# 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 over a tilt range of ±5 degrees (±10 degrees optional) 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.

TrilliumBH

### 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 (±10 degrees optional), 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 ±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 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 ±0.5%
**Accuracy:** ±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 and 0.12 *g* above 10 Hz
**Dynamic Range**: 168 dB @ 1 Hz
**Operating Tilt Range:** ±5°
**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 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

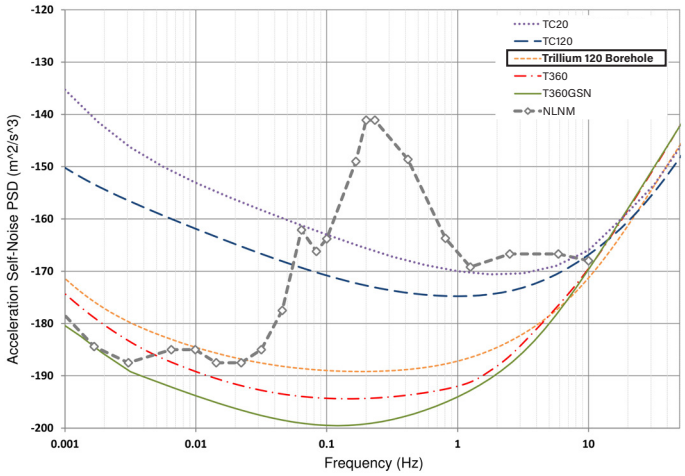
## ENVIRONMENTAL

**Operating Temperature:** -20°C to +60°C
**Storage Temperature:** -40°C to +70°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

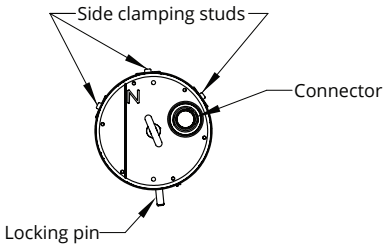
## AVAILABLE MODELS

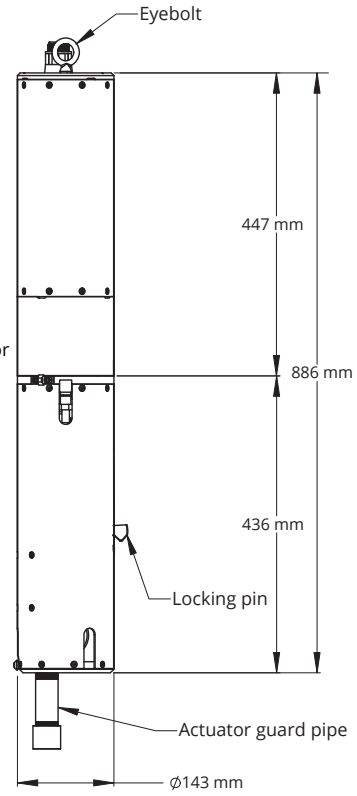
**T120-BH2:** Trillium Borehole, Low-power

## SELF-NOISE GRAPH




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

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