Magnetic Settlement System

Model 5105-GS-MSS Series

FEATURES

- ***Low cost***
- ***Easy to install***
- ***Simple and reliable***
- ***Accuracy better than ± 1 mm***
- ***Multi-point measurement***
- ***Inclinometer/ Settlement System available***

APPLICATIONS

- ***MSS02***—*Short term monitoring of settlements up to 20m deep. Building sites, land fills and preloaded embankments.*
- ***MSS03***—*Long term monitoring of settlements up to 200m deep. Earth-fill dams, large embankments, offshore reclamation projects.*
- ***MSS04***—*Long term monitoring of settlements in conjunction with inclinometer readings. Depths up to 100m (limited only by type of casing used).*

Description

The Geosystems Magnetic Settlement Systems are designed to monitor sub-surface settlement or heave in civil engineering projects involving excavations, reclamation and the construction of embankments or other structures over compressible soils, tunnels or old mine workings etc. The system can also be installed horizontally beneath embankments or dams to enable lateral displacements to be monitored

Operation

A number of magnetic anchors are installed vertically above each other (in boreholes or filled ground) and interconnected by protective access tubing which is capable of compression or elongation. The relative positions of the anchors are measured using a Magnetic Settlement Indicator. The indicator probe is passed down the access tubing until its proximity to a magnetic anchor is indicated. The distance from the magnetic anchor to a datum point at the top of the access tubing is read off the survey tape attached to the probe.

The location of all anchors is recorded immediately after installation of the settlement system and subsequent reading taken at regular intervals to provide settlement trends over the depths of the installation.

Construction

A typical settlement system consists of a number of magnetic anchors with access tubing selected to suit expected settlement or heave, depth to be monitored, soil conditions and life expectancy. Magnetic anchors can be spider or groutable type (borehole installation), plate or crossarm type (embankment or landfill installation). Different anchor types can be combined in the one system.

Geosystems magnetic settlement indicator model MSS01 can be used with all systems.

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FOR FURTHER INFORMATION
environmental systems & services | 8 River Street, Richmond VIC 3121 Australia
T + 61 3 8420 8999 | F + 61 3 8420 8900 | geotechnical@esands.com | **www.geosystems.com.au**

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Models

Three standard systems are available -

MSS02 - Shallow Settlement System
This is a low cost, short term system suitable for installations up to 20 metres deep. The outer tubing is a corrugated polyethylene pipe connected directly to spider or plate type magnetic anchors. Spider magnets are released using a pull-wire system. A PVC inner tube passes through each of the magnetic anchors, providing water-proof access for the probe to each of the anchors.

MSS03 - Deep Settlement Systems
This is a heavy duty, permanent system suitable for installations deeper than 20m. The outer tubing is heavy ABS plastic pipe with telescopic sections to allow movement. Both spider or plate type anchors can be fitted to the outer tubing which is available for different pressure ratings.

MSS01 - Magnetic Settlement Indicator
This readout comprises a probe attached to a precision survey tape, and connected to an audible/visual indicator. The tape is marked in mm, cm and metres, and is stored on a heavy duty cable reel.

MSS04 - Inclinometer Settlement System
This system uses standard inclinometer casing as the access tube, enabling settlement and horizontal deformation to be monitored in the same borehole. The magnetic anchors are fitted to the outside of inclinometer casing at the required spacing, but are free to move along the casing after grouting or release. The inclinometer casing is fitted with telescopic sections (or couplings) to accommodate subsoil settlement.

Specifications

MSS01 Magnetic Indicator	
Accuracy	±1mm
Probe	Stainless steel, 150 x 16mm dia.
Tape	Yellow enamelled steel conductors, encapsulated in clear,polyethylene plastic, 13.5mm wide
Marking	Metres (red), cm and mm (black)
Length	50m, 100m, 200m (standard). Other lengths available on request.
Indicator	Removable module with piezo buzzer, red indicator lamp, battery test button and on/off switch.
Battery	9V DC, replaceable (size PP3).
Reel	Epoxy coated steel with handle. Dimensions 430 x 370 x 270mm.
Weights	8.5kg (50m), 9.5kg (100m), 11.5kg (200m).
Accessories	Roller guide, carry bag.

Details	MSS02	MSS03	MSS04
Outer protective tube	Corrugated polyethylene pipe –43 mm OD	ABS pipe 60 mm OD, with telescopic joiners 75 mm OD	ABS or aluminium inclinometer casing, with standard or telescopic couplers
Inner access tube	PVC conduit 20 mm ID	PVC pipe 25 mm ID	Not required
Spider anchor spring	PVC –60 mm OD, spring steel or fibre-glass arms	PVC and aluminium – 100 mm OD stainless steel or phosphor bronze arms	PVC and aluminium –100 mm OD stainless steel or phosphor bronze arms
Borehole diameter	100-150 mm	150-200 mm	150-200 mm
Plate anchor	PVC and aluminium – 300 x 300 mm	PVC and aluminium – 300 x 300 mm	PVC and aluminium – 300 x 300 mm
Cross-arm anchor	Not available	PVC and aluminium – 800 mm long x 200 mm wide	PVC and aluminium – 800 mm long x 200 mm wide

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