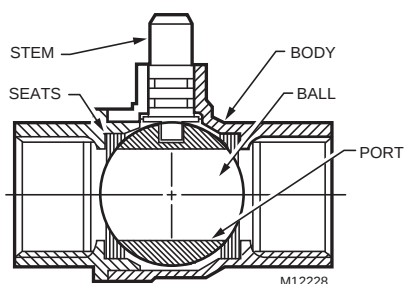


Fig. 3. Ball Valve.

**Butterfly valve:** A valve with cylindrical body, a shaft, and a rotating disc (Fig. 4). The disc rotates 90 degrees from open to closed. The disc seats against a resilient body liner or spring-loaded metal seat and may be manufactured for tight shut-off or made smaller for reduced operating torque at lower close-off. Butterfly valves have limited rangeability for modulating applications so are used mainly for two-way operation. For three-way applications, two butterfly valves are assembled to a pipe tee with linkage for simultaneous operation.

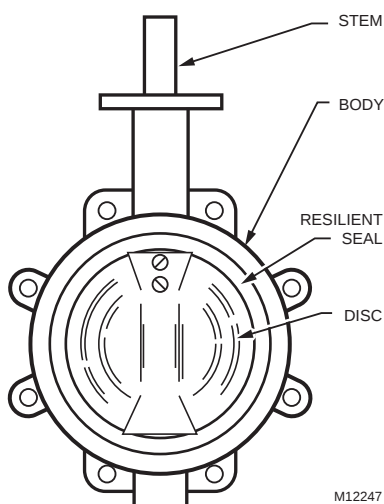


Fig. 4. Butterfly Valve.

**Double-seated valve:** A valve with two seats, plugs, and discs.

Double-seated valves are suitable for applications where fluid pressure is too high to permit a single seated valve to close. The discs in a double-seated valve are arranged so that in the closed position there is minimal fluid pressure forcing the stem toward the open or closed position; the pressure on the discs is essentially balanced. For a valve of given size and port area, the double-seated valve requires less force to operate than the single-seated valve so the double seated valve can use a smaller actuator than a single seated.

Also, double-seated valves often have a larger port area for a given pipe size. A limitation of double-seated valves is that they do not provide tight shut-off. Since both discs rigidly connect together and changes in fluid temperature can cause either the disc or the valve body to expand or contract, one disc may seat before the other and prevent the other disc from seating tightly.

**Flanged-end connections:** A valve that connects to a pipe by bolting a flange on the valve to a flange screwed onto the pipe. Flanged connections are typically used on large valves only.

**Gate valve:** A valve that controls flow using a gating mechanism, usually a plate, that moves across the valve seat instead of pushing against the flow. The actuator works against the friction of the seals rather than directly against the force of the water. Gate valves are inherently self-sealing and are often capable of high close-off pressures without an actuator. Ball valves are a type of gate valve.

**Globe valve:** A valve which controls flow by moving a circular disk against or away from a seat. When used in throttling control a contoured plug (throttling plug) extends from the center of circular disk through the center of the seat for precise control (Fig. 1).

**Pressure-balanced valve:** A globe valve with a sealed pressure chamber built into the plug, which equalizes head pressure across the seat and allows most of the actuator force to be used to close off the flow, resulting in very high close-off ratings with very low seat leakage.

**Reduced-port valve:** A valve with a capacity less than the maximum for the valve body. Ball, butterfly, and smaller globe valves are available with reduced ports to allow correct sizing for good control.

# Appendix A: Valve Selection and Sizing

**Single-seated valve:** A valve with one seat, plug, and disc.

Single-seated valves are suitable for applications requiring tight shut-off. Since a single-seated valve has nothing to balance the force of the fluid pressure exerted on the plug, it requires more closing force than a double-seated valve of the same size and therefore requires more actuator force than a double-seated valve.

**Threaded-end connection:** A valve with threaded pipe connections. Valve threads are usually tapered female, to National Pipe Thread standards, but male connections are available for special applications. Some valves have an integral union for easier installation.

**Three-way valve:** A valve with three ports. The internal design of a three-way valve classifies it as a mixing or diverting valve. Three-way valves control liquid in modulating or two-position applications and do not provide tight shut-off.

**Two-way valve:** A valve with one inlet port and one outlet port. Two-way valves control water or steam in two-position or modulating applications and provide tight shut-off in both straight through and angle patterns.

## Valve Material and Media

Valves with bronze or cast iron bodies having brass or stainless steel trim perform satisfactorily in HVAC hydronic systems when the water is treated properly. Failure of valves in these systems may be an indication of inadequate water treatment. The untreated water may contain dissolved minerals (e.g., calcium, magnesium, or iron compounds) or gases (e.g., carbon dioxide, oxygen, or ammonia). Inadequate treatment results in corrosion of the system. Depending on the material of the valve, the color of the corrosion may indicate the substance causing the failure (Table 1).

**Table 1. Corrosive Elements in Hydronic Systems.**

| Brass or Bronze Component |                   |
|---------------------------|-------------------|
| Corrosive Substance       | Corrosion Color   |
| Chloride                  | Light Blue-Green  |
| Ammonia                   | Blue or Dark Blue |
| Carbonates                | Dark Blue-Green   |
| Magnesium or Calcium      | White             |
| Oxides                    | Black (water)     |
| Sulphide (Hydrogen)       | Black (Gas)       |
| Iron                      | Rust              |
| Iron or Steel Component   |                   |
| Corrosive Substance       | Corrosion Color   |
| Magnesium or Calcium      | White             |
| Iron                      | Rust              |

Petroleum products from sources such as cutting oils, solder flux, etc. can cause some rubber compounds to swell and interfere with moving parts.

Chloramines, chemical compounds of ammonia and chlorine used to treat municipal drinking water, are reported to attack some rubber compounds commonly used in closed loop hydronic systems.

Particulate present in the system can interfere with, and sometimes damage moving parts. Examples include: rust ( $\text{Fe}_2\text{O}_3$ ), magnetite ( $\text{Fe}_3\text{O}_4$ ), sand (quartz granules), silt from municipal water, iron filings from pipe threads, and scale precipitated from hard water. Rust, in particular, is highly abrasive and can rapidly wear out stem seals, causing leaks.

To prevent damage to valves and pumps, a complete flushing of the system during commissioning, including the existing structure when building an addition, may be required to remove physical particulate. Additional components may also be needed, such as in-line Y-strainers for large objects such as stones or solder blobs and mechanical filtration, such as a 50 micron 10% side-stream filter piped in parallel with the system pumps.

Glycol solutions may be used to prevent hydronic systems freezing. Glycol solutions should be formulated for HVAC systems. Some available glycol solutions formulated for other uses contain additives that are injurious to some system seals. In addition, hydronic seals react differently to water and glycol such that when a new system is started up with water or glycol the seals are effective. The hydronic seals are likely to leak if the system is later restarted with media changed from water to glycol or glycol to water. To prevent leakage part of the process of media changeover should include replacing seals such as, pump and valve packing. Glycol mixtures are usually limited to 50% concentration. At 60% concentration, glycol mixtures have their minimum freezing temperature, but can have unstable phase changes which may severely damage a system.

## Valve Selection

Proper valve selection matches a valve to the control and hydronic system physical requirements. First consider the application requirements and then consider the valve characteristics necessary to meet those requirements. The following questions provide a guide to correct valve selection.

- What is the piping arrangement and size?

The piping arrangement indicates whether a two-way or three-way mixing or diverting valve is needed. The piping size gives some indication of whether the valve requires a screwed end or a flanged end connection.

- Does the application require two-position control or proportional control? Does the application require a normally open or normally closed valve? Should the actuator be direct acting or reverse acting?

In its state of rest, the valve is normally open or closed depending on the load being controlled, the fluid being controlled, and the system configuration.

For chilled water coils, it is usually preferable to close the valve on fan shutdown to prevent excessive condensation around the duct and coil, and to save pumping energy. This may be accomplished with either normally closed valves or a variety of other control schemes. Lower cost and more powerful normally open valve assemblies may be used with the close-on-shutdown feature and allow, in the case of pneumatic systems, the capability to provide heating or cooling in the event of air compressor failure.

Converter control valves should be normally closed and outdoor air preheat valves should be normally open.

- Is tight shut-off necessary? What differential pressure does the valve have to close against? How much actuator close-off force is required?

Valves should never be allowed to "dead head" a pump unless the pumps are controlled by variable speed drive systems capable of detecting such conditions and shutting down the pumps.

Single-seated valves provide tight shut-off, while double-seated valves do not. Double seated valves are acceptable for use in pressure bypass or in-line throttling applications.

The design and flow capacity of a valve determine how much actuator force is required for a given close-off. Therefore, the valve must first be sized, then, the valve and actuator selected to provide the required close-off.

- What type of medium is being controlled? What are the temperature and pressure ranges of the medium?

Valves must be compatible with system media composition, maximum and minimum temperature, and maximum pressure. The temperature and pressure of the medium being controlled should not exceed the maximum temperature and pressure ratings of the valve.

For applications such as chlorinated water or brine, select valve materials to avoid corrosion.

- What is the pressure drop across the valve? Is the pressure drop high enough?

The full open pressure drop across the valve must be high enough to allow the valve to exercise control over its portion of the hydronic system. However, the full open pressure drop must not exceed the valve's rating for quiet service and normal life. Closed pressure drop must not exceed valve and actuator close-off rating.

## Globe Valve

Globe valves are popular for HVAC applications. They are available in pipe sizes from 1/2 in. to 12 in. and in a large variety of capacities, flow characteristics, and temperature and pressure capabilities. They provide wide rangeability and tight shutoff for excellent control over a broad range of conditions. Globe valves are made in two-way, straight or angle configurations and three-way mixing and diverting designs. Globe valves close against the flow and have arrows on the body indicating correct flow direction. Incorrect piping can result in stem oscillations, noise, and high wear.

