VW PIEZO

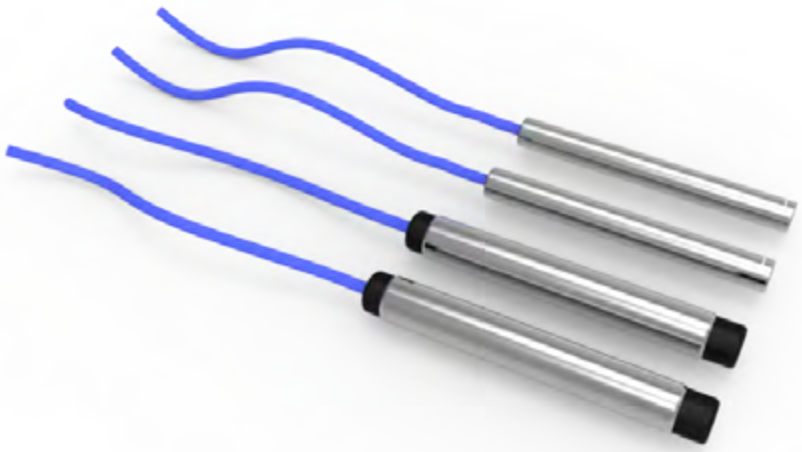
STANLAY™

VIBRATING WIRE

PIEZOMETERS

PIEZOMETERS

SISGEO®



VIBRATING WIRE
PIEZOMETERS

Vibrating wire piezometers are designed to measure pore water pressure in soils across various geotechnical monitoring applications. They are commonly installed in sealed boreholes but can also be embedded in fills or embankments, or suspended within wells or standpipe piezometers.

Typical applications include assessing slope stability, monitoring dewatering and drainage systems, evaluating overpressure in silt and clay soils, measuring permeability and hydraulic gradients in dams, and tracking groundwater levels. Additionally, they are suitable for monitoring uplift pressures in gravity dams.

APPLICATIONS

- Dams and fill embankments
- Measurement of ground water
- Dewatering activities
- Landslides monitoring
- Natural or cut slope sites
- Monitoring of up-lift pressure

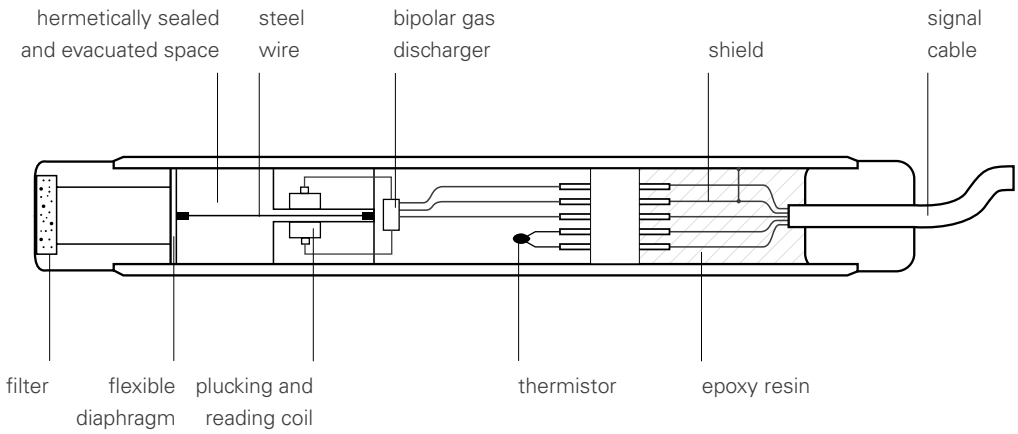
FEATURES

- Long-term stability
- Cable length does not affect reading
- Long working life and reliability
- Built-in surge protection (overvoltage)
- Built-in temperature sensor
- Hermetically sealed

CE *Conforme aux exigences essentielles de la Directive CEM 2014/30/UE*

WORKING PRINCIPLE

The vibrating wire pressure sensor consists of a steel wire held in tension between a flexible outer diaphragm and a rigid inner bulkhead. The sensor is designed so that water pressure acting on the diaphragm alters the tension in the wire. As the pressure increases, the wire's tension decreases, and vice versa.The wire's tension is measured by inducing vibrations using a series of electromagnetic pulses generated by a coil. Once the excitation stops, the wire vibrates at its natural resonant frequency. This vibration induces a sinusoidal signal in the coil, which is transmitted to the readout unit. The sensor features a built-in bipolar gas discharge tube for protection against voltage transients. Additionally, it includes an integrated thermistor to provide temperature readings, enabling thermal corrections.



FILTER UNITS

VW piezometers are equipped with a filter tip designed to prevent soil particles from entering the chamber in front of the diaphragm. The filter's pores allow water to pass through while blocking soil particles.
This standard filter, commonly used in most piezometers, is referred to as an LAE (Low Air Entry) filter, distinguishing it from an HAE (High Air Entry) filter.
In some environments, the gas pressure in the soil exceeds the water pressure, potentially impacting the accuracy of water pressure measurements. In such cases, a filter with very small pores is required. When saturated, the surface tension at the pores prevents air from entering while still allowing water to pass through. Air can only penetrate under very high pressure, which is why this type of filter is called an HAE filter.
Both LAE and HAE filters must be fully saturated. For the LAE filter, this involves ensuring that no air bubbles remain in the chamber in front of the diaphragm, as such bubbles can slow the piezometer's response time. For the HAE filter, saturation is essential to create the surface tension effect. A specialized saturation device is available for this purpose.
In general, LAE (standard) filters are suitable for most applications. However, HAE filters should be considered for use in unsaturated soils where gas pressure could influence pore water pressure readings.

Saturation of HAE filter with saturation device

TECHNICAL SPECIFICATIONS

	STANDARD PIEZOMETERS		HD PIEZOMETERS AND PRESSURE TRANSDUCERS		
APPLICATION	Suitable for most geotechnical applications. Small diameter is convenient for installation in boreholes, standpipes, and observations wells.		Heavy Duty HD piezo are recommended for installation in fills and dam embankments and usually supplied with armored cable for good survivability during construction.		3-port pipe union with M10x1 threaded head
MODEL	**PK20S**	**PK20A**	**PK45S**	**PK45A**	**PK45H**
Description	Standard piezo with LAE filter	Standard piezo with HAE filter	HD piezo with LAE filter	HD piezo with HAE filter	pressure transducer
Ranges (Full scales)	0-170 kPa up to 0-5.0 MPa 0-25 psi up to 0-725 psi		0-170 kPa up to 0-5.0 MPa 0-25 psi up to 0-725 psi		0-350 kPa up to 0-30 MPa 0-50 psi up to 0-4350 psi
Overload	2 x Full Scale		2 x Full Scale		
Sensitivity	0.025% FS		0.025% FS		
Accuracy [1] Lin. MPE Pol. MPE	< ±0.4% FS < ±0.25% FS (< ±0.1% FS on request, leaving out 170 kPa FS)		< ±0.4% FS < ±0.25% FS (< ±0.1% FS on request, leaving out 170 kPa FS)		
Typical frequency range [2]	2250 - 3000 Hz		2250 - 3000 Hz		
Thermic zero shift	0.01÷0.03 % FS /°C		0.01÷0.03 % FS /°C		
Electric insulation	> 50 MΩ		> 50 MΩ		
Temp. operating range	-20 to +80 °C		-20 to +80 °C		
Temperature sensor	built-in thermistor		built-in thermistor		
Material	stainless steel		stainless steel		
IP rate	IP68 up to sensor full scale		IP68 up to sensor full scale		
Diameter and weight	Ø 20 mm (0.8"), 0.4 kg (0.9 lb)		Ø 27 mm (1.1"), 0.5 kg (1.1 lb)		
FILTER UNIT					
Type	LAE filter	HAE filter	LAE filter	HAE filter	-
Material	stainless steel or Vyon®	ceramic	stainless steel or Vyon®	ceramic	-
Pore size	40-50 µm	0.25 µm	40-50 µm	0.25 µm	-
CABLE					
Signal cable	0WE104K00ZH (standard LSZH cable) 0WE104K00PV (standard PVC cable)		0WE104X20ZH (armoured LSZH cable) 0WE104X20PV (armoured PVC cable) 0WE104K00ZH (standard LSZH cable) 0WE104K00PV (standard PVC cable)		
Max cable length to logger [3]	1000 m (for more information see FAQ#77)		1000 m (for more information see FAQ#77)		

