



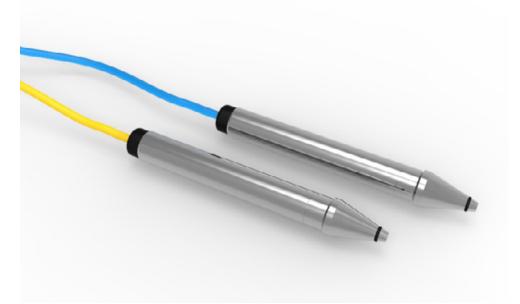
# \_ REMOVABLE PRESSURE

PIEZOMETERS









# REMOVABLE PRESSURE TRANSDUCERS

The removable pressure transducer is designed to measure pore-water pressure through a special Casagrande filter tip.

This unique design is especially suitable for long-term monitoring since it allows the instrument to be withdrawn for calibration checks.

The removable pressure transducer can be supplied with either vibrating wire or piezo-resistive technology.

#### APPLICATIONS

- Long term monitoring
- Suitable in lightning-prone areas (since it can be replaced)
- Dams and fill embankments
- Measurement of ground pore pressure
- Landslides monitoring
- Natural or cut slope sites

FEATURES

- Removable for further calibration and check
- Cable length does not affect reading
- Built-in surge protection and temperature sensor (vibrating wire only)
- If removed, Casagrande continue to works with manual water level indicator

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



### TECHNICAL SPECIFICATIONS

#### VIBRATING WIRE

#### REMOVABLE PRESSURE TRANSDUCER

#### PIEZO-RESISTIVE

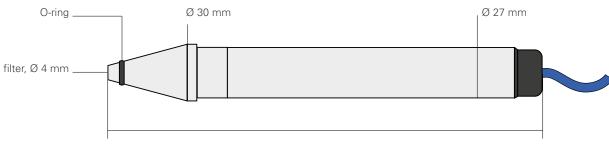
#### REMOVABLE PRESSURE TRANSDUCER

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APPLICATION	Pore pressure monitoring directly into Casagrande filter unit		Pore pressure monitoring directly into Casagrande filter unit	
MODEL	0PK45C20000	0PK45C50000	0P252C00200	0P252C00500
Range	0 - 200 kPa 0 - 29 psi	0 - 500 kPa 0 - 73 psi	0 - 200 kPa 0 - 29 psi	0 - 500 kPa 0 - 73 psi
Overpressure	2 x range		1.3 x range	
Sensitivity	0.025% FS		0.01% FS	
Linearity (1)	< ±0.40% FS	< ±0.40% FS	< ±0.25% FS	< ±0.25% FS
Total Accuracy (2)	< ±0.25% FS	< ±0.25% FS	< ±0.20% FS	< ±0.15% FS
Signal output	frequency (VW), resistance (T)		4 - 20 mA (current loop)	
Electric supply	-		12 -24 V DC	
Thermal zero shift	0.01÷0.03 % FS /°C		0.00025 % FS /°C	
Electric insulation	> 50 MΩ		4 kV	
Temp. operating range	-20 to +80 °C		-10 to	+55 °C
Temperature sensor	thermistor		thermistor	(on request)
Material	stainless steel		stainle	ss steel
Body diameter	Ø 27 mm (1.1")		Ø 27 m	m (1.1")
FILTER UNIT				
Туре	stone, Ø 4 mm (0.16")		stone, Ø 4	mm (0.16")
Material	stainless steel		stainle	ss steel
Pore size	40/50 μm		40/5	0 µm
CABLE				
Signal cable	0WE104K00ZH (LSZH jacket) 0WE104K00PV (PVC jacket)		0WE102KEOZ	H (LSZH jacket)
Max cable length to logger (3)	1000 m (for more information see <u>FAQ#77</u> )		1000 m (for more info	ormation see <u>FAQ#77</u> )

(1) including hysteresis (2) including linearity, hysteresis and repeatability, calculated with 3rd degree polynomial (3) refer to FAQ section of Sisgeo website: www.sisgeo.com/faq





