



INCLINOMETER PROBES



Monitoring of lateral earth movements in landslide areas

Detecting the shear planes in earthfill dams

Deformation of tunnels, excavation walls and shafts

Horizontal inclinometers are used to control settlement in foundations or embankments

The inclinometer probe consists of a wheeled torpedo equipped with force-balanced or solid-state accelerometers which provide high precision, durability and quick response.

Systel inclinometer probes can be used in conjunction with all commercial available inclinometer casing with ID grooves from 38 mm to 84 mm.

Inclinometer probe is supplied with a robust anti-shock plastic ABS carrying case with place for the dummy probe too.

Horizontal uniaxial accelerometer probe is also available for monitoring vertical movements (settlement or heave).

INCLINOMETER SYSTEM PERFORMANCES (with ARCHIMEDE datalogger)

Readout value $20.000 \sin \alpha$ (for both probe) It is the amplified value of angle that can be read on the digital readout, expressed in sin alpha

Repeatability $\pm 0.050\text{mm} \times 500\text{mm}$ (with servo-probe, $\pm 30^\circ$) It is the difference between two or more repeated readings taken at $\pm 0.075\text{mm} \times 500\text{mm}$ (with MEMS probe, $\pm 30^\circ$) the same inclination

Reading resolution $\pm 0.025\text{mm} \times 500\text{mm}$ (for both probe) It is the smallest increment in angle resolution change that can be read on the readout display as 1 digit

Sensor orientation 0.5 dg (for both probes) It is the maximum azimuthal rotation between the probe wheels and sensitive axis of the sensor. Differences in rotation introduce systematic error declared in the calibration sheet. The value of 0.5° introduces a negligible error that doesn't require any data correction

Total accuracy $\pm 3.00 \text{ mm} \times 30 \text{ m}$ (with servo-probe, $\pm 30^\circ$) It is the system accuracy attainable during the measurements in field. **$\pm 4.00 \text{ mm} \times 30 \text{ m}$** (with MEMS probe, $\pm 30^\circ$) It is expressed as lateral deviation over a length of 30 m of casing, correctly installed (vertical deviation within 3°)



	Model 0S242SV3000	Model 0S242HV3000	Model 0S241HH3000
Applications	(sub)vertical casing	horizontal casing	
Sensor	force balance servo-accelerometer	solid-state accelerometer (MEMS technology)	solid-state accelerometer (MEMS technology)
Measuring range	±30° (±90° optional)	±30° (±90° optional)	±30°
Sensitive axis	one or two	one or two	one
Electric output signal	±5 V at full scale	±2 V at full scale	±2V at full scale
Excitation voltage	±12 to ±15 V	10 to 30 V	10 to 30 V
Resolution	3.0x10 ⁻⁶ rad	4.3x10 ⁻³ rad	4.3x10 ⁻³ rad
Non-linearity + hysteresis	0.02% FS (for ±90° probe: 0.06% FS)	0.05% FS (for ±90° probe: 0.20% FS)	0.05% FS
Repeatability	0.01% FS (for ±90° probe: 0.02% FS)	0.05% FS (for ±90° probe: 0.20% FS)	0.05% FS
Temp. operating range	from -40°C to +80°C	from -20°C to +70°C	from -20°C to +70°C
Scale thermal factor sensitivity	±0.0002% / °C	±0.01% / °C	±0.01% / °C
Material	stainless steel	stainless steel	stainless steel
Diameter	28 mm	28 mm	28 mm
Length (without connector)	750 mm	750 mm	750 mm
Wheel carriage	pair of wheels mounted on long-life sealed ball bearings	pair of wheels mounted on long-life sealed ball bearings	pair of wheels mounted on long-life sealed ball bearings
Wheel diameter	32 mm	32 mm	32 mm
Distance between wheel axis	500 mm (metric)	500 mm (metric)	500 mm (metric)
Weight	2.0 kg	2.0 kg	2.0 kg

INCLINOMETER CABLE (PRODUCT CODE SIS306KE000)



Inclinometer cable is used to position the probe in the casing. It has 6 electrical leads – 18 AWG - conducting power and signal. The external yellow polyurethane jacket with copper crimped depth marks resists abrasions and chemicals. A stainless steel shield moulded within the external jacket reduces cable twisting and a stainless steel core wire controls stretching. An internal binder sheath eliminates slipping of the single conductors relative to the external cable jacket. Cable is supplied in specified lengths graduated every 500 mm, wrapped on a portable cable reel with the connector of probe attached at factory. Probe connector is stainless steel made watertight up to 20 bar.

