S430

STANLAY™

_ BH PROFILE

IPI INCLINOMETERS

INCLINOMETERS
& PENDULUMS

SISGEO®

BH PROFILE

INCLINOMETERS

BH profile gauges are designed for automatic monitoring of critical locations where displacement request a nearly-real time monitoring.

The 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. Each BH profile chain is composed by a string of gauges with carbon fiber extension rods and an upper terminal wheels assembly.

The gauges are electrically linked one to each other with waterproof male/female connectors, and the string is connected to readout or datalogger with single digital bus cable.

MAIN APPLICATIONS

- Landslides
- Dams
- Tunneling
- Deep excavations
- Unstable slopes

FEATURES

- Carbon fiber rods grants light strings and simpler installation
- Digital bus simplify and speed-up the the installation procedures
- Internal humidity and power supply sensors permit to have more information in the event of gauge malfunction

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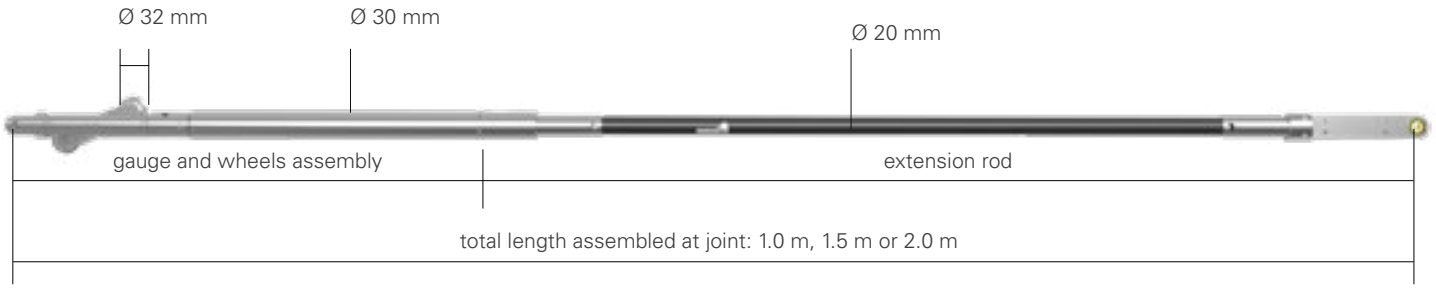
CE *Meet the essential requirements of the EMC Directive 2014/30/UE*

TECHNICAL SPECIFICATIONS(1)

	0S432HD15S0	0S432HD30S0
Measurement principle	BIAXIAL MEMS inclinometer	
Measuring range	±10°, ±15°	±20°, ±30°
Sensor resolution	0.0001°	
Sensor repeatability	±0.001°	
Sensor mechanical bandwidth	1 Hz	
Sensitivity (2)	see Calibration Report	
Sensor accuracy MPE (3)	< ±0.01 % FSR	
Sensor 24h stability (4)	< ±0.004° @24h	
Repeatability (precision) of a string of BH profile elements(5)	< ±2.00 mm / 30 m (A-axis)	
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)	

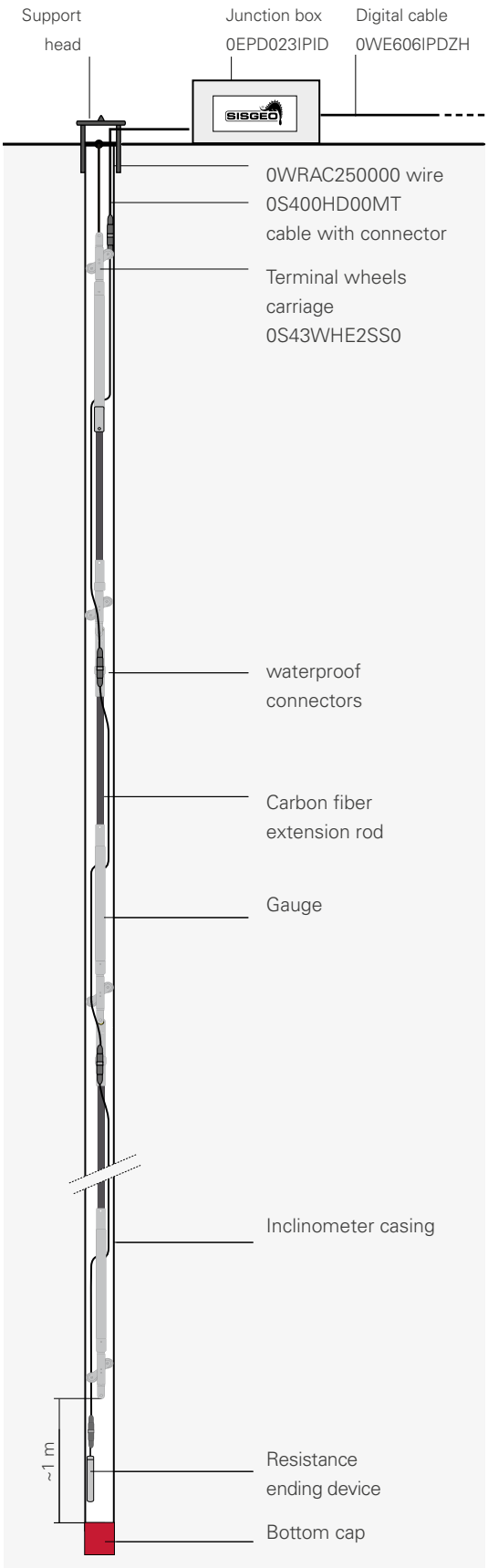
PHYSICAL FEATURES

	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	



(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 the linear regression; the error reported is the maximum residual error on the FSR.
(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. Gauges with longer extension rods available on request. Performances of gauges with extension rods longer than 2m could be worst than what reported in this datasheet.

ACCESSORIES AND SPARE PARTS



CARBON FIBRE EXTENSION ROD 0S430EX00RD

Extension rod connected to the BH profile gauge at factory. Available in different dimensions to reach a total length of 1.0 m, 1.5 m and 2.0 m (length to be specified at order).

TERMINAL WHEELS CARRIAGE 0S43WHE2SS0

Composed by stainless steel spring loaded carriage with two wheels. Permits to end the BH profile chain at the top.

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.

INCLINOMETER SUPPORT HEAD 0S4TS101000

It is installed at the top of inclinometer casings for hanging the in-place inclinometer string.

DIGITAL INCLINOMETER CABLE 0WE606IPDZH

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

DIGITAL JUNCTION BOX 0EPD023IPID

Junction box for chains of digital instruments, composed by IP67 plastic box, internal electronic board for wiring and three cable glands.

SUPPORT STEEL WIRE 0WRAC250000

It is used to suspend the BH profile within the inclinometer casing. Diameter 2.5 mm.

RESISTANCE ENDING DEVICE 0ETERMRESI0

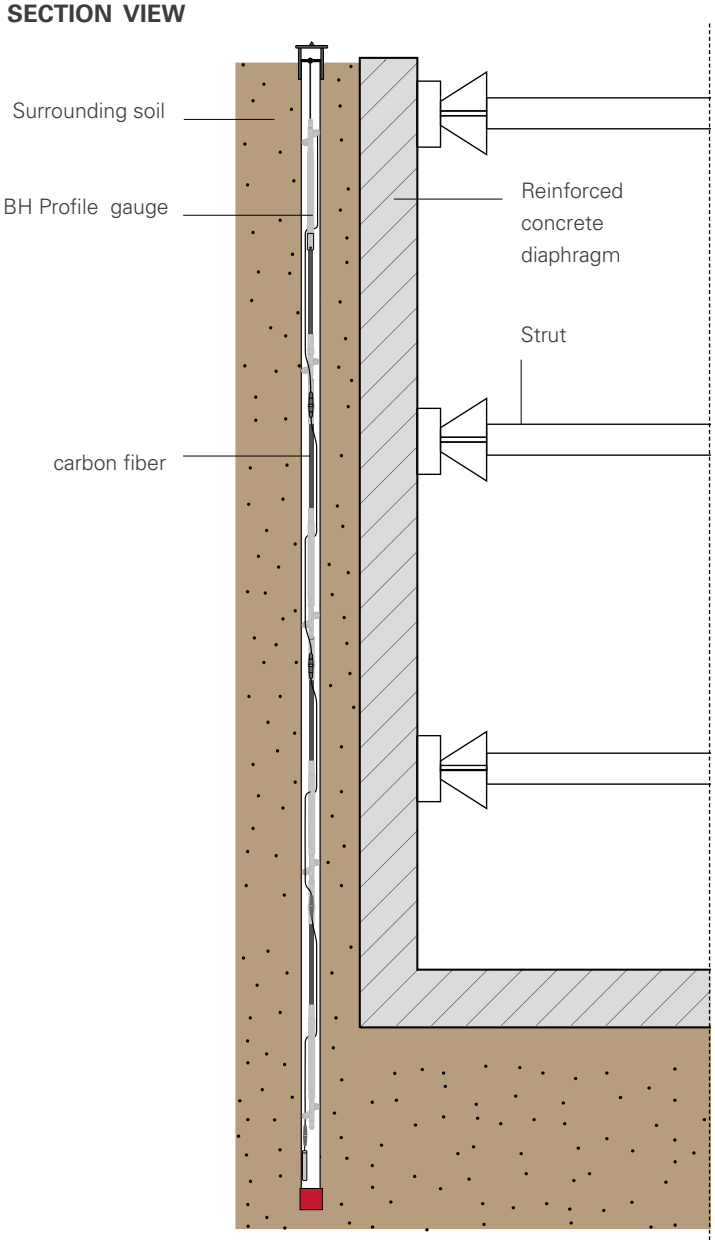
Termination resistance with connector, needed to close every digital BH Profile chain. The value of resistor depends on the layout of each BH Profile system.
For more detail see the FAQ#076.

RESISTANCES KIT (SPARE) 0ERESIKIT00

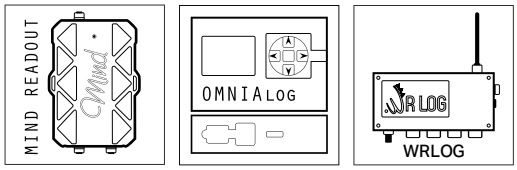
Kit composed by one 120 Ohm, two 240 Ohm, three 360 Ohm and four 480 Ohm resistance ending devices. Each one has an M12 5-pin connector for linking to SISGEO digital gauges. Check compatibility with old digital gauges with your Sales Representative.

TYPICAL TRENCH INSTALLATION

SECTION VIEW



READABLE BY



For further information refer to their own datasheets

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S131

STANLAY™

RED STRIPE

INCLINOMETER CASINGS

INCLINOMETERS
& PENDULUMS

SISGEO®

RED STRIPE

INCLINOMETER CASINGS

Inclinometer casings are special grooved tubes, generally installed into drilled holes, used in conjunction with inclinometer system or in-place inclinometers to determine sub-surface ground displacements.

Red stripe casings are made with virgin ABS and inclinometer tube assembly require drill, rivets, glue and tape.

Red-Stripe couplings create strong, twistproof joints. They fit directly onto full diameter of the casing.

APPLICATIONS

- Landslides
- Diaphragms and retaining walls
- Dams and embankments
- Deep excavations
- Tunneling
- LNG and oil tanks

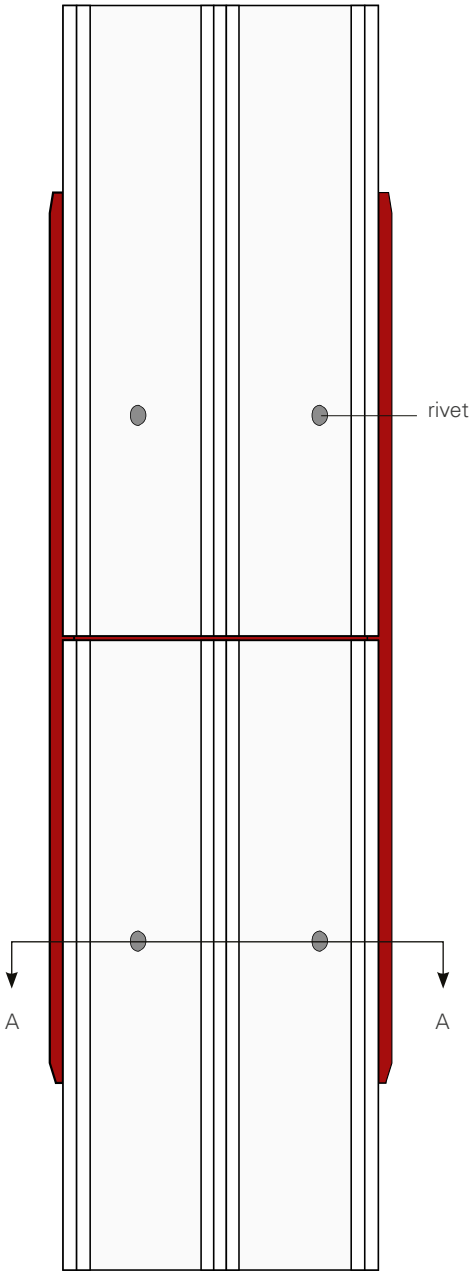
FEATURES

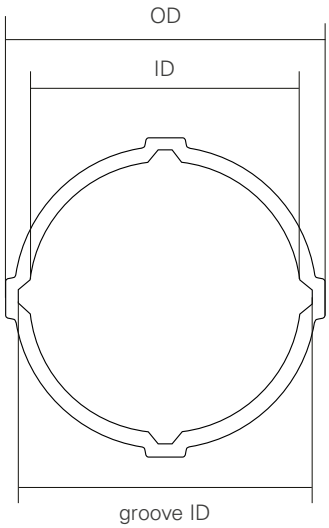
- Low spiral
- Suitable for inclino-settlement columns
- Inert to the aggressive waters
- Suitable for all inclinometer systems in the market

RED STRIPE CASINGS

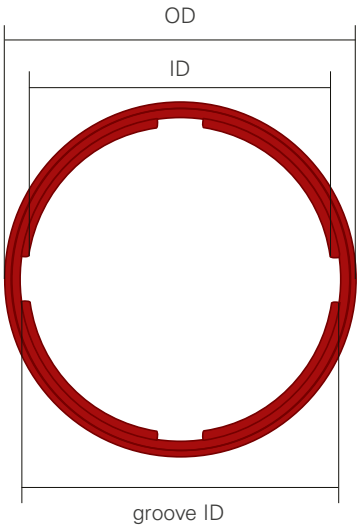
PRODUCT CODE	0S13100603M	0S13100610F
Description	metric red stripe casing	English red stripe casing
Material	ABS (Acrylonitrile-Butadiene-Styrene)	
Outer diameter (OD)	71 mm (2.8")	
Inner diameter (ID)	60 mm (2.4")	
Groove ID	65 mm (2.6")	
Thickness	3.75 mm (0.15")	
Length	3 meter	10 feet
Casing weight	2.1 kg	4.6 lb
Spiral	< 0.6° / 3 m	< 0.61° / 10 feet
Suggested borehole drilling diameter	101 mm (4")	
Temperature (max 1 hour)	+80°C (176 °F)	

PRODUCT CODE	0S131MF6000
Description	coupling for red stripe casing
Material	ABS (Acrylonitrile-Butadiene-Styrene)
Outer diameter (OD)	77 mm (3.0")
Inner diameter (ID)	67 mm (2.6")
Groove ID	71.5 mm (2.8")
Thickness	5 mm (0.2")
Length	200 mm (7.9")
Casing weight	0.20 kg (0.44 lb)
Spiral	-
Suggested borehole drilling diameter	-

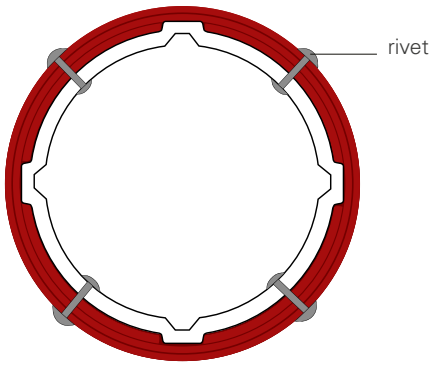




SECTION AA CASING ONLY



SECTION AA COUPLING ONLY



SECTION AA
CASING AND COUPLING

ACCESSORIES AND SPARE PARTS

LOCKABLE TOP CAP OS100CH1000

Consists of a 12" steel sleeve and an ABS plastic top. The sleeve is embedded in the concrete pad at the top of the casing. The top consists of a collar and a hinged lid. The collar has a clamp that holds a pulley. The lid has a survey pin and can be locked.

