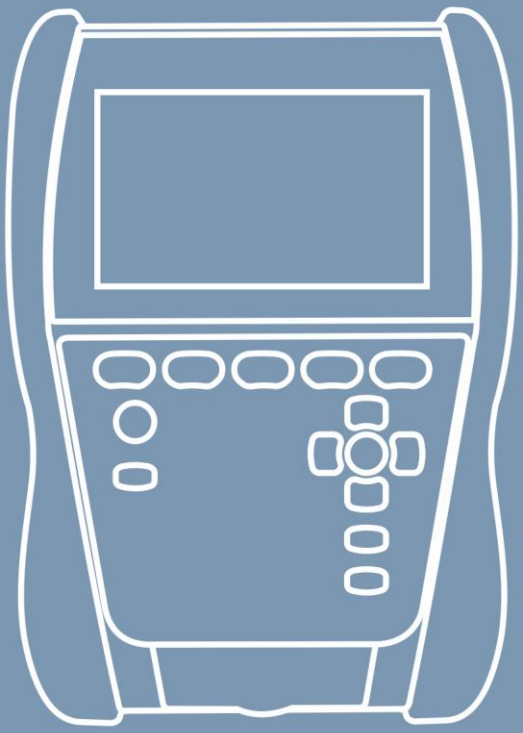


User manual

MPI-515 • MPI-516

Meter for electrical installation parameters


R_{ISO}+ / R_X+ / R_{CONT}+ / L / L_1 / H
PE / L_2 / E
R_{ISO}– / R_X– / R_{CONT}– / N / L_3 / S
MPI-516 | ES
PE
TEST
USB-PD
MPI-516
Measure2Protect

User manual

MPI-515 • MPI-516

Meter for electrical installation parameters

SONEL S.A.
Wokulskiego 11
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Poland

Version 1.00 02.10.2026

The MPI-515/516 meter is a modern, top quality measuring instrument which is easy and safe to use, provided that the principles presented in this manual are observed.

MeasureEffect™

The meters are part of the **Sonel MeasureEffect** platform. It is a comprehensive system that enables you to take measurements, store and manage data, and provides multi-level control of your instruments. You can find a detailed description of the system in the dedicated user manual.

The manual can be found on the manufacturer's website. Check **www.sonel.com › EN › Download › User manuals** (**Software** section), the platform page and the instrument page (**Files** section).

TROUBLE WITH MEASUREMENTS?



You can find all the information about the desired test in the help menu of the respective measurement function.



Download the user manual for the **Sonel MeasureEffect** platform and find information on the test in it. To do so, visit:

- the Sonel MeasureEffect platform web page,
- the web page of your instrument.

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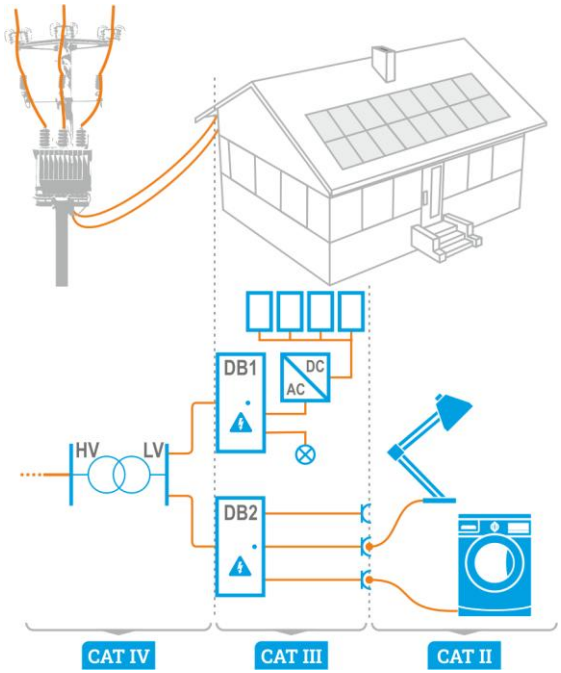
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1 General information

1.1 Safety symbols

The following international symbols are used in the device and/or in this manual:

	Refer to the user manual for additional information and explanations		Ground		AC current/voltage
	DC current/voltage		Double insulation (protection class)	CE	Declaration of Conformity with EU directives (*Conformité Européenne*)
	Do not dispose of with other household waste		Attention, risk of electric shock	⚠>550 V	Do not connect the device to systems with voltages above 550 V
	Conforms to relevant Australian standards				



Measurement categories according to EN IEC 61010-2-030:

- **CAT II** – concerns measurements performed in circuits directly connected to low voltage installations,
- **CAT III** – concerns measurements performed in buildings installations,
- **CAT IV** – concerns measurements performed at the source of low voltage installation.

1.2 Behaviour of signalling LEDs

The LED is on continuously

The LED flashes slowly

The LED flashes rapidly

1.3 Safety

To avoid electric shock or fire, as well as provide the conditions for correct operation and accuracy of obtained results, you must observe the following guidelines:

- Before you proceed to operate the device, acquaint yourself thoroughly with this manual and observe the safety regulations and specifications defined by the producer.
- Any application that differs from those specified in this manual may result in damage to the device and constitute a source of danger for the user and bystanders.
- The device must be operated solely by appropriately qualified personnel with relevant certificates to realise measurements of electric installation. Operating the analyzer by unauthorised personnel may result in damage to the device and constitute a source of danger for the user.
- Using this manual does not exclude the need to comply with occupational health and safety regulations and with other relevant fire regulations required during the performance of a particular type of work. Before starting the work with the device in special environments, e.g. potentially fire-risk/explosive environment, it is necessary to consult with the person responsible for health and safety.
- Before starting the work, check the device, wires, adapters and other accessories for any sign of mechanical damage. Pay special attention to the connectors.
- It is unacceptable to operate:
  - ⇒ it is damaged and completely or partially out of order,
  - ⇒ its cords and cables have damaged insulation,
  - ⇒ of the device and accessories mechanically damaged,
  - ⇒ it was stored for an excessive period of time in disadvantageous conditions (e.g. excessive humidity) After moving the device from a cool to a warm place with a high level of relative humidity, do not start measurements until the device is warmed up to the ambient temperature (approximately 30 minutes).
- Before measurement, choose a correct measurement function and make sure that the test leads are connected to their respective measuring terminals.
- The correct operation of the instrument and accessories must be checked regularly to avoid any hazard which may result from erroneous results.
- In a situation where the product works with other instruments or accessories, the lowest measurement category of the connected devices is used.
- Do not power the meter from sources other than those listed in this manual.
- Repairs may only be performed by an authorised service point.
- The set may contain third-party accessories. Regarding their safe use, the technical documentation of the respective accessory's manufacturer included in the set is binding.



WARNING

- **Only accessories for a given device should be used. Using other accessories may cause damage to measuring terminals, introduce additional measurement error and create a risk for the user.**
- **Do not touch the tested object during the R_{ISO} insulation resistance measurement or after the measurement before it is fully discharged. It may result in electric shock.**



NOTE!

