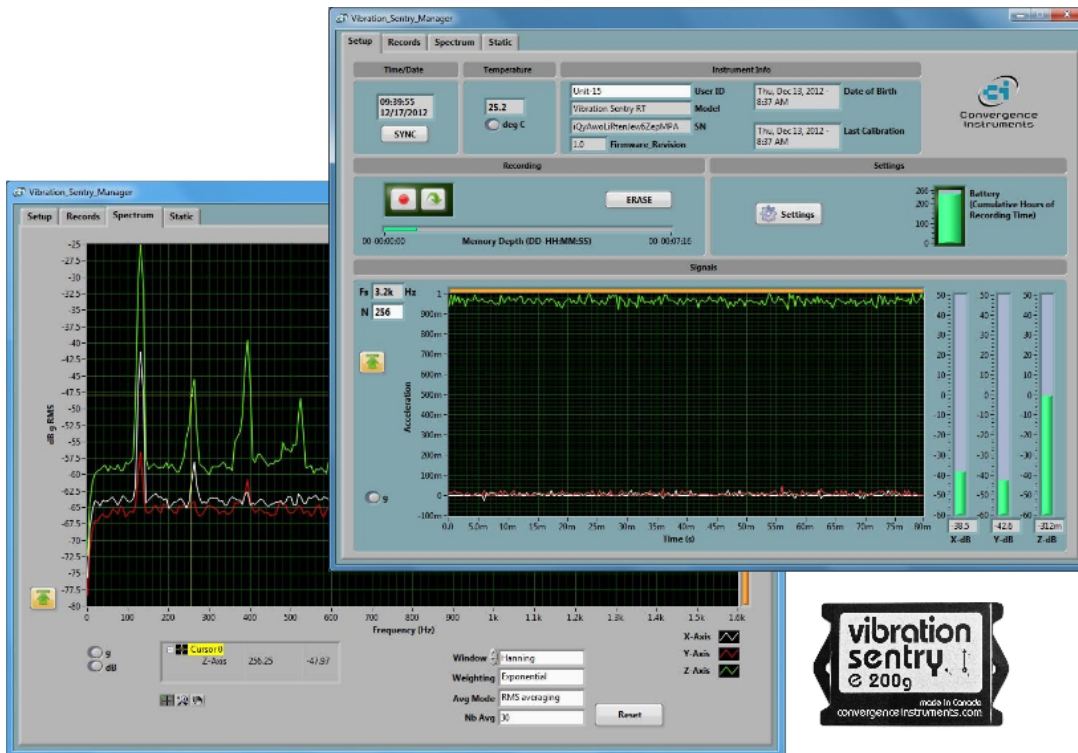




Convergence  
Instruments

# Vibration Sentry E

## Data Sheet



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<b>1</b>	<b>PRODUCT DESCRIPTION</b>	<b>2</b>
<b>2</b>	<b>APPLICATIONS</b>	<b>2</b>
<b>3</b>	<b>SPECIFICATIONS</b>	<b>3</b>
<b>3.1</b>	<b>Frequency Response</b>	<b>4</b>
3.1.1	Upper Frequency Limit	4
3.1.2	Low-Frequency Limit	5
<b>3.2</b>	<b>Sensor Noise</b>	<b>5</b>
<b>4</b>	<b>VS_E_MANAGER APPLICATION SPECIFICATIONS</b>	<b>6</b>

## 1 Product Description

*Vibration Sentry E* is a new generation of smart dataloggers that can record accelerations, vibrations impacts and inclinations. It includes a 3-axis MEMS accelerometer, an accurate date/time clock and a non-volatile 128 Mb recording memory. Depending on the settings it can record vibration signals and/or RMS vibration levels for months. Its very small size allows it to be attached to, or embedded within, the monitored equipment.

The *E* model is an evolution of the *RT* model. It is implemented mostly by new firmware that can be applied to existing *RT* models. It has the following new features:

- A visual alarm on acceleration threshold (only on new *Vibration Sentry E* hardware)
- A timer that allows the instrument to start the *Record* or the *AutoRec* mode at a specified date and time.
- A new *AutoRec* implementation that performs the triggering in software with much greater precision than on the *RT* model. The new trigger provides at least 80 ms of pre-trig data.
- Management of Time Zones at the instrument level.
- Settings are retained through a reset.

