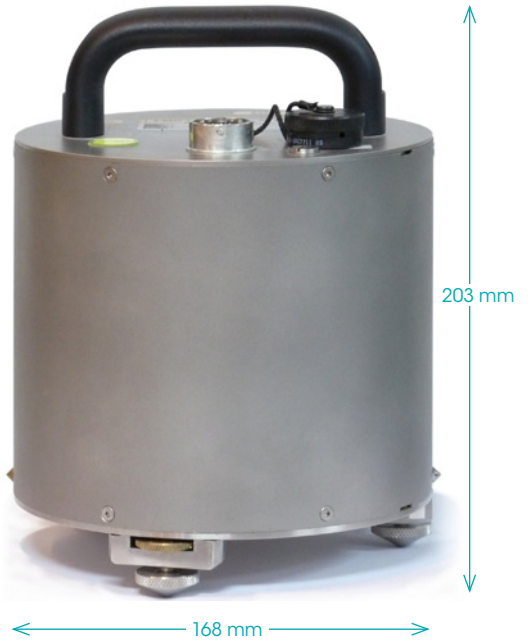
Güralp 40T

COMPACT, ROBUST BROADBAND SEISMOMETER



A rugged and robust three-component broadband seismometer.

The Güralp 40T is ideally suited for tempoary and semi-permanent installations in areas with moderate noise levels.

Its high-gain feedback loop eliminates mechanical non-linearity (>90 dB) and minimizes resonances in the spring system (the lowest spurious vibration mode of the 40T is a barely measureable resonance at 450 Hz.

The stainless steel casing provides a high degree of protection in highly corrosive environements.

Applications

> Volcano monitoring
> Local and regional seismic monitoring
> National and local seismic networks
> Microseismic monitoring
> Passive seismic imaging

Images show the Güralp 40T broadband seismometer

Key features

True broadband force-feedback instrument

Direct velocity outputs

Self-contained in a highly robust steel case

Fully adjustable levelling feet

Low power consumption of just 780 mW

No mass locking required - plug in and go

High sensitivity (800 V/ms^{-1}) and
high dynamic range (151 dB at 5 Hz)

The 40T has a standard response of 60 seconds to 50 Hz making it highly suitable for seismic monitoring at local and regional scales

Lowest spurious vibration is a barely measureable resonance at 450 Hz

The 40T sensor is also available as a 40TDE (www.guralp.com/documents/DAS-040-0004.pdf) which incorporates an integrated digitiser and data aquisition module.

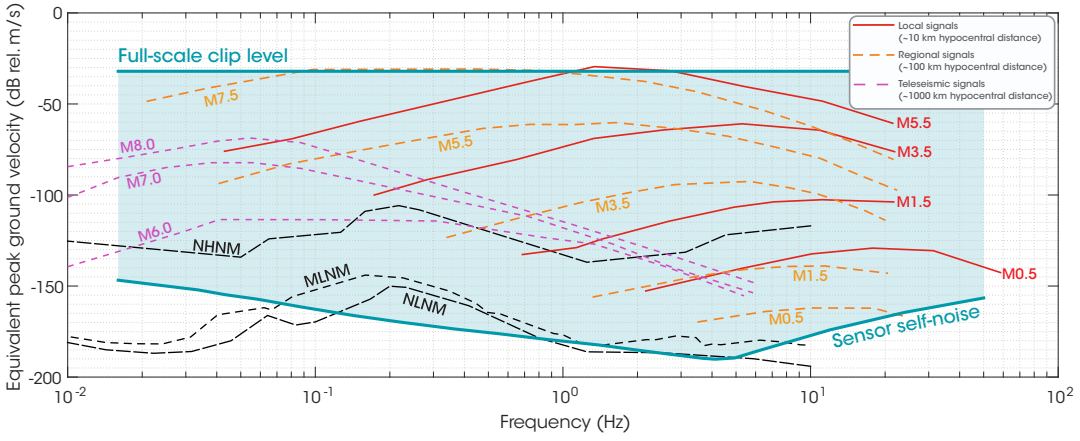
Güralp 40T

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)	60 s (0.017 Hz) to 50 Hz standard 30 s (0.03 Hz) to 50 Hz option available Contact Güralp to discuss other frequency response options
Output sensitivity	800 V/ms^{-1} (2 x 400 V/ms^{-1}) differential standard output (full-scale clip level of 25 mm/s) Contact Güralp to discuss alternative high sensitvity (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)	7 s (0.15 Hz) to 4 Hz* *Independently tested value - see Tasic & Runovc (2012), Journal of Seismology
Sensor dynamic range (at standard output sensitivity)	148 dB @ 1 Hz 151 dB @ 5 Hz
Cross axis rejection	65 dB
Linearity	>90 dB
Lowest spurious resonance	450 Hz
Damping	70% of critical
Operating tilt range	±2.5°
MASS / MONITORING CONTROL	
Sensor Mass positions	Three independent sensor mass position outputs (single-ended)
Mass locking	No mass locking required
Mass centring / offset zeroing	Manually adjustable via screws located on lid

CALIBRATION	
Calibration input	Independent signal and enable lines exposed on sensor connector
CONNECTORS	
Analogue output	26-pin Mil-spec (military specification bayonet) connector Optional 1500 psi waterproof connector for posthole deployment
POWER	
Power supply voltage	10–36 V DC
Power consumption (at 12 V DC)	0.78 W
PHYSICAL / ENVIRONMENTAL	
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
Diameter	168 mm
Height	With handle: 203 mm Without handle: 177 mm
Weight	7.1 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 and zeros enclosed
Full user's guide	Available online at: https://www.guralp.com/documents/MAN-040-0001.pdf

SELF NOISE & DYNAMIC RANGE



Octave-wide bandpassed acceleration signal strengths from Clinton and Heaton (2002).

NLNM (New Low Noise Model) and NHNM (New HIgh Noise Model) from Peterson (1993).

MLNM (Medium Low Noise Model) from McNamara and Buland (2004).

Characteristic ground motions are for illustrative purpose only. Actual ground velocity depends on many factors including rupture properties, hypocentral distance, local site attenuation / amplification, station noise level, and digitiser performance.

40T self-noise data based on Tasic & Runovc (2012).

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