



# NOVARENT

LOCATION ET VENTE DE MATÉRIEL DE MESURE

## MAGNETIC SETTLEMENT RECORDER

MODEL EDS-91/2.1



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## 1. INTRODUCTION AND GENERAL DESCRIPTION

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Encardio-rite model EDS-91/2.1 magnetic settlement recorder is used for monitoring vertical settlement or heave of soft ground under the influence of loading or unloading due to the construction of embankments, fills, tunnels, buildings, foundations, and structures around tunnels, underground cavities, foundations and embankments. Plate or spider magnets positioned outside a central access tube grip the surrounding soil at locations where displacement is to be monitored. A probe incorporating a reed switch is lowered within the access tube to sense the position of magnets. The reed switch closes on entering a magnetic field and activates a buzzer in the signal receiving instrument.

Model EDS-91/2.1 magnetic settlement recorder is accurate, robust, light weight and convenient to use. It comprises of a probe, graduated flat cable and winding cable reel mounted on a triangular stand with an easy to grip carrying handle. A spring loaded knurled knob with a locking pin is provided on the stand on the side of the handle for locking the cable reel during transportation. To disengage cable reel, the knurled knob is pulled out and slightly rotated.

The following are provided on the hub of cable reel on the handle side:

- A push button switch to switch on power. A red LED lights up.
- A green LED lights up on probe making contact with water. Simultaneously a buzzer gives a sound alarm.
- A battery compartment that houses a 9 V PP3 size battery.

The electronics PCB, a high volume buzzer and a standard 9 V PP-3 size battery are housed in a hub on the cable reel.

The hub can be easily removed to replace the battery or check the electronics without disassembling the entire cable reel.

Horizontal movement at any level within a soil mass may also be assessed by monitoring the location of magnetic targets which have been positioned over a near-horizontal access tube. The Encardio-rite model EDS-91 magnetic extensometer system is also suitable to measure the lateral ground movement or horizontal displacement of soft ground under the influence of loading or unloading due to the construction of embankments, fills, buildings, and structures. The lateral ground movement may be in abutments, foundations or embankments, and in consolidation-induced settlement in embankments and foundations.

Proper evaluation of settlement/heave or lateral ground movement helps in monitoring the behavior after construction and indicates potentially dangerous conditions that may adversely affect the stability of the structure, its foundation and the surrounding areas. It also provides basic data for design improvement that will promote safer and economical design and construction.

Magnetic targets are fixed to the access tubing or surrounding ground at selected points. The telescopic access tubing most commonly supplied and offered by Encardio-rite consists of two parts:

EDS-91/1.1: PVC access tubing, 25 mm i.d. and 34 mm o.d., 3 m long. (Central hole of ring magnet assembly is 35 mm).

EDS-91/1.2: PVC access tubing, around 37.5 mm i.d. and 5 mm wall thickness, 1 m long, fitted with 'O' rings at both ends.

In case the user has procured the Encardio-rite model EAN-25 Inclinator system with ABS grooved tubing and wants settlement/heave monitoring, larger inside diameter ring magnets are available.

### 1.1 Probe description

The probe is of stainless steel construction with a diameter of 22 mm x 150 mm length. The slim size probe makes unit suitable for narrow boreholes.

The probe has a reed switch encapsulated inside it in silicon rubber for protection against shock, corrosion and ingress of water. It is connected to the signal receiver consisting of a reel with a battery pack, an on-off switch, buzzer, LED by a flat measuring tape.

### 1.2 Cable description

The cable of model EDS-91/2.1 magnetic settlement recorder is made of high tensile virtually non-expandable, non-stretch, insulated flat steel tape 10 mm wide x 2 mm thick. The length of the cable is commensurate with depth to which observation is required to be made. The cable is marked red in 'm' (ft) and black in cm (in). The tape has integral twin wires for current transmission. The two conductor cable serves to lower the probe and also to connect the probe to the output circuit board.



