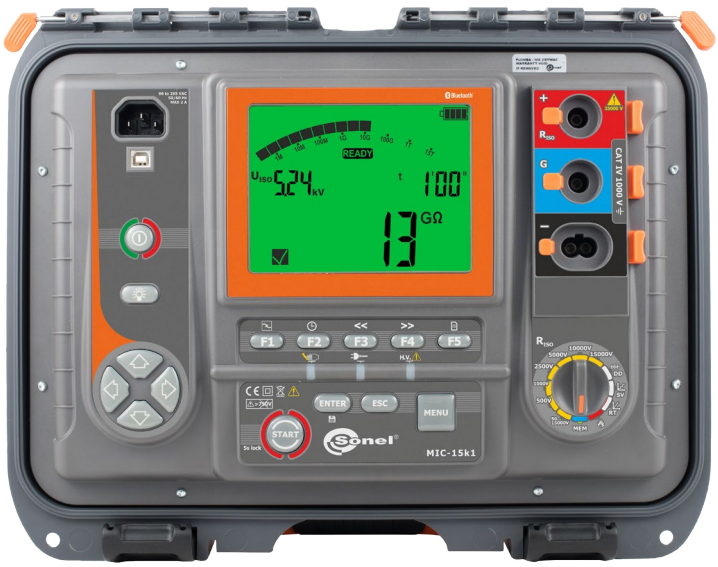
Insulation Resistance Meter

MIC-15k1

index: WMGBMIC15K1



CAT IV
1000 V

IP67
closed case

IP40
open case

BLUETOOTH

50°C
HEAVY DUTY
-20°C

For insulation resistance measurements of power transformers

For insulation resistance measurements of electrical machines

For insulation resistance measurements of power objects

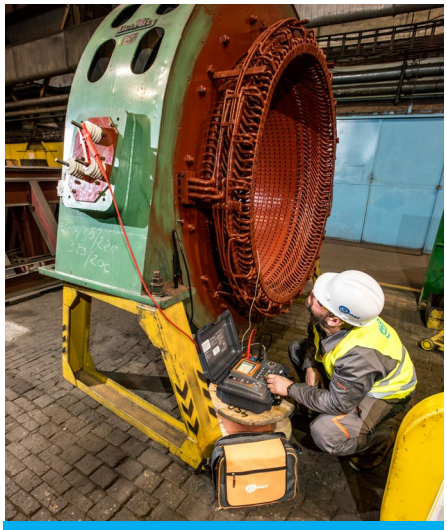
For insulation resistance measure-ments of power cables

The most advanced insulation resistance meter on the market

Designed for professionals providing power electrical services, including maintenance of electrical insulation materials

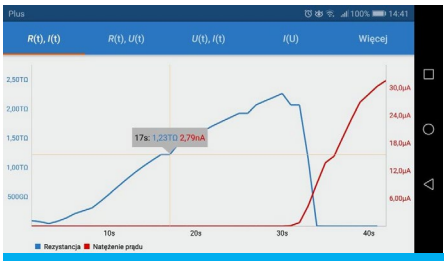
Features

- The maximum **measuring voltage of 15 000 V** and **the measurement range up to 40 TΩ** enabled for measurements of the most effective insulation materials used to isolate objects under high voltage.
- Efficient converter with a **power of ~150 W** that enables insulation burnout, allowing for pinpointing the location of cables and wires short circuit using one of the following:
  - visual method (if power cables are visible along the entire length),
  - reflectometric methods, seismic-acoustic waves detector, or with A-frame to indicate direction of the fault (the conductor must be buried in the ground with earth direct contact).
- Designed for the toughest working conditions thanks to hermetic case housing.
- It allows testing the electrical durability of the tested object - **breakdown voltage indication**.
- Compliance with the recommendations of IEEE Std 43™ allows for rotating machinery testing.
- High resistance to electromagnetic interferences guarantees uninterrupted work in power stations and in close proximity to high voltage transmission lines up to **1200 kV AC** and **500 kV DC**.
- Built-in **discharge resistor** will fully reduce electric charge, accumulated during the measurement of very long cables, protecting the user.
- **Dedicated application for a mobile device** allows remote start and stop of measurement, setting parameters and display in real time measured values - **also in graphical form** (resistance, voltage, current, partial discharges in time function).
- The function of smooth voltage rise in time (RT - Ramp Test) allows to state the partial discharges in the facility and to carry out a partial location of their occurrence.
- Record of measured values in the tested object and their analysis on a computer using dedicated software.



