

3T SERIES

THE SUPERIOR PERFORMANCE WEAK MOTION
BROADBAND SEISMOMETER



KEY FEATURES

- > 120 s or 360 s to 50 Hz frequency response (option to 100 Hz)
- > Excellent self-noise performance
- > Up to 167 dB dynamic range at 1 Hz
- > Stainless steel enclosure, with refinement options for vault, polar posthole or borehole installations
- > Optional atmospheric pressure isolator for enhanced performance in vault applications

APPLICATIONS

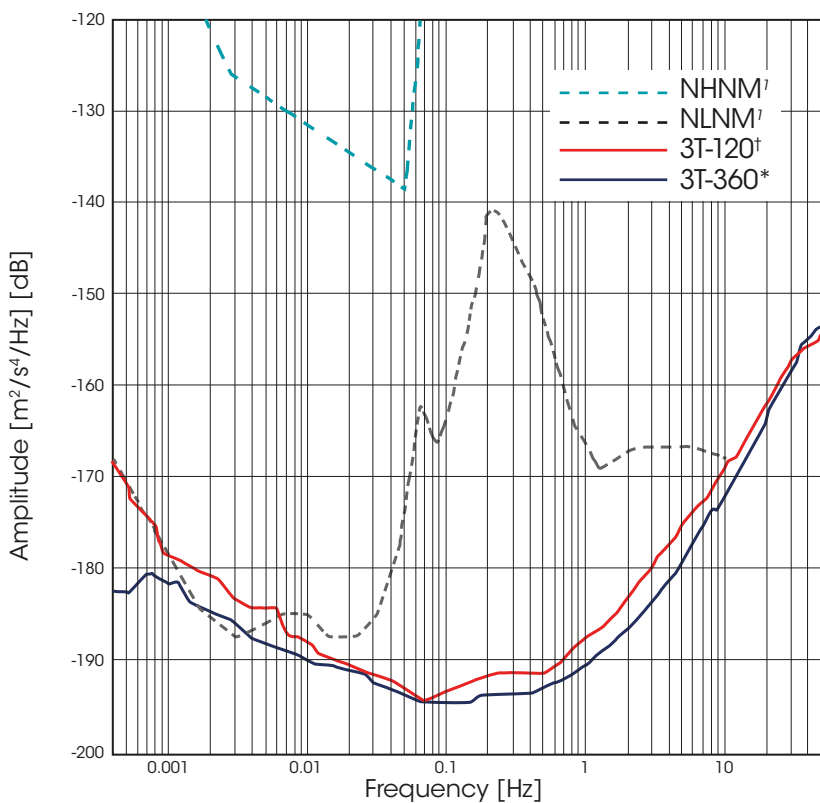
- > Vault and posthole installation
- > National, regional and teleseismic networks
- > Nuclear test ban treaty monitoring
- > Earth tide and deep-crust seismic modelling
- > Permanent dense arrays

3T SERIES

The Güralp 3T has been delivering exceptional performance since it was first launched in 1985.

A pioneer in force-feedback sensing capability, the 3T was designed for research of seismic signals over the very long period. Available in two classes, the 120 second and 360 second models are suited to standard vault or posthole deployments as observatory grade instruments.

SELF NOISE PLOT FOR THE 3 SERIES SENSORS



¹(Peterson, 1993)

*3T-120 output sensitivity set at 2000 V/ms⁻¹ (2 x 1000 V/ms⁻¹)

*3T-360 output sensitivity set at 4000 V/ms⁻¹ (2 x 2000 V/ms⁻¹)

3T POSTHOLE CASING WITH 100 BAR/10 MPA WATERPROOF CONNECTOR



ATMOSPHERIC PRESSURE ISOLATOR ENHANCES 3T PERFORMANCE IN VAULT INSTALLATIONS, PROTECTING THE SENSOR FROM TINY FLUCTUATIONS IN TEMPERATURE AND PRESSURE.



Key features

3T-120: 120 s to 50 Hz frequency response (option to 100 Hz)

3T-360: 360 s to 50 Hz frequency response (option to 100 Hz)

Covers the complete seismic spectrum with a single transfer function

3T-120: Measured Self noise below the USGS NLNM from 166 s (0.006 Hz), remaining below the high frequency limit of the NLNM at 10 Hz

3T-360: Measured Self noise below the USGS NLNM from 200 s (0.005 Hz) and remains below the high frequency limit of the NLNM at 10 Hz

High linearity: >111 dB (USGS figures)

Dynamic range of 167 dB at 1 Hz (Full octave width across 1 Hz)

Cross axis rejection over 65 dB; sensor axes orthogonal to within $\pm 0.05^\circ$

Remote, automatic electronic mass locking, unlocking and centring

Operating tilt range of $\pm 5^\circ$ with adjustable feet for off-horizontal installation bases

Low power consumption: 0.75 W from a 10–36 V supply

Available in surface, posthole or polar casing

Comes with lifing handle and convenient access to connectors

Data Integrity

The 3T can be partnered with the Affinity or Minimus digitisers. Each offers a flexible array of features and functionality that you can tailor according to your needs and both utilise precision time protocol for absolute timing accuracy.

