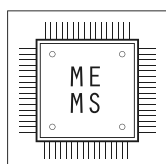# _ HORIZONTAL
IN-PLACE INCLINOMETERS

INCLINOMETERS
& PENDULUMS

SISGEO

ME MS

HORIZONTAL

IN PLACE INCLINOMETERS

Horizontal IPI gauge consists of a stainless steel body with on one side the connection for carbon fibre extension rod and on the other side a stainless steel carriage with spring-loaded wheels.

IPI string is composed by a chain of IPI gauges with carbon fiber extension rods and a terminal wheels assembly. A string of horizontal IPIs is usually installed inside inclinometer casing buried within trenches, foundations or horizontal drill hole for automatic monitoring of settlement or heave.

The string is connected to readout or datalogger with single digital bus cable.

APPLICATIONS

- Embankment vertical displacements

- Settlement/heave in oil and gas tanks

- Slope deformation in earth and rockfill dams

FEATURES

- Removable and modular system for multiple installation

- Nearly real-time monitoring with OMNIAlog and miniOMNIAlog

- Internal humidity and power supply sensor permit to have more information in the event of gauge malfunction
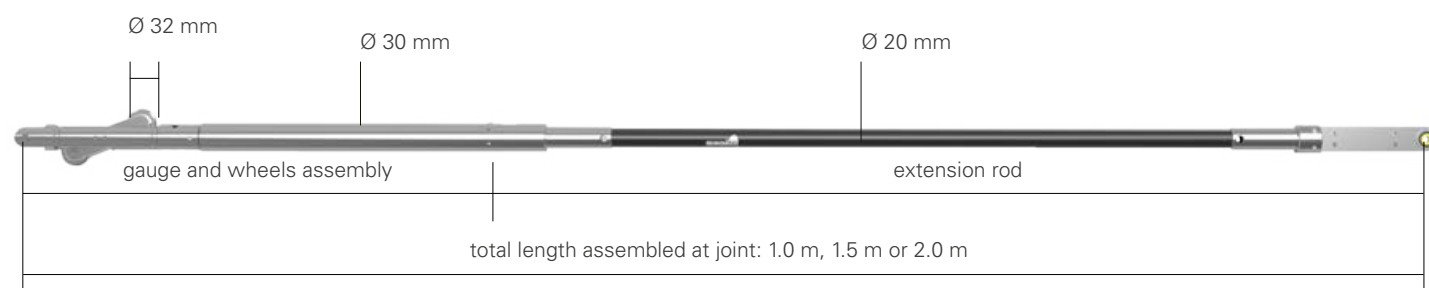
CE *Meet the essential requirements of the EMC Directive 2014/30/UE*

TECHNICAL SPECIFICATIONS

	0S441HD15S0	0S441HD30S0
Measurement principle	self-compensated digital MEMS inclinometer	
Axis	Uniaxial	
Measuring range	±10°, ±15°	±20°, ±30°
Sensitivity[1]	see calibration report	
Sensor accuracy Lin. MPE[2] Pol. MPE[2]	±0.025% FS ±0.010% FS	±0.070% FS ±0.015% FS
Sensor 24h stability [4]	< ±0.04 mm / m	
Offset temperature dependancy	±0.002° / °C	
Power supply	from 8 to 28 Vdc	
Signal output and protocol	RS-485 with Modbus RTU protocol [6]	
A/D converter	sigma-delta 32 bit, 38-KSPS	
Average consumption	4.3 mA @ 24 Vdc, 8 mA @ 12 Vdc	
Temperature operating range	from -30°C to +70°C	
Built-in temperature sensor range / accuracy	Temperature sensor (embedded in electronic board) from -40°C to +125°C / ±1 °C (-10°C + 85°C)	

PHYSICAL FEATURES

	GAUGE AND WHEELS ASSEMBLY	EXTENSION ROD
Material	stainless steel	stainless steel joint tips and carbon fiber rod
IP class	IP68 up to 1.0 MPa (2.0 MPa on request)	–
Casing compatibility [7]	Min. casing ID 58 mm - Max casing ID 83 mm	–
Gauge length / Total weight [8]	1.0 m length / 2.30 kg - 1.5 m length / 2.40 kg - 2.0 m length / 2.50 kg	