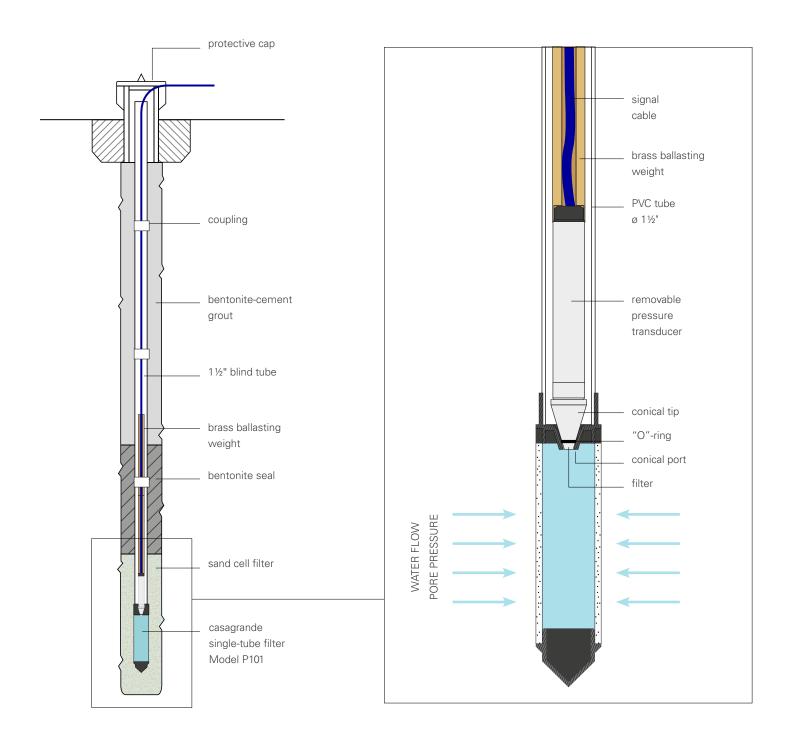


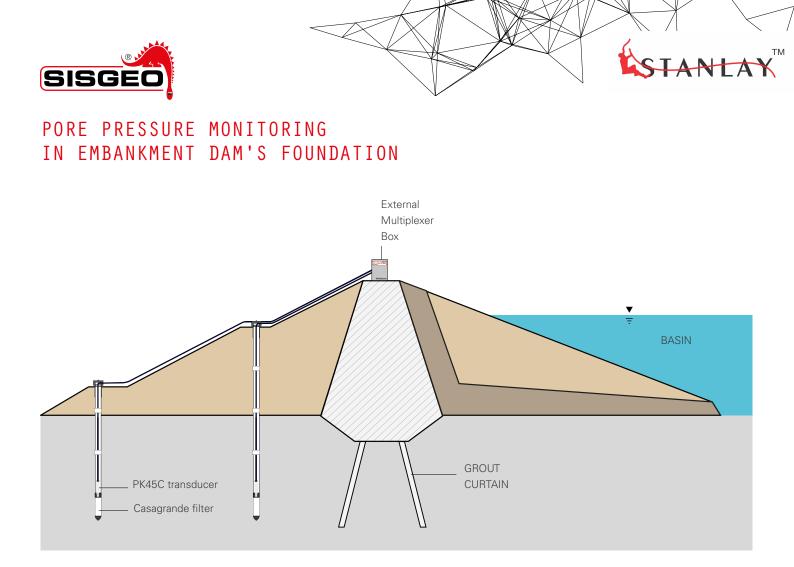


### W O R K I N G P R I N C I P L E

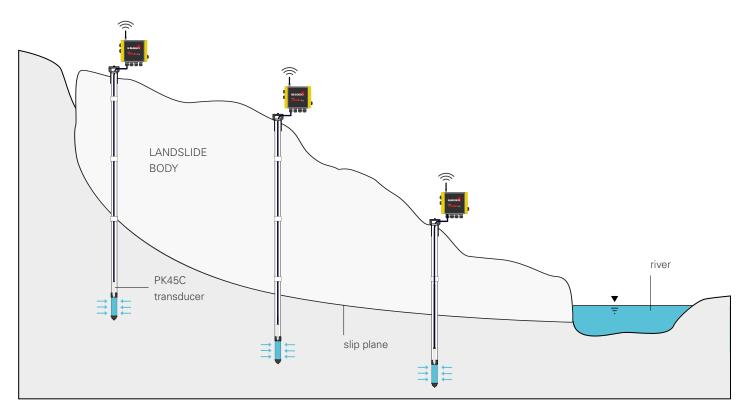
The tip of the removable pressure transducer is designed to mate with the conical port of the P101 Casagrande filter. A seal is maintained via an o-ring in the tip and ballasting weights slipped onto the signal cable. A small orifice in the tip allows pore-water pressure to act on the diaphragm inside the pressure transducer.

The P101 Casagrande filter tip and riser pipe are installed in the normal way. The transducer, with brass ballasting weights, is lowered to mate with the port in the P101 filter. The transducer can be removed for calibration checks or replacement.





### UP-LIFT PRESSURE MONITORING IN LANDSLIDE APPLICATION





### ACCESSORIES AND SPARE PARTS

#### LSZH 4 WIRE CABLE OWE104K00ZH

Electrical cable with 2 pairs of 22 AWG wire and LSZH jacket. External diameter 7.4 mm. Rated for -30° to + 80°C.

#### PVC 4 WIRE CABLE OWE104K00PV

Electrical cable with 2 pairs of 22 AWG wire and PVC jacket. External diameter 7.6 mm. Rated for -30° to + 80°C.

#### LSZH 2 WIRE CABLE OWE102KE0ZH

Electrical cable with 2 wires (20 AWG), Kevlar stress member and LSZH jacket. External diameter 7.7 mm. Rated for -30° to + 80°C.



PROTECTIVE PIEZOMETER CAP

Protective lockable cap for standpipe

or Casagrande piezometers with data

0P100CH1000

plate and survey pin.

