

# VM4

## Wireless Condition Monitoring Sensor for Rotating Equipment



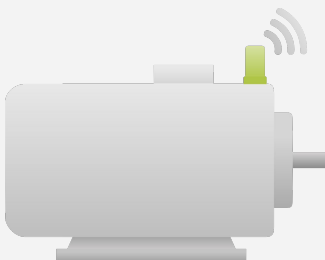
**The Vibration Mote 4 (VM4)** is a wireless vibration and temperature sensor for condition monitoring of rotating machinery, such as motors, pumps, fans, compressors, gearboxes and more.

The VM4 is battery powered, WiFi-enabled, and compatible with the Petasense ARO Cloud, to continuously monitor the health of your critical assets from anywhere at any time.

Choose between 2 models: **VM4 and VM4 Pro**. The VM4 is suitable for fixed speed machinery while the VM4 Pro enables you to monitor variably operating equipment, including variable speed (VFD), batched or spared assets.

Petasense Web & Mobile Apps enable you to track your critical assets remotely in real-time and receive actionable insights and predictive maintenance recommendations.

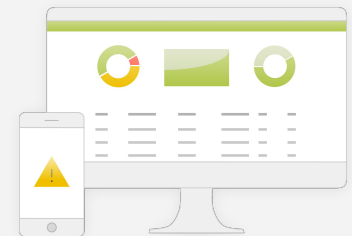
### AN END-TO-END CONDITION MONITORING SYSTEM



**VIBRATION MOTE\***  
Easily mount on rotating equipment and send asset condition data over WiFi



**ARO CLOUD**  
Predict asset health and optimize performance using machine learning



**WEB + MOBILE APPS**  
Visualize asset health data and receive actionable insights with real-time notifications

\*Use of Vibration Motes requires an active subscription to the Petasense ARO Cloud

## DETECT ISSUES EARLIER

High bandwidth, triaxial vibration sensor with 6,000 Hz max frequency response in all 3 axes, providing the perfect balance between battery life and data resolution. Detect faults such as:

- Misalignment
- Imbalance
- Gearbox defects
- Cavitation
- Looseness
- Belt drive issues
- Early stage bearing wear

## MONITOR VARIABLE SPEED (VFD) OR VARIABLY OPERATING ASSETS

Integrated magnetometer enables the collection of running speed data (RPM), designed for monitoring variable speed or intermittently operating machinery.

## 5 YEAR BATTERY LIFE\*

Expanded battery capacity prolongs the VM4's battery life to 5 years, based on one full bandwidth measurement per day with optimal WiFi and environmental conditions.

## ENTERPRISE-GRADE SECURITY

WiFi module compatible with 802.1X Enterprise WiFi authentication protocol.



## COLLECT MEANINGFUL DATA

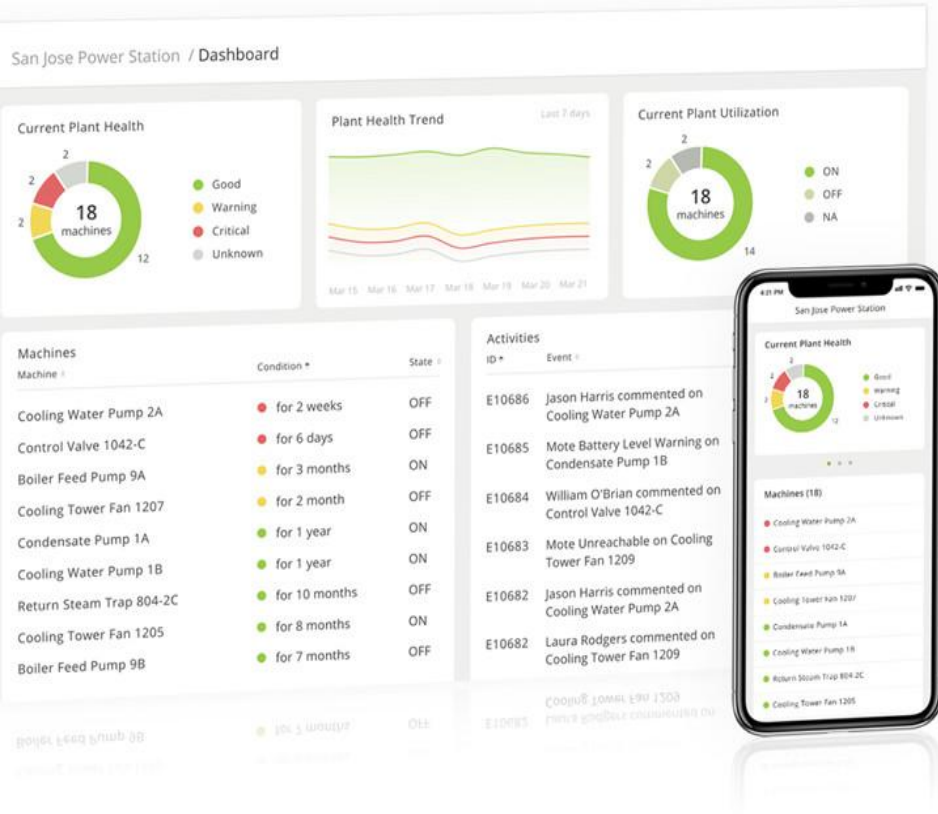
Advanced Machine Learning at the Edge is built into the VM4, providing smart measurement capabilities such as:

