Honeywell

ASSET RELIABILITY SOFTWARE-AS-A-SERVICE

PRODUCT INFORMATION NOTE

Scalable asset reliability solution that utilizes rapidly deployable, wireless sensors for the continuous monitoring of critical rotating assets like motors, pumps, compressors and gear boxes. The end-to-end solution aggregates and analyzes data from “plug and play” wireless IoT sensors to maximize the life of assets by proactively identifying inefficiencies or impending issues, expediting root cause analysis and facilitating the instrumentation of stranded assets.

RUNNING AN ASSET RELIABILITY PROGRAM IS RESOURCE INTENSIVE

Reliability programs for assets in facilities typically involve the setup of costly sensors, cabling, and time-consuming configuration processes. These programs require enterprise-level integrations with strong handshakes between IT and SME teams to be able to smoothly deploy and start providing value. This complexity has led maintenance managers and reliability engineers to focus their efforts on critical assets leaving many other assets uninstrumented.

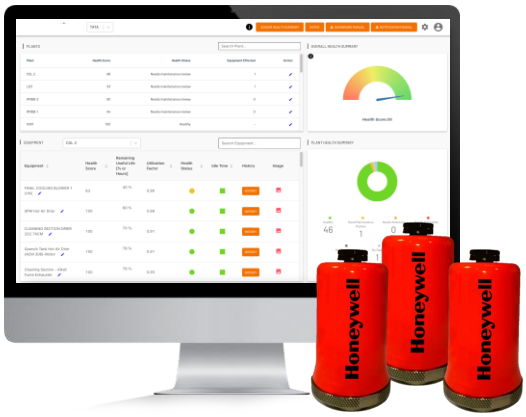
WHY CHOOSE WIRELESS INSTRUMENTATION?

Wireless instrumentation allows for a larger volume of sensor deployments by leveraging existing standard IT infrastructure and cloud services without the need for costly installation and setup of wired networks throughout the facility.

Using battery power with wireless instrumentation further reduces the setup requirements and allows the rapid creation of always-on, high-density managed networks. This plug-and-play approach allows the setup and connection of new sensors on demand facilitating the expansion of reliability programs and the effective use of data to keep operations up and running.

SOLUTIONS

Honeywell’s asset reliability software-as-a-service sensors enable reliability and maintenance managers to expand machine health monitoring efforts beyond critical assets. 6-in-1 sensors paired with cloud-based, AI-powered analytics and dashboards create an always-on asset health monitoring solution aimed at minimizing downtime, reducing repair costs, and improving overall equipment effectiveness (OEE) without steep upfront hardware costs and cumbersome technology integrations.



The 6-in-1 sensor utilizes advanced edge analytics that allows for near-real time monitoring without always needing to be connected to the network. Other key benefits include:

- Avoid missing key events with time-based data collection
- Detect any equipment anomalies or incessant issues
- Long sensor life by combining edge technology with cloud framework for monitoring of critical assets
- Identify and pinpoint fault modes for rotating equipment
- Predict remaining useful life of the machine using advance AI analytics
- Plan maintenance activities in advance to correct identified issues

How does the Asset Reliability Software-as-a Service portal integrate with existing systems?

The Honeywell portal makes all sensor data available to third-party applications via a secure RESTful API.

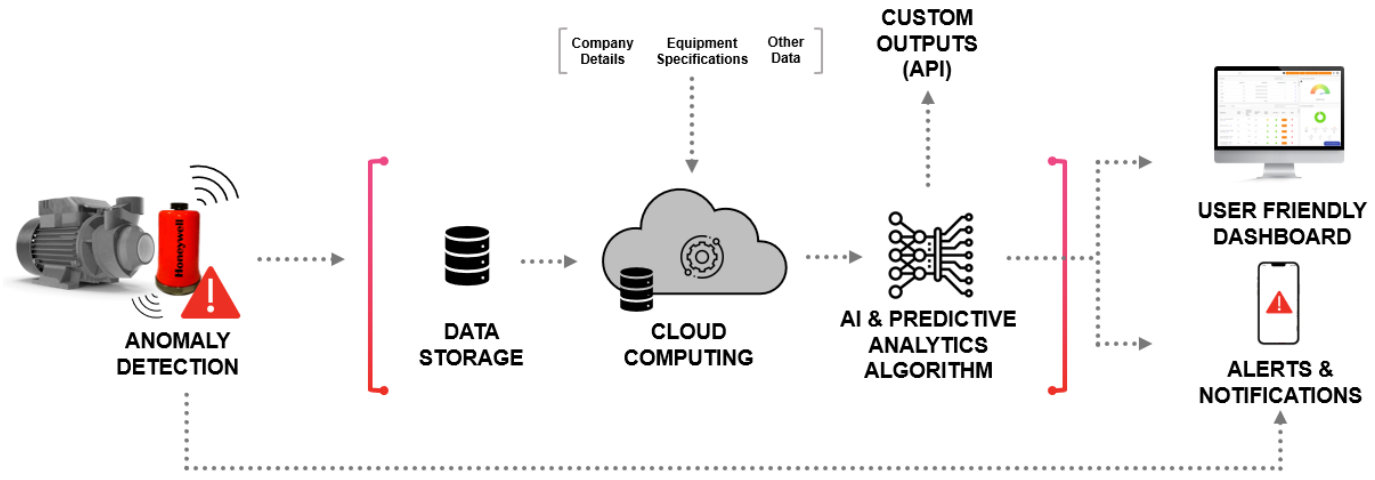
The API allows the integration of data streams with commercial CMMS, EAM, ERP, and historians to correlate new insights.