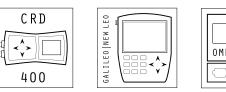
#### CABLE SPLICING KIT OEGSMOKOOOO

Splice kits are used when cables must be repaired or extended. Each splice kit includes circuit boards, butt connectors, plastic protection tubes, and the two-part epoxy resin kit for waterproofing.

TANKA



### READABLE BY





Refer to separate datasheets for further information.

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Tel. +91-11-41860000 sales@stanlay.com - www.stanlay.in CDL

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Configuration

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6. Manual

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7.



# CDL DATALOGGERS

READOUT UNITS AND DATALOGGERS









# CDL DATALOGGERS

CDL is a family line of durable, water resistant easy-to-use portable readout which includes Galileo and New Leonardo dataloggers.

They are equipped with an high performance microprocessor, Ni-MH batteries and color graphic display.

New Leonardo datalogger is compatible with all types of Sisgeo's sensors. Galileo is designed for use with vibrating wire instruments.

Multiple-readings through multiplexer box and switch measuring boxes are supported.

#### FEATURES

- Compatible with all sensors
- Large coloured display
- Accurate and precise measurements
- Splash-proof hand-held case
- Bluetooth module for smartphone connection

#### BENEFITS

- Lightweight and portable
- Reads both electrical and engineering units
- Auto shutdown
- Live up-date for firmware and software
- Sunlight reliable display

### 😵 Bluetooth

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





### TECHNICAL SPECIFICATIONS

#### DATALOGGER NEW LEONARDO (PRODUCT CODE 0CDL400N0000)

#### DATALOGGER GALILEO (PRODUCT CODE 0CDL100VW00)

Channels	2	2
A/D converter	2x24 bit with autocalibration (19 true bit)	2x24 bit with autocalibration (19 true bit)
Digital display	TFT graphic backlight LCD 320 x 240 pixel, 5.7", sunlight reliable	TFT graphic backlight LCD 320 x 240 pixel, 5.7", sunlight reliable
Type of measure	mA, mV, V, mV/V, Hz, μsec, digit, με, °C (PT100 and thermistors)	Hz, μsec, digit, με, °C (thermistors)
Measuring range	4-20 mA, ±10 mV, ±400 mV, ±5 V, 1000 Ohm (PT-100) 10000 Ohm (thermistors), from 400 to 6000 Hz	10000 Ohm (thermistors) from 400 to 6000 Hz
Measurement resolution	1 μA at FS 20 mA - 1 μV at FS ±10 mV 10 μV at FS ±400 mV - 100 μV at FS ±5 V 0.001 mV/V at FS 10 mV/V - 0.1°C at FS 1000 Ohm 0.1°C at FS 10000 Ohm - 0.1 Hz at FS 400-6000 Hz	0.1 Hz at FS 400-6000 Hz 0.1°C at FS 10000 Ohm
Measurement accuracy	0.01% FS (0.1% FS for PT100 and NTC)	0.01% FS (0.1% FS for NTC)
Thermal drift	0.001 % FS / °C	0.001% FS/°C
Internal battery	12 V DC, 4500 mAh Ni-MH, with protections	12 V DC, 4500 mAh Ni-MH, with protections
Operating time	8 hours (always power-on)	8 hours (always power-on)
Battery charger	fast charge (2.5h), 100-240 V AC, 50-60 Hz, 35W	fast charge (2.5h), 100-240 V AC, 50-60 Hz, 35W
Sensor supply	Fully automated power supply selection	Fully automated power supply selection 100
Input impedance	<ul><li>&gt; 10 MW for voltage &lt;2.5V</li><li>&gt; 1 MW for voltage &gt;2.5V</li></ul>	
Maximum sensor output current	190 mA	100 mA
Temperature range	-20°C a +60°C	20°C +60°C
Storage memory	2 GB*	2 GB*
COMM port	USB 2.0, Bluetooth optional (0CDL0BTOOTH)	USB 2.0, Bluetooth optional (0CDL0BTOOTH)
Enclosure	ABS, IP67 protection	ABS, IP67 protection
Dimensions and weight	200 x 280 x 76 mm, 2 kg	200 x 280 x 76 mm, 2 kg





\* Readings are stored in an internal SD card and the stored data can be fast and easily transmitted to a host PC by USB cable.

The storage memory of dataloggers works like an Hard Disk: data is organized in a "site"; in each site there are the installed instruments and for each instrument the Client can store and download data, sorted by date and time.





### ITEMS INCLUDED

CARRYING CASE OCDLOBAG927

Carrying bag and red customized case for easy operation at site

#### CD-ROM

Smart Manager Suite package and user manual

SENSOR CABLE 0 E C A V 7 P 6 A 0 0

Jumper cable with 6 alligator clips

#### USB CABLE

PC communication cable



### ACCESSORIES

SWITCH BOX CABLE 0ECAV07V2000

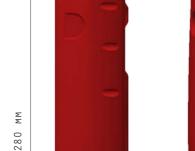
Jumper cable for switch measuring box

#### ADDITIONAL POWER SUPPLY OCDL012EXBP

12 V external power supply package for T-REX probe and DEX extensometers

#### MULTIPLEXER CABLE OECAV10MUX0

Jumper cable for direct connection to multiplexer measuring boxes





BATTERY CHARGER OECAB12VNMNB

100-240V AC/12V DC battery charger



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### CRD 400 READOUT

1.

