güralp

CERTIMUS

NEXT GENERATION MEDIUM MOTION SEISMIC STATION WITH ULTRA-LOW-POWER MODE FOR REMOTE SITES



All-in-one portable, digital, broadband triaxial seismometer with state-of-the-art communication capabilities suitable for direct burial, surface and vault deployment.

KEY FEATURES

> 120 s to 100 Hz
> Remote, user-selectable long-period corner between 20 s and 120 s
> Operational at ± 90°
> Ultra-low-power mode < 300 mW
> Industry standard digitiser with advanced data communication features

APPLICATIONS

> Local, regional and global monitoring
> Microseismic and induced seismicity monitoring
> Permanent and rapid deployment for volcanic unrest monitoring

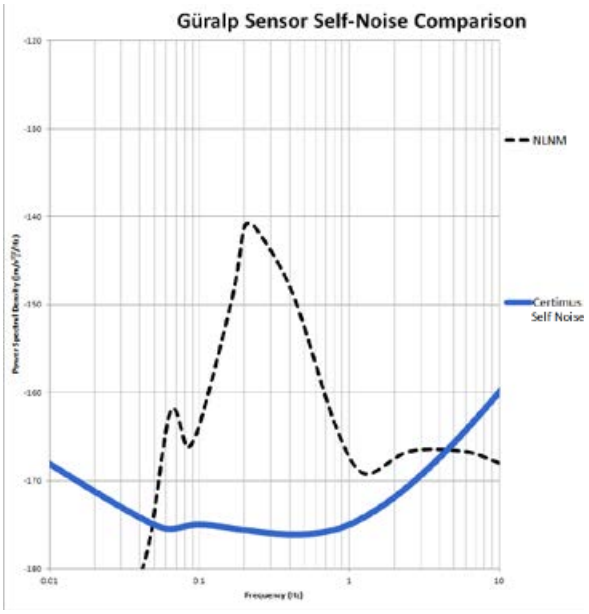
Certimus

A complete seismic station suitable for the remotest of sites, for quick-and-easy, plug-and-play deployment.

CERTIMUS DIMENSIONS:



SELF NOISE PLOT:



*(Peterson, 1993)

Applications

> Local, regional and global seismic monitoring

> Temporary deployment in challenging environments or remote areas

> Rapid deployment for aftershock monitoring

> Microseismic and induced seismicity monitoring in the hydrocarbon market, e.g. fracture monitoring

> Geothermal energy production monitoring

> Permanent or rapid temporary deployment for volcanic unrest monitoring

Certimus is a triaxial, broadband, digital seismometer with sophisticated data timing, storage and communication capabilities in a single compact instrument.

Certimus offers maximum flexibility for installation in challenging conditions. Unlike any other medium motion instrument, the state-of-the-art digital sensor can operate at a tilt range of ±90° and has a wide frequency response of 120 s to 100 Hz.

For scenarios such as aftershock monitoring where speed is paramount, the Certimus benefits from an adjustable long-period corner which can be adujsted pre- or post-deployment. Certimus offers eight options ranging between 20 s and 120 s.

Data are recorded on dual-redundant microSD cards. Users can elect to house the removable card within the instrument or, for instances of direct burial, in a Surface Storage Module in line with the GNSS at the surface.

An ultra-low-power mode allows for operation at less than 300 mW. When used with our 250 Wh Portable Power Module (PPM) which is re-chargable using solar panels, the expected life and power usage are reported and recorded.

An optional 2.4 inch, full colour LCD display shows waveforms, instrument state-of-health and settings, network configuration and a virtual instrument level.

The hard anodised aluminium casing is environmentally sealed to withstand the harshest environments. An internal thermometer and a humidity sensor alert you to any moisture ingress.

For added confidence during deployments, the GüVü Bluetooth App displays waveforms, orientation, temperature and humidity data.

Data can be shared via Ethernet and Bluetooth connections.

Users can select sample rates of up to 1000 samples per second with the option to simultaneously stream multiple sample rates in addition to two recording rates.

Data are locally recorded in miniSEED (with metadata stored in Station XML and dataless SEED formats) and can be streamed in realtime using GCF (Scream!), GDI-link and SEEDlink.

Enhanced instrument and data management

Integrated network connectivity allows the Certimus to be controlled remotely using Güralp Discovery, our sophisticated instrument and data management software platform, or via a standard web browser.

