



USER MANUAL

DIGITAL CLAMP METER

CMP-1010




Version 1.01 11.09.2023


CMP-1010 True RMS multimeter is intended for measuring direct and alternating voltage, direct and alternating current, resistance, capacitance, frequency, duty cycle (filling) and temperature and for testing diodes and circuit continuity.

The most important features of CMP-1010 include:

- **possibility of carrying out measurements in the output circuits of inverters and frequency converters,**
- non-contact voltage detector,
- automatic and manual range setting,
- **REL** function for relative measurements,
- **PEAK MAX/PEAK MIN** function for displaying maximum and minimum peak values,
- the **INRUSH** function captures the starting current precisely in the beginning of 100-millisecond period when the device is just started,
- **HOLD** function used to maintain the read-out on the meter screen,
- backlight of the screen to read the measurement results in poor light,
- built-in flashlight for lighting the measurement location,
- sound signal for circuit continuity,
- AUTO-OFF function,
- 4-digit display (read-out 6000).




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1 Introduction

Thank you for purchasing Sonel multimeter. CMP-1010 meter is a modern, easy and safe measuring device. Please acquaint yourself with this manual in order to avoid measuring errors and prevent possible problems in operation of the meter.

This manual contains three types of warnings. They are presented as a framed text describing the possible risks for the user and the device. Texts  **WARNING** describe situations, which may endanger user's life or health, when instructions are not followed. Texts  **CAUTION!** begin a description of a situation, which may result in device damage, when instructions are not followed. Indication of possible problems is preceded by symbol .



WARNING

- **CMP-1010 meter is designed to measure the AC/DC current and voltage, frequency, resistance, capacitance, as well as to test the circuit continuity and diodes.** Any application that differs from those specified in the present manual may result in a damage to the device and constitute a source of danger for the user.
- **CMP-1010 meter must be operated only by appropriately qualified personnel with relevant certificates authorising the personnel to perform works on electric systems.** Unauthorized use of the meter may result in its damage and may be a source of serious hazard to the user.
- **Before operating the device, read thoroughly this manual and observe the safety regulations and guidelines provided by the producer.** Failure to follow instructions specified in this manual may result in a damage to the device and be a source of serious hazard to the user.

2 Safety

2.1 General rules

In order to provide conditions for correct operation and the correctness of the obtained results, the following recommendations must be observed:

- before using the meter read carefully this manual,
- the meter should be operated only by qualified persons that have passed health and safety training,
- be very careful when measuring voltages exceeding (as per IEC 61010-1:2010/AMD1:2016):

Normal locations	Wet locations
60 V DC	35 V DC
30 V AC RMS	16 V RMS
42.4 V AC of peak value	22.6 V AC of peak value

as they generate a potential risk of electric shock,

- do not exceed the maximum limits of the input signal,
- during the voltage measurements do not switch the device in the current or resistance measuring mode and vice versa,
- when changing ranges, always disconnect the test leads from the tested circuit,
- hold the measuring probes by the spot provided, restricted by a special barrier to avoid accidental contact with exposed metal parts,
- If during the measurement symbol **OL** appears on the screen, it indicates that the measured value exceeds the measurement range,
- It is unacceptable to operate:
 - ⇒ a damaged meter which is completely or partially out of order,
 - ⇒ a device with damaged insulation of test leads,
 - ⇒ a meter stored for an excessive period of time in disadvantageous conditions (e.g. excessive humidity).
- repairs may be carried out only by an authorised service point.



WARNING

- Never start the measurements if you have wet or damp hands.
- Do not perform measurements in explosive atmosphere (e.g. in the presence of flammable gases, vapours, dusts, etc.). Using the meter in such conditions may result in sparking and cause an explosion.

The limit values of the input signal	
Function	The maximum input value
A DC, A AC	1000 A
V DC, V AC	1000 V DC/AC RMS
Voltage frequency, duty cycle	1000 V DC/AC RMS
Resistance, continuity, diode test, capacitance, temperature	300 V DC/AC RMS

2.2 Safety symbols



This symbol located near another symbol or terminal, indicates that the user should read the further information contained in the manual.



This symbol located near the terminal, indicates that in normal use there is a possibility of dangerous voltages.



Protection class II – double insulation



Terminals with this marking cannot be connected to a circuit where the voltage to ground exceeds the maximum safe voltage of the device.

3 Preparing the meter for operation

After purchasing the meter, check whether the content of the package is complete.

