Insulation Resistance Meters

# MIC-5010 / 5005

index: WMGBMIC5010 / WMGBMIC5005

CAT III 1000 V

CAT IV 600 V

IP67

BLUETOOTH

Insulation of cables

Transformers

Electric machines

Power objects

Pole transform-er substations

Street lighting power cables

## Insulation resistance measurements: go premium

### Features

- Insulation resistance measurement up to **15 TΩ**
- Measuring voltage in the range of **50...5000 V**, 50...1000 V in steps of 10 V, 1...5 kV in steps of 25 V
- Continuous indication of measured insulation resistance and leakage current
- Automatic discharge of measured object capacitance voltage after the end of insulation resistance measurement
- Acoustic signalling of 5-second intervals to facilitate capturing time characteristics
- Adjustable measuring time - max. **99'59"**
- Metered $T_1$, $T_2$ and $T_3$ test times for measuring one or two absorption coefficients from the range of 1...600 s
- Measurement of coefficients: polarisation (PI), absorption Ab1, Ab2, dielectric absorption ratio (DAR)
- Indication of actual test voltage during measurement
- Test current: **1.2 mA** or **3 mA**
- Two- and three-lead method of insulation resistance measurement
- Measurements with test leads up to 20 m
- Protection against measuring live objects
- Measurement of capacitance during the measurement of $R_{ISO}$
- Step voltage insulation resistance measurement (SV)
- Dielectric Discharge calculation (DD)
- Digital filters for measurements with strong interferences

## Additional features

- Continuity measurement of protective connections and equipotential bonding in accordance with EN 61557-4 with current > 200 mA (**MIC-5010**)
- Adjustable limits for measured insulation resistance (**MIC-5010**)
- Adjustable limits for measured $R_{CONT}$ resistance (**MIC-5010**)
- High resistance to interferences - digital filters (10 s, 30 s, 60 s)
- Measurement of capacitance during the measurement of $R_{ISO}$
- Measurement of leakage current during insulation resistance testing
- DC and AC voltage measurement in the range of 0...600 V
- 990 cells of memory (11880 records) with the capability of wireless data transmission to a PC (with Bluetooth) or via USB cable
- Power supply from mains or battery pack
- Backlit display
- Backlit keys (**MIC-5010**)
- The instruments meet the requirements of the EN 61557 standard

## Comparison of meters

| | MIC-5010 | MIC-5005 |
|---|---|---|
| **maximum measuring voltage** | 5000 V | 5000 V |
| **maximum measuring range** | 15 TΩ | 15 TΩ |
| **resistance to external interference voltages** | up to 500 V | up to 500 V |
| **advanced, digital interference filtration** | 10 / 30 / 60 seconds | 10 / 30 / 60 seconds |
| **continuity measurement of protective conductors** | √ | - |
| **backlit keys** | √ | - |

### Insulation resistance measurement

- Measuring range according to IEC 61557-2

$R_{ISOmin}$ =$U_{ISOnom}$ /$I_{ISOmax}$=50 kΩ...15.0 TΩ ($I_{ISOmax}$ =1.2 mA or 3 mA)

| Display 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...15.0 TΩ | 0.1 TΩ | ±(10% m.v. + 10 digits) |

Values of measured resistance depending on measuring voltage

| $U_{ISO}$ voltage | Measuring range |
|---|---|
| 250 V | 500 GΩ |
| 500 V | 2.00 TΩ |
| 1000 V | 4.00 TΩ |
| 2500 V | 10.00 TΩ |
| 5000 V | 20.0 TΩ |

### Capacitance measurement

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

- Capacitance measurement result is displayed after the $R_{ISO}$ measurement
- For measurement voltages below 100 V the measurement error is not specified

### Continuity test with current >200 mA (MIC-5010 only)

- Measuring range according to IEC 61557-2: 0.12...999 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...999 Ω | 1 Ω | ±(4% m.v. + 3 digits) |

- Current flowing bidirectionally, average resistance is displayed on the screen
- Compensation of test leads resistance, autozeroing

## Technical specification

| | |
|---|---|
| **type of insulation acc. to EN 61010-1 and IEC 61557** | double |
| **measurement category acc. to EN 61010-1** | IV 600 V (III 1000 V) |
| **ingress protection acc. to EN 60529** | IP67 (IP40 for closed case) |
| **power supply** | Li-Ion 14.8 V rechargeable battery<br>from network 90 V ÷ 260 V, 50 Hz/60 Hz |
| **dimensions** | 390 x 308 x 172 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** | segment 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, PN-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