Standard connectors for specific platforms allow the dissemination of sensor aggregated data and analytics to enable multiple use cases across operations.

Wireless connectivity help reduce costs, improve flexibility and facilitate the rapid expansion of reliability and maintenance programs

NEXT GENERATION WIRELESS INSTRUMENTATION

Honeywell wireless vibration sensors are a plug-and-play, solution to rapidly instrument stranded assets. Sensors are directly mounted on the body of the asset and communicate data to the Honeywell Wireless Gateway. The gateway seamlessly integrates with existing IT infrastructure to aggregate data in the Honeywell solution to provide continuous monitoring and analytics. This architecture allows the fast deployment of a large volume of sensors in an always-on, high-density, managed network eliminating the need of costly wired instrumentation and custom system integrations.



6-in-1 wireless sensor for scalable, 24/7 asset monitoring

6 MEASUREMENTS, 1 SENSOR
Measure 6 different parameters for reliable asset monitoring including vibration, acoustic emissions, temperature, RPM, humidity, and magnetic flux.

ALWAYS-ON MONITORING
Utilizes LTE communication protocols for a seamless integration with existing infrastructure.

SCALABLE ASSET COVERAGE
Sensors are easy to configure and deploy allowing for quick scale up of an asset reliability program. Wi-Fi and cellular communication allow for seamless integration with existing infrastructure.

INDUSTRIAL CERTIFICATIONS
IP 68 Enclosure, Class I Division 2 sensor operational in a wide range of hazardous environments.

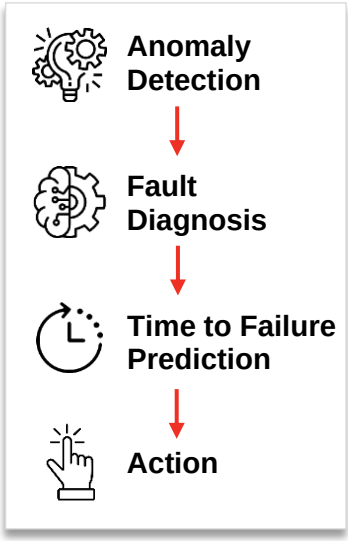
CONNECTIVITY OPTIONS
Sensors are available in a variety of options to suit the exact needs of the facility or application. Sensors can be installed using either wireless or cellular connectivity to the cloud. Available connectivity and power options include:

Sensor	Connectivity*	Battery Life
LTE	LTE/ CAT M1	3-8 years

**Available cellular signal required for installation.*
30mb of cellular data is included per month for each sensor.

PLUG AND PLAY CONVENIENCE
Wireless sensors allow for simple plug and play and hassle-free deployment, without worrying about extra IT infrastructure. It is easy to configure and enables fast installation and startup. Data measured by the sensors feeds directly into an analytics portal for near real-time monitoring and predictive analytics.

MACHINE HEALTH DIAGNOSTICS
Enhance the life of your assets with 24/7 monitoring and real-time alerts. Asset Reliability Software-as-a-Service provides insights and diagnosis to facilitate early detection of equipment issues to maximize asset life and help optimize maintenance budgets.



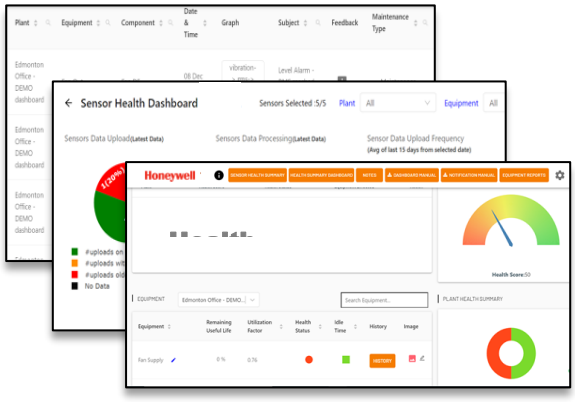
AUTOMATED ANOMALY DETECTION
Acoustic emissions signal early-stage faults. Advanced signal processing and filtration technique's separate fault signals from varying process conditions.

