ALTA by MONNIT

Remote Monitoring for Business

ALTA Accelerometer - G-Force Max/Avg Sensor

General Description

The ALTA Wireless - G-Force Max/Avg Sensor reports the maximum and average g-force levels that occur on X, Y, Z, and combined axes in-between sensor heartbeats. The sensor uses a digital, low power, low profile, capacitive accelerometer capable of measuring acceleration on three axes to produce this data.

Principle of Operation

The sensor employs a MEMS (micro electromechanical system) based accelerometer to detect forces caused by acceleration. These forces may be static such as the constant force of gravity, or they may be dynamic - caused by moving or vibrating the sensor. A user may set thresholds (defined as Delta Values in the user interface) for each axis (X, Y, Z) as well as a magnitude threshold, such that when thresholds are exceeded the sensor will trigger and report data to iMonnit immediately. The sensors accelerometer uses three configurable settings (Output Data Rate(ODR), Range, and High Pass Filter(HPF)) to refine the measurement capabilites of the sensor for various applications. ODR controls the responsiveness of the sensor. The highest ODR (100 Hz) will trigger in under a second, where the lowest ODR (6 Hz) will take up to 5 seconds to trigger. The sensor is constantly measuring and higher ODRs result in short battery life. The range can be set to 2, 4, or 8 g. There is a small loss of resolution as the range increases. Generally, even at 8 g, the resolution is sufficient for most applications. When the High Pass Filter is activated the sensor filters out static g-forces such as gravity. A user may also set a re-arm time, which establishes the time after the sensor triggers before the sensor may trigger again. The X, Y, Z data correlates directly with the specified axis and the magnitude data is the summation of the absolute value of the XYZ data.

Example Applications

- Unauthorized access via a fence breach
- Physical barrier integrity
- Abnormal motor shake
- Wind turbine abnormalities
- Assembly line irregularities
- Additional applications

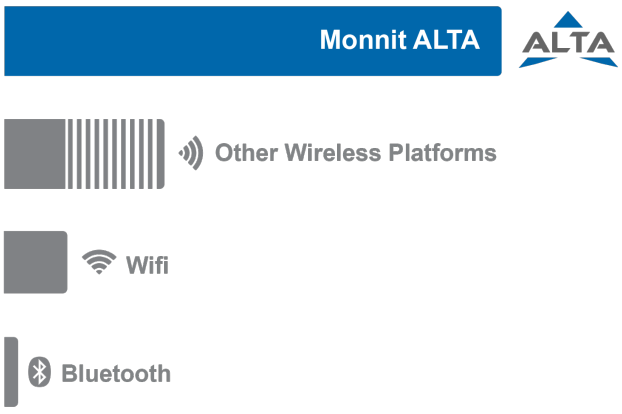
Features of Monnit ALTA Sensors

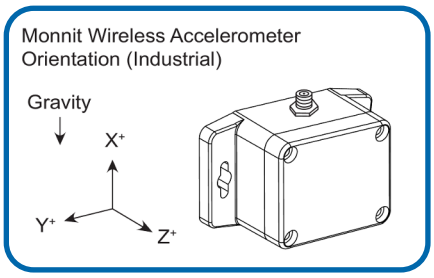
Wireless range of 1,200+ feet through 12+ walls *
- Frequency-Hopping Spread Spectrum (FHSS)
- Improved interference immunity
- Improved power management for longer battery life **
- Encrypt-RF® Security (Diffie-Hellman Key Exchange + AES-128 CBC for sensor data messages)
- All ALTA sensors now have up to 3200 readings:
  - 10-minute heartbeats = 22 days
  - 2-hour heartbeats = 266 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

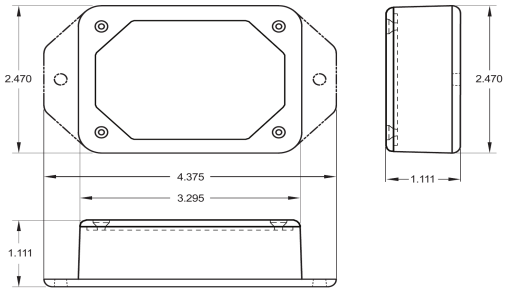
*Actual range may vary depending on environment.

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

Wireless Range Comparison





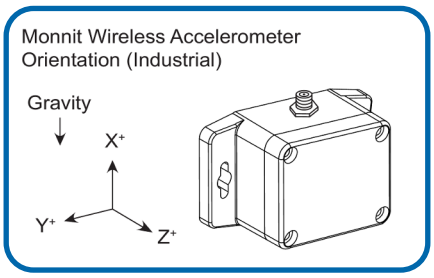


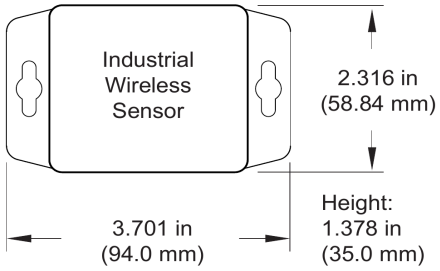
AA Platform Specifications	
Battery Supply Voltage	2.0–3.8 VDC (2x 1.5 V AA Batteries)
External Supply Voltage (Option)	5.0 VDC via 2.1 x 5.5 mm barrel jack (Option)
Operating temperature range (board circuitry and batteries)	-18°C to 55°C (0°F to 130°F) using alkaline -40°C to 85°C (-40°F to 185°F) using lithium*
Optimal battery temperature range (AA)	+10°C to +50°C (+50°F to +122°F)
Integrated memory	Up to 3200 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
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

*At temperatures above 100°C, it is possible for the board circuitry to lose programmed memory.

