

IN-PLACE INCLINOMETERS

In-place inclinometer (IPI) sensors are designed for automatic monitoring of critical locations.

Jointed together and installed inside the inclinometer casing where deformation may occur, a string of IPI sensors allows to monitor the continuous profile of the inclinometer casing and of the related soil mass.

Vertical and (sub)horizontal in-place probes could be equipped with MEMS solid-state inclinometer and force-balanced servo-accelerometer sensors. MEMS probes have also a built-in thermistor for temperature compensation.

Separated signal cable is required for each IPI, but also a group of IPI can be linked together to have a single multicore cable output.

Monitoring landslide areas, stability of natural slopes and movement at shear zone

Monitoring ground movements induced by excavation and tunnel construction

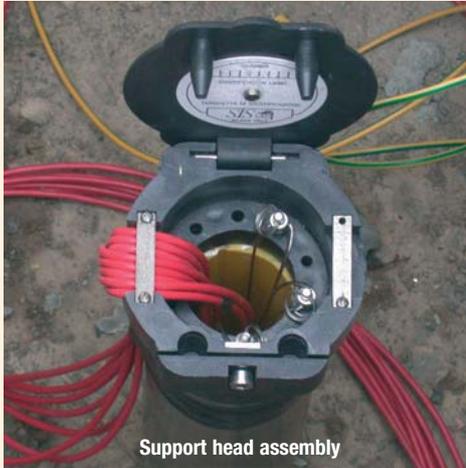
Monitoring of deformations of embankments, earthfill dams and retaining walls

Monitoring settlement and heave in embankments, tanks, landfills and foundations



VERTICAL IN-PLACE INCLINOMETERS

ACCESSORIES AND SPARE PARTS



Support head assembly

OS4TS101000 The support head assembly is installed at the top of inclinometer casings for supporting the in-place inclinometers. Casing and cable diameters determine the number of inclinometers that can be installed.

OWRAC200000 Support steel wire (2 mm diameter) is used to position in-place inclinometers at the correct position within the inclinometer casing.

OSIPIT00LO Mounting kit for vertical In-Place Inclinometer composed by No.20 tellurit and clamp.

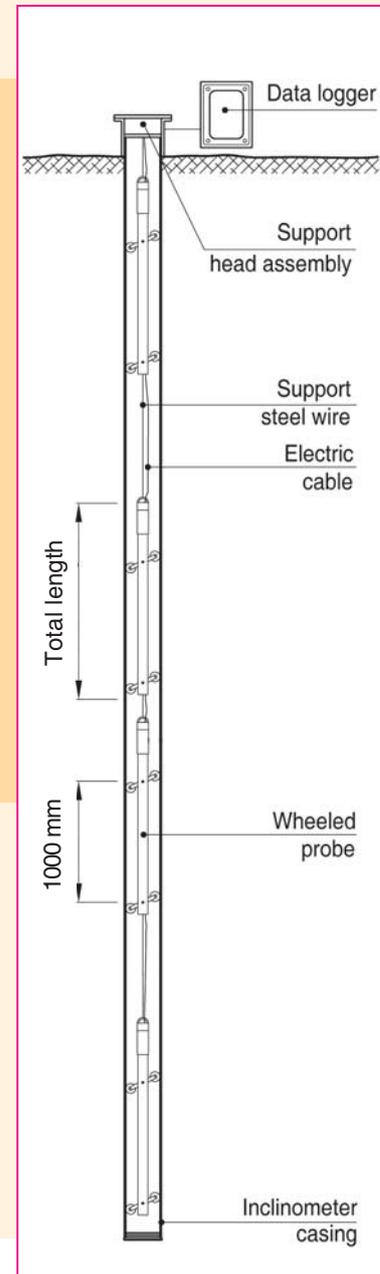
TECHNICAL SPECIFICATIONS

Model	S411HA S412HA	S411SV S412SV
Sensor type	MEMS inclinometer	force balanced servo-accelerometer
Axis	uniaxial or biaxial	uniaxial or biaxial
Range	±10°, ±20°, ±90°	±14.5°, ±30°
Sensor resolution	0.001% FS with CRD-400 readout	
Total accuracy	Better than ± 0.4%FS*	better than ± 0.07%FS
Scale thermal factor sensitivity	±0.01% / °C	±0.0002% / °C
Excitation voltage	12 to 24 V DC	±15V DC ±1%
Signal output	4-20 mA	±5 V ±1%
Built-in thermistor (RTD)		
- Range	-50°C to +150°C	-
- Accuracy	0.2 °C	-
Temperature operating range	- 40°C to + 85°C	- 20°C to + 80°C
Temp. compensated range	-25°C to +80°C	0°C to +50°C

