BOREHOLE EXTENSOMETER

Model WR-FLEX

APPLICATIONS

The borehole extensometer Model WR-FLEX is used to measure deformation and displacement of soil, rock and structures. Typical applications include:

- Measuring settlement, subsidence and uplift of structures
- Determining stability of slopes and retaining structures
- Measuring deformation of underground openings due to internal stress relief in surrounding rock

DESCRIPTION

The WR-FLEX borehole extensometer consists of anchors spaced along a protective plastic tube. The anchors are located at elevations where displacement measurements are required. One end of a spring-steel measuring rod is attached to the inside of each anchor. The rods extend through the protective tube and are terminated within the head assembly. The rods are free to move within the head assembly and protective plastic tube.

As relative displacement between the anchors and head assembly occurs, the location of the free ends of the rods in the head assembly move the same amount. By measuring the displacement between the free ends of the head assembly, the displacement of the anchors relative to the head assembly is obtained.

Displacement can be measured either manually, using a depth gauge, or remotely, by converting the head using the electrical head assembly and installing linear potentiometer displacement transducers.

The head assembly can be installed flush with the rock or ground surface and can be extended at a later date, for example, through a concrete tunnel lining. Extension rods can be added to the installed rod to extend the measuring range of the extensometer.

Groutable ribbed-steel anchors are used in rock and mechanical leaf-spring anchors are used in soft soils.

FEATURES

- **Pre-assembled and ready to install**
- **Low cost and simple installation**
- **Two models: one with up to 5 measuring points and one with up to 10**
- **Accommodates shear deformations**
- **Compact, fits in small size boreholes without reaming of collars**
- **Can be extended through concrete tunnel linings**
- **Simple manual reading with depth gauge**
- **Easily converted for remote reading with electrical readout without losing the manual reading capability**

SPECIFICATIONS

MODEL	WR-5		WR-10	
Anchoring points	1 to 5		6 to 10	
Anchor types	Groutable	Mechanical	Groutable	Mechanical
Borehole, max. diameter	N/A	76 mm	N/A	100 mm
Borehole, min. diameter	48 mm	60 mm	65 mm	76 mm
Anchors, max. diameter	34 mm	43 mm	51 mm	65 mm
HEAD DIMENSIONS (INCLUDING PROTECTIVE CAP)				
Mechanical head				
Length	15 cm		8 cm	
OD	6 cm		22 cm	
Electrical head				
Length	Varies according to electrical sensor			
OD	10.2 cm			

READINGS	MECHANICAL	ELECTRICAL
Instruments	Depth gauge, vernier or LCD	Linear potentiometer
Range*	150 mm	50, 100, 150 mm
Accuracy	±0.003 mm	±0.5% F.S.
Resolution	0.01 mm (vernier), 0.001 mm (LCD)	0.01 mm with REP readout
Operating temperature	0 to +40°C (LCD)	–20 to +80°C

** Other ranges available upon request.*

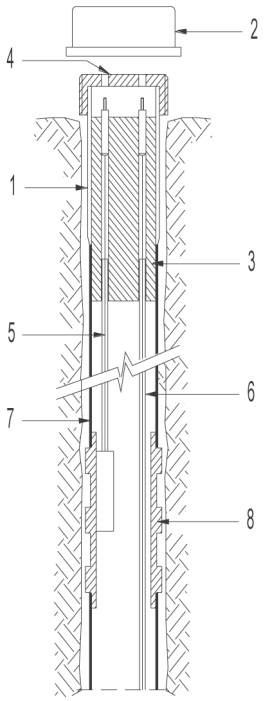
ORDERING INFORMATION

Please specify:

- Borehole depth and diameter
- Number of measuring points and depths
- Anchor type

ACCESSORIES

- Installation tool
- Grout and vent tubes
- Extension rods
- Readout instruments



1: Stainless steel tube
2: Protective cap
3: Rod guide tube
4: Reference plane
5: Spring steel rods
6: Semi-rigid plastic tube
7: External polyethylene sheath
8: Ribbed steel anchors

WR-FLEX Schematic

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