Ø 32 mm   Ø 30 mm   Ø 20 mm

gauge and wheels assembly   extension rod

total length assembled at joint: 1.0 m, 1.5 m or 2.0 m

(1) Performance are granted for instruments installed in vertical casing installations where borehole inclination should be kept within ±2° of vertical, at any point along the borehole (ISO 18674-3).
(2) Sensitivity is a specific paramenter different for every gauge. The sensitivity is calculated during gauge calibration test and inserted into the Calibration Report.
(3) MPE is the Maximum Permitted Error on the measuring range (FSR). In the Calibration Report, the accuracies of the gauge are calculated using both linear regression (≤ Lin. MPE) and polynomial correction (≤ Pol. MPE)
(4) Stability calculated as difference after a 24 h period under repeatability conditions (ISO 18674-3).
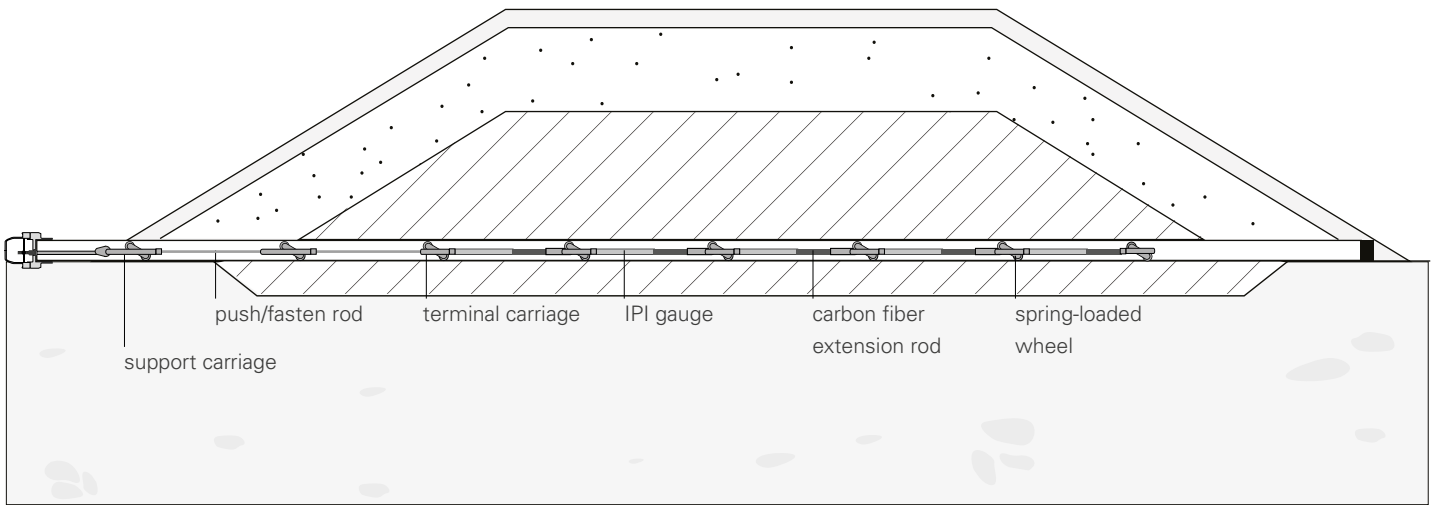(5) 60 days test, reference reading taken 96 hours after installation, system composed by 15 BH-Profile gauges with 2m elongation rod. Test performed in nearly-repeatability conditions.
(6) RS485 not-optoisolated Modbus communication with RTU Protocol. Default output is sen α, other units available are degree, mm/m and inch/feet (to be requested at order). Sisgeo Modbus protocol manual is available for download at this page.
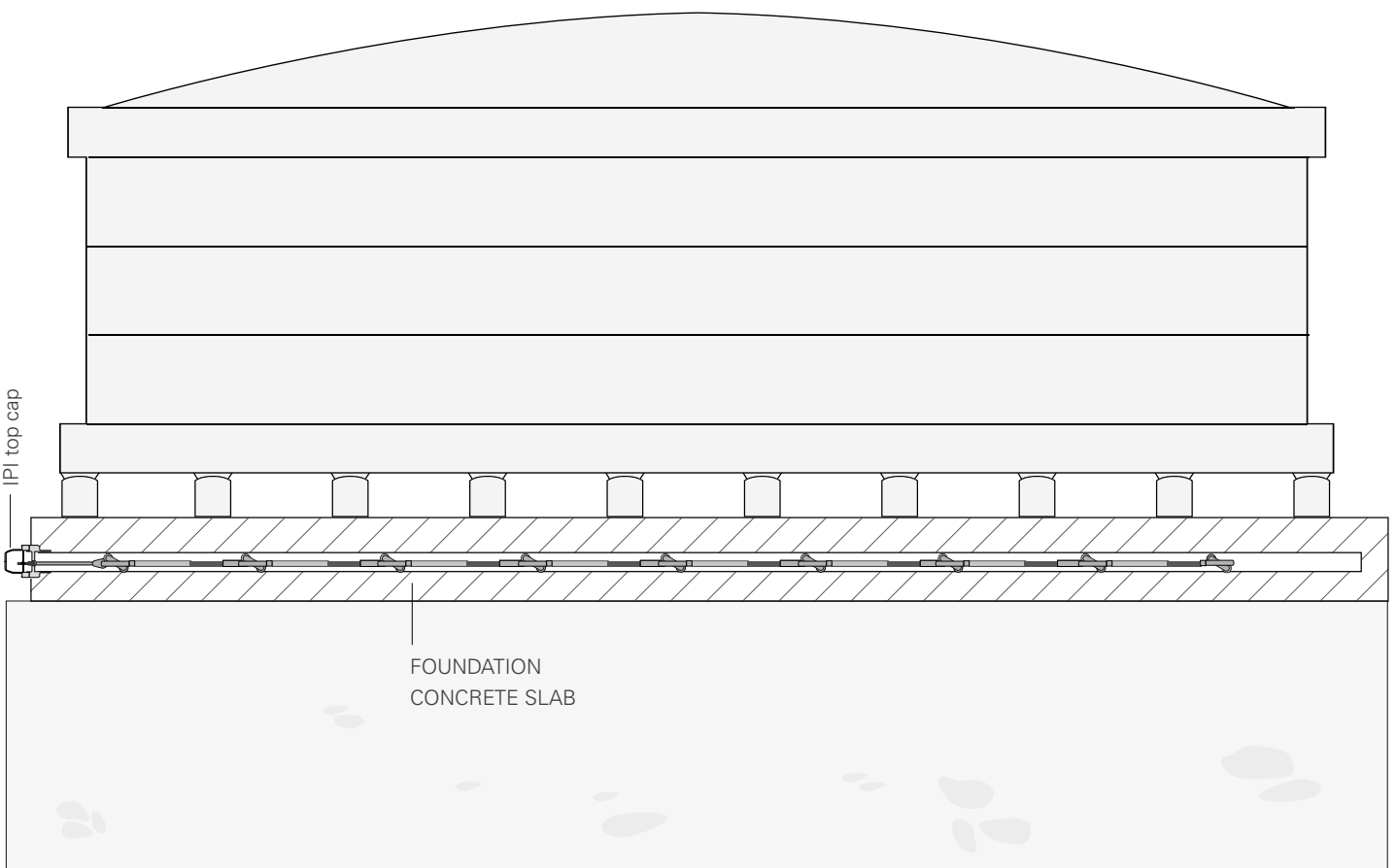(7) We strongly suggest to use Sisgeo ABS casing
(8) As for ISO 18674-3 standard, total length should not exceed 2 m. Longer instruments available on request (performances of longer instruments could be worst).

