

Shallow Borehole EpiSensor 2

FEATURES

Shallow Borehole EpiSensor 2 (SBEPI 2) is a cost-effective version of an advanced borehole force-balance, triaxial broadband seismic sensor that builds upon the outstanding record of its predecessor, the EpiSensor/HypoSensor; the world's first seismological-grade strong motion accelerometer. It is a triaxial downhole package made for hostile subsurface to borehole installations up to 100m depth. The SBEPI 2 comes in a small package of 2.375" OD diameter allowing deployment in very small subsurface and borehole installations that is drilled at much lower cost. The unit consists of three EpiSensor 2 force balance accelerometer modules mounted orthogonally in one small convenient package.

The high dynamic range of the broadband SBEPI 2 sensor allows both weak and strong motion high-fidelity recording from a single sensor. The seismic industry-leading self-noise of the SBEPI 2 is accomplished with quiescent power consumption (under 325mW for a triaxial sensor), well below that of any 4g sensors on the seismic monitoring market today. The SBEPI 2 has quiescent power consumption that is 60% to 70% less than competing designs!

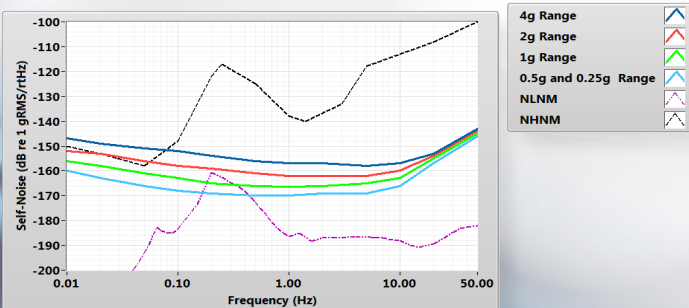
When combined with the world's only 26-bit seismic data acquisition system, the Quanterra Q330HRS, it establishes a new performance standard for digital strong motion recording applications. When paired to the seismic community leading ultra-low power digitizer, the Quanterra Q330, it allows high fidelity triaxial strong motion recording with combined power consumption of well under 1W.

SBEPI 2 Performance Attributes:

- Industry leading 166 dB dynamic range
- Very low self-noise: comparable to some broadband seismometers
- Wide passband: DC to >350 Hz
- Highest thermal stability, and enhanced dynamic accuracy, allow for higher data quality
- Selectable full-scale ranges from $\pm 0.25 g$ to $\pm 4 g$
- Powerful "AUTOZERO" capability for offset removal on any full-scale range
- Full calibration capability
- Remote signaling of full-scale range via multiple interfaces
- Galvanic isolation of critical power and control interfaces

SBEPI 2 Ease-of-Use:

- Allows full functional control through the digitizer, via an isolated Epi™ serial interface:
 - Digital selection of full-scale range
 - Control of AUTOZERO mode
 - CAL ENABLE function
- Remote control modes (digitizer and serial interface) enable efficient operation once installed
- Serial interface provides access to sensor-specific information
- Very small diameter; 2.375 inch, rated for depth up to 100m
- Rugged design



SPECIFICATIONS

Architecture:	Triaxial, force-balance accelerometer with capacitive displacement transducer; X/Y/Z (non-Galperin) configuration
Centering:	Optional AUTOZERO mode to allow removal of static sensor offsets (zeroed to within ± 0.005 g)
Full-scale Range:	Electronically selectable range: ± 4 g, ± 2 g, ± 1 g, ± 0.5 g, and ± 0.25 g (peak)
Bandwidth:	DC to >350 Hz (-3 dB point)
Dynamic Range (Integrated RMS):	166 dB @ 1 Hz over 1 Hz bandwidth 155 dB, 3 to 30 Hz
Non-linearity:	< 0.015% total non-linearity
Hysteresis:	< 0.005% of full scale
Cross-axis:	< 0.5% total
Sensitivity:	5V/g for ± 4 g full scale range
Offset Temperature Coefficient:	Horizontal sensor: $60 \mu\text{g}/^\circ\text{C}$, typical Vertical sensor: $320 \mu\text{g}/^\circ\text{C}$, typical
Power Supply:	Voltage: 9 to 36 V DC isolated input
Power Consumption:	<325 mW typical quiescent
Protection:	Reverse-voltage and over-/under-voltage protected Over-current protection with self-resetting feature
Isolation:	Input power, serial interface, and digital control lines galvanically isolated from sensor ground
Grounding:	Case ground connected to dedicated cable line for automatic connection to digitizer case
Control Interfaces	
Digital ENABLE Lines:	Dedicated, isolated lines for control of full-scale range, CAL ENABLE and AUTOZERO ON/OFF
RS-232 Interface:	TIA/EIA-232-F compliant, isolated RS-232 with full command-line control of all sensor parameters and functions

Full-Scale Range Remote Signaling Mass

Position Interface: Range-dependent voltage output on traditional broadband sensor mass position lines

Signal Line

Interface: Time/Amplitude-coded pulse train superimposed on differential signal lines: signaled upon full-scale range change, or upon power-ON reset

Electrical Interface

Connector: Molded connection to housing

Acceleration Output: 40 Vpp differential

Output Impedance: 2 x 100 Ohms

Calibration Input: Protected, differential input for exciting all three axes simultaneously

Cable:

Rated up to 100m

Inbound end connects directly to Q330-class digitizers; Y-plug for RS-232 interface

Standard Length: 40m and 100m

Physical and Environmental

Housing: Stainless steel type 316

Mounting: PVC or steel Pipe

Dimensions: 2.375 inch diameter x 20 inch length

Weight: 6.5lbs

Operating

Temperature: -40°C to 60°C

Storage

Temperature: -65°C to 75°C

Humidity: 0 to 100%

Remote Commands (password-protected access):

Full-scale range setting

Calibration ENABLE

AUTOZERO ON/OFF

System Response Values

Offset Voltages for each Axis

System Information/Serial Numbers/Hardware and Firmware Revisions