- **Event-based measurements**  
Taken only when asset is on and/or operating at a specific running speed, enabling consistent trending
- **Coordinated measurements**  
All Motes on asset train to take synchronous measurement

## NEVER LOSE YOUR DATA

If the wireless network goes down, the VM4s have onboard storage to prevent data loss. Data gets automatically transmitted once the connection is re-established.

\* Planned specification, pending final testing



## Petasense ARO: Asset Reliability & Optimization

brings together sensor data, asset knowledge, physics based modeling and machine learning analytics to get the most out of any industrial asset. Implement a wireless IoT based predictive maintenance program (PdM) for all critical equipment.

### ACTIONABLE INSIGHTS POWERED BY MACHINE LEARNING

Advanced ML algorithms generate Asset Health Scores for each unique asset in real-time. By analyzing each sensor reading and comparing with historical trends, the algorithm can detect anomalies weeks or months before a failure occurs and present a single indicator of asset health.

### ADVANCED ANALYST TOOLS

ARO Cloud has an intuitive-user interface with all the features that an analyst will need to diagnose developing problems, without the complexity.

### MONITOR ANY CRITICAL ASSET

While the Vibration Mote can be used for any rotating asset, Petasense ARO also enables monitoring of any asset with the use of the Petasense Transmitter. Critical static assets like steam traps, valves and electrical panels can be monitored alongside rotating assets within the same software.

### INTEGRATE 3RD PARTY SYSTEMS

Bring in data from a variety of sources to create a complete model of real-time asset conditions. RESTful APIs allow easy connection with historians, analytics, CMMS, SCADA systems and other software.

**PROACTIVELY MONITOR YOUR CRITICAL ASSETS**

**MINING & METALS**

- Evaporators
- Finishers
- Conveyors
- Gearboxes
- Process Fans

**CRITICAL FACILITIES**

- Air handling units
- Exhaust fans
- Chillers

**OIL & GAS**

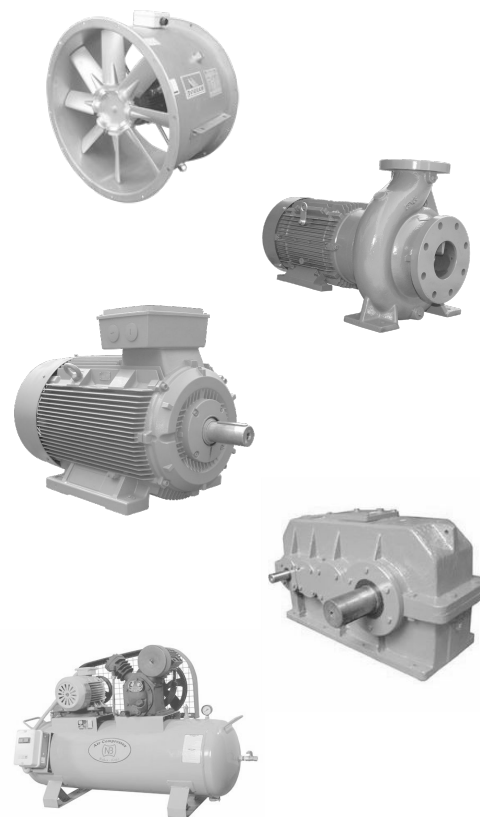
- Gas compressors
- Process pumps
- Gearboxes

**POWER GENERATION**

- Chill water & boiler feed pumps
- Cooling towers
- Generator fans

**PHARMACEUTICALS**

- Homogenizers
- Agitators & Mixers
- HVAC - AHUs, Fans and Pumps



**JOIN A COMMUNITY OF INDUSTRY LEADERS**

“Petasense caught a significant issue with an air handling unit that saved valuable biological experiments for our client. Everyone benefits from the sheer value this technology brings.”