Before performing the measurement:

- make sure that the battery level is sufficient for measurements,
- check whether the meter casing and insulation of the test leads are not damaged,
- to ensure consistent measurement results it is recommended to connect **black** lead to **COM** terminal and **red** lead to other terminals,
- when the meter is not in use, set the function switch in **OFF** position.

The device has the **AUTO-OFF function** triggered after 30 minutes of user inactivity. To turn the meter on again, set the function switch to **OFF** position and then set it at the desired function.



WARNING

- **Connecting wrong or damaged leads may cause electric shock.**
- **The meter must not be connected to the voltage source when it is set to current or resistance measurement or to diode test. Failure to observe this precaution may damage the meter!**

When using the meter, be sure to:

- discharge capacitors in the tested power sources,
- disconnect the power supply when measuring the resistance and diode tests,
- turn off the meter and disconnect test leads before removing the back cover to replace the batteries.



WARNING

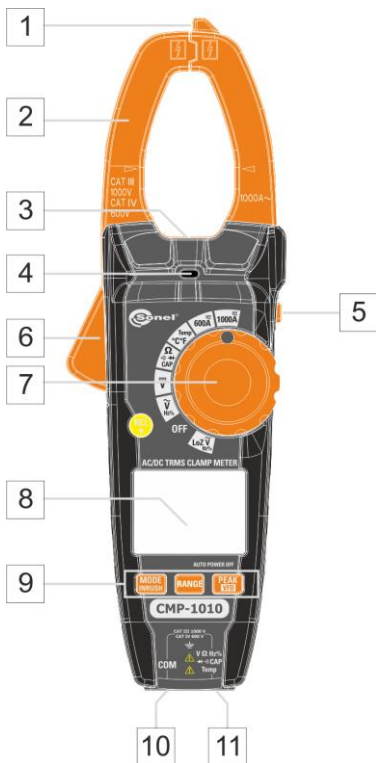
Do not use the meter if the cover of battery compartment is removed.



It is possible that in certain low ranges of AC or DC voltage, when the meter is not connected to the leads, the screen will show random and variable readings. This is a normal phenomenon, which results from the input sensitivity with high input resistance. When connected to a circuit, the read-out will stabilize and the meter will provide the correct value.

4 Functional description

4.1 Measuring terminals and functions



1 **Non-contact voltage detector**

2 **Current clamp**

3 **Flashlight**

4 **Indicator light of the non-contact voltage detector**




5 **Button HOLD / **

- HOLD mode – freezing the measurement results on the display (press briefly)
- flashlight mode (press and hold)

6 **Clamp-opening trigger**

7 **Rotary switch**

Function selection:

- **1000A**  – measurement of direct and alternating current up to 1000 A
- **600A**  – measurement of direct and alternating current up to 600 A
- **Temp °C °F** – temperature measurement
- **Ω ●**  **CAP** – measurement of resistance, continuity, diode test, measurement of capacitance
- **V** – measurement of direct voltage
- **V̂ Hz%** – measurement of alternating voltage, measurement of frequency and duty cycle
- **OFF** – the meter is switched off
- **LoZ V̂ Hz%** – low impedance measurement of alternating voltage, measurement of frequency and duty cycle

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Button REL 

- REL mode – press briefly:
 - ⇒ Reset display (DC current measurement)
 - ⇒ Displaying the measurement result related to the reference value (other measuring functions)
- Activating the backlight of the display (press and hold)

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LCD display

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Function buttons

- **MODE / INRUSH button**

The choice of sub-functions and modes assigned to the selected measurement function

- Changing the measurement mode in functions: A / temperature measurement / resistance / capacitance / continuity / diode test / V / frequency / duty cycle (press briefly)
- Displays the starting current (press and hold)

- **RANGE button**

Ustawianie zakresu pomiarowego:

- automatic (press and hold)
- manual (press briefly)

- **PEAK / VFD button**

- Displays peak value of the measured signal (press briefly)
- Measurement of current and voltage behind the inverter, frequency converter, in the VFD system (press and hold)

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COM measuring terminal

Measuring input, common for all measuring functions excluding current.

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Measurement terminal  CAPTemp

Measuring input for measurements other than current measurement.