It is forbidden to perform measurements: R_{CONT} continuity on energized circuits. This may damage the meter.



- Do not connect the device to systems with voltages above 550 V.
- Due to continuous development of the meter's software, the actual appearance of the display for some features may slightly differ from that presented in this user manual. The latest version of the manual is provided on the manufacturer's website.

2 Quick start

When you start the device for the first time, you must set the interface language and create a user profile (local user account). Finally, set the date, time and time zone.

1		Turn the meter on.
2		Create or log in to a local profile (local user account).
3		Enter the meter settings.
4		Select measurement. You can find information about it under ⓘ icon and in the **Sonel MeasureEffect** platform manual.
5		Enter the measurement settings.
6		Connect the meter to the tested object.
7		Start the measurement.
8		End the measurement or wait for it to be completed. Then you can enter additional information about the measurement.
9		Save the result in the memory.
10	**3 s** 	Turn the meter off / sleep mode.

- The menu windows are available under the function buttons.
  - ⇒ **F1** – Help.
  - ⇒ **F2** – Main settings.
  - ⇒ **F3** – Measurements.
  - ⇒ **F4** – Memory (folders),
  - ⇒ **F5** – **MPI-515**: Memory (measurements), **MPI-516**: Procedures.
- You can save measurements in two ways:
  - ⇒ by performing a measurement and then assigning it to an object in the memory structure,
  - ⇒ entering an object in the memory structure and making a measurement at this memory location.

3 Interface

The physical buttons are used to navigate the menu – just like the touch interface controls. They are necessary for when you turn off the screen touch function.



F1	Help		Up
F2	Main settings		Down
F3	Measurements		Left
F4	Memory (folders)		Right
F5	MPI-515 | Memory (measurements) MPI-516 | Procedures		Confirm
	• Turn on the meter / display brightness (short press) • Turn the meter off / sleep mode (press and hold)		Back / delete sign / stop measurement
	Start / stop measurement		Go to the main window

To activate a given interface element, use the arrows to select it (successive selected elements will be highlighted), and then press the button to confirm your selection. The same principle applies to the entire interface: from measurement screens, through the memory management menu and to the help.

4 Voltage check on the PE cable



- Connect the meter to the PE cable of the object being tested, enable the RCD or Z measurement function (except for $Z_{L-N,L-L}$!), touch the electrodes and wait approx. 1 second.
- If the meter detects voltage on the PE cable, it will display a warning. In this case, **immediately stop the measurements and correct the installation error.**

- During the test, be sure to stand on an uninsulated ground. Insulated ground may cause an incorrect test result.
- If the voltage on the PE conductor exceeds the acceptable limit value (approx. 50 V), the meter will signal the fact.
- If the meter is set to IT network, the electrode is inactive.

5 Measurements



WARNING

- **<u>Take particular care during wire measurement.</u> The risk of electric shock is present also after discharging their capacitance by the meter, as the voltage can be rebuilt automatically.**
- **During measurements, it is recommended to use electrical insulating personal protection equipment, which reduces the risk of touching the wires that may pose a threat to the user.**
- **During measurements of insulation resistance, dangerous voltage up to 1 kV + (0…10%) occurs at the ends of test leads of the meter.**
- **It is forbidden to disconnect test leads before the measurement is completed. Failure to obey the above instruction will lead to high voltage electric shock and make it impossible to discharge the tested object.**

5.1 Measurement indicators



Before the measurement

R_{ISO}

The voltage on the object is present continuously and exceeds 25 V, but does not exceed 50 V. The measurement is possible, but it may be burdened with an additional error.

- The voltage on the object is present continuously and exceeds 50 V. The measurement is blocked.
- Emergency state of the meter.

During the measurement

R_{ISO}	R_X
The meter is measuring the insulation resistance.	Continuity is maintained.
▼	
The meter has finished measuring the insulation resistance and is currently discharging the tested object.	
▼	
3x The measurement is completed and the tested object is discharged.	

6 Data transmission

6.1 MeasureEffect platform support

The meter supports the MeasureEffect platform. More details in the system's user manual.

6.2 Set of accessories to connect the meter to a PC

In order to ensure the communication of the meter with a computer a USB cable and the relevant software are required:

- Sonel Reader,
- Sonel Reports PLUS.

The software may be used for many devices manufactured by SONEL S.A. which are equipped with a USB interface. Detailed information is available from the manufacturer and distributors.

If the required software has not been purchased with the meter, it may be obtained from the manufacturer or from an authorised distributor.

6.3 Data transmission through USB port

1 

Enter the USB mode on the meter.

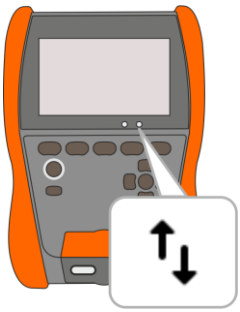
2 

Use the USB cable to connect the meter to the computer.

3 

Start the software for data transfer. During data transmission, all buttons on the meter are locked, except for those responsible for interrupting the transmission and switching off the device.

Additional information displayed by the meter





USB communication, data transfer.

7 Software update

- When the meter is connected to a wireless network with Internet access, it automatically updates its software, so no user action is necessary.
- When the meter is offline, you can update it using the USB memory in the menu **Settings ► Meter ► Update** (see **Sonel MeasureEffect** platform manual).

8 Power supply

NOTE!

- Before operating the meter, discharge the battery and then fully charge it, so that the indication of its charged status is correct.
- In order to do this as quickly as possible, proceed as follows:
  - ⇒ set the maximum brightness of the display,
  - ⇒ enter the measurement of insulation resistance,
  - ⇒ set the maximum measurement voltage and the maximum measurement time,
  - ⇒ start the measurement,
  - ⇒ after discharging and the meter automatically switching off, proceed to charging the battery.

The charge level of the rechargeable battery is indicated by the symbol in the right upper corner of the display on a permanent basis.

100% Battery charged.	Charging voltage too high. Change the charger or power supply source.
1% Battery completely discharged – charge it. All measurements are blocked. The meter will turn off automatically when the battery charge drops to a critical level.	Battery temperature out of permissible range. If a charging is in progress, it will be aborted.
Charging of the battery is in progress.	No battery. The meter operates on an external power supply.
Battery failure. It is recommended to replace it with a new one.	? Battery status unknown. Contact the customer service centre.

Additional information displayed by the meter



- Low battery charge level.
- Battery problem
- Charging of the battery is in progress.

8.1 Battery power

The meter is powered by a lithium-ion battery. The meter is charged by a USB power supply. It can be also charged from the car 12 V accessory socket, using an optional converter.



NOTE!

Do not power the meter from sources other than those listed in this manual.

8.2 Charging rechargeable battery

Charging starts once the power supply has been connected to the meter, regardless of whether the meter is on or off. The charging status is indicated on the display and by an active LED.