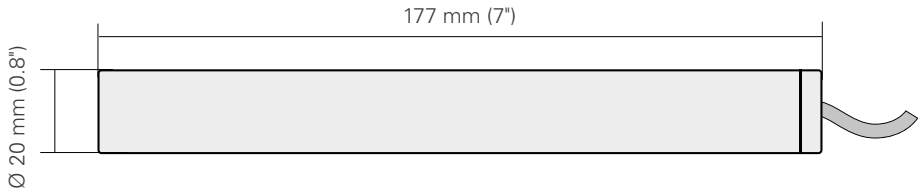
(1) MPE is the Maximum Permitted Error on the measuring range (FSR). In the Calibration Report, the accuracies of the gauge are calculated using both linear regression (≤ Lin. MPE) and polynomial correction (≤ Pol. MPE)

(2) The expressed frequency range may vary +/- 10%

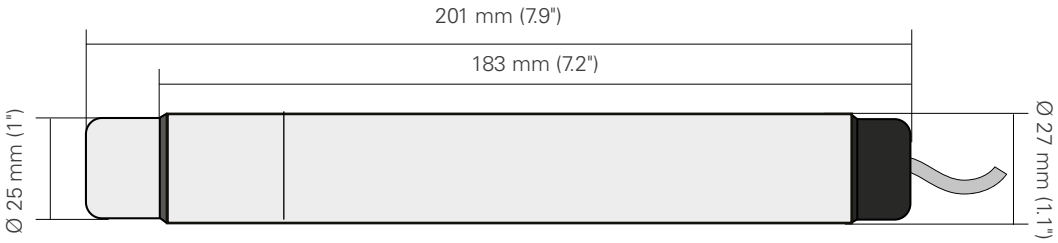
(3) refer to FAQ section of Sisgeo website: www.sisgeo.com/faq