The *Vibration Sentry E* includes the following features:

- 3-Axis integral MEMS accelerometer
- Measures and records:
  - Raw acceleration signals
  - Acceleration statistics
  - Vibration levels
  - Inclinations
- All-digital design.
- Integrated oscilloscope function that can show the vibration signals in real time.
- Allows the observation of recorded data while the recording is ongoing.
- Works standalone, or USB connected for setup and data transfer to PC.
- Long life internal rechargeable battery that recharges from USB.
- Self-calibrated using the earth's gravity as a reference.
- Observes and records 100% of the acceleration signals (no missed samples).
- Editable individual custom ID for easier instrument management.
- Completely sealed weatherproof enclosure.
- LabVIEW driver available

## 2 Applications

- Long-term measurement and recording of accelerations, impacts, vibration signals and RMS vibration levels.
- Monitoring of operation and transport conditions of fragile equipment.
- Continuous monitoring of machinery wear.
- Long-Term seismic monitoring.
- Long term inclination monitoring

### 3 Specifications

Category	Specification
Number of Axes	<ul style="list-style-type: none"> <li>3</li> </ul>
Acceleration Sensor	<ul style="list-style-type: none"> <li>MEMS 3-axes</li> </ul>
Dynamic Range (-16g)	<ul style="list-style-type: none"> <li>+16 g</li> </ul>
Dynamic Range (-200g)	<ul style="list-style-type: none"> <li>+200g</li> </ul>
Bandwidth High Limit	<ul style="list-style-type: none"> <li>Adjustable up to 1.6 kHz (@ 3.2 kHz Sampling Rate)</li> </ul>
Bandwidth Low Limit	<ul style="list-style-type: none"> <li>DC (High-Pass Filter Bypass)</li> <li>Adjustable from 10 mHz to <math>F_s/2</math> (High-Pass Filter On)</li> </ul>
Noise-Floor X-Y Axes (Typical – 16g)	<ul style="list-style-type: none"> <li>-54 dBg (2 mg RMS) @ 100 Hz Sampling Rate</li> <li>-40 dBg (10 mg RMS) @ 3.2 kHz Sampling Rate</li> </ul>
Noise-Floor Z Axis (Typical – 16g)	<ul style="list-style-type: none"> <li>-49 dBg (3.6 mg RMS) @ 100 Hz Sampling Rate</li> <li>-36 dBg (16 mg RMS) @ 3.2 kHz Sampling Rate</li> </ul>
Noise-Floor X-Y Axes (Typical – 200g)	<ul style="list-style-type: none"> <li>-30 dBg (31 mg RMS) @ 100 Hz Sampling Rate</li> <li>-18 dBg (125 mg RMS) @ 3.2 kHz Sampling Rate</li> </ul>
Noise-Floor Z Axis (Typical – 200g)	<ul style="list-style-type: none"> <li>-29 dBg (36 mg RMS) @ 100 Hz Sampling Rate</li> <li>-16 dBg (160 mg RMS) @ 3.2 kHz Sampling Rate</li> </ul>
Connectivity	<ul style="list-style-type: none"> <li>USB</li> </ul>
Measurements	<ul style="list-style-type: none"> <li>Raw Acceleration (g or <math>m/s^2</math>)</li> <li>Min, Max and Avg Acceleration values (g or <math>m/s^2</math>)</li> <li>Inclinations</li> <li>Min, Max and Avg RMS Vibration level (linear or dB, g or <math>m/s^2</math>)</li> </ul>
Duty Rate of Signal Capture	<ul style="list-style-type: none"> <li>100% - No Missed Samples</li> </ul>
Spectral Display	<ul style="list-style-type: none"> <li>3-Axes 512-point Power Spectrum – dB or Lin Scale.</li> </ul>
Modes of Operation	<ul style="list-style-type: none"> <li>Idle (Micro-Power)</li> <li>USB-Connected (Active)</li> <li>Recording</li> <li>Auto-Rec <ul style="list-style-type: none"> <li>Idle when no activity</li> <li>Recording while activity is present</li> </ul> </li> </ul>
Calibration	<ul style="list-style-type: none"> <li>Self-Calibration using the earth's gravity as a reference</li> </ul>
Battery Type	<ul style="list-style-type: none"> <li>Integral Li-Poly - USB-Rechargeable</li> </ul>
Recharge Time	<ul style="list-style-type: none"> <li>2 H 30 (Typical)</li> </ul>

Battery Autonomy (Full-Charge)	<ul style="list-style-type: none"> <li>Up to one year while in <i>Idle</i></li> <li>300 H to 6000 H while recording, depending on settings</li> </ul>
Battery Life	<ul style="list-style-type: none"> <li>&gt; 300 Charge/Discharge Cycles</li> </ul>
Temperature Range	<ul style="list-style-type: none"> <li>-20 degC to 60 degC (-4 degF to 140 degF)</li> </ul>
Recording Memory	<ul style="list-style-type: none"> <li>Non-Volatile Flash Memory</li> </ul>
Recording Memory Capacity (E128 Models)	<ul style="list-style-type: none"> <li>128 Mb</li> <li>Ex: can continuously record single-axis raw signals for 42 min @ 3.2 kHz Sampling Rate</li> <li>Ex: can continuously record 3-axes full-statistics levels at 1s intervals for 10 days</li> <li>Ex: can continuously record 3-axes full statistics levels a 1min intervals for 2 years.</li> </ul>
Recording/Erasure Cycles	<ul style="list-style-type: none"> <li>Greater than 100 000</li> </ul>
Data Retention	<ul style="list-style-type: none"> <li>Greater than 20 Years</li> </ul>
Dimensions	<ul style="list-style-type: none"> <li>76.2 mm x 39.4 mm x 20.6 mm</li> <li>(3" x 1.55" x 0.81")</li> </ul>
Weight	<ul style="list-style-type: none"> <li>65 g</li> </ul>
Construction	<ul style="list-style-type: none"> <li>Integrally Potted Weather-Proof ABS Enclosure</li> </ul>