The USB-PD controller tries to negotiate charging parameters in the following order:

- 20 V, 2 A, max 40 W,
- 12 V, 2.25 A, max 27 W,
- 5 V, 3 A, max 15 W,
- 5 V, 0.5 A, max 2.5 W.

The charging algorithm allows the battery to be charged to approx. 90% in less than 2 hours. Charging time may take longer in non-optimal environmental conditions (too high or too low temperature) or in the case of using a USB-C-PD power adapter with parameters other than the factory supplied adapter (USB-C-PD 20 V min. 2.25 A).

Charging by any of the following methods is only possible with the meter turned off and will take more than 16 hours:

- power bank,
- power supply that does not support the USB-C-PD standard,
- computer USB port,
- via the USB-A / USB-C adapter.

If the battery temperature is below 0°C or above 45°C then charging stops completely.

When the meter is turned off by ⏻ button or by AUTO-OFF, the charging process is not stopped.

Indication of completed charging is shown by: 100%.

8.3 Power supply from mains

It is possible to charge the battery when carrying out the measurements. To do this, just connect the factory supplied charger to the meter.

When the meter is turned off by ⏻ button or by **AUTO-OFF**, the charging process is not stopped.

8.4 General rules for using Li-Ion rechargeable batteries

- Store the meter with batteries charged at least to 50%. The battery pack may be damaged if stored when fully discharged. The ambient temperature for prolonged storage should be maintained within the range of 5°C…25°C. The environment should be dry and well ventilated. Protect the device from direct sunlight.
- Charge the batteries in a cool, well-ventilated place at a temperature of 10°C ... 28°C. Modern fast chargers detect both too low and too high temperature of rechargeable batteries and react to the situation adequately. When the temperature is too low, charging is prevented as it may irreparably damage the batteries.
- Do not charge or use the batteries in extreme temperatures. Extreme temperatures reduce the lifetime of rechargeable batteries. Always observe the rated operating temperature. Do not dispose of the battery pack into fire.
- Li-Ion cells are sensitive to mechanical damage. This kind of damage may cause its permanent damage and thus cause ignition or explosion. Any interference in the structure of Li-ion battery pack may cause its damage. This may result in its ignition or explosion. A short-circuit of the battery poles "+" and "-" may permanently damage the battery pack or even cause its fire or explosion.
- Do not immerse Li-Ion battery in liquids and do not store in humid conditions.
- If the electrolyte contained in the Lithium-Ion battery pack comes into contact with eyes or skin, immediately rinse the affected area with plenty of water and consult with a doctor. Protect the battery against unauthorised persons and children.
- When you notice any changes in the Lithium-Ion battery pack (e.g. changes in colour, swelling, excessive temperature), stop using the battery pack. Li-Ion batteries that are mechanically damaged, overcharged or excessively discharged are not suitable for use.
- Any misuse of the battery may cause its permanent damage. This may result in its ignition. The seller and the manufacturer shall not be liable for any damages resulting from improper handling of the Li-Ion battery pack.

9 Cleaning and maintenance



NOTE!

Use only the maintenance methods specified by the manufacturer in this manual.

The casing of the meter may be cleaned with a soft, damp cloth using all-purpose detergents. Do not use any solvents or cleaning agents which might damage the casing (powders, pastes, etc.).

Clean the probe with water and dry it.

The test leads should be cleaned with water and detergents, and then dried.

The electronic system of the meter does not require maintenance.

10 Storage

In the case of storage of the device, the following recommendations must be observed:

- disconnect all the test leads from the meter,
- clean the meter and all its accessories thoroughly,
- wind the test leads,
- in order to prevent a total discharge of the battery pack in the case of a prolonged storage, charge the device **at least once every six months**.

11 Dismantling and utilisation

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 regulations valid in a given region.

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

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

12 Technical data

12.1 Basic data

⇒ The abbreviation "m.v." used in the specification of accuracy denotes a measured value

12.1.1 Measurement of AC/DC voltage

Display range	Resolution	Accuracy
0.0 V…299.9 V	0.1 V	±(2% m.v. + 6 digits)
300 V…550 V	1 V	±(2% m.v. + 2 digits)

- Frequency range: 45…65 Hz

Functions where voltage is measured

Measurement function	AC voltage measurement	DC voltage measurement
Voltage U measurement	√	√
Measurement of Z fault loop impedance	√	
Measurement of the RCD parameters	√	
Measurement of R_{ISO} insulation resistance	√	√
SPD tests	√	√
Phase sequence	√	
Measurement of R_E earth resistance	√	√
IMD health check	√	

12.1.2 Measurement of frequency

Display range	Resolution	Accuracy
45.0…65.0 Hz	0.1 Hz	±(0.1% m.v. + 1 digit)

- Voltage range: 50…550 V

12.1.3 Measurement of Z_{L-PE}, Z_{L-N}, Z_{L-L} fault loop impedance

Z_S fault loop impedance measurement for current I_{SCM}>1 A

Measuring range according to EN IEC 61557:

Test lead	Z_S measurement range
1.2 m	0.13…1999 Ω
5 m	0.17…1999 Ω
10 m	0.21…1999 Ω
20 m	0.29…1999 Ω
WS-03, WS-04, WS-07	0.19…1999 Ω
WS-09 + 1.2 m	0.19…1999 Ω

Display ranges:

Display range	Resolution	Accuracy
0…19.99 Ω	0.01 Ω	±(5% m.v. + 3 digits)
20.0…199.9 Ω	0.1 Ω	
200…1999 Ω	1 Ω	

- Rated operating voltage U_{nL-N}/U_{nL-L}: 110/190 V, 120/208 V, 220/380 V, 230/400 V, 240/415 V
- Voltage operating range: 90…270 V (for Z_{L-PE} and Z_{L-N}) and 180…460 V (for Z_{L-L})
- Mains rated frequency f_n: 50 Hz, 60 Hz
- Frequency operating range: 45…65 Hz
- Maximum test current: 41.5 A for 415 V (10 ms)
- Check of PE terminal connection correctness with the contact electrode (for Z_{L-PE})

Readings of fault loop impedance R_S and fault loop reactance X_S

Display range	Resolution	Accuracy
0…19.99 Ω	0.01 Ω	±(5% + 5 digits) of Z_S value
20.0…199.9 Ω	0.1 Ω	

- Calculated and displayed for Z_S values <200 Ω

Readings of short-circuit current I_k

Measurement ranges according to EN IEC 61557 can be calculated from the measurement ranges Z_S and rated voltages.

Display range	Resolution	Accuracy
0.057…1.999 A	0.001 A	Calculated on the basis of accuracy for the fault loop
2.00…19.99 A	0.01 A	
20.0…199.9 A	0.1 A	
200…9999 A	1 A	

- Prospective fault current calculated and displayed by the meter may slightly differ from the value calculated by the user with a calculator, basing on the displayed value of the impedance, because the meter calculates the current from unrounded value of fault loop impedance (which is used for displaying). As the correct value, consider I_k current value, displayed by the meter or by firmware.