A two-way globe valve has one inlet port and one outlet port (Fig. 5) in either a straight through or angle pattern. The valve can be either push-down-to-close or push-down-to-open.

Pneumatic and electric actuators with linear motion to operate globe valves are available for operation with many control signals.

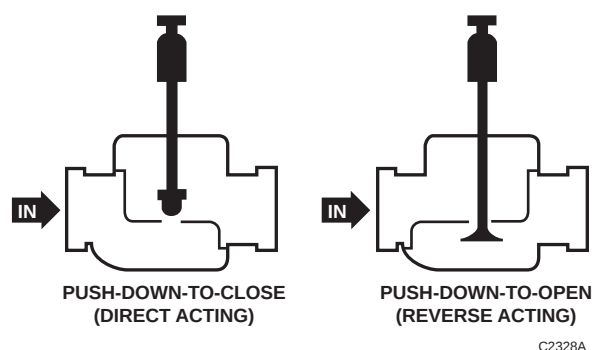


Fig. 5. Two-Way Globe Valves.

# Appendix A: Valve Selection and Sizing

## Ball Valve

Ball valves are available for two-position applications either manual (hand) or power operated or for modulating applications with direct coupled electric actuators. Ball valves are relatively low cost, provide tight close off, and are available in two-way and three-way configurations. As with all other valves, ball valves must be properly sized to provide good flow control.

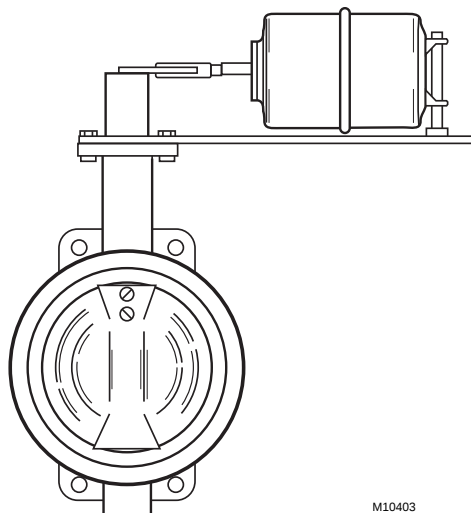
When used in modulating service, ball valves must be specifically designed for modulating service as compared to two-position service. Packing must provide leak-free sealing through thousands of cycles to ensure trouble-free HVAC service. The ball, stem and seals should be made of materials that minimizes sticking and breakaway torque to achieve smooth operation.

Two-way ball valves have equal percentage flow control characteristics and flow in full-port models can be in either direction.

Three-way ball valves can be used in either mixing or diverting service. Full port models have linear flow control characteristics for constant total flow. A popular option with 3-way valves is a 20% flow capacity reduction in the B port to equalize pressure losses in a coil-bypass application.

## Butterfly Valve

Butterfly valves (Fig. 6) control the flow of hot, chilled, or condenser water in two-position or proportional applications. Butterfly valves are available in two-way or three-way configurations. Tight shutoff may be achieved by proper selection of actuator force and body lining. The three-way valve can be used in mixing or diverting applications with the flow in any direction. The three-way valve consists of two butterfly valves that mount on a flanged cast iron tee and are linked to an actuator which opens one valve as it closes the other. Minimum combined capacity of both valves occurs at the half-open position.



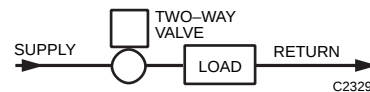
**Fig. 6. Butterfly Valve.**

When butterfly valves are used for proportional control, they must be applied using conservative pressure drop criteria. If the pressure drop approaches the critical pressure drop, unbalanced forces on the disc can cause oscillations, poor control, and/or damage to the linkage and actuator, even though the critical flow point is not reached. Modulating control is usually limited to a range of 15 to 65 degrees of disk rotation.

Butterfly valves are usually found in larger pipe sizes. For example, two butterfly valves could be piped in a mixing application to control the temperature of the water going back to the condenser. The valves proportion the amount of tower water and condenser water return that is flowing in the condenser water supply line.

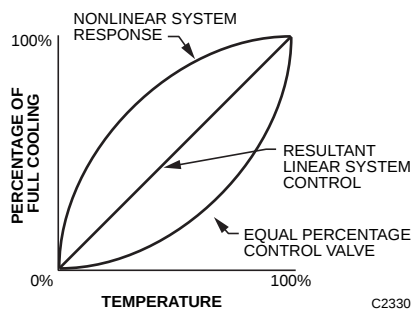
## Two-way Valve

Two-way valves are available as globe, ball, or butterfly valves. The combination of valve body and actuator (called valve assembly) determines the valve stem position. Two-way valves control steam or water in two-position or proportional applications (Fig. 7). They provide tight shutoff and are available with quick-opening, linear, or equal percentage flow characteristics. Control valves are typically installed on the supply side of convectors and radiators, and the return side of small-bore water coils used in fan-forced equipment.



**Fig. 7. Two-Way Valve Application.**

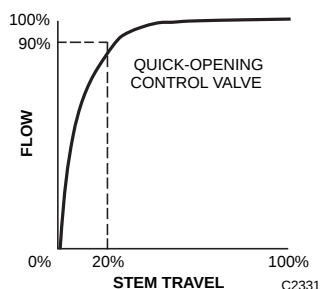
Ideally, a control system has a linear response over its entire operating range. The sensitivity of the control to a change in temperature is then constant throughout the entire control range. For example, a small increase in temperature provides a small increase in cooling. A nonlinear system has varying sensitivity. For example, a small increase in temperature can provide a large increase in cooling in one part of the operating range and a small increase in another part of the operating range. To achieve linear control, the combined system performance of the actuator, control valve, and load must be linear. If the system is linear, a linear control valve is appropriate (Fig. 8). If the system is not linear, a nonlinear control valve, such as an equal percentage valve, is appropriate to balance the system so that resultant performance is linear.



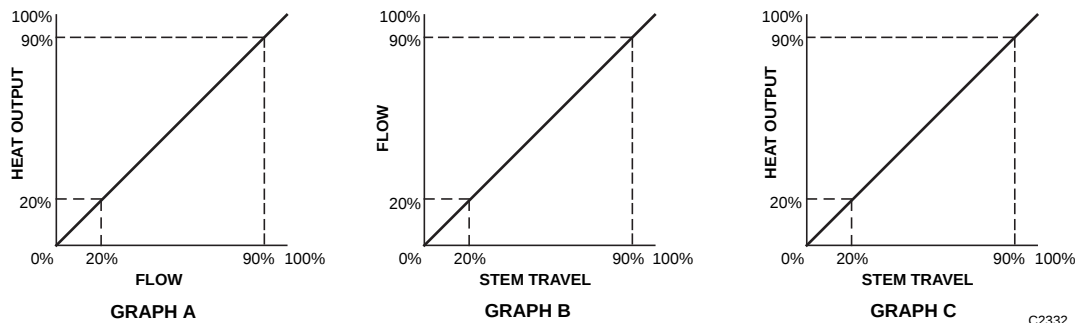
**Fig. 8. Linear vs. Nonlinear System Control.**

## QUICK-OPENING VALVE

A quick-opening two-way valve includes only a disc guide and a flat or quick-opening plug. This type of valve is used for two position control of steam. The pressure drop for a quick opening two-way valve should be 10 to 20 percent of the piping system pressure differential, leaving the other 80 to 90 percent for the load and piping connections. Figure 9 shows the relationship of flow versus stem travel for a quick-opening valve. To achieve 90 percent flow, the stem must open only 20 percent. Linear or equal percentage valves can be used in lieu of quick-opening valves in two-position control applications as the only significant positions are full open and full closed.



**Fig. 9. Flow vs. Stem Travel Characteristic of a Quick-Opening Valve.**



**Fig. 10. Heat Output, Flow, and Stem Travel Characteristics of a Linear Valve.**

## EQUAL PERCENTAGE VALVE

An equal percentage valve includes a contoured plug or contoured V-port shaped so that similar movements in stem travel at any point in the flow range change the existing flow an

## Linear Valve

A linear valve may include a V-port plug or a contoured plug. This type of valve is used for proportional control of steam or chilled water, or in applications that do not have wide load variations. Typically in steam or chilled water applications, changes in flow through the load (e.g., heat exchanger, coil) cause proportional changes in heat output. For example, Figure 10 shows the relationships between heat output, flow, and stem travel given a steam heat exchanger and a linear valve as follows:

- Graph A shows the linear relationship between heat output and flow for the steam heat exchanger. Changes in heat output vary directly with changes in the fluid flow.
- Graph B shows the linear relationship between flow and stem travel for the linear control valve. Changes in stem travel vary directly with changes in the fluid flow.

**NOTE:** As a linear valve just starts to open, a minimum flow occurs due to clearances required to prevent sticking of the valve. Some valves have a modified linear characteristic to reduce this minimum controllable flow. This modified characteristic is similar to an equal percentage valve characteristic for the first 5 to 10 percent of stem lift and then follows a linear valve characteristic for the remainder of the stem travel.

- Graph C shows the linear relationship between heat output and stem travel for the combined heat exchanger and linear valve. Changes in heat output are directly proportional to changes in the stem travel.

Thus a linear valve is used in linear applications to provide linear control.

