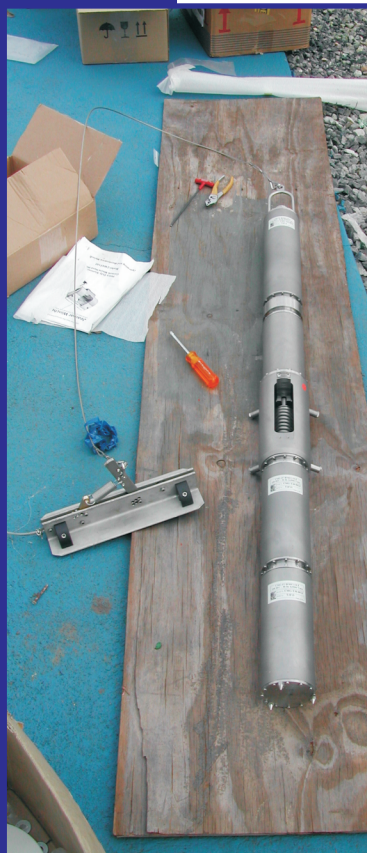




**GURALP
SYSTEMS**

Accessories

for borehole installations



Guralp Systems has extensive experience in the installation of seismic equipment in boreholes in a wide range of environments. Our range of borehole accessories is designed to ease the process of installing and maintaining instruments.

Accessories described in this data sheet include:

Single- and three-jaw hole lock modules

Custom hole lock systems

Hole lock control units

Strain relief mechanisms

Waterproofing

Downhole inclinometers

Electronic compasses

Downhole cameras for health inspections and maintenance

Universal breakout boxes

Handheld control units for testing and troubleshooting

Lightweight tripods and winches (see separate data sheet)



Guralp Systems can also produce custom designs for the special circumstances of your installation. Contact us or your local distributor to arrange a consultation.

Distributed by:

Downhole equipment

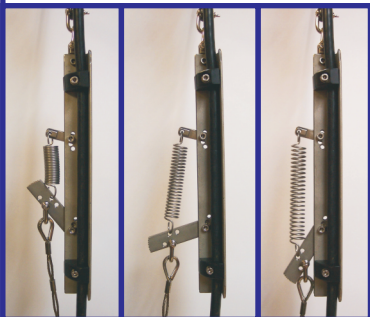


Single-jaw and three-jaw hole lock units

Güralp Systems provides hole lock units to two standard designs. Triaxial instruments are normally supplied with single-jaw hole locks, which use a high-tension spring-loaded arm to hold the instrument against the borehole casing. Skids and studs are used to ensure the instrument fits precisely within the borehole. Three-jaw hole lock units, normally used for vertical sensors, have three spring-loaded arms which work in concert to fix the instrument at the centre of the borehole.

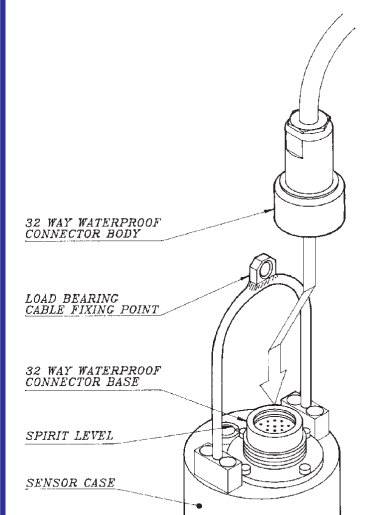
Other hole lock types

We can also design and supply attachments to any borehole instrument to allow installation in boreholes with pre-installed hole lock mechanisms. Contact Güralp Systems to discuss your requirements.



