

MINIMUS LITE

PORTABLE ULTRA-LOW-POWER, SMART SEISMIC DIGITISER WITH
ADVANCED COMMUNICATIONS AND STATE OF HEALTH



Compact and portable, ultra-low power, four-channel, smart seismic digitiser.

KEY FEATURES

- > Ultra-low-power < 400 mW
- > 24-bit, 4-channel ADC
- > 142 dB dynamic range
- > Compact and lightweight
- > Bluetooth and Power-over-Ethernet
- > Dual-redundant microSD storage
- > Advanced State-of-Health capabilities
- > Utilises Güralp Discovery software interface providing access to a range of instrument and data management tools
- > Güralp Data Centre compatible

Minimus Lite

The portable, ultra-low-power Güralp Minimus Lite offers advanced communication capabilities with rapid GNSS lock, making it ideal for rapid deployments.

ENCASED IN AN ENVIRONMENTALLY SEALED, HARD ANODISED ALUMINIUM CASING TO WITHSTAND THE HARSHTEST OF ENVIRONMENTS, THE MINIMUS LITE HAS AN INTERNAL THERMOMETER AND A HUMIDITY SENSOR TO ALERT YOU TO ANY MOISTURE INGRESS.

MINIMUS LITE DIMENSIONS:



Multidisciplinary functionality with simplified streaming and filtering options and advanced communications capabilities.

The four channel Minimus Lite is our lowest power digitiser and can accommodate any triaxial analogue seismic sensor plus an auxiliary input (e.g. for infrasound).

The portable and ergonomic Minimus Lite features a rapid GNSS lock making it particularly suited for field applications where speed of deployment is of the utmost importance.

Integrated network connectivity enables the Minimus Lite to be controlled remotely using Guralp Discovery, our software platform, or via a standard web browser. Discovery allows the user to identify the instrument IP address via a Cloud registry server or data centre, eliminating the need for static IP addresses.

Discovery also provides simple and streamlined instrument and data management for arrays of any scale, with access to hardware State-of-Health (SoH); data streaming; GNSS location; instrument response and calibration values.

For added confidence during deployments, GüVü, a Bluetooth app, displays waveforms, orientation, temperature and humidity data, for instant checking of installation integrity.

Key features

24-bit, four channel digitiser

Compatible with any analogue seismic sensor

Rapid GNSS lock with accuracy of ± 50 ns once locked

Industry standard triggering algorithms for EEW (STA/LTA and Threshold)

Common Alert Protocol (CAP) enabled for automated emergency warning

Identification of IP address via Discovery and Cloud registry server

Remote instrument and data management via easy-to-use Discovery software

Scream!™ compatible

GüVü Bluetooth app for installation integrity checking available (Android)

Dual redundant 16 GB microSD cards (1 fixed, 1 hot-swappable) with options of 64 GB or 128 GB

Select from GNSS (GPS and GLONASS, BeiDou optional)

Versatile streaming options.

Users can select sample rates of up to 4000 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 dataless SEED format) and can be streamed in realtime using GCF (Scream!), GDI-link and SEEDlink. Whilst traditional 'Nominal Response' files are supported, the system also provides 'machine generated Response files' to faithfully represent the exact configuration of the station and sensors.

Applications

- > Temporary seismic stations
- > Earthquake Early Warning
- > Rapid deployment arrays
- > Volcanology
- > Multi-discipline seismic observatories
- > Structural health monitoring
- > Induced seismicity detection

Minimus Lite Tools:

GÜRALP DISCOVERY SOFTWARE*

*See Discovery datasheet for more details

Discovery dramatically simplifies instrument and data management and gives users powerful tools via a web interface:

- > Identify instrument IP address
- > Analysis of hardware State of Health
- > Data streaming control
- > Remotely upgrade digitiser firmware
- > Simultaneous configuration of multiple units
- > Advanced waveform data analysis e.g. PSD
- > Easy access to data archiving services with additional network state-of-health tools