# Appendix A: Valve Selection and Sizing

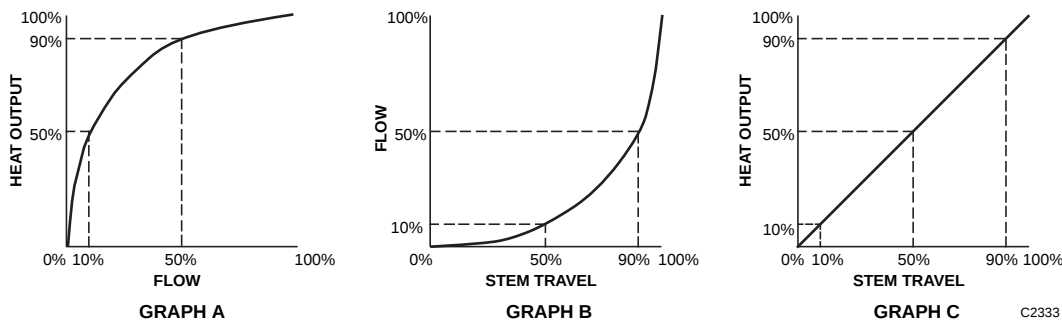
**EXAMPLE:**

When a valve with the stem at 30 percent of its total lift and existing flow of 3.9 gpm (Table 2) opens an additional 10 percent of its full travel, the flow measures 6.2 gpm or increases 60 percent. If the valve opens an additional 10 percent so the stem is at 50 percent of its full travel, the flow increases another 60 percent and is 9.9 gpm.

**Table 2. Stem Position vs. Flow for Equal Percentage Valve.**

| Stem         |          | Flow    |              |
|--------------|----------|---------|--------------|
| Change       | Position | Rate    | Change       |
| —            | 30% open | 3.9 gpm | —            |
| 10% increase | 40% open | 6.2 gpm | 60% increase |
| 10% increase | 50% open | 9.9 gpm | 60% increase |

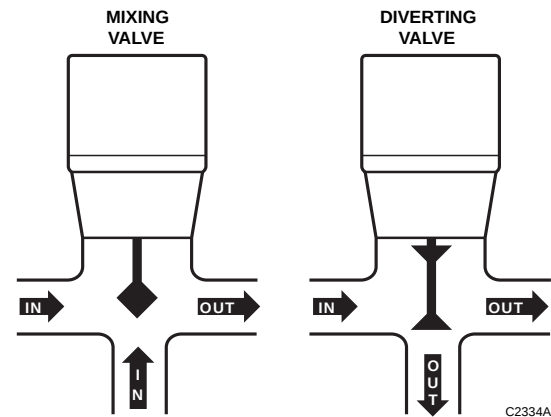
An equal percentage valve is used for proportional control in hot water applications and is useful in control applications where wide load variations can occur. Typically in hot water applications, large reductions in flow through the load (e.g., coil) cause small reductions in heat output. An equal percentage valve is used in these applications to achieve linear control. For example, Figure 11 shows the heat output, flow, and stem travel relationships for a hot water coil, with 200F, entering water and 50F entering air and an equal percentage valve, as follows:



**Fig. 11. Heat Output, Flow, and Stem Travel Characteristics of an Equal Percentage Valve.**

## Three-way Valves

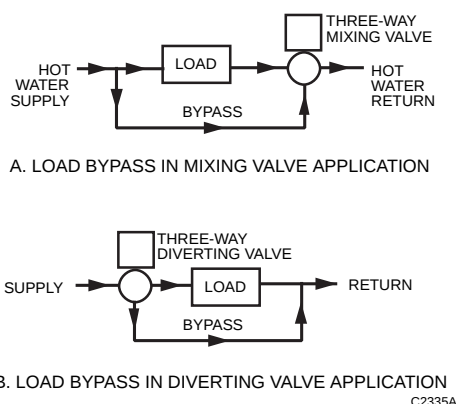
Three-way valves (Fig. 12) control the flow of liquids in mixing or diverting valve applications (Fig. 13). The internal design of a three-way globe valve enables it to seat against the flow of liquid in the different applications. An arrow cast on the valve body indicates the proper direction of liquid flow. It is important to connect three-way valve piping correctly or oscillations, noise, and excessive valve wear can result. Three-way valves are typically have linear flow characteristics, although, some are equal percentage for flow through the coil with linear flow characteristics for flow through the coil bypass. Ball valves are also available in a three-way configuration, while two butterfly valves can be made to act as a three-way valve.



**Fig. 12. Three-Way Valves.**

- Graph A shows the nonlinear relationship between heat output and flow for the hot water coil. A 50 percent reduction in flow causes a 10 percent reduction in heat output. To reduce the heat output by 50 percent, the flow must decrease 90 percent.
- Graph B shows the nonlinear relationship between flow and stem travel for the equal percentage control valve. To reduce the flow 50 percent, the stem must close 10 percent. If the stem closes 50 percent, the flow reduces 90 percent.
- Graph C shows the relationship between heat output and stem travel for the combined coil and equal percentage valve. The combined relationship is close to linear. A 10 percent reduction in heat output requires the stem to close 10 percent, a 50 percent reduction in heat output requires the stem to close 50 percent, and a 90 percent reduction in heat output requires the stem to close 90 percent.

The equal percentage valve compensates for the characteristics of a hot water application to provide a control that is close to linear.



**Fig. 13. Three-Way Valve Applications.**

## MIXING VALVE

A mixing valve provides two inlet ports and one common outlet port. The valve receives liquids to be mixed from the inlet ports and discharges the liquid through the outlet port (Fig. 12). The position of the valve disc determines the mixing proportions of the liquids from the inlet ports.

The close-off pressure in a mixing valve equals the maximum value of the greater inlet pressure minus the minimum value of the downstream pressure.

### EXAMPLE:

A mixing valve application has a maximum pressure of 25 psi on one inlet port, maximum pressure of 20 psi on the other inlet port, and minimum downstream pressure of 10 psi on the outlet port. The close-off pressure is  $25 \text{ psi} - 10 \text{ psi} = 15 \text{ psi}$ . The application requires a mixing valve with at least a 15 psi close-off rating. The actuator selected must have a high enough force to operate satisfactorily.

In globe mixing valve applications, the force exerted on the valve disc due to unbalanced pressure at the inlets usually remains in the same direction. In cases where there is a reversal of force, the force changes direction and holds the valve disc off the seat, cushioning it as it closes. If the pressure difference for the system is greater than the pressure ratings of available globe mixing valves, use a ball mixing valve or two butterfly valves in a tee configuration.

Globe mixing valves are not suitable for modulating diverting valve applications. If a mixing valve is piped for modulating diverting service, the inlet pressure slams the disc against the seat when it nears the closed position. This results in loss of control, oscillations, and excessive valve wear and noise. Mixing valves are acceptable using about 80 percent of the close-off rating, but not recommended, in two-position diverting valve applications.

## DIVERTING VALVE

A globe diverting valve provides one common inlet port and two outlet ports. The diverting valve uses two V-port plugs which seat in opposite directions and against the common inlet flow. The valve receives a liquid from one inlet port and discharges the liquids through the outlet ports (Fig. 12) depending on the position of the valve disc. If the valve disc is against the bottom seat (stem up), all the liquid discharges through the side outlet port. If the valve disc is against the top seat (stem down), all the liquid discharges through the bottom outlet port.

The close-off pressure in a diverting valve equals the maximum value of the inlet pressure minus the minimum value of the downstream pressure.

Globe diverting valves must not be used for mixing service. As with mixing valves used for diverting service, media pressure drop across the valve can cause it to slam shut with resulting loss of control.

### EXAMPLE:

A diverting valve application has 20 psi maximum on the inlet port, one outlet port discharging to the atmosphere, and the other outlet port connecting to a tank under 10 psi constant pressure. The pressure difference between the inlet and the first outlet port is 20 psi and between the inlet and second outlet port is 10 psi. The application requires a diverting valve with at least 20 psi close-off rating.

## Valve Sizing

Every valve has a capacity index or flow coefficient ( $C_v$ ). Typically determined for the globe and ball valves at full open and about 60 degrees open for butterfly valves.  $C_v$  is the quantity of water in gpm at 60F that flows through a valve with a pressure differential of 1 psi. Sizing a valve requires knowing the medium (liquid or gas) and the required pressure differential to calculate the required  $C_v$ . When the required  $C_v$  is not available in a standard valve, select the next closest and calculate the resulting valve pressure differential at the required flow to verify acceptable performance.

After determination of the valve  $C_v$ , calculation of the flow of any medium through that valve can be found if the characteristics of the medium and the pressure drop across the valve are known.

# Appendix A: Valve Selection and Sizing

## Water Valves

Determine the capacity index ( $C_v$ ) for a valve used in a water application, using the formula:

$$C_v = \frac{Q\sqrt{G}}{\sqrt{h}}$$

Where:

- $Q$  = Flow of fluid in gallons per minute required to pass through the valve.
- $G$  = Specific gravity of the fluid (water = 1).
- $h$  = Pressure drop in psi. See Figures 14 and 15 for glycol solution correction values.

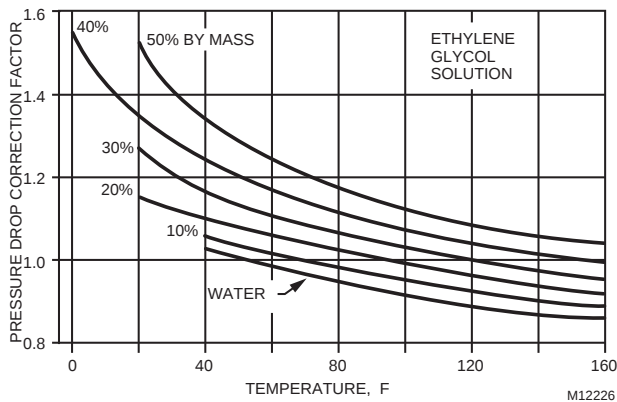
**NOTE:** The calculated  $C_v$  will rarely match the  $C_v$  of an available valve. For most accurate proportional control, select the valve with the next lower  $C_v$  value, and increase the pressure drop across the control valve to achieve the required flow through the coil by reducing the setting of the balancing valve. Otherwise, turn-down ratio will be reduced, proportionally.

