ALTA by MONNIT

The Leading Enterprise Internet of Things Solution

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VIBRATION METER

Wireless Accelerometer - Advanced Vibration Meters

General Description

The ALTA Wireless Advanced Vibration Meter uses an accelerometer to measure vibration and frequency on 3 axes. The sensor reports vibration (acceleration, velocity, displacement, or acceleration peak), frequency (Hz/RPM), and crest factor on all three axes, and duty cycle (how much of the report interval was vibration present), and temperature. This sensor can be used to manage vibration in assembly lines and monitor seismic activity in bridges.

Features

- Three Axis Measurement
- Capable of Measuring Acceleration, RMS, Velocity RMS, Displacement, or Acceleration Peak
- Configurable Frequency Range
- Configurable Rectangular, Hanning, or Flat Top Window Filters
- Measure Up to 4800 Hz / 288,000 RPM
- Configurable Measurement Interval as Low as 1 second
- Configurable Critical Vibration Aware Threshold
- Runtime Indication via Duty Cycle
- Leaded and Non-Leaded Options Available

Principle of Operation

The ALTA Advanced Vibration Meter measures vibration (acceleration, velocity, displacement, or acceleration peak), frequency (Hz/RPM), and crest factor on all three axes, duty cycle (how much of the report interval vibration was present), and temperature of the system to which it is attached. The sensor uses an accelerometer to capture g-force on all axes and then calculates vibration, frequency, and crest factor from that acceleration data. The Vibration Meter reports the duty cycle as a percentage of how long the vibration was present during the heartbeat. A single measurement consists of gathering 256 acceleration data points, analyzing those data points to produce vibration data, then taking a temperature measurement. The sensor will take a measurement based on a configurable Measurement Interval. Only the most recent set of data points is reported on each heartbeat.

Example Applications

- Vibration monitoring
- Smart machines, smart structures & smart materials
- Bridge and building seismic activity monitoring
- Assembly line monitoring
- Many additional applications

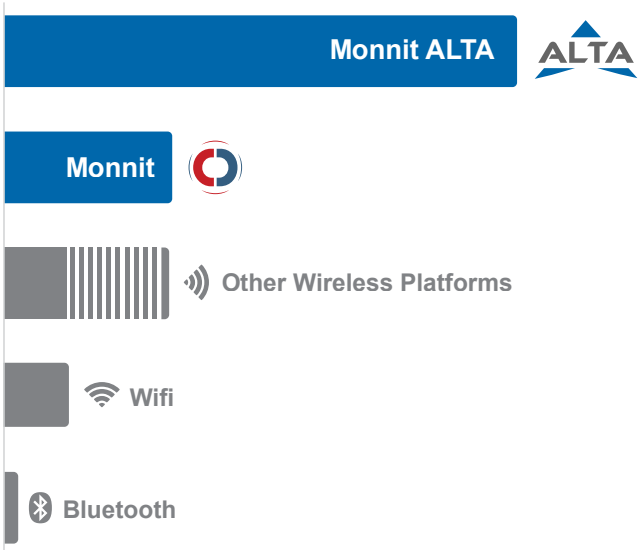
Features of Monnit ALTA Sensors

- Wireless range of 1,200+ feet through 12+ walls *
- Frequency-Hopping Spread Spectrum (FHSS)
- Improved interference immunity
- Improved power management for longer battery life ** (12+ years on AA batteries)
- Encrypt-RF® Security (Diffie-Hellman Key Exchange + AES-128 CBC for sensor data messages)
- Onboard data memory stores up to 512 readings per sensor:
  - 10-minute heartbeats = 3.5 days
  - 2-hour heartbeats = 42 days
- Over-the-air updates (future proof)
- Free iMonnit basic online wireless sensor monitoring and notification system to configure sensors, view data and set alerts via SMS text and email

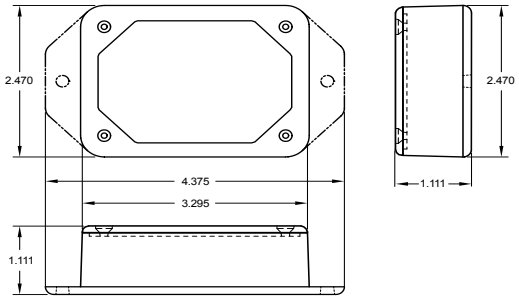
* Actual range may vary depending on environment.

