

## TRILLIUM 120 OBS OCEAN BOTTOM SEISMOMETER



The **Trillium 120 Ocean Bottom Seismometer (OBS)** combines exceptionally high-performance with low-power to optimize the data collection and duration of ocean bottom experiments. Providing new opportunities for OBS deployments, the Trillium 120 OBS delivers observatory grade performance with the ease-of-use and durability of our industry-leading, land-based Trillium seismometers.

### Purpose-Built for Ocean Bottom Seismology

Incorporating a robust leveling gimbal, the 120 OBS can self-level up to a  $\pm 50^\circ$  tilt range to ensure a successful deployment on the ocean bottom. The titanium ellipsoidal pressure vessel is rated for 6000 m deployments, and features proven glass epoxy connectors to provide exceptional ruggedness and resistance to corrosion in both marine and fresh water environments.

### Ultra Low-Noise Floor in a Versatile Form Factor

The Trillium 120 OBS provides the same exceptionally low-noise performance as our previous Trillium 240 OBS with a 60-70% reduction in size, weight, and power to facilitate integration into new or existing OBS deployment systems.

### Low-Power Solutions for OBS Systems

The Trillium 120 OBS is optimized for use with our purpose-built, Pegasus OBS digital recorder, providing a low-power system for integration into any OBS system or as part of our turnkey Abalones Ocean Bottom System.

The Abalones combines a Trillium OBS seismometer with the streamlined workflows of the modern Pegasus OBS digital recorder and a robust deployment frame design, licensed from Scripps Institution of Oceanography.



### Key Benefits

- Ultra-low 250 mW power consumption reduces battery costs and extends experiment durations
- Maintenance-free titanium pressure vessel rated to 6000 m depths
- Robust design doesn't require a mass or gimbal lock providing reliable, trouble-free operation
- Precise, kinematic auto-leveling gimbal ensures successful deployments
- Plug and play interface for Pegasus OBS providing automatic generation of StationXML metadata
- Comprehensive State-of-Health logging includes case orientation, providing a powerful data set for optimizing deployments
- Digital connectivity provides visibility into the configuration and State-of-Health prior to deployment
- Also available:  
Trillium Compact OBS,  
Trillium 360 OBS

# TECHNICAL SPECIFICATIONS TRILLIUM 120 OBS

\*Specifications subject to change without notice

## SEISMOMETER

### SEISMOMETER TECHNOLOGY

**Topology:** Symmetric triaxial

**Feedback:** Force balance with capacitive displacement transducer

**Mass Centering:** Motorized recentering automatically initiated during leveling sequence

### SEISMOMETER PERFORMANCE

**Self-Noise:** See self-noise graph

**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:** 167 dB @ 1 Hz

**Operating Tilt Range:**  $\pm 50^\circ$

**Temperature:**  $\pm 45^\circ\text{C}$  without recentering

**Magnetic sensitivity:**  $< 0.03 \text{ (m/s}^2\text{)}/\text{T}$

### AVAILABLE MODELS

**T120-OBST2:** 6000 m, Titanium Model

### LEVELING AND ORIENTATION

**Technology:** Dual degree-of-freedom motorized gimbals

- Jam-free mechanism, no mass lock/unlock
- Kinematic design preserves full seismometer performance

**Accuracy:** Levels to within  $\pm 0.5^\circ$  of true vertical

**Leveling initiation:** Leveling checks done at some or all of:

- Configurable delay after power on
- Configurable periodic (three stage user-configurable schedule)
- On external command via serial interface from a SLIP-enabled device or Centaur digital recorder
- Initiated by the digitizer via control line

## CONNECTORS/PLUGS

**Main:**

- 16-pin submersible connector male, MCBH16MT1 (Titanium)
- Mounted on top of case

**Vacuum/pressure port:**

- 1/4-inch male quick disconnect with shutoff
- Vent can be powered on for descent and ascent

## POWER

**Supply voltage:** 9 to 36 VDC isolated

**Power Consumption:** 250 mW typical quiescent

**Protection:** Reverse-voltage and over-voltage protected

- Self-resetting over-current protection
- Unit can be powered on for descent and ascent

## PHYSICAL

**Enclosure:** Titanium ellipsoidal pressure vessel, split dual half-shell assembly, with tripod feet

- All connectors on top side
- Dual O-ring sealing between half-shells
- Internal magnetic shield

**Diameter:** 327 mm

**Height:** 265 mm (not including tripod, feet, or connectors)

- 340 mm with Abalones tripod kit

**Weight:**

- Weight of complete assembly in air: 26.1 kg
- Weight of complete assembly in sea water: 10.5 kg

## ENVIRONMENTAL

**Operating Temperature:**  $-5^\circ\text{C}$  to  $+40^\circ\text{C}$

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

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

**Ingress Protection:** Marine 6000 m submersion depth in fresh or salt water

**Humidity:** 0% to 100% (submersible)

## DIGITAL COMMAND AND CONTROL INTERFACE

### USER INTERFACE

**Web Browser:** Onboard web server, accessed with industry standard web browsers using Serial Line IP (SLIP) HTTP

**Plug-and-Play:** Nanometrics interface for communication via Pegasus OBS digital recorder

### CONFIGURATION AND CONTROL

**Sensor:** XYZ/UVW mode

- Calibration enable
- Short/long period mode

**Leveling:** Initiate immediate leveling check

- Automatic cycle mode selection: (post power-on, three stage periodic)
- Automatic cycle parameter selection: (delay and interval times, max attempts)

**Unit:** Firmware updates

- State-of-health request

### DATA OUTPUTS

**On-Request:** Seismometer mass position values

- Temperature
- Internal relative humidity
- Instrument serial number, subassembly revisions
- Firmware revision
- Case orientation (with respect to vertical)
- Seismometer orientation (with respect to vertical)
- Download logged state-of-health
- Erase state-of-health log

**Leveling Log:** Every leveling event logged in non-volatile memory

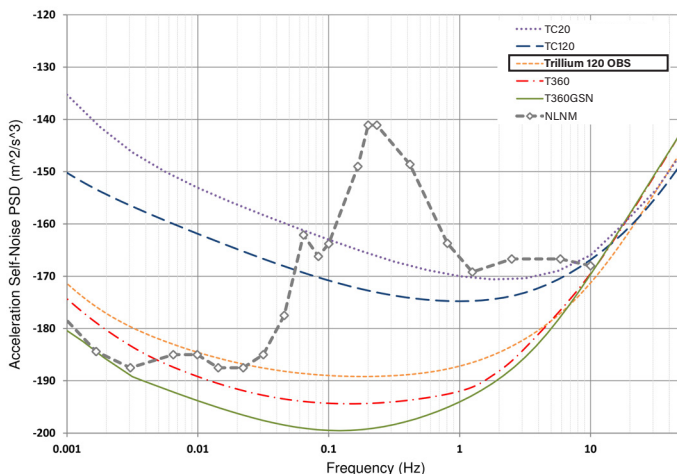
- Full before-and-after State of Health logged

**State of Health Log:**

Recording capacity of >2 years of daily scheduled interval SoH values

- Time from power on
- Seismometer mass positions
- Vessel and seismometer orientations
- Temperature

## SELF-NOISE GRAPH



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

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Listening to the Earth

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