For example, if the calculated  $C_v$  is 87, and the two closest  $C_v$  values are 63 and 100, the best choice for control precision would be the valve with a  $C_v$  of 63, and increase pressure drop across the valve by 90%.

If increased pressure drop is not possible, use the valve with  $C_v$  of 100, and accept a 13% reduction in valve rangeability.

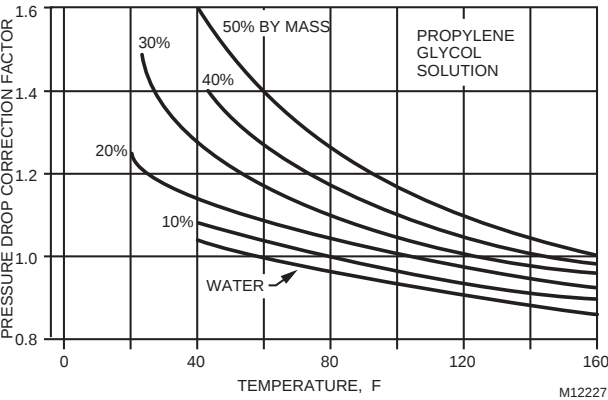
For two-position control, always chose the largest  $C_v$  greater than the coil with acceptable close-off pressure rating.

Determining the  $C_v$  of a water valve requires knowing the quantity of water (gpm) through the valve and the pressure drop ( $h$ ) across the valve. If the fluid is a glycol solution, use the pressure drop multipliers from either Figure 14 or 15. See the sections on QUANTITY OF WATER and WATER VALVE PRESSURE DROP. Then select the appropriate valve based on  $C_v$ , temperature range, action, body ratings, etc., per VALVE SELECTION guidelines.



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**Fig. 14. Pressure Drop Correction for Ethylene Glycol Solutions**



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**Fig. 15. Pressure Drop Correction for Propylene Glycol Solutions.**

## Quantity of Water

To find the quantity of water ( $Q$ ) in gallons per minute use one of the following formulas:

- When Btu/hr is known:

$$Q = \frac{Btu/hr}{K \times TD_w}$$

Where:

- Btu/hr= Heat output.
- $K$  = Value from Table 3; based on temperature of water entering the coil. The value is in pounds per gallon x 60 minutes per hour.
- $TD_w$  = Temperature difference of water entering and leaving the coil.

**Table 3. Water Flow Formula Table**

| Water  |     | Water  |     |
|--------|-----|--------|-----|
| Temp F | K   | Temp F | K   |
| 40     | 502 | 200    | 484 |
| 60     | 500 | 225    | 483 |
| 80     | 498 | 250    | 479 |
| 100    | 496 | 275    | 478 |
| 120    | 495 | 300    | 473 |
| 150    | 490 | 350    | 470 |
| 180    | 487 | 400    | 465 |

## 2. For hot water coil valves:

$$Q = \frac{cfm \times 1.08 \times TD_a}{K \times TD_w}$$

Where:

- cfm = Airflow through the coil.
- 1.08 = A scaling constant. See Note.
- TD<sub>a</sub> = Temperature difference of air entering and leaving the coil.
- K = Value from Table 3; based on temperature of water entering the coil (pounds per gallon x 60 minutes per hour).
- TD<sub>w</sub> = Temperature difference of water entering and leaving the coil.

NOTE: The scaling constant 1.08 is derived as follows:

$$1.08 = \frac{0.24 BTU}{lbairF} \times \frac{60 min}{1 hr} \times \frac{1 lbair}{13.35 ft^3}$$

Where:

$$\frac{1 lbair}{13.35 ft^3} = \text{the specific volume of air at standard conditions of temperature and atmospheric pressure.}$$

Simplifying the equation:

$$1.08 = \frac{14,40 Btu min}{F hr 13.35 ft^3}$$

To find the scaling constant for air conditions other than standard, divide 14.40 Btu by specific volume of air at those conditions.

## 3. For fan system chilled water coil valves:

$$Q = \frac{cfm \times Btu/lb}{113 \times TD_w}$$

Where:

- cfm = Airflow through the coil.
- Btu/lb = Heat per pound of dry air removed. Includes both sensible and latent heat.
- 113 = A scaling constant.
- TD<sub>w</sub> = Temperature difference of water entering and leaving the coil.

## WATER VALVE PRESSURE DROP

To determine valve pressure drop:

1. For two-way valves consider the following guidelines for valve pressure drop:
  - a. Include the pressure drop in the design of the water circulating system.
    - In systems with two-way valves only, it is often necessary to provide a pump relief bypass or some other means of differential pressure control to limit valve pressure drops to the valve capabilities. For control stability at light loads, pressure drop across the fully closed valve should not exceed triple the pressure drop used for sizing the valve.
    - To avoid high pressure drops near the pump, reverse returns are recommended in large systems.
  - b. The pressure drop across an open valve should be about half of the pressure difference between system supply and return, enough so that the valve, not the friction through the coil or radiator, controls the volume of water flow or the valve pressure drop should be equal to or greater than the pressure drop through the coil or radiator, plus the pipe and fittings connecting them to the supply and return mains.
  - c. Verify allowable full open and full closed pressure drops for all proportional and two-position water valves with appropriate manufacturer literature.
  - d. Make an analysis of the system at maximum and minimum rates of flow to determine whether or not the pressure difference between the supply and return mains stays within the limits that are acceptable from the stand point of control stability and close-off rating.
2. For two- and three-way valves consider the following guidelines for valve pressure drop:
  - a. In load bypass applications (Fig. 13) such as radiators, coils, and air conditioning units, the pressure drop should be 50 to 70 percent of the minimum difference between the supply and return main pressure at design operating conditions.
  - b. A manual balancing valve may be installed in the bypass to equalize the load drop and the bypass drop.
3. When selecting pressure drops for three-way mixing valves in boiler bypass applications (Fig. 13), consider the following:
  - a. Determine the design pressure drop through the boiler including all of the piping, valves, and fittings from the bypass connection through the boiler and up to the three-way valve input.
  - b. The valve pressure drop should be equal to or greater than the drop through the boiler and the fittings. If the valve drop is much smaller than the boiler pressure drop at design, effective control is obtained only when the disc is near one of the two seats. The mid-portion of the valve lift will be relatively ineffective.

# Appendix A: Valve Selection and Sizing

- c. A manual balancing valve may be installed in the boiler bypass to equalize the boiler drop and the bypass drop.

## WATER VALVE SIZING EXAMPLES

### EXAMPLE 1:

A two-way linear valve is needed to control flow of 45F chilled water to a cooling coil. The coil manufacturer has specified an eight-row coil having a water flow pressure drop of 3.16 psi. Further, specifications say that the coil will produce 55F leaving air with a water flow of 14.6 gpm. Supply main is maintained at 40 psig, return is at 30 psig. Select required capacity index ( $C_V$ ) of the valve.

Use the water valve  $C_V$  formula to determine capacity index for Valve V1 as follows:

$$C_V = \frac{Q\sqrt{G}}{\sqrt{h}}$$

Where:

- Q = Flow of fluid in gallons per minute required is 14.6 gpm.  
G = Specific gravity of water is 1.  
h = Pressure drop across the valve. The difference between the supply and return is 10 psi. 50% to 70% x 10 psi = 5 to 7 psi. Use 6 psi for the correct valve pressure drop. Note that 6 psi is also greater than the coil pressure drop of 3.16 psi.

Substituting:

$$C_V = \frac{14.6\sqrt{1}}{\sqrt{6}} = 6$$

Select a linear valve providing close control with a capacity index of 6 and meeting the required pressure and temperature ratings.

### EXAMPLE 2:

A bypass valve is required to prevent flow through the chiller from dropping below 90 percent of design flow. When sizing valves for pump or chiller bypass applications (Fig. 16), system conditions that cause the valve to open or close completely must be considered before a pressure drop can be selected.

Assume the following:

- System flow at design, 1000 gpm
- Pump head at design, 48 ft
- Pump head at 90 percent flow, 50 ft
- Pressure across mains at AHU 1 at design flow, 28 ft
- Chiller pressure drop, 12 ft
- Chiller piping loop design pressure drop, 8 ft

