

A high performance seismograph for down-hole installations



Meridian PH

All-in-one Digital Seismometer

Exceptional Performance

Marrying the sensor to the digitizer and recorder, this all-in-one seismograph provides exceptional performance for a variety of downhole installations: direct burial, shallow or deep-cased holes. The Meridian PH features the latest generation Trillium 120Q class seismometer technology mounted on a levelling system inside a stainless steel pressure vessel. Inherent in all Trillium seismometers, the Meridian PH provides low power consumption, remote mass centering, and a robust no-mass lock design. The Meridian PH is also available for Polar environments.

Meta data you can trust

- > Instrumentation configuration is made easy with an intuitive user interface. Once configured, the Meridian PH builds its own meta data.
- > With the digitizer and sensor housed in a single unit, data-less seed volume is internally built and guaranteed to be correct every time.

Efficient array management, Simplified site visits and logistics

- > Reduced “touch time” makes it easier to manage your resources

Less to forget, less to integrate

- > Combining proven technologies in a single package keeps it simple

Cost Benefits

- > Less equipment to maintain
- > Installation costs reduced
- > Logistics costs lowered

Operational Benefits

- > Higher data quality than vault style installations
- > Auto-levels to true vertical for highest fidelity recording
- > Uniform installation technique
- > Less equipment to transport
- > Simplified meta data management
- > Better performance in urban areas
- > Improved security of assets



Meridian PH connects to a Surface Interface Unit which provides intuitive diagnostic LEDs enabling installations without the need for a smart device.



Meridian PH

For more detailed specifications, please go to www.nanometrics.ca. Specifications subject to change without notice.

SENSOR: Trillium 120Q Seismometer

See the Trillium Posthole Seismometer specifications for more details.

TECHNOLOGY	
Topology	Symmetric triaxial
Operational tilt range	$\pm 5^\circ$ automated levelling to true vertical
Mass centering	Motorized re-centering automatically initiated during levelling sequence
Auto mass centering	Configurable thresholds, intervals, retries

PERFORMANCE	
Bandwidth	-3dB corners at 120s and 150Hz
Self-noise	Below the NLNM 100s to 10Hz
Clip Level	<17mm/s up to 10Hz and 0.17g above 10Hz

DIGITAL RECORDER

PERFORMANCE	
Type	24-bit ADC per channel, simultaneous sampling
Dynamic range	142dB @ 100sps (full-scale peak to RMS shorted-input noise)
Sample rates	1, 2, 5, 10, 20, 40, 50, 80, 100, 125, 200, 250, 500, 1000, 2000, 5000sps, plus dual sample rates
Selectable Gain	1, 2, 4, 10, 20, 40
Sensitivity	480, 960, 1920, 4800, 9600, 19200 counts/(\(\mu\text{m}/\text{s}\)), 1% accuracy
Anti-alias Filters	Attenuation: 140dB at output Nyquist, 0dB at 80% Nyquist frequency
Digital Filter	User-configurable low-pass and high-pass 1st to 5th order, 0.1mHz - Nyquist

CALIBRATION	
Signal Source	16-bit DAC with 30ksps output
Attenuator	Selectable 1, 10, 100, 1000 attenuation
Waveforms	Playback standard .wav files (step and sine wave provided) Custom waveforms may be used

RECORDING (CONTINUOUS)	
Formats	MiniSEED, Nanometrics NP
Internal Media	8 GB flash memory (32 or 64 GB options available)
Removable Media	SD Card up to 64GB

RECORDING (EVENTS)	
Triggers	Bandpassed STA/LTA, Threshold
Captured Data	MiniSEED, ASCII

DATA RETRIEVAL	
File Transfer	Via Ethernet, Ethernet-connected DSL, VSAT, cellular, radio
Media Exchange	Weather-sealed data cartridge that is field-swappable during continuous recording with no loss of data

TIMING	
Timing System	Internal DCXO clock disciplined to GPS (standard) or external PTP timing source (opt.)
Timing Accuracy	<5 \(\mu\text{s}\) (GPS Always On) <100 \(\mu\text{s}\) (GPS duty cycled)
GPS Receiver	Internal receiver
GPS Power	Selectable: Always On, or Duty Cycled

DATA STREAMING	
Continuous	Seismic data and State-of-Health data
Formats	SeedLink (optional), Nanometrics NP (standard)
Events	Triggered event data: email, secure file transfer, other options available

COMMUNICATIONS	
Web-based UI	Supports standard PC, tablet and mobile devices
Network interface	10/100 Base-T Ethernet
IP Addressing	Static, dynamic (DHCP) or link-local IP address
Protocols	UDP/IP unicast/multicast, HTTP data streaming (inbound or outbound)

POWER, ENVIRONMENTAL, PHYSICAL

POWER	
Power Input	9-36 VDC isolated input
Consumption	1.5W (1.8W with Ethernet) typical
Protection	Lightning surge protected Reverse-voltage and over-voltage protected Self-resetting over-current protection
Battery Manager	User configurable low voltage shutdown and restart thresholds

ENVIRONMENTAL	
Operating temperature	-20°C to +60°C (Ultra-low temperature option available, including SIU. Please contact Nanometrics.)
Storage temperature	-40°C to +70°C
Shock	20g half sine, 5ms without damage, 6 axes
Pressure	Insensitive to pressure
Weather/ water resistance	Rated to IP-68 continuous immersion up to 40m
Humidity	0 to 100%

PHYSICAL	
Max. cable length	40m
Housing	Stainless steel
Weight	17.9kg (39.5lb.)
Height	600mm (23.62in.), including connector and feet
Diameter	143mm (5.64in.)
Removable digitizer	Digital recorder can be removed for servicing
Connector	16-pin, Subconn Micro series, top mounted

SURFACE INTERFACE UNIT (SIU)

FEATURES	
Status LEDs	Removable media, Archive, Time, Link, Sensor, System
Connectors	Power: 3-pin MIL-Circular Ethernet: 4-pin MIL-Circular Data cartridge: 8-pin MIL-Circular GPS antenna: TNC connector with 3.3V supply for active antenna 14-pin MIL-Circular
Data cartridge	Field-swappable, weather-sealed data cartridge holding replaceable SD card (41mm x 67mm)
Buttons	Media Eject, Shutdown

PHYSICAL/ENVIRONMENTAL	
Housing	Powder coat aluminum with nickel-plated steel base
Weather/water resistance	Rated to IP-67
Dimensions	Length: 180mm (7.09in.) Width: 83mm (3.27in.) Height: 43mm (1.7in.) including connectors