READOUT UNITS AND DATALOGGERS



CRD

Termistore

CRD-400







# 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

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



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### 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)

We reserve the right to change our product without prior notice.





### 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 OECAVO8V2JO

Jumper cable with 2 connectors

#### SWITCH BOX CABLE OECAVO8V2SO

Jumper cable for switch measuring box



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# MIND

### **MIND** READOUT

READOUT UNITS AND DATALOGGERS

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# 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.

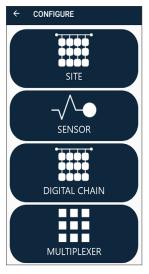
Minimum Device Specifications

(device not supplied by SISGEO)

Bluetooth Low Energy BLE 4.2 APPLE iOS 16 or higher Android OS 10 or higher



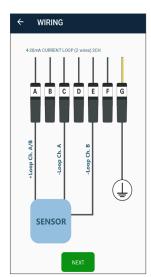
### APP OVERVIEW



Instruments configuration main page.



QR code scanner for automatic configuration of analog sensors.



Guided clips wiring connection.



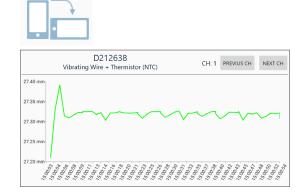
Instrument reading page with both biaxial 4-20mA current loop channels reading. The temperature measure is displayed scrolling down.



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

ADDRESS: 37 MODEL: 19 SN: 5202354 FW: 3.9 OP.MODE: ALWAYS-ON HW: 6.1	
1100. 001	
ADDRESS: 41 MODEL: 19 SN: 5222776 FW: 35 OP MODE: AUWAYS-ON HW: 61	
ADDRESS: 52 MODEL: 191 SN: 5202356 FW: 314 OP.MODE: AUWAYS-ON HW: 61	

DSC (Digital Sensors Configuration) tool main page.



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





### MIND READOUT PHYSICAL FEATURES

Aluminum / 1 Kg	
 IP65	
205x128x45 mm	
-20 to +55°C (charging +5°C to +40°C)	
-10 to +45°C for max 6 months, -20 to -10°C for max 1 month	
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

Biaxial 4-20 mA current loop 2-wire gauges

Biaxial 4-20 mA current loop 2-wire gauges + Thermistor Ratiometric 6-wire gauges

RTD PT-100 temperature gauges

NTC Thermistor temperature gauges

Vibrating wire gauges

Vibrating wire + NTC Thermistor 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<sup>(1)</sup>



ТΜ

#### 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.



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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 SENS	DRS	
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 <sup>(2)</sup>		
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  $\pm$ 5 V | 1 mV at range  $\pm$ 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

±10% (ratio) | 0.01% (ratio) | 0.1% (ratio)

±150 °C | 0.1°C | ±1 °C

±150 °C | 0.1°C | ±1 °C

#### G.8 - Carlson instruments

(4 wires)

Range | resolution | accuracy

### G.9 - Carlson thermometer (3 wires)

Range | resolution | accuracy

#### G.10 - PT-100 (Platinum RTD)

(3 wires)

Range | resolution | accuracy

### G.11 - Vibrating wire double coils

(4 wires)	
Range   accuracy	
Excitation sine wave signal	Up to

Resolution

300 to 6000 Hz | 0.0033% FS p to 12 Vpp (selectable by the software)

0.01Hz at range 300÷1000Hz 0.02Hz at range 1000÷3000Hz 0.1Hz at range 3000÷6000Hz

 ${<}10\text{ppm/°C}$  (-30°C to  ${+}70^{\circ}\text{C})$ 

Temperature drift

<image>



### ACCESSORIES AND SPARE PARTS

#### JUMPER CABLE OECAV08V2J0

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



#### SWITCH BOX JUMPER CABLE OECAV08V2SO

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.

TANH



#### 7-CLIPS SENSOR CABLE (SPARE) OECAV8P6A00

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





Jumper cable for MIND connection to digital gauges.