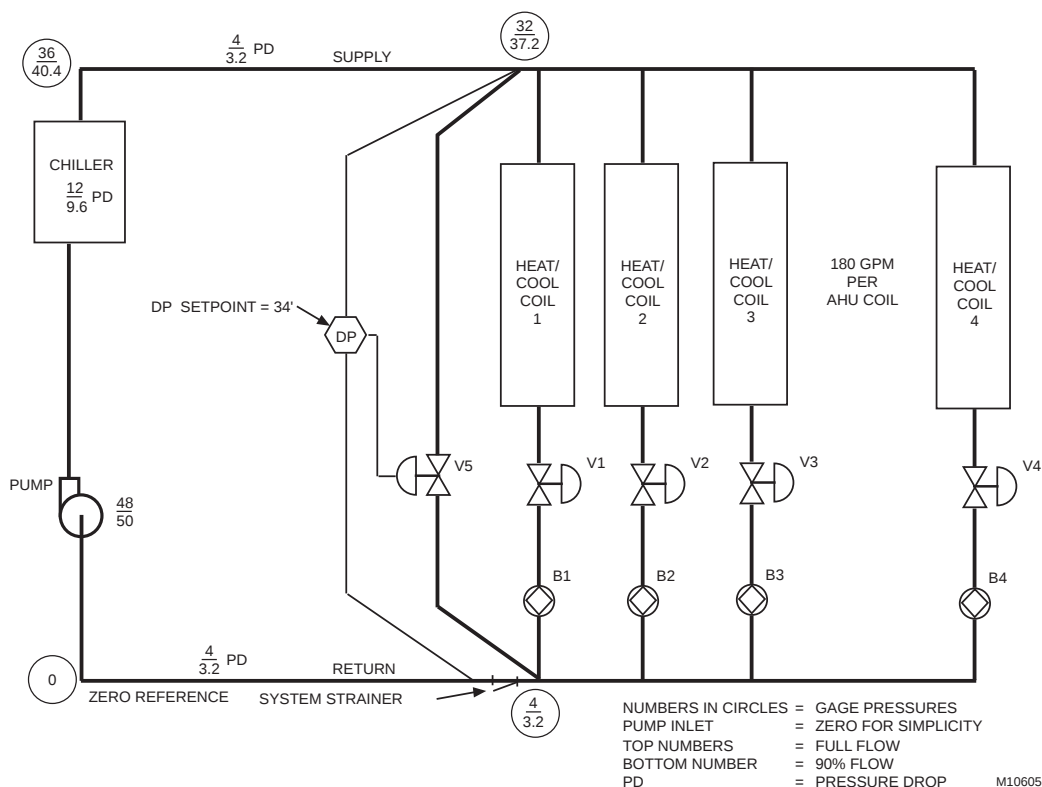
With full system flow, Valve V5 is closed. Pressure drop across V5 equals the pump head minus the friction drops to V5. Pressure drop across Valve V5 is then 48 ft – 12 ft (chiller drop) – 4 ft (supply drop) – 4 ft (return drop) or 28 ft.

With system flow at 90 percent, the pump head rises to 50 ft, while the friction drops fall to the lower values shown in Figure 16. For additional information on chiller bypass operation see Chiller, Boiler, and Distribution System Applications section. Pressure drop across V5 equals the pump head minus the friction drops to V5. Pressure drop across Valve V5 is then 50 ft – 9.6 ft (chiller drop) – 3.2 ft (supply drop) – 3.2 ft (return drop) or 34 ft. Converting ft to psi, 34 ft x 0.4335 psi/ft = 14.7 psi.

Substituting the flow of water, specific gravity of water, and pressure drop in the  $C_V$  formula shows that the Valve V5 should have a  $C_V$  of 235.

$$C_V = \frac{900\sqrt{1}}{\sqrt{14.7}} = 235$$

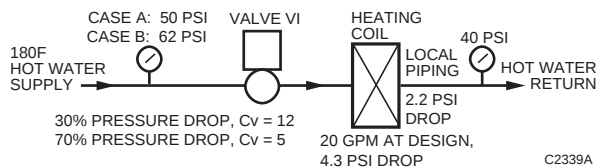
# Appendix A: Valve Selection and Sizing



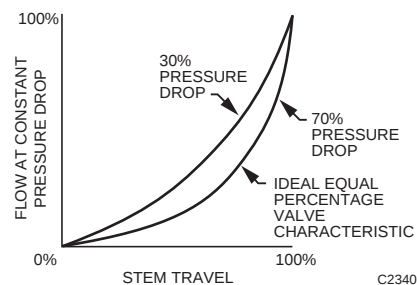
**Fig. 16. Chiller Bypass Application.**

## EXAMPLE 3:

Sizing water valves for heating coils is especially critical. In Figure 17, a valve with a  $C_v$  of 12 will have 30 percent of the available pressure drop when full open, while a valve with a  $C_v$  of 5 will have 70 percent of the available pressure drop. As shown in Figure 18, the valve with 70 percent of the available pressure drop essentially provides the equal percentage water flow control, resulting in linear coil heat transfer and stable temperature control. The valve with only 30 percent of the available pressure drop has a more linear flow control which results in nonlinear coil heat transfer. See EQUAL PERCENTAGE VALVE section for further information.



**Fig. 17. Equal Percentage Valve Hot Water Application.**



**Fig. 18. Effect of Pressure Drop in Hot Water Valve Sizing.**

## EXAMPLE 4:

A three-way mixing valve is needed for a heat exchanger application with a bypass line. Water flow is specified at the rate of 70 gpm. Manufacturer data for the exchanger indicates a pressure drop of 1.41 ft of water through the exchanger coils.

# Appendix A: Valve Selection and Sizing

Use the water valve  $C_v$  formula to determine capacity index for Valve V1 as follows:

$$C_v = \frac{Q\sqrt{G}}{\sqrt{h}}$$

Where:

- Q = Flow of fluid in gallons per minute required to pass through the valve is 70 gpm.  
 G = Specific gravity of water is 1.  
 h = Pressure drop across the valve. Plans of the heating system indicate three-inch supply and return mains. From an elbow equivalent table and pipe friction chart found in the ASHRAE Handbook or other reference manuals, the calculated pressure drop through a three-inch tee and the piping from the valve and the tee to the exchanger is 0.09 psi. Heat exchanger pressure drop is 1.41 ft of water or 1.41 ft x 0.433 psi/ft = 0.61 psi. Total pressure drop from bypass connection through the heat exchanger and to the hot-water input of the three-way valve is 0.61 + 0.09 or 0.70 psi.

Since the valve pressure drop (h) should be equal to or greater than the drop through the heat exchanger and fittings, 0.70 psi is used as the valve pressure drop.

For optimum control, a manual balancing valve is installed in the bypass line to equalize the pressure drops in the exchanger and bypass circuits.

$$C_v = \frac{70\sqrt{1}}{\sqrt{0.70}} = 83.6 \text{ or } 84$$

Substituting the flow of water, specific gravity of water, and pressure drop in the  $C_v$  formula shows that the valve should have a  $C_v$  of 83.6 or 84.

Select a linear valve providing close control with a capacity index of 84 and meeting the required pressure and temperature ratings.

## Steam Valves

Calculate the required capacity index ( $C_v$ ) for a valve used in a steam application, using the formula:

$$C_v = \frac{(1 + 0.00075s)Q\sqrt{V}}{63.5\sqrt{h}}$$

Where:

- Q = Quantity of steam in pounds per hour required to pass through the valve.  
 V = Specific volume of steam, in cubic feet per pound, at the average pressure in the valve. For convenience Table 5 at the end of the STEAM VALVES section lists the square root of the specific volume of steam for various steam pressures. Therefore, use the value in this column of the table as is; do not take its square root.  
 63.5 = A scaling constant.  
 h = Pressure drop in psi.  
 s = Superheat in degrees F.

Determining the  $C_v$  for a steam valve requires knowing, the quantity of steam (Q) through the valve, the pressure drop (h) across the valve, and the degrees of superheat. See QUANTITY OF STEAM and STEAM VALVE PRESSURE DROP. Then select the appropriate valve based on  $C_v$ , temperature range, action, body ratings, etc., per VALVE SELECTION guidelines.

NOTE: When the superheat is 0F, then (1 + 0.00075s) equals 1 and may be ignored.

## QUANTITY OF STEAM

To find the quantity of steam (Q) in pounds per hour use one of the following formulas:

1. When Btu/hr (heat output) is known:

$$Q = \frac{\text{Btu/hr}}{1000\text{Btu/lbsteam}}$$

Where:

- Btu/hr = Heat output.  
 1000 Btu/lb= A scaling constant representing the approximate heat of vaporization of steam.

2. For sizing steam coil valves:

$$Q = \frac{\text{CFM} \times \text{TD}_a \times 1.08}{1000\text{Btu/lbsteam}}$$

Where:

- cfm = Cubic feet per minute (ft<sup>3</sup>/min) of air from the fan.  
 TD<sub>a</sub> = Temperature difference of air entering and leaving the coil.  
 1.08 = A scaling constant. See NOTE.  
 1000 Btu/lb= A scaling constant representing the approximate heat of vaporization of steam.

# Appendix A: Valve Selection and Sizing

NOTE: The scaling constant 1.08 is derived as follows:

$$1.08 = \frac{0.24 \text{ BTU}}{\text{lb air F}} \times \frac{60 \text{ min}}{1 \text{ hr}} \times \frac{1 \text{ lb air}}{13.35 \text{ ft}^3}$$

Where:

$$\frac{1 \text{ lb air}}{13.35 \text{ ft}^3} = \text{the specific volume of air at standard conditions of temperature and atmospheric pressure.}$$

Simplifying the equation:

$$1.08 = \frac{14.40 \text{ Btu min}}{\text{F hr } 13.35 \text{ ft}^3}$$

To find the scaling constant for air conditions other than standard, divide 14.40 Btu by specific volume of air at those conditions.

### 3. For sizing steam to hot water converter valves:

$$Q = \text{gpm} \times TD_w \times 0.49$$

Where:

gpm = Gallons per minute of water flow through converter.

$TD_w$  = Temperature difference of water entering and leaving the converter.

0.49 = A scaling constant. This value is derived as follows:

$$0.49 = \frac{8.33 \text{ lb water}}{1 \text{ gal}} \times \frac{60 \text{ min}}{1 \text{ hr}} \times \frac{1 \text{ lb steam}}{1000 \text{ Btu}} \times \frac{1 \text{ Btu}}{\text{lb water F}}$$

Simplifying the equation:

$$0.49 = \frac{0.49 \text{ min lb steam}}{\text{gal hr F}}$$

### 4. When sizing steam jet humidifier valves:

$$Q = \frac{(W_1 - W_2) \text{ lb moisture}}{\text{lb air}} \times \frac{1}{13.35 \text{ ft}^3} \times \frac{\text{ft}^3}{\text{min}} \times \frac{60 \text{ min}}{\text{hr}}$$

Where:

$W_1$  = Humidity ratio entering humidifier, pounds of moisture per pound of dry air.

$W_2$  = Humidity ratio leaving humidifier, pounds of moisture per pound of dry air.

