WR_LOG

WR LOG

WIRELESS MONITORING SYSTEM

READOUT UNITS
AND DATALOGGERS

SISGEO

WR_LOG_EN_07_10/2020

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

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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) - ±48VDC 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 Front Mounting kit	Aluminum Polycarbonate Stainless steel
Operating temp. range	-40°C to +60°C

LONG RANGE RADIO MAX DISTANCE COVERED(3)

Open field	15 Km (10 Km for MINI NODE)
City street	4 Km (2 Km for MINI NODE)
Manhole in a city street	2 Km (1 Km for MINI NODE)
Tunnel	4 Km (2 Km for MINI NODE)

(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.
(3) Data valid with external antenna. The distances have been tested and have been accomplished in several actual real projects scenarios. However, radio range depends on the specific environment conditions so these distances are only indicative.

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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
Operating temperature	-40°C to +80°C

BATTERY LIFE ESTIMATION(1)

1 CH, sampling 5 min, 1 x battery	1 year
1 CH, sampling 30 min, 1 x battery	4 years
5 CH, sampling 5 min, 4 x batteries	2 years
5 CH, sampling 30 min, 4 x batteries	7 years

(1) considering laboratory condition. 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
4-20mA output accuracy (0 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

BATTERY LIFE ESTIMATION(2)

	Current @ 12 V @ 24 mA	Current @24 V @24 mA	Voltage @ 12 V @ 24 mA	Full Wheatstone bridge @ 5 V @ 350 Ω	Potentiometer @ 5 V @ 1 kΩ
Warm-up time	1 seconds	1 seconds	1 seconds	-	-
1 channel, sampling 5 minutes	6.2 months	4 months	4.7 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	3.4 months	1.4 months	2 months	3.8 months	5.2 months
4 channels, sampling 6 hours	>10 years	6.4 years	8.1 years	>10 years	>10 years

(2) Estimations with 4 batteries, considering laboratory conditions. Extreme temperatures could cut-down the capacity by 20 to 40%. Check the battery specifications. USB not used.

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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
Pulse voltage	internal pull up to 2.7 V DC
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)	120x80x66 mm
Housing material	Polycarbonate
IP class	IP67
Operating temperature	-40°C to +80°C
Antenna	Internal antenna

BATTERY LIFE ESTIMATION(3)

	1 x battery	2 x batteries
sampling 5 minutes	1 year	2 years
sampling 1 hour	5.1 years	10 years
sampling 6 hours	6.9 years	>10 years

(3) Considering 1x300 Ω strain gauge + 1x3000 Ω thermistor in laboratory conditions. Extreme temperatures could cut-down the capacity by 20 to 40%. Check the battery specifications. USB not used.

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DIGITAL NODE
PRODUCT CODE OLSWRDIG000

Digital node can manage 1 chain of Sisgeo digital instruments such as BH-profile in-place inclinometers, 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, please refer to the related table.
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	12 VDC (up to 120 mA)
Sampling rate	30 seconds to 1 day
Time synchronization by radio	time discipline better than ±10 seconds
Power supply	4 x C-size 3.6 V high power battery

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

INTERNAL BATTERY LIFE ESTIMATION(1)

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)

(1) 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 INSTRUMENTS PER NODE	NEEDED EXTERNAL POWER SUPPLY (1)	NEEDED INSTRUMENTS' POWER CONFIGURATION (2)
Digital BH-Profile IPIs (model S430HD)	up to 30 gauges	NO	from 1 to 15 gauges: ALWAYS-ON or TIMED from 16 to 30 gauges: TIMED
Digital IPIs (Model S410HD)	up to 30 gauges	NO	from 1 to 15 gauges: ALWAYS-ON or TIMED from 16 to 30 gauges: TIMED
Digital Tiltmeters (Model S540HD)	up to 30 gauges	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	NO	from 1 to 15 gauges: ALWAYS-ON or TIMED from 16 to 30 gauges: TIMED
Digital DEX gauges (Model DEX350000D)	up to 18 gauges	YES	from 1 to 18 gauges: TIMED
Digital DEX-S gauges (Model 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) *Coming soon*	up to 30 gauges	NO	from 1 to 15 gauges: ALWAYS-ON or TIMED from 16 to 30 gauges: TIMED
Digitlized electrical MPBX or MEXID extens. up to 2 anchor points (Model D222 + DTE1A or Model D2MX00A)	up to 30 extensometers	NO	from 1 to 15 extensometers: ALWAYS-ON or TIMED from 16 to 30 extensom: TIMED
Digitlized electrical MPBX or MEXID extens. 3 anchor points (Model D222 + DTE1A or Model D2MX00A)	up to 18 extensometers	NO	from 1 to 15 extensometers: ALWAYS-ON or TIMED from 16 to 18 extensom: TIMED
Digitlized electrical MPBX or MEXID extens. up to 6 anchor points (Model D222 + DTE1A or Model D2MX00A)	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/.

