GEOSYSTEMS

# HID CELL
## Digital Hollow Inclusion Cell

## APPLICATIONS

The HID Cell is a proven, reliable and accurate instrument to determine triaxial stress in rock or concrete.

Common applications of HID Cells are for monitoring stress changes over time or determining orientation and magnitude of virgin stress by method of overcoring.

HID Cells are installed in metalliferous mines, coal mines, dams, tunnels, bridges, underground caverns, storage facilities and other civil engineering projects.

## FEATURES

- Triaxial stress management in rock or concrete
- Recommended by the ISRM for stress determination
- Designed for monitoring during overcoring applications
- Short or long term monitoring of triaxial stress
- Complete 3D stress tensor from one measurement
- Fully encapsulated electronics
- Range of grouts for specific application temperatures
- Digital sensor with embedded micro-controller
- Narrow cable for easy insertion throught drill string
- Improved accuracy

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# GEOTECHNICAL SOLUTIONS

## TECHNICAL SPECIFICATIONS

| | |
|---|---|
| **STRESS RANGE** | up to 100 MPa |
| **TEMPERATURE RANGE** | 0° to 60°C |
| **GAUGE RESISTANCE** | 120 ohms |
| **CIRCUIT CONFIGURATION** | Three wire, quarter bridge |
| **ACCURACY** | Standard error of stress +/- 10 ppm |
| **STRAIN GAUGES** | Gauge length 10mm |
| **BOREHOLE SIZE** | 38 mm diameter (EX or EXT for HI Cell 100-150 mm diameter for overcore |
| **POWER SUPPLY** | 5-15VDC at 55mA during measurement, 5mA during dwell |
| **COMMUNICATIONS** | RS-232 serial at 9600 baud |
| **DATA FORMAT** | NMEA 0138, comma separated |
| **PROTECTION** | Over voltage, reverse polarity, ESD |
| **RESOLUTION** | +/- 0.1 microstrain |
| **ADVANTAGES** | No signal losses due to cable<br>Narrow and cheaper four conductor cable<br>Higher accuracy<br>Turn key solution<br>Easy data download and analysis<br>Eliminates problems associated with readout drift<br>Compatible with any low cost datalogger that accepts RS232 comms |

## OPERATING PRINCIPLE

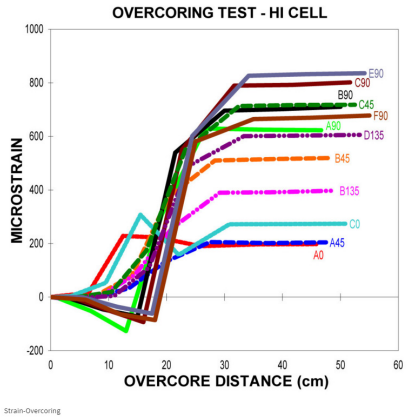
The Digital HI-Cell is a very low power, high-precision instrument purposely designed for in-situ monitoring of rock stress. The unit is designed to be permanently fixed within a bore-hole, and provides an immediate indication of strain and temperature.

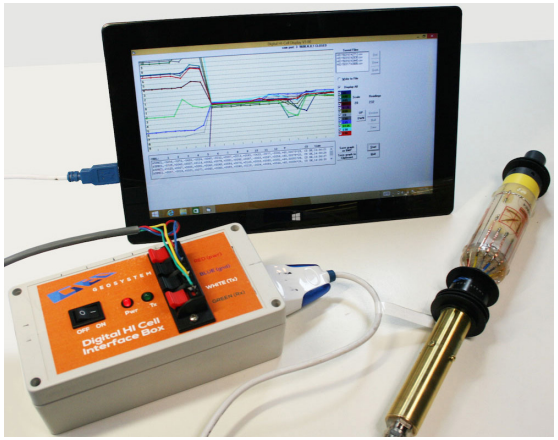
The unit contains precision strain gauges along with an embedded micro-controller which continually monitors the strain, and reports the values via a serial link. Strain values are digitised directly at the gauges, essentially removing the common problems of noise and signal degradation due to long cables. Power is only applied to the gauges when a value is read, removing any issues associated with long-term heating.

The HID Cell consists of an array of strain gauges that are encapsulated in the wall of a hollow pipe with known Elastic Modulus. The cell is epoxy grouted into a borehole and monitored for strain response during overcoring or left permanently installed for measuring relative stress over time.
The HI Cell is installed into a 38mm hole by filling the hollow body of the cell with a pre-formulated epoxy cement. Cement is extruded by the piston when the cell reaches target depth. Pushing the body of the cell, via installation rods activates the piston and a trip wire within the cell registers completion of extrusion.

Multiple rubber seals confine the grout flow to around the cell. Prior to installation, the hole is cleaned with compressed air and the walls of the hole prepared for the HI Cell. Once the grout has cured, the strain gauges are fully bonded 1.5 to 2.0 mm from the borehole wall, for which allowance is made during data reduction. Monitoring of the strain response is possible during overcoring via the data cable, which runs though the drilling rods and a modified water swivel to a logger/tablet/PC. The ability to record strain gauge information during overcoring provides valuable information, and indicates conditions such as the onset of core cracking, cell de-bonding or inelastic response of the rock. The retrieved overcored section of rock containing the cell may be restressed in a biaxial pressure chamber to derive the actual rock properties of and Poisson's ratio.

Long term stress change monitoring is possible with the HID Cell and is best suited to monitoring compressive or tensile stress changes in the long term. The standard HID Cell has twelve strain gauges and is suitable for measuring both isotropic and anisotropic rock. A standard temperature measuring thermistor is included to provide a check of possible temperature changes at the HID Cell site.

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