$\frac{13.35 \text{ ft}^3}{\text{lb air}}$  = The specific volume of air at standard conditions of temperature and atmospheric pressure.

$\frac{\text{ft}^3}{\text{min}}$  = Cubic feet per minute (cfm) of air from the fan.

$\frac{60 \text{ min}}{\text{hr}}$  = A conversion factor.

Simplifying:

$$Q = 4.49 \frac{(W_1 - W_2) \text{ lb moisture}}{\text{hr}}$$

### 5. When Equivalent Direct Radiation (EDR) is known:

$$Q = \text{EDR (Total)} \times 0.24$$

Where:

EDR (Total) = Radiators are sized according to Equivalent Direct Radiation (EDR). If controlling several pieces of radiation equipment with one valve, add the EDR values for all pieces to obtain the total EDR for the formula.

0.24 = A scaling constant, lb steam/unit EDR. See Table 4.

**Table 4. Output of Radiators and Convectors.**

| Average Radiator of Convector Temperature, Deg F | Cast Iron Radiator Btu/Hr/EDR <sup>a</sup> | Convector, Btu/Hr/EDR <sup>b</sup> |
|--------------------------------------------------|--------------------------------------------|------------------------------------|
| 215                                              | 240                                        | 240                                |
| 200                                              | 209                                        | 205                                |
| 190                                              | 187                                        | 183                                |
| 180                                              | 167                                        | 162                                |
| 170                                              | 148                                        | 140                                |
| 160                                              | 129                                        | 120                                |
| 150                                              | 111                                        | 102                                |
| 140                                              | 93                                         | 85                                 |
| 130                                              | 76                                         | 69                                 |
| 120                                              | 60                                         | 53                                 |
| 110                                              | 45                                         | 39                                 |
| 100                                              | 31                                         | 27                                 |
| 90                                               | 18                                         | 16                                 |

a At Room Temperature

b At 65 F Inlet Air Temperature

## STEAM VALVE PRESSURE DROP

### Proportional Applications

When specified, use that pressure drop (h) across the valve.

When not specified:

1. Calculate the pressure drop (h) across the valve for good modulating control:

$$h = 80\% \times (P_m - P_r)$$

NOTE: For a zone valve in a system using radiator orifices use:

$$h = (50 - 75)\% \times (P_m - P_r)$$

Where

$P_m$  = Pressure in supply main in psig or psia (gauge or absolute pressure).

$P_r$  = Pressure in return in psig or psia. A negative value if a vacuum return.

# Appendix A: Valve Selection and Sizing

## 2. Determine the critical pressure drop:

$$h_{\text{critical}} = 50\% \times P_{\text{ma}}$$

Where:

$P_{\text{ma}}$  = Pressure in supply main in psia (absolute pressure)

psia = psig + 14.7

Use the smaller value  $h$  or  $h_{\text{critical}}$  when calculating  $C_v$ .

## Two-Position Applications

Use line sized valves whenever possible. If the valve size must be reduced, use:

$$h = 20\% \times (P_{\text{m}} - P_{\text{r}})$$

Where

$P_{\text{m}}$  = Pressure in supply main in psig or psia (gage or absolute pressure).

$P_{\text{r}}$  = Pressure in return in psig or psia. A negative value if a vacuum return.

## STEAM VALVE SIZING EXAMPLES

### EXAMPLE 1:

A two-way linear valve (V1) is needed to control high-pressure steam flow to a steam-to-water heat exchanger. An industrial-type valve is specified. Steam pressure in the supply main is 80 psig with no superheat, pressure in return is equal to atmospheric pressure, water flow is 82.5 gpm, and the water temperature difference is 20F.

Use the steam valve  $C_v$  formula to determine capacity index for Valve V1 as follows:

$$C_v = \frac{(1 + 0.00075s)Q\sqrt{V}}{63.5\sqrt{h}}$$

Where:

$Q$  = The quantity of steam required to pass through the valve is found using the converter valve formula:

$$Q = \text{gpm} \times TD_w \times 0.49$$

Where:

gpm = 82.5 gpm water flow through exchanger

$TD_w$  = 20F temperature difference

0.49 = A scaling constant

Substituting this data in the formula:

$Q$  = 808.5 pounds per hour

$h$  = The pressure drop across a valve in a modulating application is:

$$h = 85\% \times (P_{\text{m}} - P_{\text{r}})$$

Where:

$P_{\text{m}}$  = Upstream pressure in supply main is 80 psig.

$P_{\text{r}}$  = Pressure in return is atmospheric pressure or 0 psig.

Substituting this data in the pressure drop formula:

$$h = 0.80 \times (80 - 0)$$

$$= 0.80 \times 80$$

$$= 64 \text{ psi}$$

The critical pressure drop is found using the following formula:

$$h_{\text{critical}} = 50\% \times (\text{psig} + 14.7 \text{ psi})$$

$$h_{\text{critical}} = 0.50 \times (80 \text{ psig upstream} + 14.7 \text{ psi})$$

$$= 0.50 \times 94.7 \text{ psi}$$

$$= 47.4 \text{ psi}$$

The critical pressure drop ( $h_{\text{critical}}$ ) of 47.4 psi is used in calculating  $C_v$ , since it is less than the pressure drop ( $h$ ) of 64 psi. Always, use the smaller of the two calculated values.

$V$  = Specific volume ( $V$ ) of steam, in cubic feet per pound at average pressure in valve ( $P_{\text{avg}}$ ):

$$P_{\text{avg}} = P_{\text{m}} - \frac{h}{2}$$

$$= 80 - \frac{47.4}{2} = 80 - 23.6 = 56.4 \text{ psig}$$

The specific volume of steam at 56.4 psig is 6.14 and the square root is 2.48.

63.5 = A scaling constant.

Substituting the quantity of steam, specific volume of steam, and pressure drop in the  $C_v$  formula shows that the valve should have a  $C_v$  of 4.6.

$$C_v = \frac{(1 + 0.00075 \times 0) \times 808.5 \times 2.48}{63.5\sqrt{47.4}}$$

$$= \frac{1745.6}{63.5 \times 6.88} = 4.6$$

NOTE: If  $P_{\text{avg}}$  is rounded off to the nearest value in Table 5 (60 psi), the calculated  $C_v$  is 4.5 a negligible difference.

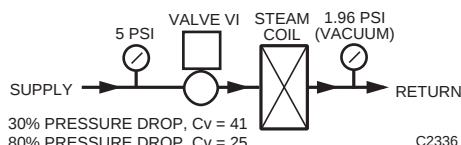
# Appendix A: Valve Selection and Sizing

Select a linear valve providing close control with a capacity index of 4 and meeting the required pressure and temperature ratings.

**NOTE:** For steam valves downstream from pressure reducing stations, the steam will be superheated in most cases and must be considered.

## EXAMPLE 2:

In Figure 19, a linear valve (V1) is needed for accurate flow control of a steam coil that requires 750 pounds per hour of steam. Upstream pressure in the supply main is 5 psig and pressure in the return is 4 in. Hg vacuum minimum.



**Fig. 19. Linear Valve Steam Application.**

Use the steam valve  $C_v$  formula to determine capacity index for Valve V1 as follows:

$$C_v = \frac{(1 + 0.00075s)Q\sqrt{V}}{63.5\sqrt{h}}$$

Where:

- $Q$  = Quantity of steam required to pass through the valve is 750 pounds per hour.
- $h$  = The pressure drop across a valve in a modulating application is found using:  
 $h = 80\% \times (P_m - P_r)$
- and:
- $P_m$  = Upstream pressure in supply main is 5 psig.
- $P_r$  = Pressure in return is 4 in. Hg vacuum.

**NOTE:** 1 in. Hg = 0.49 psi and 1 psi = 2.04 in. Hg.

Therefore,  
4 in. Hg vacuum = -1.96 psig.

$$\begin{aligned} h &= 0.80 \times [5 - (-1.96)] \\ &= 0.80 \times 6.96 \\ &= 5.6 \text{ psi} \end{aligned}$$

The critical pressure drop is found using the following formula:

$$h_{\text{critical}} = 50\% \times (\text{psig} + 14.7 \text{ psi})$$

$$\begin{aligned} h_{\text{critical}} &= 0.50 \times (5 \text{ psig upstream} + 14.7 \text{ psi}) \\ &= 0.50 \times 19.7 \text{ psia} \\ &= 9.9 \text{ psi} \end{aligned}$$

The pressure drop ( $h$ ) of 5.6 psi is used in calculating the  $C_v$ , since it is less than the critical pressure drop ( $h_{\text{critical}}$ ) of 9.9 psi.

$V$  = Specific volume ( $V$ ) of steam, in cubic feet per pound at average pressure in valve ( $P_{\text{avg}}$ ):

$$\begin{aligned} P_{\text{avg}} &= P_m - \frac{h}{2} \\ &= 5 - \frac{5.6}{2} = 5 - 2.8 = 2.2 \text{ psig} \end{aligned}$$

The specific volume of steam at 2.2 psig is 23.54 and the square root is 4.85.

63.5 = A scaling constant.

$s$  = 0

Substituting the quantity of steam, specific volume of steam, and pressure drop in the  $C_v$  formula shows that Valve V1 should have a  $C_v$  of 24.17 or the next higher available value (e.g., 25).

$$\begin{aligned} C_v &= \frac{(1 + 0.00075 \times 0) \times 750 \times 4.85}{63.5\sqrt{5.6}} \\ &= \frac{3637.5}{63.5 \times 2.37} = 24.17 \end{aligned}$$

**NOTE:** If  $P_{\text{avg}}$  is rounded off to the nearest value in Table 5 (2 psi), the calculated  $C_v$  is 24.30.

Select a linear valve providing close control with a capacity index of 25 and meeting the required pressure and temperature ratings.

