

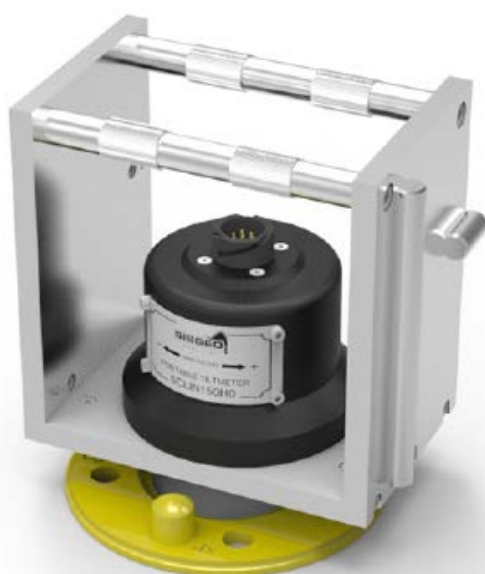
TILLI



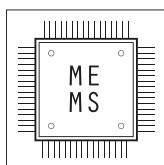
— **TILLI**  
PORTABLE  
TILTMETER

INCLINOMETERS  
& PENDULUMS





## TILLI PORTABLE TILTMETER



TILLI is a portable tiltmeter composed by a rugged stainless steel frame with aluminium sensor housing containing a self-compensated MEMS accelerometer. The surfaces of the frame are machined to allow an accurate positioning of the tiltmeter during measurements.

When in use, TILLI is placed on the tilt plate which is permanently installed on the structure surface. The bottom surface of the tiltmeter is used with horizontally-mounted tilt plates while the side surface is used with vertically-mounted tilt plate.

Readings in two orthogonal directions can be obtained rotating the instrument of 90° only on the horizontal surface. Coniugated measurements (180 degree rotation) eliminate instrumental offset.

### APPLICATIONS

- Monitoring rotations in open pits and retaining walls
- Rotations caused by tunneling and mining
- Monitoring rotation in structures and buildings
- Slope stability and rock masses displacements

### FEATURES

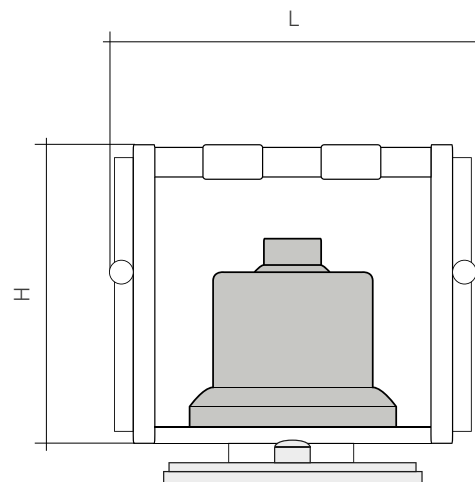
- Light and rugged system
- Very accurate thanks to the new MEMS technology
- Available steel protection cover to preserve measuring plate



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

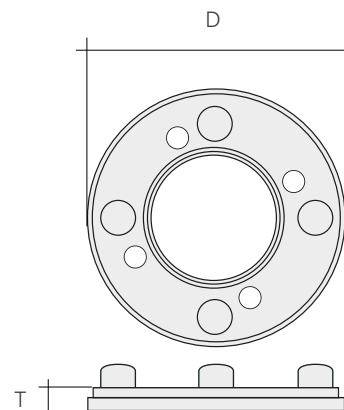
## TECHNICAL SPECIFICATIONS

	OSCLIN150H0 TILTMETER	CE
TILLI sensor	Uniaxial self-compensated MEMS	
Measuring range	$\pm 15^\circ$ from the vertical	
Sensor sensitivity	0.0013°	
Repeatability	$< \pm 0.003^\circ$	
Accuracy	$< 0.06\%$ FS (with 3 <sup>rd</sup> degree polynomial)	
Thermal drift	$\pm 0.005\%$ / °C	
Temp. operating range	-30°C to +70°C	
Material	Stainless steel frame anodised aluminium sensor housing	
Protection and overall dimensions (LxWxH)	IP67, 172x100x150 mm	
Weight	3 Kg	
Carrying case	Shock-resistant box dimension: 340x 290x150 mm	

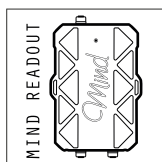
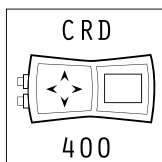


## TILT PLATE

	OSCLTP14B00
Material	brass
Dimension (DxT)	135x23 mm
Weight	630 g
Mounting method	epoxy bonding compound or screws (four 13 mm holes provided)



## READABLE BY



For further information refer to their own datasheets

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For the specific accuracy performance of each product, please refer to the Calibration Report issued for each instrument.  
The datasheet is issued in English and other languages. In order to avoid discrepancies and disagreement on the interpretation of the meanings, Sisgeo Srl declares that English Language prevails.