## 2. MEASUREMENT AND MAINTENANCE

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### 2.1 Taking Readings

- Switch on the magnetic extensometer recorder.
- Lower the probe into the vertically installed access tubes till it is just below the magnet assembly mounted at the lowest level.
- Raise the probe slowly by pulling the flat tape. As soon as the probe reaches the location of magnet assembly, the reed switch closes (on entering a magnetic field) and activates a buzzer giving sound alarm and a light signal.
- At the point where buzzer starts ringing, hold the flat cable against the reference and read the depth from the cable marking. Re-check this reading by slightly lowering the probe and again raising it slowly. The top of the well is usually taken as the reference.
- Repeat the procedure for all magnets assemblies installed in the magnetic extensometer borehole. During the process keep winding the flat cable on the cable reel.

**NOTE:** It is a recommended practice to monitor top of access tubing (installed in magnetic extensometer borehole) by a total station before taking the initial reading with magnetic probe.

### 2.2 Replacing Battery

- Battery must be replaced if indicator fails to buzz when probe tip reaches location of magnetic assembly..
- Unscrew knob on hub of cable reel and remove battery cover to gain access to the battery holder. The indicator uses a 9 V PP3-size battery.
- Remove battery terminal from the 9 V PP3 size battery. Replace battery with a new one and connect the battery terminal.
- Replace battery cover and tighten knob.

### 2.3 Cleaning the magnetic probe assembly

- Wash probe and cable with a laboratory-grade detergent. Rinse with distilled water.
- Remove oily deposits with dishwashing detergent, after testing its effect on a short length of cable. Do not leave the cable immersed in detergent for a long time. Rinse in distilled water.
- Wipe cable reel and stand with a damp cloth taking care that water does not enter the hub on the cable reel.

**NOTE:** The installation personnel must have a background of good installation practices and knowledge of the fundamentals of geotechnics. Novices may find it very difficult to carry on installation work. The intricacies involved in installation are such that even if a single essential but apparently minor requirement is ignored or overlooked, the most reliable of instruments will be rendered useless. A lot of effort has been made in preparing this instruction manual. However the best of instruction manuals cannot provide for each and every condition in the field that may affect the performance of the sensor. Also, blindly following the instruction manual will not guarantee success. Sometimes, depending upon field conditions, installation personnel will have to consciously depart from the written text and use their knowledge and common sense to find the solution to a particular problem.

### 3. WARRANTY

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The Company warrants its products against defective workmanship or material for a period of 12 months from date of receipt or 13 months from date of dispatch from the factory, whichever is earlier. The warranty is however void in case the product shows evidence of being tampered with or shows evidence of damage due to excessive heat, moisture, corrosion, vibration or improper use, application, specifications or other operating conditions not in control of Encardio-Rite. The warranty is limited to free repair/replacement of the product/parts with manufacturing defects only and does not cover products/parts worn out due to normal wear and tear or damaged due to mishandling or improper installation. This includes fuses and batteries

If any of the products does not function or functions improperly, it should be returned freight prepaid to the factory for our evaluation. In case it is found defective, it will be replaced/repared free of cost.

A range of technical/scientific instruments are manufactured by Encardio-rite, the improper use of which is potentially dangerous. Only qualified personnel should install or use the instruments. Installation personnel must have a background of good installation practices as intricacies involved in installation are such that even if a single essential but apparently minor requirement is ignored or overlooked, the most reliable of instruments will be rendered useless.

The warranty is limited to as stated herein. Encardio-rite is not responsible for any consequential damages experienced by the user. There are no other warranties, expressed or implied, including but not limited to the implied warranties of merchantability and of fitness for a particular purpose. Encardio-rite is not responsible for any direct, indirect, incidental, special or consequential damage or loss caused to other equipment or people that the purchaser may experience as a result of installation or use of the product. The buyer's sole remedy for any breach of this agreement or any warranty by Encardio-rite shall not exceed the purchase price paid by the purchaser to Encardio-rite. Under no circumstances will Encardio-rite reimburse the claimant for loss incurred in removing and/or reinstalling equipment.