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WIRELESS TILTMETER OLSWRO2INC15

Node with embedded biaxial tilt meter and temperature sensor for buildings and other civil structures monitoring. The inclinometer works with the box installed horizontally.
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 inclinometer
Axes	Two (biaxial)
Range	±15° Calibration Report issued limiting the range to ±9°
Accuracy (±5°)	±0.01 % FS (0.003°)
Accuracy (±15°)	±0.04 % FS (0.010°)
Digital output resolution	0.0001°
Temperature dependancy	0.002° / °C
Repeatability	0.0002°
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	IP67

BATTERY LIFE ESTIMATION(1)

sampling 5 min, 2 x batteries	1.2 years
sampling 1 hour, 2 x batteries	5.8 years
sampling 6 hours, 2 x batteries	8.3 years

(1) considering South Europe environmental condition

WIRELESS LASER DISTANCE GAUGE OLSWRLASER15

Node with embedded 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	
Memory	200000 readings	
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	

(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)

PHYSICAL FEATURES

Box Dimensions (WxLxH)	100x100x61 mm
Overall Dimensions without antenna	150x100x61 mm
External Antenna	100 mm length (including connector)
Housing material	Aluminium alloy
Operating temperature	-10°C to +50°C
IP class	IP67

BATTERY LIFE ESTIMATION[3]

sampling 5 min, 2 x batteries	1.5 years
sampling 1 hour, 2 x batteries	6.4 years
sampling 6 hours, 2 x batteries	8.5 years

(3) considering South Europe environmental condition and measurements at maximum distance of 20m

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SOFTWARE SUITE

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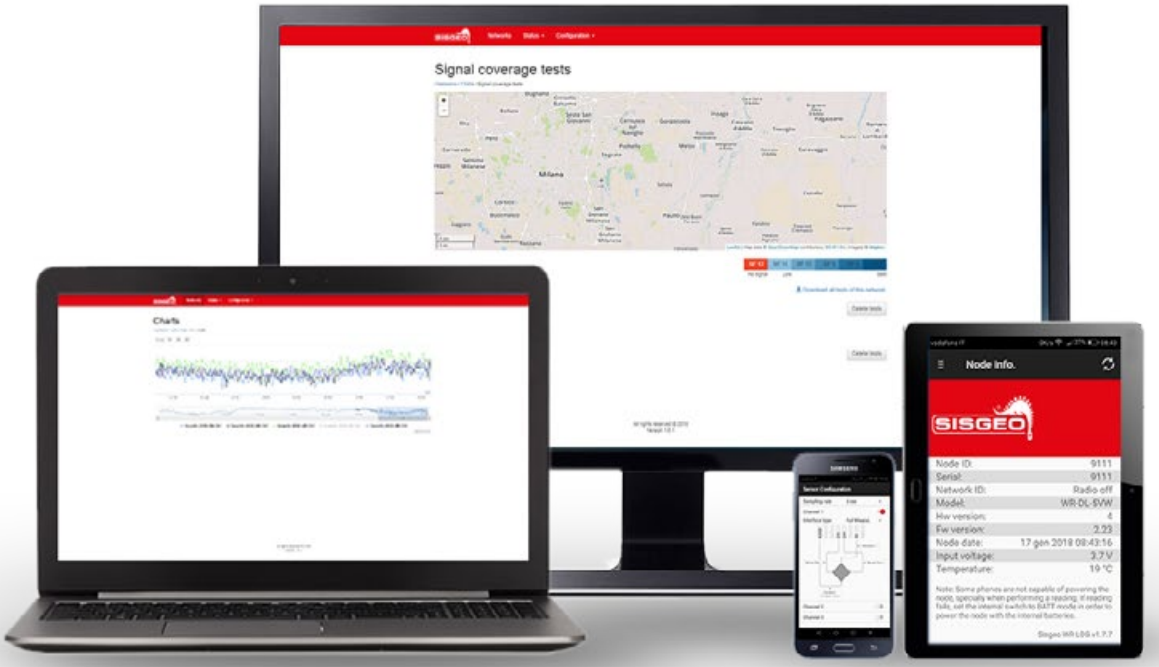