PHYSICAL FEATURES

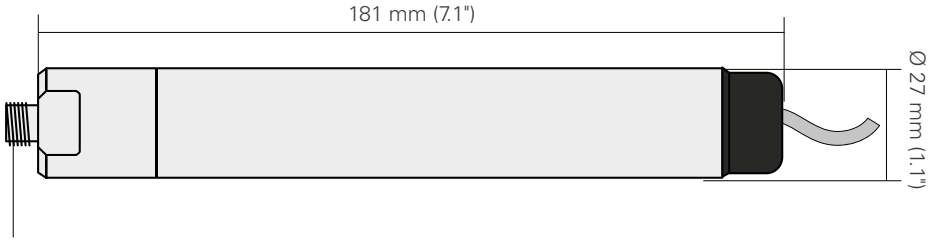
PK20 STANDARD
VW PIEZOMETER



PK45 HEAVY DUTY
VW PIEZOMETER

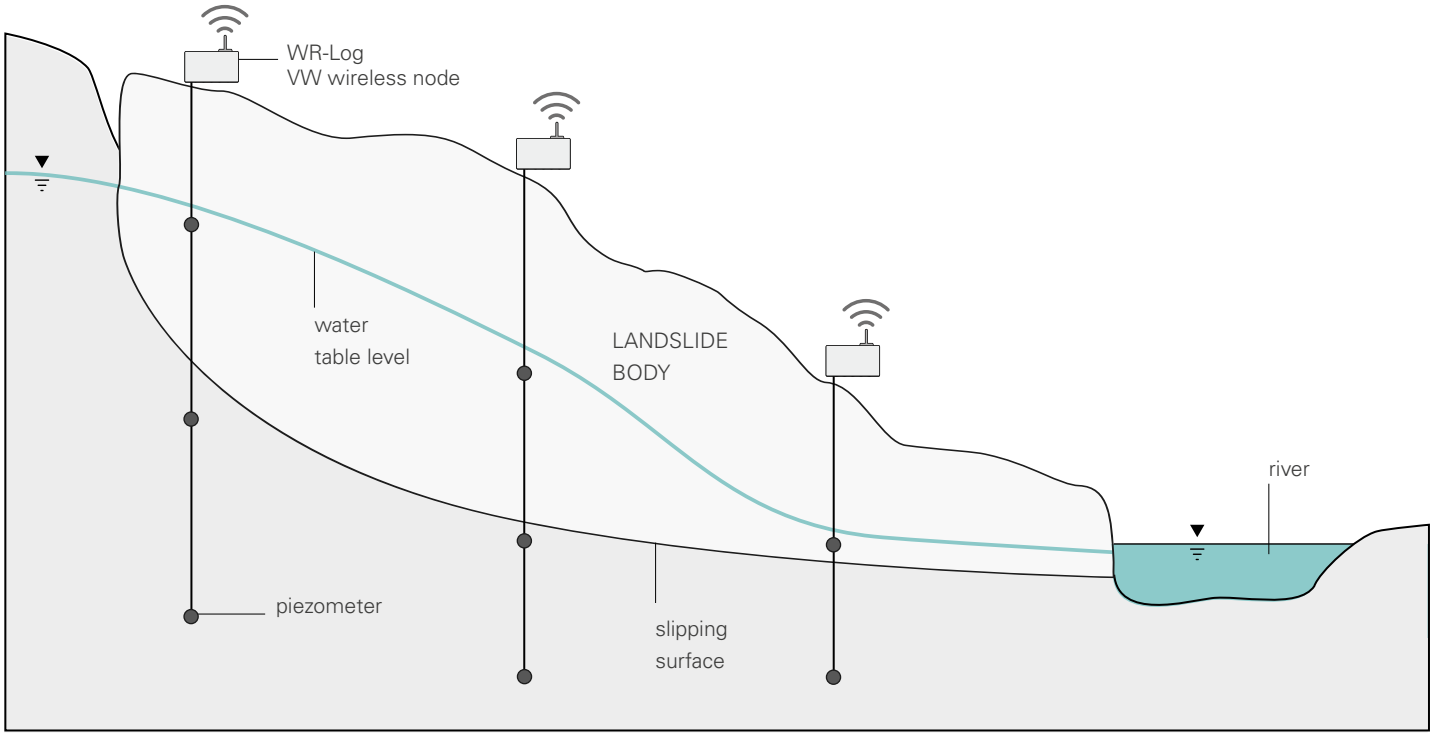


PK45H PRESSURE
TRANSDUCER

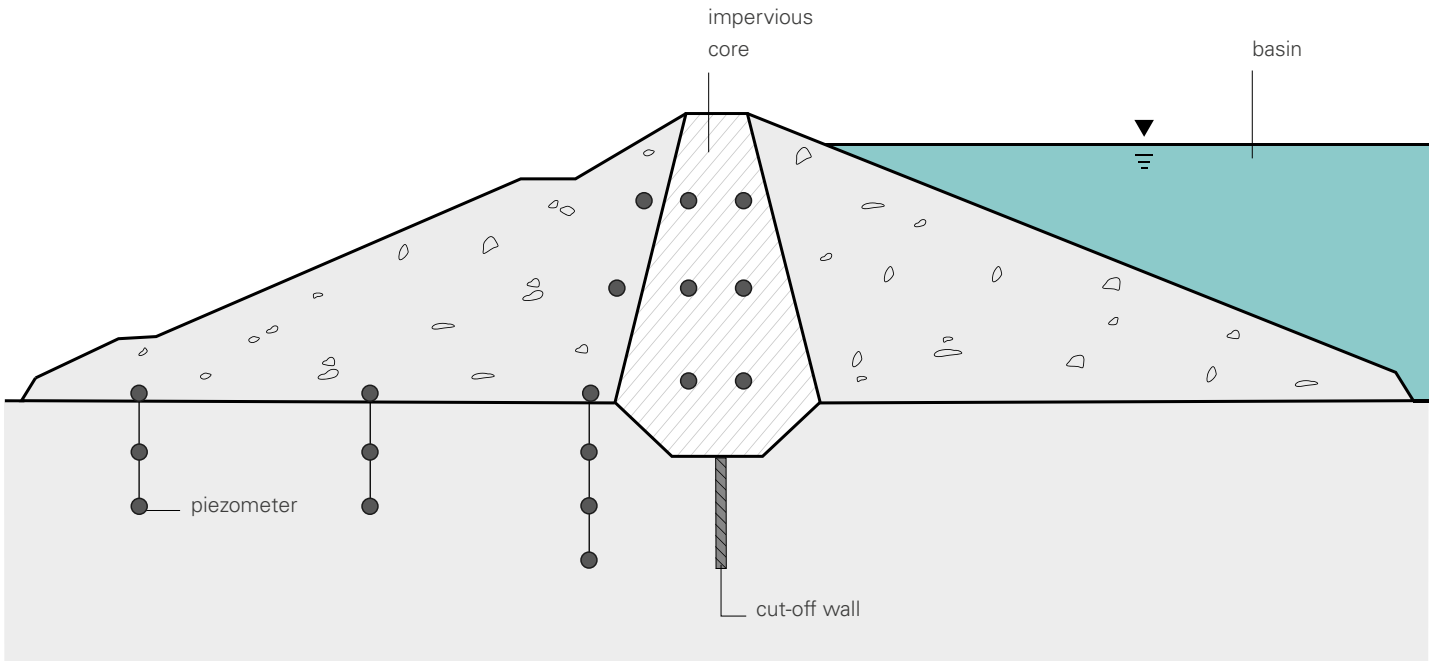


Vibrating wire piezometer in embankment dam foundation

TYPICAL LANDSLIDE APPLICATION



TYPICAL EMBANKMENT DAM APPLICATION



3-PORT PIPE UNION

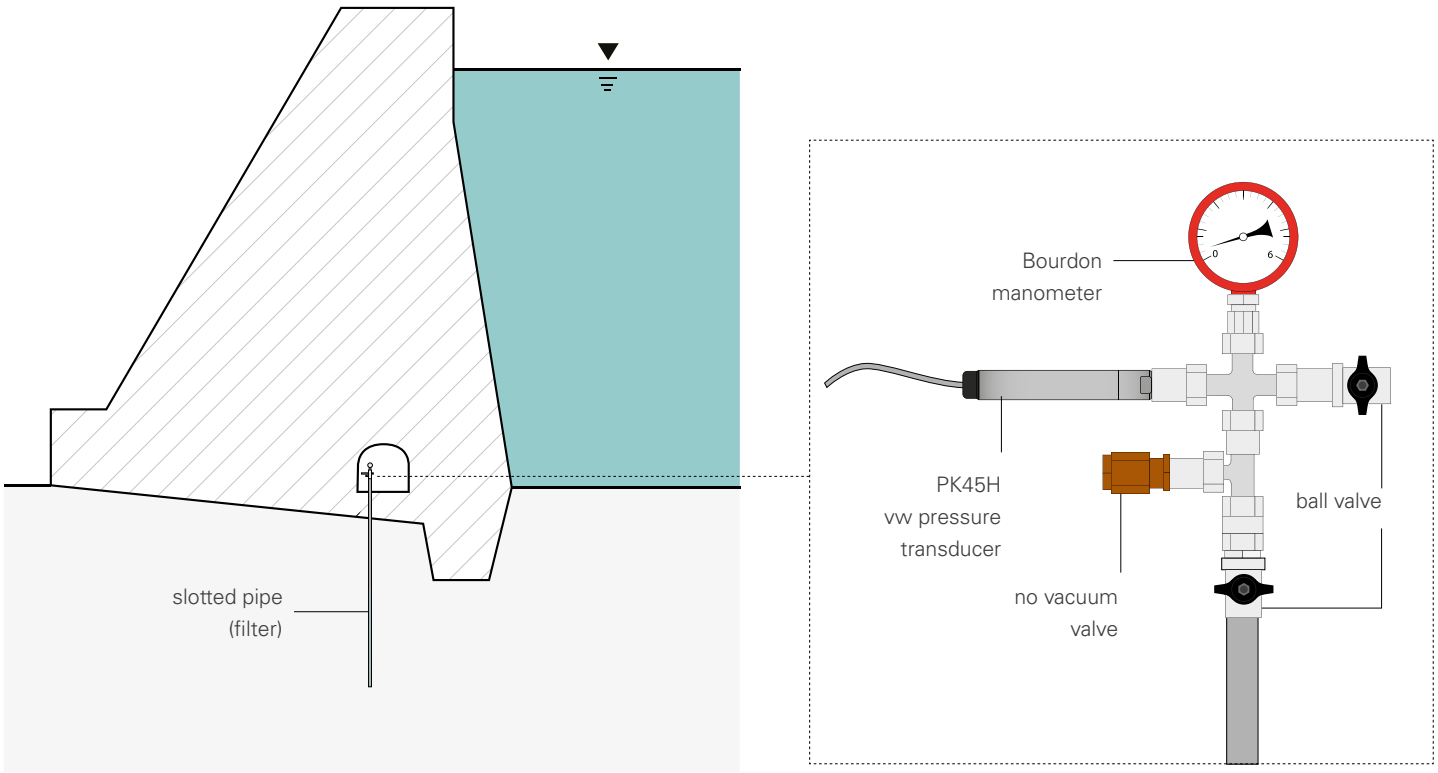
Uplift pressures are usually monitored installing a 3-port pipe assembly at the top of a standpipe located in the dam's drainage gallery. The 3-port assembly consists of a 3-port pipe brass union equipped with stainless steel Bourdon gauge manometer, no-vacuum brass valve (2.1 MPa), 2 ball valves and, optionally, a PK45H vibrating wire pressure transducer.

PRODUCT CODE	3-PORT PIPE UNION 0P2RACT2000	NO-VACUUM VALVE 0P2RACV2100
Material	brass	brass
Working pressure	12.5 MPa (1813 psi)	2.1 MPa (305 psi)
Thread for standpipe	G 1/2"	-

PRODUCT CODE	BOURDON MANOMETER 0PMAN100000	VW PRESSURE TRANSD. PK45H MODEL (1)
Available ranges	0-10 bars, 0-25 bars (0-145 psi up to 0-362 psi)	0 - 1 MPa up to 0 - 30 MPa (0-145 psi up to 0-4350 psi)
Resolution	1% range	0.025% range
Material	Stainless steel and brass	Stainless steel
Diameter	100 mm	27 mm

(1) For more information, refer to page 4

TYPICAL APPLICATION IN CONCRETE DAM



ACCESSORIES AND SPARE PARTS

PROTECTIVE PIEZOMETER CAP OP100CH1000

Protective cap for standpipe piezometers with data plate and survey pin.