Affinity - 31-bit, four or eight channels

- > Exceptionally low noise, >138 dB dynamic range @ 100 sps
- > Up to 4000 samples per second
- > STA/LTA, level and external triggers
- > Multi-user Linux operating system with full network support
- > Remote configuration
- > Fully interactive, fast user interface via web server with remote control of digitiser parameters and broadband sensors, including remote lock, unlock and centre

For more details see the Affinity webpage:

www.guralp.com/products/affinity-digitiser

Applications

- > Surface and subsurface vaults
 - > National seismic networks
 - > Regional and global earthquake monitoring
 - > Permanent dense arrays
 - > Nuclear test ban treaty monitoring
 - > Temporary / permanent posthole
 - > Polar casing option for ice-quake monitoring
 - > Observatories
 - > Earth tide and deep-crust seismic modelling
-

Minimus - 24-bit, four or eight channels

- > Up to 5000 samples per second
- > Multi purpose functionality - simultaneously stream multiple sample rates in addition to two recording rates
- > Ultra-low-latency mode for Earthquake Early Warning - when used with GDI protocol, transmission can be achieved in 40 ms
- > STA/LTA and Threshold triggers
- > Multi-instrument voting for mitigating false positive alerts
- > Common Alert Protocol (CAP) enabled for automated emergency warning
- > Remote instrument and data management

For more details see the Minimus webpage:

www.guralp.com/products/minimus-digitisers

3T Series



SPECIFICATIONS

SYSTEM	
Technology	Force feedback (force-balance) velocity sensor
Configuration / Topology	Triaxial orthogonal (ZNE)
PERFORMANCE	
Velocity output band (flat response within -3 dB crossing points)	3T-120: 120s (0.0083 Hz) to 50 Hz standard Option of 120s (0.0083 Hz) to 100 Hz 3T-360: 360 s (0.0028 Hz) to 50 Hz standard Option of 360 s (0.0028 Hz) to 100 Hz
Output sensitivity	1500 V/ms ⁻¹ (2 x 750 V/ms ⁻¹) differential standard output (full-scale clip level of 13 mm/s) Contact Güralp to discuss alternative high sensitivity (high gain) options
Peak full-scale output voltage	Differential: ±20 V (40 V peak-to-peak) Single-ended (e.g. mass positions): ±10 V (20 V peak-to-peak)
Self noise below NLNM (New Low Noise Model; Peterson, 1993, USGS)	3T-120: 166 s (0.006 Hz) to 10 Hz 3T-360: 200 s (0.005 Hz) to 10 Hz
Sensor dynamic range	167 dB at 1 Hz (Full octave width across 1 Hz)
Cross axis rejection	65 dB
Linearity	>111 dB
Lowest spurious resonance	>140 Hz
Damping	0.7 critical or 70% critical
Operating tilt range	±5°
MASS / MONITORING CONTROL	
Sensor Mass positions	Three independent sensor mass position outputs (single-ended)
Mass locking	Remote auto mass lock/unlock for transportation
Mass centring / offset zeroing	Remotely controlled automatic mass centring
CALIBRATION	
Calibration input	Independent signal and enable lines exposed on sensor connector

CONNECTORS	
Analogue output	26-pin military specification bayonet connector
POWER	
Power supply voltage	10–36 V DC*
Power consumption (at 12 V DC)	0.75 W
<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>	
PHYSICAL / ENVIRONMENTAL	
Operating temperature range	-20 to +75 °C (-55 °C optional)
Operating humidity range	0-100% relative humidity
Enclosure ingress protection Surface:	IP68 - protection against effects of prolonged immersion at 3 m depth for 72 hours Posthole: For deeper, long term immersion, the optional 100 bar/10 MPa waterproof connector is recommended Borehole: Please see the Very Broadband Borehole brochure www.guralp.com/documents/DAS-BRO-0013.pdf
Enclosure material	Stainless steel case O-ring seals throughout
Diameter	168 mm
Height without feet, handle or connector	273 mm
Standard connector height	14 mm
Posthole connector height	31 mm
Height with feet and handle	340 mm
Weight (standard)	15 kg
Weight (posthole)	15.15 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 and zeros enclosed
Full user's guide available online at: https://www.guralp.com/documents/MAN-030-0001.pdf	

Güralp Systems Limited
Midas House
Calleva Park
Aldermaston
Reading
RG7 8EA
United Kingdom

T +44 118 981 9056
F +44 118 981 9943
E sales@guralp.com

www.guralp.com

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.



DAS-030-0004 Issue I