** Battery life is determined by sensor reporting frequency and other variables. Other power options are also available.

Wireless Range Comparison







ALTA Commercial AA Wireless Accelerometer - Advanced Vibration Meter (Non-Leaded) | Technical Specifications	
Supply voltage	2.0–3.8 VDC (3.0–3.8 VDC using power supply) *
Current consumption	0.2 µA (sleep mode), 0.7 µA (RTC sleep), 570 µA (MCU idle), 2.5 mA (MCU active), 5.5 mA (radio RX mode), 22.6 mA (radio TX mode)
Operating temperature range (board circuitry and batteries)	-18°C to 55°C (0°F to 130°F) using alkaline -40°C to 85°C (-40°F to 185°F) using lithium
Optimal battery temperature range (AA)	+10°C to +50°C (+50°F to +122°F)
Vibration Measurement Range and Units	Acc RMS / Acc Peak: 0 to 65.535 mm/s^2, Velocity RMS: 0 to 655 35 mm/s, Displacement: 0 to 655.35 mm **
Vibration Resolution	0.001 mm/s^2, 0.01 mm/s, .01 mm
Frequency Measurement Range	See Frequency Measurement Range table below
Frequency Measurement Resolution	0.1 Hz
Minimum Sensitivity Range / Resolution	Software Configurable (0 to 2.56 g / .01 g)
Accelerometer g-Force Range	Software Configurable (+/- 8 g, +/- 16 g, +/- 32 g)
Crest Factor Measurement Range / Resolution	1.41 to 3.97 / .01
Duty Cycle Measurement Range / Resolution	0 to 100% / 1%
Temperature Measurement Range / Resolution	-40°C to +125°C (-40°F to +257°F) / 0.1 C (0.1 F)
Sample Rates	Software Configurable (See Frequency Measurement Range table below for available Sample Rates)
Window Filters	Software Configurable (Rectangular, Hanning, Flat Top)***
Integrated memory	Up to 512 sensor messages
Wireless range	1,200+ ft non-line-of-sight
Security	Encrypt-RF® (256-bit key exchange and AES-128 CTR)
Weight	3.7 ounces, cube dimensions: 0.75 in. x 0.75 in. x 0.75 in.
Certifications FC CE Industry Canada	900 MHz product; FCC ID: ZTL-G2SC1 and IC: 9794A-G2SC1. 868 and 433 MHz product tested and found to comply with: EN 300 220-2 V3.1.1 (2017-02), EN 300 220-2 V3.1.1 (2017-02) and EN 60950

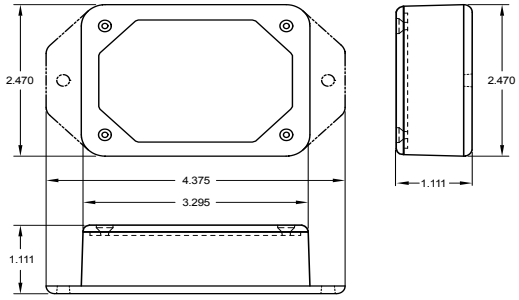
* Hardware cannot withstand negative voltage. Please take care when connecting a power device.

** Vibration measurement mode is software configurable. Only one measurement mode can be used at a time.

*** When making Displacement measurements the Hanning filter is recommended for best accuracy and performance.

Frequency Measurement Range (Based on Configured Sample Rate)						
	ACC RMS/AccPeak		Velocity		Displacement	
Sample Rate	Min Freq (Hz)	Max Freq (Hz)	Min Freq (Hz)	Max Freq (Hz)	Min Freq (Hz)	Max Freq (Hz)
12800	200	4800	300	4800	400	4800
6400	100	2400	150	2400	200	2400
3200	50	1200	75	1200	100	1200
1600	25	600	37.5	600	50	600
800	12.5	300	18.75	300	25	300
400	6.25	150	9.375	150	12.5	150
200	3.125	75	4.6875	75	6.25	75
100	1.5625	37.5	2.34375	37.5	3.125	37.5
50	0.78125	18.75	1.171875	18.75	1.5625	18.75
25	0.390625	9.375	0.5859375	9.375	0.78125	9.375





