

# Magnet Extensometer

## Applications

The magnet extensometer is used to monitor settlement and heave in excavations, foundations, dams, and embankments.

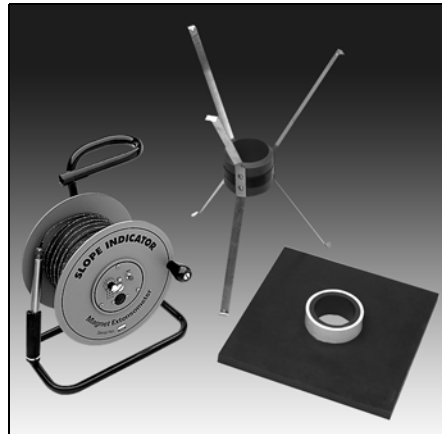
Readings obtained with the extensometer indicate the depths at which settlement has occurred as well as the total amount of settlement.

## Operation

The system consists of a probe, a graduated cable, a reel with built-in light and buzzer, and a number of magnets positioned along the length of an access pipe. The magnets move with settlement or heave of the surrounding ground.

Readings are obtained by drawing the probe through the access pipe to find the depth of the magnets. When the probe enters a magnetic field, a reed switch closes, activating the light and buzzer on the reel at the surface. The operator then refers to the graduations on the cable and notes the depth of the magnet.

Settlement and heave are calculated by comparing the current depth of each magnet to its initial depth. Movement is generally referenced to the datum magnet, which is anchored in stable ground.



## Installed Components

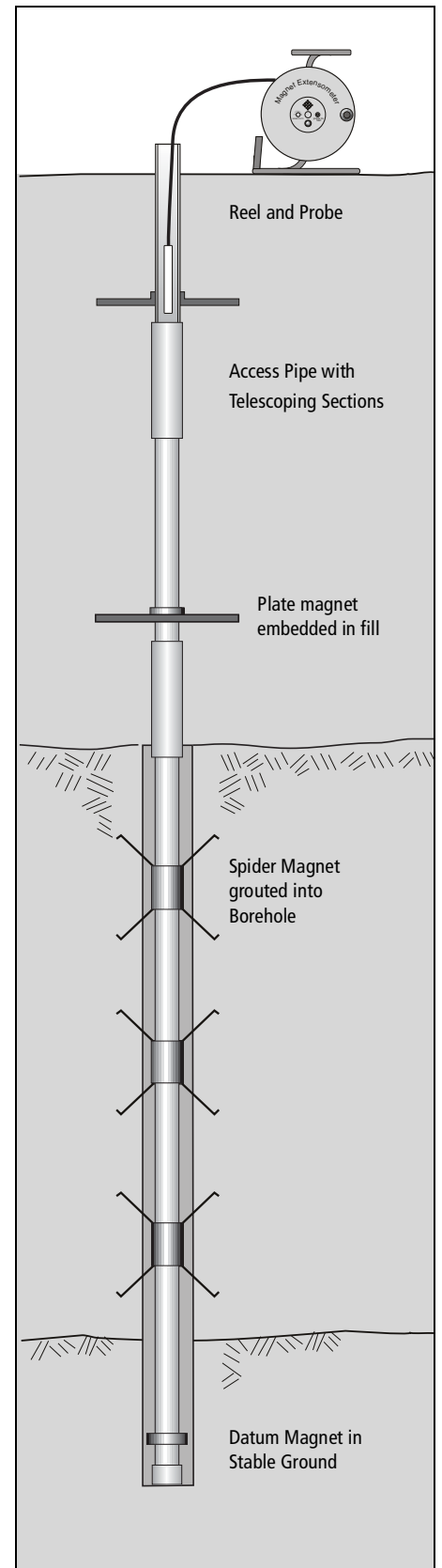
**Access Pipe:** Subsurface access for the probe is provided by plastic inclinometer casing or one-inch pipe. Telescoping pipe sections are used to help accommodate settlement.

**Plate Magnet:** The plate magnet is used in fill. It is positioned at the specified elevation and then covered with fill material that is compacted to the same specification as the surrounding fill.

**Spider Magnet:** The spider magnet, named for its appearance, is used in boreholes. The legs are compressed for installation and are released when the magnet is positioned at the specified depth. The borehole is then backfilled with a soft grout.

**Datum Magnet:** The datum magnet is fixed directly to the bottom section of access pipe. A datum magnet is used when the bottom of the pipe is anchored in stable ground.

**Pipe Magnet:** The pipe magnet (not shown) is factory attached to telescoping sections of 1" PVC pipe, eliminating the need for spider magnets and simplifying installation.