4.2 Display



	Auto-off mode
AUTO	Automatic range setting
	Diode test
	Continuity test
P	Peak value
MAX / MIN	Maximum / Minimum value
REL	Relative measurement
H	HOLD function activated
VFD	Measurement behind the inverter, frequency converter, in the VFD system
INRUSH	Inrush current
n / μ / m / k / M	The prefix of multiple measurement unit
V	Voltage measurement
A	Current measurement
F	Measurement of capacitance
Ω	Measurement of resistance
Hz	Measurement of frequency
%	Duty cycle measurement
°C / °F	Temperature measurement in Celsius / Fahrenheit degrees
LoZ	Low-impedance measurement
DC	Constant signal
AC	Alternating signal
	Low battery
-	Negative read-out value
OL	Exceeded measurement range

4.3 Leads

The manufacturer guarantees the correctness of read-outs only when original test leads are used.



WARNING

Connecting wrong leads may cause electric shock or measurement errors.



- The probes are equipped with additional removable tip guards.
- The probes must be stored in a designated area.

5 Measurements

The content of this chapter should be thoroughly read and understood since it describes methods of measurements and basic principles of interpreting measurement results.

5.1 Current measurement

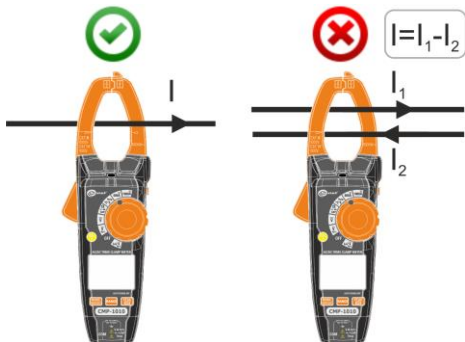



WARNING

Disconnect the test leads before measuring current using clamp.

To perform the current measurement:

- set the rotary switch at **600A** \approx / **1000A** \approx ,
- press **MODE/INRUSH** button to display the following symbol:
 - ⇒ \sim , if you are measuring alternating current,
 - ⇒ $\overline{\text{—}}$, if you are measuring direct current,
- use the clamp-opening trigger **6** and attach the clamps on the tested conduit. Only one conduit must be within the testing range of the clamps,
- read the measurement result on the display.



If DC current is measured and the meter is not attached to the tested circuit, but it still indicates a non-zero value, then you must reset it by pressing and holding **REL**  button.

5.2 Non-contact voltage detector



WARNING

- The detector is designed to detect the presence of a voltage, not for determining its absence.
- Electric shock hazard. Before using the tester, check if its operational by testing it on a known AC voltage (i.e. next applicable socket with live voltages).

To activate the detector:

- set the rotary switch at any position,
- touch the tip of the detector to the tested object.

If the AC voltage is present, the **indicator light will glow red**.



- The wires in the extension cords are often twisted. For best results, move the tip of the detector along the wire to locate the live line.
- The indicator has a high sensitivity. It can be randomly actuated by static electricity or other energy sources. This is normal.
- The type and thickness of the insulation, distance from the power source, shielded cables and other factors may affect the operation of the tester. If you are unsure about the test result, check the presence of voltage in a different way.

5.3 Voltage measurement



WARNING

- Electric shock hazard. The ends of measuring probes, due to their length, may not reach the live parts inside some network connections of low-voltage electrical equipment, because the contacts are arranged inside the sockets. In such a case, the read-out will be 0 V with the simultaneous presence of voltage in the socket.
- Before acknowledging the absence of voltage in the socket make sure that the ends of the of the probe touch the metal contacts inside the socket.



CAUTION!

Do not measure the voltage when an electric motor located within the circuit is being switched on or off. Resulting voltage spikes may damage the meter.

To perform AC voltage measurement:

- set the rotary switch at \overline{V} (direct voltage) or \tilde{V} Hz% (alternating voltage),
- connect black test lead to **COM** terminal, and red test lead to **VΩHz% → (•))** **CAPTemp** terminal,
- contact the tips of test probes to the points of measurement,
- read the measurement result on the display.

5.4 Frequency measurement

To perform frequency measurement:

- set the rotary switch at \tilde{V} Hz% or LoZ \tilde{V} Hz%,
- press **MODE/INRUSH** button to display **Hz** on the screen,
- connect black test lead to **COM** terminal, and red test lead to **V Ω Hz% \rightarrow (●) CAPTemp** terminal,
- contact the tips of test probes to the points of measurement,
- read the measurement result on the display.

