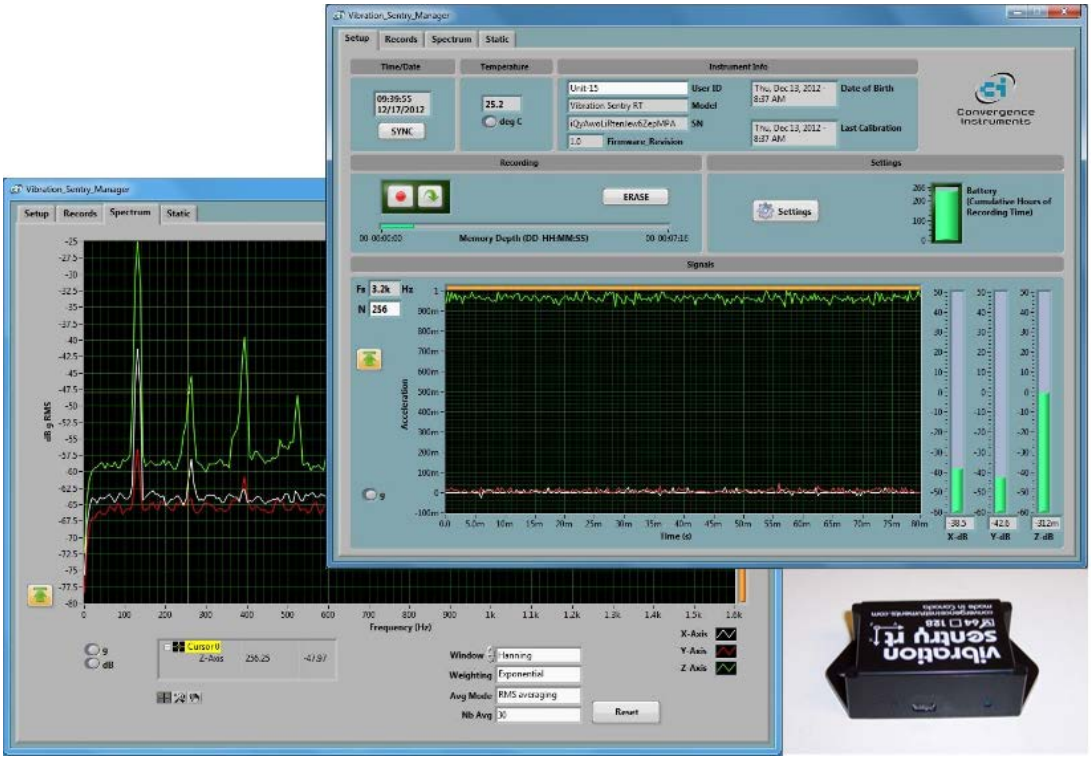
Convergence Instruments

Vibration Sentry RT

Data Sheet



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1 Product Description

Vibration Sentry RT 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 64 Mb or 128 Mb recording memory. Depending on the settings it can record vibration signals and/or RMS levels for months. Its very small size allows it to be attached to or embedded within the monitored equipment.

The *Vibration Sentry RT* includes the following models:

- VS_RT64-16g: +-16g dynamic range with a 64Mb memory
- VS_RT128-16g: +-16g dynamic range with a 128Mb memory
- VS_RT128-200g: +-200g dynamic range with a 128Mb memory

Note: All models have exactly the same features and functions, but the VS_RT64-16g and VS_RT128-16g models are generally better suited to inclinometer applications, seismic application and most low to medium-g applications. The VS_RT128-200g models are generally better suited to shock and other high-g measurement applications.

The *Vibration Sentry RT* 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).
- *Auto-Rec* feature: The instrument can stay dormant for months, only recording when the acceleration signals are detected over an adjustable threshold.
- Editable individual custom ID for easier instrument management.
- Completely sealed weatherproof enclosure.
- LabVIEW driver available
- Post-processing applications to perform spectral analyses, filtering… etc.