* Values valid for ±10° and ±20°

PROBE FEATURES

Outer diameter (without wheels)	28 mm
Total length	1.170 mm
Distance between wheel axes	1.000 mm
Wheel diameter	28 mm
Material	stainless steel and thermoplastic resin
Cable connection	epoxy sealed up to 2 MPa
Weight	2.3 kg



CE electromagnetic compatibility according to EN 61326-1 and EN 61326-A1 directives for EMC emission and immunity

(SUB)HORIZONTAL IN-PLACE INCLINOMETERS



Detail of probe-rod connection

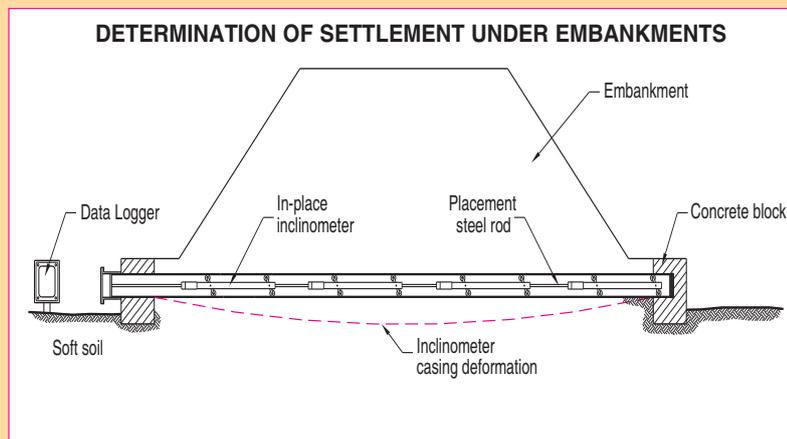
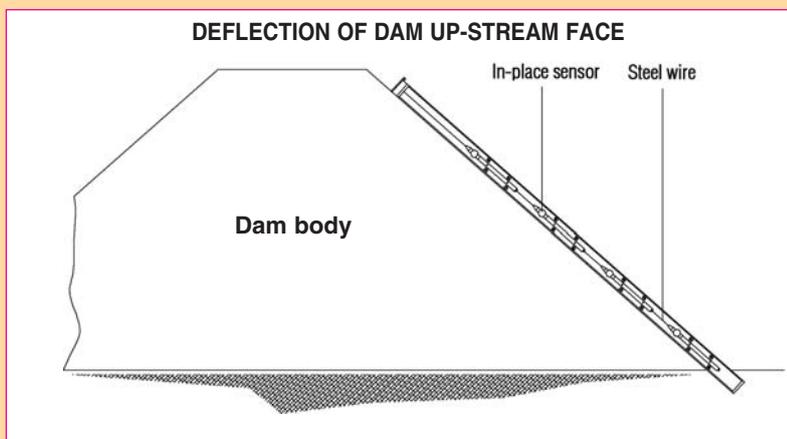
(Sub)-horizontal in-place inclinometer S421HA model is equipped with uniaxial solid-state accelerometer tilt sensor. A string of in-place inclinometers is usually installed inside inclinometer casing buried within trenches or horizontal drill hole. The grooved inclinometer casing ensures the orientation of the inclinometer probe which is constrained to a known orientation. Installation can be done either pushing the inclinometer string by a number of steel rods or pulling the inclinometer probes using a steel wire. Electrical cable connects each inclinometer to measuring box or data acquisition system.

TECHNICAL SPECIFICATIONS

Model	S421HA
Sensor type	MEMS solid-state inclinometer
Axis	uniaxial
Range	$\pm 10^\circ, \pm 20^\circ, \pm 90^\circ$
Sensor resolution	0.001% FS with CRD-400 readout
Accuracy:	
- with linear factor sensitivity	better than $\pm 0.4\%$ FS*
- with polynomial factor	better than $\pm 0.05\%$ FS
Scale thermal factor sensitivity	$\pm 0.01\%$ FS / °C
Excitation voltage	12 to 24 V DC
Signal output	4-20 mA
Built-in thermistor (RTD)	
- Range	-50°C to +150°C
- Accuracy	0.2 °C
Temperature operating range	-40°C to +85 °C
Temp.compensated range	-25°C to +80°C
Housing diameter	28 mm
Probe overall lengths	1.170 mm
Distance between wheel axes	1.000 mm
Material	stainless steel and thermoplastic resin
Weight	2.3 kg
Inclinometer casing minimum ID	60 mm

* Value valid for $\pm 10^\circ$ and $\pm 20^\circ$ ranges. For $\pm 90^\circ$ model the accuracy is <1% FS.

