

Nanometrics industry leading portfolio of **Trillium** seismometers now includes a borehole variant for deep-earth deployments in cased boreholes



Trillium BH

Borehole Seismometer



The **Trillium Borehole Seismometer** is a very broadband seismometer designed for cased boreholes. The instrument is housed in a stainless steel enclosure with an integrated hole-lock mechanism, strain relief, and a high-pressure marine grade connector. An advanced leveling system allows the instrument to self-correct over a tilt range of +/- 5 degrees.

The **Trillium Borehole** is ideal for local, regional and tele-seismic studies having a response flat to velocity from 120 seconds to 150 Hz and a self-noise below the NLNM at 100 seconds. Operators will appreciate the low power consumption, remote mass centering and robust no-mass lock design inherent in all Trillium seismometers.

Benefits

- Automatic leveling can be remotely initiated for corrections of up to +/- 5 degrees, facilitating hole-lock installations in deep boreholes.
- The axis stack is mechanically levelled to ensure that the vertical axis does not couple horizontal noise.
- A robust, waterproof, stainless steel enclosure ensures the sensor is protected from hostile environments.
- Instrument recovery is aided by a fail-safe holelock release mechanism that prevents jamming to the casement during removal.
- Low power consumption of 560 mw minimizes power source requirements at the site.
- Quiet down-hole deployments benefit from the exceptional self-noise below NLNM at 100 s.



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Specifications subject to change without notice.

TECHNOLOGY

Topology	Symmetric triaxial
Feedback	Force balance with capacitive transducer
Self-Leveling	Internal automated leveling +/- 5°
Leveling Initiation	Control line or serial port command
Mass Centering	Motorized re-centering automatically initiated during leveling sequence
Holelock	Motorized single jaw, non-jamming Adaptable to a wide range

PERFORMANCE

Self-noise	See plot at right
Sensitivity	1200 V-s/m ±0.5% precision
Bandwidth	-3 dB points at 120 s and 150 Hz
Clip Level	>16.6 mm/s up to 10 Hz and 0.17 g above 10 Hz
Temperature	±45°C without re-centering

INTERFACE

Connector	20-pin marine
Velocity Output	40 V peak-to-peak differential Selectable XYZ or UVW mode
Mass Position Output	Three independent voltage outputs
Calibration Input	Single voltage input for all channels, independent calibration enable for each channel Calibration in XYZ or UVW
Control Lines	Auto-level & Mass Center, Calibration Enable, XYZ/UVW mode
Serial Port	RS-232 compatible serial IP (SLIP) Onboard web server standard HTTP For enhanced instrument control and status: Self-leveling and mass centering, UVW/XYZ mode, short/long period mode, firmware updates, temperature, mass position, instrument status, serial number and factory info

POWER

Supply Voltage	9 to 36 Volts DC isolated input
Power Consumption	560 mW typical at 15 V input 1.5 A to operate holelock
Protection	Reverse-voltage protection Auto-resettable over-current protection (No fuse to replace)

PHYSICAL

Case Design	Stainless steel pressure vessel and holelock
Diameter	143 mm [5.6"]
Height	886 mm [34.9"] not including connector or actuator guard pipe
Weight	30 Kg
Handling	Eye bolt on lid for lifting cable 1300 lbf (5800 N) rated

ENVIRONMENTAL

Operating Temp.	-40°C to +55°C
Storage Temp.	-60°C to +75°C
Water Immersion	Rated to IP68 and NEMA6P for prolonged submersion
Shock	20 g half sine, 5 ms without damage, 6 axis No mass lock required for transport

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SELF-NOISE PERFORMANCE PLOT