CABLE SPLICING KIT OEGSM0K0000

Splice kit for lengthening or repairing cable.

BAROMETER OMEPR106000

Piezoelectric barometer for atmospheric pressure compensation.
Range 880-1200 mBar, 4-20 mA output.

PK20 HAE CERAMIC FIL. OPF20D16000

Spare HAE ceramic filter for PK20 piezometers, pore size 0.25 µm.

PK20 LAE VYON® / STEEL FILTER OPF20D20000

Spare LAE Vyon® (polyethylene) or sintered steel filter for PK20 piezometers, pore size 40/50 µm.

FILTER SATURATION DEVICE OPF01SAT000

Stainless steel pump for saturating HAE ceramic filters. Includes pump, 10 bar pressure gauge, and a threaded connection for the filters.

PK45 HAE CERAMIC FIL. OPF01D16000

Spare HAE ceramic filter for PK45 piezometers, pore size 0.25 µm.

PK45 LAE STEEL FILTER OPF40D20000

Spare LAE sintered steel filter for PK45 piezometers, pore size 40/50 µm

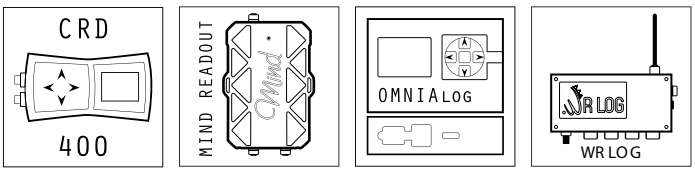
BENTONITE PELLETS 1000BE20025K

10 mm bentonite pellets supplied in 25 kg bag.

PK45 LAE VYON® FILTER OPF40D2000P

Spare LAE Vyon® (polyetyilene) filter for PK45 piezometers, pore size 40/50 µm.

READABLE BY



Refer to separate datasheets for further information.

SISGEO HEADQUARTER
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STANLAY™

CRD 400
READOUT

READOUT UNITS
AND DATALOGGERS

SISGEO®

CRD-400
READOUT

CRD-400 is a new generation multipurpose readout designed to take readings of all instruments including vibrating wire.

CRD-400 permits readings in both electrical and engineering units. Battery level, readout temperature and date are always displayed.

CRD-400 comes with shoulder/belt bag, battery charger, sensor cable with 6 alligator clips and USB flash drive with user manual.

FEATURES

- Compatible with all SISGEO analog sensors
- Large coloured display
- Accurate and precise measurements
- Splash-proof hand-held case
- Powered by Ni-MH rechargeable batteries

BENEFITS

- Easy to use
- Lightweight and portable
- Right and left hand users
- Auto shutdown
- Sunlight reliable display
- Reads both electrical and engineering units

CE *Meet the essential requirements of EMC directive 2014/30/UE and Safety Low Voltage Directive 2014/35/UE*

TECHNICAL SPECIFICATIONS

Type of measurements	mA - mV - V - mV/V - °C - Hz (µsec - digit - µε)
A/D converter	24-bit Sigma-Delta ADC (22 true bit)
Range and power supply	Current loop (2 wires): range 0÷21 mA - Power supply: 24V DC Transmitter (3 wires): range 0÷21mA - Power supply: 24V DC Voltage (4 wires): range ±10V - Power supply: 24V DC Wheatstone bridge (6 wires): range ±10 mV/V - Power supply: 5 V DC Servo-inclinometer: range ±10000 mV - Power supply: ±12V DC Platinum RTD (Pt100): range -150°C to +150°C - Power supply: 1 mA Thermistor (NTC): range -30°C to +150°C - Power supply: 0.04mA, 0.1mA, 1mA Vibrating Wire: range 400Hz to 6000Hz - Excitation sine wave signal (adaptive): ±10 V
Reading resolution	1µA at FS 20mA - 1µV at FS ±20mV - 10µV at FS ±1V - 100µV at FS ±10V 0.001mV/V at FS 10mV/V - 0.1°C for PT100 - 0.1°C for NTC 0.1 Hz at FS from 400 to 6000Hz
Accuracy	0.01% FS (0.1% for Voltage and Servo-inclinometer, 0.2% FS for PT100 and NTC)
Temperature drift	0.001 % FS / °C
Rechargeable battery	4 x AA, NiMH, 2400 mAh
Operating time	min. 4h (constant use, 24 Vdc @ 20 mA @ 25 °C, maximum backlight, 2400 mAh batteries) min. 6h (constant use, 24 Vdc @ 20 mA @ 25 °C, 50% backlight, 2400 mAh batteries)
Battery charger	Programmable charger, IP41, input voltage: 100-240 V AC, 50-60 Hz, 1.3A
Display	Amorphous silicon TFT LCD panel with LED backlight unit, 320 x 240, 3.5", sunlight reliability

ENVIROMENTAL CONDITIONS

Operating temperature	from -20°C to +60°C
Storage temperature	from -30°C to +70°C

PHYSICAL CHARACTERISTICS

Weight	0.5 Kg
Dimensions (L x W x H)	100 x 230 x 45 mm
Protection Degree	IP67
Material	ABS
Connectors	1 x instrument, 1 x battery charger

CERTIFICATIONS

Eletromagnetic compatibility	EN 61326-1 (2006)
Safety requirements	EN 61010-1 (2001)

ITEMS INCLUDED

TRAVEL BAG

Splashproof shoulder/belt carrying bag.

BATTERY CHARGER OECABCRD400

100-240 Vac / 12 Vdc battery charger

SENSOR CABLE OECAV8P6A00

Jumper cable with 6 alligator clips

USB FLASH DRIVE

User manual

ACCESSORIES

JUMPER CABLE OECAV08V2J0

Jumper cable with 2 connectors

SWITCH BOX CABLE OECAV08V2S0

Jumper cable for switch measuring box

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MIND
READOUT

READOUT UNITS
AND DATALOGGERS

MIND App 2.0 compatible with:

iOS

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

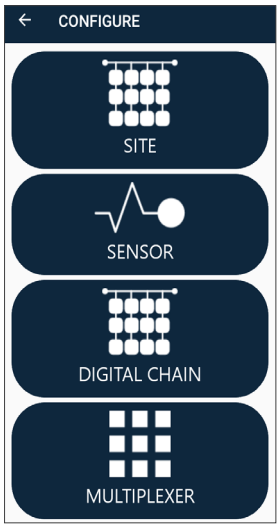
CE *Meet the essential requirements of RED Directive 2014/53/EU,*
Certified for extended environmental conditions: altitude up to 3000m

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.

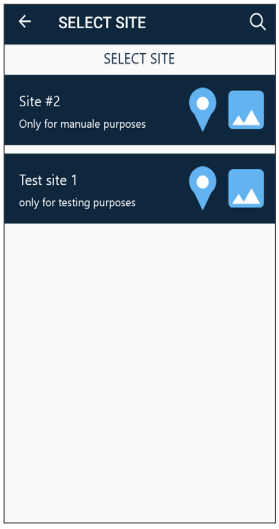
Minimum Device Specifications (device not supplied by SISGEO)	Bluetooth Low Energy BLE 4.2
	APPLE iOS 16 or higher
	Android OS 10 or higher

APP OVERVIEW

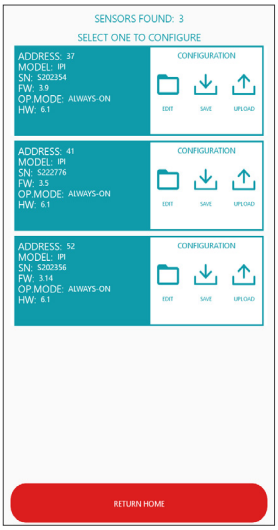


Instruments configuration main page.