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	• 3
Acceleration Sensor	• MEMS 3-axes
Dynamic Range (-16g) **Dynamic Range (-200g)**	• +-16 g • +-200g
Bandwidth High Limit	• Adjustable up to 1.6 kHz (@ 3.2 kHz Sampling Rate)
Bandwidth Low Limit	• DC (High-Pass Filter Bypass) • Adjustable from 10 mHz to *Fs/2* (High-Pass Filter On)
Noise-Floor X-Y Axes (Typical – 16g)	• -54 dBg (2 mg RMS) @ 100 Hz Sampling Rate • -40 dBg (10 mg RMS) @ 3.2 kHz Sampling Rate
Noise-Floor Z Axis (Typical – 16g)	• -49 dBg (3.6 mg RMS) @ 100 Hz Sampling Rate • -36 dBg (16 mg RMS) @ 3.2 kHz Sampling Rate
Noise-Floor X-Y Axes (Typical – 200g)	• -30 dBg (31 mg RMS) @ 100 Hz Sampling Rate • -18 dBg (125 mg RMS) @ 3.2 kHz Sampling Rate
Noise-Floor Z Axis (Typical – 200g)	• -29 dBg (36 mg RMS) @ 100 Hz Sampling Rate • -16 dBg (160 mg RMS) @ 3.2 kHz Sampling Rate
Connectivity	• USB
Measurements	• Raw Acceleration (g or m/s^2) • Min, Max and Avg Acceleration values (g or m/s^2) • Inclinations • Min, Max and Avg RMS Vibration level (linear or dB, g or m/s^2)
Duty Rate of Signal Capture	• 100% - No Missed Samples
Spectral Display	• 3-Axes 512-point Power Spectrum – dB or Lin Scale.

Modes of Operation	• Idle (Micro-Power)
	• USB-Connected (Active)
	• Recording
	• Auto-Rec
	  o Idle when no activity
	  o Recording while activity is present

Calibration	• Self-Calibration using the earth's gravity as a reference
Battery Type	• Integral Li-Poly - USB-Rechargeable
Recharge Time	• 2 H 30 (Typical)

Battery Autonomy (Full-Charge)	• Up to one year while in *Idle* • 300 H to 6000 H while recording, depending on settings
Battery Life	• > 300 Charge/Discharge Cycles
Temperature Range	• -20 degC to 60 degC (-4 degF to 140 degF)
Recording Memory	• Non-Volatile Flash Memory
Recording Memory Capacity (RT64 Models)	• 64 Mb • Ex: can continuously record single-axis raw signals for 21 min @ 3.2 kHz Sampling Rate • Ex: can continuously record 3-axes full-statistics levels at 1s intervals for 5 days • Ex: can continuously record 3-axes full statistics levels a 1min intervals for 1 year.
Recording Memory Capacity (RT128 Models)	• 128 Mb • Ex: can continuously record single-axis raw signals for 42 min @ 3.2 kHz Sampling Rate • Ex: can continuously record 3-axes full-statistics levels at 1s intervals for 10 days • Ex: can continuously record 3-axes full statistics levels a 1min intervals for 2 years.
Recording/Erasure Cycles	• Greater than 100 000
Data Retention	• Greater than 20 Years
Dimensions	• 76.2 mm x 39.4 mm x 20.6 mm • (3” x 1.55” x 0.81”)
Weight	• 65 g
Construction	• Integrally Potted Weather-Proof ABS Enclosure

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.

