Remote Monitoring for Business

Wireless Accelerometer - Tilt Detection Sensor

General Description

The Tilt Detection Sensor is a digital, low-power, low-profile, MEMS based sensor that detects changes in tilt on a single axis and reports data in the form of pitch, based on user configurable orientation changes.The sensor also reports rise/fall time and the current sensor orientation/trigger state.

Principle of Operation

The Tilt Detection Sensor constantly monitors a single axis of rotation over a range of -179.9° to +180.0°. The data is displayed in degrees with 0.1° of resolution. If the sensor does not experience a detectable orientation change, the sensor will report the most recent measured data at a specified user specified time interval. If a user specified orientation change is detected, the sensor will report immediately. The sensor has two main modes of operation which determine what triggers the sensor to report. In Up/Down mode user configurable angles are used to define regions for "Up", "Down, and "Stuck". Data is reported when the sensor moves between these regions. In Delta mode the sensor triggers when the absolute difference between the current sensor angle and the last reported angle exceeds a user defined Delta Value. The axis or rotation is user selectable. The axis image below indicates the axis of rotation and the arrow indicates the direction of increasing pitch angle (0° to 180° ▶ -180° to -0°).

Example Data: Pitch: 18.21°, Rise/Fall Time:0 ms, Data State: down

Example Applications

- Inclination monitoring
- Bay doors
- Loading gates
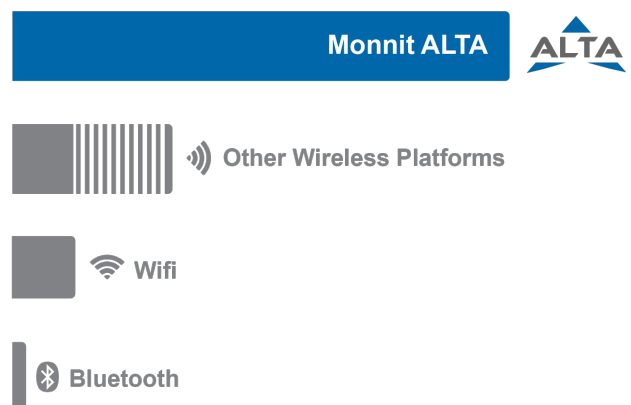- Overhead doors
- Additional applications
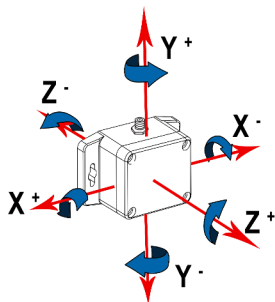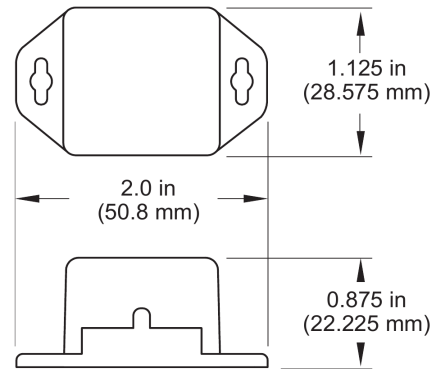

Features of Monnit ALTA Sensors

- 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

Monnit ALTA

Other Wireless Platforms

Wifi

Bluetooth

1.125 in
(28.575 mm)

2.0 in
(50.8 mm)

0.875 in
(22.225 mm)

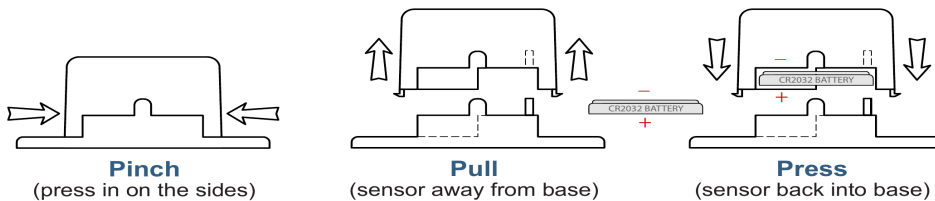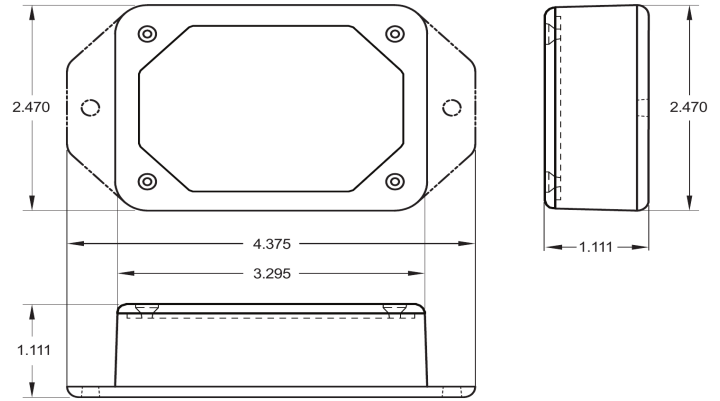| ALTA Commercial Coin Cell Wireless Accelerometer - Tilt Detection Sensor | Technical Specifications | |
|---|---|
| Supply voltage | 2.0–3.8 VDC * |
| Current consumption | 0.2 µA (sleep mode), 0.7 µA (RTC sleep), 570 µA (MCU idle), 2.5 mA (MCU active), 5.5 mA (radio RX mode), 22.6 mA (radio TX mode) |
| Operating temperature range (board circuitry and coin cell) | -7°C to +60°C (20°F to +140°F) ** |
| Optimal battery temperature range (coin cell) | +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 | 0.7 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 |

