

TRILLIUM 120

BOREHOLE SEISMOMETER

Ideal for local, regional, and teleseismic studies, the **Trillium 120 Borehole Seismometer** minimizes onsite power system requirements while providing exceptionally low-noise performance. The robust holelock mechanism of this instrument makes it possible to position the instrument at a specific depth for quiet down-hole installations that can take advantage of the observatory class performance.

Designed for Down-Hole Deployments

The Trillium 120 Borehole's corrosion resistant, stainless steel enclosure features a high-pressure, marine-grade connector, holelock and fail-safe release mechanism making it suitable for use in existing or new cased borehole installations. The advanced levelling system allows the instrument to self-correct to ensure a successful down-hole deployment at any site.

Exceptional Performance and Reliability

The Trillium 120 Borehole provides a flat response to velocity from 120 seconds to 150 Hz with an exceptionally low self-noise, maximizing the dynamic range over the passband and providing a more reliable data output.

Complete Station Solutions

The Trillium 120 seismometer series is optimized for use with our popular Centaur digital recorder. Pairing the Trillium 120 with a Centaur provides a range of added functionality including quick and easy configuration of the station and digital leveling tools via the intuitive web-based user interface.



Key Features

- Low-power consumption of 230 mW minimizes power system requirements at the site.
- 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.
- Instrument recovery is aided by a fail-safe holelock release mechanism that prevents jamming to the casement during removal
- A robust, waterproof, stainless steel enclosure ensures the sensor is protected from harsh environments.
- Robust design doesn't require a mass lock providing reliable, trouble-free operation
- Also available: Trillium 120 Posthole, Trillium 120 Slim Posthole, and Trillium Horizon for vault or shallow direct bury

TECHNICAL SPECIFICATIONS TRILLIUM 120 BH

Specifications subject to change without notice

TECHNOLOGY

Topology: Symmetric triaxial

Feedback: Force balance with capacitive transducer

Self-Leveling: Internal automated leveling

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 of hole sizes

LEVELING & ALIGNMENT

Digital Bubble Level: Graphical bullseye level is available via Centaur digital recorder web interface

Leveling: Automatic motorized mechanical

Alignment: Case-top north-south guide for straight-edge, line, or laser level; Vertical scribe marks for north and south on base

Digital Tiltmeter: Reports case tilt from vertical for easy installation and remote troubleshooting

PERFORMANCE

Self-Noise: See plot below

Sensitivity: (Nominal) 1200 V-s/m; (Actual) 1202.5 V-s/m $\pm 0.5\%$

Accuracy: $\pm 0.5\%$ 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: 168 dB @ 1 Hz

Operating Tilt Range: $\pm 5^\circ$

Temperature: $\pm 45^\circ\text{C}$ 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 with one active-high control signal for all channels

- Calibration in XYZ or UVW
- Individual channels selectable via web interface

Control Lines: Auto-Level & Mass Center, Calibration Enable, XYZ/UVW mode

Serial Port:

- RS-232 compatible serial IP (SLIP) with onboard HTTP web server to select sensor operating modes, to mass center, and to access state-of-health, virtual level bubble, firmware updates and metadata
- Plug-and-Play automated workflow interface to select sensor operating modes, and to access state-of-health, virtual level bubble and metadata

POWER

Supply Voltage: 9 to 36 Volts DC isolated input

Power Consumption: 230 mW typical quiescent

Protection:

- Reverse-voltage and over-voltage protected
- Self-resetting over-current protection

PHYSICAL

Case Design: Stainless steel pressure vessel, and holelock

Diameter: 143 mm

Height: 886 mm not including connector or actuator guard pipe

Weight (including holelock): 34 kg

Handling: Eye bolt on lid for lifting cable

- 1300 lbf (5800 N) rated

ENVIRONMENTAL

Operating Temperature: -20°C to $+60^\circ\text{C}$

Storage Temperature: -40°C to $+70^\circ\text{C}$

Ingress Protection: Seismometer is rated to IP68 and NEMA6P to 300 m for prolonged immersion.

A dry hole is recommended for best seismic performance. Holelock motor is rated to IP68 and NEMA6P to 30 m for prolonged immersion

Humidity: 0% to 100% (submersible)

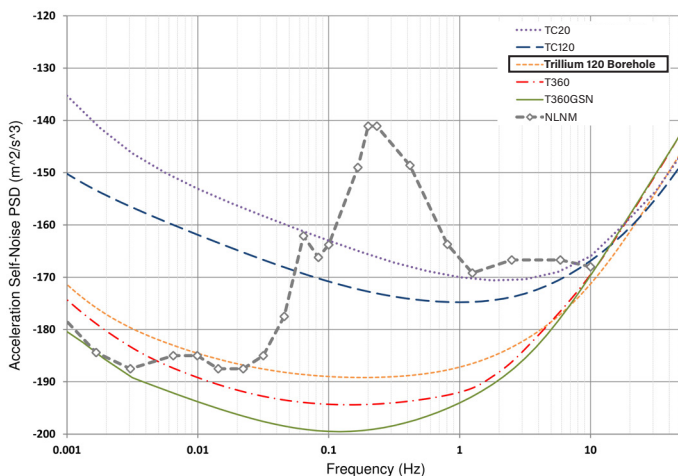
Shock: 20 g half sine, 5 ms without damage, 6 axis

- No mass lock required for transport

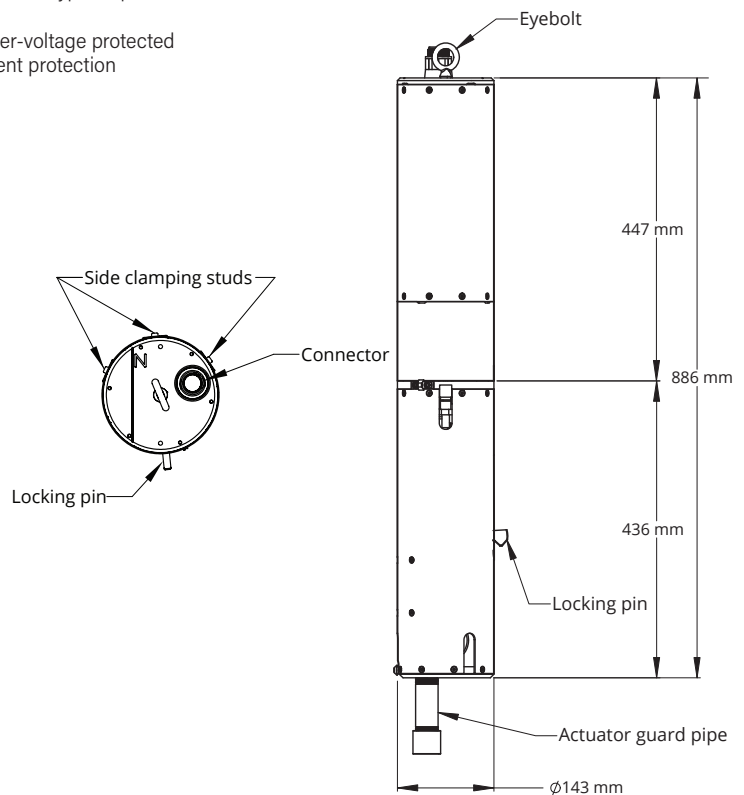
AVAILABLE MODELS

T120-BH2: Trillium Borehole, Low-power

SELF-NOISE GRAPH



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



Contact a Product Expert Toll Free: 1 855 792 6776 | sales_mkt@nanometrics.ca