Güralp 5TDE

NETWORK-READY DIGITAL FORCE-BALANCE STRONG-MOTION ACCELEROMETER

200 mm

176 mm

A digital, triaxial, force-feedback accelerometer with a large dynamic range.

The Güralp 5TDE is suitable for seismology, hazard mitigation and civil engineering applications. An on-board, Linux-based acquisition module offers remote monitoring and control with unparalleled flexibility.

Combining the 5TC strong motion instrument, a DM24 digitizer and an embedded acquisition module (EAM), the 5TDE is a low-noise sensor with on-board and external storage options. With web-based user interface and multi-protocol communications over serial and Ethernet connections, an optional Wi-Fi module offers 802.11b/g connectivity.

Applications

> Ground motion modelling
> Large earthquake source characteristics
> Earthquake Early Warning systems
> Structural health monitoring

Key features

Low-noise components for high precision and extra dynamic range (151 dB)

Full-scale sensitivity of ±2 g as standard

Low pass corner at 100 Hz (200 Hz option also available)

No mass-locking or sensor levelling required

Isolated power supply for 11-30 V operation

Robust, water-proof and dust-proof (IP67)

Up to 64 GB of on-board Flash memory storage

Unlimited external USB mass storage

Data recording in GCF or miniSEED formats

Fast data download over Ethernet or USB

Configuration via serial or Ethernet; command-line or web-based

Full network security suite, including HTTPS and Firewall, allows direct, permanent connection to the internet

LCD display allows operators to monitor triggers and memory usage in real-time

Powerful, flexible Linux operating system

Optional USB Flash memory stick storage option

Optional 802.11b and 802.11g Wi-Fi

Images show the Güralp 5TDE feedback internet accelerometer

Güralp 5TDE

SPECIFICATIONS

SENSOR: GÜRALP 5TC STRONG MOTION ACCELEROMETER

SENSOR SYSTEM	
Technology	Force feedback (force balance) accelerometer
Configuration / Topology	Triaxial orthogonal (ZNE)

SENSOR PERFORMANCE	
Velocity output band (flat response within -3 dB crossing points)	DC – 100 Hz standard
	DC - 200 Hz option available
	Contact Güralp to discuss other frequency response options
Full-scale sensitivity	± 2 g
Self-noise	< 1 µg rms*
	*Independently tested value - see Ringler et al., (2015), Seismological Research Letters
Sensor dynamic range (at standard output sensitivity)	>147 dB @ 0.1 Hz >151 dB @ 1 Hz >146 dB for 5 Hz
Cross axis rejection	0.001 g/g
Linearity	0.1 % full scale
Lowest spurious resonance	>450 Hz

SENSOR MASS CONTROL	
Offset zeroing	Automatic on start up and on user command
Mass locking	No mass locking required

CALIBRATION CONTROLS	
Calibration signal types	Sine, step or broadband (adjustable amplitude and frequency)

DIGITISER PERFORMANCE	
Digitiser type	Fourth-order sigma-delta
Digitiser resolution	24-bit
Dynamic range	140 dB at 20 sps
	136 dB at 40 sps
	135 dB at 80 sps
Sample rates	1 to 1000 sps (up to four simultaneous streams wih different sample rates available)
Gain options	Unity (1×) only
Digital filter types	FIR (linear phase) and IIR options available
Decimation filters	÷2; ÷4; ÷5; ÷8; ÷10
Anti-aliasing filter at Nyquist	160 dB
Absolute accuracy	<0.15%
Input impedance	117 kΩ
Crosstalk (out of band rejection)	140 dB
Linearity	110 dB at 80 sps
Common-mode rejection ratio	80 dB

USER INTERFACE / SOFTWARE	
Digitiser control and configuration	Platinum software (via web browser)
	Güralp Scream! software (free download)
	Terminal window over SSH or serial link
Triggering modes	STA/LTA, level, per-channel & network voting

DIGITISER / DATA-LOGGER: GÜRALP DM24S3EAM

REAL-TIME DATA COMMUNICATION	
Protocols	Scream! (GCF); SEEDlink; CD1.1; GDI-link
Latency	0.38 s digitisation delay at 250 sps
	1 s transmission delay at 250 sps (GCF protocol)

ON-BOARD DATA STORAGE	
Data storage file formats	GCF; miniSEED
Internal storage capacity	Flash memory storage options available up to 64 GB
Data retrieval interfaces	Storage accessible via GPIO port (appears as USB 2.0 drive); or secure file transfer (e.g. sftp)
Expandable storage	Optional hot-swappable USB armoured canister (various sizes available)

TIMING	
Timing system	Internal VCXO clock
Timing sources	GPS; GLONASS; NTP (Network time protocol)
Timing accuracy	GPS unlocked: <100 µs drift per day at 40 sps

STATE-OF-HEALTH	
Parameters available	Sensor mass positions, digitiser temperature, digitiser voltage and current

CONNECTORS	
Connector types	Power/data: 10-pin mil-spec bayonet GPS: 10-pin mil-spec bayonet USB: 6-pin mil-spec bayonet GPIO: 12-pin mil-spec bayonet Ethernet: 6-pin mil-spec bayonet

POWER	
Power supply voltage	11-30 V DC
Power consumption (at 12 V DC)	With GPS and Ethernet: 3.2 W

ENVIRONMENTAL / PHYSICAL	
Operating temperature range	-20° to +70°C
Operating humidity range	0-100% relative humidity
Enclosure ingress protection	IP67 - resistant against water ingress to a maximum of 1 metre of water for up to 30 minutes, as well as protected against dust ingress
Enclosure material	Hard-anodised aluminium case; O-ring seals throughout
Height	With handle: 200 mm Without handle: 141 mm
Diameter	176 mm
Weight	3.4 kg
Alignment	Bubble level on lid; north arrow on handle.

SUPPORTING DOCUMENTATION	
Calibration values	Measured sensor sensitivity, frequency response, instrument poles & zeros, digitiser sensitivity and test results enclosed
Full user's guide	Available online at: https://www.guralp.com/documents/MAN-050-0006.pdf

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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