

RotoSense™: RS-3001

Features

- Precision triaxial accelerometer measurements with up to ± 200 [g] sensor range
- Multiple operating modes with programmable sampling rates
- Near real-time reliability data for advanced diagnostics
- Software scheduling function that generates alert files with GPS correlation and results from embedded data analytics
- Data files can be integrated with existing condition-based maintenance + (CBM+) systems using alerting mechanisms via email, text, or SMS

Applications

- Sensors can be used to monitor mission critical components in various dynamic operating environments that exhibit any combination of linear movement, rotation, and/or vibration
- Detection of high-force events that can be associated with anomalies of interest on rolling stock, train tracks, wheel hubs, rotating gears, conveyers, and other industrial components
- The secure IP-based sensor network is robust and scalable for warehouses, shipping ports, constructions sites, and other industrial/commercial applications

Description

The RotoSense 3001 (RS-3001) is an advanced wireless accelerometer for commercial and industrial use case applications. The RS-3001 uses a 3-dimensional accelerometer in a rugged housing assembly that is designed to sustain harsh operating environments. This robust smart sensor was originally designed to be mounted on various railroad vehicle components such as the wheel hubs, bogies, and connecting frames. The RS-3001 is not limited to just railroad applications or rotating machinery. The easy to mount bolt pattern allows this innovative sensor to address the application needs in mining, construction, trucking, shipping, and other industries that need reliable accelerometer data for mission critical equipment.

Data acquisition and sensor management is handled by the Sentinel Gateway and Sentinel MotionView software application. Together, the Sentinel Gateway and RotoSense form an easy-to-deploy Internet-of-Things package, complete with edge computing and cloud compatibility. RS-3001 provides reliable accelerometer data that is reported in a standard format and is immediately ready for data processing.

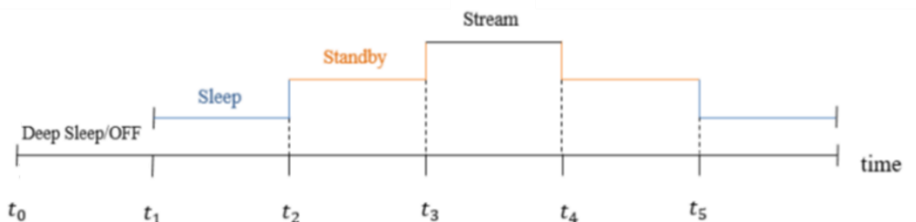
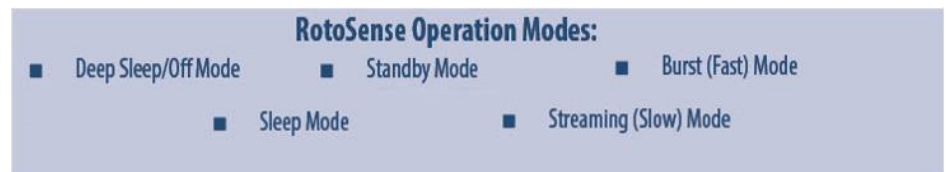


Basic Working Principles

RotoSense data collection is initiated through user invoked operation modes (shown right) that tell the sensor when to activate and begin collecting data.

