Geosystems **digi-Crackmeter** displacement sensor integrates magnetostrictive technology to produce a high precision digital instrument comprising a non-contact displacement sensor and digital temperature sensor. An on-board microcontroller applies temperature compensation and outputs a digital signal. Both the resolution (<0.01mm) and accuracy (0.25% linearity typical) are significantly better than for similarly priced technology.

The output signal includes the instrument’s unique Sensor_ID, the Sensor_Type as well as the temperature and displacement data. A balanced differential RS485 output signal is widely recognized for reliability in harsh environments. The signal can be routinely transmitted over 500m of lead-wire.

The digi-Crackmeter is easy to install either (i) as a GMM by attaching to a 5/8” rock-bolt, or (ii) in a wide range of other crack-meter configurations. The device is fully retrievable. The electronics are hermetically sealed and the sensor can be submerged indefinitely.

Each instrument is individually calibrated to ensure that the resolution (<0.01mm) and accuracy (0.5% linearity typical) are an order of magnitude better than for similarly priced technology. The inherently digital form of the signals eliminates the necessity for expensive analog-to-digital conversion and results in low cost monitoring peripherals that output data in real world units (mm and degC).

**Features:**

- On-board digital signal processing
- Digital (d-tech) 125mm (5 inch) stroke length
- High accuracy (0.5% FS) and resolution (0.01% FS)
- Individual calibration with coefficients stored in memory
- RS485 Output signal (9600,8,N,1) ASCII encoded
- Microcontroller provides output in real world units (mm and degC)
- Unique ID facilitates plug ‘n play networking
- Digital temperature sensor for accurate compensation
- Magnetostrictive technology provides immunity to hostile environment
- Easy to interface with dataloggers (digi-LOGGER), Ethernet and WiFi (GATEWAY)
- Competitively priced
# digi-Crackmeter Technology

## Installation

The digi-Crackmeter is typically installed using a mechanical rock-bolt in a borehole as shown in the figure below. However different customers have found various ingenious ways to monitor deformation.

![Installation Diagram](image)

If installed in borehole the **digi-Crackmeter** target can be tightened with socket wrench (purchased separately). The GMM itself is usually secured using rock-bolt resin or expandable foam. In wet holes it is important to use a drain tube.

## Shear Displacement

When deployed as a crack-meter, it can measure a combination of shear and dilation. This creates opportunities for monitoring large displacements on cracks.

## Telemetry

### Manual Readout

Readout can be made using Geosystems low cost manual readout box, which performs diagnostics on the lead-wires, recognizes the sensor type and ID and outputs the displacement and temperature data directly in mm and °C.

### Automated Data Retrieval

Clusters of sensors (4 per Slave) can be polled Geosystems. **GATEWAY** is a low cost interface to Ethernet or WiFi running TCP/IP. Other versions of **GATEWAY** can interface with the pre-existing leaky feeder wireless or even an ESG seismic system.

This solution can save time and money by transmitting data directly to a central control room or an engineer’s desktop computer.
The range of applications for the digi-Crackmeter are virtually limitless. Some of the more common scenarios include:

- Crack monitoring.
- Monitoring tunnels and drifts.
- Monitoring intersections wide spans
- Monitoring brows
- Monitoring fill mats
- Monitoring bulkheads

**Specifications**

- **Borehole size:** 30mm+
- **Range (F.S.):** 250mm, 125mm, 100mm or 50mm. Temp: -40 to 125°C
- **Core Technology:** 126mm magnetostrictive + temperature sensor
- **Output Signal:** RS485(9600,8,N,1) ASCII encoded string with Sensor_ID, Temp, and Displacement values.
- **Displ. Resolution:** 0.01mm with hand held readout
- **Displ, Hysteresis:** 0.025mm
- **Displ Repeatability:** 0.025mm
- **Displ. Linearity:** typically 0.01mm
- **Temp. Range:** -40 - 125°C
- **Temp Accuracy:** +/- 2°C
- **Temp Resolution:** 0.1°C