

## d-EXTO



YieldPoint's unique 1 to 6-Point Multiple Rod Extensometer (**d-EXTO**) combines a traditional Multi-rod design and digital signal processing to result in dramatically improved accuracy reliability compared to similar priced existing technology. This high precision digital instrument comprises up to six (6) Variable Induction Displacement Sensors and an on-board digital temperature sensor.

Design features of the d\_EXTO include a Lexan™ body sheath much stiffer, stronger and durable than polyethylene commonly used; a compact central core which will not be damaged by shear movements of up to 10mm; hermetically sealed electronics that operate indefinitely when submerged in water and robust torsionally straightened stainless steel rods.

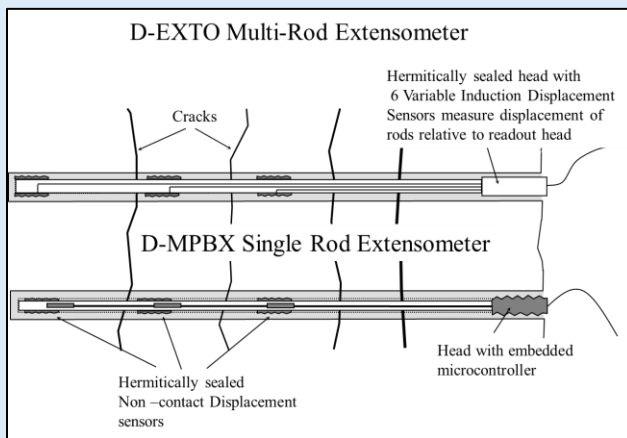
The inherently digital nature of the signals eliminates the necessity for expensive analog-to-digital conversion and results in low cost readout unit that reads data directly in real world units (*mm* and  $^{\circ}\text{C}$ ). The sensor output is an ASCII (9600,8,N,1) digital signal which can be read by a low cost readout unit (**d-READER**), dataloggers (**d-LOGGER**), and networked (**DESTINY**) for transmission to servers. The signals themselves are robust and can be transmitted over 1000ft of lead-wire. If broken the lead-wire can be twisted and taped together.

### Features:

- ▲ *'Super-Tough' design with high strength Lexan™ outer sheath*
- ▲ *Multiple Stainless Steel rods maintained straight in multi-lumen extruded tube for maximum accuracy.*
- ▲ *1-6 anchor points*
- ▲ *125mm (5 inch) stroke length*
- ▲ *High accuracy (0.5% FS) and resolution (0.01% FS)*
- ▲ *Microcontroller for output in real world units*
- ▲ *Unique instrument ID*
- ▲ *Calibration Coeffs. in Flash memory*
- ▲ *Smallest electronics head (25mm diameter 150mm long)*
- ▲ *On-board digital temperature sensor for accurate compensation*
- ▲ *High survivability following blasts and vibration even if toe is damaged*
- ▲ *Easy to install and maintain—Arrives on site fully assembled*

## Technology

The **d-EXTO** design is based on a traditional multi-rod design (see below) which includes 1 to 6 Variable Inductive Displacement Sensors. The 6 stainless steel rods are housed individually in a central multi-lumen tube to maintain them perfectly straight and eliminate friction between rods. The individual rods are completely independent of one another and therefore if damaged by blasting the proximal sensors will continue to operate.



Each displacement sensor is individually calibrated and the calibration coefficients written to microcontroller memory. The **d-EXTO** can easily detect and resolve sub-mm displacements of with  $10\mu\text{m}$  resolution. Accuracy is enhanced by an on-board temperature sensor which provides compensation. The displacement sensors use non-contact sensing the design is inherently waterproof; therefore it is especially suited for monitoring the displacement of backfill.

The diameter of the instrument is only 25mm. this includes the electronics head that can be recessed into the borehole for protection.

## Telemetry

The RS485 output signal can be transmitted over 1000ft without amplification. Readings are directly in mm allowing immediate interpretation of rock mass deformation without having to enter the raw voltage data in a spreadsheet.

### Manual Readout



YieldPoint's low cost **d-READER** readout unit provides the temperature and load data directly in  $^{\circ}\text{C}$  and tons.

### Datalogging

Data from the **d-EXTO** can be collected using YieldPoint's **d-LOGGER** dataloggers (**d<sup>1</sup>LOGGER** and **d<sup>4</sup>LOGGER**). The dataloggers require no configuration and are fully interchangeable with any other type of YieldPoint instrument (**d-CABLE** borehole extensometers, **d-GMM**, **d-TILT**, **d-PLUCKER** etc). Therefore arrays of instruments to monitor cable load and ground movement can easily be combined.

### Automated Data Retrieval

Clusters of instruments (4 per Slave) can be polled using YieldPoint's **DESTINY** (digitally Enabled Sensor Transducer and Instrumentation Network from YieldPoint) technology. Each low-cost **DESTINY** node interfaces 4 instruments directly to a TCP/IP or WiFi network.

## Applications

- ▲ Slope monitoring.
- ▲ Monitoring cable reinforcement in tunnels and drifts
- ▲ Monitoring cable reinforcement in stopes and other large openings
- ▲ Monitoring cables in fill mats
- ▲ Monitoring ground anchors
- ▲ Monitoring strand reinforced concrete
- ▲ Monitoring tie-backs

## Specification

- ▲ **Core Technology:** Temperature compensated Variable inductance displacement sensor: 0-125mm range . Digital Temperature sensor
- ▲ **Output Signal** -RS485 with transmission up to 500m over 2 x tp.
- ▲ **Disp Range (F.S.)** -0-125mm. Initial reading usually set to 25mm.
- ▲ **Disp Resolution** - 0.01mm.
- ▲ **Disp.Linearity** - typically 0.5% F.S
- ▲ **Disp Accuracy** - typically better than 1mm.
- ▲ **Temp. range:** Temp: -40 to 125°C
- ▲ **Temp Resolution:** 0.1°C
- ▲ **Temp Accuracy:** +/- 2°C Temp
- ▲ **Temp. coeff for disp sensor:** <+/- 0.01%/°C

### To Order Specify:

- ▲ Number of anchor points(1-6).
- ▲ Location of anchor points.
- ▲ Leadwire length.
- ▲ Poly leadwire cover.