ALTA Commercial AA Wireless Accelerometer - Advanced Vibration Meter (Leaded) | Technical Specifications	
Supply voltage	2.0–3.8 VDC (3.0–3.8 VDC using power supply) *
Current consumption	0.2 µA (sleep mode), 0.7 µA (RTC sleep), 570 µA (MCU idle), 2.5 mA (MCU active), 5.5 mA (radio RX mode), 22.6 mA (radio TX mode)
Operating temperature range (board circuitry and batteries)	-18°C to 55°C (0°F to 130°F) using alkaline -40°C to 85°C (-40°F to 185°F) using lithium
Optimal battery temperature range (AA)	+10°C to +50°C (+50°F to +122°F)
Vibration Measurement Range and Units	Acc RMS / Acc Peak: 0 to 65.535 mm/s^2, Velocity RMS: 0 to 655 35 mm/s, Displacement: 0 to 655.35 mm **
Vibration Resolution	0.001 mm/s^2, 0.01 mm/s, .01 mm
Frequency Measurement Range	See Frequency Measurement Range table below
Frequency Measurement Resolution	0.1 Hz
Minimum Sensitivity Range / Resolution	Software Configurable (0 to 2.56 g / .01 g)
Accelerometer g-Force Range	Software Configurable (+/- 8 g, +/- 16 g, +/- 32 g)
Crest Factor Measurement Range / Resolution	1.41 to 3.97 / .01
Duty Cycle Measurement Range / Resolution	0 to 100% / 1%
Temperature Measurement Range / Resolution	-40°C to +125°C (-40°F to +257°F) / 0.1 C (0.1 F)
Sample Rates	Software Configurable (See Frequency Measurement Range table below for available Sample Rates)
Window Filters	Software Configurable (Rectangular, Hanning, Flat Top)***
Integrated memory	Up to 512 sensor messages
Wireless range	1,200+ ft non-line-of-sight
Security	Encrypt-RF® (256-bit key exchange and AES-128 CTR)
Weight	3.7 ounces, cube dimensions: 0.75 in. x 0.75 in. x 0.75 in.
Certifications	900 MHz product; FCC ID: ZTL-G2SC1 and IC: 9794A-G2SC1. 868 and 433 MHz product tested and found to comply with: EN 300 220-2 V3.1.1 (2017-02), EN 300 220-2 V3.1.1 (2017-02) and EN 60950

* Hardware cannot withstand negative voltage. Please take care when connecting a power device.

** Vibration measurement mode is software configurable. Only one measurement mode can be used at a time.

*** When making Displacement measurements the Hanning filter is recommended for best accuracy and performance.

Frequency Measurement Range (Based on Configured Sample Rate)						
	ACC RMS/AccPeak		Velocity		Displacement	
Sample Rate	Min Freq (Hz)	Max Freq (Hz)	Min Freq (Hz)	Max Freq (Hz)	Min Freq (Hz)	Max Freq (Hz)
12800	200	4800	300	4800	400	4800
6400	100	2400	150	2400	200	2400
3200	50	1200	75	1200	100	1200
1600	25	600	37.5	600	50	600
800	12.5	300	18.75	300	25	300
400	6.25	150	9.375	150	12.5	150
200	3.125	75	4.6875	75	6.25	75
100	1.5625	37.5	2.34375	37.5	3.125	37.5
50	0.78125	18.75	1.171875	18.75	1.5625	18.75
25	0.390625	9.375	0.5859375	9.375	0.78125	9.375