Measurement of Z_{L-PE}, Z_{L-N}, Z_{L-L} fault loop impedance for current I_{SCM}=1 A

Measuring range according to EN IEC 61557: **0.75…1999 Ω**

Display range	Resolution	Accuracy
0…19.99 Ω	0.01 Ω	±(5% m.v. + 10 digits)
20.0…199.9 Ω	0.1 Ω	±(5% m.v. + 3 digits)
200…1999 Ω	1 Ω	

- Rated operating voltage U_{nL-N}/U_{nL-L}: 110/190 V, 120/208 V, 220 V, 230 V, 240 V
- Voltage operating range: 90…270 V
- Mains rated frequency f_n: 50 Hz, 60 Hz
- Frequency operating range: 45…65 Hz
- Maximum test current: 1 A
- Check of PE terminal connection correctness with the contact electrode (for Z_{L-PE})

12.1.4 Measurement of $Z_{L-PE[RCD]}$ fault loop impedance (without tripping the RCD)

Z_S fault loop impedance measurement

Measuring range according to EN IEC 61557: **0.5…1999 Ω** for the 1.2 m leads, WS-03, WS-04, WS-09+1.2 m and **0.51…1999 Ω** for the 5 m, 10 m and 20 m leads

Display range	Resolution	Accuracy
0…19.99 Ω	0.01 Ω	±(6% m.v. + 10 digits)
20.0…199.9 Ω	0.1 Ω	±(6% m.v. + 5 digits)
200…1999 Ω	1 Ω	

- Does not trip the RCD's with $I_{\Delta n} \geq 30$ mA
- Rated operating voltage U_n: 110 V, 120 V, 220 V, 230 V, 240 V
- Voltage operating range: 90…270 V
- Mains rated frequency f_n: 50 Hz, 60 Hz
- Frequency operating range: 45…65 Hz
- Check of PE terminal connection correctness with the contact electrode

Readings of fault loop impedance R_S and fault loop reactance X_S

Display range	Resolution	Accuracy
0…19.99 Ω	0.01 Ω	±(6% + 10 digits) of Z_S value
20.0…199.9 Ω	0.1 Ω	±(6% + 5 digits) of Z_S value

- Calculated and displayed for Z_S values <200 Ω

Readings of short-circuit current I_k

Measurement ranges according to EN IEC 61557 can be calculated from the measurement ranges Z_S and rated voltages.

Display range	Resolution	Accuracy
0.057…1.999 A	0.001 A	Calculated on the basis of accuracy for the fault loop
2.00…19.99 A	0.01 A	
20.0…199.9 A	0.1 A	
200…9999 A	1 A	

- Prospective fault current calculated and displayed by the meter may slightly differ from the value calculated by the user with a calculator, basing on the displayed value of the impedance, because the meter calculates the current from unrounded value of fault loop impedance (which is used for displaying). As the correct value, consider I_k current value, displayed by the meter or by firmware.

12.1.5 Measurement of $Z_{L\text{-}PE[RCD]}$ fault loop impedance (without tripping the RCD) – EV type RCD

Z_S fault loop impedance measurement

Measuring range according to EN IEC 61557: **0.5…1999 Ω** for the 1.2 m leads, WS-03, WS-04, WS-09+1.2 m and **0.51…1999 Ω** for the 5 m, 10 m and 20 m leads

Display range	Resolution	Accuracy
0…19.99 Ω	0.01 Ω	±(6% m.v. + 10 digits)
20.0…199.9 Ω	0.1 Ω	±(7% m.v. + 5 digits)
200…1999 Ω	1 Ω	

- Does not trip the EV type RCDs with $I_{\Delta n}$ ≥ 15 mA
- Rated operating voltage U_n: 110 V, 120 V, 220 V, 230 V, 240 V
- Voltage operating range: 90…270 V
- Mains rated frequency f_n: 50 Hz, 60 Hz
- Frequency operating range: 45…65 Hz
- Check of PE terminal connection correctness with the contact electrode

Readings of fault loop impedance R_S and fault loop reactance X_S

Display range	Resolution	Accuracy
0…19.99 Ω	0.01 Ω	±(6% + 10 digits) of Z_S value
20.0…199.9 Ω	0.1 Ω	±(7% + 5 digits) of Z_S value

- Calculated and displayed for Z_S values <200 Ω

Readings of short-circuit current I_k

Measurement ranges according to EN IEC 61557 can be calculated from the measurement ranges Z_S and rated voltages.

Display range	Resolution	Accuracy
0.057…1.999 A	0.001 A	Calculated on the basis of accuracy for the fault loop
2.00…19.99 A	0.01 A	
20.0…199.9 A	0.1 A	
200…9999 A	1 A	

- Prospective fault current calculated and displayed by the meter may slightly differ from the value calculated by the user with a calculator, basing on the displayed value of the impedance, because the meter calculates the current from unrounded value of fault loop impedance (which is used for displaying). As the correct value, consider I_k current value, displayed by the meter or by firmware.

12.1.6 Measurement of earth resistance

3-pole method (R_E3P)

The measurement method: 3-pole, in accordance with EN IEC 61557-5.
Measuring range according to EN IEC 61557-5: **0.46 Ω…1999 Ω** for U_n = 25 V, **0.38 Ω…1999 Ω** for U_n = 50 V.

Display range	Resolution	Accuracy
0.00…19.99 Ω	0.01 Ω	±(3% m.v. + 5 digits)
20.0…199.9 Ω	0.1 Ω	
200…1999 Ω	1 Ω	±5% m.v.

- Measuring current at the short circuit: 20 mA
- Test voltage frequency: 125 Hz for f_n=50 Hz, 150 Hz for f_n=60 Hz
- Selected test voltage: 25 V or 50 V
- Maximum interference voltage for the R_E measurement: 24 V
- Maximum resistance of auxiliary earth electrodes: 2 kΩ

MPI-516 | 4-wire method (R_E4P)

The measurement method: 4-wire, in accordance with EN IEC 61557-5.
Measuring range according to EN IEC 61557-5: **0.46 Ω…1999 Ω** for U_n = 25 V, **0.38 Ω…1999 Ω** for U_n = 50 V.

Display range	Resolution	Accuracy
0.00…19.99 Ω	0.01 Ω	±(3% m.v. + 5 digits)
20.0…199.9 Ω	0.1 Ω	
200…1999 Ω	1 Ω	±5% m.v.

