

## TAPE EXTENSOMETER

MODEL EDS-80

### INTRODUCTIN

The tape extensometer is a precision instrument designed to help civil engineers and geologist for the measurement of small changes of distance between deformations of underground openings when subjected to changing ground stresses and predict roof falls before they actually occur. Roof or wall falls in underground cavities are almost invariably preceded by sags as the strata opens up. The movement usually occurs at an increasing rate as fall conditions are approached. Proper evaluation of this sag may help in averting unsuspected roof and wall falls, which may result in serious accidents and require costly patch up and repair operations.

The tape extensometer forms an important part in investigations during tunneling, especially the New Austrian Tunneling Method (NATM).

### TAPE EXTENSOMETER

The Encardio-rite tape extensometer measures the relative displacement which takes place with time between reference anchors fixed to an excavation or a structure.

The tape extensometer is designed to accurately measure small change in distance between two points which may be from 1 m to 30 m (3 ft to 100 ft) apart. It can be used in any orientation. (In case tape extensometer ordered is in imperial units, refer to figures in brackets).

### OPERATION

To obtain distance reading between pair of reference anchor bolts grouted into any structure, the operator is required to stretch the tape between two anchors, adjust its tension and note the tape and digital readings. This is not the true distance between the two reference points. This is only used as an initial reading. The variation from the initial reading, gives the change in distance (convergence or divergence) between two anchorage points with measurement sensitivity of  $\pm 0.01$  mm ( $\pm 0.0005$ ").



### DESCRIPTION OF EQUIPMENT

The Encardio-rite tape extensometer consists of a precision punched tape, incorporating a repeatable tensioning system and a digital read-out, which are housed in an instrument casing (1). A shackle (3) is fixed to one end of the instrument casing. Another shackle (3) is fixed to the free end of the tape measure (2).

### FEATURES

- ♦ Rugged, compact and cost effective.
- ♦ Light weight, portable and reliable,
- ♦ Can measure small changes in distance between two points 1-30 m apart. Longer tape measures are available on request.
- ♦ Heavy duty engineering steel tape.
- ♦ Large knurled knob for easy tension adjustment.
- ♦ Rapid and accurate measurement can be made with tape extended in any direction.

### APPLICATIONS

- ♦ To determine radial movement and convergence of tunnels, shafts and linings.
- ♦ To study the effectiveness of the roof of a mine or underground cavity and monitor its behavior during the excavation operation.
- ♦ To determine the stability of concrete structures and buildings.
- ♦ Monitoring and control of construction by the New Austrian Tunneling Method (NATM).

To obtain a reading, the shackle on the instrument casing is hooked to one of the anchor bolts firmly grouted to the structure. The tape measure is unwound, allowing the shackle on its end to hook into the anchor bolt on the opposite side. Constant tension in the tape is achieved by a precision tension spring and a serrated adjustment knob. This permits the measurement to be made with a minimum of sag (which is

repeatable) over a variety of distances in the horizontal, inclined or vertical directions.

### EDS - 80/1 Instrument housing

The Encardio-rite tape extensometer has an epoxy coated aluminum body for housing the digital display. The display is a 5 digit LCD which works on a 1.5 V silver oxide (SR 44) button cell.

### EDS -80/2 Steel measuring tape

A precision steel measuring tape, punched with holes at a progressive distance of approximately 12.5 mm, provides the reference scale reading on the model EDS-80 tape extensometer. To take the slack out of the tape measure, coarse tension adjustment is accomplished by engaging a pin of the extensometer in one of the spaced perforations on the steel tape.

Fine tension adjustment is achieved by rotating a serrated aluminum adjustment knob which reduces the overall length of the device, until two index marks provided on the extensometer, coincide. This results in a constant repeatable tension on the tape measure. The digital indicator measures this fine adjustment.

### EDS - 80/3 Stainless steel shackle

For taking reading of any displacement which may have taken place, the stainless steel shackles are provided at both the ends of the steel tape. The shackles are easy to hook to the anchor bolts.

### EDS - 80/4 Calibration frame

To check the zero stability and accuracy of the tape extensometer, Encardio-rite provides an optional calibration frame having an anchor distance of around 1 m. The calibration frame is of steel construction.

### RECOMMENDED PRACTICE

For maximum reliability and accuracy, it is recommended that one instrument be dedicated to each project. A calibration frame should be regularly used to check repeatability and determine a temperature correlation. The temperature should always be recorded and allowed to stabilize at the time of taking readings.

After the fine adjustment with serrated knob, the digital display reading should be recorded carefully. This reading is taken as reference reading. For a particular tape hole, any variation from this reference reading gives the change in distance (convergence or divergence). In case the change in distance grows large and the tape hole has to be changed, a new reference reading must be established.

### SPECIFICATIONS

**Measurement** mm (inch)

**Length of tape** 1-30 m (3-100 ft).

Other lengths available on request.

**Precision** ± 0.1 mm (± 0.005")

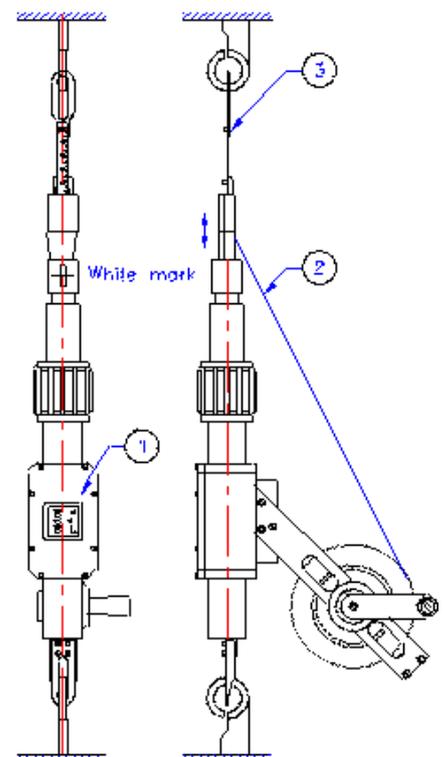
**LCD resolution** 0.01 mm (0.0005")

**Coefficient of linear Expansion** 11 ppm/°C (20 ppm.0/°F)

### ACCESSORIES

The following accessories if separately ordered are available for use with the tape extensometer.

- ◆ Reference frame
- ◆ Replacement tape measure
- ◆ Groutable anchor



\* All specifications are subject to change without prior notice.

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