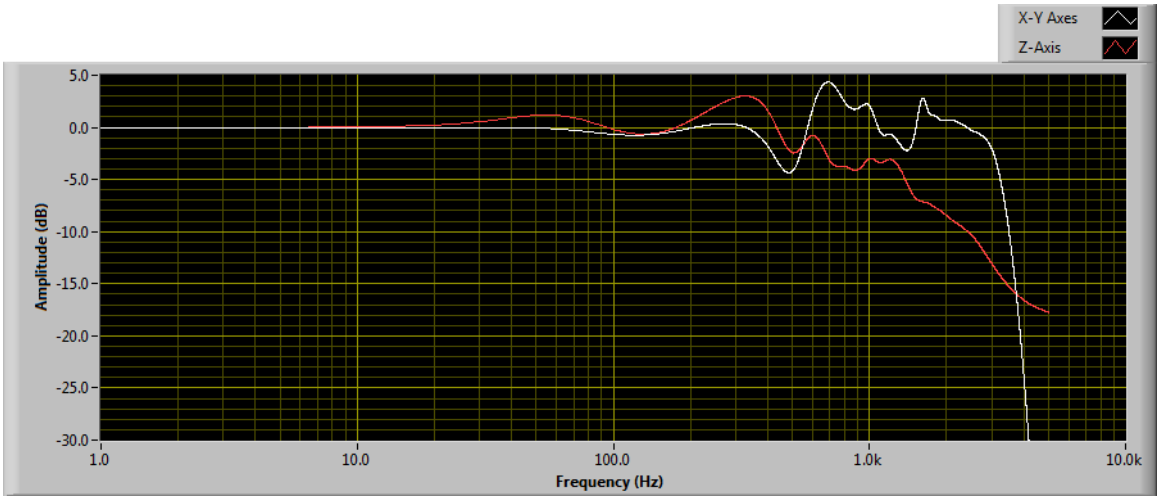

Figure 1

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.

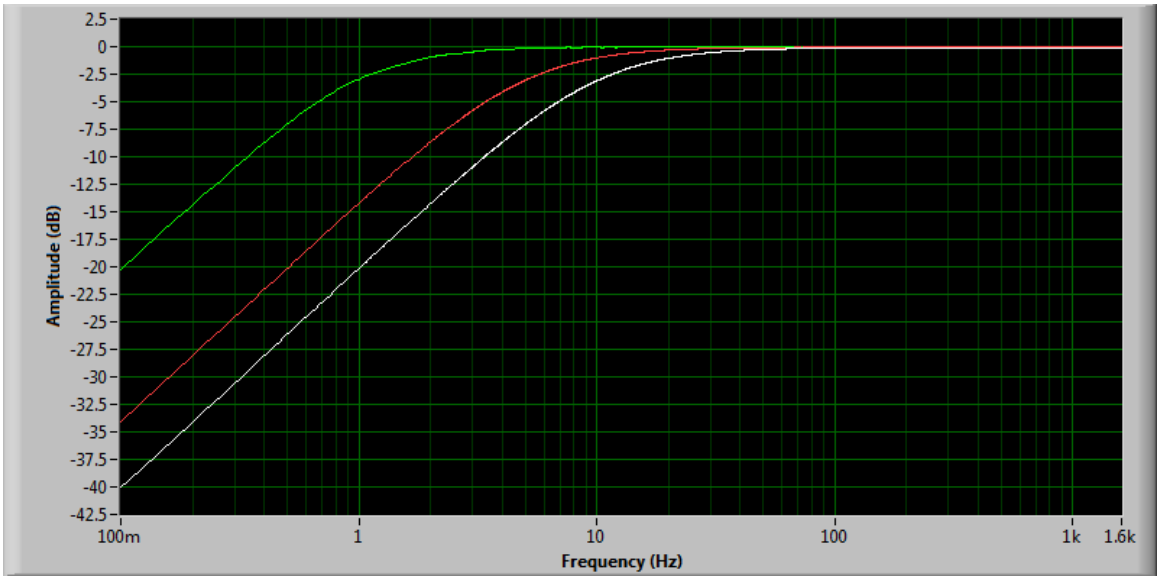

Figure 2

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_RT_Manager Application Specifications

Category	Specification
Compatibility	• Windows XP, Windows Vista, Windows 7
Configuration	• Instrument Internal Time • User ID • Sampling Frequency • High-Pass Filter • Auto-Rec Settings • Recording Interval • Recording Channels and Statistics • Integration Time Constant for RMS levels
Display	• Instrument Internal Time • Instrument Internal Temperature • Instrument Information (Serial Number, User-ID, Calibration…etc.)

	• Real-Time Signals • Real-Time RMS levels • Real-Time Spectra • Recorded Raw Signals or RMS levels • Static Acceleration • Battery Level and Charge • All acceleration data can be viewed in g or m/s^2 • All graphs can be viewed in dB or Lin scale
Record Management	• Record Manual Start/Stop • Record Auto-Rec Mode • Recording Memory Download (Even while recording) • Recording Memory Clear • Auto-Calculation of Memory Depth
Data Export	• Export to Tab-Delimited Format for Use with Spreadsheet Applications • Export of Raw Data in .wav Format for Post-Processing Applications

Table 4

Note: Our application portfolio is always growing. In addition to the main VS_RT_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.*