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

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

PinchPower™ Enclosures

Pinch
(press in on the sides)

Pull
(sensor away from base)

Press
(sensor back into base)

ALTA Commercial AA Wireless Accelerometer - Tilt Detection Sensor	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)
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

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

Industrial Wireless Sensor

2.316 in (58.84 mm)

3.701 in (94.0 mm)

Height: 1.378 in (35.0 mm)
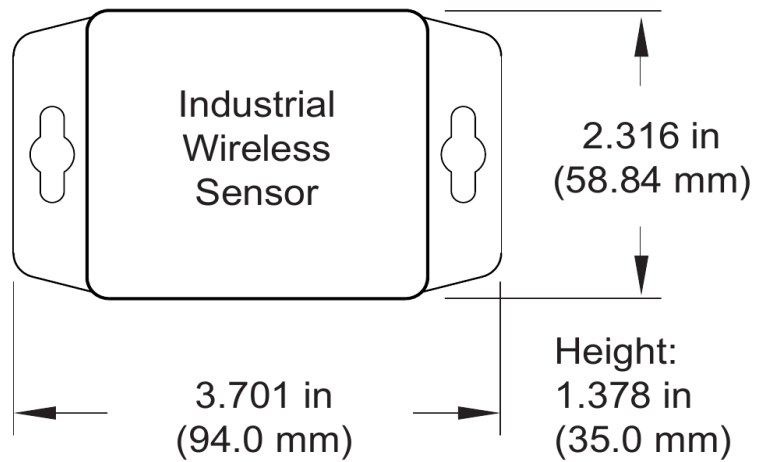
ALTA Industrial Wireless Accelerometer - Tilt Detection Sensor | Technical Specifications		
Supply voltage		2.0–3.8 VDC (3.0–3.8 VDC using power supply) *
Current consumption		0.2 μA (sleep mode), 0.7 μA (RTC sleep), 570 μA (MCU idle), 2.5 mA (MCU active), 5.5 mA (radio RX mode), 22.6 mA (radio TX mode)
Operating temperature range (board circuitry and 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)
	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	600 mAh/>2000 charge cycles (80% of initial capacity)
	Solar efficiency	Optimized for high and low-light operation ***
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 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.
**At temperatures above 100°C, it is possible for the board circuitry to lose programmed memory.
***Light present 25% of day yields 125% of operating power to support 10-minute heartbeats.

Sensor Specifications

Tilt Measurement Range	0.00° to 180.00° ▶ -179.99° to -0.01° (Rotating in positive direction)
Tilt Measurement Accuracy	+/- 0.5°
Tilt Measurement Resolution	0.01°
Rise/Fall Time Range*	0 to 65535 ms
Rise/Fall Time Accuracy*	+80 ms + Measurement Stability Configuration * 80 ms **
Rise/Fall Time Resolution*	~80 ms
Data States	Up/Down Mode: Up, Down, Stuck Delta Mode: Delta Exceeded, No Delta Exceeded
Response Time	Up and Down: Determined by Measurement Stability Config Stuck: Determined by Stuck Time Out Config Delta Exceeded: 80 ms + Rearm Time after Previous Delta Exceeded Event
Axis of Rotation	User Configurable: See diagram. Blue arrows indicate direction of increasing tilt angle (0° to 180° ▶ -180° to -0°).

*Only applicable in Up/Down mode, this value doesn't mean anything in Delta mode.
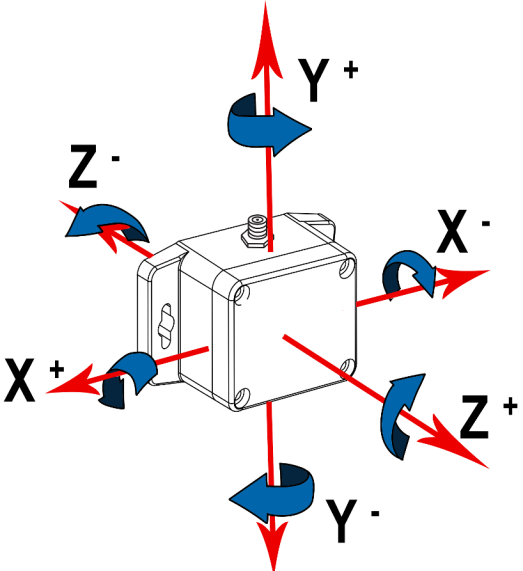
Commercial Grade Sensors

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

OneTemp pty ltd
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