EMBANKMENT APPLICATION

support carriage

push/fasten rod   terminal carriage   IPI gauge   carbon fiber extension rod   spring-loaded wheel

LNG TANK APPLICATION

IPI top cap

FOUNDATION CONCRETE SLAB

ACCESSORIES AND SPARE PARTS

CARBON FIBRE EXTENSION ROD
0S430EX00RD

Extension rod rigidly connected to the IPI probe at factory. Available in different dimensions to reach a total probe length of 1.0 m, 1.5 m, 2.0 m and 3.0 m (length to be specified).

TERMINAL WHEEL
0S44WHE2SS0

Composed by one fixed wheel and one spring loaded wheel. It permits to end the IPI chain.

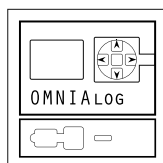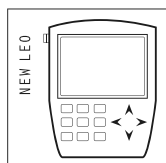## PUSH/FASTEN RODS
0S4ROD0AC00

Threaded steel bar with special ends for pushing IPI chain into the tube and fasten it to the top cap. Available in 1.0, 2.0 and 3.0 m lengths.

HORIZ. IPI TOP CAP
0DEX0TS2350

Special cap with No.3 anchor that permits to fasten the horizontal IPI chain and fix it into the inclinometer tube.

HORIZ. RODS SUPPORT CARRIAGE
0S4ROD00SUP

Additional carriage to be inserted every 2m length of steel pushing rods in order to support the steel rod chain and to do not have any bending.

DIGITAL INCLINOMETER CABLE
0WE606IPDZH

LSZH cable for connecting digital BH profile chain to OMNIAlog datalogger.

UPPER CABLE WITH CONNECTOR
0S400HD00MT

Available in different lengths (2m, 5m, 10m, 15m), it is composed by a signal cable with IP68 connector to link the upper inclinometer probe to the junction box or local logger.

TERMINATION RESISTANCE
0ETERMRESI0

Resistance ending device with connector, needed to close every digital IPI chain. The value of resistor depends on the layout of the system. For more detail see the FAQ#076.

READABLE BY

NEW LEO

OMNIALog

For further information refer to their own datasheets

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ADDITIONAL SUPPORT
SISGEO offers on-line assistance service to the Customers in order to maximize the performance of the system and training on the correct use of the instrument/readout.

For more information contact mail: *assistance@sisgeo.com*