5.5 Measurement % of duty cycle (pulse filling indicator)

To perform the measurement:

- set the rotary switch at \tilde{V} Hz% or LoZ \tilde{V} Hz%,
- press **MODE/INRUSH** button, until symbol % is shown on the display,
- connect black test lead to **COM** terminal, and red test lead to **V Ω Hz% \rightarrow (●) CAPTemp** terminal,
- contact the tips of test probes to the points of measurement,
- read the measurement result on the display.

5.8 Circuit continuity test



WARNING

Do not perform measurements on the circuit under the voltage. Before the measurement disconnect the power and discharge capacitors.

To perform the continuity test:

- set the rotary switch at Ω ●))) →|CAP,
- press **MODE/INRUSH** button to display ●))) Ω on the screen,
- connect black test lead to **COM** terminal, and red test lead to **V Ω Hz% →|●))) CAPTemp** terminal,
- contact the tips of test probes to the points of measurement,
- read the measurement result on the display; the beep will be activated when resistance values are below approx. **50 Ω** .

5.9 Diode test



WARNING

Do not perform measurements on the circuit under the voltage. Before the measurement disconnect the power and discharge capacitors. Do not test the diode under voltage.

To perform the diode test:

- set the rotary switch at Ω ●))) →|CAP,
- press **MODE/INRUSH** button, to display →|V on the screen,
- connect black test lead to **COM** terminal, and red test lead to **V Ω Hz% →|●))) CAPTemp** terminal,
- contact the tips of test probes to the diode. The red test probe should contact the anode and the black should contact cathode,
- read the test result on the display – the forward voltage is displayed.
 - ⇒ For a typical silicon rectifier diode, it is approx. 0.7 V, and for a germanium diode it is approx. 0.3 V

- ⇒ For LEDs with a low power, typical voltage value is in the range of 1.2...5.0 V depending on the colour.
- ⇒ If the diode is polarized in the reverse direction, or there is a break in the circuit, the display will show **OL**.
- ⇒ When the diode is shorted, the meter will show a value near **0 V**,
- after completing the measurements, remove test leads from the terminals of the meter.

5.10 Measurement of capacitance



WARNING

Risk of electric shock. Disconnect the power supply from the tested capacitor and discharge all capacitors before any starting capacity measurements.

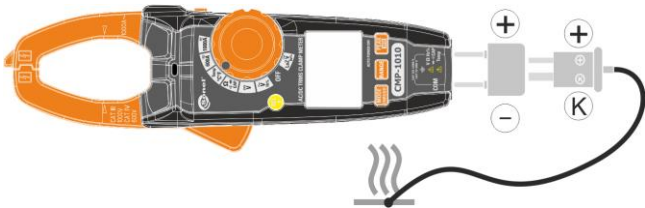
To perform the measurement:

- set the rotary switch at **Ω ●)))) → CAP**,
- press **MODE/INRUSH** button to display **nF** on the screen,
- connect black test lead to **COM** terminal, and red test lead to **VΩHz% → ●)))) CAPTemp** terminal,
- contact the probe tips to the tested capacitor,
- read the measurement result on the display.

5.11 Temperature measurement

To perform the measurement:

- set the rotary switch at **Temp °C °F**,
- to change the unit, press **MODE/INRUSH**,
- **place the adapter of the temperature probe in COM terminal** (black leg and **VΩHz% →(•)) CAPTemp** (red leg):
- **place the temperature probe in the adapter**, as shown in the figure:
 - ⇒ thin pin of the probe (marked as **+**) fits to terminal **+**;
 - ⇒ thick pin of the probe (marked as **K**) fits to terminal **-**;
 - ⇒ reversed connection of the probe is mechanically **impossible**,
- contact the head of the temperature probe to the device under test. Maintain the contact of the probe head with the part of the device under test, until the reading stabilizes.
- read the measurement result on the display,
- after completing the measurements, disconnect the probe from the meter.



CAUTION!



Risk of burns. The temperature probe heats up, adapting to the temperature of tested object.

6 Special features

6.1 Button REL

6.1.1 REL function

This mode enables a measurement relative to a reference value.

- To enable the mode, press briefly **REL** . Then, the displayed readout value is taken as the reference value, and the readout will be reset.
- From this moment, the readings will be presented as the ratio of the measured value to the reference value.
- To enable the mode, press **REL** .