**READOUT (PROBE AND REEL)**

Readout with 30m cable . . . . .	51817203
Readout with 50m cable . . . . .	51817205
Readout with 100m cable . . . . .	51817210
Readout with 100' cable . . . . .	51817310
Readout with 150' cable . . . . .	51817315
Readout with 300' cable . . . . .	51817330

The readout consists of a reed-switch probe, a graduated cable, and a reel that contains a power switch, indicator light, and batteries.

**Probe:** Stainless steel, 16 x 203mm (5/8 x 8").

**Cable:** 3.5mm (0.125") diameter, twin steel conductors for good dimensional stability, polyurethane jacket for high resistance to abrasion, indelible graduations marked by a laser marking machine. Metric cable have 2 mm graduations. English cables have 0.01' graduations.

**Reel:** 230 or 280mm (9 or 11") in diameter, depending on cable length. Mounted on a steel-tube stand with a durable finish.

**Batteries:** The readout operates on three 1.5 volt alkaline AA cells. Battery life depends on usage.

**Precision:** Readings are typically repeatable to  $\pm 3$  to 5 mm or  $\pm 0.1$  to 0.2 inches.

**MAGNETS FOR 1-INCH PIPE**

Datum Magnet . . . . .	51817303
Spider Magnet . . . . .	51817503
Plate Magnet . . . . .	51817703
Pipe Magnet . . . . .	91821450

Datum magnet has 34 mm ID (1.34"). Body is PVC plastic.

Spider magnet has legs that are compressed for downhole installation and released when magnet is in place. Compression wires and release pin are included. Release cord is not included. OD of magnet is 86 mm (3.4") with legs compressed, so borehole should have a diameter of 100 to 200 mm (4 to 8"). ID of magnet ID is 34 mm (1.34"). Spring force of legs is 2.7 kg (6 lb). Legs are spring steel, body is PVC plastic.

Plate magnet measures 300 x 300 mm (12 x 12"). ID is 34mm (1.34"). Body is PVC plastic.

Pipe magnet is fixed directly to telescoping sections of 1-inch pipe (50711048), eliminating spider magnets and simplifying installation. Up to two magnets can be attached to each telescoping section.

**1-INCH PIPE**

Pipe Section, 3.05m (10') . . . . .	50711408
Telescoping Section . . . . .	50711458
Pop Rivet, AD-42H . . . . .	51003303
End Cap . . . . .	50711428

Pipe section is 3.05 m (10') long PVC pipe. Threaded ends provide flush joints.

Telescoping section is 3.05m (10') long when expanded and 2m (7') long when collapsed. It has threaded ends for coupling to PVC pipe above. OD is 43 mm (1.7").

Pop rivets hold telescoping sections open during installation. Use 2 per telescoping section.

End cap is glued on with PVC cement.

**MAGNETS FOR 70MM (2.75") INCLINOMETER CASING**

Datum Magnet . . . . .	51817346
Spider Magnet . . . . .	51817546
Plate Magnet . . . . .	51817746

Datum magnet has an ID of 71 mm (2.8").

Spider magnet has legs that are compressed for downhole installation and released when a pin is pulled. Compression wires and release pin are included. Release cord is not included. Magnet OD is 122 mm (4.8") with legs compressed, so borehole diameter should be 125 to 305 mm (5 to 12"). Magnet ID is 71 mm (2.8"). Legs have spring force of 2.7 kg (6 lb). Legs are spring steel, body is PVC plastic.

Plate magnet measures 300 x 300 mm (12 x 12"). ID is 71 mm (2.8").

**MAGNETS FOR 85MM (3.34") INCLINOMETER CASING**

Datum Magnet . . . . .	51817366
Spider Magnet . . . . .	51817566
Plate Magnet . . . . .	51817766

Datum magnet has an ID of 85 mm (3.36") and is made of PVC plastic.

Spider magnet has legs that are compressed for downhole installation and released when a pin is pulled. Compression wires and release pin are included. Release cord is not included. Magnet OD is 122 mm (4.8") with legs compressed, so borehole diameter should be 125 to 305 mm (5 to 12"). Magnet ID is 85 mm (3.36"). Legs have spring force of 2.7 kg (6 lb). Body is PVC plastic. Legs are spring steel.

Plate magnet measures 300 x 300 mm (12x12") and has an ID of 85 mm (3.36"). Body is PVC plastic.

**INCLINOMETER CASING**

See data sheet for inclinometer casing for part numbers.