S131 SIMPLE TOP CAP OS131TS6000

Simple top cap for S131 casings, made by ABS.

S131 BOTTOM CONICAL CAP OS131TF6000

Conical bottom cap for S131 casings, made by ABS.

CASING ASSEMBLY KIT OS1ABKIT200

Suitable for 100 m of casing, it includes rivets, adhesive tape, self-amalgamating tape and three drill bits.

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S143

STANLAY™

EASY-LOCK
INCLINOMETER CASING

INCLINOMETERS
& PENDULUMS

SISGEO®

EASY-LOCK

INCLINOMETER CASING

The easy-lock inclinometer casing is a grooved tube machined at one end in order to have a self-aligning junction and a pre-assembled coupling at the other end. The special design of the coupling with an internal O-ring provide waterproof joint and nearly flush surface between tube and coupling.

The locking system is extremely simple, performant and cost-effective: the coupling contains a hole alligned with a groove of the next casing. A nylon wire is pushed throug the hole in the groove, covering the circumference of the casing. That's it: no need of rivets or glue.

APPLICATIONS

- Landslides
- Diaphragms and retaining walls
- Earth and rockfill dams
- Embankments
- Deep excavations
- Tunneling
- LNG and oil tanks

FEATURES

- Nearly-flush joint
- Negligible twisting (spiral)
- Suitable for T-Rex and DEX extenso-inclinometer columns
- Inert to the aggressive waters (acid waters, brackish or marine waters)
- Suitable for all inclinometer systems in the market

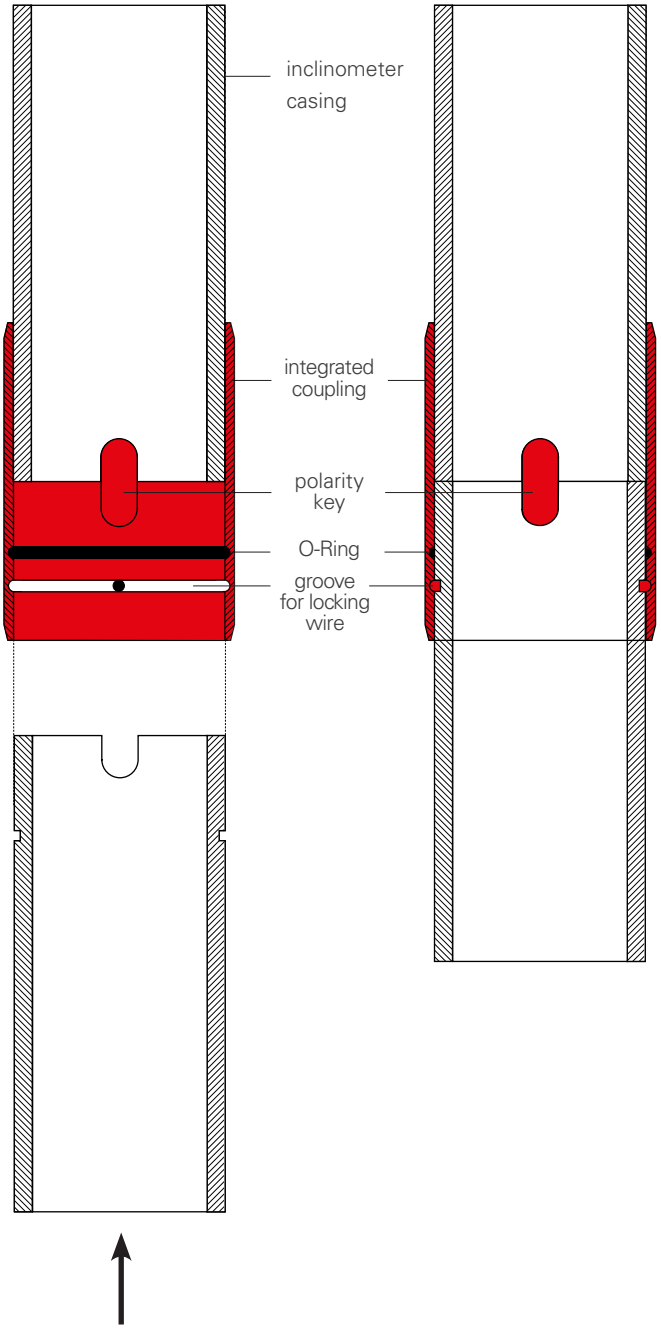
TECHNICAL SPECIFICATIONS

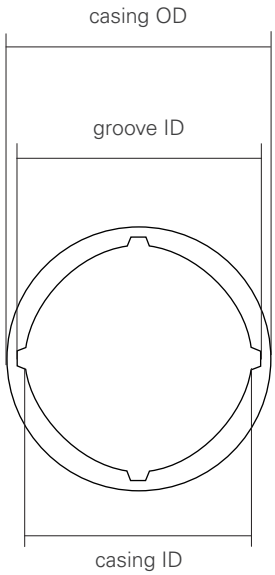
INCLINOMETER CASING	MODEL 0S143107000
Casing outer diameter	70 mm (2.75")
Coupling outer diameter	76 mm (3.00")
Casing Inner diameter	58 mm (2.32")
Groove inner diameter	63.5 mm (2.5")
Thickness	6 mm (0.22")
Overall section length (casing+coupling)	3055 mm (10.02')
Total section weight with coupling	3.6 kg
Spiral (1)	< 0.2° / m
Material	Shock-resistant ABS
Maximum tensioning load	200 kg
Casing tensile strength	40 MPa
Casing breacking elongation	20%
Casing elastic modulus	2700 MPa
Collapse test(2)	15 bar
ABS transition temperature	+105 °C (221 °F)
HDT test ISO 75(3)	+83°C (181 °F)
Minimum borehole drilling diameter	101 mm (4")

(1) During manufacturing particular attention is paid to minimise the spiral of the casing grooves and to machine the aligning key for casing junction with self aligning couplings. Spiral value is verified connecting 10 inclinometer casings of a batch and verifing the spiralling between the two ends.

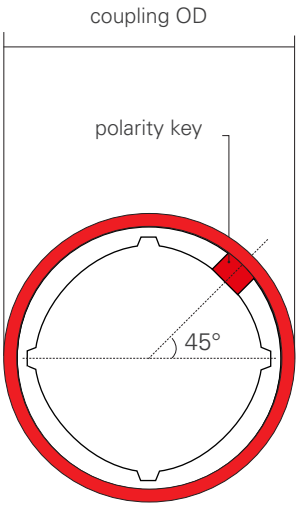
(2) Test was performed in a water pressure chamber with empty casing sealed at the two ends.

(3) Heat deflection temperature is defined as the temperature at which a standard test bar deflects a specified distance under a load of 1.80 MPa.





CAS ING SECTION



COUPLING AND CAS ING SECTION

ACCESSORIES AND SPARE PARTS

LOCKABLE TOP CAP OS100CH1000

Lockable protective cap with survey pin permits topographical surveying in order to define and check the borehole coordinates. It also provides temporary fixing for 0S1CSU10000 pulley and cable stop during manual inclinometer measurements.

EASY-LOCK BOTTOM CAP OS143TF70EL

Bottom cap for 143 casings, made of ABS with easy-lock system for faster installation.

SIMPLE TOP/BOTTOM CAP OS143TF7000

Top/bottom cap for 143 casings, made of ABS. Need to be riveted.

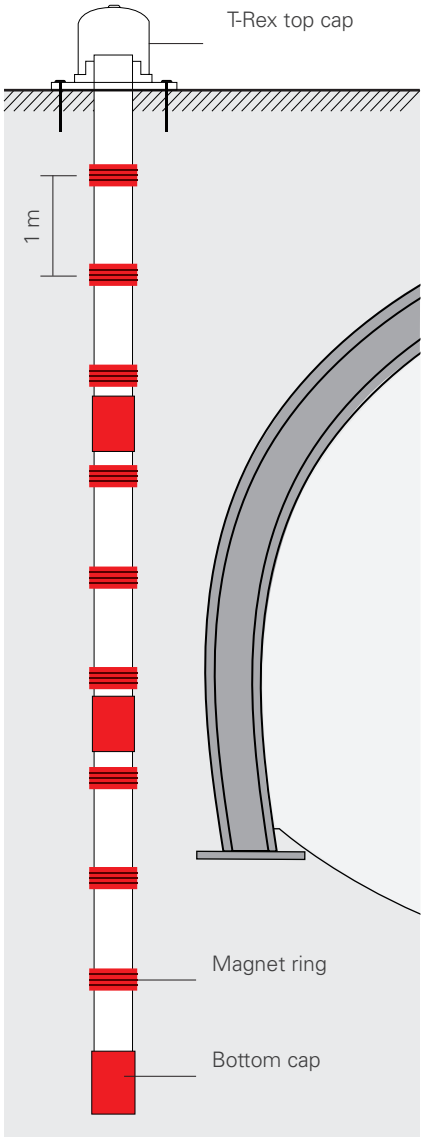
ASSEMBLING KIT FOR 100 M OS143KIT000

Assembling set composed by 5 O-rings, locking wire and Sisgeo adhesive tape. (Mandatory)

REPAIRING & ELONGATION KIT OS143KITR00

Kit for elongation of casing already cutted. It includes 5 coupling and mounting jig.

EXTENSO-INCLINOMETER COLUMN (T-REX AND DEX-S COLUMN)



S143 ABS casings are suitable to realise an extenso-inclinometer tube for high-precision measurements in borehole with T-REX or DEX-S extensometers.
Measuring targets are special magnet rings which are externally attached to ABS casing every meter.
Measurements are taken meter by meter inserting into the casing the T-REX mobile extensometer and the inclinometer probe for obtaining a detailed cumulative and accurate 3-D borehole profile.
Automatic 3-D borehole monitoring is allowed using DEX-S in-place extenso-inclinometer probes; DEX-S shall be connected to OMNIAlog datalogger for data storage, remote management and alerting.
Extenso-inclinometer colum can be read with the C121 magnetic probe to check the position of the rings after column grouting, and to take interim measurements before using T-REX or DEX.

MAGNET REFERENCE RING OREXORINGR0

Simple measuring reference ring for T-REX incremental extensometer and DEX in-place extensometers.
OD: 93 mm
ID: 71 mm
Material: PVC with permanent magnet

SPIDER REFERENCE RING OREX0AF71R0

Spider measuring reference ring for T-REX incremental extensometer and DEX in-place extensometers.
OD: 93 mm
ID: 71 mm
Max spring span: 300 mm
Material: PVC with permanent magnet

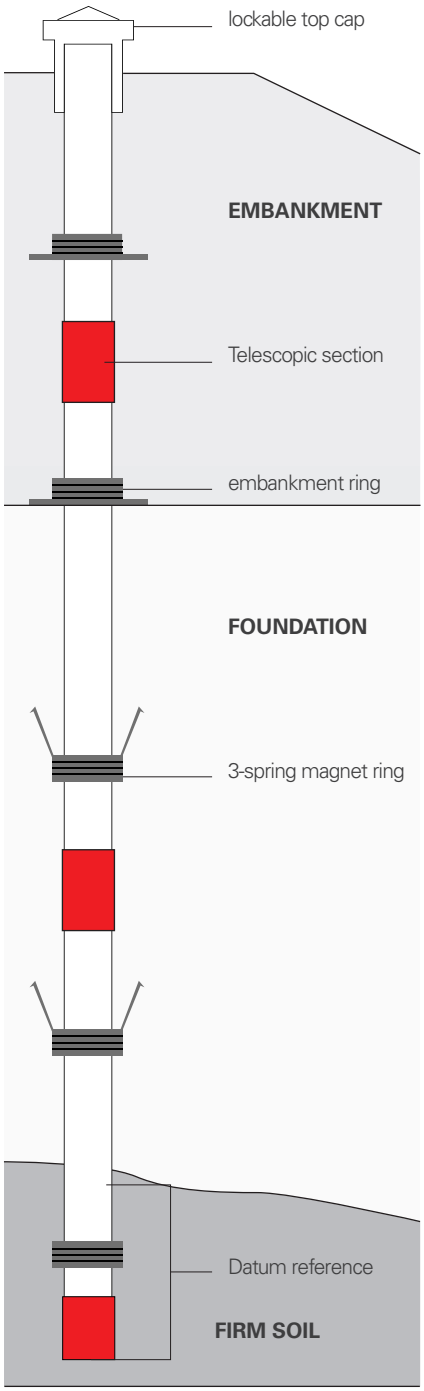
T-REX TOP CAP OREXOTS2350

Lockable top cap ready with fixing plate for T-REX positioning system.