GATEWAY NETWORK AND ASSET MANAGEMENT SOFTWARE (ON BOARD WEB SERVER)

- 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

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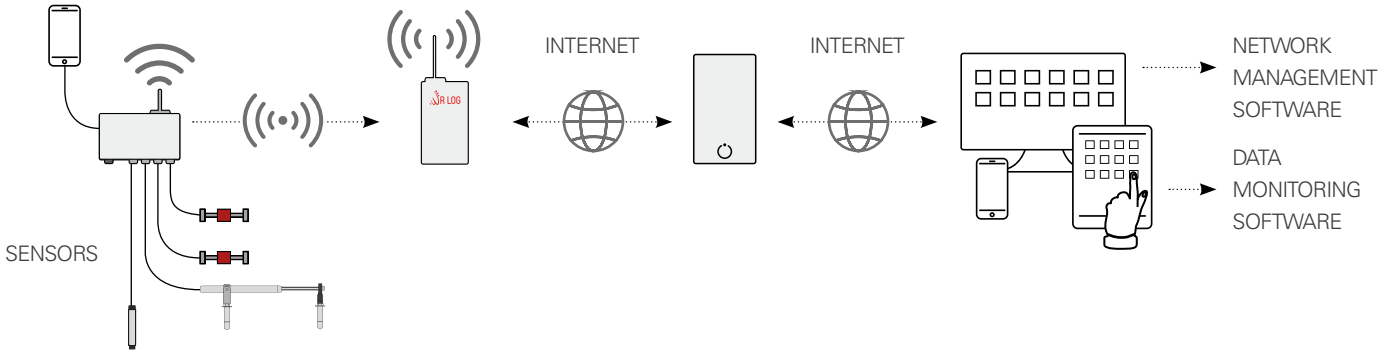
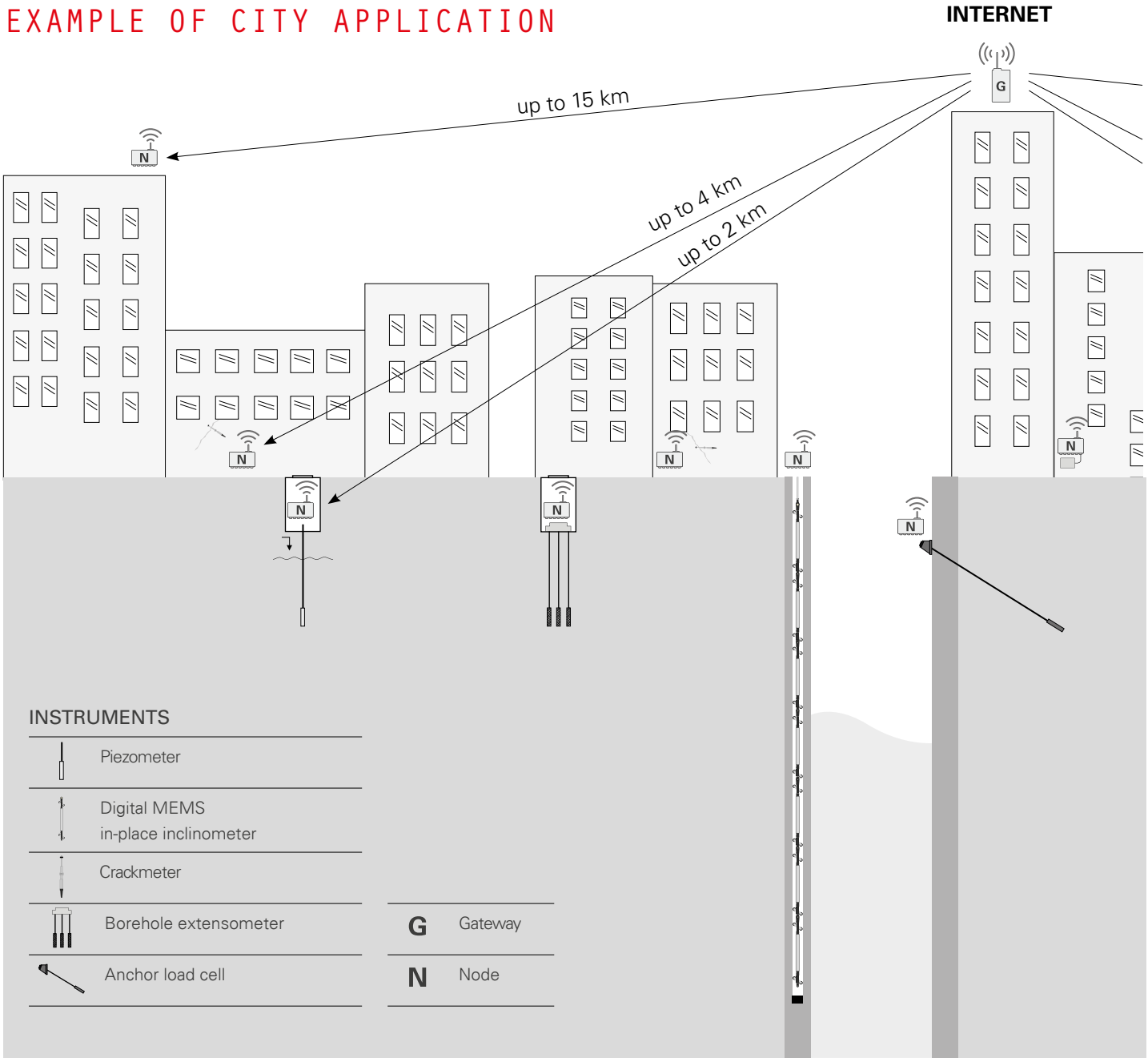
TYPICAL SYSTEM ARCHITECTURE