CRD



## — CRD 400 READOUT

READOUT UNITS  
AND DATALOGGERS





## 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.

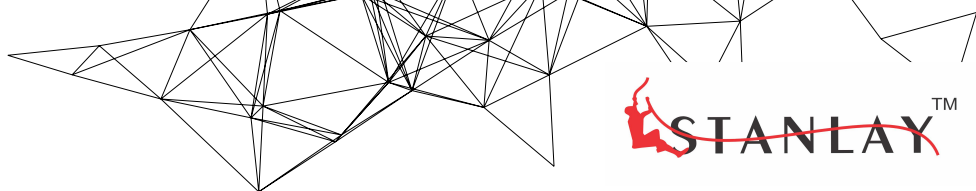
CRD-400 comes with shoulder/belt bag, battery charger, sensor cable with 6 alligator clips and USB flash drive with user manual.

### 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



## 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 0ECABCRD400

100-240 Vac / 12 Vdc  
battery charger



### SENSOR CABLE 0ECAV8P6A00

Jumper cable with 6  
alligator clips



### USB FLASH DRIVE

User manual



## ACCESSORIES

### JUMPER CABLE 0ECAV08V2J0

Jumper cable with  
2 connectors

### SWITCH BOX CABLE 0ECAV08V2S0

Jumper cable for  
switch measuring box



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MI ND



— MIND  
READOUT

READOUT UNITS  
AND DATALOGGERS







## MIND READOUT

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

When configuring sensors on the MIND app, calibration parameters of analog gauges (e.g. vibrating wire) can be downloaded from the Internet by entering the serial number.

## MAIN ADVANTAGES

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

## MIND APP

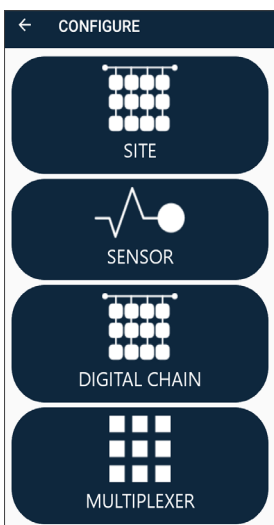
Thanks to its app, Mind is light system for a quick and handy interface with the instruments. The data storage and sharing is made simpler and immediate. Mind APP is also useful to read the QRcode placed on every analog Sisgeo instrument, having the identification, calibration and reading information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



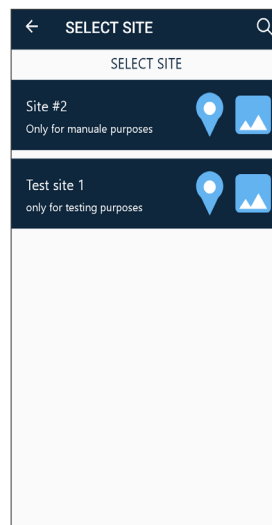
## APP OVERVIEW



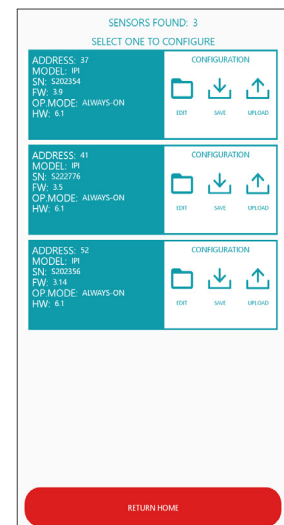
Instruments configuration main page.



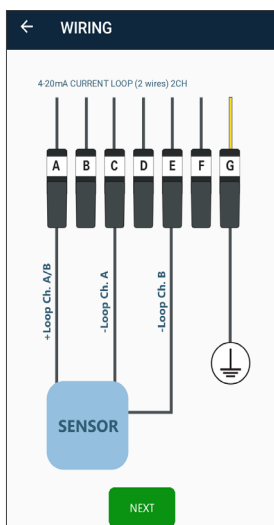
QR code scanner for automatic configuration of analog sensors.



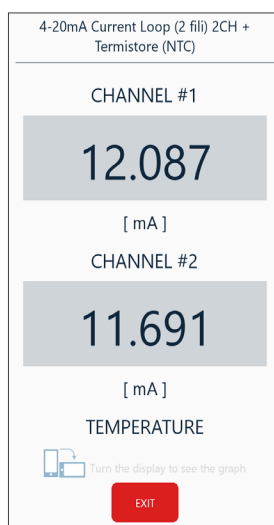
List of site with selectable icons to have info of geographical positioning and related picture.



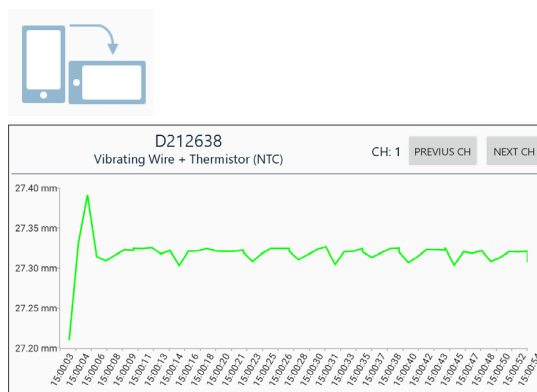
DSC (Digital Sensors Configuration) tool main page.



