

## DETECTOR 3EX

### *Features:*

- ▲ 3 point borehole extensometer with 127mm (5 inch) stroke length
- ▲ Electronics can be retrieved after deployment
- ▲ Reduces deployment costs by 50 to 75 %
- ▲ High accuracy (0.5% FS) +resolution (0.01% FS) using [DETECT](#) technology
- ▲ Single rod design enhances accuracy and reduces manufacturing costs
- ▲ Inherently digital
- ▲ Microcontroller provides output in real world units
- ▲ Microcontroller stores sensor ID & Calibration Coeffs. in FLASH memory
- ▲ Smallest electronics head (25mm diameter 150mm long)
- ▲ On-board digital temperature sensor for accurate compensation
- ▲ Non contact technology provides immunity to hostile environment
- ▲ High survivability following blasts and vibration
- ▲ Easy to install and maintain. Arrives on site fully assembled
- ▲ Low cost readout unit for output in mm and °C
- ▲ Guaranteed lowest cost in class

YieldPoint's 3-Point Extensometer (DETECTOR - Digital Extensometer Technology using Eddy Current Transducer - Optionally Retrievable) is a major breakthrough in ground monitoring technology for mining. Unlike civil engineering where a location may require monitoring for many years, for mining the critical locations change frequently as mining progresses. In many cases extensometers provide useful information for only a few weeks or months.

The DETECTOR-3EX involves grouting a low cost disposable plastic tube with conductive aluminum anchors/targets into a borehole. The electronics probe extensometer is then inserted into the tube to monitor relative displacement of the aluminum targets. During monitoring the response is identical to a permanently installed extensometer (eg.DETECT-3EX). Following the monitoring period the retrievable electronics can be recovered from the borehole and installed elsewhere. The [single rod design](#) means that displacement measurements are made at the point of ground movement, and do not depend on translation of a mechanical rod between the point of ground movement and the linear displacement sensor.



*The 3EX can be coiled to a 1.25m diameter*

### *Manual Readout*

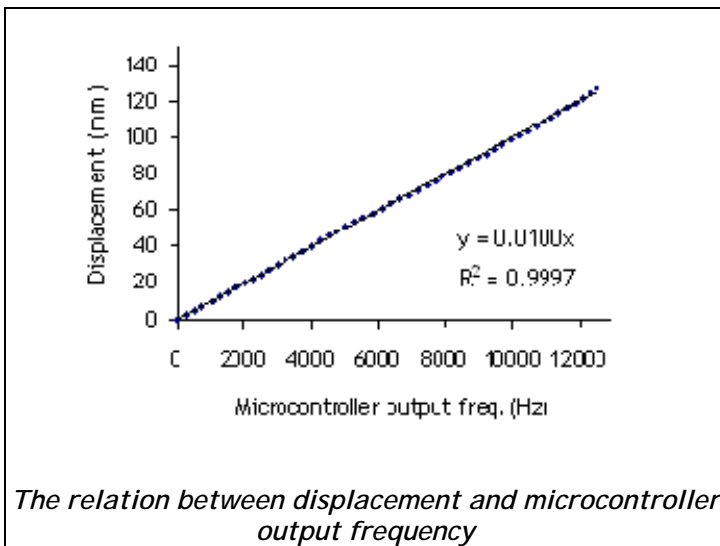
Readout can be made using YieldPoint's low cost manual readout box, with a backlit LCD. An on-board microcontroller performs diagnostics on the leadwires, recognizes the sensor type and ID and outputs the displacement and temperature data in mm and °C. A jumper inside the unit can be used to configure the unit for either SI or imperial units.



*The manual readout unit.  
The LCD is backlit for underground.*

The inherently digital nature of the signals eliminates the necessity for expensive analog-to-digital conversion. The sensor output is a 1-wire frequency modulated (CMOS and TTL compatible) digital signal which can be read by a low cost electronic meter or tachometer, and can be routinely interfaced with digital channels on PLCs. The output frequency is directly related to real world units (mm and °C) so that meaningful results can be obtained by even unskilled personnel. The signals themselves are robust (0-5V square waves) can be transmitted over 1000ft of lead-wire, and if broken the lead-wire can be twisted and taped together. Frequency modulation is widely recognized as preferable for the harsh mining environment where amplitude signals are prone to inaccuracies.

As a result both the resolution (<0.01mm) and accuracy (<0.50% ) are an order of magnitude better than for similarly priced alternatives. An on-board digital temperature sensor provides accurate compensation ( $T_c=0.01\%FS/^\circ C$  over 0-50°C).



Since [DETECT](#) technology involves non-contact sensing the design is inherently waterproof; therefore it is especially suited for monitoring the displacement of backfill or pastefill. The DETECTOR-3EX is suitable for embedment in concrete structures.

### Unique Advantages of the DETECTOR

- ▲ Reduced cost of deployment
- ▲ Extensometer can be used and then returned to inventory.
- ▲ Rapid replacement of damaged electronics without re-drilling hole
- ▲ In-hole calibration possible.
- ▲ Extensometer can be re-zeroed to extend range

### Automated Data Retrieval

Clusters of sensors (4 per Slave) can be polled YieldPoint's DESTINY (Digitally Enabled Sensor Transducer and Instrumentation Network from YieldPoint) technology. DESTINY/IP is a low cost, low maintenance RS-485 sensor network (modbus protocol), that interfaces with ethernet running TCP/IP. Other versions of DESTINY 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.

### Applications

DETECTOR-3EX extensometers provide detailed information concerning the stability of small, medium and large scale underground excavations. The 3EX is primarily designed as a low cost solution to monitor the stability of underground stopes (hanging walls, backs and brows), crusher stations as well as detailed monitoring of garages, shaft stations and drift intersections

Specific applications include:

- ▲ Monitoring stope HWs
- ▲ Monitoring stope backs
- ▲ Monitoring brows
- ▲ Monitoring crusher stations
- ▲ Monitoring intersection stability
- ▲ Monitoring shaft stability
- ▲ Monitoring pillar stability
- ▲ Mining under backfill

### Specification

Dimensions: up to 6m (18ft) length.

Borehole size: 50mm+

Core Technology: Long range eddy current displacement sensor (oscillation Frequency 100 - 12,700Hz @ 100Hz/mm)

Temperature sensor (oscillation frequency 10Hz/°C)

Output Signal: CMOS + TTL compatible 0-5V square wave train.

Displ. Range (F.S.): 127mm.

Displ. Resolution: 0.01mm with manual readout

Displ. Linearity: typically 0.25% F.S.

Displ. Accuracy: better than +/- 0.5mm.

Temp. Range: -40 to 125°C

Temp Accuracy: +/- 2°C -Digitally trimmed at 0°C and 25°C

Temp Resolution: 0.1°C

Temp coeff for eddy current sensor: <0.01%F.S./°C (0-50°C)