#### MIND CARRYING BAG (SPARE) OMIND1BAGOO

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

Mind

#### BATTERY CHARGER (SPARE) OECABMINDOO

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 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

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





### TECHNICAL SPECIFICATIONS

CPU AND MEMORY	OMNIALOG GT-2400	OMNIALOG GT-100D
Processor	ARM Cortex-M3 MCU with 1 MB Flash, 120 MHz CPU, ART Accelerator, Ethernet	
RAM Memory	1 Mbyte RAM v	vith backup
Mass storage	SD CARD 32 GB (*)	and WEB pages
Clock accuracy	High precision RTC (real time self compensated in temperature (3p	
On-board sensors	Temperature measured on the ele	ectronic board (accuracy ±1%)
INPUT		
Analog differential inputs	24 differentials individually configured. Channel expansion provided by SISGEO multiplexers	-
Digital inputs	Two opto-isolated digital inputs individ high frequency pulse and trigger. Indepe Max Input Voltage: 24V Min Input Voltage: 5V (	ndent 32-bit counters for each input. (Max Current: 10mA)
INTERFACES		
Display & Keyboard	Small backlight graphic LCD 128x64 dpi with membrane ke PC. Keyboard for start a uniscan, sequential display of the converted unit reading, UM), device status, data downloa mode (back-up/format/res	last memorized readings for each channel (sensor ID, ad and FW/web pages update by USB pen drive, safe
LAN ethernet isolated	10/100 Mbp	s, RJ45
RS232	9-pin, DE9: DCE port for GSM/ Baud Rates: selectable from 9600 by Default Format: 8 data bits	ps to 115.2 kbps (default setting)
USB	USB 2.0 flash drive only	(FAT 32), 5 V 200 mA
RS485#1 opto-isolated	5 screw clamp: DCE port for max. I Communication int Communication protocol: MODE The voltage 'V OUT' is switched on and of unregulated input powe Power supply management (a	terface: RS485 BUS RTU (SISGEO Protocol) if under program control. V OUT is the r supply 'V IN' (1 A)
RS485#2 opto-isolated	5 screw clamp: DCE port multiplexer board Communication int Communication protocol: MODE The voltage 'V OUT' is swi program c V OUT is the unregulated inpu Every channel of each multip independ	s connection. terface: RS485 BUS RTU (SISGEO Protocol) tched on and off under ontrol. t power supply 'V IN' (1 A) lexer board is completely
SWITCHED OUTPUT POWER SUPPLY	The voltage 'V OUT' is switched on V OUT is the unregulated inpu	

(\*) Including system files



#### ANALOG MEASUREMENTS

Measurement rate (MR)

Type of measurements

ADC

Range and power supply

Reading resolution

Measurement accuracy



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OMNIALOG GT-2400

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



#### OMNIALOG GT-100D

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	
mA, mV, V, mV/V, °C, Hz (μsec, digit)	
24-bit (22 true bit) differential	-
Analog-to-Digital Converters, 5SPS, 0-24	
Average Function, auto-calibration and auto-range	
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 k $\Omega$	
Minimum bridge resistance: 10 $\Omega$	
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	
$1 \ \mu A$ at range 20 mA	-
10 $\mu$ V at range ±100 mV - 100 $\mu$ V at range ±1 V	
1 mV at range $\pm 10$ 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	
0.01% F.S. (0.1% F.S. for Pt100 and NTC) with Standard Measurement	-
Calibration in Sisgeo laboratories recommended every	
2 years.	
2 yours.	is is
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# WR\_LOG

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SISGEO OLSWR4CHANL



STANLAY

READOUT UNITS AND DATALOGGERS

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25 km . 🔘









### WRLOG 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

Keet the essential requirements of the EMC Directive 2014/30/EU and RED directive 2014/53/EU





### 4 G GATEWAY OLSWR000GW4

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

(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.



### PHYSICAL FEATURES

Overall D	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	g temp. range	-40°C to +60°C





### 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
Sampling rate
Internal data storage
Time synchronization by radio
Power supply

#### VIBRATING WIRE INPUT

Measurement method

THERMISTOR INPUT Measurement range

EMBEDDED BAROMETER

Relative Accuracy (950 to 1050 hPa at 25°C)

Resolution Accuracy (20°C)

Pressure Range

Excitation wave	
Measurement range	
	Excitation frequency
Sweep A	450 - 1125 Hz
Sweep B	800 - 2000 Hz
Sweep C	1400 - 3500 Hz
Sweep D	2300 - 6000 Hz

Up to 200000 rea	dings incl. time and 1 sensor
time discipline bet	ter than ±10 seconds
	6 V high power battery C-size 3.6 V high power batterie: -
Embedded algori	0
±5V	
300 to 7000 Hz	
Accuracy	Resolution
0.013%	0.002 Hz
0.008%	0.002 Hz
0.010%	0.004 Hz

1 or 5 (vibrating wire + thermistor)

Up to 72500 readings incl. time and 5 sensors

30 seconds to 1 day

### PHYSICAL FEATURES

Box Dimensions (WxLxH) 1 channel node 5 channels node	100x100x61 mm 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

0.009%

Ω	
.05°C (0.04% FS)	

0.007 Hz

### 300 to 1100 hPa ±0.12 hPa

### BATTERY LIFE ESTIMATION<sup>(1)</sup>

I CH, sampling 5 min, 1 x battery	1 year
I 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 $\pm 10$ 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



Box Dimensions (WxLxH)
Overall Dimensions without antenna (WxLxH)
External Antenna
Housing material
IP class
Operating temperature
Weight (without antenna and batteries)

100x200x61 mm

140x220x61 mm

114 mm length (including connector)
Aluminium alloy
IP67
-40°C to +80°C
1.10 kg

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

### BATTERY LIFE ESTIMATION<sup>(2)</sup>

	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)	PH Box [
Sampling rate	30 seconds to 1 day	Overa
Internal data storage	Up to 200000 readings incl. time	Hous
Instruments power supply	5 V DC (up to 50 mA)	IP cla
Power supply	1 or 2 x C-size 3.6 V high power battery	Opera
INSTRUMENT INPUTS		Weig
Potentiometer/Ratiometric measuring ranges	0÷5 V DC , 0÷1 V/V	Anter
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 <sup>(2)</sup> 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 \Omega25^C

### BATTERY LIFE ESTIMATION<sup>(3)</sup>

	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.