Discovery's powerful tools include:

> Instrument IP address identification on LAN or internet, eliminating the need for static IP addresses
> Access to hardware State-of-Health (SoH), GNSS location, instrument response and calibration values
> View and stream data with back-fill capabilities plus selectable date-and-time-window data transmission
> Advanced data analysis including spectral density graphs, spectograms, discrete Fourier transforms and histograms
> Remotely and simultaneously apply configuration files to multiple units within a network

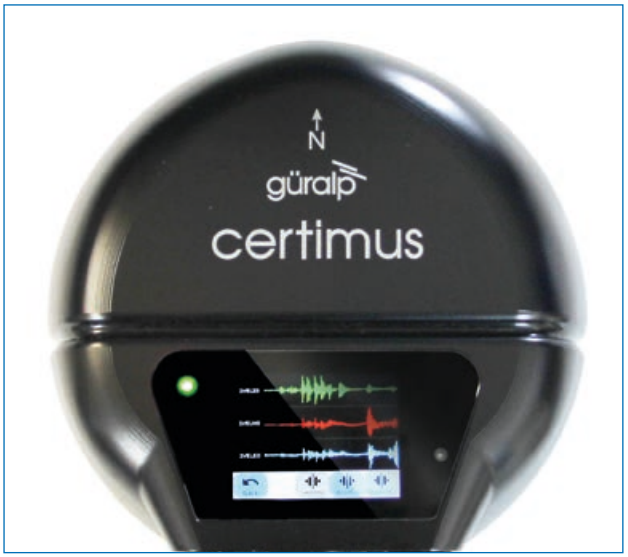
Key features

- State-of-the-art seismic sensor allows full operation over a wide tilt range of ±90° by automatically centring the mass
- Triaxial orthogonal (ZNE) instrument with high cross-axis rejection (> 65 dB)
- Remote, user-selectable long-period corner options of 20 s, 30 s, 45 s, 60 s, 90 s, 100 s, 110 s and 120 s
- Low latency outputs available (approx. 0.04 s data packets)
- Streaming and storage of instrument response and calibration parameters dramatically simplifies data management (RESP, Station XML and Dataless SEED formats)
- Dual redundant 16 GB microSD cards (1 fixed, 1 hot-swappable) with options of 64 GB or 128 GB
- Ultra-low-power mode < 300 mW for remote or temporary deployments using batteries and solar panels
- Accurate time-base provided by either surface GNSS, Precision Time Protocol (PTP), or internally trained clock (< 1 ms drift per day without GNSS)
- Powerful real-time data Transforms: mathematical operations applied to real-time and recorded data e.g. integration; differentiation; high and low-pass filters
- Quick Seismic Characteristic Data (QSCD) protocol and Maximum, Minimum and Average (MMA) calculated on selected time window
- On-demand event-specific or time-window data transmission

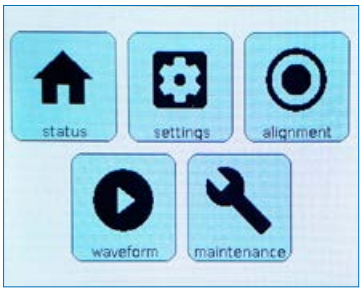
OPTIONS AND ACCESSORIES 1

OPTIONAL 2.4 INCH FULL COLOUR LCD SCREEN DISPLAY SHOWING:

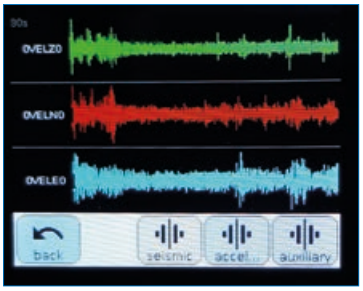
- WAVEFORMS
- INSTRUMENT STATE-OF-HEALTH
- INSTRUMENT SETTINGS
- NETWORK CONFIGURATION
- VIRTUAL INSTRUMENT LEVEL



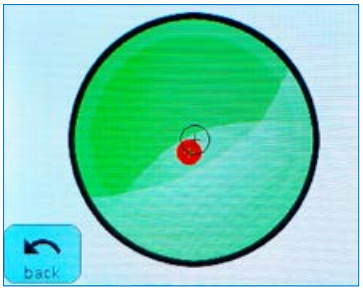
MAIN MENU



WAVEFORMS



ALIGNMENT



FOR DIRECT BURIAL THE CERTIMUS IS AVAILABLE WITHOUT A SCREEN:

IN THESE INSTANCES AN OPTIONAL IN-LINE SURFACE STORAGE MODULE (SSM) PROVIDES EASY ACCESS TO DATA STORAGE AT THE SURFACE.