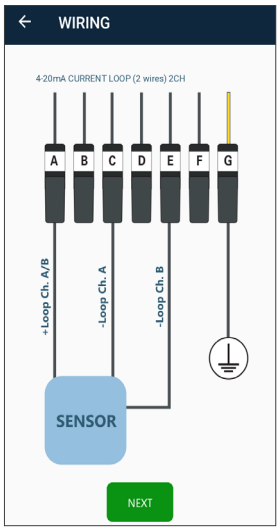
QR code scanner for automatic configuration of analog sensors.



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

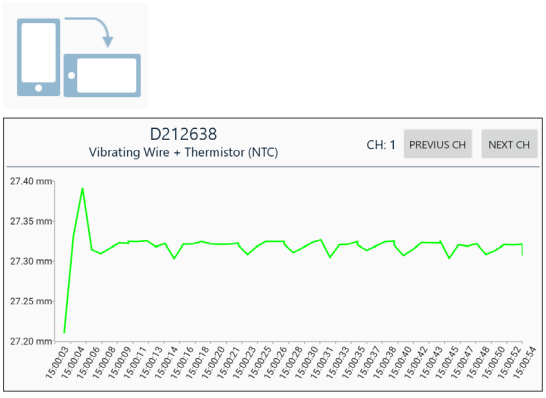


DSC (Digital Sensors Configuration) tool main page.



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

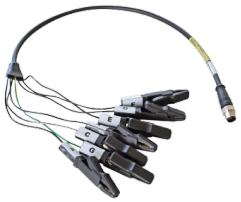
Jumper cable for MIND connection to a switch terminal box.

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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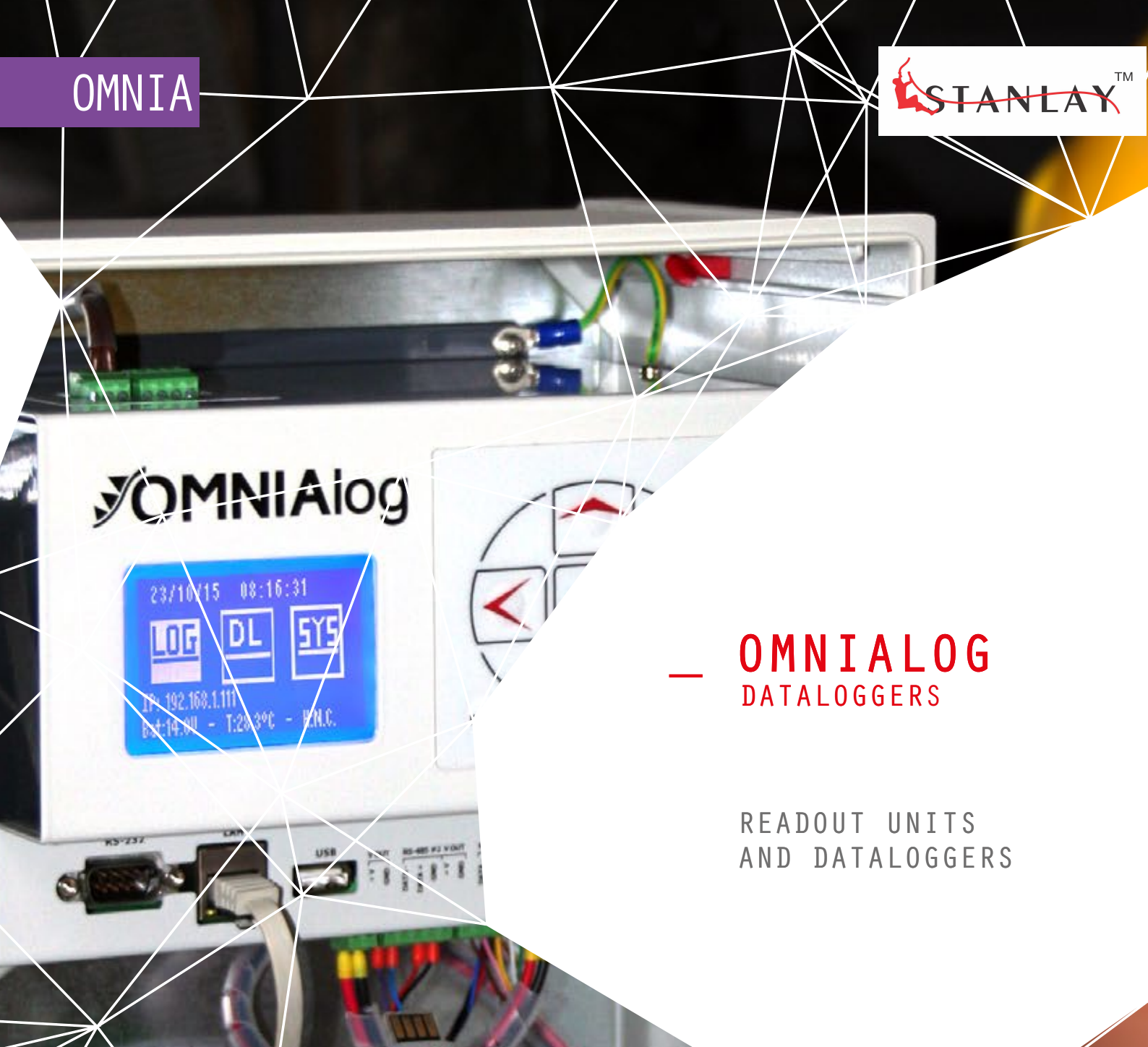
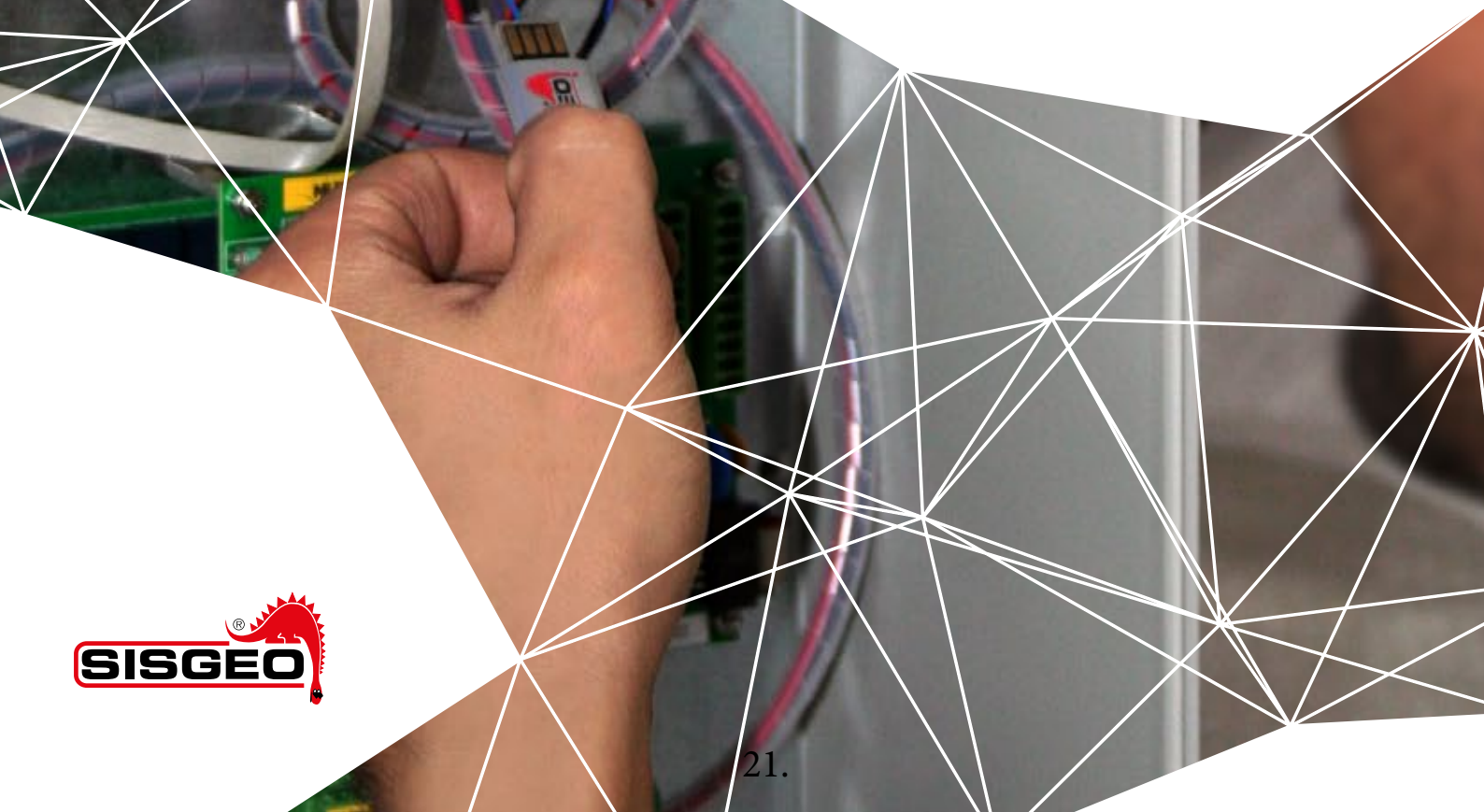


