Technical Specifications - Trillium 240

Specifications subject to change without notice.

➤ Technology

Topology ..... Symmetric triaxial
Feedback ..... Force balance with capacitive transducer
Mass centering ..... Automatic mechanical re-centering, can be remotely initiated
Leveling ..... Integrated bubble level, adjustable locking leveling feet
Alignment ..... Vertical scribe marks for E and W; holes for 5/16" alignment rod for N and S

➤ Performance

Instrument Noise ... See graph
Passband ..... 240 seconds to 35 Hz
Clip level ..... 16 mm/s up to 10 Hz
Temperature ..... ± 10°C without re-centering
Sensitivity ..... 1200 V·s/m standard sensitivity
Consult factory for other options

➤ Analog Interface

Velocity output ..... 40 V peak-to-peak differential
Selectable XYZ or UVW mode
Mass position ..... Three independent voltage outputs
Mass centering ..... Single 5 V active-high control
Calibration ..... Single voltage input with one active-high control signal per channel; remote calibration in XYZ or UVW

➤ Digital Interface

Type ..... Serial interface for state-of-health, command and control.
Access to: ..... Mass position display
Mass center command
UVW/XYZ mode command
Long/short period mode command
Temperature: current and min/max since reset
Stepper motor position: current and min/max since reset
Factory calibration data
Instrument ID information

➤ Power

Supply voltage ..... 9 to 36 V DC, <1 W typical
Protection ..... Reverse voltage protected
Auto-resettable over-current protection
No fuse
Connector ..... 19 pin MIL-C-28642, mounted on base

➤ Physical

Diameter ..... 25 cm
Height ..... 26.5 cm without leveling feet
28.6 cm with leveling feet at minimum extension
29.5 cm with leveling feet at maximum extension
Weight ..... 14 kg

➤ Environmental

Operating. ..... -20°C to +50°C
Humidity ..... 0 to 100%
Parasitic resonance .... None, DC to 200 Hz
Shock ..... 20 g half sine, 5 ms without damage, 6 axes

Technical Specifications - Trillium 40

Specifications subject to change without notice.

➤ Technology

Topology ..... Symmetric triaxial
Feedback ..... Force balance with capacitive transducer
Mass centering ..... Operates over full temperature range without manual recentering; manual centering control included
Leveling ..... Integrated bubble level, adjustable locking leveling feet
Alignment ..... Vertical scribe marks for N and S; holes for 3/8" alignment rod for E and W

➤ Performance

Noise ..... Below NLNM from 20 s to 5 Hz
Passband ..... Flat from 40 seconds to 50 Hz
Sensitivity ..... 1500 V·s/m standard sensitivity
Consult factory for other options
Temperature ..... ± 35°C without re-centering

➤ Analog Interface

Velocity output ..... 16 V peak-to-peak differential
Selectable XYZ or UVW mode
Mass position ..... Three independent voltage outputs
Calibration ..... Single voltage input with one active-low control signal per channel; remote calibration in XYZ or UVW

➤ Power

Supply voltage ..... 9 to 36 V DC, 0.4 W typical
Protection ..... Reverse voltage protected
Auto-resettable over-current protection
No fuse
Connector ..... 19 pin MIL-C-28642, mounted on top

➤ Physical

Diameter ..... 22 cm
Height ..... 18 cm
Operating temp. ..... -20°C to +50°C
Humidity ..... 0 to 100%
Parasitic resonance .... None, DC to 200 Hz
Shock ..... 20 g half sine, 5 ms without damage, 6 axes
Weight ..... 11 kg

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SEISMOLOGICAL INSTRUMENTS

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Trillium

BROADBAND SEISMOMETER

Trillium 240

A very broadband low noise seismometer, the newest member of the Trillium family has a response flat to velocity from 240 seconds to 35 Hz. This exceptionally quiet seismometer is ideal for portable and fixed network applications.