FAULT MODE IDENTIFICATION
Quickly understand the root cause of the issue with insights into the cause of faults.

PREDICT REMAINING ASSET USEFUL LIFE
Time to failure predictions allow for proactive planning of downtime and maintenance actions before an actual equipment failure occurs

PROACTIVE ALERT AND ACTION
SMS and email alerts combined with prescriptive analytics provide early warnings of equipment issues and allow users to take actions to quickly resolve pending issues

END-TO-END VISIBILITY OF OPERATIONS



Health Summary Dashboard

View the health of all connected assets and get visibility into equipment alerts and conditions. The health summary dashboard displays information about asset status and remaining useful life for real-time monitoring.

Notification Dashboard

Edge calculations and analytics help differentiate between process upsets or variations and actual faults. Near real-time alerts and reports can be sent to any device along with prescriptive recommendations for what actions to take.

Sensor Health Dashboard

View the status of wireless sensors in your asset network. Sensor health dashboard gives insights into sensor performance, including remaining battery life, to ensure confidence in measurements and maximize performance of the asset reliability solution.

Asset Coverage

Sensors can be used on a variety of assets including:

- Motor
- Pump
- Gearbox
- Compressor
- Engines
- Fans
- Bearings
- Air Handling Units
- Chillers
- And others

Predictive Analytics & Monitoring Strategy

1. **Monitor Acoustic Emissions**
   Acoustic emissions (rubbing/friction and noise) can signal and provide initial indication for an early-stage fault.

2. **Signal Processing and Filtration**
   To differentiate the potential fault from varying process conditions (load/speed) additional analytics are required. Advanced signal processing and filtration algorithms are applied to better understand the measurement and detect potential fault conditions.

3. **Extract RPM & Fault Type**
   Using vibration measurements (velocity, acceleration, displacement), Quick Connect extracts the asset RPM to determine the type of fault.

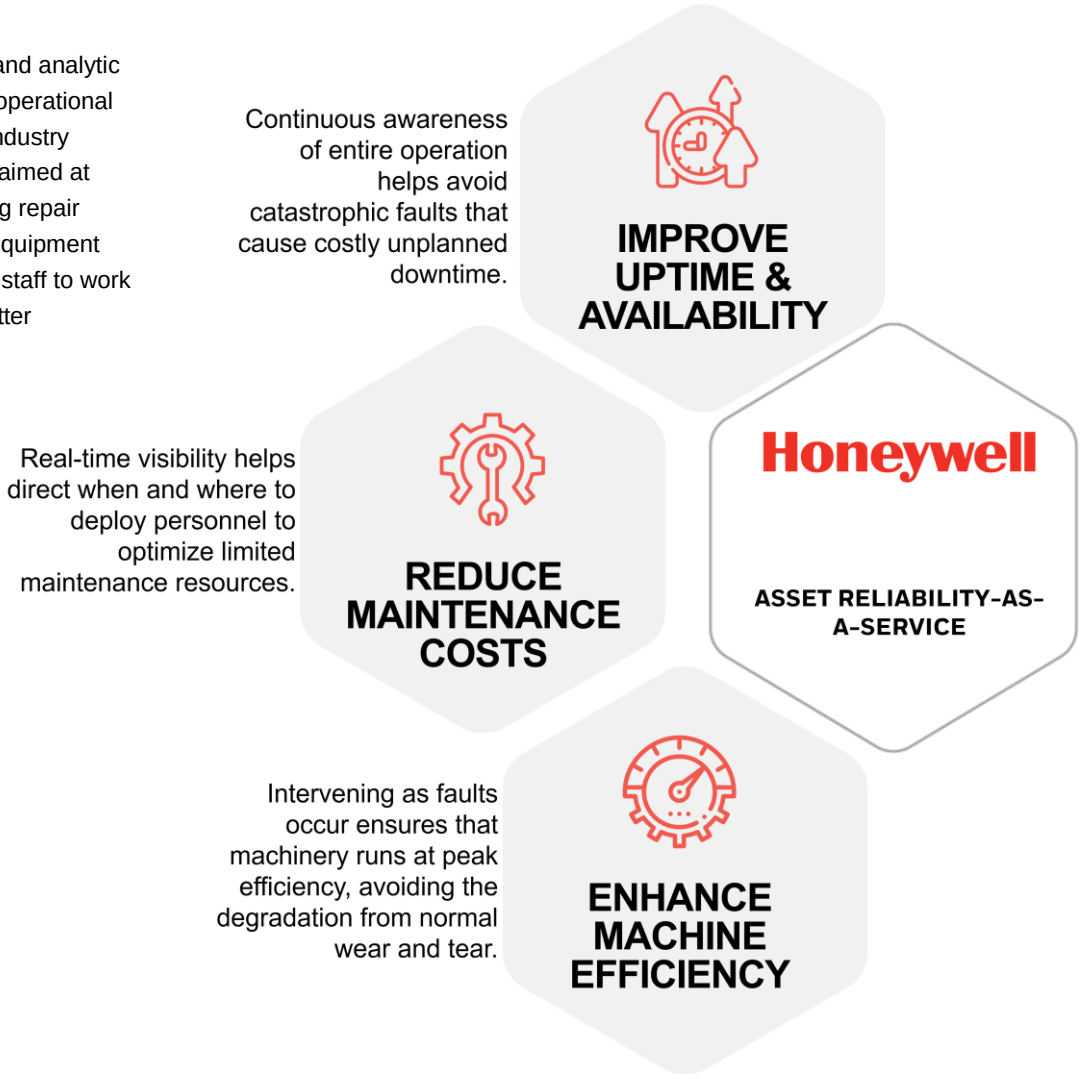
4. **Calculate Remaining Time to Failure**
   Analyzing the various sensors and asset measurements, Quick Connect calculates the remaining time to failure and determines which component is likely to fail first.