Güralp Systems - Discovery

File Edit Tools Window Help Manuals

View Discovery Manual Search... Clear Search

Status	Label	Name	Firmware Ver	WAN Address	LAN Address	Uptime	Last Contact	Latitude	Longitude	Voltage	Humidity	T _a
<input checked="" type="checkbox"/>	CurtisQR 1	MIN-SC5B	2.1-27920	0.0.0.0	10.20.0.195	4days 22Hrs	Just Now	-59.9000	107.3760	24.10V	25%	33.0
<input checked="" type="checkbox"/>	CurtisQR 2	MIN-676B	2.1-27920	0.0.0.0	10.20.0.204	4days 4Hrs	Just Now	-59.9000	107.4090	24.20V	25%	33.0
<input checked="" type="checkbox"/>	CurtisQR 3	MIN-SE6B	2.1-27920	0.0.0.0	10.20.0.200	3days 22Hrs	Just Now	-59.9000	107.3820	24.20V	25%	34.0
<input checked="" type="checkbox"/>	CurtisQR 4	MIN-456B	2.1-27920	0.0.0.0	10.20.0.209	3days 22Hrs	Just Now	-59.9000	107.3070	24.20V	22%	33.0
<input checked="" type="checkbox"/>	CurtisQR 5	MIN-596B	2.1-27920	0.0.0.0	10.20.0.201	14days 0Hrs	Just Now	-59.9000	107.3670	24.20V	26%	33.0
<input checked="" type="checkbox"/>	CurtisQR 6	MIN-436B	2.1-27920	0.0.0.0	10.20.0.17	14days 0Hrs	Just Now	-59.9000	107.3010	24.10V	26%	33.0
<input checked="" type="checkbox"/>	Engineering Lite	MIN-650B	2.1-18780	0.0.0.0	10.30.0.7	16days 3Hrs	Just Now	51.3611	-1.1642	24.30V	22%	35.0
<input checked="" type="checkbox"/>	FXM	MIN-A75B	2.1-28301	0.0.0.0	10.30.0.39	50days 1Hrs	Just Now	51.3611	-1.1642	12.40V	16%	34.0
<input checked="" type="checkbox"/>	FXM	CERT-696B	2.1-28101	0.0.0.0	10.30.0.73	27days 21Hrs	Just Now	51.3611	-1.1642	PoE	16%	36.0
<input checked="" type="checkbox"/>	Ismail + Tom	CERT-F85C	2.1-27920	0.0.0.0	10.30.0.116							
<input checked="" type="checkbox"/>	London	FMUS-2169	2.1-28370	0.0.0.0	10.30.0.27							

— NETWORK OVERVIEW

DIGITISER WEB INTERFACE —

Status Network **Setup** Power Trigger Data Stream Data Record Storage Log

System type: Minimus Lite | Host label: SUPRT-MNL-TEST-FORTIS | Host name: MNL-6708 (10.20.1.85) | Serial number: 0086

Digitiser Controls

Auto Refresh: 1 | Auto Reboot: On Error | Filter quality: High

Station Config

Host Label: SUPRT-MNL-TEST-FORTIS | Station Code: 06708 | Network Code: 06 | Site Name: No site

Digitiser ADC

Pre-amp Gain: x1

Sensor Calibration

Cal Signal: Off | Level: 50% | Timebase: 1s

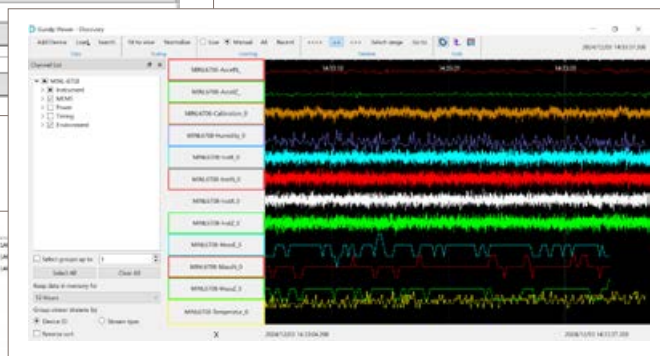
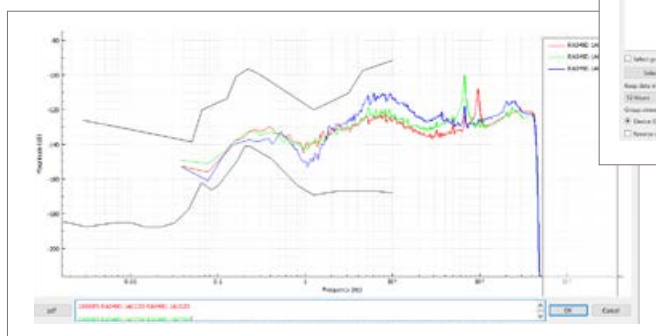
Dual Analog / Digital Sensor 0