**SENIOR DIRECTOR OF RELIABILITY**

“The Motes alerted us about a major inefficiency in the operation of our pump system and we have taken corrective action. Looks like another win for Petasense!”

**DIRECTOR OF OPS & MAINTENANCE**

# VM4: Technical Specifications

## VIBRATION SENSOR

	VM4	VM4 Pro		
Accelerometer	Triaxial MEMS	Triaxial MEMS		
Frequency Response	2 to 1,600 Hz (+/- 3 dB)	2 to 6,000 Hz (+/- 3 dB)		
Measurement Range	Up to +/-16g	Up to +/-16g		
AD Conversion	16 Bit	16 Bit		
Resolution	Up to 4,000 LOR	Up to 6,000 LOR		
Sensitivity	FS = +/-2g	0.061 mg/LSB	FS = +/-2g	0.061 mg/LSB
	FS = +/-4g	0.122 mg/LSB	FS = +/-4g	0.122 mg/LSB
	FS = +/-8g	0.244 mg/LSB	FS = +/-8g	0.244 mg/LSB
	FS = +/-16g	0.488 mg/LSB	FS = +/-16g	0.488 mg/LSB
Sampling Rate	Up to 6.664 kHz	Up to 26.7 kHz		
P2P Sync	Not available	Enabled, synchronized measurements for multiple VM4 Pros on same asset		

## TEMPERATURE SENSOR

Measurement Range	-20 °C to 75 °C (-4 °F to 167 °F)
Temperature Accuracy	+/- 1°C (1.8 °F)

## MAGNETIC FLUX SENSOR (VM4 Pro Only)

Running Speed (RPM) and On/Off Detection	Integrated magnetic flux sensor (Magnetometer)
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## MEASUREMENT FREQUENCY OPTIONS

Interval-based	Measurement taken at specified time interval (e.g. every 3 hours)
Schedule-based	Measurement taken at specified times/days (e.g. every Monday at 9:00 AM)
Event-based	Measurement taken based on specified asset state or running speed (e.g. every time the asset turns on OR when the asset runs at 1600 RPM)

# VM4: Technical Specifications (Cont.)

## PHYSICAL

Dimensions	<i>Height:</i> 72.41 mm (2.85 inches) <i>Width:</i> 43.82 mm (1.73 inches) <i>Depth:</i> 30 mm (1.18 inches)
Weight	245 g
Mounting (recommend epoxy or stud)	<i>Adhesive:</i> Thermally conductive steel epoxy <i>Stud:</i> 1/4-28 UNF tapped hole
Materials	<i>Body and Door:</i> Flame-retardant, UV-stabilized Polycarbonate <i>Base:</i> Corrosion-resistant Stainless Steel (SS316)

## ENVIRONMENTAL

Operating Temperature Range	-20°C to 75°C (-4°F to 167°F)
Storage Temperature	5°C to 35°C (41°F to 95°F), store without battery
Storage Humidity	20-70% RH
Shock Resistance	2 meter fall, 16 g continuous vibration*
Certifications	UL Class 1 Div 2, IP67, ATEX Zone 2, FCC, CE, RoHS Compliant

## POWER

Source	2x CR123A Lithium Battery, 1500 mAh, 3V
Battery Life	1 to 5 years, based on device configuration and environmental conditions

## CONNECTIVITY

Wireless Protocol	WiFi (2.4 GHz, 802.11 b/g/n)
On-Demand Measurements <i>VM4 Pro Only</i>	Bluetooth Low Energy (BLE)
User Interface	Web: Internet browser access Mobile: iOS application available in App Store
Security	<i>Network:</i> WPA3, 802.1X <i>Data:</i> TLS 1.2 with AES encryption

\* Planned specification, pending final testing

# VM4: Product Dimensions