MAGNET RING JIG OREXODIMA00

Setting rod for positioning the rings 1 m apart.

INCLINO-SETTLEMENT COLUMN (BRS MAGNET EXTENSOMETER COLUMN)



Inclino-settlement column is a cost-effective solution when inclinometer and settlement measurement are requested. It is composed by ABS inclinometer casing with a number of magnet rings; telescopic sections are provided for columns where big settlements are expected with consequent damage of the casings. Spider magnet rings are usually installed in borehole; embankment magnet rings with circular plate are available for installation during embankment construction.
Measurements are perfomed with removable inclinometer system and C121 portable magnet settlement probe.
The magnet rings utilized for the inclino-settlement column are not compatible with T-REX, DEX and DEX-S probes.

3-SPRING MAGNET RING OS143AF6000

BRS magnet ring with 3 nylon springs for borehole installation. Not compatible with T-REX, DEX and DEX-S.
Ring ID 71 mm
Ring OD 95 mm
Max. spring span 300 mm

6-SPRING MAGNET RING OS143AF6060

BRS magnet ring with 6 nylon springs for borehole installation. Not compatible with T-REX, DEX and DEX-S.
Ring ID 71 mm
Ring OD 95 mm
Max. spring span 300 mm

EMBANKMENT RING OS143AR6000

BRS magnet ring with circular settlement plate for embankment installation. Not compatible with T-REX, DEX and DEX-S.
Ring ID 71 mm
Ring OD 95 mm
Plate OD 300 mm

DATUM REFERENCE OS143DR7000

Bottom datum reference for S143 casing, total length 1500mm. It includes a magnet ring.

70MM TELESCOPIC SECTION OS143ST0700

Telescopic section with 75 mm gap (movement range).

150MM TELESCOPIC SECTION OS143ST1500

Telescopic section with 150 mm gap (movement range).

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S151

STANLAY™

_ QUICK JOINT

INCLINOMETER CASING

INCLINOMETERS
& PENDULUMS

SISGEO®

QUICK JOINT

INCLINOMETER CASING

Sisgeo QJ casing is an alternative to the traditional inclinometer tubes, mainly designed for earth-fill and rock-fill dams, and deep borehole applications.
QJ tube offers simple and fast installation, consistent joint and deeper tube grooves. O-rings prevent ingress of grout or water.
The fitted-at-factory coupling and the alignment keys assure a perfect grooves continuity.
Telescopic section and a variety of settlement rings for either borehole and embankment installations permit to combine inclinometer and settlement measurements in one borehole.

APPLICATIONS

- Earth-fill and rock-fill dams
- Deep borehole installations
- Landslides
- Diaphragms and retaining walls
- Embankments
- Deep excavations
- Tunneling

FEATURES

- Simple assembling, no rivets, tape or glue required
- Fast installation reducing costs and drilling-rig stand-by
- Heavy duty, suitable for extreme installations
- High precise and deep tube grooves
- Available a special settlement plate for rock-fill dams

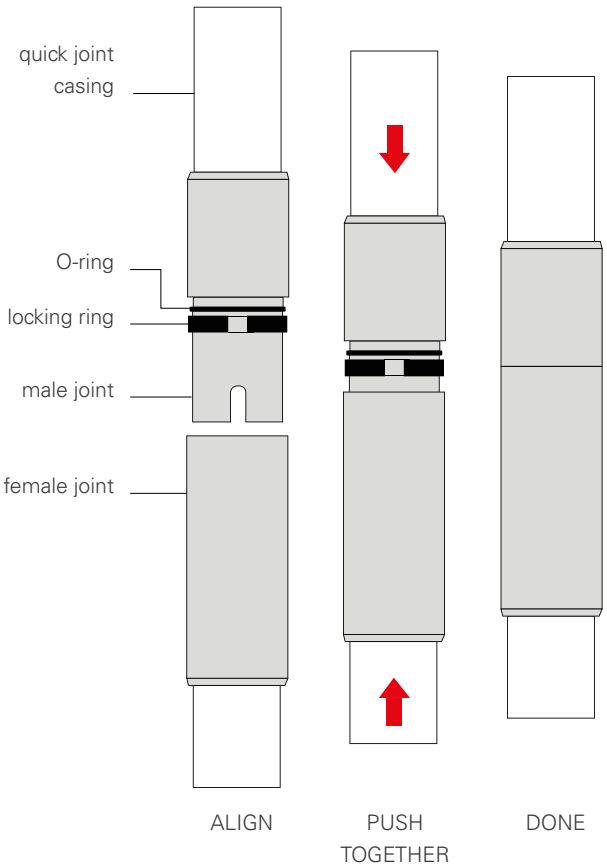
CE *Meet the essential requirements of the EMC Directive 2004/108/EC*

TECHNICAL SPECIFICATIONS

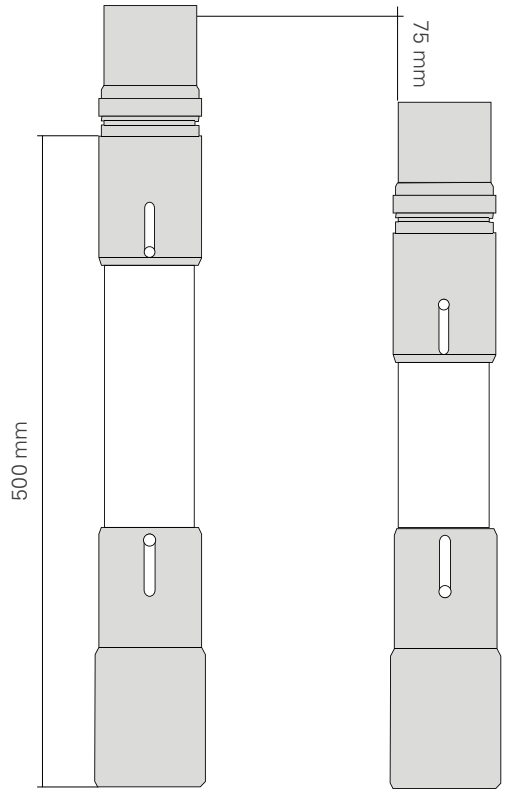
	MODEL 0S151107000	MODEL 0S151MT0700
Description	Standard QJ section	QJ Telescopic section 75 mm gap (3")
Tube outer diameter	70 mm (2.75")	70 mm (2.75")
Tube inner diameter	59 mm (2.32")	59 mm (2.32")
Tube groove ID	63 mm	63 mm
Overall section lenght	3100 mm	500 mm
Overall diameter	84 mm	84 mm
Thickness	5.5 mm	5.5 mm
Material	ABS (Acrylonitrile Butadiene Styrene)	ABS (Acrylonitrile Butadiene Styrene)
Colour	white/red	white/red
Spiral (1)	< 0.6° / 3 meter	-
Collapse test (2)	15 bar	15 bar
Temperature (max 1 hour)	+80°C (176 °F)	+80°C (176 °F)
Max working load (3)	> 500 Kg	> 500 Kg

(1) During manufacturing particular attention is paid to minimise the spiral of the casing grooves and to machine the couplings.
(2) Test was performed in a water pressure chamber with empty casing sealed at the two ends.
(3) Pulling test is performed on a two QJ tube sections jointed together under a thrusting machine.

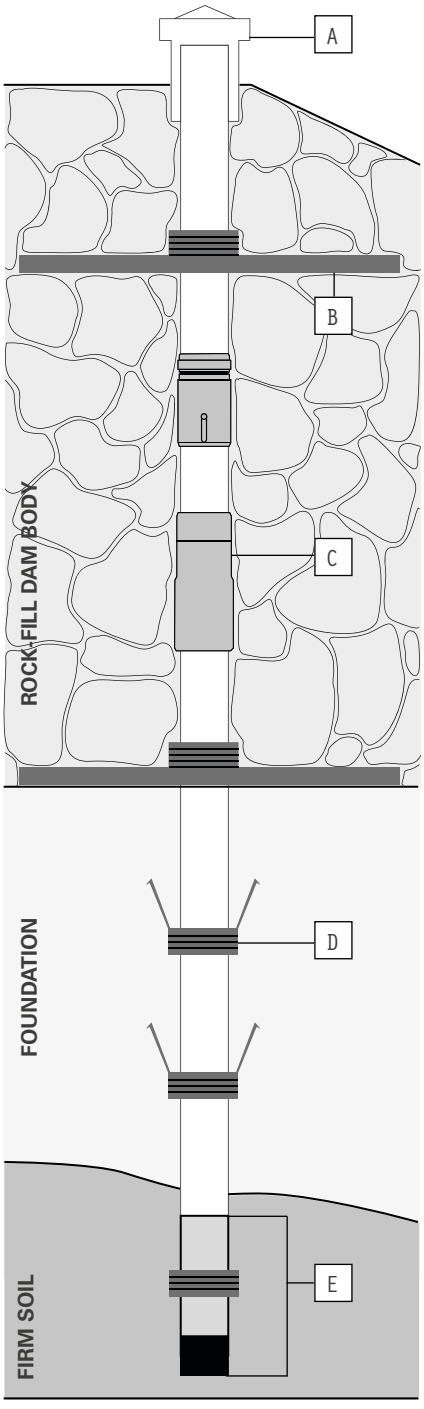
ASSEMBLY SEQUENCE



QJ TELESCOPIC SECTION



QUICK JOINT ACCESSORIES AND INCLINO-SETTLEMENT COLUMN



LOCKABLE TOP CAP OS100CH1000

Lockable protective cap with survey pin permits topographical surveying in order to define and check the borehole coordinates. It also provides temporary fixing for 0S1CSU10000 pulley and cable stop during manual inclinometer measurements.

ABS QJ TOP CAP OS151TS7000

Simple top cap to prevent tube clogging with topographic survey point

ABS QJ BOTTOM CAP OS151TF7000

Bottom cap with femal quick joint coupling for fast column assembling

SPARE KIT FOR QJ OS151KIT000

This kit includes No.10 "O" rings and No.10 locking rings

REPAIRING KIT FOR QJ OS151KITR00

It includes No.5 female joints, No.5 male joints, No.7 "O" rings and No.7 locking rings

3-SPRING MAGNET RING OS143AF6000(1)

BRS magnet ring with 3 nylon springs for borehole installation.
Ring ID 71 mm
Ring OD 95 mm
Max. spring span 300 mm

6-SPRING MAGNET RING OS143AF6060(1)

BRS magnet ring with 6 nylon springs for borehole installation.
Ring ID 71 mm
Ring OD 95 mm
Max. spring span 300 mm

EMBANKMENT RING OS143AR6000(1)

BRS magnet ring with circular settlement plate for embankment installation.
Ring ID 71 mm
Ring OD 95 mm
Plate OD 300 mm

A. Lockable top cap
B. Platform target
C. QJ telescopic section
D. Spring magnetic ring
E. QJ datum reference

QJ DATUM REFERENCE OS151DR7000

It provides bottom datum point in borehole for inclino-settlement column.

PLATFORM TARGET OS151AR80RC

Platform magnet target designed for rockfill dams.
Material: stainless steel
Platform area: 900x300 mm
Platform thickness: 30 mm
Hole ID: 83 mm

Inclino-settlement columns with QJ casing are a cost-effective solution when inclinometer and settlement measurement are required. A typical application is in rock-fill dams thank to QJ extreme robustness and availability of magnet platform target. The columns are composed by QJ casings with a number of magnet rings/platforms; telescopic sections are provided for columns where big settlements are expected with consequent damage of the casings. Measurements are perfomed with removable inclinometer system and portable settlement probe C121 model.

(1) Magnet ring shall be installed on the casing during production.

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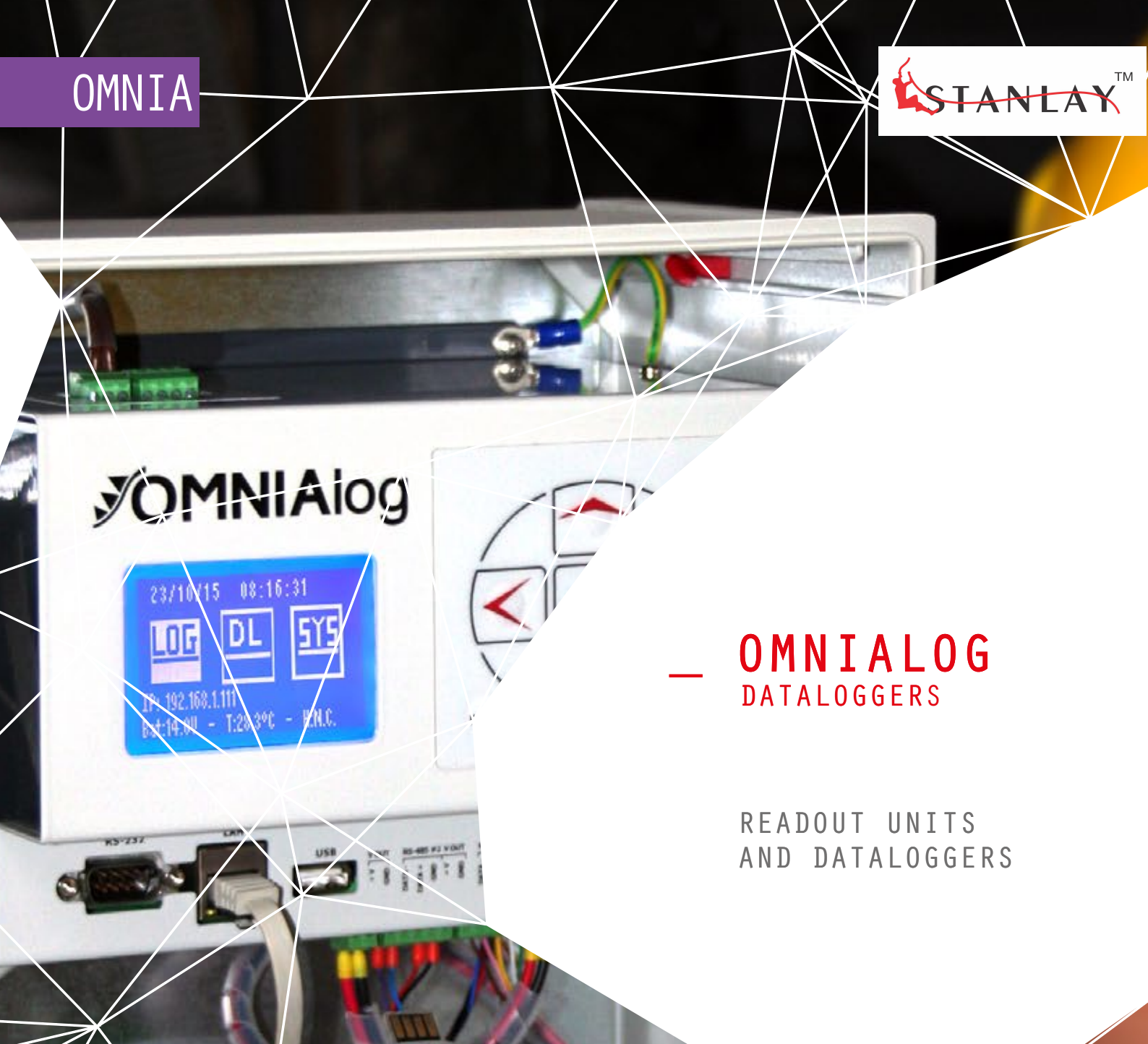

OMNIALOG
DATALOGGERS

READOUT UNITS
AND DATALOGGERS

SISGEO®

OMNIALOG DATALOGGER

The OMNIAlog has been designed "in house" by Sisgeo and is the result of over 25 years experience using different dataloggers in geotechnical field.