Table 1

### 3.1 Frequency Response

#### 3.1.1 Upper Frequency Limit

The instrument does not have an anti-aliasing filter. [Figure 1](#) shows the response of the accelerometer structure and its acquisition chain at 3.2 kHz sampling rate.

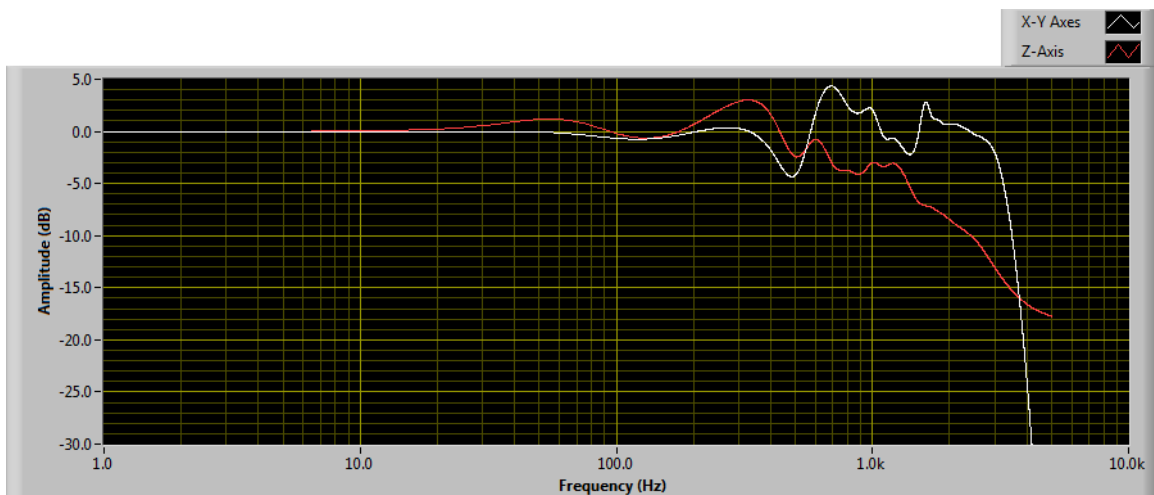


Figure 1

### 3.1.2 Low-Frequency Limit

The low-frequency can optionally be limited by the digital high-pass filter. The cutoff frequency is adjustable, and can be adjusted to extremely low frequencies thanks to the filter's exceptionally high resolution. [Figure 2](#) shows the low-frequency response for a high-pass filter adjusted to 1 Hz, 5 Hz and 10 Hz, and operating at 3.2 kHz sampling frequency.