### PHYSICAL FEATURES

Dimensions (WxLxH)	113x80x60 mm
erall Dimensions (WxLxH)	120x80x60 mm
using material	Polycarbonate
ass	IP67
erating temperature	-40°C to +80°C
ght (without batteries)	0.24 kg
enna	Internal antenna





### DIGITAL NODE PRODUCT CODE OLSWRDIGOOO

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 <sup>1</sup> to 1 day
Time synchronization by radio	time discipline better than $\pm 30$ 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<sup>(2)</sup>

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	
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 c	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

STAN

INSTRUMENT MODEL	MAXIMUM NUMBER OF GAUGES PER NODE WITH SISGEO V3 PROTOCOL	NEEDED EXTERNAL POWER SUPPLY <sup>(1)</sup>	NEEDED INSTRUMENTS' POWER CONFIGURATION <sup>(2)</sup>
Digital BH-Profile IPIs, uniaxial and biaxial (model S431HD, S432HD, S441HD)	up to 30 gauges <sup>(3)</sup>	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 <sup>(3)</sup>	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 <sup>(3)</sup>	NO	from 1 to 30 gauges: ALWAYS-ON or TIMED
Digital LT Inclibus, uniaxial and biaxial <sup>(4)</sup> (Model LTIBV, LTIBH)	up to 30 gauges <sup>(3)</sup>	NO	from 1 to 30 gauges: ALWAYS-ON or TIMED
Digital Tiltmeters, uniaxial and biaxial (Model S541HD, S542HD)	up to 30 gauges <sup>(3)</sup>	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 <sup>(3)</sup>	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) <i>Available on request</i>	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

If the external power supply is needed, add to the order the accessories' codes 0AX10W003AH (solar panel kit) and 0OMX24V030W (digital sensor kit).
 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, <u>triaxial sensors are not allowed</u>), 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  $X \le 50$ ).

(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 $^{\circ}$ INCLINOMETERS CONNECTED TO DIGITAL NODE

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

(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 0AXBC022015 (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

0AX10W003AH

## SOLAR PANEL KIT

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 00MX24V030W (must be installed and supplied separately).

#### MAINS POWER SUPPLY KIT OAXBC022015

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 00MX24V030W (must be installed and supplied separately).

#### DIGITAL SENSOR KIT OOMX24V030W

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.

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 0AXBC022015 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	zation by radio zation by radio from 1 to 2x C-size 3.6 V high power battery	
Time synchronization by radio		
Power supply		
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<sup>(1)</sup>

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.

30 seconds to 1 day

from 0.05 m to 150 m

0.15 mm

0.1 mm

favorable

+1 mm

±1 mm

±1.5 mm

+4 mm

±9 mm

±16 mm

±1 °C

conditions (1)

2x C-size 3.6 V high power battery

Visible Laser Class II laser 655 nm

unfavorable

conditions (2) ±2 mm

±2 mm

±3 mm

±7 mm

±15 mm

not applicable

### TECHNICAL **SPECIFICATIONS**

Sampling	rate
----------	------

Power supply

#### LASER DISTANCE GAUGE

Technology

Measuring range (considering favorable conditions)

Repeatability

Resolution

Accuracy:

distance 1 m distance 10 m distance 20 m distance 50 m distance 100 m

Built-in temperature sensor accuracy

#### TILTMETER (3)

distance 150 m

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<sup>(4)</sup>

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.



