Güralp 3TDE

WEAK MOTION DIGITAL BROADBAND SEISMOMETER

güralp

425 mm

168 mm

A digital broadband sensor offering unparalleled flexibility.

The Güralp 3TDE is a well proven, established design based on the 3T seismometer and DM24 digitiser. An on-board, Linux-based acquisition module offers remote monitoring and control, with unparalleled flexibility.

The 3TDE combines the well-regarded 3T weak motion sensor, an integrated DM24 digitiser and an EAM embedded acquisition module to form a low noise sensor with on-board and external storage options, a convenient web-based user interface and multi-protocol communications over serial and Ethernet connections. This capability makes the 3TDE ideal for long-term, permanent deployments.

Key features

Self-contained weak-motion broadband triaxial seismometer (3T) with digitiser and data-logger (DM24S3EAM) in a single waterproof stainless steel case

Covers the complete seismic spectrum with a single transfer function

Flat frequency response from 120 s (0.0083 Hz) to 50 Hz, with longer period (360 s) options available

High sensor linearity: >111 dB (USGS figures)

Over 140 dB dynamic range over a wide frequency band

Cross axis rejection over 65 dB; sensor axes orthogonal to within +/- 0.05 °

Remote, automatic electronic mass locking for transport, unlocking for instllation, and mass centring

Standard 16 GB of on-board Flash storage

Fast data download over Ethernet or USB

Communication includes Ethernet, Wi-fi and Serial with many options such as GSM or VSAT

Real-time data streaming protocols include: SEEDlink, CD1.1, GCF (SCREAM!) - fully compatible with SeisComp3, Earthworm, Antelope analysis packages

Configuration, monitoring and control via web interface, terminal based menu systems or the Linux command line

Applications

> Surface and subsurface vault installations
> Monitoring arrrays
> Nuclear test ban treaty monitoring
> Geophysical and petrochemical exploration
> Global and national seismic networks

Images show the 3TDE weak motion digital broadband seismometer

Güralp 3TDE

SPECIFICATIONS

SENSOR: GÜRALP 3T BROADBAND SEISMOMETER

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

SENSOR PERFORMANCE	
Velocity output band (flat response within -3 dB crossing points)	120 s (0.0083 Hz) to 50 Hz standard
	360 s (0.0028 Hz) to 50 Hz option available
	Contact Güralp to discuss other frequency response options
Sensitivity	6,000 V/ms⁻¹ (2 x 3000 V/ms⁻¹) differential standard output
	Contact Güralp to discuss alternative sensitvity (gain) options
Self-noise below NLNM (New Low Noise Model; Peterson; 1993, USGS)	200 s (0.005 Hz) to 20 Hz
Sensor dynamic range (at standard output sensitivity)	140 dB
Cross axis rejection	65 dB
Linearity	>111 dB
Lowest spurious resonance	>140 Hz
Operating tilt range	±2.5°
Lowest spurious resonance	>140 Hz

MASS MONITORING / CONTROL	
Sensor mass positions	Three independent sensor mass position outputs (single-ended)
Mass ;ocking	Remote auto mass lock/unlock for transportation
Mass centring / offset zeroing	Remotely controlled automatic mass centring

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
	138 dB at 40 sps
	135 dB at 80 sps
	135 dB at 100 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 frequency	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

DIGITISER / DATA-LOGGER: GÜRALP DM24S3EAM

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

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	16 GB
Data retrieval interfaces	Internal flash memory accessible via GPIO connector (appears as USB drive); or via secure file transfer protocols (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 per day at 40 samples per second
Timing accuracy: GPS locked	<1 µs

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

CONNECTORS	
Connector types	Power/data: 19-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	12–32 V DC
Power consumption	With GPS; no Ethernet: 2.0 W

ENVIRONMENTAL / PHYSICAL	
Operating temperature range	-20 to +75 °C
Operating humidity range	0-100% relative humidity
Enclosure ingress protection	IP68 - protection against prolonged effects of immersion under pressure (tested under 3 m of water for 72 hours)
Enclosure material	Stainless steel case; O-ring seals throughout
Height	With feet: 380 mm With feet & handle: 425 mm
Diameter	168 mm
Weight	16.1 kg
Alignment	Bubble level on lid; north arrow on handle and base; adjustable feet

SUPPORTING DOCUMENTATION	
Calibration values	Measured sensor sensitivity, frequency response, instrument poles & zeros, digitiser sensitivity and test results enclosed

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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