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 5 volt 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.





Industrial Platform Specifications

Supply Voltage		2.0–3.8 VDC, Single 3.6 V AA sized industrial Lithium Thionyl Chloride Battery
Operating temperature range (board circuitry and battery)		-40°C to +85°C (-40°F to +185°F) *
Included battery	Max temperature range	-40° to +85°C (-40° to +185°F)
	Capacity	1500 mAh
Optional solar feature	Solar panel	5VDC/30mA (53mm x 30mm)VDC/30mA (53mm x 30mm)
	Charging temperature range	0° to 45°C (32° to 113°F)
	Max temperature range	-20° to 60°C (-4° to 140°F)
	Included rechargeable battery	3.2 V LiFePO4 AA sized
		600 mAh/>2000 charge cycles (80% of initial capacity)
		If the battery is kept at ~80% charge it can last up to 20 years.
	Solar efficiency	Optimized for high and low-light operation
	Charging efficiency	40%
	Luminous sustainability	Minimum of 250 LUX (Works indoors with low light)
Integrated memory		Up to 3200 sensor messages
Wireless range		1,200+ ft non-line-of-sight
Security		Encrypt-RF® (256-bit key exchange and AES-128 CTR)
Weight		4.7 ounces
Enclosure rating		NEMA 1, 2, 4, 4x, 12 and 13 rated, sealed and weather proof
UL rating		UL Listed to UL508-4x specifications (File E194432)
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

* At temperatures above 100°C, it is possible for the board circuitry to lose programmed memory.

Solar Charge Current for Different LUX Levels (Assuming light at given LUX level is present for 25% of the day)*				
Environment	LUX Level	Charge / Hour (mAh)	Charge / Day (mAh)	Charge / Year (mAh)
Low Office Lighting	250	0.039063	0.234375	85.5469
Avg Office Lighting	500	0.078125	0.46875	171.094
High Office Lightiing	750	0.117188	0.703125	256.641
Overcast Day	1000	0.15625	0.9375	342.188
Full Daylight	10000	1.5625	9.375	3421.88

* If the average charge generated exceeds the average charge consumed the sensor will last till the battery wears out (up to 20 years).

Sensor Specifications	
Current consumption	6 Hz - 32.4 uA: ~ 4 year lifetime at 10+ minute heartbeat.* 12 Hz - 36.2 uA: ~ 4 year lifetime at 10+ minute heartbeat. 50 Hz - 66.5 uA: ~ 2 year lifetime at 10+ minute heartbeat. 100 Hz - 125.6 uA: ~ 1 year lifetime at 10+ minute heartbeat.
Accelerometer Current Consumption (Based on Output Data Rate)	6 Hz: 32.4 uA; 12 Hz: 36.2 uA; 50 Hz: 66.5 uA; 100 Hz: 125.6 uA
Range (XYZ)	2 G, 4 G, 8 G (User Configurable)
Sensitivity	4096 count/g @ 2 G, 2048 count/g @ 4 G, 1024 count/g @ 8 G
Measurement accuracy	2.5 % (force: X, Y, Z)
Output Data Rate	6 Hz, 12 Hz, 50 Hz, 100 Hz (User Configurable)
High Pass Filter	Filters out frequencies below ~4 Hz when activated (User Configurable)
Resolution	0.001 g
Reported Data	
X Max	x.xxx g, maximum g-force measured on x-axis in-between heartbeats (unsigned int)
Y Max	x.xxx g, maximum g-force measured on y-axis in-between heartbeats (unsigned int)
Z Max	x.xxx g, maximum g-force measured on z-axis in-between heartbeats (unsigned int)
Magnitude Max	x.xxx g, maximum square root of squared sum of x,y,z axes in-between heartbeats (unsigned int)
X Mean	x.xxx g, average g-force measured on x-axis in-between heartbeats (unsigned int)
Y Mean	x.xxx g, average g-force measured on y-axis in-between heartbeats (unsigned int)
Z Mean	x.xxx g, average g-force measured on z-axis in-between heartbeats (unsigned int)
Magnitude Mean	x.xxx g, average square root of squared sum of x,y,z axes in-between heartbeats (unsigned int)

* If the heartbeat is above 10 minutes it only changes the battery life by a month or two.

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