WIRELESS NODE CONFIGURATION

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



EXAMPLE OF CITY APPLICATION



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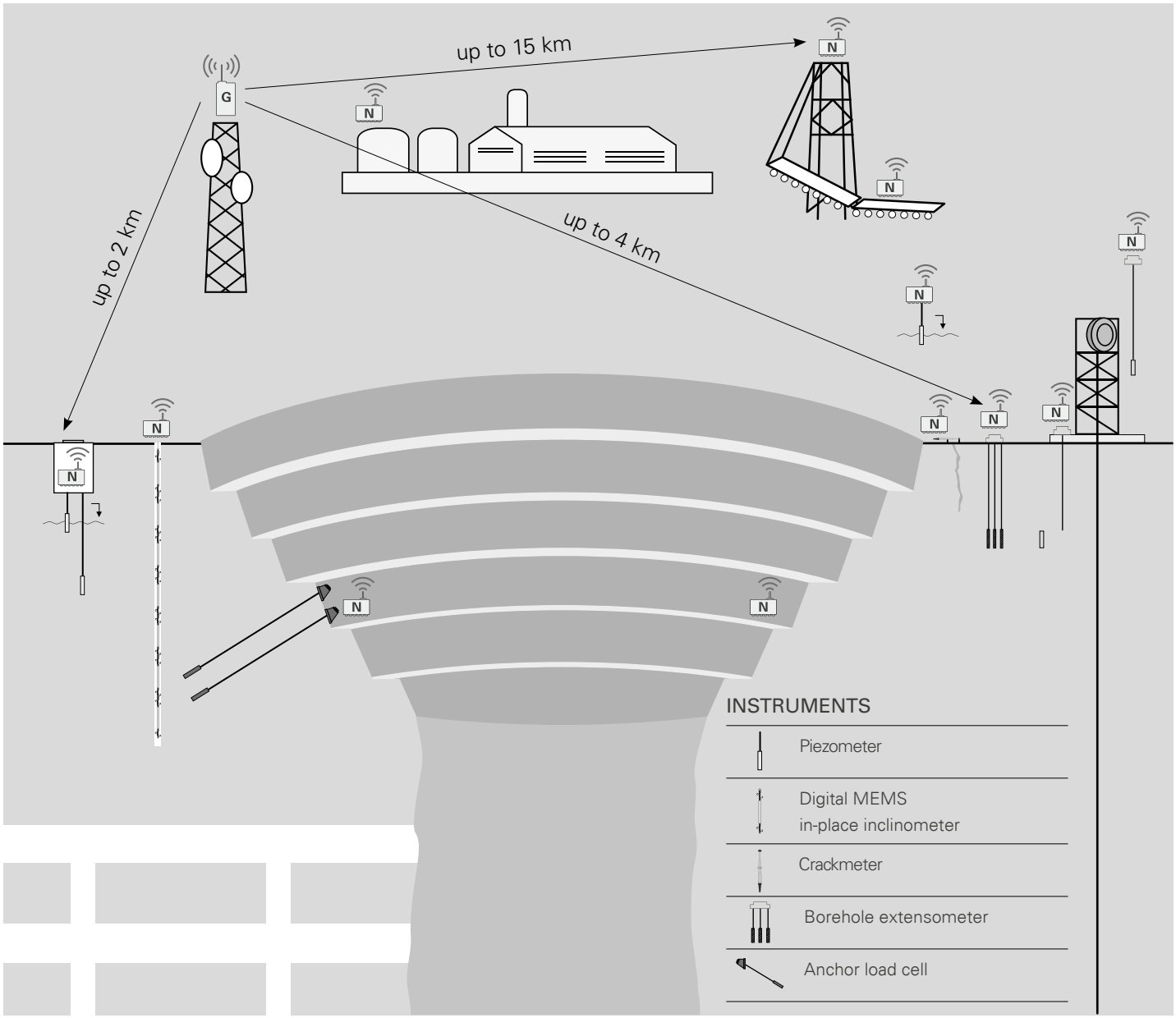
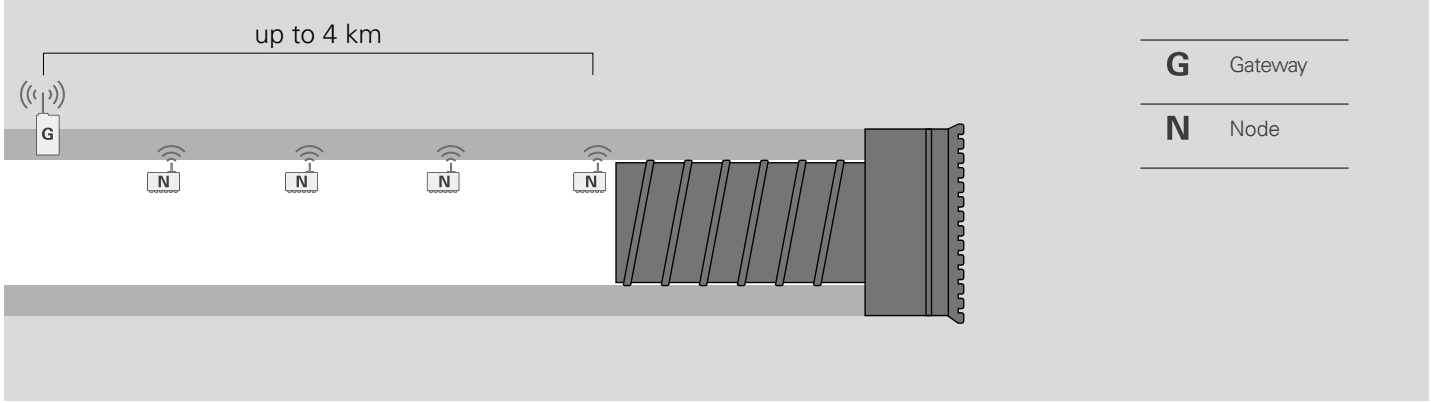
EXAMPLE OF MINES APPLICATION