- Measuring current at the short circuit: 20 mA
- Test voltage frequency: 125 Hz for f_n=50 Hz, 150 Hz for f_n=60 Hz
- Selected test voltage: 25 V or 50 V
- Maximum interference voltage for the R_E measurement: 24 V
- Maximum resistance of auxiliary earth electrodes: 2 kΩ

Measurement of resistance of auxiliary earth electrodes R_H, R_S

Display range	Resolution	Accuracy
0…999 Ω	1 Ω	±(5% (R_S + R_E + R_H) + 8 digits)
1.00…1.99 kΩ	0.01 kΩ	

12.1.7 Measurement of the RCD parameters

- Measurement of RCDs type: AC, A, B, EV, RCM
- Rated operating voltage U_n: 110 V, 120 V, 220 V, 230 V, 240 V
- Voltage operating range: 90…270 V
- Mains rated frequency f_n: 50 Hz, 60 Hz
- Frequency operating range: 45…65 Hz

RCD tripping test and t_A tripping time measurement (for t_A measurement function)

Measuring range according to EN IEC 61557-6: **10 ms … to the upper limit of displayed value**

RCD type	Multiplication factor setting	Display range	Resolution	Accuracy
General type and short-time delay type	0.5 $I_{\Delta n}$	0…300 ms (TN/TT) 0…400 ms (IT)	1 ms	±(2% m.v. + 2 digits)[1]
	1 $I_{\Delta n}$			
	2 $I_{\Delta n}$	0…150 ms		
	5 $I_{\Delta n}$	0…40 ms		
Selective	0.5 $I_{\Delta n}$	0…500 ms		
	1 $I_{\Delta n}$			
	2 $I_{\Delta n}$	0…200 ms		
	5 $I_{\Delta n}$	0…150 ms		
▪ EV 6 mA DC ▪ RCM	1 $I_{\Delta n}$	0.0…10.0 s	0.1 s	±(2% m.v. + 3 digits)
	10 $I_{\Delta n}$	0…300 ms	1 ms	
	33 $I_{\Delta n}$[2]	0…100 ms		
	50 $I_{\Delta n}$[3]	0…40 ms		

1) for $I_{\Delta n}$ = 10 mA and 0.5 $I_{\Delta n}$ accuracy is ±(2% m.v. + 3 digits)
2) for measurements acc. to IEC 62955
3) for measurements acc. to IEC 62752

- Accuracy of differential current setting:
  - ▪ for 1 $I_{\Delta n}$, 2 $I_{\Delta n}$, 5 $I_{\Delta n}$ ..... 0…8%
  - ▪ for 0.5 $I_{\Delta n}$ .....-8…0%

Effective value of forced leakage current at measurement of RCD disconnection time (does not apply to RCD EV 6 mA DC and RCM) [mA]

$I_{\Delta n}$	Multiplication factor setting															
	0.5				1				2				5			
	∿	⌒	⌒̲	⎓	∿	⌒	⌒̲	⎓	∿	⌒	⌒̲	⎓	∿	⌒		⎓
10	5	3.5	3.5	5	10	20	20	20	20	40	20	40	50	100	100	100
30	15	10.5	10.5	15	30	42	42	60	60	84	84	120	150	210	210	300
100	50	35	35	50	100	140	140	200	200	280	280	400	500	–	–	–
300	150	105	105	150	300	420	420	600	600	840	840	–	–	–	–	–
500	250	175	175	250	500	700	700	1000	1000	–		–	–	–	–	–
1000	500	–	–	–	1000	–	–	–	–	–	–	–	–	–	–	–

Effective value of forced leakage current at measurement of RCD disconnection time (applies to RCD EV 6 mA DC and RCM) [mA]

$I_{\Delta n}$	Multiplication factor setting			
	1	10	33	50
6 mA DC acc. to IEC 62955	6	60	200	—
6 mA DC acc. to IEC 62752	6	60	—	300

R_E – protective conductor resistance for RCD

Selected RCD rated current	Measurement range	Resolution	Test current	Accuracy
10 mA	0.01 kΩ…5.00 kΩ	0.01 kΩ	4 mA	0….+10% m.v. ± 8 digits
30 mA	0.01 kΩ…1.66 kΩ		12 mA	0….+10% m.v. ± 5 digits
100 mA	1 Ω…500 Ω	1 Ω	40 mA	0….+5% m.v. ± 5 digits
300 mA	1 Ω…166 Ω		120 mA	
500 mA	1 Ω…100 Ω		200 mA	
1000 mA	1 Ω…50 Ω		400 mA	

Measurement of touch voltage U_B referred to rated residual current

Measuring range according to EN IEC 61557: **10…99.9 V**

Display range	Resolution	Test current	Accuracy
0…9.9 V	0.1 V	0.4 $I_{\Delta n}$	0…10% m.v. ± 5 digits
10.0…99.9 V			0…15% m.v.

RCD I_A tripping current measurement for sinusoidal residual current

Measuring range according to EN IEC 61557: **(0.3…1.0)$I_{\Delta n}$**

Selected RCD rated current	Measurement range	Resolution	Test current	Accuracy
10 mA	3.0…10.0 mA	0.1 mA	0.3 $I_{\Delta n}$…1.0 $I_{\Delta n}$	±5% $I_{\Delta n}$
30 mA	9.0…30.0 mA			
100 mA	30…100 mA	1 mA		
300 mA	90…300 mA			
500 mA	150…500 mA			
1000 mA	300…1000 mA			

- It is possible to start the measurement from positive or negative half-period of forced residual current
- Test current flow time: max. 3200 ms

Measurement of RCD disconnection current I_A for differential unidirectional pulsed current and unidirectional pulsed current with 6 mA direct current offset

Measuring range according to EN IEC 61557: **(0.35…1.4)$I_{\Delta n}$** for $I_{\Delta n}$≥30 mA and **(0.35…2)$I_{\Delta n}$** for $I_{\Delta n}$=10 mA

Selected RCD rated current	Measurement range	Resolution	Test current	Accuracy
10 mA	3.5…20.0 mA	0.1 mA	0.35 $I_{\Delta n}$…2.0 $I_{\Delta n}$	±10% $I_{\Delta n}$
30 mA	10.5…42.0 mA		0.35 $I_{\Delta n}$…1.4 $I_{\Delta n}$	
100 mA	35…140 mA	1 mA		
300 mA	105…420 mA			
500 mA	175…700 mA			

- Measurement may be performed for positive or negative half-periods of forced leakage current
- Test current flow time: max. 3200 ms

Measurement of RCD disconnection current I_A for differential direct current
Measuring range according to EN IEC 61557: **$(0.2…2)I_{\Delta n}$**

Selected RCD rated current	Measurement range	Resolution	Test current	Accuracy
6 mA [1)]	1.0…6.0 mA	0.1 mA	1.0…6.0 mA	±6% $I_{\Delta n}$
10 mA	2.0…20.0 mA	0.1 mA	0.2 x $I_{\Delta n}$…2.0 x $I_{\Delta n}$	±10% $I_{\Delta n}$
30 mA	6…60 mA	1 mA		
100 mA	20…200 mA			
300 mA	60…600 mA			
500 mA	100…1000 mA			

- Measurement can be performed for positive or negative forced leakage current
- Test current flow time (does not apply to RCD EV and RCM): max. 4500 ms

1) Test current flow time (applies to RCD EV and RCM)
   - acc. to IEC 62955.....30 s
   - acc. to IEC 62752.....40 s