Professional diagnostic tool

For the most harsh operating conditions



Supported by a mobile application

Application

MIC-15k1 meter is designed to measure insulation resistance of power objects, i.e.:

- single- and multicore cables,
- transformers,
- motors and generators,
- capacitors, switches and other devices installed in power stations.

It is especially recommended for measurements in areas with very high electromagnetic disturbances, e.g. electrical substations with **1200 kV AC** and **500 kV DC**. Thanks to the 15 kV measuring voltage (in accordance with ANSI / NETA ATS-2009 TABLES 100.1) the meter can be used for measuring objects with a nominal voltage above 34.5 kV.

Capabilities of the device

Highly efficient HV inverter, with test voltage of **15 kV** and current **up to 10 mA**, suitable for measuring the insulation resistance **up to 40 TΩ**. Achieving such a result makes these meters unrivalled devices. Three-wire resistance measurement, performed using a "GUARD" wire, eliminates surface leakage currents caused by contaminated insulation, thereby increasing the reliability of obtained results.

The meter indicates the Dielectric Absorption Ratio **DAR**, Polarization Index **PI** and the value of Dielectric Discharge **DD**.

The device allows user to assess the condition of the insulation, by applying the test voltage incrementally in steps (SV - Step Volatge) or smoothly (RampTest - RT).

- SV method ensures that a dielectric in good condition will provide the same results, regardless of the applied voltage.
- RT method allows to determine the characteristics of the insulating material. The meter smoothly increases the measuring voltage without exposing the object to so-called electrical stress. It records the time and voltage value at which the electrical breakdown of the insulation took place.

Built-in **digital filters**, with averaging time of 10, 30, 60, 100, 200 sec. guarantee stable measurement results in areas of strong electromagnetic interference.

Burnout

A very useful solution is the function that allows to Burnout the damaged object. In case of **exposed cables**, it enables **visual identification** of the fault location. In the case of shielded cables, the method allows to generate a **seismic-acoustic wave** from the place of damage.

In special conditions, an energetic discharge will appear cyclically. By using the geophone it will be possible to precisely pinpoint the place where such a discharge occurs.

Burnout feature allows also locating transient faults (appearing, for example, only during rainfall) with the support of reflectometry, and in case of a short circuit (of a screen or return wire) to the ground - applying the method of measuring voltage drop (the A-frame)

Data analysis

The **Sonel MIC Mobile** mobile app allows to observe the results during the measurement. The application can generate real-time graphs in various configurations. This allows to evaluate the condition of the object already during the tests. **The option of remote start and stop of the measurement is particularly useful**. Thanks to it, the tests can be carried out remotely, eg. from a different room or inside the car, when there are difficult weather conditions for the user. Using the phone GPS, it is possible to precisely determine the place of measurement.

Thanks to the mobile application and the **Sonel Reader** software, the user can store previous measurements data and compare them with current results transferred from the meter's extensive memory. This solution allows to prepare a measurement report, track the progress of insulation degradation and plan renovation works.

Insulation resistance measurement

Measuring range according to IEC 61557-2
U_N = 15 000 V: 10.0 MΩ...40.0 TΩ
Measurement with DC and increasing voltage (SV) for U_{ISO} = 15 kV

Range	Resolution	Accuracy
0...999 kΩ	1 kΩ	±(3% m.v. + 10 digits)
1.00...9.99 MΩ	0.01 MΩ	
10.0...99.9 MΩ	0.1 MΩ	
100...999 MΩ	1 MΩ	
1.00...9.99 GΩ	0.01 GΩ	
10...0...99.9 GΩ	0.1 GΩ	
100...999 GΩ	1 GΩ	±(3.5% m.v. + 10 digits)
1.00...9.99 TΩ	0.01 TΩ	±(7.5% m.v. + 10 digits)
10.0...20.0 TΩ	0.1 TΩ	±(12.5% m.v. + 10 digits)
10.0...40.0 TΩ		

Capacitance measurement

Range	Resolution	Accuracy
0...999 nF	1 nF	±(5% m.v. + 5 digits)
1.00...49.99 µF	0.01 µF	

