

AXONHD VIBRATION SENSOR

DATASHEET

This document is intended for regulatory and compliance purposes, providing detailed information for regulatory personnel, certification bodies, and government authorities, including compliance-related details that may be unnecessary or overwhelming for typical users. For an overview of the product focused on the information most relevant to end users, including its key specifications, features, and operation, please refer to the product's User's Manual.



1 PRODUCT DESCRIPTION

The *AxonHD Vibration Sensor*, part of the SEMEQ Wireless Sensor Network, is a battery-powered device designed for industrial predictive maintenance. It measures acceleration and temperature at the installation point and wirelessly transmits the data via Bluetooth Low Energy® to a gateway, which forwards it to the cloud. Designed for screw mounting and primarily intended for rotating machinery, it helps detect potential failures and features IP69K protection for demanding industrial environments.

AxonHD is a product family available in different variants. All variants share the same technical specifications presented in this Datasheet and differ only in their functional behavior, without affecting their technical data. The variants are tailored to specific applications, such as intermittent machines or direct transmission to smartphones. For a complete list of variants, including their descriptions and ordering information, refer to the User's Manual.

2 DIMENSIONS

All dimensions are expressed in millimeters.



3 TECHNICAL DATA

General Info	
Compatible Gateways	Any model or version of the SMQ990 Family
Approximated Gateway Occupation per Transmission	16 seconds
Transmission Interval ¹	Customizable. Default: 1 hour
Output Data - Vibration	
Sensing Element	MEMS Accelerometer
Number of Axis	3
Acceleration Range ²	from ± 8 g up to ± 64 g
Acceleration Resolution ²	from 0.24 mg up to 1.95 mg
Average Noise Density	300 $\mu\text{g}/\sqrt{\text{Hz}}$
Mechanical Signal Cutoff Frequency	10 kHz (X and Y-axis) and 6 kHz (Z-axis)
Sampling Frequency	25,600 samples/second
Anti-Aliasing Filter	12.8 kHz
Samples Average	Customizable. Default: 2
Spectral Lines (Resolution)	Customizable up to 12,000 lines. Default: 1,600 lines
Measurements Types	Acceleration, Velocity and Envelope
Measurements Formats	Overall Level, Bands, FFT and Waveform on Time
Data units	g, mm/s and in/s
Wake-up by Vibration Threshold ³	
Minimum Vibration Duration to Trigger	12.5 seconds
Minimum Vibration RMS to Trigger	0.3 g
Wake-up by Wireless Trigger ⁴	
Fastest Wireless Trigger Perception Delay ⁵	21 milliseconds
Output Data - Temperature	
Sensing Element Measurement Range ⁸	-40 to 125 °C (-40 to 257 °F)
Sensing Element Measurement Resolution	0.08 °C
Sensing Element Measurement Precision	$\pm 4^\circ\text{C}$
Wireless Communication	
Protocol	Bluetooth® Low Energy 5.1
Frequency	2.402 to 2.480 GHz
TX Power	99 mW (20 dBm)
RX Sensitivity	-97 dBm
Modulation	GFSK
Antenna Type	Ceramic Patch
Antenna Gain	3.68 dBi
Antenna Range (Free Space) ⁶	200 m (656 ft)
Antenna Range (Industrial Environment) ⁶	70 m (230 ft)

¹ Changing this value will increase or decrease the expected battery duration considerably.

² Automatically adjustable by the AxonHD during each acquisition.

³ Only available for Axon HD IT variant. For the correct configuration of this product, contact the SEMEQ support team;

⁴ Only available for Axon HD WT variant. For the correct configuration of this product, contact the SEMEQ support team.

⁵ Will impact heavily in the battery duration, so change it with caution. For reference, the factory standard perception delay is 270 ms, which results in a battery lifetime of 2 months.

⁶ These are empirical values and should be taken as an approximation since they are very sensitive to environment variables, as stated in the electromagnetic waves' theory.

Power Supply	
Battery Cell Type	CR123A
Battery Quantity	1
Battery Chemistry	Lithium Manganese Dioxide
Battery Voltage	3 V
Battery Capacity	1550 mAh
Maximum Current	20 mA
Current During Sleep	4 μ A
Approximate Battery Duration ⁷	2 years
General Mechanical Specifications	
Approximate Width	55 mm (2.2 in)
Approximate Length	44 mm (1.7 in)
Approximate Height	39.5 mm (1.6 in)
Weight	120 g (4.2 oz)
Material	PA66 GF30 and Stainless Steel A2
Battery Lid Allen Key Size	5/16 in
Mounting Screw	
Type	Socket Head Cap
Diameter	1/4 in
Number of Threads	28
Thread Type	UNF
Length	1.5 in
Screwdriver	Allen Key 3/16 in
Mounting Torque	8.5 to 9.5 Nm (6.3 to 7 ft.lb)
Environmental	
Minimum Ambient Operating Temperature	-30 °C (-22 °F)
Maximum Ambient Operating Temperature ⁸	70 °C (158 °F)
Maximum Surface Temperature at 25 °C Ambient ⁸	100 °C (212 °F)
Ingress Protection Rating	IP66 / IP69K

⁷ Battery life will vary significantly depending on the configured transmission interval and may also be slightly affected by operating temperature. The estimated duration applies only to the standard AxonHD variant with a one-hour transmission interval under ambient temperature conditions. Since the other variants are highly customizable, providing a general estimate is not possible. For a detailed battery expectancy tailored to your application, please contact SEMEQ support.

⁸ The **Sensing Element Measurement Range** defines the temperature range that the sensing element can measure and should not be interpreted as the allowable temperature range of the complete product. The **Maximum Ambient Operating Temperature** ($T_{a^{max}}$) defines the highest surrounding air temperature at which the product can operate, while the **Maximum Surface Temperature** (T_s) defines the highest temperature of the surface on which the product can be installed. These two operating limits are interdependent: as the ambient temperature increases, the maximum allowable surface temperature decreases because heat from both the surrounding environment and the monitored surface contributes to the product's internal temperature.

The maximum allowable surface temperature (T_s) at a given ambient temperature (T_a) can be estimated as:

$$T_s = T_a + \frac{T_{s^{25^\circ C}} - 25}{T_{a^{max}} - 25} (T_{a^{max}} - T_a)$$

Where $T_{s^{25^\circ C}}$ is the **Maximum Surface Temperature at 25 °C Ambient** and $T_{a^{max}}$ is the **Maximum Ambient Operating Temperature**.

4 CONTACT

TECHNICAL SUPPORT

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