Specification

Cable lengths	30,50,60,100,150,200 m
Graduation	500 mm (metric)
Layout	6 conductors 18 AWG
Depth tactile marks	every 500 mm



Stress member	steel core, diam, 2.5 mm
Max strength	500 kg
Outer jacket	yellow colour polyurethane
Overall diameter	nominal 12 mm



Archimede is a battery operated datalogger with a large graphic color backlight display, housed in a crushproof, water-resistant plastic case. This datalogger has been specially designed for field use in heavy operating conditions. A convenient remote handswitch allows one-man surveys. Its powerful display is able to show a preliminary inclinometer graphs on field. Archimede could be supplied with a Bluetooth interface in order to sent stored data to the office by means of smartphone. SMART Manager Suite is the software package designed that permits to manage Archimede directly on you PC, automatically update FW and SW and obtain on-line technical

<p>Electronic performances A/D converter 2 x 24 bit Input impedance >10 MΩ for voltage <2.5 V Resolution 10 μV with FS ±400 mV 100 μV with FS ±5 V 100 μV with FS ±12 V Accuracy 0.01 % FS</p>	<p>Batteries 12 V – 4.5 Ah – Ni-MH Operating time approximately 8 hours Recharging time 2.5 hours Probe power supply ± 12 V for servo-accelerometer probe 12 V for MEMS probes ± 2.5 V for spiral meter</p>
<p>Data capacity Storage memory 2 GB Max depth 500 m, according to the inclinometer system features Reading interval 0.5 m, 1.0 m</p>	<p>Other features Operating temp. range -20°C to +60°C Storage temperature -30° C +85° C Case crushproof ABS, IP67 Dimensions 200 x 280 x 65 mm Weight 2 kg</p>
<p>COMS port USB 2.0 Speed 1.0 Mbit/sec</p>	<p>Display TFT color graphic, LCD backlight sunlight reliable Size 320 x 240 pixel</p>



FEATURES

- Instant screen graphics allow the measurement status checks, reducing time and the need for printed copy.
- Choice of plot types includes vertical checks, absolute position, displacement/time plots, and various combinations of incremental and cumulative displacement.
- User could choose between 5 different languages: Italian, English, Spanish, Russian and Turkish.
- Simplified management of inclinometer casing sites and relative measures
- Up to 30 measures displayed at the same time.
- Tables and graphics printer preview.
- Graphic output file creation.

Inclinometer data are managed by a software designed by FIELD. Data files can be created by manual data entry or directly from ARCHIMEDE datalogger through its USB COM port. Software functions can be selected through the main menu.

DATA PROCESSING

The deflection curve of inclinometer casing is calculated by reading the probe rotation angle - at different measuring depths - related to the vertical Z-X and Z-Y planes. Data processing allows the following choices:

ABSOLUTE: providing the actual profile of casing according to the three coordinate axis;

DIFFERENTIAL: the most common type of processing. The displacements of the inclinometer casing are referred to the initial reading;

LOCAL: showing local displacements at each depth with reference to the initial reading;

LOCAL DISPLACEMENT VERSUS TIME: deformation versus time of reading at the same depth.

OPERATIVE SYSTEM REQUIREMENTS INCLi2 works on Microsoft® Win 95/98, 2000, Millenium, NT, XP, Vista 32 and 64 bit, Windows 7 32 and 64 bit.

ACCESSORIES AND SPARE PARTS TESTS

Pulley and cable stop SIS 0S1CSU10000	Fixed to the top of the casing and used to hold the cable during measurements
Operating cable reel SIS 0S2RC000000	The cable reel is supplied with the inclinometer cable and water-tight connector. Available with 30, 50, 60, 100, 150, 200 m cable
Test (dummy) probe SIS 0S21ST00000	Dummy probe to check the integrity of any installed inclinometer casing, prior to surveying with the measuring probe. It has the same physical dimensions as the measuring probe and it is supplied with steel wire with vinyl jacket and cable reel
Watertight connector SIS 0S2CON00S00	Spare part to permit the connection between the inclinometer probe and the cable. It is mounted on the inclinometer cable
Swing wheel spare set SIS 0S2SET02B00	Each set includes two stainless steel wheel carriages