OMNIALOG
DATALOGGERS

READOUT UNITS
AND DATALOGGERS



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

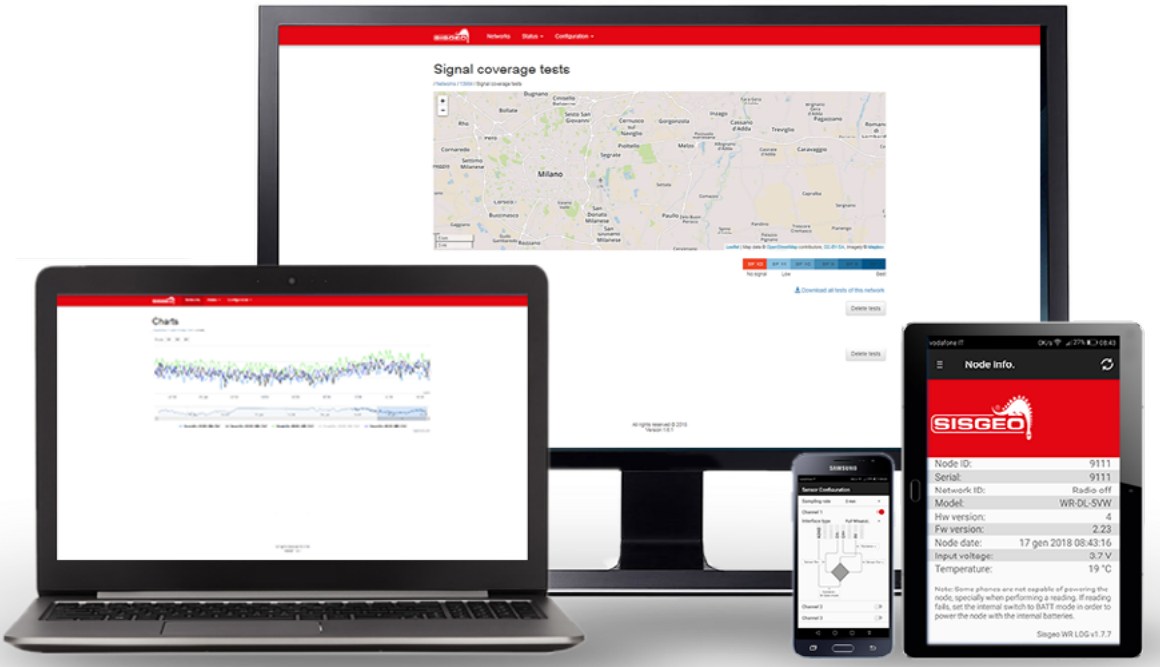
Box Dimensions (WxLxH)	100x100x61 mm
Overall Dimensions without antenna	150x120x61 mm
External Antenna	100 mm length (including connector)
Housing material	Aluminium alloy
Operating temperature	-10°C to +50°C
IP class	IP68 (2m max 2 hours)
Weight (without batteries and antenna)	0.85 kg