Link Status: Not connected

Analog Sensor

— DIGITISER CONFIGURATION

REAL-TIME VIEWER —



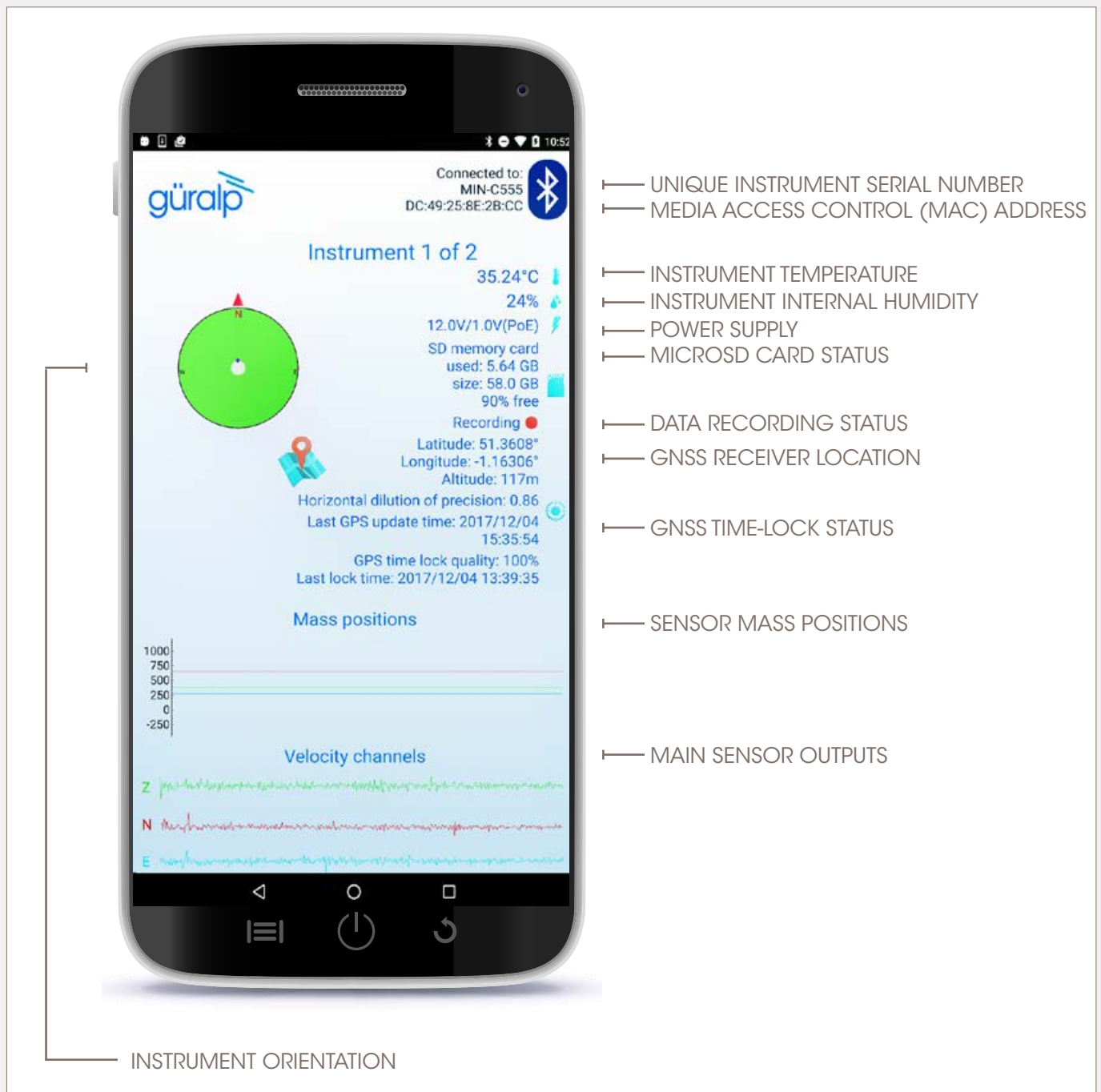
— INSTRUMENT POWER SPECTRAL DENSITY (PSD) GRAPHS

