

OVERVIEW

xGeo® is a fully digital geophone unit designed for Structural Health Monitoring (SHM) as part of the Digitex Sentry System. It integrates a high-sensitivity tri-axial geophone with advanced 24- or 32-bit digitization, providing precise velocity measurements of ground motion and structural vibrations. Engineered for permanent or portable installations, xGeo delivers reliable real-time monitoring in harsh environments where ruggedness, low power, and accurate synchronization are critical.

DESCRIPTION

xGeo can be deployed as a standalone accelerograph or as part of a daisy-chain SHM network. It embeds a geophone with a scale factor of 28 V/m/s, natural frequency of 4.5 Hz, and operating bandwidth from 0.2 to 200 Hz, optimized for measuring vibrations across a wide frequency range. Its 24- or 32-bit Delta-Sigma ADCs provide dynamic ranges up to 120 dB, capturing even the smallest motion signals with accuracy.

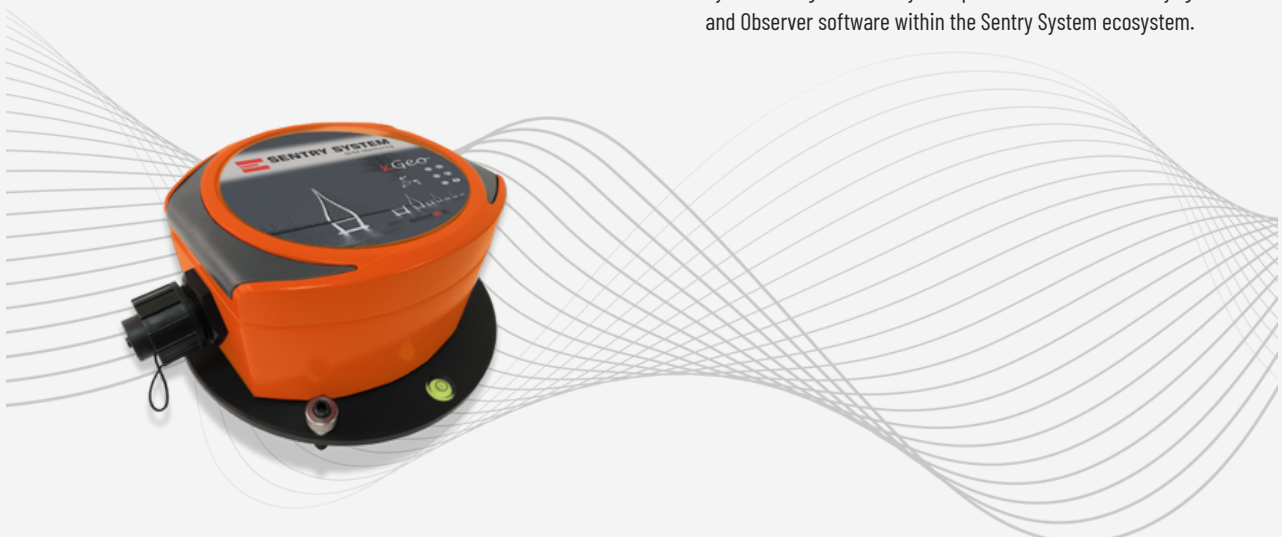
The unit includes built-in anti-aliasing filters, supports sampling rates from 50 SPS up to 1000 SPS, and features Store&Forward® buffering for data continuity during network outages. Data can be streamed in real time or stored locally on an SD/eMMC card in MiniSEED format. Synchronization is achieved via GPS or proprietary DigiSync®, ensuring all sensors in the network remain precisely aligned.

APPLICATIONS

- Seismic monitoring of dams, tunnels, and bridges
- Ground vibration monitoring from construction, blasting, or piling
- Condition assessment of buildings and high-rise structures
- Vibration analysis of transport infrastructure (railways, metro, highways)
- Rapid assessment of dynamic response after earthquakes or extreme events
- Research and testing requiring precise geophone measurements

KEY FEATURES

- Embedded High-Sensitivity Geophone: 28 V/m/s scale factor, 4.5 Hz natural frequency, 0.2-200 Hz bandwidth; available in uni-, bi-, or tri-axial configurations.
- High-Performance ADCs: 24- or 32-bit Delta-Sigma converters with dynamic range up to 120 dB.
- Signal Quality: Built-in anti-aliasing filter and precision digitization minimize noise and maximize fidelity.
- Flexible Installation: Supports permanent or portable deployments; can act as standalone unit or part of a daisy-chain SHM system.
- Communication Options: Standard Ethernet; optional Wi-Fi, DigiMESH®, or GSM/4G modules enable flexible connectivity.
- Advanced Data Handling: Store&Forward® ensures no data loss; data compression in proprietary Digitex format or MiniSEED standard.
- Configurable Sampling Rates: From 50 sps up to 1000 sps, adaptable for seismic or vibration monitoring.
- Time Synchronization: GPS or DigiSync® provides precise, sub-millisecond alignment across networks.
- Local Storage: Optional SD/eMMC card for MiniSEED event and ring-buffer storage.
- Device Management: Embedded web interface for configuration, live monitoring, and OTA firmware updates.
- Rugged Enclosure: Compact aluminum housing with IP67 protection, wide operating temperature range (-40°C to +55°C).
- Low Power Operation: Low power consumption; supports PoE and 12-24VDC supply.
- Status Indicators: Informational LEDs provide immediate device feedback.
- System Integration: Fully compatible with xPlorer, Voyager, Nexus, and Observer software within the Sentry System ecosystem.



