

# AFFINITY

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CAPTURE. PROCESS. DISTRIBUTE.

Our most sophisticated and adaptable digital acquisition system yet

- > Low power
- > Switchable gain
- > Fully interactive, fast user interface
- > State of the art timing protocols
- > User-accessible software environment
- > Remote control of seismometer

# Affinity

The Güralp Affinity is a high-fidelity integrated digitiser and network communications unit that provides a convenient and expandable way of connecting analogue and digital instruments to your network.



The Affinity delivers low-power, high-quality digitisation with full 24-bit resolution. Designed for data quality and durability, the Affinity is a stable and robust Linux-powered unit with on-board storage and networking facilities. An advanced module directly controls power supply to peripherals and reports their voltages via state-of-health communications.

Packaged in a rugged, waterproof stainless steel casing, the Affinity is suitable for downhole and borehole deployment, or can be wall mounted for vault applications.

## Key features

24-bit channels. Eight-channel (6 primary, 2 auxiliary)

Exceptionally low noise: >138dB of dynamic range @ 100 sps

16 environmental multiplexed ADC channels

STA/LTA, level and external triggers

High sampling rates of up to 4000 samples per second

Four (or eight) streams with individually selectable sample rates (continuous or triggered)

UTC time-stamped data using a low-power GPS receiver and state of the art timing protocols e.g. Precision Timing Protocol (PTP)

Multi-user Linux operating system with full network support

Remote configuration with on-board Web server (HTTP and HTTPS)

On-board, high-speed USB2.0 accessible storage (16 GB capacity; other options available)

Additional external USB storage connection

Full remote control of digitiser parameters

Full remote control of broadband sensors, including remote lock, unlock and centre, via web server

Supports multiple data formats, including GCF, GDI, miniSEED, CD1.1 and SEEDlink

Built-in calibration signal generator: step, sine or broadband

Fully integratable with a wide range of multi-disciplinary sensors

Mass positions streamed in real-time at high sample rates

Switchable gain for individual channels

## Revolutionary open-development environment

The Güralp Affinity comprises a user-accessible software environment that allows the use of custom-made codes in data reading/writing and signal processing.

This dynamic feature of the Affinity expands its versatility in modern seismic monitoring applications, including:

- > Calculation of key seismic parameters for on-site earthquake early warning
- > Sending triggered data over low bandwidth communications (e.g. satellite)
- > Tailored processing of additional multidisciplinary sensors (e.g. infrasound, meteorological instruments and geodetic GPS)
- > Customised waveform filtering schemes
- > Adaptation to proprietary data transfer protocols
- > Bespoke file compression formats

## Applications

- > Earthquake Early Warning Systems
- > Multidisciplinary geophysical observatories
- > Seismic and microseismic monitoring
- > Borehole and posthole installations
- > Dense array networks

## SPECIFICATIONS

SENSOR INPUTS	
Primary digitisation channels	Eight at 24 bits, $\pm 10$ V differential
Optional environmental channels	Sixteen multiplexed channels, $\pm 10$ V single-ended
Input impedance	113 k $\Omega$
PERFORMANCE	
ADC converter type	4th-order, single-bit, low-pass $\Sigma$ - $\Delta$
Output format	32-bit
Dynamic Range	>138 dB at 100 samples per second
Absolute accuracy	0.5 %
Common-mode rejection	>80 dB
DATA PROCESSING	
Output rates available	1 to 4000 samples per second
Highest output capability	20,000 samples per second aggregate
Decimation filters	2, 4, 5, 2x4, 2x5
Anti-alias filters	3-pole
Low pass filters	FIR (other options available)
Out-of-band rejection	140 dB
Data transmission modes	Continuous and triggered
Trigger modes	STA/LTA, level, external, software
TIMING AND CALIBRATION	
Timing source precision	<2 ms drift per day when unsynchronised (without GPS)
Timing sources	GPS, NTP and PTP
Calibration signal generator	Amplitude/frequency adjustable, sine, step or broadband noise
OPERATION AND POWER USAGE	
Operating temperature	-25 to +60 °C
Relative humidity range	zero to 100 %
Power supply	9 - 36 V DC (9 V will power digitiser only)
Power consumption at 12 V DC	
4 channel	1.2 W (no GPS or ethernet) 1.55 W (GPS with 10 Mb/s Ethernet output)
8 channel	1.5 W (no GPS or ethernet) 1.85 W (GPS with 10 Mb/s Ethernet output)
SOFTWARE PROTOCOLS	
Operating system	Linux
Communication technologies supported	RS232, USB, Ethernet (10BASE-T / 100BASE-T) with POE
Internet technologies supported	TCP/IP, PPP, SSH, HTTP, HTTPS (others on request) Firewall and routing capabilities
DATA COMMUNICATION	
Data recording formats	GCF, GDI and miniSEED
Seismic network protocols	Scream (Antelope/Earthworm), CD1.0/1.1, SEEDlink and others
Flash memory and storage	512 MB Flash plus 64 GB external USB storage available

PHYSICAL CHARACTERISTICS	
Casing type	Stainless steel cylinder
System weight	5.5 Kg (excluding GPS and cables)
Weight with mounting and carry bracket	6.1 Kg (excluding GPS and cables)
Dimensions - cylinder alone	114 $\varnothing$ x 274 mm, excluding connectors and cables
Dimensions with mounting/carrying bracket	130 x 160 x 304 mm, excluding connectors and cables
Standard accessories pack comprises	GPS antenna; 20 m GPS cable; 5 m power cable; 3 m general purpose input/output cable; 5 m ethernet cable

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