#### 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

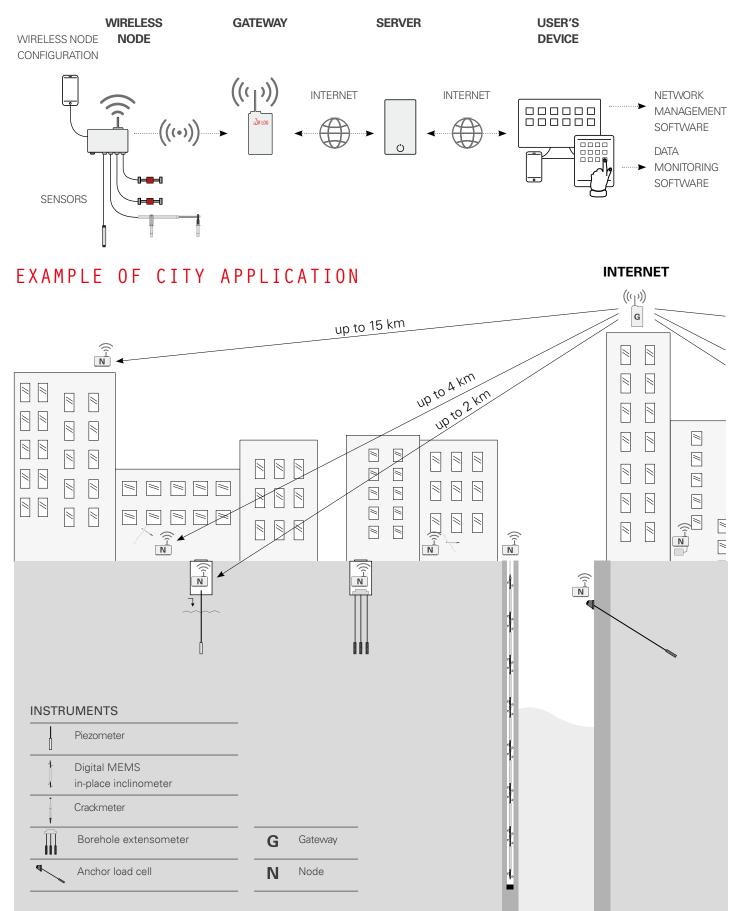
Takes current reading

Updates wireless node firmware



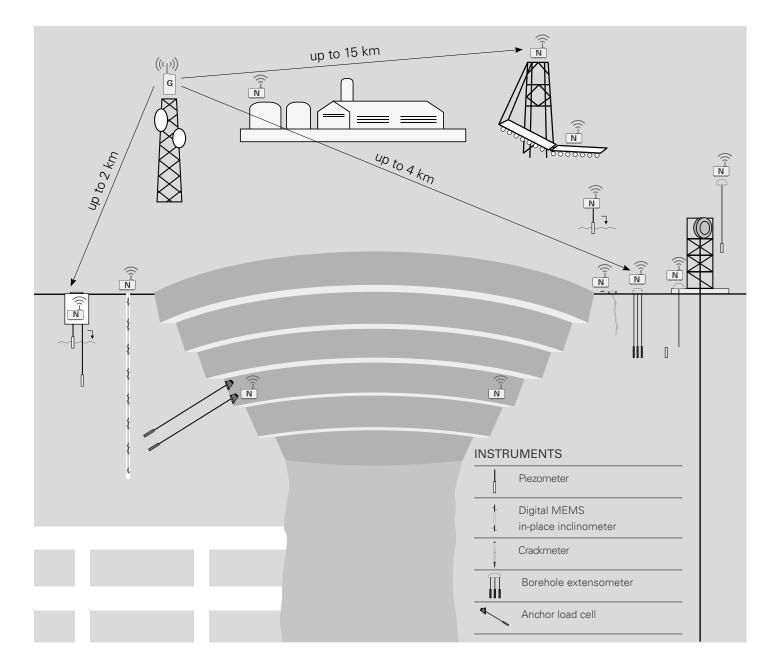


### TYPICAL SYSTEM ARCHITECTURE

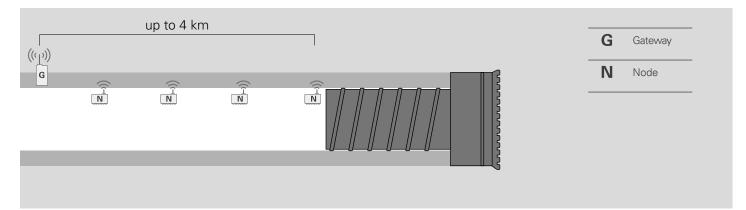


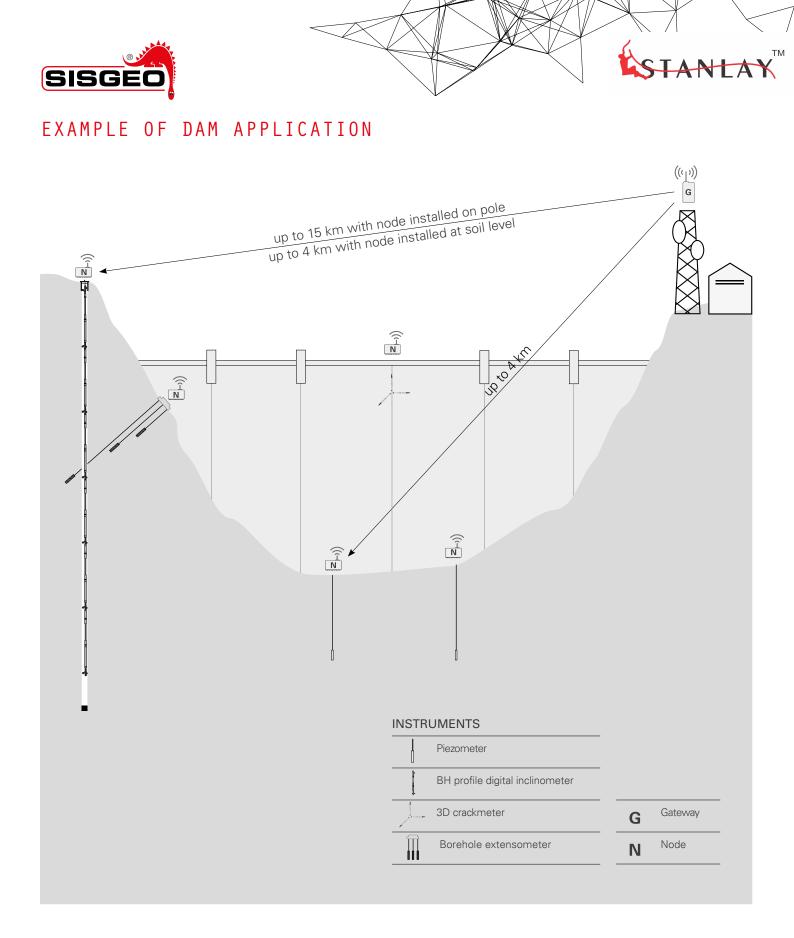


### EXAMPLE OF MINES APPLICATION



### EXAMPLE OF TUNNEL APPLICATION







### ACCESSORIES AND SPARE PARTS

C-SIZE BATTERY FOR NODES OLSWROBATTC	POLE MOUNTING BRACKET FOR NODES OLSACPOLPL8	WALL MOUNTING BRACKETS FOR NODES OLSACCMWALL	WALL MOUNTING BRACKETS FOR MININODE OLSPLAMWALL
<ul><li>3.6 V lithium-thionyl chloride high power C-size spiral cell for nodes power supply.</li><li>Minimum pulse capability: 2000mA.</li><li>Minimum continuous current: 1000mA.</li><li>Minimum capacity: 6.0Ah.</li></ul>	Plate for pole monting of nodes. It includes U-bolts and nuts for Ø 50 mm poles.	Suitable for all nodes model, except for Mininode. Composed by 2 mounting Brackets, aluminium made.	Suitable for Mininode only. Composed by 4 mounting Brackets, plastic made.
VERTICAL MOUNTING PLATE FOR WIRELESS TILTMETER OLSACCINCVPO	HORIZ. MOUNT. PLATE FOR WIRELESS TILTMETER OLSACCINCHPO	POLE MOUNT. BRACKET FOR WIRELESS TILTMETER OLSACCINCPLO	VERT. MOUNT. PLATE FOR LASER DIST. GAUGE OLSACCLASVPO
L shaped plate for wireless tiltmeter to be installed on vertical walls. Overall dimensions: 120x102x50 mm, thikness 10 mm.	Plate for wireless tiltmeter to be installed on horizontal surface. Dimensions 130x102x5 mm.	Plate for pole monting of wireless tiltmeters. It includes U-bolts and nuts for Ø 50 mm poles.	Adjustable mounting plate for vertical surface. Anchor bolts not included.
GATEWAY LIGHTENING PROTECTION FOR ETHERNET OLSACCPRETH	GATEWAY LIGHTENING PROTECTION FOR ANTENNA OLSACCPRANT	SWIVEL MOUNT. PLATE FOR LASER DIST. GAUGE OLSACCLASSWI	
