# YieldPoint
## Sensing the future

## *d*-GMM (DETECT)

# Instruction Manual

# YieldPoint Inc.

# Jan 2011

# Warranty and Service Policy

## Product Warranty

YieldPoint Inc warrants the instruments described in this manual to be free from defects in materials and factory workmanship to the original buyer. This warranty is contingent upon proper use of the equipment, and does not cover equipment that has been modified or has been subjected to abusive physical or electrical stresses. YieldPoint Inc., agrees to repair or replace, at its sole discretion, any instrument that fails to perform as specified within 6 months after date of the original shipment from the factory, or 3 months after the date of installation, whichever date comes first.

Yieldpoint Inc., reserves the right to make substitutions and modifications in the specifications of equipment that do not materially or adversely affect the performance of the equipment.

New equipment may be returned within 30 days of shipment with prior approval. New items which are less than thirty days old after shipment may be returned for credit, less a minimum restocking and testing charge of twenty percent of the list price upon factory approval only, provided the customer pays all shipping and handling charges. Specially ordered, or modified goods, or goods which have been used or have been unpacked, or goods which have been shipped more than thirty days prior are not returnable.

The information contained in this manual is subject to change without notice. YieldPoint Inc. makes no warranty of any kind with regard to this material, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose. Further, YieldPoint Inc., assumes no responsibility for any errors that may appear in this manual and makes no commitment to update, or keep current, the information contained in this manual.

## Service Policy

Units within the warranty period returned for repair, test, and recalibration are serviced at no charge in accordance with the terms of the warranty policy. The Customer pays all transportation and other charges to the factory.

Units out of warranty returned for repair, test, and/or recalibration are handled on a time and material basis. If requested, or if costs exceed 50% of current list price, YieldPoint Inc., advises the customer prior to making the repairs. Such repairs are performed at the customer's expense. Typical test, recalibration, and repairs are 25% of the instrument's current list price. Transportation charges both ways are at the customer's expense.

Please be sure all returns are shipped with the following information included:

1. Your company Name with Billing and Shipping Addresses.

2. A complete description of your problem, or re-calibration data.

3. The contact person at your company, with their telephone and facsimile numbers.

4. Non-Warranty returns additionally need your Purchase Order Number.

Please pack your returned instruments in their original shipping cartons, or in equivalent strong protective shipping cartons.

The **d-GMM(DETECT)** is a digital ground movement monitoring instrument based on YieldPoint's **d-Tech** technology. The sensor consists of two separate components the electronic probe and the aluminum target between which there is no physical connection. Thus we refer to the sensor as being 'non-contact' in operation, and because the electronic probe unit can be hermetically sealed, it will function indefinitely underwater and, with no moving parts is virtually immune to blast vibration.

On-board the **d-GMM (DETECT)** the following digital operations are conducted;

1. The inductance variations of the sensor associated with relative motion of the aluminum target are determined.

2. the temperature is determined by a digital temperature sensor.
3. A micro-controller used the inductance value, the temperature and a series of calibration coefficients to calculate the displacement in directly in mm.
4. An RS485 transceiver transmits a serial (9600,8,N,1) ASCII  data-stream from which includes: a unique Sensor_ID, the Sensor_Type, the Temperature and Displacement data.
5. These signals can be carried over long lead wire lengths, and can be read using the Manual Interrogation Unit,  **d-LOGGER** Data-loggers or a  **DESTINY** monitoring system.

Advanatges of the digital design include:
1. Information can be sent over long lead-wire lengths - orders of magnitude further than analog voltage signals.
2. Using a serial signal many channels of information can be sent along a single pair of wires, which reduces price and minimizes the time required for any repair.
3. If accidentally severed, lead-wires can be twisted together as a temporary fix.
4. Expensive A/D conversion has already been performed in the sensor so that Data Acquisition can be built around low cost micro-controller.
5. Output in real world units decreases the cost of data interpretation and increases the number of personnel who can use the data. Many times data gets trapped in an engineer's spreadsheet program.

## For Installation the following items are required:

1. **d-GMM(DETECT)** + Manual Interrogation Unit (**d-READER**)
2. Ratchet socket driver with 13/16" socket
3. 2 rolls of electrical tape.
4. Expansive foam or rock bolt epoxy
5. Drain tube for wet holes.