OMNIAlog is a versatile, cost effective and low powered datalogger supporting vibrating wire and all major geotechnical sensors.

OMNIAlog has a mini web server on board, 24 local analog channels, expandable to 408 channels through multiplexers and 2 digital opto-isolated input ports. It can be managed by any Internet browser and also includes a USB flash drive support.

APPLICATIONS

- Tunnelling
- Dam surveillance
- Structural monitoring
- Mining exploration
- Deep excavation
- Landslide safety implementation
- Retaining walls
- Geotechnical investigation campaign

FEATURES

- No software required
- LAN Ethernet, USB and RS232 Comm ports
- High performances
  (resolution, accuracy, environment -30°C +70°C)
- 32GB internal memory
- Stand alone or part of network
- Vibrating wire built-in interface
- Digital sensors support
- Compatible with all major geotechnical sensors

CE *Meet the essential requirements of the EMC Directive 2004/108/EC and low voltage Directive 2006/95/EC*

TECHNICAL SPECIFICATIONS

	OMNIALOG GT-2400	OMNIALOG GT-100D
CPU AND MEMORY		
Processor	ARM Cortex-M3 MCU with 1 MB Flash, 120 MHz CPU, ART Accelerator, Ethernet	
RAM Memory	1 Mbyte RAM with backup	
Mass storage	SD CARD 32 GB (*) and WEB pages	
Clock accuracy	High precision RTC (real time clock with battery back-up) self compensated in temperature (3ppm @ 25°C, 10ppm @ -30 +70°C)	
On-board sensors	Temperature measured on the electronic board (accuracy ±1%)	
INPUT		
Analog differential inputs	24 differentials individually configured. Channel expansion provided by SISGEO multiplexers	-
Digital inputs	Two opto-isolated digital inputs individually selectable for switch closure, high frequency pulse and trigger. Independent 32-bit counters for each input. Max Input Voltage: 24V (Max Current: 10mA) Min Input Voltage: 5V (Max Current: 2mA)	
INTERFACES		
Display & Keyboard	Small backlight graphic LCD 128x64 dpi with membrane keyboard for the minimal local management without the PC. Keyboard for start a uniscan, sequential display of the last memorized readings for each channel (sensor ID, converted unit reading, UM), device status, data download and FW/web pages update by USB pen drive, safe mode (back-up/format/restore internal SD card)	
LAN ethernet isolated	10/100 Mbps, RJ45	
RS232	9-pin, DE9: DCE port for GSM/GPRS modem connection Baud Rates: selectable from 9600 bps to 115.2 kbps (default setting) Default Format: 8 data bits; 1 stop bits; no parity	
USB	USB 2.0 flash drive only (FAT 32), 5 V 200 mA	
RS485#1 opto-isolated	5 screw clamp: DCE port for max. No.250 SISGEO digital sensors Communication interface: RS485 Communication protocol: MODBUS RTU (SISGEO Protocol) The voltage 'V OUT' is switched on and off under program control. V OUT is the unregulated input power supply 'V IN' (1 A) Power supply management (always on or energy safe)	
RS485#2 opto-isolated	5 screw clamp: DCE port for max. 16 SISGEO multiplexer boards connection. Communication interface: RS485 Communication protocol: MODBUS RTU (SISGEO Protocol) The voltage 'V OUT' is switched on and off under program control. V OUT is the unregulated input power supply 'V IN' (1 A) Every channel of each multiplexer board is completely independent.	
SWITCHED OUTPUT POWER SUPPLY	The voltage 'V OUT' is switched on and off under program control. V OUT is the unregulated input power supply 'V IN' (2 A)	

(*) Including system files

ANALOG MEASUREMENTS	OMNIALOG GT-2400	OMNIALOG GT-100D
Measurement rate (MR)	**High precision measurement (low speed, 5 sps):** Init. analog (with auto-calibration): 27.80 sec Instrument warm-up: depending on sensor configuration Measurement: 5.41 sec **Standard measurement (20 sps):** Init. analog (with auto-calibration): 7.1 sec Instrument warm-up: depending on sensor configuration Measurement: 1.57 sec **Fast measurement (High speed 40 sps):** Init. analog (no auto-calibration): 2.65 sec Instrument warm-up: depending on sensor configuration Measurement: 0.45 sec **Note1: times indicated not valid for vibrating wire measures** **Note2: init. analog phase is made only one time before the measurement cycle**	-
Type of measurements	mA, mV, V, mV/V, °C, Hz (µsec, digit)	-
ADC	24-bit (22 true bit) differential Analog-to-Digital Converters, 5SPS, 0-24 Average Function, auto-calibration and auto-range	-
Range and power supply	**Current loop (2 wires)**: range 0÷25 mA Power supply (selectable by the software, up to 100 mA): 24V DC, 10V DC, external **Transmitter (3-4 wires)**: range 0÷25mA Power supply (selectable by the software, up to 100 mA): 24V DC, 10V DC, external **Voltage (4 wires):** range ±100mV, ±1V, ±10V Power supply (selectable by the software, up to 100 mA): 24V DC, 20V DC, 10V DC, 5 V DC ,external **Servo inclinometer:** range ±5V Power supply (selectable by the software): ±12V DC (dual), external **Wheatstone bridge (6 wires, with sensing)**: range ±10mV/V Power supply (selectable by the software, up to 80 mA): 10 V DC , 5 V DC, external (max 10 Vdc) Maximum bridge resistance: 10 kΩ Minimum bridge resistance: 200 Ω **Platinum RTD (Pt100)**: range -150°C to +150°C Power supply: 1.2 mA **Potentiometer:** range ±2.5V Power supply (selectable by the software): 10V DC, 5V DC **Thermistor (NTC)**: range -50°C to +150°C Power supply: 0.05mA / 0.1mA / 1.2mA **Vibrating Wire**: range 400Hz to 6000Hz Excitation sine wave signal (adaptive): ±10 V	-
Reading resolution	1 µA at range 20 mA 10 µV at range ±100 mV - 100 µV at range ±1 V 1 mV at range ±10 V - 0.1 °C for Pt100 - 0.1 °C for NTC 0.1 Hz at range 6000 Hz - 0.001 mV/V at range ±10 mV/V	-
Measurement accuracy	0.01 % F.S. (0.1 % F.S. for Pt100 and NTC) with Standard Measurement Calibration in Sisgeo laboratories recommended every 2 years.	-

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WR_LOG

STANLAY™

WR LOG

WIRELESS MONITORING SYSTEM

READOUT UNITS
AND DATALOGGERS

SISGEO

WR LOG

WIRELESS MONITORING SYSTEM

WR LOG wireless monitoring system nodes can be connected to a wide variety of sensors and communicate with the Gateway using a Long Range Radio. Nodes can be easily set up through an Android app and the system offers a simple visualization web based software.

WR LOG is a low power consumption system that can reach up to 10 years battery life. Distance between node and gateway can arrive up to 15 km.

The system allows the remote connection and offers near real time data that can be pushed to other visualization softwares through FTP, API calls and Modbus TCP.

FEATURES

- Long-range communication of over 15km
- Truly low-power, 10 years of unattended runtime
- Wireless LPWA communication
- Supports most structural and geotechnical instruments
- User-friendly web software

BENEFITS

- Remotely monitor hard-to-access infrastructures
- Cover a wide area with geotechnical sensors
- Easily add sensors to extend measurement range
- Save resources through fast implementation
- Diminish risks and make operations safer

CE *Meet the essential requirements of the EMC Directive 2014/30/EU and RED directive 2014/53/EU*

4G GATEWAY
OLSWROOOGW4

It is an outdoor LoRa gateway equipped with a 4G Worldwide module with 3G/2G fallback. The gateway receives readings from the nodes and pushes data through the integrated 4G modem to a server for management and visualization. It includes an external waterproof connectors (RJ45, SIM card), an easy installation mounting kit and USB (Type C) connector for local access. The internal processor can manage up to 50 data messages every minute in single gateway network architecture.
The gateway incorporates 1 x green LED for power and 1 x red LED for system status. The SIM card port accepts mini-SIM format.

TECHNICAL SPECIFICATIONS

PRODUCT CODES: (1)	
0LSWR868GW4	RX: 863- 873MHZ, TX: 863-873MHZ
0LSWR915GW4	RX: 902-915MHZ, TX: 922-928MHZ
0LSWR923GW4	RX: 915-928 MHZ, TX: 915-928MHZ (according to hardware capabilities)
BASE STATION	
Band	ISM Sub 1 GHz sensitivity down to -137 dBm (SF11)
Integrated internal antennas	GPS, 4G and LoRa (peak gain = 2.6dBi)
Memory	DDRAM 256MB, 8GB eMMC (6GB available for user)
GNSS receiver	GPS, GLONASS, QZSS & SBAS
External antenna (included)	3 dBi vertical omni-directional, 30cm length 868/915/923 MHz
POWER	
Powered by	- PoE both Mode A and Mode B (802.3af specifications) - ±48 VDC through RJ45 (isolated power)
Mean power consumption	4.5 Watts
Power over Ethernet	PoE injector for indoor use included in the kit
NETWORK INTERFACES	
Ethernet	10/100 Ethernet WAN (RJ45 PoE) (LAN cable not included)
Integrated 4G Modem (2)	Worldwide LTE, UMTS/HSPA+ and GSM/GPRS/EDGE coverage

PHYSICAL FEATURES

Overall Dimensions	265x165x100 mm without ext. antenna
Weight	1.4 kg (mounting kit included)
IP class	IP67
Materials: Back	Aluminum
Front	Polycarbonate
Mounting kit	Stainless steel
Operating temp. range	-40°C to +60°C

(1) For more information regarding how to choose the right Gateway band, see FAQ #089 on our web site www.sisgeo.com
(2) WWAN capabilities are listed in F.A.Q..#107 on www.sisgeo.com.

VIBRATING WIRE NODES OLSWR1CHVWS/OLSWR5CHVWO

The vibrating wire nodes are able to manage 1 or up to 5 vibrating wire instruments such as piezometers, crack meters, strain gauges, etc...
It has an embedded barometer useful for piezometers' data compensation.
Examples of application are column of multipoint piezometers, 3-D crack meters, rosette-mounting strain gauges, multipoint extensometers.
Batteries are not included with the node and shall be ordered separatelly.

TECHNICAL SPECIFICATIONS

Number of channels	1 or 5 (vibrating wire + thermistor)
Sampling rate	30 seconds to 1 day
Internal data storage	Up to 72500 readings incl. time and 5 sensors Up to 200000 readings incl. time and 1 sensor
Time synchronization by radio	time discipline better than ±10 seconds
Power supply	1 CH: 1 x C-size 3.6 V high power battery 5 CH: from 1 to 4 x C-size 3.6 V high power batteries

VIBRATING WIRE INPUT

Measurement method		Embedded algorithms increasing immunity to noise	
Excitation wave		±5 V	
Measurement range		300 to 7000 Hz	
	Excitation frequency	Accuracy	Resolution
Sweep A	450 - 1125 Hz	0.013%	0.002 Hz
Sweep B	800 - 2000 Hz	0.008%	0.002 Hz
Sweep C	1400 - 3500 Hz	0.010%	0.004 Hz
Sweep D	2300 - 6000 Hz	0.009%	0.007 Hz

THERMISTOR INPUT

Measurement range	0 Ω to 4 MΩ
Resolution	1 Ω
Accuracy (20°C)	0.05°C (0.04% FS)

EMBEDDED BAROMETER

Pressure Range	300 to 1100 hPa
Relative Accuracy (950 to 1050 hPa at 25°C)	±0.12 hPa

PHYSICAL FEATURES

Box Dimensions (WxLxH)	
1 channel node	100x100x61 mm
5 channels node	100x200x61 mm
Overall Dimensions without antenna (WxLxH)	
1 channel node	140x120x61 mm
5 channels node	140x220x61 mm
External antenna	114 mm length (including connector)
Housing material	Alluminium alloy
IP class	IP67
Weight (without antenna and batteries)	
1 channel node	0.66 kg
5 channels node	1.27 kg
Operating temperature	-40°C to +80°C

BATTERY LIFE ESTIMATION(1)

1 CH, sampling 5 min, 1 x battery	1 year
1 CH, sampling 1 hour, 1 x battery	3.5 years
5 CH, sampling 5 min, 4 x batteries	2.2 years
5 CH, sampling 1 hour, 4 x batteries	7.1 years

(1) Based on mathematical model using SAFT LSH14 batteries, SF8. Extreme temperatures could cut-down the capacity by 20 to 40%. Check the battery specifications. USB not used.
Bear in mind that consumption varies depending on the sensor used, sampling rate and environmental conditions.

ANALOG NODE OLSWR4CHANLO

Analog nodes are 4 channel devices that support several voltage output, 4-20mA output, potentiometer, Wheatstone bridge, thermistor and PT100. Each channel can be individually configured according to the sensor output.
Batteries are not included with the node and shall be ordered separatelly.