Indoor Ethernet surge protection. Transient protection circuit based on high energy gas discharge tubes and a network of fast response silicon avalanche diodes (SAD).	RF coaxial surge protection on radio link. P8AX09-6G-N/ MF series from CITEL.	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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	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	One relay output (for alarm, etc.): volt-free closure (low voltage 30V, 2A)	
DIGITAL INPUTS			
Measurement rate (MR)	Max freque	ncy 1kHz	
Accuracy	0.1 H	0.1 Hz	
PROTECTIONS	Electro-mechanical relays for each measuring channel: Electrical endurance: min. 2x10 <sup>5</sup> operations, Mechanical endurance: 10x10 <sup>8</sup> operations. Circuit protection: Gas DischargeTubes (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 pola	10 to 30 V DC (reverse polarity protected), max 5 A	
External rechargeable batteries	12V DC n	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 (displ	-30 to +70°C (display -20 to +70°C)	
Storage temperature	-40 to +85°C (displ	lay -30 to +80°C)	
Humidity	80%	6	
Overvoltage category	П		
	2		
Pollution degree	2		
Pollution degree	< 74d	BA	



SOFTWARE & FIRMWARE





#### OMNIALOG GT-2400

#### OMNIALOG GT-100D

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

FHI SICAL CHANACTENISTICS		
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	2 3 4 5 6 7 6 7 6 7 6 7 6 7 6 7 6 7 6 7 6 7 6 7	5 6 7 6 7 6 7 6 7 6 7 6 7 6 7 100D 8 0 MNIALOG GT-100D
	1 Membrane keyboard	4 USB 7 "V" IN
	2 RS-232	5 "V" OUT 8 PWR input

3 LAN

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RS-485

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Analogical inputs

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