A REVOLUTIONARY NEW ECOSYSTEM
FOR PORTABLE MONITORING CAMPAIGNS
DATA ACQUISITION SYSTEM
OCEAN BOTTOM
SEISMOMETER SYSTEM

Triton
OCEAN BOTTOM SEISMOMETER SYSTEM
The long-standing collaboration between Nanometrics and Scripps Institution of Oceanography has led to a joint R&D partnership that integrates Scripps’ industry leading OBS technology with Nanometrics’ OBS seismometers and the revolutionary, new Pegasus digitizers.

The Triton OBS system features a low-profile design and a robust conformal syntactic-foam flotation-based structure. To minimize environment noise, the seismometer is mechanically decoupled from the system while still completely shielded from ocean currents.

Designed to be deployed for shallow, intermediate, and deep water up to 6,000 m, for durations ranging from days to over two years. The Triton is also equipped with self-contained anchor and flotation designed for quick deployment and recovery.

The Triton Ocean Bottom Seismometer System was developed with an emphasis on ensuring scientific outcomes by providing an intuitive experience that yields ready-to-use, complete data sets. This versatile system combines minimal size, weight and power requirements with advanced data transfer and a mobile user interface to provide the most efficient OBS solution possible.

A mobile user interface removes the need to open pressure vessels on the ship which greatly improves the onboard workflow; the robust internal memory eliminates the inherent risks in using swapable media. Multiple available configurations of the primary, reserve and backup batteries provides highly reliable power to all critical subsystems.

The integrated Triton system provides added smart-system capabilities including:

- Manage attached seismometer with plug+play sensor API, identifies model, serial, instrument response and sensitivity
- Configurable automatic sensor/gimbal levelling schedule
- One-click time-sync of internal clock to GPS before/after deployment
- Sensor, digitizer and gimbal state-of-health (SoH)
- Sensor-digitizer instrument response metadata automatically generated
- Companion control and harvesting apps to manage complete system

The Triton OBS features a hinged sensor cover that shields the seismometer from ocean currents when it is dropped from the Triton onto the ocean floor.
The Pegasus series of digitizers are a revolution in size, weight and power consumption while maintaining the fidelity and versatility of a modern broadband data acquisition system. The class-leading low power consumption significantly reduces battery requirements and overall OBS system size and weight. With a boot time of a few seconds, smart sensor auto configuration and the ability to recover one year of data in just 1-2 minutes, Pegasus is optimized for simplicity and ease-of-use ensuring the highest possible data quality and availability from even the most demanding environments.

Nanometrics has a long history of developing reliable, high-performing Ocean Bottom Seismometers (OBS) which have earned a reputation for rugged dependability. The Trillium Compact OBS is an ultra-low power broadband seismometer for deployments up to 6,000 m depth.

The precise, kinematic 360° gimbal auto-levels from any orientation ensuring successful deployment and implementation providing the full performance of a land-based seismometer, including its exceptional dynamic range, low noise floor and low power consumption. A titanium pressure vessel and proven glass epoxy connectors ensure exceptional ruggedness and resistance to corrosion in marine and freshwater environments.

PEGASUS DATA COLLECTION, HANDLING AND MANAGEMENT

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MODERNIZING THE WAY YOU COLLECT AND PROCESS YOUR DATA

Data recovery is via lightning-fast USB 3.0, where one year of data can be seamlessly downloaded ready for processing in just 1-2 minutes (1 GB/10 s). Pegasus operators have the option of utilizing the Nanometrics Cloud based Deployment Manager which provides all the tools required to archive, distribute, verify, audit and process the data collected. Advanced platform tool sets allow users to take high volumes of raw data right through to research-grade catalogs benefiting from our state-of-the-art machine learning, advanced beamforming and template matching algorithms.

SCIENCE READY DATA

• Complete ready-to-process data: MiniSEED or SEGY waveform data, StationXML metadata and comprehensive project audit information, including merging ancillary data

• Full Audit trail: Integrated project quality control tracking, field notes and photos

• Cloud software: Interactive open science environment for large volume data processing

iOS and Android mobile applications connect to the digitizer to provide the primary field interface for the Pegasus digital recorder.
TECHNICAL SPECIFICATIONS TRITON OBS WITH INTEGRATED PEGASUS OBS DIGITAL RECORDER
Specifications subject to change without notice

SENSOR INPUTS
Channels: 3-channel Sensor A port (seismometer)
1-channel Sensor B port (DPG or hydrophone)
Sampling: Simultaneous on all channels
Resolution: 28 bits per channel
Input Voltage Range (Peak-to-peak differential): 40 V, 10 V, 4 V, 1 V, 0.5 V
Input Impedance: 2 MΩ (40 kΩ for 40 Vpp range)

