



ENCARDIO RITE



VERTICAL IN-PLACE INCLINOMETER SYSTEM

MODEL EAN-51M

INTRODUCTION

Encardio-rite model EAN-51M vertical in-place inclinometer is used to measure lateral movement of earthworks or structures. It is ideal for remote real-time monitoring for critical applications. Its data logging and real-time monitoring feature helps to provide early warning in case of failures.

EAN-51M provides significant quantitative data on magnitude of inclination or tilt of a foundation, embankment or slope and its variations with time. It also provides the pattern of deformation, zones of potential danger and effectiveness of construction control measures undertaken.

Real-time monitoring of inclination with in-place inclinometer helps in observing behavior of ground movement after construction and indicates potentially dangerous conditions that may adversely affect stability of the structure, its foundation and appurtenant. It also provides basic data for design improvement that will promote safer and more economical design and construction.

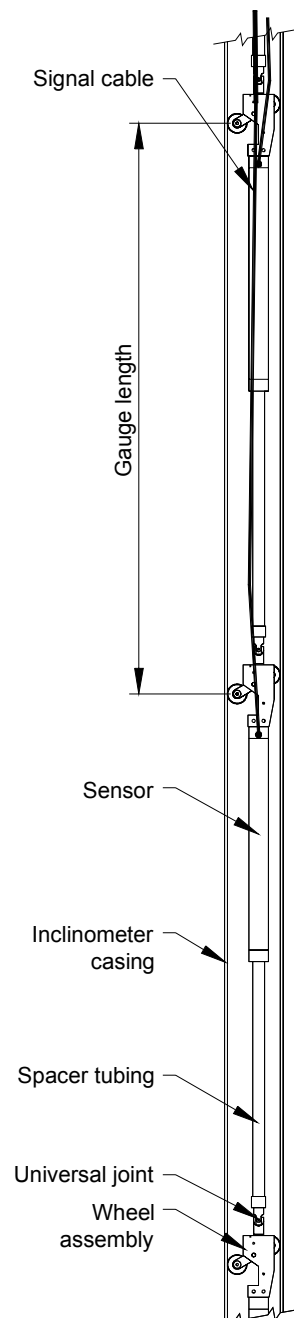
APPLICATIONS

- ◆ To accurately measure lateral movement of structures and embankment fills and landslide areas above dams, highways, earthworks, etc.
- ◆ To monitor deformation of embankments, retaining walls etc.
- ◆ Construction control, stability investigation and monitoring of ground movement caused by tunnel construction or any such excavation.



FEATURES

- ◆ Reliable, accurate and simple to read.
- ◆ Proven technology.
- ◆ Rugged and robust construction.
- ◆ Excellent temperature stability.
- ◆ Can be easily connected to a remote data acquisition system for continuous monitoring.



OVERVIEW

A series of access tubes, attached to each other, are installed in a borehole or embedded in earth/rockfill or concrete structure during construction or fixed to the vertical face of a completed structure.

In-place inclinometer system consists of a string of inclination sensors. This string of sensors is positioned inside the inclinometer casing to span the movement zone. Each in-place inclination sensor is fitted with a pair of pivoted sprung wheels.

When ground movement occurs, it displaces the inclinometer access tubing, causing change in the tilt of the in-place inclinometer sensors. This results in change in output of the sensors, proportional to the tilt i.e the angle of inclination from the vertical.

The sensors can be connected to a data acquisition system for continuous real-time monitoring of the movements.

The tilt reading applies over the gage length of the sensor (gage length is distance between wheels). This tilt reading can be converted to lateral deviation - " $L \sin \theta$ " where L is gage length and θ is angle of tilt from vertical.

Displacement i.e. the lateral movement of casing, can be calculated by subtracting initial deviation from current deviation. Provided that one end of the access tubing is known to be fixed, it is possible to obtain a complete profile of the access tubing by summing readings of successive sensors. By comparing these profiles, the horizontal displacement of the gage well at different depths over a period of time may be determined.

DESCRIPTION

Following sub-assemblies are available in the Encardio-rite model EAN-51M in-place inclinometer system:

- ✦ EAN-51M/1.1 Uniaxial sensor with one pair of wheels.
- ✦ EAN-51M/1.2 Biaxial sensor with one pair of wheels.
- ✦ EAN-51M/2.1 Spacer assembly for 1 m gage length.
- ✦ EAN-51M/2.2 Spacer assembly for 2 m gage length.
- ✦ EAN-51M/2.3 Spacer assembly for 3 m gage length.
- ✦ EAN-51M/3 Wheel assembly.
- ✦ EAN-51M/4 Suspension kit with protective cap.
- ✦ EAN-51M/5 Placement tubing (specify length) for placing string of sensors.
- ✦ EAN-51M/6 Protective rope to prevent loss of of sensor downhole.
- ✦ Cable 4 core cable for uniaxial sensor and 6 core cable for biaxial sensor (refer datasheet # 1087).
- ✦ Casing For casing refer to datasheet 1064 on model EAN-25 Inclinometer system.

SENSOR SPECIFICATIONS

Sensor	Uniaxial or biaxial sensor
Measuring range	$\pm 15^\circ, \pm 30^\circ$
Sensitivity	± 10 arc seconds
Accuracy¹	$\pm 0.1\%$ fs
Temperature range	0°C to 80°C

¹ As tested under laboratory conditions

Specifications are subject to change without notice.

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DATA SHEET 1202-06 R0