## EXAMPLE 3:

Figure 20 shows the importance of selecting an 80 percent pressure drop for sizing the steam valve in Example 2. This pressure drop (5.6 psi) approximates the linear valve characteristic. If only 30 percent of the available pressure drop is used ( $0.30 \times 6.96 \text{ psi} = 2.10 \text{ psi}$  or 2 psi), the valve  $C_v$  becomes:

$$\begin{aligned} C_v &= \frac{(1 + 0.00075s)Q\sqrt{V}}{63.5\sqrt{h}} \\ C_v &= \frac{750 \times 4.85}{63.5\sqrt{2}} = 40.5 \end{aligned}$$

# Appendix A: Valve Selection and Sizing

This larger valve (2 psi drop) has a steeper curve that is further away from the desired linear valve characteristic. See LINEAR VALVE under VALVE SELECTION for more information.

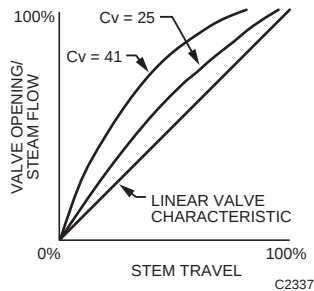


Fig. 20. Effect of Pressure Drop in Steam Valve Sizing.

Table 5. Properties of Saturated Steam.

| Vacuum, Inches of Mercury | Boiling Point or Steam Temperature (Deg F) | Specific Volume (V), cu. ft/lb | $\sqrt{V}$ (For valve sizing) | Maximum Allowable Pressure Drop, psi. |
|---------------------------|--------------------------------------------|--------------------------------|-------------------------------|---------------------------------------|
| 29                        | 76.6                                       | 706.00                         | 26.57                         | 0.23                                  |
| 25                        | 133.2                                      | 145.00                         | 12.04                         | 1.2                                   |
| 20                        | 161.2                                      | 75.20                          | 8.672                         | 2.4                                   |
| 15                        | 178.9                                      | 51.30                          | 7.162                         | 3.7                                   |
| 14                        | 181.8                                      | 48.30                          | 6.950                         | 3.9                                   |
| 12                        | 187.2                                      | 43.27                          | 6.576                         | 4.4                                   |
| 10                        | 192.2                                      | 39.16                          | 6.257                         | 4.9                                   |
| 8                         | 196.7                                      | 35.81                          | 5.984                         | 5.4                                   |
| 6                         | 201.0                                      | 32.99                          | 5.744                         | 5.9                                   |
| 4                         | 204.8                                      | 30.62                          | 5.533                         | 6.4                                   |
| 2                         | 208.5                                      | 28.58                          | 5.345                         | 6.9                                   |

| Gage Pressure, psig | Boiling Point or Steam Temperature (Deg F) | Specific Volume (V), cu. ft/lb | $\sqrt{V}$ (For valve sizing) | Maximum Allowable Pressure Drop, psi. |
|---------------------|--------------------------------------------|--------------------------------|-------------------------------|---------------------------------------|
| 0                   | 212.0                                      | 26.79                          | 5.175                         | 7.4                                   |
| 1                   | 215.3                                      | 25.20                          | 5.020                         | 7.8                                   |
| 2                   | 218.5                                      | 23.78                          | 4.876                         | 8.4                                   |
| 3                   | 221.5                                      | 22.57                          | 4.751                         | 8.8                                   |
| 4                   | 224.4                                      | 21.40                          | 4.626                         | 9.4                                   |
| 5                   | 227.1                                      | 20.41                          | 4.518                         | 9.8                                   |
| 6                   | 229.8                                      | 19.45                          | 4.410                         | 10.4                                  |
| 7                   | 232.3                                      | 18.64                          | 4.317                         | 10.8                                  |
| 8                   | 234.8                                      | 17.85                          | 4.225                         | 11.4                                  |
| 9                   | 237.1                                      | 17.16                          | 4.142                         | 11.8                                  |

| Gage Pressure, psig | Boiling Point or Steam Temperature (Deg F) | Specific Volume (V), cu. ft/lb | $\sqrt{V}$ (For valve sizing) | Maximum Allowable Pressure Drop, psi. |
|---------------------|--------------------------------------------|--------------------------------|-------------------------------|---------------------------------------|
| 10                  | 239.4                                      | 16.49                          | 4.061                         | 12.4                                  |
| 11                  | 241.6                                      | 15.90                          | 3.987                         | 12.8                                  |
| 12                  | 243.7                                      | 15.35                          | 3.918                         | 13.4                                  |
| 15                  | 249.8                                      | 13.87                          | 3.724                         | 14.8                                  |
| 20                  | 258.8                                      | 12.00                          | 3.464                         | 17.4                                  |
| 25                  | 266.8                                      | 10.57                          | 3.251                         | 19.8                                  |
| 30                  | 274.0                                      | 9.463                          | 3.076                         | 22.4                                  |
| 35                  | 280.6                                      | 8.56                           | 2.93                          | 24.8                                  |
| 40                  | 286.7                                      | 7.826                          | 2.797                         | 27.4                                  |
| 45                  | 292.4                                      | 7.209                          | 2.685                         | 29.8                                  |
| 50                  | 297.7                                      | 6.682                          | 2.585                         | 32.4                                  |
| 55                  | 302.6                                      | 6.232                          | 2.496                         | 34.8                                  |
| 60                  | 307.3                                      | 5.836                          | 2.416                         | 37.4                                  |
| 65                  | 311.8                                      | 5.491                          | 2.343                         | 39.8                                  |
| 70                  | 316.0                                      | 5.182                          | 2.276                         | 42.4                                  |
| 75                  | 320.0                                      | 4.912                          | 2.216                         | 44.8                                  |
| 80                  | 323.9                                      | 4.662                          | 2.159                         | 47.4                                  |
| 85                  | 327.6                                      | 4.445                          | 2.108                         | 49.8                                  |
| 90                  | 331.2                                      | 4.239                          | 2.059                         | 52.4                                  |
| 95                  | 334.6                                      | 4.060                          | 2.015                         | 54.8                                  |
| 100                 | 337.9                                      | 3.888                          | 1.972                         | 57.4                                  |
| 110                 | 344.1                                      | 3.595                          | 1.896                         | 62.3                                  |
| 120                 | 350.0                                      | 3.337                          | 1.827                         | 67.4                                  |
| 130                 | 355.2                                      | 3.12                           | 1.766                         | 72.3                                  |
| 140                 | 360.9                                      | 2.923                          | 1.710                         | 77.4                                  |
| 150                 | 366.2                                      | 2.746                          | 1.657                         | 82.3                                  |
| 160                 | 370.6                                      | 2.602                          | 1.613                         | 87.4                                  |
| 170                 | 375.5                                      | 2.462                          | 1.569                         | 92.3                                  |
| 180                 | 379.6                                      | 2.345                          | 1.531                         | 97.4                                  |
| 190                 | 383.9                                      | 2.234                          | 1.495                         | 102.3                                 |
| 200                 | 387.8                                      | 2.134                          | 1.461                         | 107.4                                 |
| 225                 | 397.4                                      | 1.918                          | 1.385                         | 119.8                                 |
| 250                 | 406.0                                      | 1.742                          | 1.320                         | 132.4                                 |
| 275                 | 414.2                                      | 1.595                          | 1.263                         | 145.0                                 |
| 300                 | 421.8                                      | 1.472                          | 1.213                         | 157.4                                 |
| 350                 | 435.6                                      | 1.272                          | 1.128                         | 182.4                                 |
| 400                 | 448.1                                      | 1.120                          | 1.058                         | 207.4                                 |
| 450                 | 459.5                                      | 0.998                          | 0.999                         | 232.4                                 |
| 500                 | 470.0                                      | 0.900                          | 0.949                         | 257.4                                 |
| 550                 | 479.7                                      | 0.818                          | 0.904                         | 282.4                                 |
| 600                 | 488.8                                      | 0.749                          | 0.865                         | 307.4                                 |
| 650                 | 497.3                                      | 0.690                          | 0.831                         | 332.4                                 |
| 700                 | 505.4                                      | 0.639                          | 0.799                         | 357.4                                 |
| 800                 | 520.3                                      | 0.554                          | 0.744                         | 407.4                                 |
| 900                 | 533.9                                      | 0.488                          | 0.699                         | 457.4                                 |
| 1000                | 546.3                                      | 0.435                          | 0.659                         | 507.4                                 |

