

## BOREHOLE EXTENSOMETER

### MODEL EDS-63U/D

#### INTRODUCTION

The Encardio-rite model EDS-63U/D borehole extensometer is ideally suited for upward, downward or inclined boreholes. It is a precision instrument designed to help civil engineers and geologists in the measurement of deformation of rock mass and adjacent or surrounding soil. Together with anchor bolt load cell and tape extensometer, it is an essential equipment for investigation and monitoring of foundations, slopes & embankments and for studying the behavior of rock around under ground cavities, tunnels and mines.

#### GENERAL DESCRIPTION

The borehole extensometer measures the extension (displacement) which takes place with time in a bored hole or in several bored



holes in a rock mass. It essentially consists of one or more anchors and a reference plate. The anchor or anchors are set in the same borehole or in different boreholes drilled adjacent to the first borehole. They help to accurately measure the distance between the various anchors with respect to the reference plate and monitor their relative displacement with passage of time. It is usually assumed that the deepest anchor is in stable ground and so any change in the anchor spacing gives information about the settlement of foundation taking place.

#### MEASUREMENT METHOD

The measurement with model EDS-63U/D borehole extensometer is economical, very reliable and is preferred at locations where access to the mouth of the borehole is easily available. Displacement readings are taken by measuring the depth of the near end of the connecting rod from a reference plate provided at the mouth of the borehole. A digital caliper/micrometer depth gage with a resolution of 0.01 mm is used to take the readings.

#### APPLICATIONS

- ♦ To determine how roof or wall of an under ground cavity or tunnel behaves during excavation operation and to study the effectiveness of the support system.
- ♦ To measure and monitor settlement in a foundation due to excavation of underground cavities or due to construction of a heavy structure like concrete, rockfill, masonry or earth dam over the foundation.

#### EDS-63U-X SINGLE/MULTI-POSITION EXTENSOMETER

The model EDS-63U/D borehole extensometer with up to three position can be installed in a 3"  $\phi$  NX (76 mm  $\phi$ ) borehole; with up to six positions, it can be installed in a 100 mm  $\phi$  borehole.

#### Groutable anchor

At locations where the rock formation is soft or lots of water exists, it is not possible to install expandable anchors effectively. Groutable anchor is ideally suited for such applications. In a borehole, it is usual to use a 20 mm  $\phi$ , 500 mm long groutable anchor.

#### Extensometer system description

The groutable reinforced bar anchor (1) is attached to SS 410 stainless steel ( $\phi$  8 mm) or fibreglass ( $\phi$  6 mm) connecting rods (2) of appropriate length, as specified in the design.

The anchors are inserted into borehole along with their respective connecting rods and fixed in position by cement grout. The connecting rods are protected from the cement grout by enclosing in heavy duty protective tube (3), thus allowing for free movement and displacement.

Extensometer assembly		
1	Anchor ( $\varnothing 20 \times 500$ length)	*
2	Connecting rod (SS- $\varnothing 8$ / Fibre glass- $\varnothing 6.3$ )	#
3	Protective tube	#
4	Air vent tube ( OD- 12 x 1 thk.)	#
5	Grout tube ( OD- 12 x 1 thk.)	#
6	Flanged housing	1
7	Reference plate spacers	4
8	Rubber bush for protective tube	*
9	Hollow bolt for protective tube	*
10	Rubber bush for air vent/ grout tube	2
11	Hollow bolt for air vent/ grout tube	2
12	Reference button	*
13	Reference plate	1
14	Allen head screw M6x10	4
15	Cover	1
16	Grouting anchor / dowel	3
*	Quantity depends upon number of positions	
#	Quantity depends upon number of positions and depth of anchors	

The extension head consists of a flanged housing (6) and a protective cover (15). The flanged housing is grouted concentric with the borehole. The flange has three grouting anchors/dowels (16) for fastening the extensometer head to the surface of the borehole. The protective tube (3), grout tube (5) and vent tube (4) are secured to the flanged housing with rubber washers (8 & 10) and hollow bolts (9 & 11) to make the system leak proof. A reference plate (13) is used to measure the displacement of the anchor from the reference button (12) fixed on the connecting rod (2).

Encardio-rite uses convention that depth of anchor is calculated as distance from the mouth of the hole to the near end of anchor.

#### Ordering information

- ◆ Number of anchors per system
- ◆ Depth of each anchor in meter.
- ◆ Number of systems required.
- ◆ Number of digital caliper/depth gage required.

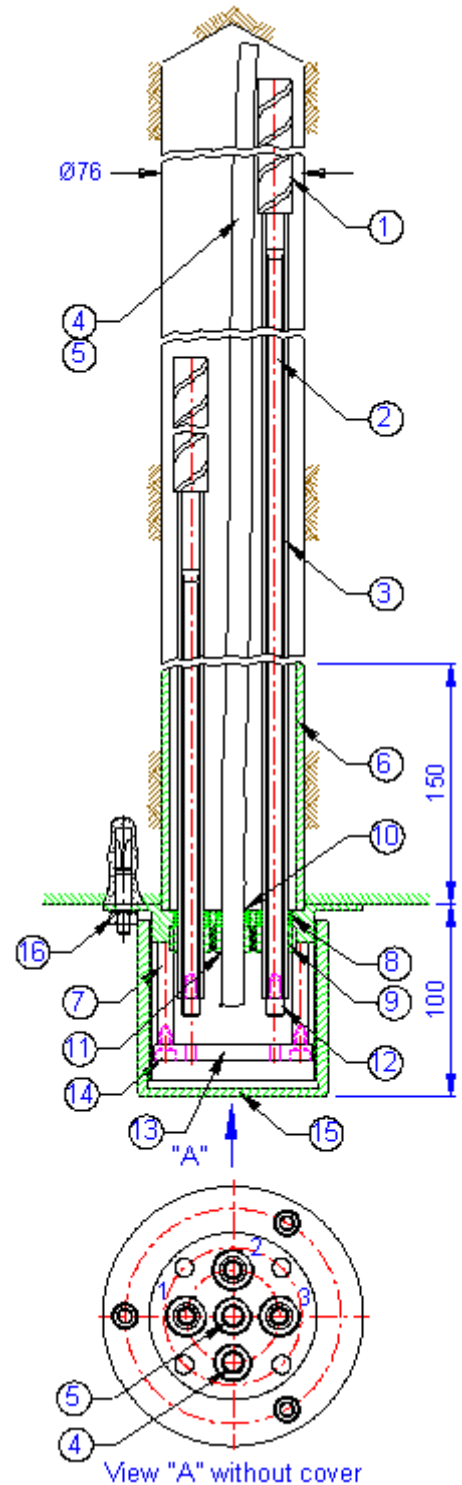


Figure 1

Specifications are subject to change without notice.

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