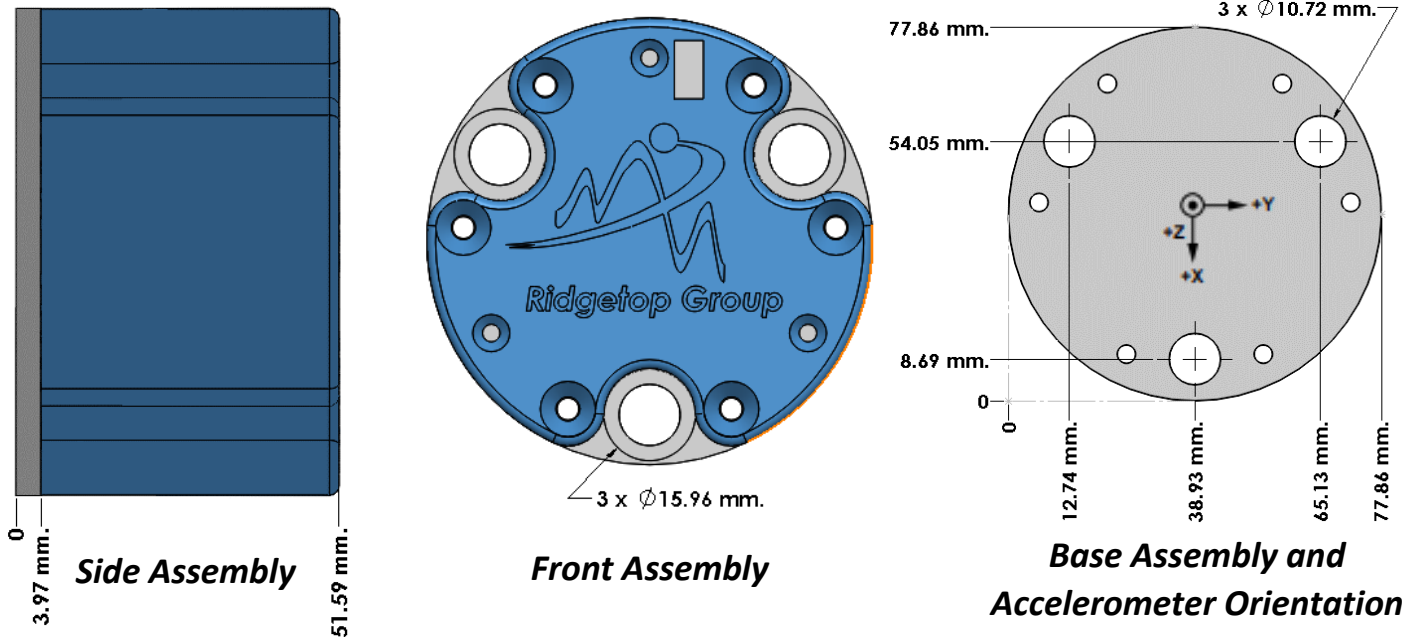
Data is streamed to the Sentinel Gateway through the low powered IEEE 802.15.4 communication protocol. The data is then accessible via a network drive that is provided by the Sentinel Gateway access point.

The flexible functionality allows the data to be exported to a number of data analytics platforms such as MATLAB Microsoft Excel, and more.



Example duty cycle for RotoSense showing power consumption as a function of operating mode

RotoSense Unit Construction



Electrical and Mechanical Specifications

SENSOR PARAMETERS	Specifications: RS-3001
On-board accelerometer(s)	3 dimensional accelerometer with X-Y-Z coverage
Accelerometer range	±200 [g]
Measurement sensitivity	Min = 5.8 mV/g Typ = 6.5 mV/g Max = 7.2 mV/g
Temperature sensor range	- 40 °C up to 125 °C
Zero [g] bias voltage	Min = 1.4 V Typ = 1.5 V Max = 1.6 V
Anti-aliasing filter bandwidth	50 Hz - 1,000 Hz
Analog-to-Digital Converter (ADC)	Three successive approximation, 16-bit resolution ADCs
Variable sampling rate	1 Hz to 100 KHz, software selectable in discrete increments
Data storage capacity	2 MB of on-board nonvolatile sensor memory
RF data packet standard	IEEE 802.15.4 open communication architecture
RF data downloading	2 minute to download full memory buffer mode/streaming mode
Range	10 meters (between RotoSense and Sentinel Gateway)
*Power consumption	Deep Sleep = 0 W, Sleep Mode = 0.012 W, Standby Mode = 0.065 W, Streaming Mode = 0.066 W, Burst = 0.075 W (approximates)
*Operating temperature	Standard Temperature Range: -20°C to 70 °C Extended Temperature Range: -40 °C to 125°C
ASSEMBLY PARAMETERS	Specifications: RS-3001
*Battery	9600 mAh capacity
*Dimensions	Diameter = 7.78 cm. Height = 5.16 cm.
*Weight	304 grams
*Enclosure material	Composite material
Baseplate diameter	7.72 cm
Baseplate thickness	1.52 mm
Mounting hole diameter	(3) 8/32

*Specifications are application specific and subject to change.