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

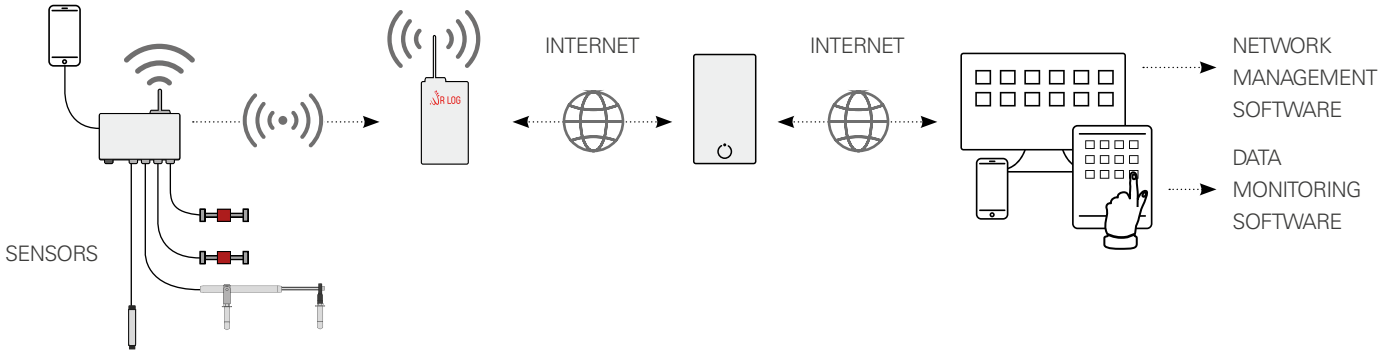
WR LOG CONFIGURATION APP FOR NODES

- 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

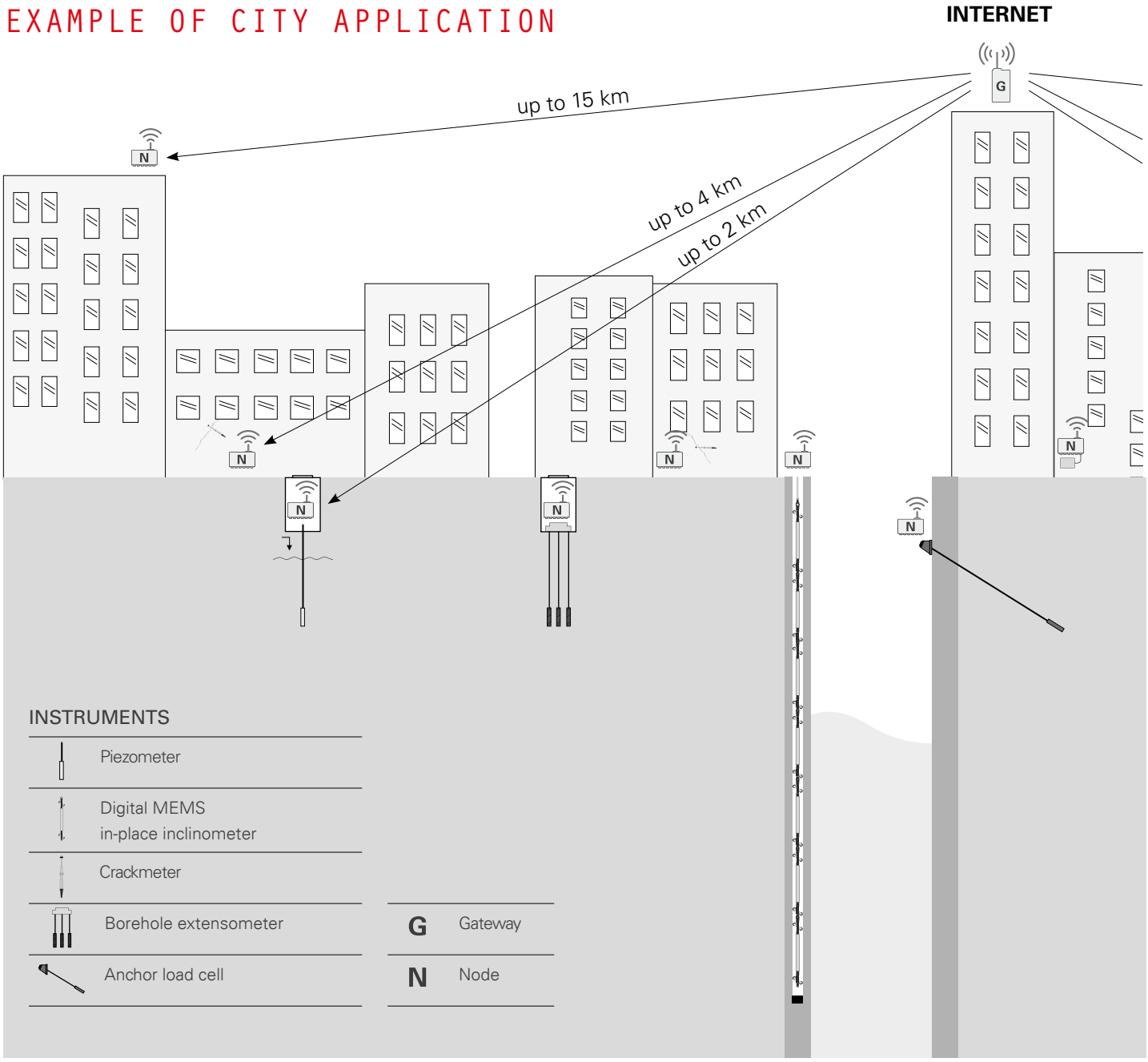
TYPICAL SYSTEM ARCHITECTURE

WIRELESS NODE CONFIGURATION

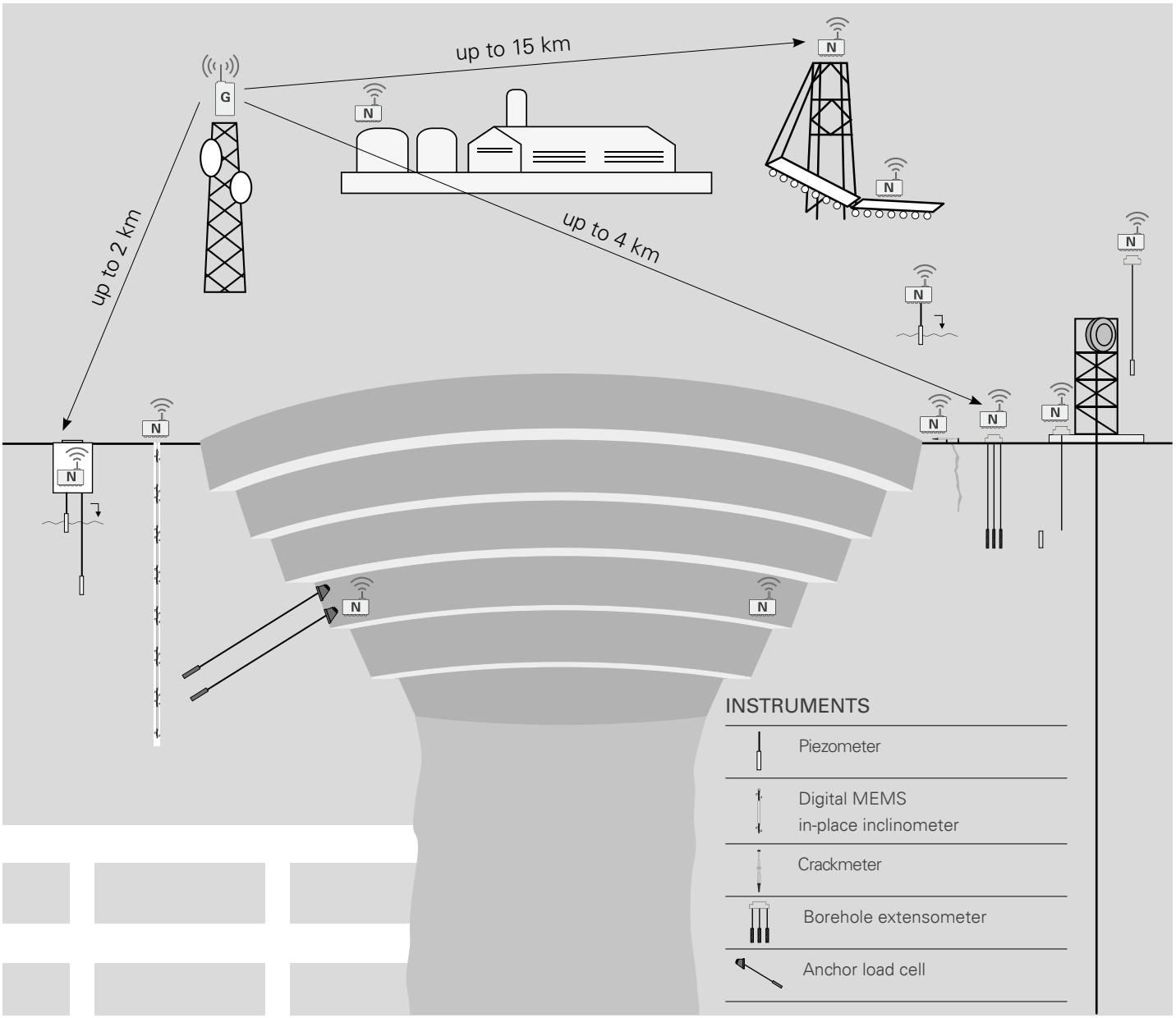
WIRELESS NODE | **GATEWAY** | **SERVER** | **USER'S DEVICE**