The displayed main result is the difference between the reference value (read-out at the moment of activating REL mode) and the current read-out. Example: if **the reference value is 20 A**, and the current **reading is 12.5 A**, then the main result on the **display will be -7.5 A**. If the new reading is identical to the reference value, then the result will be zero.



- When the function is activated, the automatic adjustment of the measuring range is not available.
- If the reading is outside the measurement range, symbol **OL** is displayed. In this situation, turn off the function and manually switch to a higher range.
- This function is **not available** for diode test, continuity test and duty cycle.

6.1.2 Display backlight

Pressing and holding **REL**  button for **2 seconds** will turn ON/OFF the display backlight function.

6.2 RANGE button

The button is used to set the measuring range.

- ⇒ To enable the automatic function, press and hold **RANGE button longer than 1 second**.
- ⇒ To manually toggle through the measuring ranges, press **RANGE** button.

6.3 Button MODE/INRUSH

6.3.1 Changing the measurement mode

Press briefly **MODE/INRUSH** button to switch between the available measurement modes.

6.3.2 INRUSH function

The INRUSH function captures the starting current precisely in the beginning of 100-millisecond period when the device is just started. To perform the measurement:

- activate the AC measurement,
- press and hold **MODE/INRUSH** button,
- fasten the clamp on the cord supplying power to the tested object,
- turn ON the tested object,
- read the results.

To disable the mode, press and hold the **MODE/INRUSH** button.



- This function is available only when measuring AC current.
- While INRUSH is active, autoranging is disabled, therefore it is advised to start the function after connecting test leads to the measurement point. Running INRUSH before that may cause overrange symbols to appear.

6.4 PEAK/VFD button

6.4.1 PEAK MAX/PEAK MIN function

PEAK function allows user to record very short alternating voltage surges.

The meter will update the display each time a lower negative, or higher positive peak occurs. Auto Power Off feature will be disabled automatically in this mode.

- ⇒ To activate the mode, press briefly the **PEAK/VFD** button.
- ⇒ To disable the mode, press and hold the **PEAK/VFD** button.



- This function is available only when measuring AC voltage.
- While PEAK is active, autoranging is disabled, therefore it is advised to start the function after connecting test leads to the measurement point. Running PEAK before that may cause overrange symbols to appear.

6.4.2 VFD function


To measure the AC voltage behind the inverter, frequency converter or in the VFD system:


- set the rotary switch to the voltage or current measurement position,
- press and hold the **PEAK/VFD** button until the "VFD" symbol appears.

To disable the mode, press and hold the **PEAK/VFD** button.


6.5 Button HOLD

6.5.1 HOLD function


This function is used to 'freeze' the measurement result on the display. To do this, briefly press **HOLD**  button. When the function is enabled, the display shows symbol **H**.

To return to the normal operation mode of the device, press **HOLD**  button again.


6.5.2 Flashlight function

Briefly press **HOLD** , to turn on or off the flashlight mode.

6.6 Auto-Off

The meter automatically shuts off after **30 minutes** of user inactivity. Symbol  in the display indicates activated function.

Auto-off function may be temporarily disabled. For this purpose:

- set the rotary switch at **OFF** position,
- press and hold **MODE/INRUSH** button,
- set the rotary switch at the desired measuring function,
- wait until the meter reaches the measurement readiness,
- release **MODE/INRUSH** button. When the automatic shutdown is deactivated, the display does not show .



Each pass of the rotary switch through "OFF" position with non-pressed **MODE/INRUSH** button, will activate again the Auto-Off function.

7 Replacing the batteries



WARNING

To avoid electric shock, do not use the meter if the battery compartment cover is not in place or is not properly fastened.

CMP-1010 is powered by three LR03 AAA 1.5 V batteries. It is recommended to use alkaline batteries.

To replace the batteries:

- set the rotational function selector at OFF,
- **remove test leads from the terminals of the meter.**
- turn the fixing screw of the compartment cover to the position:



- remove the cover,
- remove the batteries and insert a new ones, observing the polarity,
- put on the cover and turn the fixing screw to the position:



- While performing the measurements with the low battery symbol displayed, the user must be aware of additional measurement uncertainties or unstable operation of the device.
- If the meter does not work properly, check the batteries in order to ensure that they are in proper condition and properly installed in the device.