- Displaying measured capacity after R_{ISO} measurement
- For measurement voltages below 100 V the measurement error is not specified

When choosing a professional meter, make sure that:

- it can be used in harsh measurement conditions, in high humidity and dusty environment (IP67),
- it has advanced digital filters for measuring objects with strong electromagnetic interferences, i.e. up to 1550 V of induced voltage and 8 mA of interference current,
- it provides the highest safety standards in accordance with EN 61010-1 and the measurement category of CAT IV 1000 V,
- it has a feature of cable lock that prevents unintentional removal of cables from terminals of the meter, eliminating
- the risk of leaving the object undischarged, provided with a wireless communication and the ability to collect large amounts of data,
- equipped with a Li-Ion battery, for continuous 8-hour operation.

Ranges of measured resistance depending on the test voltage

Voltage U_{ISO}	Measuring range
250 V	500 GΩ
500 V	1 TΩ
1000 V	2.00 TΩ
2500 V	5.00 TΩ
5000 V	15.0 TΩ
10 000 V	40.0 TΩ
15 000 V	40.0 TΩ

Technical specification

type of insulation acc. to EN 61010-1 and IEC 61557	double
measurement category acc. to EN 61010-1	IV 1000 V (operating altitude ≤2000 m) IV 600 V (operating altitude ≤3000 m)
ingress protection acc. to EN 60529	IP67 (IP40 for closed case)
resistance to external interference voltages	up to 1550 V
advanced, digital filtering of interferences	10 / 30 / 60 / 100 / 200 seconds
test leads lock	yes
power supply	Li-Ion 12 V rechargeable battery, from network 90 V ÷ 260 V, 50 Hz/60 Hz
dimensions	390 x 310 x 180 mm
weight	approx. 5.6 kg
storage temperature	-25°C...+70°C
operating temperature	-20°C...+50°C
humidity	20%...90%
operating altitude	<3000 m
reference temperature	+23°C ± 2°C
reference humidity	40%...60%
display	graphical LCD
number of R_{ISO} measurements with battery power supply	min. 1000 acc. to EN 61557-2
data transmission	USB and Bluetooth
quality standard	ISO 9001, ISO 14001, N-18001 compliant
device meets the requirements of standards	EN 61010-1 and IEC 61557
the product meets EMC requirements (immunity for industrial environment)	with accordance to standards EN 61326-1 and EN 61326-2-2

Please see available applications with "Virtual Instruments Applications". They allow to check the functions of the meter and its interface before the purchase. Application user may set changes in device settings and perform all possible measurements as in reality.

https://www.sonel.pl/en/virtual-instrument-applications

Standard accessories

Crocodile clip, black, 11 kV, 32 A

WAKROBL32K09

Crocodile clip, red, 11 kV, 32 A

WAKRORE32K09

Crocodile clip, blue, 11 kV, 32 A

WAKROBU32K09

Test lead 3 m, black, 11 kV (banana plugs, shielded

WAPRZ003BLBBE10K

Test lead 3 m, red, 11 kV (banana plugs)

WAPRZ003REBB10K

Test lead 3 m, blue, 11 kV (banana plugs)

WAPRZ003BUBB10K

Mains cable with IEC C13 plug

WAPRZ1X8BLIEC

USB cable

WAPRZUSB

PC software: Sonel Reader

WAPROREADER

L4 carrying case

WAFUTL4

W1 hanging straps

WAPOZSZE5

Additional accessories

Test lead black, 11 kV (banana plugs, shielded)

1,8 m - WAPRZ1X8BLBBE10K
5 m - WAPRZ005BLBBE10K
10 m - WAPRZ010BLBBE10K
20 m - WAPRZ020BLBBE10K

* cables with a length of max. 55 m on request

Test lead red, 11 kV (banana plugs)

1,8 m - WAPRZ1X8REBB10K
5 m - WAPRZ005REBB10K
20 m - WAPRZ020REBB10K

Przewód niebieski 11 kV (wtyki bananowe)

1,8 m - WAPRZ1X8BUBB10K
5 m - WAPRZ005BUBB10K
20 m - WAPRZ020BUBB10K

PRS-1 resistance test probe

WASONPRS1GB

Resistance calibrator SRP-10G010T0

WMXXSRP10G010T0

CS-5 kV calibration box

WAADACS5KV