



## MULTI POINT BOREHOLE EXTENSOMETER

MODEL EDS-70V/EDS-70M



### OVERVIEW

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The Encardio-rite model EDS-70V / 70M multi point borehole extensometer is a precision instrument designed to help civil engineers and geologists in the measurement of deformation of rock mass & adjacent or surrounding soil. Together with anchor bolt load cell and tape extensometer, it is essential equipment for investigation & monitoring of foundations, slopes & embankments and for studying the behavior of rock around underground cavities, tunnels and mines. The borehole extensometer is an important instrument especially in investigation of underground cavities & landslides.

### APPLICATIONS

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- To determine how the roof or wall of a mine, underground cavity or tunnel behaves during excavation operation and to study the effectiveness of the support system.
- To predict potential roof or wall fall before it actually occurs. Roof or wall fall in an underground cavity is almost invariably preceded by measurable sag as the strata opens up and the movement usually occurs at an increasing rate as fall conditions are approached. Unsuspected roof and wall fall may result in serious accidents and may require costly patch-up and repair operations.
- To measure and monitor the movement in a slope or foundation due to excavation of underground cavities or due to the construction of a heavy structure like concrete, rock fill, masonry or earth dam over the foundation.

## DESCRIPTION

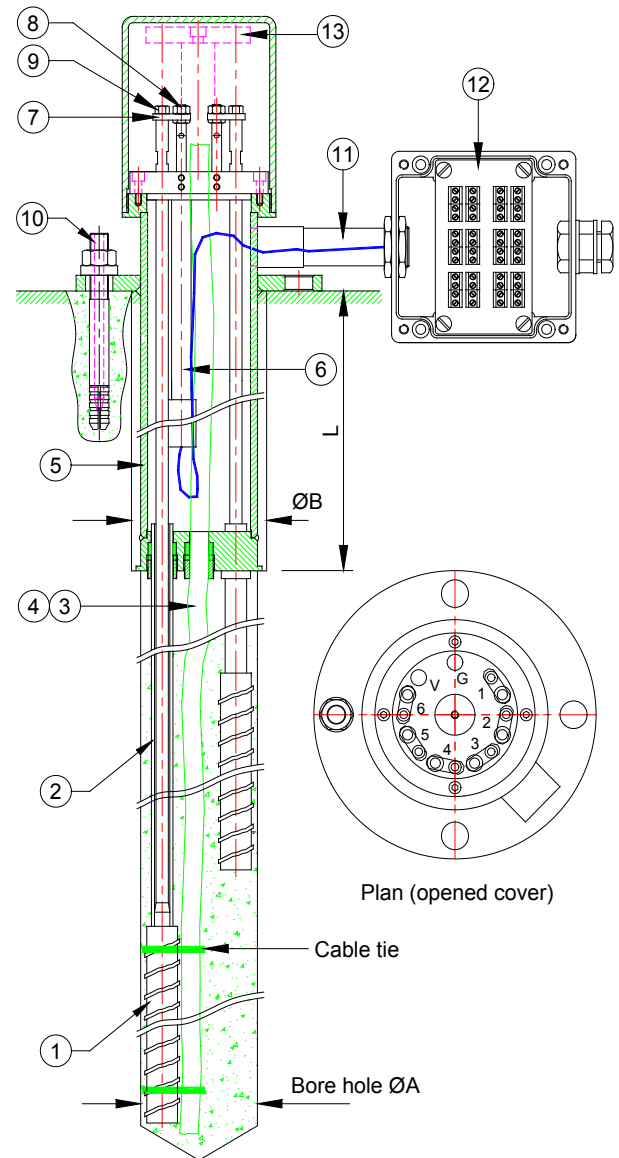
The borehole extensometer measures extension (displacement) that takes place with time in a bored hole or in several bored holes in a rock mass. The borehole extensometer essentially consists of one or more anchors and a reference. The anchor or anchors are set in the same borehole or in different boreholes drilled adjacent to the first borehole. They help to accurately measure distance between the various anchors with respect to the reference 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 is interpreted as sag of the roof bed, movement of side wall or slope, settlement of the foundation etc.