8 Maintenance and care

The digital multimeter has been designed for many years of reliable use, provided that the following recommendations are observed for its maintenance and care:

1. **THE METER MUST BE DRY.** Wipe the dampened meter.
2. **THE METER MUST BE USED AND STORED IN NORMAL TEMPERATURES.** Extreme temperatures may shorten the life of electronic components and distort or melt plastic parts.
3. **THE METER MUST BE HANDLED CAREFULLY AND GENTLY.** Dropping the meter may damage its electronic elements or the housing.
4. **THE METER MUST BE KEPT CLEAN.** From time to time wipe the housing with a damp cloth. DO NOT use chemicals, solvents or detergents.
5. **USE ONLY NEW BATTERIES OF RECOMMENDED SIZE AND TYPE.** Remove the old or discharged batteries from the meter to avoid leakage and damage.
6. **IF THE METER IS TO BE STORED FOR LONGER THAN 60 DAYS,** remove the batteries and keep them separately.



The electronic system of the meter does not require maintenance.

9 Storage

During the storage of the device, the following recommendations must be observed:

- disconnect the test leads from the meter,
- make sure that the meter and accessories are dry,
- when the device is to be stored for longer time, remove the batteries.

10 Dismantling and disposal

Worn-out electric and electronic equipment should be gathered selectively, i.e. it must not be placed with waste of another kind.

Worn-out electronic equipment should be sent to a collection point in accordance with the law of waste electrical and electronic equipment.

Before the equipment is sent to a collection point, do not dismantle any elements.

Observe local regulations concerning disposal of packages, waste batteries and accumulators.

11 Specifications

11.1 Technical data

⇒ "m.v." means a standard measured value.

True RMS measurement for AC current

Range	Resolution	Accuracy
600.0 A	0.1 A	± (2.5% m.v. + 8 digits)
1000 A	1 A	± (2.8% m.v. + 8 digits)

- All AC current ranges are specified from 10% to 100% of range
- Frequency range: 50 Hz...60 Hz
- Overload protection: 1000 A

DC current measurement

Range	Resolution	Accuracy
600.0 A	0.1 A	± (2.5% m.v. + 5 digits)
1000 A	1 A	± (2.8% m.v. + 5 digits)

- Overload protection: 1000 A

True RMS voltage measurement

Range	Resolution	Accuracy for f = 50 Hz...40 kHz
4.000 V	0.001 V	± (1.5% m.v. + 5 digits)
40.00 V	0.01 V	
400.0 V	0.1 V	
1000 V	1 V	

- All AC voltage ranges are specified from 10% to 100% of range
- Input impedance: 9 MΩ
- Frequency range: 50 Hz...1000 Hz
- Overload protection: 1000 V DC/AC RMS

DC voltage measurement

Range	Resolution	Accuracy
600.0 mV	0.1 mV	$\pm (0.5\% \text{ m.v.} + 5 \text{ digits})$
6.000 V	0.001 V	$\pm (1.5\% \text{ m.v.} + 2 \text{ digits})$
60.00 V	0.01 V	
600.0 V	0.1 V	
1000 V	1 V	

- Input impedance: 10 M Ω
- Overload protection: 1000 V DC/AC RMS

LoZ measurement

Range	Resolution	Accuracy
6.000 V	0.001 V	$\pm (3.0\% \text{ m.v.} + 40 \text{ digits})$
60.00 V	0.01 V	
300.0 V	0.1 V	

- All AC voltage ranges are specified from 10% to 100% of range
- Input impedance: 300 k Ω
- Overload protection: 1000 V DC/AC RMS

Resistance measurement

Range	Resolution	Accuracy
600.0 Ω	0.1 Ω	$\pm (1.0\% \text{ m.v.} + 4 \text{ digits})$
6.000 k Ω	0.001 k Ω	$\pm (1.5\% \text{ m.v.} + 2 \text{ digits})$
60.00 k Ω	0.01 k Ω	
600.0 k Ω	0.1 k Ω	
6.000 M Ω	0.001 M Ω	$\pm (2.5\% \text{ m.v.} + 3 \text{ digits})$
60.00 M Ω	0.01 M Ω	$\pm (3.5\% \text{ m.v.} + 5 \text{ digits})$

- Overload protection: 300 V DC/AC RMS

Capacitance measurement

Range	Resolution	Accuracy
60.00 nF	0.01 nF	$\pm (4.0\% \text{ m.v.} + 20 \text{ digits})$
600.0 nF	0.1 nF	$\pm (3.0\% \text{ m.v.} + 5 \text{ digits})$
6.000 μF	0.001 μF	
60.00 μF	0.01 μF	
600.0 μF	0.1 μF	
6.000 mF	0.001 mF	
60.00 mF	0.01 mF	$\pm (5.0\% \text{ m.v.} + 8 \text{ digits})$
100.0 mF	0.1 mF	$\pm (5.0\% \text{ m.v.} + 15 \text{ digits})$