SPECIFICATIONS

Sensor

Type: Embedded triaxial geophone module integrating three orthogonally oriented velocity sensors for precise ground motion measurement

Supported Models : Configurable for uni-axial, bi-axial, or tri-axial operation depending on application requirements

Digitizer

Channels: Up to 3 analog velocity channels, featuring low frequency and wide dynamic range

- Details:**
- Type: Vertical/Horizontal low-frequency velocity sensor (electromagnetic coil & moving-mass)
 - Natural Frequency: 4.5 Hz
 - Scale Factor: 28 V/m/s
 - Damping: 0.6 % (open circuit)
 - Coil Resistance: 375 Ω
 - Moving Mass: 11.5 g
 - Spurious Frequency: ≥ 90 Hz
 - Maximum Coil Excursion: 4 mm
 - Distortion: ≤ 0.3 %

Resolution: 24- or 32-bit Sigma Delta ADC per channel

Sampling rates: User-selectable from 50 to 1000 samples per second (SPS)

Anti-alias Filter: Integrated digital low-pass filters (mode-dependent, 10 Hz - 70 Hz) providing effective anti-alias protection

Trigger

Modes: Above Max, Under Min, Over Relative, Over Absolute

Pre-/Post-Event: User configurable

Configuration: Voting logic with user-defined weighting per channel

Interface

Connectivity: Ethernet (10/100 Base-T), Wi-Fi, DigiMESH®, GSM/4G (model dependent)

Led Interface: Power, Streaming Type, State of Health, Battery Voltage, and Charging Status

Embedded Web server: Integrated HTTP interface for configuration, data retrieval, real-time visualization, and basic frequency analysis. Provides access to device logs, user actions (reboot, backup, restore, and configuration management), and sensor diagnostics

Environmental

Operating Temp.: -20 °C to +60 °C

Humidity: 0 - 100 % RH (non-condensing)

Synchronization

Time Base: GPS-disciplined oscillator or DigiSync® network synchronization protocol

Accuracy: Sub-microsecond (GPS mode) or sub-millisecond (DigiSync® mode) timing precision across distributed networks

Communications & Output

Data Modes: Continuous real-time streaming; user-configurable ON/OFF operation in standalone mode

Protocols: Embedded SeedLink protocol for data redundancy via Nexus application

Internal Storage: Optional 32 GB non-volatile SDHC card.

Operation Mode: Ring Buffer and Triggered Event modes; miniSEED format

Stream Compression DigiWLC®, miniSEED STEIM1 or Uncompressed

Data Reliability: Store&Forward® buffering - retains data during communication loss and automatically forwards upon link restoration, ensuring zero data loss

Power

Supply Voltage: 9 - 28 V DC (typ. 12 V) PoE compatible

Power Consumption: ~ 2.5 W (average)

Backup: Optional Li-Ion battery pack (~12 h autonomy)

Protection: Reverse voltage, over/under voltage, surge protection up to 2 kV DC (optional)

Physical

Dimensions: 130 × 120 × 65 mm (5.12 × 4.72 × 2.56 in)

Weight: 1.1 kg

Enclosure: Rugged coated aluminum housing, IP67 rated

Mounting: Horizontal or vertical using mounting plate; single anchor point, three leveling bolts, and integrated bubble level

Certification & Calibration

Standards: CE, RoHS, ISO9001, ISO14001

Calibration: Factory calibrated; individual calibration certificate included

Software Updates

Firmware: Over-the-air (OTA) updates via Voyager® or embedded HTTP server

AVAILABLE OPTIONS

SSWiFi: Wi-Fi Communication Module

SSGPS: GPS Module for time and data synchronization

SSGSM: 4G GSM module for streaming and/or SMS alarming

SSPW: Power protection module (2.25KV, 10-36V Input)

SSSDG: SD Memory Module (Non detachable 32GB SD card)

SSBAT: Battery option (12h autonomy)

SSDO: Digital Relay Outputs Module with ext. JB (4, NO/NC)

SSDSP: Informational display (2.8 Inch at the top)

SSPOE: Power Supply: 24VDC; 1A; 24W and POE Injector

BENEFITS

- Provides precise velocity measurements across a wide frequency range
- Enables both standalone and networked SHM deployments
- Ensures reliable performance in harsh environments with IP67 housing
- Offers versatile connectivity options (Ethernet, Wi-Fi, DigiMESH®, GSM/4G)
- Guarantees data continuity through Store&Forward® and MiniSEED support
- Seamlessly integrates into the Digitex Sentry System ecosystem