

DIGITAL OUTPUT

BROADBAND SEISMOMETER

THETA Θ - TTD120 - VEL

THETA Θ - TTD120 - VEL is a unified digital output broad band seismometer, a broadband feedback sensor and a precision 24 bit 8 channel digitiser are housed inside waterproof enclosure.

The low noise high dynamic range broadband feedback seismometer is based on truly rectilinear suspension system which does not require mass lock. Eight channel 24 bit digitiser exploits the high dynamic range of the sensor forming a perfect portable sensor system.

THETA Θ - TTD120 - VEL digital sensor can be effectively utilised in permanent or short term seismic experiments such as:

- Single or large scale seismic networks
- Micro-seismic monitoring
- After-shock monitoring
- Volcanology
- Structural health monitoring
- Hydrocarbon exploration
- Permanent reservoir monitoring
- Induced seismicity detection
- Explosion monitoring
- Post hole seismology
- Micro-seismic monitoring



The product specifications and the stated data are subject to change without prior notice.

SIGNIFICANT QUALITIES AND BENEFITS OF THE SYSTEM

- High data quality broadband data
- Truly rectilinear suspension system with high cross axis rejection
- Broad band data with high frequency response extending to 150 Hz
- Minimises equipment used during installation
- Reduces equipment to transport
- Automatic self-installation and zeroing for quick installation
- Tilt tolerance of ± 10 degrees
- Display of operational parameters
- System gain can be remotely adjusted with programmable gain amplifiers
- Portable and easy to deploy
- Waterproof with connectors mated
- Connector turret provides easy access to the connectors and cabling

Acceleration Ground referenced Power Spectral noise estimate in 1 Hz bandwidth in units of $(m^2/s^4)/Hz$.

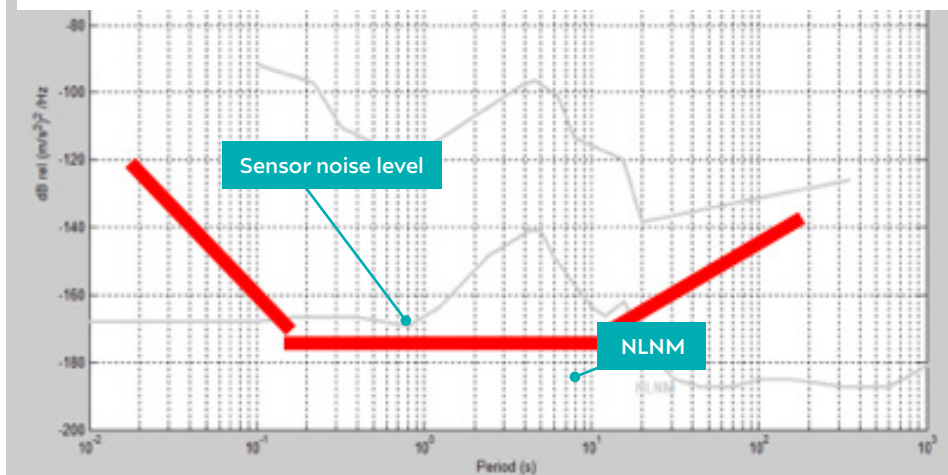
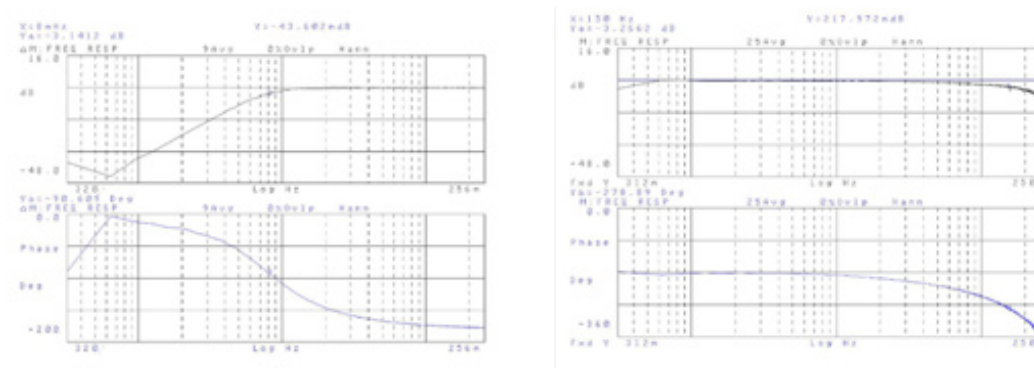


Figure 1: Triple red line is sensor power spectral noise density over the entire seismic spectrum. The sensor noise level crosses the low noise model form 8 Hz to 14 seconds.

