DGSI
DURHAM GEO SLOPE INDICATOR

Vertical GeoFlex

System Overview

The GeoFlex system is a string of closely spaced MEMS sensors ideal for geotechnical monitoring applications including:

- Monitoring deformation of the diaphragm walls that support deep excavations.
- Monitoring ground movements induced by tunnel construction.
- Monitoring deformations of embankments and retaining walls.
- Monitoring landslide areas above dams, highways, and railroads to provide early warning of slope failure.

Operation

The system can contain up to 200 sensor nodes in a vertical string installed in 85 mm or up to 50 nodes in a 70 mm inclinometer casing.

The casing provides access for subsurface measurements. The joints between each sensor are robust, allowing the system to maintain a consistent orientation of all the nodes.

The casing is typically installed in a vertical borehole that passes through a suspected zone of movement. The nodes are spaced at 50 cm and provide a reading resolution similar to a traversing probe. The system spans the zone of movement and when the ground moves, the casing moves with it, changing the inclination of the nodes inside.

Cumulating the deflections along the string produces a graph of the casing profile. Changes indicate displacement (movement).

The GeoFlex system uses a data acquisition system, and can transmit readings to cloud based processing software that can trigger alarms based on displacements or rate of change.

A single GeoFlex segment folded for shipment

Advantages

Real Time Monitoring: The GeoFlex system is ideal for continuous, unattended monitoring and can deliver readings in near-real time.

Single-Cable Installation: Each sensor connects to the sensor above, requiring only one signal cable for each bore hole and making data logger wiring easy.

Convenient Shipping and Transport: GeoFlex systems are made easy to ship. Five segments, each 2.5 m long, easily fit in a carton measuring approximately 64 x 64 x 64 cm and weighing less than 2.13 kilograms.

This makes the logistics of a GeoFlex installation easy. You can send the packages to a job site through overnight mail, carry a GeoFlex array in the trunk of your car, or even strap it to the cargo rack on an ATV and haul it to a remote job location.

DGSI also offers sensorless nodes to install at the top of the system, letting you save money by only monitoring the zone of interest and bypassing the upper layers.

Durable Components: Nodes, cables, connectors and gage rods are exceptionally durable, making it practical to remove the systems at the end of the project and redeploy them on other projects.

Data Reduction: The GeoFlex system outputs the displacement as engineering units, requiring less computing power and a lighter load on your data acquisition system. No need to keep track of what node has what calibration coefficients or what order you installed the segments in — the data logger detects and configures this automatically.

Complete Solutions: DGSI offers complete monitoring solutions that include data loggers and web-based monitoring software that can check for alarm conditions in near-real time and can plot data immediately after retrieving the readings.

GeoFlex System Configuration

A GeoFlex system requires casing, GeoFlex segments, a suspension kit, a bottom plug and a jumper cable.

Casing: Choose 70 mm or 85 mm diameter inclinometer casing.

GeoFlex Segments: Choose the number of GeoFlex segments required, and casing diameter.

Suspension Kit: Order one suspension kit for each installation. The kit includes the suspension gate and hardware for securing the system.

Signal Cable: Each borehole requires a bottom plug to seal the end of the signal cable and a jumper cable to connect to the data logger.

Data Logger:

Campbell Scientific: The GeoFlex system works with many Campbell Scientific data loggers. The CR6 or CR1000Xe can log two GeoFlex systems per logger directly. The CR350 requires an MD485 interface module and can log one GeoFlex system.

DGSI GTecLink Wireless Dataloggers: Use the GTecLink data loggers for easy wireless data monitoring. The Digital Node works with up to 10 nodes, while the GeoFlex Node works with up to 50.

Data Reduction Software: Process the GeoFlex data with a spreadsheet or the Sensly web-based monitoring system.

Standard GeoFlex System

70 mm Inclinometer Casing

GeoFlex Segment, 2.5 m. 57802900
GeoFlex Segment, 2.0 m. 57802920
GeoFlex Segment, 1.5 m 57802915
GeoFlex Segment, 1.0 m. 57802910
GeoFlex Segment, 0.5 m. 57802905
Dummy Segment, 1.5 m 57801993
Dummy Segment, 0.5 m 57801990
Suspension Kit for 70 mm. 57801755

85mm Inclinometer Casing

GeoFlex Segment, 2.5 m. 57802960
GeoFlex Segment, 2.0 m. 57802980
GeoFlex Segment, 1.5 m. 57802975
GeoFlex Segment, 1.0 m. 57802970
GeoFlex Segment, 0.5 m. 57802965
Dummy Segment, 1.5 m 57801995
Dummy Segment, 0.5 m 57801992
Suspension Kit for 85 mm. 57801758
Bottom Plug 57802210
Jumper Cable, 25 m 57802225
Jumper Cable, 50 m 57802250

GeoFlex Node Specifications

Sensor Type: MEMS (Micro Electro-Mechanical Systems) tilt sensor for inclination readings.

Requirements: Minimum supply voltage of 10 Vdc. Maximum supply voltage of 30 Vdc. Digital RS485 signal requires Campbell Scientific or GTecLink data logger.

Weight: 0.426kg per 50cm gauge length.

Calibrated Range: ±30 degrees from vertical over a temperature range of -10°C to +40°C.

Resolution: 9 arc seconds or 0.04 mm/m using the CR1000 data logger.

Repeatability: ±82 arc seconds or ±0.4 mm/m.

Required Casing: Fits 70 mm or 85 mm diameter inclinometer casing.

Waterproof: Waterproof to 2 MPa.

Signal Cable: Jumper Cable for connecting the system to the datalogger.

Sensors per Chain: The tables below show nominal limits for chains of nodes.

Number of Nodes	Jumper Length, m (12V Supply)	Jumper Length, m (24V Supply)
10	320	-
25	122	-
50	52	215
75	24	139
100	5	97
125	-	69
150	-	47
175	-	28
200	-	12

Data Loggers

The GeoFlex system requires a Campbell or GTecLink data logger. The CR300, CR800 and CR1000 data loggers require one MD485 module per installation, while the CR1000X and CR6 connect to the GeoFlex directly.

CR300 Data Logger. 56700300
CR800 Data Logger. 56700800
CR1000 Data Logger. 56701000
MD485 RS-485 Interface. 56704850
CR1000X Data Logger 56700000
CR6 Data Logger. 56700006
GTecLink Digital Node. 57801705
GTecLink GeoFlex Node 57801700

Buy/Request a Quote

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