

TRILLIUM 120 POSTHOLE SEISMOMETER

Nanometrics' industry-leading portfolio of Trillium seismometers includes a posthole variant that is revolutionizing the way seismologists deploy instruments and collect seismic data.

Reliability, repeatability, outstanding performance

The **Trillium Posthole Seismometer** is a very broadband seismometer designed for down-hole deployments. The instrument is housed in a stainless steel enclosure incorporating a high-pressure, marine-grade connector making it suitable for uncased buried/posthole installations. An advanced levelling system reorients the internal seismometer mechanism to true vertical, correcting for installations tilted up to ± 5 degrees.

Local, regional & teleseismic studies

The Trillium PH is ideal for local, regional and teleseismic studies having a response flat to velocity from 120 seconds to 150 Hz and exceptionally low self-noise. Operators will appreciate the low power consumption, automatic mass centering and robust no-mass lock design inherent in all Trillium seismometers.

A highly integrated station solution

When using the Trillium 120 PH with our popular Centaur digitizer, you'll have access to a digital leveling bubble through the Centaur GUI. The virtual leveling bubble makes for easy leveling down a dark hole, or once buried, gives you the ability to check levelness at any time.

Also available:

- Trillium 120 Posthole ± 9 degree models, Trillium 120 Borehole and Trillium Horizon for vault or shallow direct bury



Polar Certified Model available for operating temperatures down to -50°C



Benefits

- The ability to get beneath the noise, even in urban environments, and keep your assets secure.
- Automatic leveling can be remotely initiated for corrections of up to ± 5 degrees, simplifying down-hole installation.
- The axis stack is mechanically leveled 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.
- Cylindrical down-hole design with 143 mm outside diameter facilitates buried deployments.
- Low power consumption of 490 mW minimizes power source requirements at the site.

TECHNICAL SPECIFICATIONS TRILLIUM 120 POSTHOLE

Specifications subject to change without notice

TECHNOLOGY

- Topology:** Symmetric triaxial
- Feedback:** Force balance with capacitive transducer
- Self-Leveling:** Internal automated leveling $\pm 5^\circ$
- Leveling Initiation:** Control line or serial port command
- Mass Centering:** Motorized recentring automatically initiated during leveling sequence
- Alignment:** N-S line on cover for down-hole sighting
 - Keying features for down-hole alignment rod
 - N-S marks on base for pier installation
- Digital tiltmeter:** Reports case tilt from vertical for easy installation and remote troubleshooting

PERFORMANCE

- Self-noise:** See plot below
- Nominal Sensitivity:** 1200 V-s/m (reference User Guide for precise value)
- Precision:** $\pm 0.5\%$ relative to User Guide specification
- Bandwidth:** -3 dB points at 120 s and 150 Hz
- Clip Level:** 16.6 mm/s up to 10 Hz and 0.12 g above 10 Hz
- Dynamic Range:** > 167 dB @ 1 Hz
- Temperature:** $\pm 45^\circ\text{C}$ without recentring

INTERFACE

- Connector:** 20-pin marine
- Velocity Output:** 40 V peak-to-peak differential
 - Selectable XYZ or UVW mode
- Mass Position Output:** Three independent ± 4 V 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, case tilt, digital bubble level, serial number and factory info

POWER

- Supply Voltage:** 9 to 36 Volts DC isolated input
- Power Consumption:** 490 mW typical at 15 V input
- Protection:**
 - Reverse-voltage and over-voltage protected
 - Self-resetting over-current protection

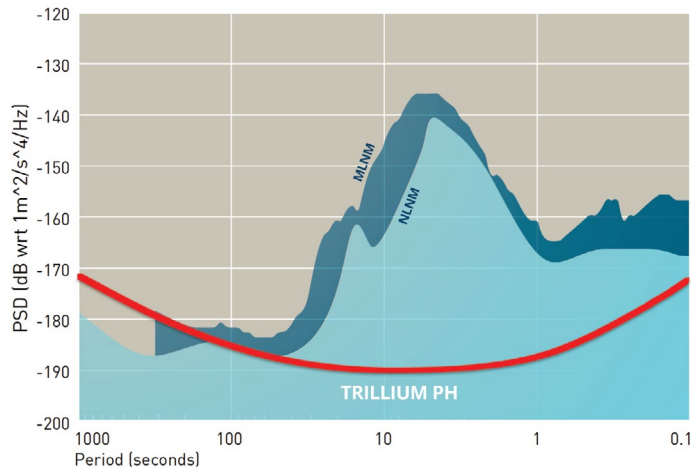
PHYSICAL

- Case Design:** Stainless steel pressure vessel
- Diameter:** 143 mm
- Height:** 432 mm not including connector or feet
- Weight:** 15.5 kg
- Handling:** Eye bolt on lid for lifting cable
 - 1300 lbf (5800 N) rated

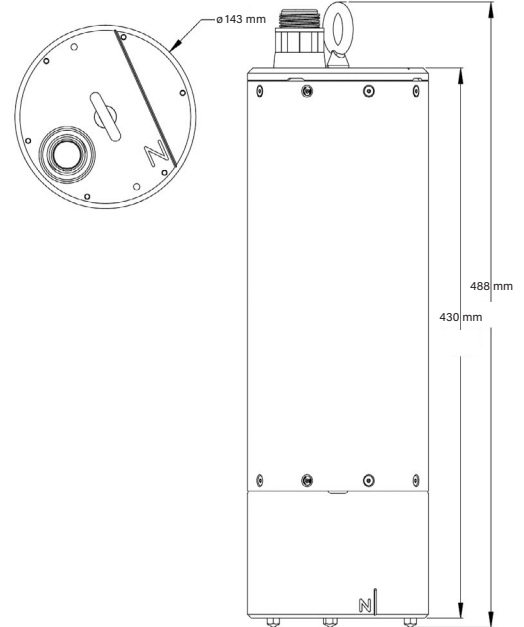
ENVIRONMENTAL

- Operating Temperature:**
 - 20°C to 60°C (Standard Model)
 - 50°C to 60°C (Polar Certified Model)
- Storage Temperature:**
 - 40°C to +70°C (Standard Model)
 - 60°C to +70°C (Polar Certified Model)
- Ingress Protection:** Rated to IP68 and NEMA6P to 300 m for prolonged immersion. A dry hole is recommended for best seismic performance
- Shock:** 20 g half sine, 5 ms without damage, 6 axis
 - No mass lock required for transport

SELF-NOISE PERFORMANCE PLOT



Seismometer self-noise plotted against NLNM (after Peterson, 1993) and MLNM (after McNamara and Buland, 2004)



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