12.1.8 Measurement of insulation resistance

Measuring range according to EN IEC 61557-2 for U_N = 50 V: **50 kΩ…250 MΩ**

Display range dla U_N = 50 V	Resolution	Accuracy
0 kΩ...49 kΩ	1 kΩ	unspecified
50 kΩ...1999 kΩ	1 kΩ	±(3% m.v. + 8 digits). [±(5% m.v. + 8 digits)] *
2.00 MΩ...19.99 MΩ	0.01 MΩ	
20.0 MΩ...199.9 MΩ	0.1 MΩ	
200 MΩ...250 MΩ	1 MΩ	

* – for WS-03 and WS-04 adapter

Measuring range according to EN IEC 61557-2 for U_N = 100 V: **100 kΩ…500 MΩ**

Display range dla U_N = 100 V	Resolution	Accuracy
0 kΩ...99 kΩ	1 kΩ	unspecified
100 kΩ...1999 kΩ	1 kΩ	±(3% m.v. + 8 digits) [±(5% m.v. + 8 digits)] *
2.00 MΩ...19.99 MΩ	0.01 MΩ	
20.0 MΩ...199.9 MΩ	0.1 MΩ	
200 MΩ...500 MΩ	1 MΩ	

* – for WS-03 and WS-04 adapter

Measuring range according to EN IEC 61557-2 for U_N = 250 V: **250 kΩ…999 MΩ**

Display range dla U_N = 250 V	Resolution	Accuracy
0 kΩ...249 kΩ	1 kΩ	unspecified
250 kΩ...1999 kΩ	1 kΩ	±(3% m.v. + 8 digits) [±(5% m.v. + 8 digits)] *
2.00 MΩ...19.99 MΩ	0.01 MΩ	
20.0 MΩ...199.9 MΩ	0.1 MΩ	
200 MΩ...999 MΩ	1 MΩ	

* – for WS-03 and WS-04 adapter

Measuring range according to EN IEC 61557-2 for U_N = 500 V: **500 kΩ…2.00 GΩ**

Display range dla U_N = 500 V	Resolution	Accuracy
0 kΩ...499 kΩ	1 kΩ	unspecified
500...1999 kΩ	1 kΩ	±(3% m.v. + 8 digits) [±(5% m.v. + 8 digits)] *
2.00...19.99 MΩ	0.01 MΩ	
20.0...199.9 MΩ	0.1 MΩ	
200...999 MΩ	1 MΩ	
1.00…2.00 GΩ	0.01 GΩ	±(4% m.v. + 6 digits) [±(6% m.v. + 6 digits)] *

* – for WS-03 and WS-04 adapter

Measuring range according to EN IEC 61557-2 for U_N = 1000 V: **1000 kΩ…3.00 GΩ**

Display range dla U_N = 1000 V	Resolution	Accuracy
0 kΩ...999 kΩ	1 kΩ	unspecified
1000...1999 kΩ	1 kΩ	±(3% m.v. + 8 digits)
2.00...19.99 MΩ	0.01 MΩ	
20.0...199.9 MΩ	0.1 MΩ	
200...999 MΩ	1 MΩ	
1.00...3.00 GΩ	0.01 GΩ	±(4% m.v. + 6 digits)

- Type of test voltage: DC
- Test voltage: 50 V, 100 V, 250 V, 500 V, 1000 V
- Accuracy of generated voltage (R_{LOAD} [Ω] ≥ 1000*U_N [V]): -0+10% from the set value
- Detection of a dangerous voltage before commencing a measurement
- Discharging the tested object
- Measurement of voltage on R_{ISO}+, R_{ISO}- terminals within the range of: 0…440 V
- Test current <1.4 mA
- Adjustable measuring time: 4 s…3 min with a resolution of 1 s and option **Continuous test**
- When the WS-03 or WS-04 adapter is used (U_N = 50 V / 100 V / 250 V / 500 V), the insulation resistance between the shorted L and N lines and the PE conductor is tested ($R_{ISO\ LN-PE}$)
- Insulation resistance measurement for multi-wire cables (max. 5) using an optional external AutoISO-1011 adapter
- Discharge time of C=2 µF capacitance charged to 1000 V: <30 s



For insulation resistance below R_{ISOmin} there is no accuracy specified because the meter works with the adjustable current limit in accordance with the following formula:

$$R_{ISO\,min} = \frac{U_{ISO\,nom}}{I_{ISOnom}}$$

where:
R_{ISOmin} – minimum insulation resistance measured without limiting the converter current
U_{ISOnom} – nominal test voltage
I_{ISOnom} – nominal converter current (1 mA)

12.1.9 Low-voltage measurement of continuity and resistance

Measurement of continuity of protective conductors and equipotential bondings with ±200 mA current

Measuring range according to EN IEC 61557-4: **0.12…400 Ω**

Display range	Resolution	Accuracy
0.00…19.99 Ω	0.01 Ω	±(2% m.v. + 3 digits)
20.0…199.9 Ω	0.1 Ω	
200…400 Ω	1 Ω	

- Voltage at open terminals: 9…13 V
- Output current at R < 2 Ω: I_{SC} > 200 mA
- Compensation of test leads resistance
- Measurements for both current polarizations

Measurement of resistance with low current

Display range	Resolution	Accuracy
0.0…199.9 Ω	0.1 Ω	±(3% m.v. + 3 digits)
200…1999 Ω	1 Ω	

- Voltage at open terminals: 9…13 V
- Short-circuit current I_{SC}: 8…15 mA
- Audio signal for measured resistance <(30 Ω±50%)
- Compensation of test leads resistance

12.1.10 Phase sequence

- Phase sequence indication: correct, incorrect
- Range of mains voltage U_{L-L}: 95…550 V (45…65 Hz)
- Display of phase-to-phase voltages

12.1.11 MPI-516 | SPD tests

SPD type	Voltage type	Voltage range U_C	Resolution	Accuracy
Varistor (MOV)	DC	0…1000 V	1 V	±(3% m.v. + 8 digits)
	AC	0…615 V		
Spark gap (GDT)	DC	0…1000 V	1 V	±(3% m.v. + 20 digits)

- Current protection: 1 mA
- Voltage surge speed: 200 V/s

12.1.12 MPI-516 | IMD health check

The parameters below are for tests on sockets L1-L2, L1-PE and L2-PE.