TECHNICAL SPECIFICATIONS

Number of channel	up to 4 (individually configurable by the user)
Sampling rate	30 seconds to 1 day
Internal data storage	Up to 200000 readings incl. time and 1 sensor) Up to 72500 readings incl. time and 4 sensors)
Time synchronization by radio	time discipline better than ±10 seconds
Instruments power supply	5 V DC / 12 V DC / 24 V DC (up to 60 mA) selectable for each channel
Power supply	from 1 to 4 x C-size 3.6 V high power battery
INSTRUMENT INPUTS	
Voltage measuring ranges	±10 V DC
Voltage output accuracy (-40 to +85°C)	±0.05 % FS
Current loop 4-20mA accuracy (-40 to +50°C)	±0.05 % FS
Potentiometer accuracy (0 to +50°C)	±0.02 % FS
Wheatstone bridge accuracy (0 to +50°C)	±0.1 % FS (full bridge) (1)
Thermistor accuracy (0 to +50°C)	±0.2°C
PT-100 accuracy (20°C)	±0.8°C

(1) In case of reading of a Wheatstone bridge gauge, we suggest to have maximum 30m of signal cable from gauge to node

PHYSICAL FEATURES

Box Dimensions (WxLxH)	100x200x61 mm
Overall Dimensions without antenna (WxLxH)	140x220x61 mm
External Antenna	114 mm length (including connector)
Housing material	Aluminium alloy
IP class	IP67
Operating temperature	-40°C to +80°C
Weight (without antenna and batteries)	1.10 kg

BATTERY LIFE ESTIMATION(2)

	Current @ 12 V @ 24 mA, SF9	Current @24 V @24 mA, SF9	Voltage @ 12 V @ 24 mA, SF9	Full Wheatstone bridge @5V @350 Ω, SF8	POT @5V @1 kΩ, SF8
Warm-up time	1 seconds	1 seconds	1 seconds	-	-
1 channel, sampling 5 minutes	6 months	4 months	5.4 months	1.4 years	1.5 years
1 channel, sampling 6 hours	>10 years	>10 years	>10 years	>10 years	>10 years
4 channels, sampling 5 minutes	2.2 months	1.4 months	2 months	3.8 months	5.2 months
4 channels, sampling 6 hours	8.8 years	6.4 years	8.4 years	>10 years	>10 years

(2) Estimations with 4 SAFT LSH14 batteries, based onn mathematical models. Extreme temperatures could cut-down the capacity by 20 to 40%. Check the battery specifications. USB not used.

MINI NODE OLSWR1CHANPO

The Mini node is the easiest way to connect an electric load cell to WR LOG wireless network. Mini node can also manage potentiometers, ratiometric sensors and pulses (i.e. rain gauges). On a dedicated channel can be also connected a thermistor probe. Batteries are not included with the node and shall be ordered separatelly.

TECHNICAL SPECIFICATIONS

Number of channels	1 individually (configurable, no thermistor) 1 thermistor (not configurable) 1 pulse counter (not configurable)
Sampling rate	30 seconds to 1 day
Internal data storage	Up to 200000 readings incl. time
Instruments power supply	5 V DC (up to 50 mA)
Power supply	1 or 2 x C-size 3.6 V high power battery

INSTRUMENT INPUTS

Potentiometer/Ratiometric measuring ranges	0÷5 V DC , 0÷1 V/V
Potentiometer/Ratiometic accuracy (-40 to +80°C)	0.1% FS
Full Wheatstone bridge measuring ranges	±7.8 mV/V (4-wires) [1]
Full Wheatstone bridge accuracy (-40 to +80°C)	0.13 %FS
Single-ended voltage ranges	0÷5 V DC
Single-ended voltage accuracy (-40 to +80°C)	0.6% FS
Thermistor measuring ranges	0 to 2 MΩ
Thermistor[2] accuracy (-40 to +80°C)	0.04 °C (thermistor sensor error not included)
Pulse (dry contact) accuracy	±1 pulse
Pulse (dry contact) rate	0 to 50 Hz
Built-in temperature sensor accuracy	±2°C

(1) In case of reading of a Wheatstone bridge gauge, we suggest to have maximum 30m of signal cable from gauge to node
(2) Thermistor model: 3000 Ω@25°C

PHYSICAL FEATURES

Box Dimensions (WxLxH)	113x80x60 mm
Overall Dimensions (WxLxH)	120x80x60 mm
Housing material	Polycarbonate
IP class	IP67
Operating temperature	-40°C to +80°C
Weight (without batteries)	0.24 kg
Antenna	Internal antenna

BATTERY LIFE ESTIMATION[3]

	1 x battery	2 x batteries
sampling 5 minutes	0.9 year	1.8 years
sampling 1 hour	5.0 years	8.1 years
sampling 6 hours	6.5 years	9 years

(3) Based on the lifetime mathematical model, SF9, potentiometer + thermistor. Extreme temperatures could cut-down the capacity by 20 to 40%. Check the battery specifications. USB not used.

DIGITAL NODE
PRODUCT CODE OLSWRDIG000

Digital node can manage 1 chain of Sisgeo digital instruments such as BH-profile in-place inclinometers, MD-Profile inclinometers, LT-Inclibus, MEMS in-place inclinometers, tiltmeters, Railway Deformation System (RDS), extensometer probes (DEX), extenso-inclinometer probes (DEX-S), liquid settlement system (H-level), load cells and multipoint borehole extensometers (MPBX), amongst others. For the maximum number of gauge in the chain and the needed power supply, please refer to the related table in next page. Batteries are not included with the node and shall be ordered separatelly.

TECHNICAL SPECIFICATIONS

Input	One RS485 channel and two SDI-12 channels
RS485 mode	Modbus RTU, full or half-duplex supported
Instruments power supply	regulated 12 VDC (up to 200 mA)
Sampling rate	30 seconds[1] to 1 day
Time synchronization by radio	time discipline better than ±30 seconds
Power supply	4 x C-size 3.6 V high power battery

(1) Depending from the model of the gauges connected, numbers and powering mode

PHYSICAL FEATURES

Box Dimensions (WxLxH)	100x200x61 mm
Overall Dimensions without antenna	140x220x61 mm
External Antenna	114 mm length (including connector)
Housing material	Aluminium alloy
Operating temperature	-40°C to +80°C
IP grade	IP67
Weight (without batteries and antenna)	1.15 kg

INTERNAL BATTERY LIFE ESTIMATION(2)

10 IPI (always on), sampling 5 minutes	60 days
30 IPI (always on), sampling 5 minutes	12 days
30 IPI (always on), sampling 30 minutes	72 days (2.3 months)
30 IPI (always on), sampling 6 h	864 days (28.4 months)
10 IPI (timed mode), sampling 5 minutes	80 days
30 IPI (timed mode), sampling 5 minutes	22 days
30 IPI (timed mode), sampling 30 minutes	130 days (4.3 months)
30 IPI (timed mode), sampling 6 h	1500 days (4.1 years)

(2) Considering laboratory conditions. Extreme temperatures could cut-down the capacity by 20 to 40%. Check the battery specifications. USB not used.
Data not valid for powering with external solar power kit.

MAXIMUM NUMBER OF DIGITAL INSTRUMENTS CONNECTED TO DIGITAL NODE

INSTRUMENT MODEL	MAXIMUM NUMBER OF GAUGES PER NODE WITH SISGEO V3 PROTOCOL	NEEDED EXTERNAL POWER SUPPLY [1]	NEEDED INSTRUMENTS' POWER CONFIGURATION [2]
Digital BH-Profile IPIs, uniaxial and biaxial (model S431HD, S432HD, S441HD)	up to 30 gauges [3]	NO	from 1 to 15 gauges: ALWAYS-ON or TIMED from 16 to 30 gauges: TIMED
Digital IPIs, uniaxial and biaxial (Model S411HD, S412HD, S421HD)	up to 30 gauges [3]	NO	from 1 to 15 gauges: ALWAYS-ON or TIMED from 16 to 30 gauges: TIMED
Digital MD Profiles, uniaxial and biaxial (Model MDP30V, MDP30H)	up to 30 gauges [3]	NO	from 1 to 30 gauges: ALWAYS-ON or TIMED
Digital LT Inclibus, uniaxial and biaxial [4] (Model LTIBV, LTIBH)	up to 30 gauges [3]	NO	from 1 to 30 gauges: ALWAYS-ON or TIMED
Digital Tiltmeters, uniaxial and biaxial (Model S541HD, S542HD)	up to 30 gauges [3]	NO	from 1 to 15 gauges: ALWAYS-ON or TIMED from 16 to 30 gauges: TIMED
Digital H-Levels (Model HLEV000D)	up to 30 gauges	NO	from 1 to 15 gauges: ALWAYS-ON or TIMED from 16 to 30 gauges: TIMED
Digital RDS gauges (Model S7RDSHD)	up to 30 gauges [3]	NO	from 1 to 15 gauges: ALWAYS-ON or TIMED from 16 to 30 gauges: TIMED
Digital DEX and DEX-S gauges (Model DEX350000D, DEX35S000D)	up to 18 gauges	YES	from 1 to 18 gauges: TIMED
Digitalized anchor load cells (Model L200 + 0ELCDIG4850)	up to 30 gauges	NO	from 1 to 15 gauges: ALWAYS-ON or TIMED from 16 to 30 gauges: TIMED
Digitalized Resistive Piezometers (Model P235) *Available on request*	up to 30 gauges	NO	from 1 to 15 gauges: ALWAYS-ON or TIMED from 16 to 30 gauges: TIMED
Digitized MPBX or MEXID extensometers up to 2 anchor points each extensometer (Model D2MX02D)	up to 30 extensometers	NO	from 1 to 15 extensometers: ALWAYS-ON or TIMED from 16 to 30 extensom: TIMED
Digitized MPBX or MEXID extensometers 3 anchor points each extensometer (Model D2MX03D)	up to 18 extensometers	NO	from 1 to 15 extensometers: ALWAYS-ON or TIMED from 16 to 18 extensom: TIMED
Digitized MPBX or MEXID extensometers up to 6 anchor points each extensometer (Model D2MX04D)	up to 12 extensometers	NO	from 1 to 12 extensometers: ALWAYS-ON or TIMED

(1) If the external power supply is needed, add to the order the accessories' codes 0AX10W003AH (solar panel kit) and 0OMX24V030W (digital sensor kit).
(2) For more information regarding the power configuration of digital instruments please refer to F.A.Q.#094 "Which are the available powering modes for SISGEO digital sensors?" on Sisgeo web site https://www.sisgeo.com/.
(3) Extensible up to 50 units using "50 incl sin" protocol, under certain conditions: all the sensors in the chain shall be same model of sensors, shall be tilt sensors (uniaxial or biaxial, triaxial sensors are not allowed), output measuring unit shall be sin(angle), powering mode shall be TIMED with warm-up time 3 seconds and address delay 3 seconds, sensors shall have continuous RS-485 addresses from 1 to X (with $X \leq 50$).
(4) Each LT-Inclibus can have 1, 2 or 4 gauges. Please take into consideration the number of gauges, not the number of 2m rods instrumented.

MAXIMUM NUMBER OF 360° INCLINOMETERS CONNECTED TO DIGITAL NODE

INSTRUMENT MODEL	PROTOCOL UTILIZED [1]	MAX. NUMBER OF GAUGES PER NODE	NEEDED EXT. POWER SUPPLY [2]	INSTRUMENTS' POWER CONFIGURATION [3]
360° digital tiltmeters, triaxial (model 0S543HD3600)	INCLI360_1-2-3 INCLI360_1-4 INCLI360_2-5 INCLI360_3-6 INCLI360_ACC	40 50 50 50 50	NO	from 1 to 20 gauges: ALWAYS-ON or TIMED from 21 to 50 [4] gauges: TIMED
360° digital LT-Inclibus, triaxial [5] (model 0LTIB103602, 0LTIB203602 and 0LTIB403602)	INCLI360_1-2-3 INCLI360_1-4 INCLI360_2-5 INCLI360_3-6 INCLI360_ACC	40 50 50 50 50	NO	from 1 to 20 gauges: ALWAYS-ON or TIMED from 21 to 50 [4] gauges: TIMED

(1) Various protocols are available for 360° triaxial sensors. For the most common applications, we recommend using the "INCLI360_1-2-3" protocol, which allows all three main channels of each instrument to be read.
The "INCLI360_ACC" protocol allows reading the three calibrated gravity accelerations gx, gy and gz.
To be able to use the other protocols "INCLI360_1-4" (reading channels 1 and 4), "INCLI360_2-5" (reading channels 2 and 5) and "INCLI360_3-6" (reading channels 3 and 6), check on the instrument's user manual if your application allows the use of these protocols.
(2) If the external power supply is needed, add to the order the accessories' codes 0AX10W003AH (solar panel kit) and 0OMX24V030W (digital sensor kit), or 0AXBCO22015 (mains power supply kit) and 0OMX24V030W (digital sensor kit).
(3) For more information regarding the power configuration of digital instruments please refer to F.A.Q.#094 "Which are the available powering modes for SISGEO digital sensors?" on Sisgeo web site https://www.sisgeo.com/.
(4) If the protocol used is "INCLI360_1-2-3," the maximum number of TIMED instruments readable with the digital node is 40.
(5) Each LT-Inclibus can have 1, 2 or 4 gauges. Please take into consideration the number of gauges, not the number of 2m rods instrumented.

POWERING ACCESSORIES

If a WR-LOG digital node is used to read a string of sensors that needs to be powered separately, a solar panel power kit or a kit with mains power should be provided.

SOLAR PANEL KIT 0AX10W003AH

It consists of a 10W solar panel (supplied without pole mount) with 10m cable and IP65 plastic box that houses a 2.3 Ah battery and charge controller. The box is ready for the digital sensor kit 0OMX24V030W (must be installed and supplied separately).

MAINS POWER SUPPLY KIT 0AXBCO22015

It consists of an AC/DC charger (Vin 85-265 Vac, 50-60 Hz, Vout 13.4 Vdc/0.9 A), and an IP65 plastic box that houses a 2.3 Ah battery. The box is ready for the digital sensor kit 0OMX24V030W (must be installed and supplied separately).

DIGITAL SENSOR KIT 0OMX24V030W

Consisting of a wiring board and a 30W 12V to 24V DC/DC converter. The digital instrument kit must be installed inside the box of either the 0AX10W003AH kit or the 0AXBCO22015 kit.

WIRELESS TILTMETER OLSWR03INC90

Node with embedded tri-axis tilt meter and temperature sensor for buildings and other civil structures monitoring. The inclinometer works with respect to gravity's direction.
Batteries are not included with the node and shall be ordered separatelly.