Strain relief unit

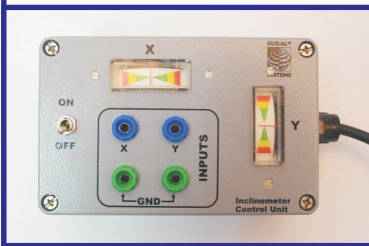
A strain relief unit relieves tension on the load-bearing and data cables near the sensor, ensuring that vibrations cannot be transmitted down the cables from the surface. Where a downhole digitizer is in use, the digitizer package includes a built-in strain relief mechanism.



Waterproofing

Güralp surface and borehole instruments use standard mil-spec connectors. These can be replaced with fully waterproof connectors as an option. High-quality cabling can also be supplied which can withstand immersion in water from -30 to 100 °C. This cabling consists of 8 individually-isolated twisted pair conductors, with a further 18 tin-plated copper cores, enclosed in a thick polyurethane shield.

Installation aids



Inclinometer

An instrument may be fitted with an inclinometer unit which detects the attitude of the sensor within the hole. These signals are exposed on the instrument's output connector, and can be monitored using a dedicated inclinometer monitor unit.

The inclinometer can help in avoiding damage to an instrument by attempted unlocking in an inclined part of a borehole.



Compass

CMG-5TB sensors are often fitted with an electronic compass which reports the orientation of the sensor within the borehole. The compass can be used at the time of installation to align the instrument with the North/South axis.

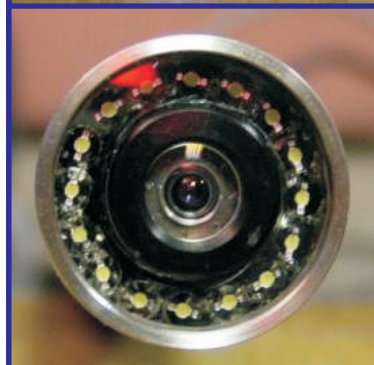
Alternatively, Guralp Systems' DM24 digitizers can be instructed to apply rotation to the incoming data automatically according to the measured orientation.



Borehole camera

The CMG-CAM1 is a compact, high resolution, easy-to-use colour video camera, designed for investigating boreholes prior to installation, or for checking the health and position of instruments afterwards.

- Small diameter 25.4 mm
- Internal light source with brightness control
- 400 m cable drum and surface control panel
- Optional 5000 m deep borehole version
- Composite analogue video out option
- View video with optional DV recorder or over USB
- Optional PC software for printing stills
- PAL TV- or VCR-compatible output signal
- Effective 628 x 582 pixel resolution (360 lines)
- Stainless steel or titanium housing



Control units



Universal breakout box

A universal breakout box is supplied with most Gralp borehole instruments. It provides a connection and monitoring point for sensor input power and output signals, as well as the Gralp Handheld Control Unit. Each connector has a full set of inputs and outputs.

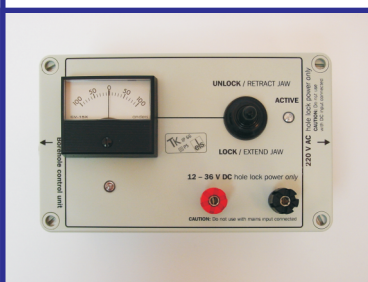
The breakout box is supplied with 5 metres of standard cable. Other cable types and lengths can be ordered as an option.



Handheld control unit (HCU)

The HCU can connect to any Gralp analogue broadband seismometer, either directly or through a breakout box. A meter displays the sensor velocity or mass position. Velocity and mass position signals are also exposed on banana jacks, and connectors are provided for your recording equipment (as on the breakout box.) In addition, the HCU provides terminals for injecting calibration signals into the system.

The HCU is supplied with a short (1 - 2 m) cable to connect to the breakout box or sensor. Longer cables may be supplied depending on the exact application.



Hole lock control unit

Borehole instruments with hole lock modules are supplied with a hole lock control unit, which controls and monitors the hole lock motor as well as providing an isolated power supply for the mechanism.

A specialized hole lock control unit is also available for deep borehole installations (> 500 m.)