ALTA Industrial Wireless Accelerometer - Advanced Vibration Meter (Leaded) | Technical Specifications	
Supply voltage	2.0–3.8 VDC (3.0–3.8 VDC using power supply) *
Current consumption	0.2 µA (sleep mode), 0.7 µA (RTC sleep), 570 µA (MCU idle), 2.5 mA (MCU active), 5.5 mA (radio RX mode), 22.6 mA (radio TX mode)
Operating temperature range (board circuitry and batteries)	-40°C to +85°C (-40°F to +185°F) **
Optimal battery temperature range (AA)	+10°C to +50°C (+50°F to +122°F)
Vibration Measurement Range and Units	Acc RMS / Acc Peak: 0 to 65.535 mm/s^2, Velocity RMS: 0 to 655 35 mm/s, Displacement: 0 to 655.35 mm **
Vibration Resolution	0.001 mm/s^2, 0.01 mm/s, 0.01 mm
Frequency Measurement Range	See Frequency Measurement Range table below
Frequency Measurement Resolution	0.1 Hz
Minimum Sensitivity Range / Resolution	Software Configurable (0 to 2.56 g / .01 g)
Accelerometer g-Force Range	Software Configurable (+/- 8 g, +/- 16 g, +/- 32 g)
Crest Factor Measurement Range / Resolution	1.41 to 3.97 / .01
Duty Cycle Measurement Range / Resolution	0 to 100% / 1%
Temperature Measurement Range / Resolution	-40°C to +125°C (-40°F to +257°F) / 0.1 C (0.1 F)
Sample Rates	Software Configurable (See Frequency Measurement Range table below for available Sample Rates)
Window Filters	Software Configurable (Rectangular, Hanning, Flat Top)***
Integrated memory	Up to 512 sensor messages
Wireless range	1,200+ ft non-line-of-sight
Security	Encrypt-RF® (256-bit key exchange and AES-128 CTR)
Weight	3.7 ounces, cube dimensions: 0.75 in. x 0.75 in. x 0.75 in.
Certifications FC CE Industry Canada	900 MHz product; FCC ID: ZTL-G2SC1 and IC: 9794A-G2SC1. 868 and 433 MHz product tested and found to comply with: EN 300 220-2 V3.1.1 (2017-02), EN 300 220-2 V3.1.1 (2017-02) and EN 60950

* Hardware cannot withstand negative voltage. Please take care when connecting a power device.

** Vibration measurement mode is software configurable. Only one measurement mode can be used at a time.

*** When making Displacement measurements the Hanning filter is recommended for best accuracy and performance.

Frequency Measurement Range (Based on Configured Sample Rate)						
	ACC RMS/AccPeak		Velocity		Displacement	
Sample Rate	Min Freq (Hz)	Max Freq (Hz)	Min Freq (Hz)	Max Freq (Hz)	Min Freq (Hz)	Max Freq (Hz)
12800	200	4800	300	4800	400	4800
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400	6.25	150	9.375	150	12.5	150
200	3.125	75	4.6875	75	6.25	75
100	1.5625	37.5	2.34375	37.5	3.125	37.5
50	0.78125	18.75	1.171875	18.75	1.5625	18.75
25	0.390625	9.375	0.5859375	9.375	0.78125	9.375

Commercial Grade Sensors

Monnit commercial grade sensors are designed for applications in ordinary environments (normal room temperature, humidity and atmospheric pressure). Do not use these sensors under the following conditions as these factors can deteriorate the product characteristics and cause failures and burnout.

- Corrosive gas or deoxidizing gas: chlorine gas, hydrogen sulfide gas, ammonia gas, sulfuric acid gas, nitric oxides gas, etc.
- Volatile or flammable gas
- Dusty conditions
- Low-pressure or high-pressure environments
- Wet or excessively humid locations
- Places with salt water, oils chemical liquids or organic solvents
- Where there are excessively strong vibrations
- Other places where similar hazardous conditions exist

Use these products within the specified temperature range. Higher temperature may cause deterioration of the characteristics or the material quality.

Industrial Grade Sensors | Type 1, 2, 4, 4X, 12 and 13 NEMA Rated Enclosure

Monnit's Industrial sensors are enclosed in reliable, weatherproof NEMA-rated enclosures. Our NEMA-rated enclosures are constructed for both indoor or outdoor use and protect the sensor circuitry against the ingress of solid foreign objects like dust as well as the damaging effects of water (rain, sleet, snow, splashing water, and hose-directed water).

- Safe from falling dirt
- Protects against wind-blown dust
- Protects against rain, sleet, snow, splashing water, and hose-directed water
- Increased level of corrosion resistance
- Will remain undamaged by ice formation on the enclosure

Power Options

The standard version of this sensor is powered by two replaceable 1.5 V AA sized batteries (included with purchase).

This sensor is also available with a line power option. The line powered version of this sensor has a barrel power connector allowing it to be powered by a standard 3.0–3.6 V power supply. The line powered version also uses two standard 1.5 V AA batteries as backup for uninterrupted operation in the event of line power outage.

Power options must be selected at time of purchase, as the internal hardware of the sensor must be changed to support the selected power requirements.

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