TECHNICAL SPECIFICATIONS

Sampling rate	30 seconds to 1 day
Time synchronization by radio	time discipline better than ±10 seconds
Power supply	from 1 to 2x C-size 3.6 V high power battery
INCLINOMETER SENSOR	
Technology	MEMS accelerometer
Axes	three (tri-axis)
Range	±90°
Accuracy (±2°)	±0.0025°
Accuracy (±4°)	±0.005°
Accuracy (±15°)	±0.013°
Accuracy (±45°)	±0.038°
Accuracy (±86°)	±0.060°
Resolution	0.0001°
Offse temperature dependancy	±0.002° / °C
Repeatability	<0.0003°
Stability @ 14 hours	<0.003°
Built-in temperature sensor resolution	0.1 °C
Built-in temperature sensor accuracy	±0.5 °C

PHYSICAL FEATURES

Box Dimensions (WxLxH)	100x100x61 mm
Overall Dimensions without antenna	150x120x61 mm
External Antenna	100 mm length (including connector)
Housing material	Aluminium alloy
Operating temperature	-40°C to +80°C
IP class	IP68 (2m max 2 hours)
Weight (without batteries and antenna)	0.6 kg
Vibration resistance	Do not subject the device to accelerations that exceed higher levels of accelerations than ±8g.

BATTERY LIFE ESTIMATION(1)

sampling 30 sec - 2 x batteries	4.8 months
sampling 5 min. - 2 x batteries	3 years
sampling 1 hour - 2 x batteries	9.5 years

(1) Based on mathematical models, considering South Europe environmental conditions, SF8. Extreme temperatures could cut-down the capacity by 20 to 40%. Check the battery specifications. USB not used.

WIRELESS TILTMETER & LASER DISTANCE GAUGE OLSWRLASEINC

Node with embedded tri-axis tiltmeter and laser distance gauge for measuring the relative distance between the gauge and another point (target or natural surface). The node include also a temperature gauge. Batteries are not included with the node and shall be ordered separatelly.

TECHNICAL SPECIFICATIONS

Sampling rate	30 seconds to 1 day	
Power supply	2x C-size 3.6 V high power battery	
LASER DISTANCE GAUGE		
Technology	Visible Laser Class II laser 655 nm	
Measuring range (considering favorable conditions)	from 0.05 m to 150 m	
Repeatability	0.15 mm	
Resolution	0.1 mm	
Accuracy:	favorable conditions (1)	unfavorable conditions (2)
distance 1 m	±1 mm	±2 mm
distance 10 m	±1 mm	±2 mm
distance 20 m	±1.5 mm	±3 mm
distance 50 m	±4 mm	±7 mm
distance 100 m	±9 mm	±15 mm
distance 150 m	±16 mm	not applicable
Built-in temperature sensor accuracy	±1 °C	
TILTMETER (3)		
Technology	tri-axis MEMS accelerometer	
Range	±90°	
Accuracy (±2°)	±0.0025°	
Accuracy (±86°)	±0.060°	
Resolution	0.0001°	
Offse temperature dependancy	0.002° / °C	
Repeatability	<0.0003°	
Stability @ 14 hours	<0.003°	

PHYSICAL FEATURES

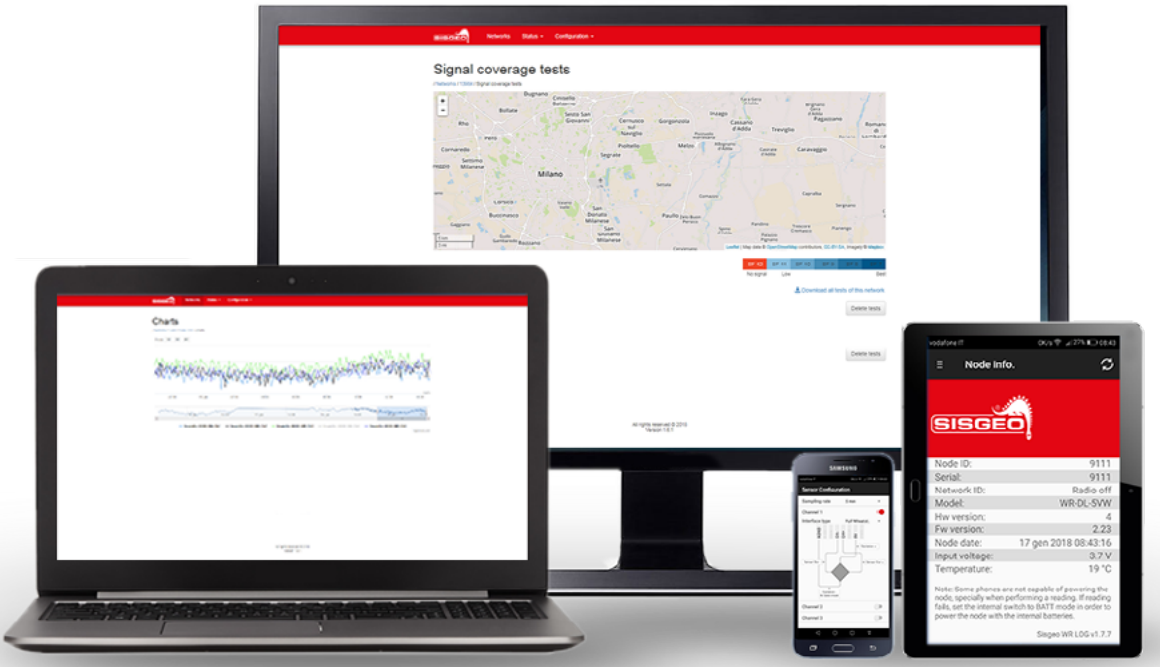
Box Dimensions (WxLxH)	100x100x61 mm
Overall Dimensions without antenna	150x120x61 mm
External Antenna	100 mm length (including connector)
Housing material	Aluminium alloy
Operating temperature	-10°C to +50°C
IP class	IP68 (2m max 2 hours)
Weight (without batteries and antenna)	0.85 kg

BATTERY LIFE ESTIMATION(4)

sampling 5 min, 2 x batteries	1.6 years
sampling 1 hour, 2 x batteries	9.1 years
sampling 6 hours, 2 x batteries	>10 years

(1) on natural objects (white wall, low target illumination <3K lx, moderate temperatures)
(2) on natural objects (white wall, high target illumination with 30K lx, full specified operating temperature range)
(3) for tiltmeter full specifications refer to "wireless tiltmeter" specifications
(4) based on mathematical models, considering South Europe environmental conditions, SF8, and measurements at maximum distance of 20m. Extreme temperatures could cut-down the capacity by 20 to 40%. Check the battery specifications. USB not used.

SOFTWARE SUITE



GATEWAY NETWORK AND ASSET MANAGEMENT SOFTWARE (ON BOARD WEB SERVER)

- Network communications configuration and control
- Wireless data unit and sensor attributes display
- Wireless data unit configuration
- Sensor data in near real time
- Conversion of raw sensor data in engineering units
- Manual and automatic data download in .csv
- Data transmitted in a secure manner
- Remote change of sensor's sampling rate
- Data accessible through Modbus TCP
- Able to push data on user FTP

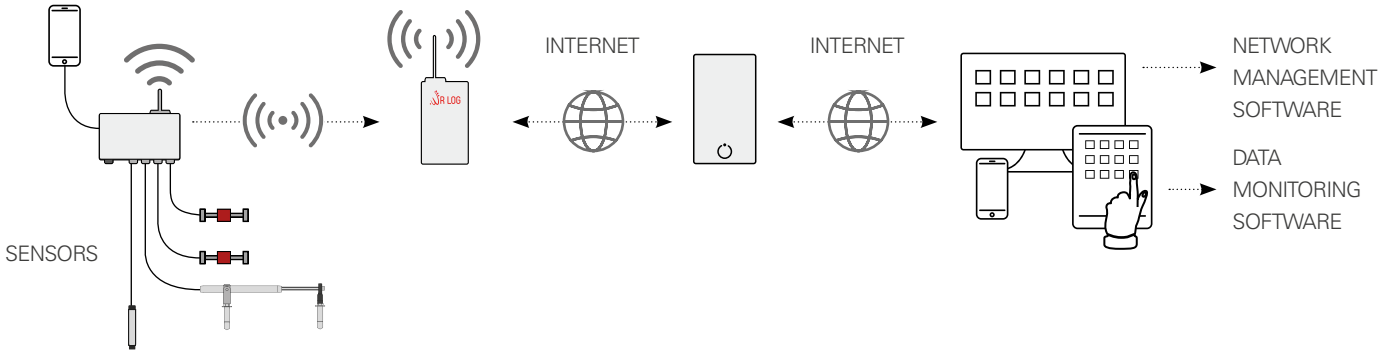
WR LOG CONFIGURATION APP FOR NODES

- Simple and fast connection to wireless node by USB-OTG cable
- Runs on most Android devices supporting standard OTG USB cable
- Easy sensor configuration: ID, sampling rate, frequency sweep, interface type, etc.
- Checks radio signal coverage
- Records coordinates (GPS)
- Downloads data from wireless node and sends by e-mail or saves it on the Android device
- Takes current reading
- Updates wireless node firmware

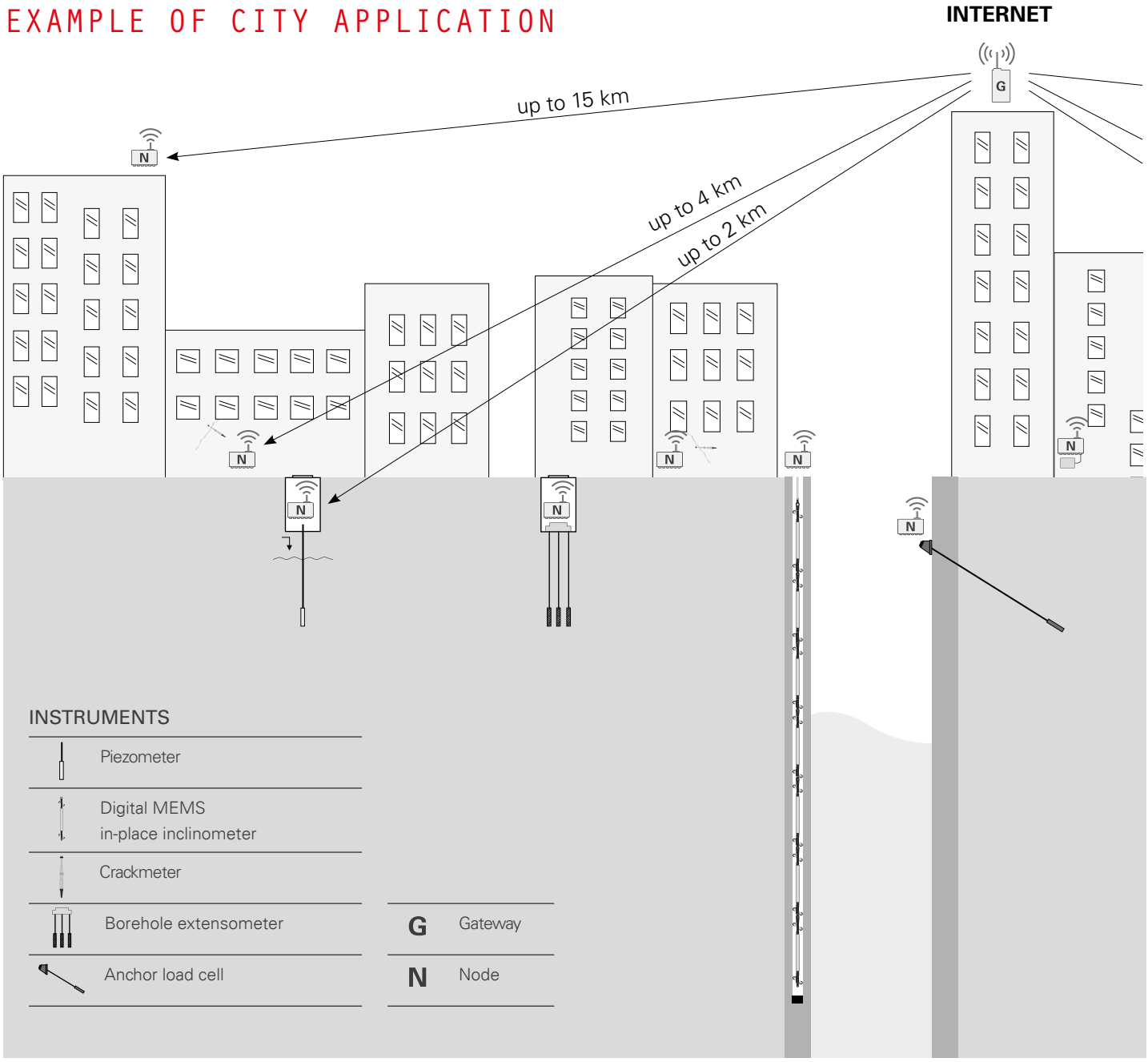
TYPICAL SYSTEM ARCHITECTURE

WIRELESS NODE CONFIGURATION

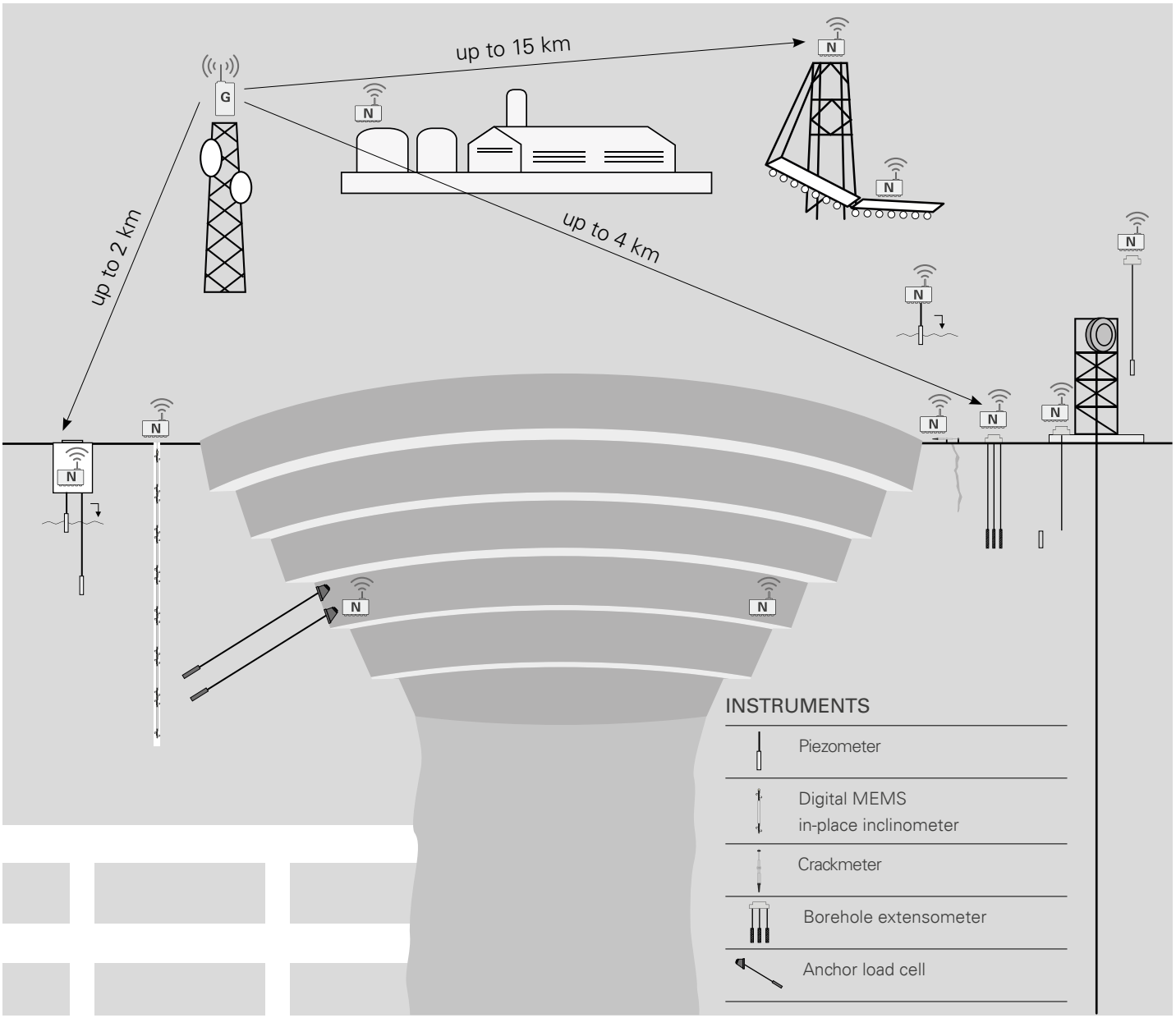
WIRELESS NODE | **GATEWAY** | **SERVER** | **USER'S DEVICE**