Benefits

- *Very broadband performance from a portable low power seismometer*
- *A Web browser interface eliminates the need for a breakout box*
- *Onboard factory calibration data, accessible via browser interface*
- *Low power consumption, advantageous for remote installations*
- *Switchable XYZ/UVW output to provide independent calibration of sensor axes*
- *Simple operation with no mass lock and fast "one-touch" mass centering*
- *Base-mounted connector simplifies installation*

Trillium 40

Rugged three-component broadband seismometer specifically designed for local and regional seismic studies. Very low power consumption and stable operation over a wide temperature range make the Trillium 40 ideal for a broad range of applications including short to medium term portable experiments and aftershock studies.

Benefits

- *Stable over a wide temperature range without re-centering*
- *Field proven with no mass lock to forget when shipping*
- *Extremely low power consumption advantageous for portable applications*

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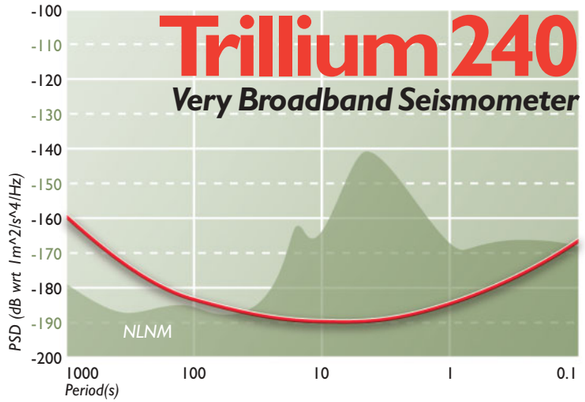
SEISMOLOGICAL INSTRUMENTS

Trillium BROADBAND SEISMOMETER

Nanometrics' Trillium seismometers are intended for weak motion earthquake research at local, regional and teleseismic distances. Trillium is a classic symmetric triaxial force feedback seismometer with axis orientation in UVW. A single axis design for all components ensures identical response. An innovative field-proven suspension system eliminates the need for a mass lock, significantly simplifying the internal mechanics and increasing overall robustness and reliability. Low power consumption and improved temperature stability are hallmarks of the Trillium seismometers making them ideal for portable and fixed network applications.

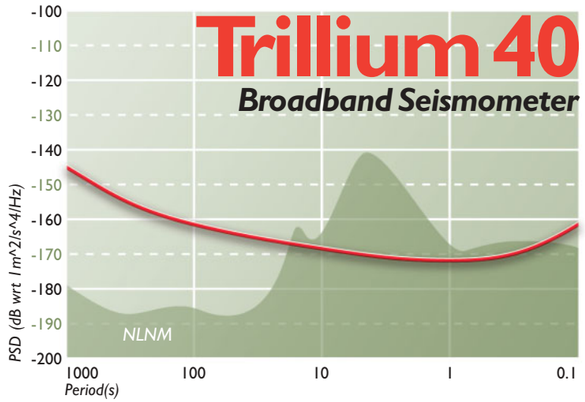


The Trillium 240 is a very broadband seismometer capable of sensing the full spectra of events. This sensor has excellent self-noise relative to the NLNM. This performance extends out to 1000 seconds and beyond, allowing the instrument to take advantage of quiet sites, recording more of the earthquake spectra at longer periods.

The Trillium 240 is simple to deploy and operate. Nanometrics' field proven mass suspension system means there is no mass lock to forget when shipping. Once on site, an integrated bubble level, a removable lifting handle, and truly accessible leveling feet allow for quick deployment in vault or post hole installations. A base-mounted connector simplifies cable routing during installation.