- Overload protection: 300 V DC/AC RMS

Frequency measurement

Range	Resolution	Accuracy
9.999 Hz	0.001 Hz	$\pm (1.2\% \text{ m.v.} + 5 \text{ digits})$
99.99 Hz	0.01 Hz	
999.9 Hz	0.1 Hz	
9.999 kHz	0.001 kHz	
99.99 kHz	0.01 kHz	

- Sensitivity: >5 V RMS for 20...80% of duty cycle and <100 kHz
- Overload protection: 1000 V DC/AC RMS

Duty cycle measurement

Range	Resolution	Accuracy
10.0...90.0%	0.1%	$\pm (1.2\% \text{ m.v.} + 2 \text{ digits})$


- Pulse amplitude: $\geq 5 \text{ V}$
- Pulse width: 0.1 ms...100 ms
- Frequency: 40 Hz...10 kHz

Temperature measurement

Range	Resolution	Accuracy
-20.0...+1000°C	0.1 or 1°C	$\pm (3\% \text{ m.v.} + 5^\circ\text{C})$
-4.0...+1832°F	0.1 or 1°F	$\pm (3\% \text{ m.v.} + 9^\circ\text{F})$

- The accuracy of the temperature probe is not taken into account
- Overload protection: 300 V DC/AC RMS

11.2 Operating data

a)	measurement category according to IEC 61010-1	CAT IV 600 V (III 1000 V)
b)	type of insulation	double, Class II
c)	housing type	double-composite
d)	degree of housing protection acc. to EN 60529	IP30
e)	pollution degree	2
f)	opening of measurement clamp	35 mm (1.4")
g)	power supply of the meter	3 x AAA 1.5 V battery
h)	diode test	$I = 0.3 \text{ mA}$, $U_0 < 3.2 \text{ V DC}$
i)	continuity test	acoustic signal for $R < 50 \Omega$ measuring current $< 0.5 \text{ mA}$
j)	indication for range exceeding	OL symbol
k)	low battery indication	symbol 
l)	measurement rate	2 measurements per second
m)	INRUSH function	
	▪ sampling time	48 Hz (RMS), 400 kHz (clock)
	▪ integration time	100 ms
	▪ sensitivity	$> 3 \text{ A AC}$
n)	crest factor for 50/60 Hz and indications in the range of 5...100%	
	▪ range of 300 A	3.0
	▪ range of 450 A	2.0
	▪ range of 1000 A	1.0
	▪ range of 300 V	3.0
	▪ range of 600 V	1.5
	▪ range of 1000 V	1.0
o)	range of the non-contact voltage detector	100...1000 V AC (50/60 Hz)
p)	response time for PEAK function	1 ms
q)	temperature sensor	type K thermocouple
r)	input impedance	
	▪ V AC/DC	10 M Ω
	▪ LoZ	300 k Ω
s)	AC read-out	True RMS (A AC and V AC)
t)	AC bandwidth	50...400 Hz
u)	display	4 digit LCD with backlight 6000 counts with function indicators
v)	dimensions	250 x 90 x 40 mm
w)	meter weight	329 g
x)	meter weight (without batteries)	293 g
y)	operating temperature	+5...+40°C
z)	operating humidity	$< 80\%$ for temp. $\leq 31^\circ\text{C}$ decreasing linearly to 50% at temp. 40°C
aa)	storage temperature	-20...+60°C
bb)	storage humidity	$< 80\%$
cc)	drop test	2 m
dd)	maximum operating altitude	2000 m
ee)	Auto-Off function	30 min
ff)	compliance with the requirements of the following standards	
		EN 61326-1, EN 61326-2, EN 301 489-1, EN 301 489-17
		IEC 61010-1, EN 61010-02-032, EN 61010-02-033
		RoHS 2011/65/EU, (EU) 2015/863, EN 62479:2010, EN 50663:2017
gg)	quality standard	ISO 9001

12 Service

The provider of guarantee and post-guarantee services is:

SONEL S.A.

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CAUTION!

Service repairs must be performed only by the manufacturer.