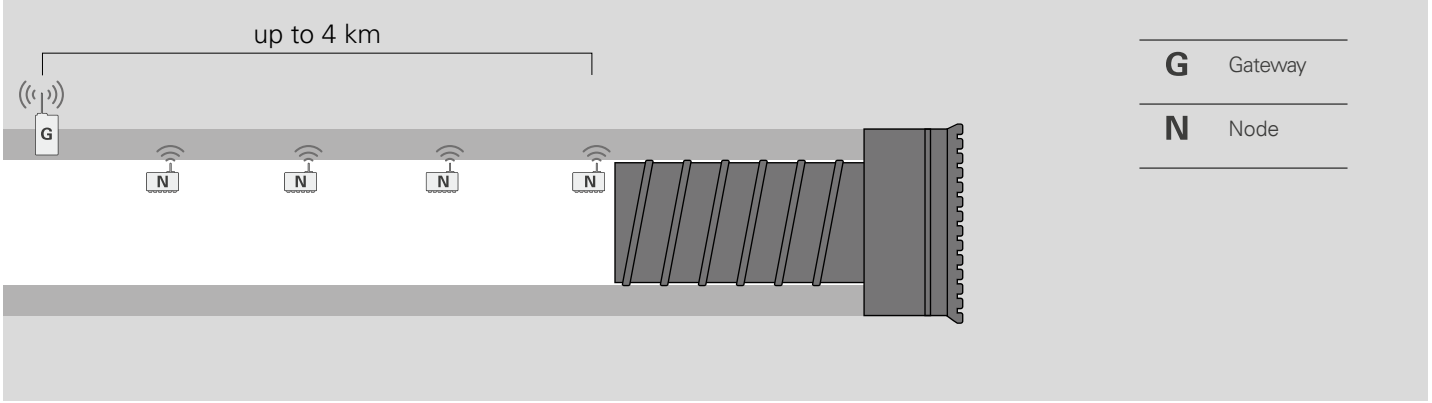
EXAMPLE OF CITY APPLICATION



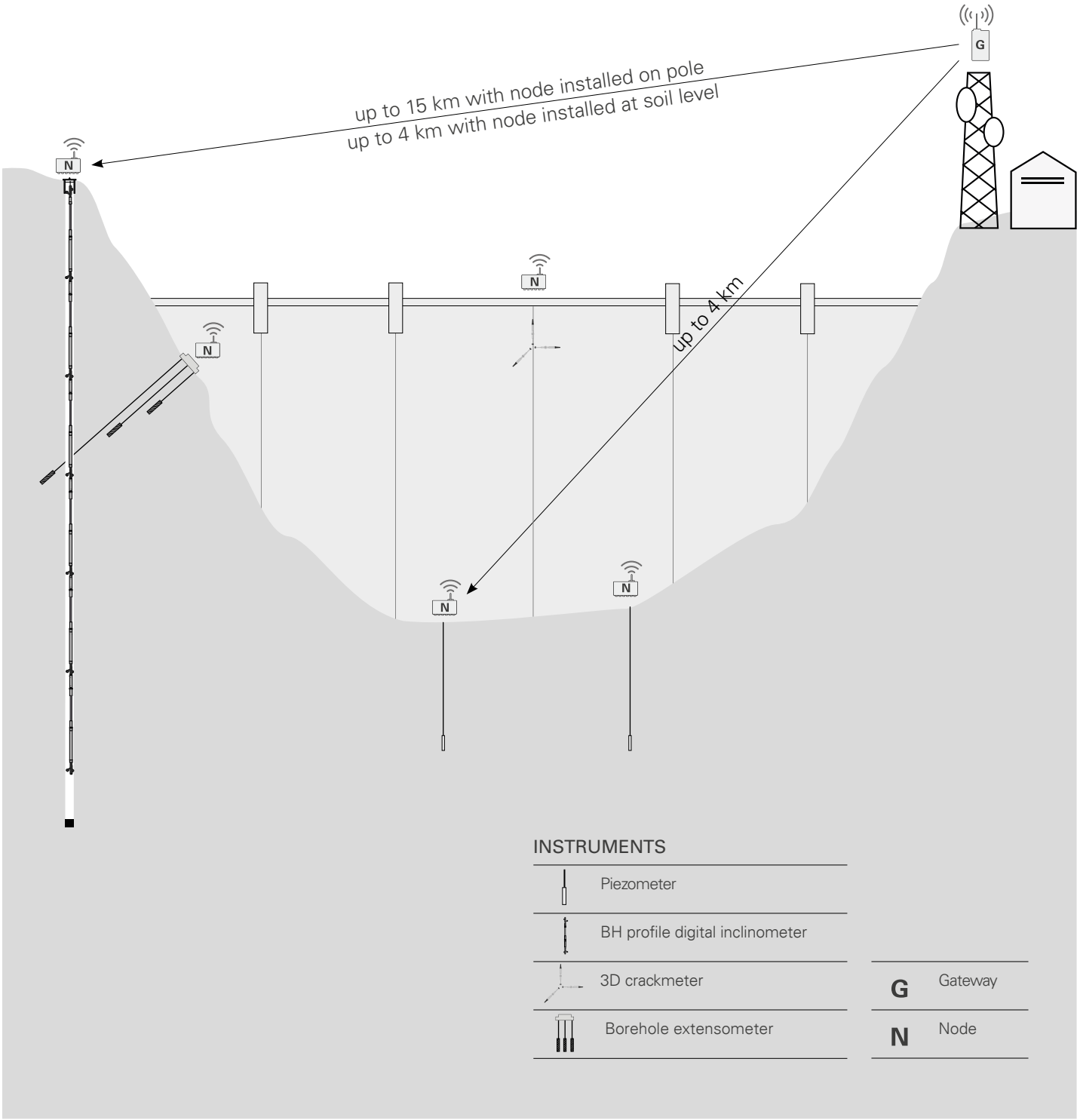
EXAMPLE OF MINES APPLICATION



EXAMPLE OF TUNNEL APPLICATION



EXAMPLE OF DAM APPLICATION



ACCESSORIES AND SPARE PARTS

C-SIZE BATTERY FOR NODES OLSWROBATTC

3.6 V lithium-thionyl chloride high power C-size spiral cell for nodes power supply.
Minimum pulse capability: 2000mA.
Minimum continuous current: 1000mA.
Minimum capacity: 6.0Ah.

POLE MOUNTING BRACKET FOR NODES OLSACPOLPL8

Plate for pole monting of nodes. It includes U-bolts and nuts for Ø 50 mm poles.

WALL MOUNTING BRACKETS FOR NODES OLSACCMWALL

Suitable for all nodes model, except for Mininode. Composed by 2 mounting Brackets, aluminium made.

WALL MOUNTING BRACKETS FOR MININODE OLSPLAMWALL

Suitable for Mininode only. Composed by 4 mounting Brackets, plastic made.

VERTICAL MOUNTING PLATE FOR WIRELESS TILTMETER OLSACCINCVPO

L shaped plate for wireless tiltmeter to be installed on vertical walls.
Overall dimensions: 120x102x50 mm, thikness 10 mm.

HORIZ. MOUNT. PLATE FOR WIRELESS TILTMETER OLSACCINCHPO

Plate for wireless tiltmeter to be installed on horizontal surface. Dimensions 130x102x5 mm.

POLE MOUNT. BRACKET FOR WIRELESS TILTMETER OLSACCINCPLO

Plate for pole monting of wireless tiltmeters. It includes U-bolts and nuts for Ø 50 mm poles.

VERT. MOUNT. PLATE FOR LASER DIST. GAUGE OLSACCLASVPO

Adjustable mounting plate for vertical surface. Anchor bolts not included.

GATEWAY LIGHTENING PROTECTION FOR ETHERNET OLSACCPRETH

Indoor Ethernet surge protection. Transient protection circuit based on high energy gas discharge tubes and a network of fast response silicon avalanche diodes (SAD).

GATEWAY LIGHTENING PROTECTION FOR ANTENNA OLSACCPRANT

RF coaxial surge protection on radio link. P8AX09-6G-N/MF series from CITEL.

SWIVEL MOUNT. PLATE FOR LASER DIST. GAUGE OLSACCLASSWI

Swivel mounting bracket. For a wall or a convergence bolt with 3/8". Anchor bolts not included.

SOLAR PANEL KIT FOR DIGITAL NODE OAX10W003AH

It is composed by a 10W solar panel with 10m cable and a plastic box housing the 2.3 Ah battery and charge controller. The IP67 box will house also the digital sensor kit (not included).

DIGITAL SENSOR KIT FOR DIGITAL NODE OOMX24V030W

Electronic boards for powering and wire 1 chain of digital instruments. To be used with solar power kit. For the maximum number of digital instrument of the chain please refer to the dedicated table.

SISGEO HEADQUARTER
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20060 Masate (MI) – Italy
Tel. +39-02.95.76.41.30
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STANLAY™ - SISGEO DISTRIBUTOR IN INDIA
Asian Contec Limited B-28, Okhla Industrial Area, Phase-1 New Delhi – 110020.
Tel. +91-11-41860000
sales@stanlay.com - www.stanlay.in

	OMNIALOG GT-2400	OMNIALOG GT-100D
Temperature drift	< 10 ppm / °C, range -30°C to +70°C	-
Input noise voltage	5,42 µVpp	-
Input limits	±12V	-
Sustained input voltage w/o damage	±50V DC max	-
DC common mode rejection	>105dB	-
Normal mode rejection	>90dB	-
Input impedance	20 MΩ typical	-

OUTPUT	
Digital output	One relay output (for alarm, etc.): volt-free closure (low voltage 30V, 2A)

DIGITAL INPUTS	
Measurement rate (MR)	Max frequency 1kHz
Accuracy	0.1 Hz

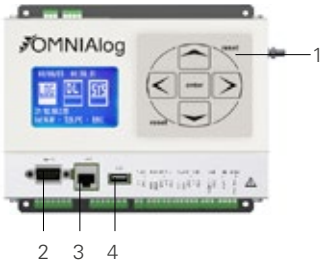
PROTECTIONS	**Electro-mechanical relays for each measuring channel:** Electrical endurance: min. $2x10^5$ operations, Mechanical endurance: $10x10^8$ operations. **Circuit protection: Gas Discharge Tubes (GDT):** DC Breakdown Voltage 75V (± 20%@100V/µs) Impulse Breakdown Voltage 250V (@100V/µs) typical Overvoltage and reverse polarity protection on power supply input. Short circuit protection on every outputs of sensor power supply.

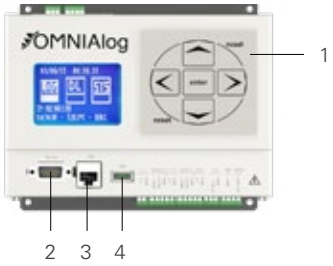
SYSTEM POWER REQUIREMENTS	
Voltage (external power supply)	10 to 30 V DC (reverse polarity protected), max 5 A
External rechargeable batteries	12V DC nominal
Typical current drain (@12Vdc, external power supply)	Sleep mode: 100 µA ON: 62 mA - ON with ethernet connected: 87 mA - ON with display ON: 115 mA ON with display ON and ethernet connected: 142 mA Analog initialisation: 115 mA Measurement: 123 mA (with 12 mA @ 24 V sensor consumption)

ENVIROMENTAL CONDITIONS	
Operating temperature	-30 to +70°C (display -20 to +70°C)
Storage temperature	-40 to +85°C (display -30 to +80°C)
Humidity	80%
Overvoltage category	II
Pollution degree	2
Sound levels	< 74dBA
Maximum height of use	3000m

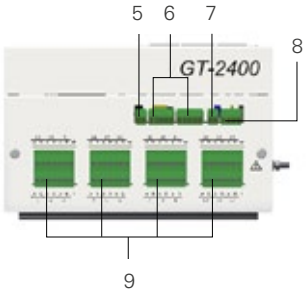
	OMNIALOG GT-2400	OMNIALOG GT-100D
SOFTWARE & FIRMWARE	Web server on board (independent OS platform). Live update (firmware and web pages). FTP client to sent data/alarms on a FTP server (SFTP not supported) MAIL to sent data/alarms to max 5 email address (SMTPS / SSL not supported) SMS to sent alarms to max 5 telephone numbers Data download (readings, logs) in .csv file (compatible with Microsoft Excel) Virtual channels management (max No.80 channels) Languages: Italian, English and French	
PHYSICAL CHARACTERISTICS		
Dimensions (L x W x H)	183 x 144 x 118 mm	183 x 144 x 76 mm
Weight	1500 grams	1000 grams
Material	Plastic and metal	Plastic and metal
Wiring	Removable connector	Removable connector

TOP VIEW

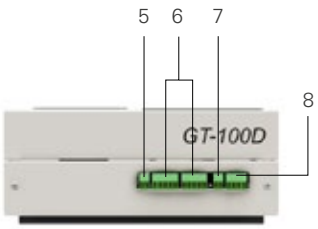




FRONT VIEW



OMNIALOG GT-2400



OMNIALOG GT-100D

1	Membrane keyboard	4	USB	7	"V" IN
2	RS-232	5	"V" OUT	8	PWR input
3	LAN	6	RS-485	9	Analogical inputs

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MIND
READOUT

READOUT UNITS
AND DATALOGGERS

MIND READOUT

Mind is a portable and compact multichannel readout unit able to read all Sisgeo instruments, both analogue and digital. It is compact, rugged, with IP65 protection class and it is supplied with a specially designed carrying bag. The BLE (Bluetooth Low Energy) wireless technology permits a fast and safe communication with Mind App, with a very low batteries' consumption.
Mind is fully managed by Mind App which is compatible with Android operating system and with iOS. Thanks to its App, Mind is a fast and light system for a quick and handy interface with the instruments, furthermore the data storage and sharing is made simpler and immediate.
Mind App is also useful to read and utilize the QRcode placed on every analog Sisgeo instrument, having the identification, calibration and reading information always available.
When configuring sensors on the MIND app, calibration parameters of analog gauges (e.g. vibrating wire) can be downloaded from the Internet by entering the serial number.