5. **Correlate with Temperature**
   Correlating measurements and analysis with asset temperature measurements and trends helps to improve the accuracy of predictive maintenance models and better determine maintenance recommendations.

ASSET RELIABILITY
SOFTWARE-AS-A-SERVICE

The Honeywell Advantage

Honeywell provides the data and analytic foundation needed to enable operational excellence. Honeywell is an industry leader in integrated solutions aimed at minimizing downtime, reducing repair costs, and improving overall equipment effectiveness enabling facility staff to work more effectively and make better decisions.



For More Information

Learn more about how Honeywell can improve your asset reliability contact your Honeywell Account Manager today.

Honeywell Connected Enterprise

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ASSET RELIABILITY SOFTWARE-AS-A-SERVICE
SENSOR SPECIFICATIONS

Parameters	Sensor Type	
	LTE	Lora + LTE
Power Source	19,000 mAH 3.6 V Battery	19,000 mAH 3.6 V Battery
Connectivity Protocol	Cellular: CAT-M1, LTE-M: 12, 2G (GSM1800/900), Wi-Fi: 2.4 GHz & 5 GHz, Bluetooth: 5.0	Cellular: CAT-M1, LTE-M: 12, 2G (GSM1800/900), Wi-Fi: 2.4 GHz & 5 GHz, Bluetooth: 5.0
Dimensions	10 cm (3.93”) Length and 7.2 cm (2.83”) Diameter	10 cm (3.93”) Length and 7.2 cm (2.83”) Diameter
Onboard Storage Capacity	4MB (avg 500kB/day, 4x VIB TWF/day) Up to 3 days	
Accelerometer	MEMS based sensor	
Operating Temperature Range	Non-Hazardous Area Ambient Operating Temp: -40 to 125°C Hazardous Area Ambient Operating Temp: -40 to 55°C	
Enterprise-grade Security	AES256 Encryption; Completely encrypted data pipeline	
Measurement Range	**Vibration sensor** • Range: ±40g • Sensitivity: 0.031 mg/LSB **Acoustic Emission sensor** • Ultrasonic Range: 50Hz to 80kHz • Sensitivity: 26dB FS +/-1 dB **RPM** • Accuracy: 99% (10-5000RPM) **Temperature** • IR Resolution: 0.1°C / 0.18°F • Range: -40°C to 120°C / -40°F to 250°F **Magnetic Flux** • Range: Adjustable +/-2 Gauss to +/-200 Gauss • Sensitivity: 0.0002 Gauss to 0.02 Gauss • Sampling Rate: 113 kHz **Humidity** • Range (Relative Humidity): ± 3.5% RH, 20 to +80% RH • Accuracy (LSB): 0.004% RH/LSB	
Consumption	Ultra-low-power mode consumption down to 8µA (Wi-Fi) or 16µA (Cellular)	
Testing	Vibration & natural frequency testing passed (5000g)	
Noise Reduction	Unique skeleton holder ensures zero noise	
Certifications*	FCC/ISED/CE/UKCA (LoRA + LTE Sensor) FCC/IC (Wi-Fi, LTE & Energy Harvesting Sensors) IECEx Class 1 Div 2 & ATEX Zone 1* IP68, ASME Class 1 Div 2, UL746C and UL94V0	

**Check with account manager for list of approved countries for sensor installation.*