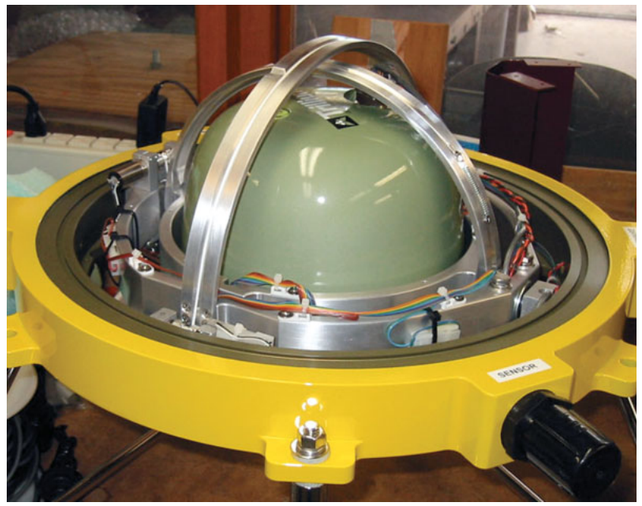
Local or remote fast, one-touch mass centering ensures the masses are centered the first time, every time, with no possibility of the mechanism sticking. Mass position outputs and a mass centering control line are accessible via the single connector mounted on the base of the unit.

Trillium 240 is the first web-enabled seismometer. A web browser is all that is required to check instrument state-of-health, initiate mass centering or retrieve the original factory calibration. This interface eliminates the need for an expensive breakout box by allowing connection to a laptop computer.



Trillium 40 is rugged and simple to use. There is no mass lock to forget when shipping and no mass centering is required after initial installation. Vault temperature changes of up to +/-35° C are automatically compensated for by the continuous electronic mass centering.

Trillium 40 response is optimized for local and regional studies. The instrument self noise is below the NLNM from 20 seconds to 15 Hz. This field proven design has demonstrated its ability to provide high quality data from a wide variety of temporary and permanent vault types.



Trillium 40 deployed in UCSD Scripps Institute of Oceanography, ocean bottom seismometer package (Photo courtesy UCSD-Scripps)

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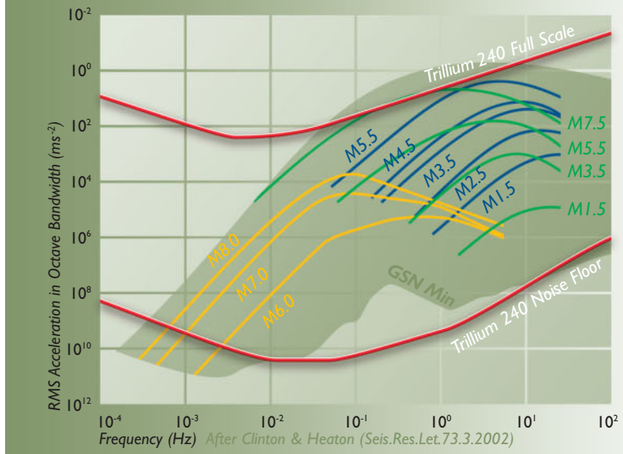
Trillium BROADBAND SEISMOMETER

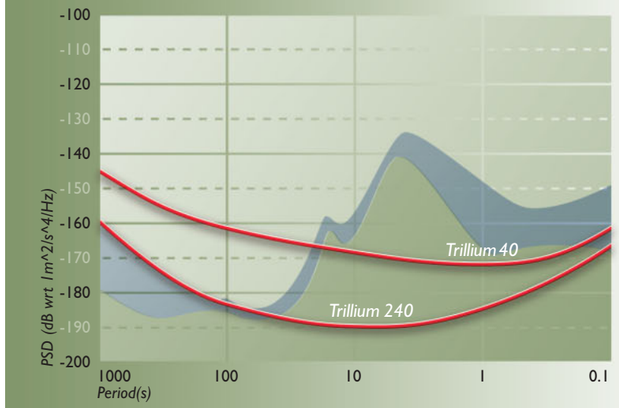
The Earthquake Spectrum



Earthquake Categories

Local events	<~10 km	Several seconds to 30Hz
Regional	>~10 km	30 seconds to 10 Hz
Teleseismic	>~3000 km	3600 seconds to 2 seconds

Trillium Self Noise Performance



Seismometer self noise plotted against NLNM. Blue area shows typical site noise range for permanent sites (derived from GSN first percentile noise data).