OPTIONS AND ACCESSORIES 2

PORTABLE POWER MODULE (PPM)

COMPACT RE-CHARGEABLE 250 Wh BATTERY PACK SUITABLE FOR DIRECT CONNECTION TO SOLAR PANELS



SURFACE STORAGE MODULE (SSM)

CONNECTS IN-LINE WITH THE GNSS AT THE SURFACE FOR EASY ACCESS TO DATA STORAGE



RUGGED BACK-PACK

PROTECTS CERTIMUS DURING FIELD DEPLOYMENTS WITH ADDITIONAL SPACE FOR ACCESSORIES AND PAPERWORK





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SPECIFICATIONS

BROADBAND SEISMOMETER SYSTEM	
Configuration / Topology	Triaxial orthogonal (ZNE)
PERFORMANCE: BROADBAND SEISMOMETER	
Maximum frequency response bandwidth	120 s (0.0083 Hz) to 100 Hz User selectable long-period corner of 20 s, 30 s, 45 s, 60 s, 90 s, 100 s, 110 s and 120 s.
Output sensitivity	2000 V/ms^{-1}
Sensor dynamic range	149 dB
Self-noise	-173 dB at 10 seconds
Operational tilt range	±90°
Cross axis rejection	> 65 dB
Linearity	> 95 dB
Lowest spurious resonance	> 450 Hz
Centring	Automatic / can be disabled
Transfer function	Measured sensitivity, frequency response and instrument poles and zeros are stored within the instrument and accessible via web interface
ENVIRONMENTAL CHANNELS	
Sensor mass positions	Three independent sensor mass position outputs (integrator)
Orientation sensors	MEMS based accelerometer (three component) Magnetometer (three component)
Other sensors	Temperature, humidity, pressure, input voltage
DIGITISER PERFORMANCE	
ADC converter type	Delta-sigma
Output format	32-bit
Dynamic range	>142 dB at 100 samples per second
Decimation filter rejection	170 dB
DATA PROCESSING	
Output rates available	1 sample per hour up to 1000 samples per second for primary channels, user-selectable* *In ultra-low-power mode, output rate is set to 250 samples per second for primary channels Up to 5 samples per second for environmental channels
Decimation filters	÷2, ÷3, ÷4, ÷5 (Causal / Acausal)
Data transmission modes	Continuous
TIMING AND CALIBRATION	
Timing source precision	Accuracy when GNSS locked ±50 ns. Typical drift when unsynchronised (without GNSS) <1 ms per day
Timing sources	GNSS (GPS and GLONASS, BeiDou optional), PTP (Precision Time Protocol)
Calibration signal generator	Step, white noise with selectable amplitude
USER INTERFACE	
Configuration and control	(Ethernet) Güralp Discovery - free download (Windows and Linux), web browser interface. GüVü w app (Android)

DATA COMMUNICATION	
Data recording formats	miniSEED (metadata stored in Station XML and dataless SEED formats)
Data streaming protocols (via Ethernet)	GCF (Scream!), GDI-link[1] and SEEDlink[1] ([1]metadata sent in RESP, StationXML and dataless SEED file formats)
ON-BOARD DATA STORAGE	
Flash memory and storage	Dual redundant 16 GB microSD cards (1 fixed, 1 hot-swappable) Option for 64 GB or 128 GB
SOFTWARE	
Operating system	Windows and Linux compatible
Communication technologies supported	Ethernet (10/100/1000BASE-T) with Power over Ethernet (PoE), Wi-Fi
OPERATION AND POWER USAGE	
Operating temperature	-20 to +60 °C
Relative humidity range	zero to 100 %
Power supply	10 - 36 V DC* or Power over Ethernet (PoE)
Power consumption	1 W standard operation without GNSS or Ethernet 2.2 W (with GNSS and Ethernet)
Ultra-low-power-mode	300 mW (GNSS sync. once per day, Ethernet is disabled, output rate is fixed at 250 samples per second)

**Power voltage for operation of this unit only. Connection to additional instrumentation or use of longer cables may result in a higher input voltage requirement*

PHYSICAL	
Casing type	Environmentally sealed, hard anodised aluminium
Environmental sensor	Humidity and temperature
Weight	3.5 kg (disconnected)
Diameter	175 mm
Height with feet	95 mm
Height (sensor only)	84.5 mm
Connector type	MIL-DTL-26482 Series 1: Ethernet - 8P8C (RJ45) Power - 4 pin LEMO: GNSS/serial - 14 pin
Environmental protection	IP68 - protection against effects of prolonged immersion at 3 m depth for 72 hours
Certimus package includes	Power cable, Ethernet cable, GNSS (GPS or GLONASS, BeiDou optional) receiver and console cable, Wi-Fi antenna
OPTIONAL ACCESSORIES	
Surface storage module (SSM)	Connects in-line with the GNSS to allow for data retrieval without instrument disturbance
Power pack module (PPM)	Compact re-chargeable battery pack, compatible with solar panel
Rugged back-pack	Protects Certimus during field deployments

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In the interests of continual improvement with respect to design, reliability, function or otherwise, all product specifications and data are subject to change without prior notice.

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