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 <sup>(1)</sup>	IP65
Overall dimensions	205x128x45 mm
Operating temperature	-20 to +55°C (charging +5°C to +40°C)
Storage temperature <sup>(2)</sup>	-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<sup>(1)</sup>

### 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 k $\Omega$

#### A.1 - MEASUREMENT TYPES

##### A.1.1 - 4-20mA current loop (2 wires)

Range   Resolution   Accuracy	0-24 mA   1 $\mu$ A at range 20 mA   6.0 $\mu$ A
Internal shunt resistor	100 $\Omega$
Power supply (up to 100 mA)	24V DC, 12V DC, external (selectable by the software)
Temperature drift	< 10 ppm / $^{\circ}$ C, range -30 $^{\circ}$ C to +70 $^{\circ}$

##### A.1.2 - Wheatstone full bridge (6 wires, with sensing)

Range   resolution   accuracy	$\pm$ 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 k $\Omega$ - min 200 $\Omega$
Temperature drift	< 10 ppm / $^{\circ}$ C, range -30 $^{\circ}$ C to +70 $^{\circ}$ C

##### A.1.3 - Platinum RTD (Pt100) 4-wire

Range   resolution   accuracy	-150 $^{\circ}$ C to +150 $^{\circ}$ C   0.1 $^{\circ}$ C   0.3 $^{\circ}$ C
Power supply	1 mA
Temperature drift	< 10 ppm / $^{\circ}$ C, range -30 $^{\circ}$ C to +70 $^{\circ}$ C

##### A.1.4 - Thermistor (NTC 3 k $\Omega$ @ 25 $^{\circ}$ C)

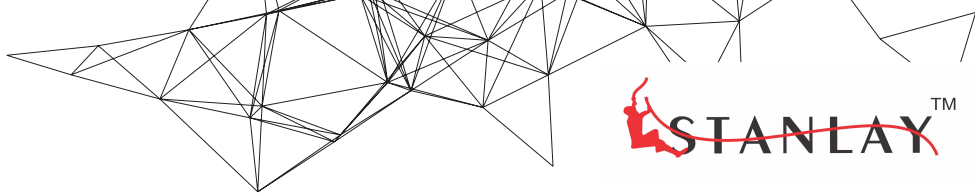
Range   resolution   accuracy	-50 $^{\circ}$ C to +150 $^{\circ}$ C   0.1 $^{\circ}$ C   0.2 $^{\circ}$ C
Power supply	2-100 $\mu$ A
Temperature drift	< 10 ppm / $^{\circ}$ C from 0 to 150 $^{\circ}$ C   < 20 ppm / $^{\circ}$ C from 0 to -30 $^{\circ}$ C   < 100 ppm/ $^{\circ}$ C from -30 $^{\circ}$ C to -50 $^{\circ}$ 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/ $^{\circ}$ C (-30 $^{\circ}$ C to +70 $^{\circ}$ 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

<b>D.1 - INTERNAL TEMPERATURE</b>	Range: -40°C to +125°C   Resolution: 0.1°C   Accuracy: ±1°C (-10°C to +85°C)
<b>D.2 - INTERNAL HUMIDITY</b>	Range: 0 to 100%RH   Resolution: 0.1% RH   Accuracy: ±5% (0 to 95%RH)
<b>D.3 - BATTERY VOLTAGE MONITOR</b>	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
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### G.2 - Voltage 4 wires, differential

Range   Resolution   Accuracy	±12V   1 mV   4 mV
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### G.3 - Servo inclinometers

Range   resolution   accuracy	±10V   1 mV   2 mV
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### G.4 - 1/2 Wheats. bridge (5 wires, with sensing)

Range   resolution   accuracy	±15 mV/V   0.005 mV/V   0.05 mV/V
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### 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

$\pm 15$  mV/V | 0.001 mV/V | 0.005 mV/V

#### G.8 - Carlson instruments (4 wires)

Range | resolution | accuracy

$\pm 10\%$  (ratio) | 0.01% (ratio) | 0.1% (ratio)

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

Range | resolution | accuracy

$\pm 150$  °C | 0.1°C |  $\pm 1$  °C

#### G.10 - PT-100 (Platinum RTD) (3 wires)

Range | resolution | accuracy

$\pm 150$  °C | 0.1°C |  $\pm 1$  °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.



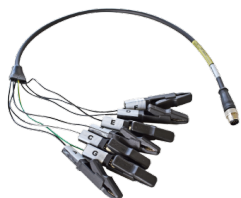
### MUX BOX-MIND JUMPER CABLE OECAVMINDMU

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) OECAV8PDIGO

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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