Data Digger Equipment
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VERTICAL IN-PLACE INCLINOMETER

INTRODUCTION

The Data Digger Equipment's Model DDE-500IPI vertical in-place inclinometer is used to measure lateral movement of earthworks or structures. It 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.

FEATURES:

- Provides reliable and high resolution readings with long term stability
- Rugged and robust construction
- Excellent temperature stability
- Innovative wireless mesh-based data collection protocol that provides seamless connectivity in large sites
- Easy to install and monitor hard to access sites and tunnels remotely.

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.

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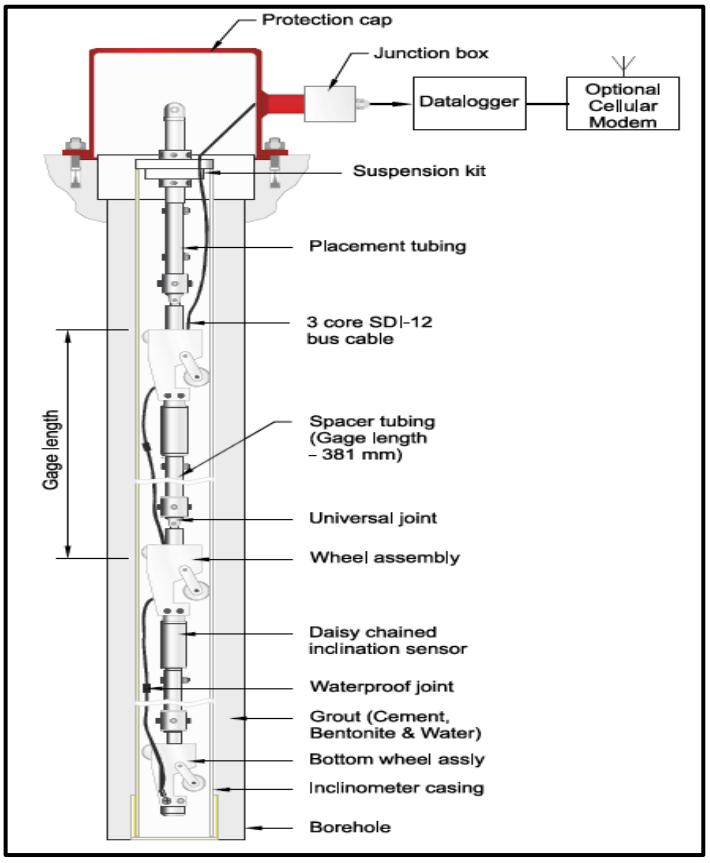

IN-PLACE INCLINOMETER SYSTEM WITH SDI-12 INTERFACE & SDI-12 DATALOGGER

DESCRIPTION:

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

In-place inclinometer system, consisting of a string of inclination sensors with MEMS tilt sensors and SDI-12 digital interface, 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. The extension rod lengths, connecting the sensors, can be varied to suit individual gage length requirements. The sensors can also be concentrated in areas where movement is expected. A suspension stainless steel wire rope is available to position a single or group of sensors where profile of entire borehole is not of interest but only a specific portion needs monitoring. A single 3 conductor bus cable is threaded in a daisy chain fashion connecting each sensor to its next immediate neighbour and finally to the top of the borehole and directly to the wireless communication network through a Node. The design allows each sensor to move independently to each other without influence from the sensors above or below. This provides a profile of displacement over the complete length of the installation..

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OPERATIONS:

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 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 θ" 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.

CONNECTING TO DATA LOGGER:

In-place inclinometer system is connected to a data acquisition system for continuous real-time monitoring of the movements. Model DDE-500IPI system provides a solution, in which each in-place sensor is equipped with SDI-12 interface so that only a single 3 conductor bus cable needs to be threaded in a daisy chain fashion connecting each sensor to its next immediate neighbour and finally to the top of the borehole and directly to the datalogger (without any multiplexer). SDI-12 bus cable from different IPI boreholes can also be connected to same datalogger. However, this includes some limitations on the total number of sensors or IPI strings being connected based on site conditions. Although in-place sensors with SDI-12 interface are a bit costlier, the savings in cable costs and the cost of the required multiplexers in the datalogger, reduces this increase to a large extent. For IPIs using a large number of sensors, SDI-12 equipped in-place sensors are a good choice as it will not be possible to accommodate a large number of individual signal cables inside the borehole.

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SPECIFICATIONS:

SENSOR

Sensor:	Uni-Axial or Biaxial MEMS Sensor
Measuring Range:	±15°
Accuracy:	± 0.1% F.S
Resolution:	±0.5mm/M (8 arc second)
Temperature Range:	-20°C to 80°C

ORDERING DESCRIPTION:

DDE-500IPI:	Uni-Axial Sensor with SDI-12, with pair of wheels.
DDE-500BIPI:	Bi-Axial Sensor with SDI-12,with pair of wheels.
DDE-500IPI/A:	Spacer Assembly with 1M/2M/3M gage length. *
DDE-500IPI/B:	Suspension Kit with Protective Cap.
DDE-500IPI/C:	Protective rope to prevent loss of sensor downhole.
DDE-500IPI/D:	Suspension stainless wire rope for positioning single sensor or group of sensors in specific portion of borehole.

(* as specified by user)