Simulated insulation resistance

Insulation resistance simulation range R_{SIM}	Resolution (resistance pitch)	Accuracy
5...640 kΩ	5 kΩ	±8%

- Insulation simulator resistance is connected in parallel to the internal resistance of the voltage meter inside the meter, whose value is around 3.5 MΩ

Generated leakage current

I_L	Resolution
0.0…54.9 mA	0.1 mA

- Current is calculated on the basis of the main voltage at the time and simulated resistance

Tripping time test

Tripping time t_{OFF}	Resolution	Accuracy
0.00...19.99 s	0.01 s	±0.01 s
20.0...300.0 s	0.1 s	±0.1 s

- Limit set in the range: 1…300 s

Test step time setting

t_{STEP}	Resolution
1...99 s	1 s

Permitted mains voltage and its time

Connection method	Voltage permitted in ≤5 s *	Voltage permitted in >5 s
1P	U_{L1-PE}. U_{L2-PE} = 0…300 V	U_{L1-PE}. U_{L2-PE} = 0…210 V
2P	U_{L1-L2} = 90.0…549 V U_{L1-PE}. U_{L2-PE} = 0…300 V	U_{L1-L2} = 90.0…549 V U_{L1-PE}. U_{L2-PE} = 0…210 V

* The presence of voltage U_{Lx-PE} = 210…300 V in >5 s or exceeding the maximum permitted voltage stops the test

12.2 Operating data

a) type of insulation acc. to EN 61010-1 and EN IEC 61557 ..... double
b) measurement category acc. to EN IEC 61010-2-030 ..... CAT IV 300 V, CAT III 500 V
c) contamination level acc. to EN 61010-1 2
d) ingress protection acc. to EN 60529 ..... IP54
e) power supply ..... Li-Ion 10.8 V 3.5 Ah rechargeable battery
f) dimensions ..... 234 x 169 x 71 mm
g) weight ..... ca. 1.5 kg
h) storage temperature ..... -25…+70°C
i) operating temperature ..... -20…+50°C
j) humidity ..... 20…90%
k) reference temperature ..... +23°C ± 2°C
l) reference humidity ..... 40…60%
m) nominal operating altitude (above sea level) ..... ≤2000 m*
n) display ..... LCD, color capacitive touchscreen 5"
..... resolution 1220x720 dots, max brightness 500 cd/m^2
o) number of R_{ISO} measurements acc. to EN IEC 61557-2 with battery power supply ..... min. 650
p) number of Z_{L-N} measurements with battery power supply ..... min. 750
q) time of operation on a single battery charge
▪ for R_{ISO}=1 MΩ, U_{ISO}=1 kV, T=(23±5)°C, screen backlight 50% ..... approx. 6 h
▪ for Z_{L-N}, T=(23±5)°C, screen backlight 50% ..... approx. 7 h
r) memory of measurement results ..... 9999 results
s) transmission of results ..... USB-C, Bluetooth, Wi-Fi
t) Wi-Fi band frequency ..... 2.4 GHz, 5 GHz
u) quality standard ..... development, design and manufacturing are ISO 9001, ISO 14001, ISO 45001 compliant
v) the device meets the requirements of ..... EN 61010-1, EN IEC 61557, EN IEC 61010-2-030
w) the product meets EMC requirements (immunity for industrial environment) according to the following standards .....
..... EN IEC 61326-1, EN IEC 61326-2-2

NOTE
*** Information about the use of meter at altitude from 2000 m a.s.l. to 5000 m a.s.l.**

As for inputs the instrument is to be considered downgraded to measurement category CAT III 300 V (from 2001 up to 4000 m a.s.l.) or CAT III 150 V (from 4001 up to 5000 m a.s.l.) to ground. Markings and symbols indicated on the instrument are to be considered valid when using it at altitude ≤2000 m.



NOTE!

The meter is classified in terms of Electromagnetic Compatibility (EMC) as instruments of Class A (for use in industrial environments – according to EN 55011). Interferences, impacting the operation of other devices must be taken into account when the meters are used in other environments (e.g. domestic).



SONEL S.A. hereby declares that the radio device type MPI-515/516 complies with Directive 2014/53/EU. The full text of the EU Declaration of Conformity is available at the following website address: https://sonel.pl/en/download/declaration-of-conformity/

12.3 Bluetooth specification

a) version ..... v4.2 Classic, BLE
b) frequency range..... 2412 MHz…2472 MHz
c) modulation method GFSK/π/4DQPSK/8DPSK/LE
d) receiver sensitivity ..... down to -92 dBm
e) maximum radio frequency power (EIRP) ..... 8.3 dBm (ca. 6.8 mW)

12.4 Additional data

Data on additional uncertainties are useful mainly when the meter is used in non-standard conditions and for metrological laboratories for the purpose of calibration.

12.4.1 Additional uncertainties according to EN IEC 61557-2 (R_{ISO})

Significant parameter	Designation	Additional uncertainty
Position	E_1	0%
Supply voltage	E_2	0%
Temperature 0°C…35°C	E_3	0.1%/°C

12.4.2 Additional uncertainties according to EN IEC 61557-3 (Z for current I_{SCM}≠1 A)

Significant parameter	Designation	Additional uncertainty
Position	E_1	0%
Supply voltage	E_2	0% (1% not displayed)
Temperature 0°C…35°C	E_3	1.2 m lead – 0 Ω 5 m lead – 0.011 Ω 10 m lead – 0.019 Ω 20 m lead – 0.035 Ω WS-03, WS-04 adapter – 0.015 Ω
Phase angle 0°…30° at the bottom of measurement range	$E_{6.2}$	0.6%
Frequency (95%…105%)f_n	E_7	0%
Mains voltage (85%…110%)U_n	E_8	0%
Harmonics	E_9	0%
DC component	E_{10}	0%

12.4.3 Additional uncertainties according to EN IEC 61557-3 (Z for current I_{SCM}=1 A)

Significant parameter	Designation	Additional uncertainty
Position	E_1	0%
Supply voltage	E_2	0% (1% not displayed)
Temperature 0°C…35°C	E_3	±(0.11%/°C + 0.035 Ω)
Phase angle 0°…18° at the bottom of measurement range	$E_{6.1}$	4%
Frequency (95%…105%)f_n	E_7	0%
Mains voltage (85%…110%)U_n	E_8	±(0.5% + 0.04 Ω)
Harmonics	E_9	0%
DC component	E_{10}	0.14 Ω

12.4.4 Additional uncertainties according to EN IEC 61557-4 (R ±200 mA)

Significant parameter	Designation	Additional uncertainty
Position	E_1	0%
Supply voltage	E_2	0% (1% not displayed)
Temperature 0°C…35°C	E_3	1.5%

12.4.5 Additional uncertainties according to EN IEC 61557-6 (RCD)

I_A, t_A, U_B

Significant parameter	Designation	Additional uncertainty
Position	E_1	0%
Supply voltage	E_2	0% (1% not displayed)
Temperature 0°C…35°C	E_3	±0.05% m.v./°C
Electrodes resistance	E_5	0%
Supply voltage (85%…110%)U_n (MPI-515, MPI-516: 90 V…270 V)	E_8	0%

12.4.6 Influence of serial interference voltage on the resistance measurements for function R_E3P, R_E4P

R_E	U_N	Additional uncertainty [Ω]
0.00…10.00 Ω	25 V	$\pm(0.001R_E+0.01)U_z+0.007U_z^2$
	50 V	$\pm(0.001R_E+0.01)U_z+0.004U_z^2$
10.01…1999 Ω	25 V, 50 V	$\pm(0.001R_E+0.01)U_z+0.001U_z^2$

12.4.7 Influence of the auxiliary electrodes on earth resistance measurements for function R_E3P, R_E4P

R_H, R_S	Additional uncertainty [%]
$R_H \leq 1.99$ kΩ $R_S \leq 1.99$ kΩ	$\pm\left(\frac{R_S}{R_S+100000}\cdot 150+\frac{R_H\cdot 0{,}004}{R_E}+1{,}5\cdot 10^{-8}\cdot R_H{}^2\right)$

R_E[Ω], R_S[Ω] and R_H[Ω] are values displayed by the device.