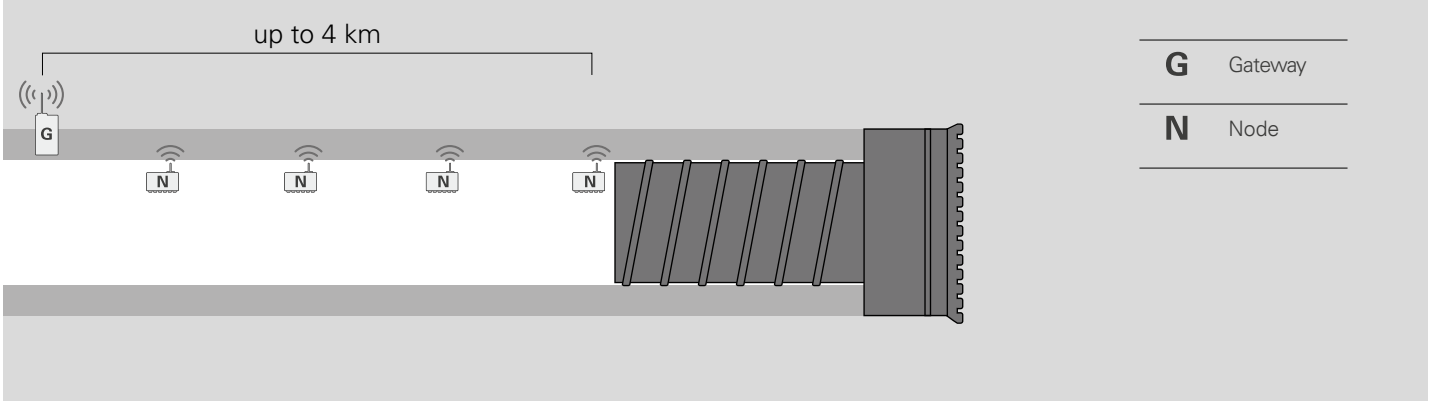
EXAMPLE OF CITY APPLICATION



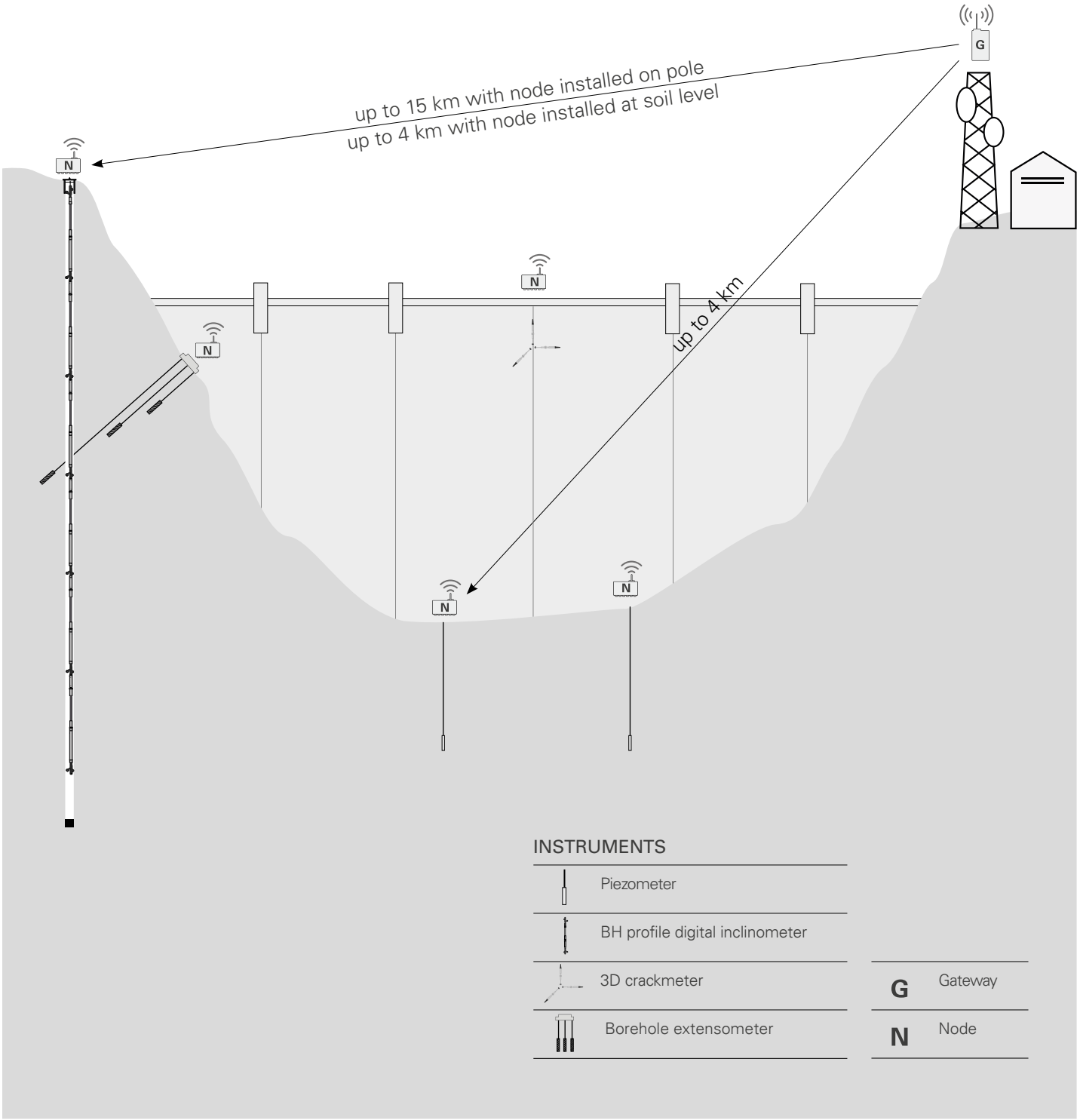
EXAMPLE OF MINES APPLICATION



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.

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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

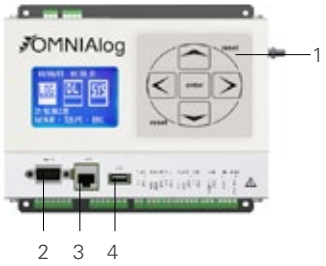
PROTECTIONS	**Electro-mechanical relays for each measuring channel:** Electrical endurance: min. $2x10^5$ operations, Mechanical endurance: $10x10^8$ operations. **Circuit protection: Gas Discharge Tubes (GDT):** DC Breakdown Voltage 75V (± 20%@100V/µs) Impulse Breakdown Voltage 250V (@100V/µs) typical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

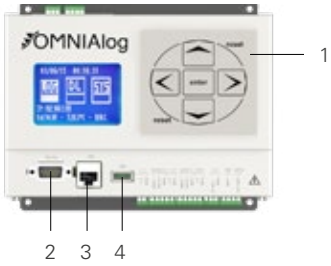
SYSTEM POWER REQUIREMENTS	
Voltage (external power supply)	10 to 30 V DC (reverse polarity protected), max 5 A
External rechargeable batteries	12V DC nominal
Typical current drain (@12Vdc, external power supply)	Sleep mode: 100 µA ON: 62 mA - ON with ethernet connected: 87 mA - ON with display ON: 115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

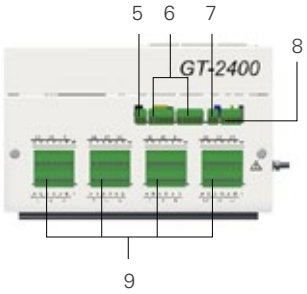
	OMNIALOG GT-2400	OMNIALOG GT-100D
SOFTWARE & FIRMWARE	Web server on board (independent OS platform). Live update (firmware and web pages). FTP client to send data/alarms on a FTP server (SFTP not supported) MAIL to sent data/alarms to max 5 email address (SMTPS / SSL not supported) SMS to sent alarms 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

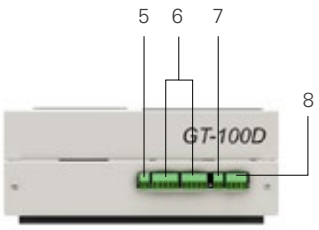




FRONT VIEW



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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