



# The SMART Contractometer

The unique collapsible structure of the Contractometer allows this device to measure closure and compression. Designed to be immersed in grout, cement, or in a borehole, this is your device for monitoring fill compression, movement on micropiles, or displacement on a fault plane.

## The SMART Contractometer

Based on our proven and popular SMART MPBX, the SMART Contractometer utilizes a collapsible structure to allow it to measure convergence. It has been used in applications like shotcrete pillars, backfill convergence, sill pillar squeeze, and micropile loading.

Like the MPBX, the Contractometer is a flexible, six-point fully recessable unit with an integrated electronic readout head. The sensor and head are small enough to be recessed into a 50 mm (2 in) diameter borehole, and the instruments are easy to install.

## Fabrication

The SMART Contractometer is assembled in flexible fibreglass and polypropylene, allowing it to be coiled on a 2.4 m (5 ft) diameter for shipping. Six fibreglass rods are anchored at user-specified distances along the instrument, and lengths of up to 60 m (197 ft) can be manufactured. Different configurations of the Contractometer are available, depending on whether they are being used in shotcrete pillars, backfill, micropiles or standard boreholes.

## Installation

The actual installation of the SMART Contractometer in a standard borehole is very similar to that of our MPBX. It will fit comfortably in a 50 mm (2") diameter percussion drilled borehole, and can be wedged in place prior to grouting.

For other uses, our engineering staff can guide you on the optimal installation method. We can also be contracted to assist with the installation, if you desire.

When installed in scenarios where the Contractometer will be covered (i.e. backfill or shotcrete pillars), special shear washers are available to ensure that full transfer of movement from the fill material to the instrument occurs. The leadwires are enclosed in a UV sensitized high density polyethylene (UV-HDPE) cover, which allows the leadwires to be protected by shotcreting or immersion in backfill.

The instruments can be read using several methods: our battery-powered wireless acquisition system from Newtrax ([www.newtrax.com](http://www.newtrax.com)), our battery-powered SMARTlog datalogger, our wired SMARTremote system, or manually using the handheld readout box.

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## Key Advantages

- Arrives on site ready to install. The only assembly that may be required is related to the shear washers, if they are used.
- The SMART Contractometer head is fully recessed into the borehole and the read-out wire is protected by shotcrete. With this configuration, the instrument is virtually immune to damage from blasting and regular mine activities.
- The SMART Contractometer is an inexpensive, yet tough, ground convergence monitoring sensor with six anchor points at locations specified by the user.
- The data generated by the SMART Contractometer is easily interpreted.

## Engineering Support

The staff at MDT has extensive backgrounds in rock mechanics and geotechnical design, specializing in instrumentation, ground support, and data acquisition. Along with our partner company MD Engineering ([www.mdeng.ca](http://www.mdeng.ca)), we can provide complete service for our instrumentation, including recommendations for particular instruments, design of instrumentation programs, data acquisition systems, and data analysis and interpretation.

## SMART Contractometer Specifications

**Length** up to 60 m

**Diameter** 33 mm

**Weight** 0.5kg/m

**Borehole diameter** 50 mm minimum

**Transducer** Linear potentiometers

**Stroke** 63 mm to 508 mm

**Accuracy** +/- 2% (1% available upon request)



Aluminum anchors ensure good bond with cementitious grout.

## Data Analysis

Output data from the SMART Contractometer is easily analyzed using standard, commercially available spreadsheet programs. Alternately, all your SMART instrument data can be stored and analyzed in one location using MineMonitor software.

The output corresponding to the displacement at the six anchor points can be plotted to determine the rate at which the medium is moving. By comparing the movement between adjacent anchor points, the location of maximum movement can be determined. Since the instrument is either fully grouted or has shear washers installed, there is no risk of anchor slip.

## To Order

To order, please specify:

- the length of CONTRACTOMETER
- desired use for unit (i.e. medium to be monitored)
- the locations of the six anchor points relative to the readout head
- the length of leadwire required

For more complex applications, please provide plans and/or sections so we can help determine the optimal configuration.