Minimus Lite Tools:

GÜVÜ BLUETOOTH APP

Check the integrity of your installation instantaneously

GüVü displays a range of instrument data such as waveforms, orientation, temperature and humidity data. Additionally you can lock/unlock and centre the masses of analogue sensors, reboot Minimus₂ and alter sample rates without instrument disturbance. GüVü can also format replacement SD cards. A deployment status report can then be emailed for a detailed record of the installation.



Minimus Lite



SPECIFICATIONS

SENSOR INPUTS	
Primary digitisation channels	Four at 24 bits Differential input: 40 V peak-to-peak (± 20 V). Also compatible with single-ended inputs: 20 V peak-to-peak (± 10 V)
Secondary channels	Three analogue channels for sensor mass positions, one internal calibration channel
Internal environmental channels	Humidity Temperature Supply voltage/Power consumption
Input impedance	50 k Ω
PERFORMANCE	
ADC converter type	Delta-sigma
ADC conversion delay	6 μ s
Output format	32-bit
Dynamic Range	>142 dB at 100 samples per second
Gain drift	3 ppm / $^{\circ}$ C
Common-mode rejection	>110 dB
DATA PROCESSING	
Output rates available	1 sample per second up to 4000 samples per second for primary channels, user-selectable Multiple independent data streams at different sample rates for all channels (transmission and recording) Up to 500 samples per second for environmental channels
Decimation filters	$\div 2$, $\div 3$, $\div 4$, $\div 5$ decimation (Causal / Acausal)
Out-of-band rejection	>167 dB
Data transmission mode	Continuous and trigger modes
Triggered data	Retrievable using event table in digitiser's web page. User selectable pre and post event time.
Trigger modes	STA/LTA, Threshold
Selectable gain	Unity $\times 1$, $\times 2$, $\times 4$, $\times 8$, $\times 12$
TIMING AND CALIBRATION	
Timing source precision	Accuracy when GNSS locked ± 50 ns. Typical drift when unsynchronised (without GNSS) <1 ms per day once temperature trained
Timing sources	GNSS (GPS and GLONASS, BeiDou optional)
Calibration signal generator	Broadband noise and Sinewave

OPERATION AND POWER USAGE	
Operating temperature	-20 to +60 $^{\circ}$ C
Relative humidity range	zero to 100 %
Power supply	5 - 36 V DC* (2S lithium compatible)
Power consumption at 12 V DC	< 0.4 W in power save mode with no GNSS or Ethernet <0.92 W in standard mode with constant GNSS and 100 Mb/s Ethernet output
<i>*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.</i>	
SOFTWARE	
Operating system	Windows and Linux compatible
Communication technologies supported	Ethernet (100BASE-T) Power over Ethernet (IEEE 802.3af compliant)
USER INTERFACE	
Configuration and control	(Ethernet) Güralp Discovery - free download, web browser interface. GüVü Bluetooth app (Android)
DATA COMMUNICATION	
Data recording formats	miniSEED (metadata stored in dataless SEED format)
Data streaming protocols (via Ethernet)	GCF (Scream!), GDI-link ¹ and SEEDlink ¹ (¹ metadata sent in RESP, StationXML and dataless SEED file formats)
Memory and storage	Dual redundant 16 GB microSD cards (1 fixed, 1 hot-swappable) Option for 64 GB or 128 GB
PHYSICAL CHARACTERISTICS	
Casing type	Environmentally sealed, hard anodised aluminium on a stainless steel base
Environmental sensor	Humidity and temperature
Weight	600 g (disconnected)
Dimensions	98 mm \times 108 mm \times 40 mm
Connector type	MIL-DTL-26482 Series 1: Analogue - 26 way Power - 4 pin SURE-SEAL IPMODM: Waterproof Ethernet LEMO : GNSS/serial - 14 pin
Global navigation satellite system (GNSS)	Compact, encapsulated, waterproof, precision timing GPS/GLONASS (BeiDou optional) receiver
Environmental protection	IP68 - protection against effects of prolonged immersion at 3 m depth for 72 hours

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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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