MAIN ADVANTAGES

- Long battery life: minimum 8 hours continuously
- Supplied with Calibration Report issued following high level metrologic procedures
- High accuracy and resolution
- Simultaneous display of electrical and engineering measures
- Real time charts
- Quick read for immediate readings without configuration
- Multiplexers reading
- One-touch reading of digital gauge arrays
- Geolocation and search engine for sites and sensors
- Display the plot of vibrating wire sensor signal's spectrum with peak value
- Embedded Digital Sensor Configuration (DSC) tool

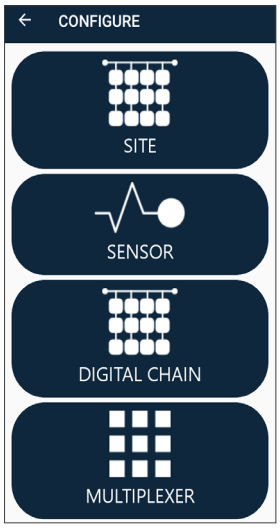
CE *Meet the essential requirements of RED Directive 2014/53/EU,*
Certified for extended environmental conditions: altitude up to 3000m

MIND APP

Thanks to its app, Mind is light system for a quick and handy interface with the instruments.
The data storage and sharing is made simpler and immediate.
Mind APP is also useful to read the QRcode placed on every analog Sisgeo instrument, having the identification, calibration and reading information always available.

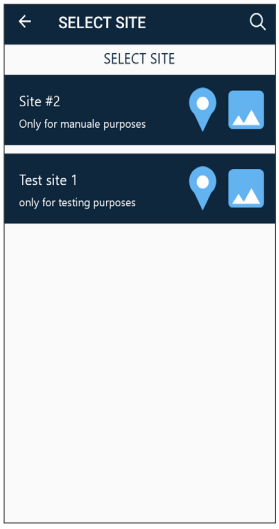
Minimum Device Specifications (device not supplied by SISGEO)	Bluetooth Low Energy BLE 4.2
	APPLE iOS 16 or higher
	Android OS 10 or higher

APP OVERVIEW

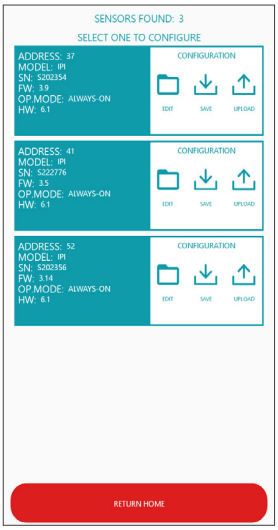


Instruments configuration main page.

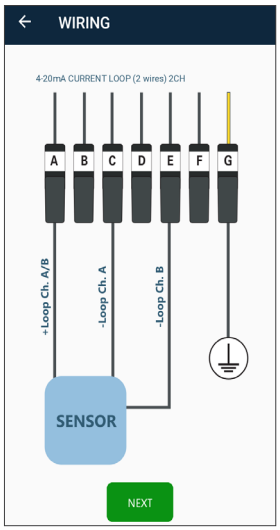
QR code scanner for automatic configuration of analog sensors.



List of site with selectable icons to have info of geographical positioning and related picture.

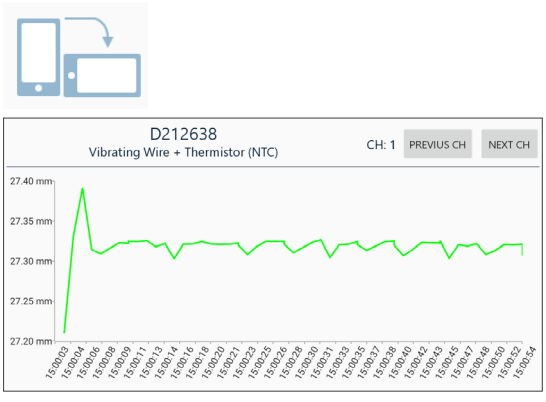


DSC (Digital Sensors Configuration) tool main page.



Guided clips wiring connection.

Instrument reading page with both biaxial 4-20mA current loop channels reading. The temperature measure is displayed scrolling down.



Graph of connected sensor's readings.
It is generated just turning the mobile device in horizontal position.

MIND READOUT PHYSICAL FEATURES

Material / Weight	Aluminum / 1 Kg
IP class[1]	IP65
Overall dimensions	205x128x45 mm
Operating temperature	-20 to +55°C (charging +5°C to +40°C)
Storage temperature [2]	-10 to +45°C for max 6 months, -20 to -10°C for max 1 month
Relative humidity	Operating: 60 ±25% RH Storage: 60 ±25% RH

(1) IP65 protection class is granted with closed connectors (i.e. with their own cap or with the cable connected) and with the on/off button not pressed.
(2) The periods indicated (6 months and 1 month) are the maximum time frames within which MIND must be recharged to not lose capacity and performance of its battery.

SISGEO COMPATIBLE INSTRUMENTS

Uniaxial 4-20mA current loop 2-wire gauges	Ratiometric 6-wire gauges	Vibrating wire gauges
Biaxial 4-20 mA current loop 2-wire gauges	RTD PT-100 temperature gauges	Vibrating wire + NTC Thermistor gauges
Biaxial 4-20 mA current loop 2-wire gauges + Thermistor	NTC Thermistor temperature gauges	Digital gauges or arrays with RS-485 Modbus RTU

OTHER COMPATIBLE SENSORS

Uniaxial and biaxial 4-20mA transmitters, 3-wire and 4-wire gauges	Carlson instruments 4-wire gauges	Uniaxial and biaxial servo-inclinometer gauges
Uniaxial and biaxial 4-20mA transmitters, 3-wire gauges + Thermistor	Carlson thermometers 3-wire gauges	RTD PT-100 temperature gauges 3-wire gauges
Ratiometric 4-wire gauge	Uniaxial and biaxial voltage gauges	Vibrating wire double coils gauges
Resistive strain gauge 1/2 bridge and 1/4 bridge	Uniaxial and biaxial potentiometers	

TECHNICAL SPECIFICATIONS(1)

A - ANALOG INPUTS

Number of channels	3
Analog-to-Digital Conversion (ADC)	Resolution: 24bit, sampling rate: 2.5 Hz per channel with 50/60 Hz mains frequency rejection, Modulation method sigma-delta
Input impedance	>10 kΩ

A.1 - MEASUREMENT TYPES

A.1.1 - 4-20mA current loop (2 wires)	
Range | Resolution | Accuracy	0-24 mA | 1 µA at range 20 mA | 6.0 µA
Internal shunt resistor	100 Ω
Power supply (up to 100 mA)	24V DC, 12V DC, external (selectable by the software)
Temperature drift	< 10 ppm / °C, range -30°C to +70°
A.1.2 - Wheatstone full bridge (6 wires, with sensing)	
Range | resolution | accuracy	±15mV/V | 0.001 mV/V | 0.005mV/V
Power supply (up to 80 mA)	5 Vdc, external
Max and min bridge resistance	Max 10 kΩ - min 200 Ω
Temperature drift	< 10 ppm / °C, range -30°C to +70°C
A.1.3 - Platinum RTD (Pt100) 4-wire	
Range | resolution | accuracy	-150°C to +150°C | 0.1°C | 0.3 °C
Power supply	1 mA
Temperature drift	< 10 ppm / °C, range -30°C to +70°C
A.1.4 - Thermistor (NTC 3 kΩ @ 25 °C)	
Range | resolution | accurcy	-50°C to +150°C | 0.1°C | 0.2°C
Power supply	2-100 uA
Temperature drift	< 10 ppm / °C from 0 to 150 °C | < 20 ppm / °C from 0 to -30 °C | < 100 ppm/°C from -30°C to -50 °C;
A.1.5 - Vibrating Wire sensors	
Range | accuracy	300 to 6000 Hz | 0.0033% FS
Excitation sine wave signal	Up to 12 Vpp (selectable by the software)
Resolution	0.01Hz at range 300÷1000Hz 0.02Hz at range 1000÷3000Hz 0.1Hz at range 3000÷6000Hz
Temperature drift	<10ppm/°C (-30°C to +70°C)

(1) The information and data in the "Technical specifications" table refer to tests performed with a calibrated control unit in an environment with controlled temperature and humidity, and using signal generators with cables shorter than 5 m.

B - DIGITAL RS485 INPUTS

Max number of gauge per array	according to the consumption of each type of sensor and if configured in Always-on mode or in Timed mode
Interface and Protocol	RS485, MODBUS RTU
Power supply (up to 500 mA)	up to 24 V DC

C - COMMUNICATION WITH DEVICE

BLE (Bluetooth Low Energy) 5.2	band: 2.4 GHz ISM Band (2402-2480 MHz) - power: 4dBm Max
Led	Different colors for local notifications

D - ON-BOARD DIAGNOSTIC SENSORS

D.1 - INTERNAL TEMPERATURE	Range: -40°C to +125°C | Resolution: 0.1°C | Accuracy:±1°C (-10°C to +85°C)
D.2 - INTERNAL HUMIDITY	Range: 0 to 100%RH | Resolution: 0.1% RH | Accuracy:±5% (0 to 95%RH)
D.3 - BATTERY VOLTAGE MONITOR	Range: 0 to 18 V | Resolution: 0.1 V | Accuracy:±5% FS

E - BATTERIES

Battery type - Voltage and capacity	Li-Ion rechargeable batteries - 7.4V - 2.6Ah
Operating time with Li-Ion batteries	min. 8h (constant use, 24 Vdc @ 20 mA x 2 @ 25 °C)
Charging temperature range	0°C to +45°C

F - BATTERY CHARGER

Input voltage	50-60 Hz 90-264 Vac
IP Class and temperature range	IP41 (for internal use only), Operating: -25°C to +40 °C
Max output power	10 W

G - OTHER COMPATIBLE SENSORS[2]

G.1 - 4-20mA transmitters (3-4 wires)	
Range | Resolution | Accuracy	0-24 mA | 1 µA | 6.0 µA
G.2 - Voltage 4 wires, differential	
Range | Resolution | Accuracy	±12V | 1 mV | 4 mV
G.3 - Servo inclinometers	
Range | resolution | accuracy	±10V | 1 mV | 2 mV
G.4 - 1/2 Wheats. bridge (5 wires, with sensing)	
Range | resolution | accuracy	±15 mV/V | 0.005 mV\V | 0.05 mV/V
G.5 - 1/4 Wheats. bridge (3 wires, w/o sensing)	
Range | resolution | accuracy	±15 mV/V | 0.005 mV/V | 0.05 mV/V

G.6 - Potentiometers	
Range | resolution | accuracy	5V | 1 mV at range ±5 V | 1 mV at range ±5 V

G.7 - Wheatstone full bridge (4 wires, without sensing)	
Range | resolution | accuracy	±15 mV/V | 0.001 mV\V | 0.005 mV/V

G.8 - Carlson instruments (4 wires)	
Range | resolution | accuracy	±10% (ratio) | 0.01% (ratio) | 0.1% (ratio)

G.9 - Carlson thermometer (3 wires)	
Range | resolution | accuracy	±150 °C | 0.1°C | ±1 °C

G.10 - PT-100 (Platinum RTD) (3 wires)	
Range | resolution | accuracy	±150 °C | 0.1°C | ±1 °C

G.11 - Vibrating wire double coils (4 wires)	
Range | accuracy	300 to 6000 Hz | 0.0033% FS
Excitation sine wave signal	Up to 12 Vpp (selectable by the software)
Resolution	0.01Hz at range 300÷1000Hz 0.02Hz at range 1000÷3000Hz 0.1Hz at range 3000÷6000Hz
Temperature drift	<10ppm/°C (-30°C to +70°C)

ACCESSORIES AND SPARE PARTS

JUMPER CABLE OECAV08V2J0

Jumper cable for MIND connection to an instrument supplied with military connector.

SWITCH BOX JUMPER CABLE OECAV08V2S0

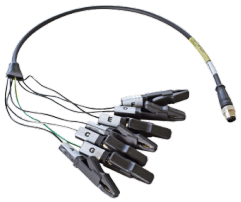
Jumper cable for MIND connection to a switch terminal box.

MUX BOX-MIND JUMPER CABLE OECAVMINDMU

Jumper cable for direct connection from MIND to multiplexer boxes. NOTE: only new MUX BOX with M12 connector can be read with MIND. Old MUX-BOX with MIL connector which could be read with New Leonardo cannot be read with MIND.

7-CLIPS SENSOR CABLE (SPARE) OECAV8P6A00

Jumper cable with 7 alligator clips for instrument reading on signal cable wires.



DIGITAL GAUGE JUMPER CABLE (SPARE) OECAV8PDIG0

Jumper cable for MIND connection to digital gauges.

MIND CARRYING BAG (SPARE) OMIND1BAG00

Specially designed carrying bag for MIND readout. It includes shoulder belt.

BATTERY CHARGER (SPARE) OECABMIND00

Charger for Li-Ion batteries.
Input voltage 90-264 Vac, 50-60 Hz IP rate IP41
Max output power 10 W

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