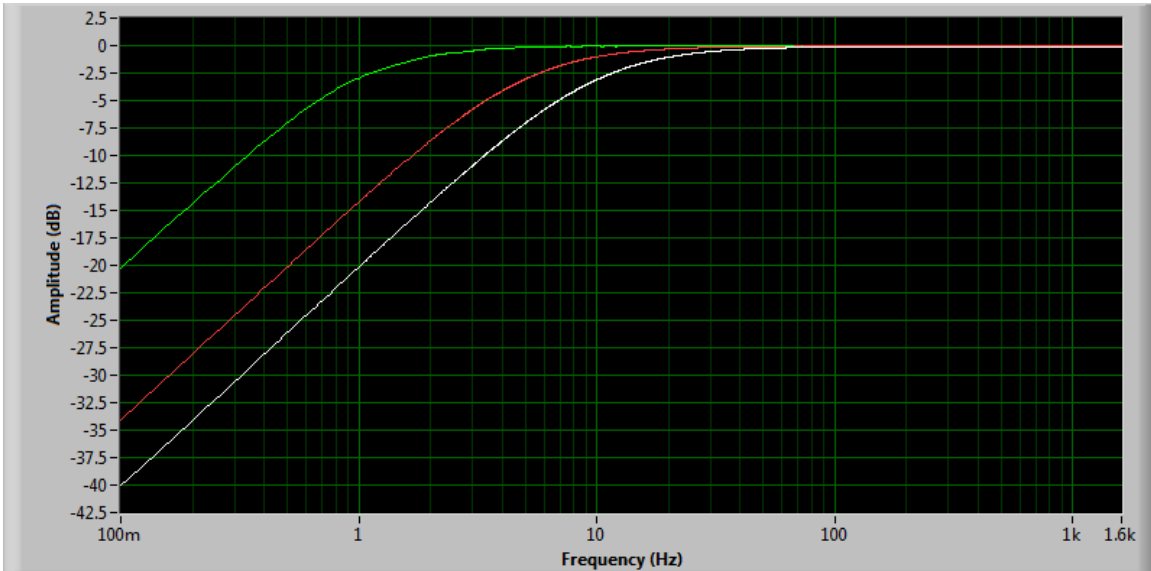


Figure 2

### 3.2 Sensor Noise

The sensor noise is dependent on the sampling rate. Higher sampling rates are noisier. Noise on the Z axis is slightly higher than the noise on the X and Y axes. Table 2 shows typical noise levels for the -16g models. Table 3 shows typical noise levels for the -200g models.

Sampling Rate	Noise: X Y axes	Noise: Z axis
3.2 kHz	-40 dBg (10 mg RMS)	-36 dBg (16 mg RMS)
1.6 kHz	-40 dBg (10 mg RMS)	-36 dBg (16 mg RMS)
800 Hz	-47 dBg (4.5 mg RMS)	-41 dBg (8.9 mg RMS)
400 Hz	-50 dBg (3.2 mg RMS)	-44 dBg (6.3 mg RMS)
200 Hz	-53 dBg (2.2 mg RMS)	-48 dBg (4 mg RMS)
100 Hz and lower	-54 dBg (2 mg RMS)	-49 dBg (3.6 mg RMS)

Table 2 -16g Models

Sampling Rate	Noise: X Y axes	Noise: Z axis
3.2 kHz	-18 dBg (125 mg RMS)	-16 dBg (160 mg RMS)
1.6 kHz	-18 dBg (125 mg RMS)	-16 dBg (160 mg RMS)
800 Hz	-23 dBg (70 mg RMS)	-21 dBg (89 mg RMS)
400 Hz	-26 dBg (50 mg RMS)	-24 dBg (63 mg RMS)
200 Hz	-28 dBg (40 mg RMS)	-26 dBg (50 mg RMS)
100 Hz and lower	-30 dBg (31 mg RMS)	-29 dBg (36 mg RMS)

**Table 3 -200g Models**

#### **4 VS\_E\_Manager Application Specifications**

Category	Specification
Compatibility	<ul style="list-style-type: none"> <li>Windows XP, Windows Vista, Windows 7, Windows 8, Windows 10</li> </ul>
Configuration	<ul style="list-style-type: none"> <li>Instrument Internal Time</li> <li>User ID</li> <li>Sampling Frequency</li> <li>High-Pass Filter</li> <li>Auto-Rec Settings</li> <li>Recording Interval</li> <li>Recording Channels and Statistics</li> <li>Integration Time Constant for RMS levels</li> <li>Timer</li> <li>Alarm</li> </ul>
Display	<ul style="list-style-type: none"> <li>Instrument Internal Time</li> <li>Instrument Internal Temperature</li> <li>Instrument Information (Serial Number, User-ID, Calibration...etc.)</li> <li>Real-Time Signals</li> <li>Real-Time RMS levels</li> <li>Real-Time Spectra</li> <li>Recorded Raw Signals or RMS levels</li> <li>Static Acceleration</li> <li>Battery Level and Charge</li> <li>All acceleration data can be viewed in g or m/s<sup>2</sup></li> <li>All graphs can be viewed in dB or Lin scale</li> </ul>
Record Management	<ul style="list-style-type: none"> <li>Record Manual Start/Stop</li> <li>Record Timer Start</li> <li>Record Auto-Rec Mode</li> <li>Recording Memory Download (Even while recording)</li> </ul>

	<ul style="list-style-type: none"> <li>• Recording Memory Clear</li> <li>• Auto-Calculation of Memory Depth</li> </ul>
<b>Data Export</b>	<ul style="list-style-type: none"> <li>• Export to Tab-Delimited Format for Use with Spreadsheet Applications</li> <li>• Export of Raw Data in .wav Format for Post-Processing Applications</li> </ul>
<b>Wizards</b>	<ul style="list-style-type: none"> <li>• Configuration wizard available for shipping applications. Takes care of the complexity of configuring all parameters using simple question/response user interface.</li> </ul>

**Table 4**

*Note: Our application portfolio is always growing. In addition to the main VS\_Manager application, we have several post-processing applications. Please see our web site at <http://www.convergenceinstruments.com/vibration-logger-rt64.html> for up to date information.*