SENSOR COMPATIBILITY
Sensor Types: Compact OBS Seismometer, differential pressure gauge (DPG), hydrophone
Control Lines: 3 on Sensor A and 1 on Sensor B port — typically used for leveling, and selecting XYZ/UVW or SP/LP modes
Serial Interface: Sensor A supports digital management of Nanometrics sensors

DIGITIZER PERFORMANCE & CAPABILITIES
Type: 28-bit ADC per channel
Accuracy: Nominal gain accurate within ±0.5%
Dynamic Range: >142 dB @ 20 sps, >135 dB @ 100 sps typ (full-scale peak to RMS shorted-input noise)
Preamp Gain: 1x, 4x, 10x, 40x, 80x
Sensor A and B independently selectable
Sample Rates: 1, 2, 5, 10, 20, 40, 100, 200, 250, 500, 1000 sps
Sensor A and B independently selectable
Decimation Anti-Aliasing Filter
• Linear phase (also known as non-causal or acausal)
  • -140 dB (linear phase) at output Nyquist frequency, 0 dB at 80% Nyquist

SEISMOmeter
Trillium Compact OBS 120
• 6,000 m depth
• Full 360° gimbal
• 180 mW power consumption
• Titanium OBS vessel

Refer to datasheet or www.nanometrics.ca for complete details.

DATA RECORDING & RETRIEVAL
Data types:
• Waveform data: miniSEED or SEGY, STEIM2 compressed
• Instrument response metadata: StationXML
• Station metadata: StationXML
• State-of-Health: miniSEED
• Instrument logs
• Ancillary experiment metadata

Internal Memory: High reliability 256 GB standard
Data Download: USB3.0 Superspeed (>100 MB/s) to application available for Windows, OSX, and Linux
Real-time view: Bluetooth with mobile application (iOS and Android) for configuration and live view of waveforms and state-of-health

TIMING
Timing System: Low-power, digitally-temperature-compensated (DTCXO) precision time base (alternative clock options available).
Timing Source: GPS (timing sync), free-running (standard operation)
Timing Accuracy: ~0.4 ms/day typical after linear correction

CERTIFICATIONS
Regulatory: CE 2014/53/EU (RED), FCC, IC

POWER
Main Battery Bottle:
1-6 lithium primary packs (1,200 Wh each)
or 1-10 lithium rechargeable packs (500 Wh each)
 Reserve Battery:
1-3 lithium primary packs (600 Wh each)
or 1-5 lithium rechargeable packs (200 Wh each)
(battery capabilities rated at 0°C)
Power-up: <10 seconds
Protection: Electronic resettable fuse design, reverse battery and short circuit protection
Battery Manager: User-configurable low voltage shutdown and restart thresholds

POWER USAGE (TYPICAL)
Pegasus Datalogger: 240 mW
DTCXO time source: 25 mW
Compact OBS: 180 mW
Total Power: 445 mW

CONNECTORS
USB: USB-C Waterproof receptacle under seal screw
Communications Module: Multipin waterproof connector under seal screw

PHYSICAL CHARACTERISTICS
Housing: Polyethylene shell filled with conformal syntactic foam on a stainless steel frame with sacrificial zinc anodes.
Al cylinder pressure vessels rated for 6,000 m depths
Ingress Protection: Rated for 6,000 m
Humidity: 100%
Operating Temperature: -20°C to +60°C (Standard Model)
Storage Temperature: -20°C to +70°C
Weight in air (full complement of batteries, and anchor): 360 kg (approximate)
Weight of Anchor: 70 kg
Size: 89 cm x 97 cm x 69 cm high (not including flag, beacon and crane hook)
Rate of Ascent: 40 m/min (approximate)
Rate of Descent: 50 m/min (approximate)
Acoustic or Timed Release: Double redundant burn wire operated acoustically by Edgetech IPC-3013 Equivalent transducer. 10 km range.
Optional Sensors:
• Differential Pressure Gauge with flat response from 2 mHz to 20 Hz
• Hydrophone (HTI-04-PCA/ULF) with a frequency range of 0.01 Hz to 8 kHz
Anchor: Mild steel with sacrificial zinc anodes
Location Beacon Options: Flasher, Radio Beacon, Signal Flag and Iridium Satellite Beacon

Contact a product expert Toll Free: 1 855 792 6776 | sales_mkt@nanometrics.ca