### EDS-70V ELECTRONIC EXTENSOMETER

The model EDS-70V borehole extensometer incorporates vibrating wire transducer for measurement of displacement. A groutable reinforced bar anchor (1) is attached to fiber glass (2.a) or AISI 410 stainless steel (2.b) connecting rods of appropriate length, as specified in the design. Fiber glass connecting rods are supplied from factory in single lengths. The connecting rods are enclosed inside heavy duty protective tubing to allow for free movement. The displacement sensor is coupled to the connecting rod using link plate and lock nut.

EDS-70V can be ordered from the factory for monitoring settlement at up to six depths. It is suitable for a 3" dia (~76 mm) borehole for up to 1~3 points & 4" dia (~102 mm) borehole for 4~6 points. To house the head assembly, the diameter at the mouth of the borehole is increased to 90 mm (for 1~3 points) and 125 mm (for 4~6 points). Spacer adjustment provided optionally for movement more than the range in case of heave/settlement.

## EXTENSOMETER ASSEMBLY



SI #	Description	Qty	SI #	Description	Qty
1.a	Anchor for fiber glass rod	*	10	Expandable anchor	4
1.b	Anchor for stainless steel rod	*	11	Pipe nipple (1" x 6" long)	1
2.a	Fiber glass connecting rod (Ø 6.3 mm) assembly with PVC protective tube (o.d.-14 mm x 2 mm thick)	#	12	Junction box assembly	1
2.b	SS connecting rod (Ø 8 mm) with PVC tube (o.d.-14 mm x 2 mm thick)	#	13 ■	Reference plate with mounting accessories	1
3	Air vent tube (o.d.-12 mm x 1 mm thick)	●	#	Quantity depends upon number of positions and depth of anchors	
4	Grout tube (o.d.- 12 mm x 1 mm thick)	●	*	Quantity depends upon number of positions	
5	Reference head assembly	1	●	Length varies from application to application	
6	Vibrating wire displacement sensor	1	■	For use with model EDS-70M only	
7	Link plate	1	ØA	- 76 mm for 1 - 3 point & 102 mm for 4 - 6 point	
8	Lock nut	1	ØB	- 90 mm for 1 - 3 point & 125 mm for 4 - 6 point	
9	Reference button	1	L	= for 50 mm sensor - 255 mm. 100 mm sensor - 385 mm	



## Vibrating wire sensor

Model EDE-VXX-RC series of vibrating wire linear displacement sensor is suitable for electronic borehole extensometer. It is based on vibrating wire technology, having a stroke of 50 mm (EDE-V05), 100 mm (EDE-V10) or 150 mm (EDE-V15). The sensor converts mechanical displacement to an electrical output in frequency form.

The frequency output can be accurately measured by any vibrating wire readout unit. The data can also be automatically collected at desired frequency, stored and transmitted to remote server by a suitable datalogger.

The initial reading of the sensor is taken as the base. Subsequent readings are then compared with the initial reading to determine the magnitude of change in displacement across the opening.

For further details on vibrating wire displacement sensor refer to our datasheet # 1085.

## EDS-70M MECHANICAL EXTENSOMETER

Model EDS-70M mechanical multipoint borehole extensometer is available for taking reading with a mechanical dial gage. This model is supplied without the vibrating wire sensors.

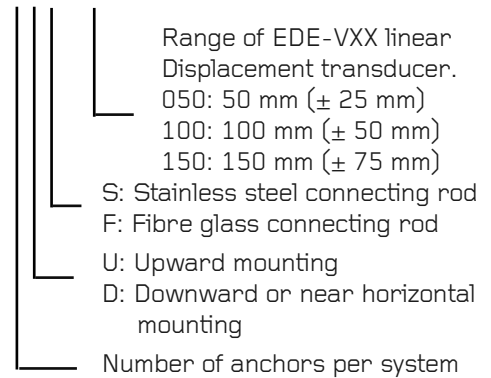
At a later date, this extensometer can be converted to take reading electronically by installing vibrating wire displacement sensors.

## SPECIFICATIONS

Model	EDS-70V
Range (mm)	50, 100, 150
Accuracy	± 0.2 % fs normal ± 0.1 % fs optional
Sensitivity	± 0.02 % fs
Non linearity	± 0.5 % fs
Temperature limit	- 10° to 80°C (operational)
Thermistor	YSI 44005 or equivalent (3 kOhms at 25°C)

## ORDERING CODE & INFORMATION

EDS-70 M/V-XYZ -NNN



\*All specifications are subject to change without prior notice