CE electromagnetic compatibility according to EN 61326-1 and EN 61326-A1 directives for EMC emission and immunity



ACCESSORIES AND SPARE PARTS FOR HORIZONTAL IPI



ODEX0TS2350 support head assembly

ODEX0TS2350 Support head assembly for horizontal and sub-horizontal IPI installations. It is installed at the top of the inclinometer casing in order to support the chain composed by IPI probes and placement rods.

OS4ROD0AC00 Stainless steel placement rods are required for the installation of (sub)horizontal in-place inclinometers. Available length: 1, 2 or 3m

MEMS TILT SENSOR AND BEAM CLINOMETERS

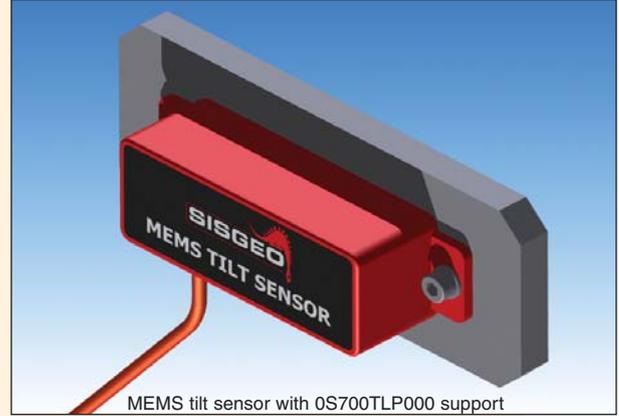
DESCRIPTION

MEMS tilt sensors are designed to measure angular displacement and deformation as on building, sub-horizontal dam face, artificial channel bank, etc...

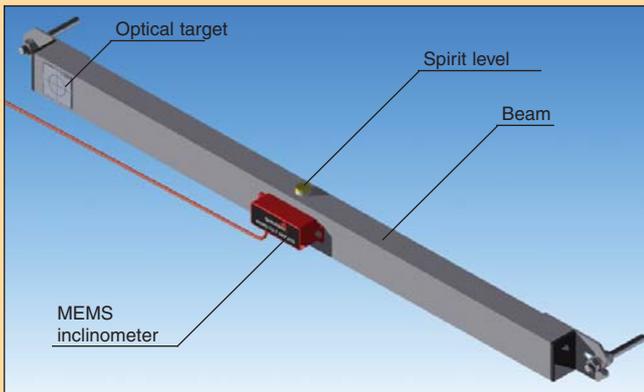
It consists of an aluminum sensor housing equipped with a single axis solid state tilt sensor and built-in thermistor for temperature compensations.

MEMS tilt sensor shall be mounted on special designed support for different applications:

- OS700TLP000** plate for welding application on vertical surfaces.
Dimensions: 150x60 mm, material: galvanized iron
- OS700TLLS00** "L" shaped support for horizontal application.
Dimensions: 135x60x60 mm, material: galvanized iron
- OS700TLLSR0** "L" shaped plate for sub-horizontal application with 360° adjustable tilt sensor support.
Dimensions: 100x100x100 mm, material: galvanized iron



TECHNICAL SPECIFICATIONS



Aluminium Beams

Lengths	1000, 2000, 3000 mm
Size	40 x 80 mm
Anchoring points	n°2 fixing holes with Fischer SLM8 bolts
Material	aluminium with plastic caps

CE electromagnetic compatibility according to EN 61326-1 and EN 61326-A1 directives for EMC emission and immunity

Model	S700TL
Sensor type	MEMS solid-state inclinometer
Axis	uniaxial
Range	$\pm 10^\circ$, $\pm 20^\circ$, $\pm 90^\circ$
Sensor resolution	0.001% FS with CRD-400 readout
Accuracy:	
- with linear factor sensitivity	better than $\pm 0.4\%$ FS
- with polynomial factor	better than $\pm 0.05\%$ FS
Scale thermal factor sensitivity	$\pm 0.01\%$ FS / °C
Excitation voltage	12 to 24 V DC
Signal output	4-20 mA
Built-in thermistor (RTD)	
- Range	-50°C to +150°C
- Accuracy	0.2 °C
Temperature operating range	-40°C to +85 °C
Temp.compensated range	-25°C to +80°C
Housing	Aluminium
Weight	0.8 kg

ALUMINIUM BEAMS

They are aluminium square section beam with different lengths for various clinometer application.

- OS7BM100000** 1 meter aluminium beam for horizontal/vertical assembling with special joint
- OS7BM200000** 2 meter aluminium beam for horizontal/vertical assembling with special joint
- OS7BM300000** 3 meter aluminium beam for horizontal/vertical assembling with special joint