EXAMPLE OF TUNNEL APPLICATION



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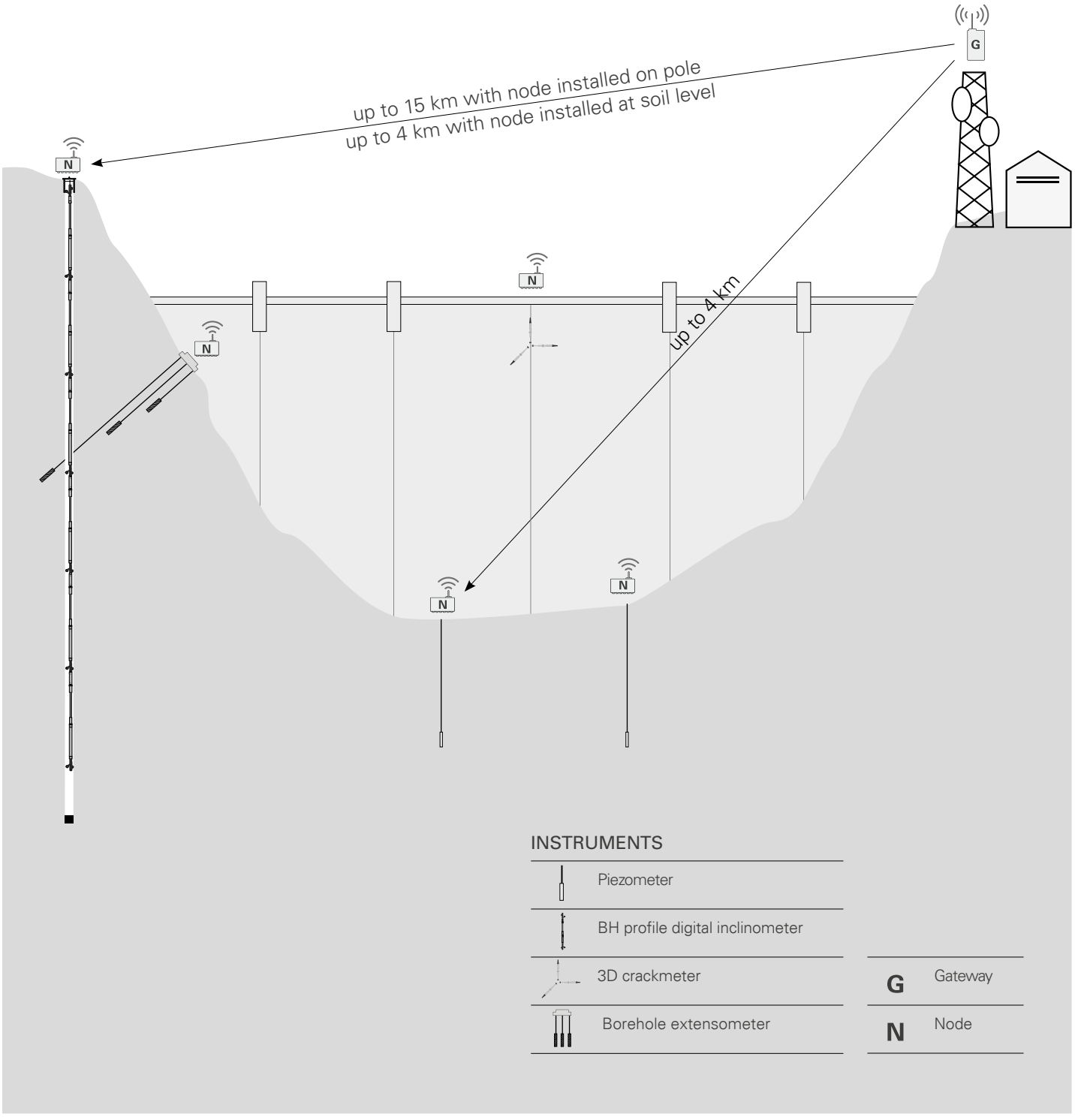
EXAMPLEM OF DAM APPLICATION



INSTRUMENTS

- Piezometer
- BH profile digital inclinometer
- 3D crackmeter
- Borehole extensometer

G	Gateway
N	Node

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 OLSACCPOL50

Plate for pole monting of digital, analog and vibrating wire 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 0AX10W003AH

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

00MX24V030W

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.

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TECHNICAL ASSISTANCE

SISGEO offers customers e-mail and phone assistance to ensure proper use of instruments and readout and to maximize performance of the system.

For more information, email us: ***assistance@sisgeo.com***