12.4.8 Additional uncertainties according to EN IEC 61557-5 (R_E3P, R_E4P)

Significant parameter	Designation	Additional uncertainty
Position	E_1	0%
Supply voltage	E_2	0% (1% not displayed)
Temperature 0°C…35°C	E_3	±0.2 digit/°C for R<1 kΩ ±0.07%/°C ± 0.2 digit/°C for R≥1 kΩ
Serial interference voltage	E_4	According to the formulas shown in sec. 12.4.6 (U_N=3 V 50/60 Hz)
Electrodes resistance	E_5	According to the formula in sec. 12.4.7
Frequency (99%…101%)f_n	E_7	0%
Supply voltage (85%…110%)U_n	E_8	0%

12.5 Prospective short-circuit current

The device always measures impedance, and the short-circuit current displayed is calculated from the formula:

$$I_k = \frac{U}{Z_S}$$

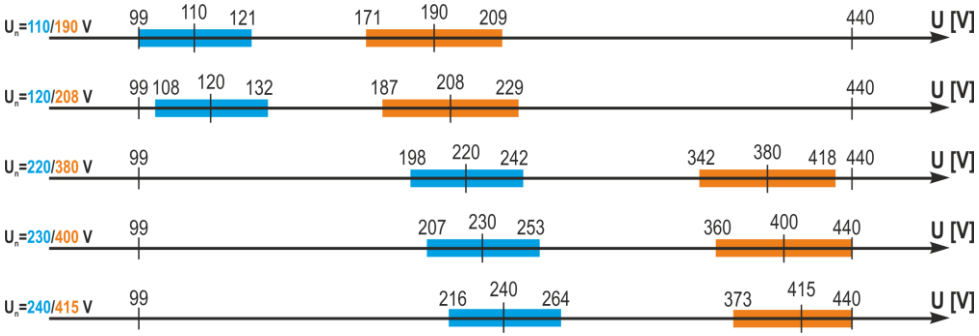
where:
Z_S – impedance measured,
U – voltage dependent on the network rated voltage settings U_n

$I_k(U_n)$	$U = U_n$
$I_k(U_0)$	$U = U_0$ for $U_0 < U_n$
	$U = U_n$ for $U_0 \geq U_n$

where:
U_n – nominal voltage of the network,
U_0 – voltage measured by the meter.

On the basis of U_n rated voltage selected, the meter automatically recognizes the measurement at phase voltage or phase-to-phase voltage and takes it into account in the calculations.

In a case when the installation voltage is outside of tolerance, the meter will not be able to determine the rated voltage for the short-circuit current calculation. In such event the display will show horizontal dashes instead of the short-circuit current value. The figure below shows the voltage ranges for which the short-circuit current is calculated.



Relationship between the network voltage and the ability to calculate the short-circuit current
– the U_{L-N} voltage ranges, for which the short-circuit current is calculated
– the U_{L-L} voltage ranges, for which the short-circuit current is calculated
99 V...440 V – the voltage range for which the impedance measurement is performed

13 Cybersecurity

13.1 Default factory settings (after factory reset)

- No data in the user storage area (directory structure, measurement data, accounts, secrets).
- All network interfaces disabled (Wi-Fi, USB-LAN).
- Bluetooth interface disabled.
- No access to the device's functions without configuring a local profile during the first start-up.

13.2 Security guidelines

13.2.1 Using strong passwords

It is recommended to use strong authentication passwords, compliant with current standards, for the meter's local profiles and the MeasureEffect platform's remote profiles, and to change them periodically (as a preventative measure) or immediately (in the event of a breach.

13.2.2 Access management

The device allows to create up to four user profiles, including one user with administrative privileges. It is recommended that the device's technical capabilities be taken into account in the organisation's internal access management policy.

13.2.3 Physical access control

Regardless of the security mechanisms implemented by the manufacturer, it is the user who is responsible for controlling physical access to the device. It is recommended that identified threats arising from physical access to the device be taken into account in the organisation's risk analysis.

13.2.4 Software updates

It is recommended to update the device each time the manufacturer releases a new software version. This process minimises the risk of hardware and software vulnerabilities being exploited.

13.2.5 Deletion of confidential data

In the event of resale, transfer, handover or decommissioning of the device, it is recommended to reset it to factory settings in order to delete confidential data such as the personal and private data of individuals (customers) and other security assets (e.g. saved Wi-Fi networks). To ensure data availability, the manufacturer has implemented additional mechanisms for secure data backup and recovery.

13.2.6 Wireless networks

The manufacturer does not recommend connecting the meter to untrusted or open Wi-Fi networks, particularly when using the MeasureEffect platform, remotely controlling the meter via the mobile app, or transmitting data to the Sonel Reader software.

13.2.7 Integration with the environment

Risk assessment
Where the device is integrated with processes and services critical to the organisation, an additional risk assessment must each time be carried out. If risks are identified that cannot be eliminated using the device's built-in security mechanisms, external mitigating measures corresponding to the risk must be implemented.

Network isolation and segmentation
It is recommended to set up a dedicated VLAN for the operation of the devices or to assign devices of a similar nature, purpose and importance to the organisation's processes to a subnet of an existing VLAN.

Firewall and ACL
Traffic and access rules should be limited to the essential functional minimum required.

Documenting changes
When a device is connected to the organisation's network, it is recommended to update the network infrastructure diagram, taking into account information relevant to security (IP address, MAC address, physical location, software version, etc.).

13.3 Incident response

To respond to product cybersecurity incidents, Sonel has appointed the Incident Response Team with a single point of contact available via email at: security@sonel.and . On first contact, the manufacturer requests that no details of the incident be provided. In accordance with Sonel's internal procedures, the confidentiality of correspondence relating to cybersecurity is further protected by a secure communication channel, which will be established by the Incident Response Team.
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14 Manufacturer

The manufacturer of the device and provider of guarantee and post-guarantee service:

SONEL S.A.
Wokulskiego 11
58-100 Świdnica
Poland
tel. +48 74 884 10 53 (Customer Service)
e-mail: customerservice@sonel.com
web page: www.sonel.com



NOTE!

Service repairs must be performed only by the manufacturer.

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TROUBLE WITH MEASUREMENTS?



You can find all the information about the desired test in the help menu of the respective measurement function.



Download the user manual for the **Sonel MeasureEffect™** platform and find information on the test in it. To do so, visit:
- the Sonel MeasureEffect™ platform web page,
- the web page of your instrument.

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