# Technology Comparison of Control Ball and Globe Valves

| Attribute                       | Control Ball Valve                                                              | Globe Valve                                                                                             | Advantage    | Reason                                                           |
|---------------------------------|---------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|--------------|------------------------------------------------------------------|
| Flow Characteristics            | Quadratic (with characterization)                                               | Equal percent to design temp.                                                                           | Globe        | BAS controller expects flow from valve at low signal             |
|                                 | Linear (full port)                                                              | Linear                                                                                                  |              |                                                                  |
|                                 | Delayed opening / early close-off                                               | Continuous from start                                                                                   |              |                                                                  |
| Rangeability (turn-down ratio)  | Fixed minimum flow results in<br>1. Low TDR at low Cv<br>2. High TDR at high Cv | 50:1 = 2% steps (HON)                                                                                   | Globe        | Small sizes are the most common applications and need high TDR   |
|                                 |                                                                                 | 100:1 (Siemens claim)                                                                                   |              |                                                                  |
|                                 |                                                                                 | Maximum 25:1 (JCI)                                                                                      |              |                                                                  |
| Operating Differential Pressure | 20 – 25 psid for characterized ports (plate distortion)                         | 20 – 25 psid for quiet operation (cavitation at low flow)                                               | — —          | 20+ psid is not typical of control valve applications            |
| Close-Off Differential Pressure | High with low Torque actuators (water pressure aids sealing)                    | Inversely proportional to Cv, and proportional to actuator force                                        | Control Ball | Globe is comparable in small sizes                               |
|                                 | Capable of dead-heading pumps*                                                  | Pressure balanced is high                                                                               |              | PB more expensive                                                |
| Seat Leakage                    | ANSI Class IV (< 0.01% Cv) @ A port (Does not apply to B port without seals)    | ANSI Class III w/ small metal seats<br>ANSI Class IV with resilient seat and larger metal seated valves | Control Ball | Less leakage reduces energy use with chilled water               |
| Trim (internal construction)    | Plated brass ball and stem                                                      | Resilient material on metal seat                                                                        | — —          | Long term performance of ball valve in automatic control unknown |
|                                 |                                                                                 | Stainless steel ball and stem<br>Brass plug on brass seat                                               |              |                                                                  |
|                                 | Rubber and Teflon stem O-rings                                                  | Stainless steel plug on SS seat                                                                         |              |                                                                  |
| Steam Ratings                   | Low pressure (full port only)                                                   | Low pressure                                                                                            | Globe        | Greater versatility. Equal % flow available with globe           |
|                                 | — —                                                                             | High pressure                                                                                           |              |                                                                  |
| Cv Ratings                      | Multiple Cv's per valve size                                                    | Multiple Cvs @ 1/2" size                                                                                | Ball         | Lower installed cost with no loss of control capability          |
| Line Size Piping                | Line size piping with lower Cv                                                  | Reducers often needed > 1/2"                                                                            | Ball         | Lower installed cost with no loss of control capability          |
| Pipe Sizes                      | 1/2" – 3" Threaded                                                              | 1/2" – 3" Threaded ANSI 150                                                                             | Globe        | Wider applications                                               |
|                                 | 4" – 6" ANSI 125 Flanged                                                        | 2-1/2" – 6" ANSI 125 and 250 Flanged                                                                    |              |                                                                  |
| 3-Way Body Styles               | Combo mixing/diverting                                                          | Mixing models                                                                                           | Control Ball | Easier to select. Piping different mixing & diverting            |
|                                 | B port seal required for tight close-off                                        | Diverting models                                                                                        |              |                                                                  |
| Physical Size                   | Low profile at large sizes                                                      | Large profile at large sizes                                                                            | Control Ball | Depends on application                                           |
|                                 | Relatively large in 1/2" pipe                                                   | Small size in 1/2" pipe                                                                                 | Globe        |                                                                  |
| Control Inputs                  | Floating/2-position, modulating                                                 | Floating/2-position, modulating                                                                         | — —          | Depends on application                                           |
|                                 | Some pneumatic actuators available                                              | Large linear pneumatic installed base                                                                   | Globe        |                                                                  |
| Fail Safe Operation             | N/O or N/C by actuator position                                                 | N/O or N/C up to 3"                                                                                     | Control Ball | Globe needs higher power actuators                               |
|                                 | Stay-in-place                                                                   | Stay-in-place                                                                                           |              |                                                                  |
| Valve Serviceability            | Requires unions for valve access<br>VBN stems replaceable                       | In-line serviceable                                                                                     | Globe        | B.V. must be removed from piping                                 |
| CE Preference                   | Growing with time                                                               | Well established                                                                                        | Globe        | Familiar technology (habit)                                      |
| Contractor Preference           | Valve comes with actuator                                                       | Actuator selection separate                                                                             | Control Ball | Easier to select                                                 |
| Actuator Selection              | Match valve and damper DCAs                                                     | Requires linkage for DCAs                                                                               | Control Ball | Added cost for globe valve                                       |

\*Pumps require pressure cut-offs or supply-return differential pressure regulators to avoid pump seal damage and potential leakage that can result without flow-through. Unless used in end-of-line-service, control valves do not need to close off against full pump head.

## Appendix B: NEMA Standard Classification Code for Enclosures

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**NEMA 1**—General purpose. for indoor protection, where conditions are not unusually severe.

**NEMA 2**—Drip tight. Designed to exclude falling moisture or dirt. Particularly applicable to cooling rooms, laundries, etc., where condensation is prevalent. For indoor use.

**NEMA 3**—Weather Resistant (weatherproof). For outdoor use; designed to withstand all normal exposure to natural elements. Controls mounted on pullout racks for easy access. With rain hood and weather seals.

**NEMA 4**—Watertight. Withstands water pressure from 1 in. hose nozzle, 65 gallons per minute, from distance of not less than 10 ft for five minutes. Suitable for maritime applications, breweries, etc.

**NEMA 5**—Dust-tight. Equipped with dust-tight gaskets. Suitable for mills and other high-dust atmospheres.

**NEMA 6**—Submersible. For submerged operation under specified pressures and time.

**NEMA 7**—Hazardous Locations, National Electrical Code Class 1 (circuit breaks in air).

**NEMA 8**—Hazardous Locations, National Electrical Code Class 1 (circuit breaks immersed in oil).

**NEMA 9**—Hazardous Locations, National Electrical Code Class 2.

**NEMA 10**—Explosion-proof. Meets U.S. Bureau of Mines requirements for explosive atmospheres.

**NEMA 11**—Acid or Fume Resistant. Provides for immersion of enclosed equipment in oil.

**NEMA 12**—Industrial Use. Excludes oils, dust, moisture, to satisfy individual requirements.

## Appendix C: Best Practices for Low Power Control Signal Wiring

Low power analog signals are commonly used for proportional control signal wiring in HVAC applications. Following are a series of best practices for the prevention of corruption of these signals due to electro-magnetic interference (“EMI”).

EMI is typically caused by coupling of the electro-magnetic field that surrounds all wires carrying current. It may also be caused by radio frequency sources such as “walkie talkies” using amplitude modulated signals. A strong EM field can induce electrical noise in wires up to 2 V in amplitude. The strongest coupling comes between closely spaced, parallel wires. Inductive and high power motor loads are some of the strongest sources of EMI, along with electronics lighting ballasts, dimmers, and variable frequency motor drives. More potential EMI sources in a building mean that greater attention needs to be paid to effective wiring practices.

All control wiring should consist of twisted pairs of wires, which resist interference better than straight, non-twisted conductors. Stranded conductors offer less resistance to current flow than solid wires, and are more flexible making them easier to install; however, care must be taken to ensure that all the conductors in the wire are properly installed and that “whiskers” do not short out any wiring connections.

### Shielded Wiring

Control signals can be protected from EMI using shielded wire. The more continuous the shield, the more effective it is. Braided shield is commonly used for microphone cables because of its superior flexibility. HVAC wiring is fixed, does not require high flexibility during use, and is better served with lower cost cables using continuous foil shielding and a “drain wire”.

1. All signal wiring in hospitals should be shielded to prevent the potential for interference with medical equipment such as high power MRI and CT scanners.
2. All 0~10 Vdc control signals should be run in shielded cable. EMI noise can be interpreted as control signaling, depending on the noise suppression circuitry in the controlled equipment.
3. Long runs of wiring from 24 V power supply transformers should be shielded in heavy electrical noise environments to prevent EMI from coupling through the actuator's power supply.
4. In typical commercial buildings, 2~10 Vdc signals do not require shielded wiring.
5. Current flow is much more difficult to induce in wiring than voltage, and current-based control signals usually do not require shielded cable except in heavy industrial applications.
  - a. If the terminal equipment only accepts voltage input, install a 500 ohm, ¼ Watt (or larger), 1% resistor across the control input terminals to convert a 4~20 mA(dc) signal to 2~10 Vdc.
  - b. If multiple actuators are connected in parallel, install this resistor at the first actuator in the group.

- c. Any standard resistor (“EIA”) value between 490 and 510 ohms is acceptable, and can be purchased at retail outlets that sell electronic components.

6. Floating, pulse-width modulated, and two-position actuators use switched 24 Vac control or power signals and so rarely require shielded wiring.

### Wiring Techniques

1. No wiring should ever be assumed to be interference-proof. Never strap signal cables to other conductors or conduit, especially line voltage.
2. Never run signal wires in raceways or wiring troughs with other conductors. Keep signal wires at least a yard away from line voltage wiring. Higher voltage wiring requires greater separation.
3. When necessary, cross line voltage conductors with signal wiring at 90° (right angles), to minimize signal coupling.
4. Electromagnetic shielding is a static phenomenon; any current running through the shield will negate any protection the shield may have provided. Only ground (or “earth”) a shield drain wire at one point, preferably where the signal will be the weakest, for example: at the actuator.
  - a. Do not ground the secondary of the 24 V power supply in the control system. This will create a secondary current path and negate the protection of any shielding.
  - b. If there is a burner ignition system, power it with its own transformer and use an interface relay for isolation, if necessary.
  - c. Use relays with built-in coil arc suppression, such as a Honeywell R8229.
5. Insulate all exposed shielding and drain wire joins and splices so that they cannot contact electrical ground, especially junction boxes and conduit. Do not use the ground screw of a junction box as a tie point. Use a separate electrical ground wire if required for safety extra-low voltage wiring by local code.
6. Both rigid and flexible conduit are continuously grounded (“bonded”) for electrical safety, and cannot function as a signal shield. Where local codes require mechanical protection for all wiring, shielded signal cable may be run inside conduit, following the practices listed above.

### Additional References

Most of these wiring techniques were developed to protect the very low-strength signals in audio recording. The 20 mA current loop signal was originally used with teletype (“TWX”) equipment communicating over telephone lines and adapted for proportional analog control signaling in industrial process control. Further information and background theory can be found in:

1. Audio Engineering Handbook, edited by Blair K. Benson, McGraw-Hill
2. Handbook for Sound Engineers, by Glen Ballou
3. Standard Handbook of Audio Engineering, by Jerry Whitaker and Blair K. Benson, McGraw-Hill.



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