## Installation Procedure.

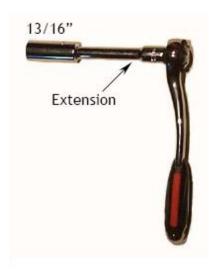The **d-GMM(DETECT)** is designed for installation in a 1 3/8" diameter (33mm) or larger percussion drill hole.


**STEP 1 IMPORTANT**

**DETECT** technology can be influenced by very conductive rocks at the borehole wall. To test whether the rock type at the collar of the borehole wall is too conductive for application:
- Remove the probe from its aluminum target.
- Plug the probe into the **d-READER**
- The displacement should indicate "Hi Range"
- Insert the probe (without aluminum target into the collar of the hole).
- Wait for two full reading cycles and check that the displacement is still "Hi Range" in which case deployment of the sensor is OK
- If the sensor indicates a displacement value (called the null displacement value) deployment is not recommended.
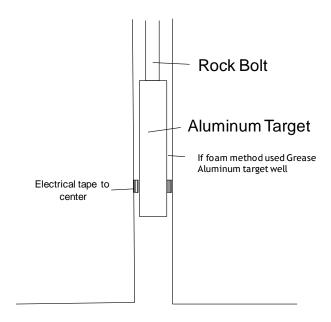- Unplug the sensor from **d-READER**.


**STEP 2**

The aluminum Target should be treaded and tightened onto a 5/8 " mechanical rock bolt. The best tool to accomplish this is a professional quality ratchet socket driver (see below) with an extension and a 13/16" socket. Tip: In a pitch, use a spark plug driver.



A socket driver suitable for **d-GMM(DETECT)** installation

**STEP 3**

Install the rock bolt into the borehole so that the collar of the aluminum target is 3 inches (75mm) from the collar of the borehole. Using a 13/16" socket (spark plug wrench can be used) to grip the aluminum target tighten so that the bolt is secure.

Rock Bolt

Aluminum Target

If foam method used Grease Aluminum target well
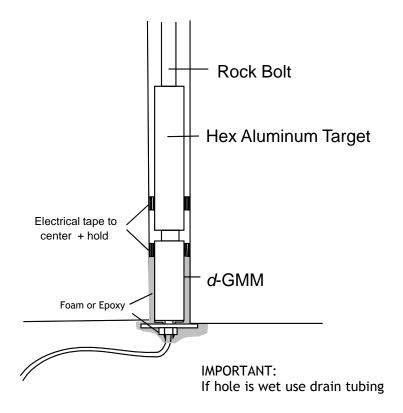
Electrical tape to center

**STEP 4**

Insert and attach the electronic probe to the borehole collar. Prior to deployment of adhesive the sensor can be wedged in place. An oversize ring of electrical tape wound on the *d-GMM(DETECT)* works well for all borehole sizes.

1. Using rock bolt resin
Mould the resin around the body of the sensor (this provides the majority of adhesion) and around the aluminum faceplate.
2. Using expansive foams.
When using expansive foams, first apply a liberal coating of grease to the aluminum target piece. Then position the sensor in the borehole and spray a small amount of the foam (STEP 4-1). Complete the application by filling around the collar of the borehole and enclosing the aluminum face-bar. In wet holes provide a drain hole using the length of tubing provided (STEP 4-2).

Rock Bolt

Hex Aluminum Target

Electrical tape to center + hold

d-GMM

Foam or Epoxy

IMPORTANT:
If hole is wet use drain tubing

## Using the Manual Readout Unit (*d*-READER)

The ***d*-READER** is a micro-controller based interrogation Unit for ***d*-Tech** instrumentes. It provides power to the instrument , provides signal conditioning and displays the results on a backlit LCD. By simply plugging in a sensor the ***d*-READER** is activated;  therefore it cannot be left on, or turned on accidentally. Information will be scrolled out on the LCD as indicated below. The sensor data will continue to cycle if the sensor remains plugged in.

- Firmware version eg. DESTINY Ver 5.0
- Battery Voltage (9.5 new to 7.5 low battery limit)
- Sensor_ID  (9 or 10 char unique ID for instrument)
- Sensor_Type (21 for ***d*-GMM**)
- Channel 1 Temperature in deg C
- Channel 2  Displacement in mm

Key Points:

1. The 9V battery should be replaced ASAP if the "LOW BATTERY" condition is indicated.
2. Damaged leadwires will result in the "Sensor_Type" signal never appearing.