The standard frequency pass band is flat to velocity from (120 Seconds period) 0.00833 Hz to 150 Hz, other options are available. Standard Pass band Frequency is shown in the provided frequency response plot.

MEASURED FREQUENCY RESPONSE OF THE DIGITAL SENSOR



Note: The measured frequency response is given as low and high frequency sections in order to identify accurately the corner frequency of the transfer function.

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TECHNICAL SPECIFICATIONS

Standard Frequency Response:

Flat velocity (120 sec.) 0.008333 Hz to 150 Hz

Other optional responses:

60 seconds to 150 Hz

30 seconds to 150 Hz

20 seconds to 150 Hz

10 Seconds to 200 Hz

1 second to 200 Hz

Analogue sensor sensitivity:

Differential: 2*1000 V/m/s

Other responses are available.

SENSOR CONTROL LINES

Calibration signal: Can be applied to each axis.

Calibration enable via serial port.

Mass Centring Range: ±10 Degrees.

Mass Lock: Not required.

Lowest spurious Resonance:

340 Hz vertical and horizontal modules.

Cross axis sensitivity: -68 dB.

Linearity: Measured at 1 Hz: -85 dB,

Bubble level: 20mm diameter

DIGITAL RECORDER MODULE:

Operational Performance: Independent 8-24 bit Delta Sigma Digitizer with simultaneous sampling.

Dynamic Range:

Sample rate: 1K Hz: -122.2dB, at: 100 Hz: -136.3 dB, at: 10 Hz -138.4dB. (Full scale P-P to RMS shorted input noise)

Gain Accuracy: ± <0.5%, Each channel calibrated.

Configurable Preamplifier (PGA):

Gain settings *1, *2, *4, *8 *12. Each channel independently controlled.

Sample rates:

User selectable sample rates: 1 2,5,10,20,40,50,100, 125,200,250,500,1000. Four separate same rates are available concurrently.

Calibration signal:

24 bit buffered output DAC with adjustable amplitude.

Wave forms:

Square, Sine, Step, Pulse with duty cycle and frequency control and Pseudo random signals.

Generated with an internal synthesizer.

Decimation Filter Options:

Causal (minimum phase) and a-causal (linear phase) filters, Applicable to all the sample rates and concurrently available. Four separate same rates are available concurrently and can be mixed with causal and a-causal output options.

Digital filters:

User selectable, high pass and band pass digital filters.

DATA STORAGE

Format: MiniSEED and PCF (Proprietary data Format)

Internal Memory: 2 G Byte

Data Storage: 32 G Byte SD card. Data downloadable via USB or Ethernet.

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32 G Byte SD card.

TRIGGERS:

Threshold trigger with high-pass filter.

User selectable high pass filter.

STA/LTA: Band passed ratio-metric trigger.

Concurrently available in addition to continuous data streams.

LED Indicators: TCP/IP activity.

Colour display: Displays operational parameters, state of health information.

TIME SYNCHRONIZATION

Time Source: GPS, GNSS, NTP or internal source.

GPS: Maximum 50 meters Cabling

NTP: NTP option software selectable.

USER INTERFACES:

Available interfaces: 10/100 Base-Ethernet, USB, Serial RS232

RS232 Serial input: Control and acquire digital data. Interface to e.g.: Weather stations, digital infrasound sensors, digital strain/stress gauges.

Logic Control Lines: Calibration enable and centre via serial interface.

IP Addressing: Static, dynamic (DHCP)

Protocols: UDP/IP unicast/multicast

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Recording/acquisition Software Options:
SeisGram2K: Swarm: Earthworm: jAmaSeis.

Operating temperature: -20 to 75 degrees centigrade.

Power Supply: +9 - +36 V DC, Galvanically Isolated analogue Input stage of digitiser.

Galvanically Isolated sensor electronics.
Polarity protected, over voltage protection with transient suppression.

Power Consumption: 1.9 W with max 1000sps and TCP/IP

PHYSICAL:

Case diameter: 138 mm

Case height: 192 mm

North South Pointer: Machined to the base

Base plate and top cap: Hard Anodised Aluminium Environmental: IP-68

Weight: 3.4 Kg



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