

# FORTIS

STRONG MOTION ACCELEROMETER



Designed to be 'best in class', our most versatile accelerometer yet.

## KEY FEATURES

- > Slimline design
- > Switchable gain
- > Easy, rapid deployment
- > Also available with waterproof, stainless steel casing for posthole deployment

## APPLICATIONS

- > Earthquake early warning systems
- > Structural health monitoring
- > Shake intensity research

# Fortis

The Güralp Fortis is a strong motion analogue accelerometer with an innovative, slim-line design for fast installation in any environment.



FORTIS AT ACTUAL SIZE  
(125 MM DIAMETER)

THE FORTIS IS ALSO AVAILABLE IN A STAINLESS STEEL CASING SUITABLE FOR POSTHOLE DEPLOYMENT\*



\*GAIN IS CONTROLLABLE REMOTELY VIA THE GÜRALP MINIMUS DIGITISER

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Our state-of-the-art gain switch allows the instrument to perform optimally in a wide range of earthquake shaking scenarios providing versatility for all earthquake early warning and structural health monitoring applications.

The Güralp Fortis is a very low-noise, force-feedback accelerometer with a large dynamic range, suitable for seismology, hazard mitigation and civil engineering applications.

The Fortis has one output which can be set at a wide range of gain options, providing flexibility for all strong motion monitoring applications.

The system has both a flat response to ground acceleration from DC to 100 Hz and a stable phase response within the passband.

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## Applications

- > Earthquake Early Warning systems
  - > Structural Health Monitoring (e.g. dams, industry, buildings)
  - > Surface and vault installation
  - > Posthole deployment
  - > Networked Arrays
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## Key features

Very low-noise components for high precision and enhanced dynamic range

Fixing bolt allows rapid installation for structural health monitoring

Slimline shape

Switchable gain from 0.5 to 4.0 g controllable manually on the sensor or remotely using the Güralp Minimus digitiser

Simple installation with a single M8 fixing bolt; robust and waterproof

The sensor doesn't require levelling to operate, however a physical bubble level is provided for instances where a level installation is desired

Isolated power supply for 10 - 36 V operation

Acceleration offsets adjustable for <1 mV precision

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The hard anodised aluminium casing protects the instrument from water, allowing it to be deployed in a range of environments.

### Posthole Deployment

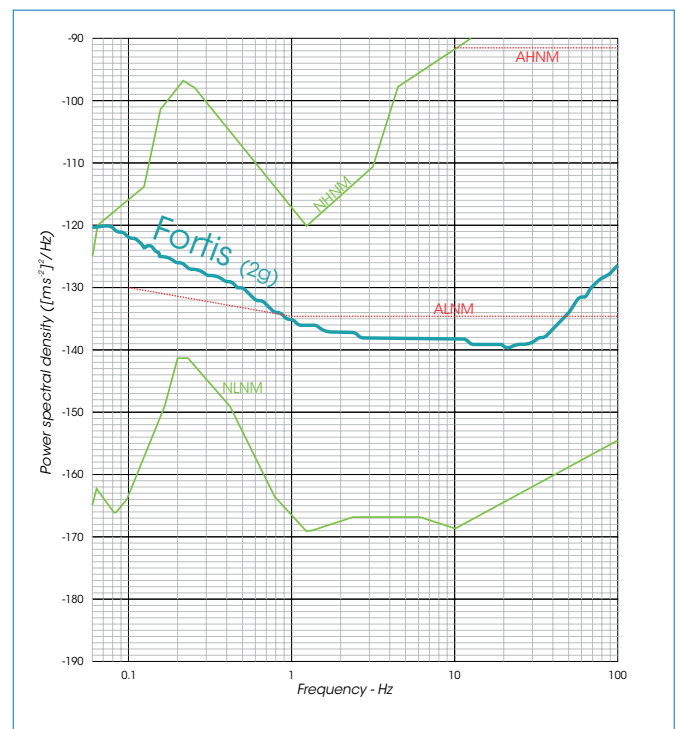
For subterranean deployments, the Fortis<sup>PH</sup> instrument incorporates the Fortis sensor housed in a stainless steel enclosure with a 100 bar / 10 MPa waterproof connector and an optional lifting bail.

### Require a digital accelerometer?

The Fortimus digital accelerometer is integrated with the feature-rich Minimus digitiser in one compact unit. Simple to use and quick to install, the Fortimus offers advanced data recording and communications features plus an ultra-low-latency mode for earthquake early warning. Find out more here: [www.guralp.com/products/surface#fortimus](http://www.guralp.com/products/surface#fortimus)

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## Sensor self-noise



## SPECIFICATIONS

| SYSTEM  |  |
|---|--|
| Configuration / Topology  | Triaxial orthogonal  |
| PERFORMANCE   |  |
| Acceleration output band  | DC – 100 Hz standard   |
| Gain switch options   | ±4 g, ±2 g, ±1 g or ±0.5 g   |
| Sensitivity   | 2.5 V/g, 5 V/g, 10 V/g, 20V/g  |
| Peak / Full scale output  | Differential: ±20 V (40 V peak-to-peak)                                    |
| Clip level  | 4.2 g  |
| Sensor Dynamic Range  | > 160 dB   |
| Self-noise below NHHM   | > 0.06 Hz (< 17 seconds)   |
| Self-noise below AHHM   | DC to 100 Hz   |
| Self-noise below ALNM   | 0.8 to 45 Hz   |
| Cross axis rejection  | 0.001 g/g  |
| Linearity   | 0.1% full scale  |
| Lowest spurious resonance   | > 450 Hz   |
| Offset zeroing  | Automatic on start up and on user command                                  |
| Calibration controls  | Independent signal & enable lines exposed on sensor connector              |
| POWER   |  |
| Power voltage range   | 10– 36V DC*  |
| Power consumption (at 12 V DC)  | 1.5 W standard<br><br>< 1.2 W option - contact Güralp for more information |
| *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 |  |
| ENVIRONMENTAL   |  |
| Operating temperature   | -20 to +70 °C  |

| PHYSICAL                                |  |
|---|--|
| Standard Fortis:                        |  |
| Diameter                                | 125 mm   |
| Height with feet and ports              | 99 mm  |
| Height (sensor only)                    | 66 mm  |
| Enclosure/Materials                     | Hard anodised aluminium  |
| Weight                                  | 1.1 kg   |
| Communication / Connector               | Military specification cconnector  |
| Optional fixing                         | M8x75 fixing bolt  |
| Humidity                                | 0 - 100%   |
| Environmental protection                | IP68 - protection against effects of prolonged immersion at 3 m depth for 72 hours     |
| Posthole Fortis:                        |  |
| Diameter                                | 125 mm   |
| Height (exc. connector)                 | 78 mm  |
| Enclosure/Materials                     | Stainless steel  |
| Communication / Connector               | 100 bar / 10 MPa waterproof connector (height 32 mm)                                   |
| Optional lifting bail assembly (height) | 259 mm   |
| Humidity                                | 0 - 100%   |
| Environmental protection (IP rating)    | IP68 - protection against effects of permanent immersion under pressure to 350 m depth |