„m.v." - measured value

## Standard accessories

**Test lead 1.8 m 11 kV (banana plugs) blue**

WAPRZ1X8BUBB10K

**Test lead 1.8 m 11 kV (banana plugs, shielded) black**

WAPRZ1X8BLBBE10K

**Test lead 1.8 m 11 kV (banana plugs) red**

WAPRZ1X8REBB10K

**Crocodile clip, blue, 11 kV, 32 A**

WAKROBU32K09

**Crocodile clip, black, 11 kV, 32 A**

WAKROBL32K09

**Crocodile clip, red, 11 kV, 32 A**

WAKRORE32K09

**Mains power cable Uni-Schuko / IEC C13 plug**

WAPRZ1X8BLIEC

**Pin probe 11 kV (banana socket) black**

WASONBLOGB11

**Pin probe 11 kV (banana socket) red**

WASONREOGB11

**USB cable**

WAPRZUSB

**W1 hanging straps**

WAPOZSZE5

**L4 carrying case**

WAFUTL4

**Calibration certificate**

## Optional accessories

**Test lead 11 kV (banana plugs) blue 3 / 5 / 10 / 20 m**

WAPRZ003BUBB10K
WAPRZ005BUBB10K
WAPRZ010BUBB10K
WAPRZ020BUBB10K

**Test lead 11 kV (banana plugs, shielded) black 3 / 5 / 10 / 20 m**

WAPRZ003BLBBE10K
WAPRZ005BLBBE10K
WAPRZ010BLBBE10K
WAPRZ020BLBBE10K

**Test lead 11 kV (banana plugs) red 3 / 5 / 10 / 20 m**

WAPRZ003REBB10K
WAPRZ005REBB10K
WAPRZ010REBB10K
WAPRZ020REBB10K

**CS-5kV calibration box**

WAADACS5KV

**PRS-1 resistance test probe**

WASONPRS1GB

**PC software: Sonel Reader**

WAPROREADER

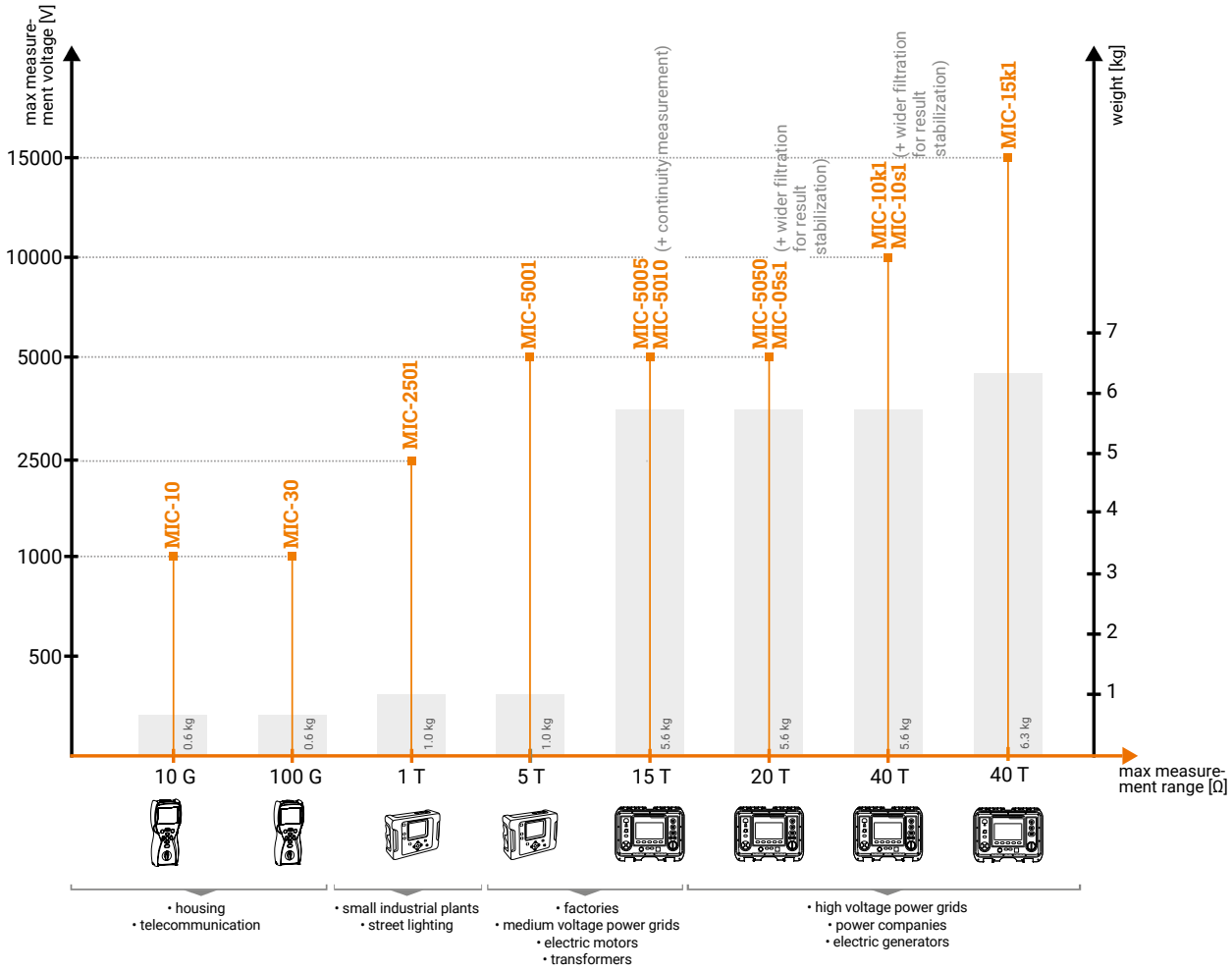
**Calibration certificate issued by an accredited laboratory**

## Times of charging and discharging the tested object at measuring voltage of 1.05 $U_{ISO}$

| Meter | Measuring voltage | | | Capacitance | Charging the object | | Discharging the object |
|---|---|---|---|---|---|---|---|
| | 5 kV | 10 kV | 15 kV | [µF] | Current [mA] | Maximal time [s] | down to voltage of 50 V [s] |
| MIC-5005 / MIC-5010 | √ | | | 1 | 1.2 | 4.3 | 0.4 |
| | | | | | 3 | 1.7 | |
| MIC-5050 / MIC-05s1 | √ | | | 1 | 1.2 | 4.3 | 0.4 |
| | | | | | 3 | 1.7 | |
| | | | | | 6 | 0.8 | |
| MIC-10k1 / MIC-10s1 | √ | | | 1 | 1.2 | 4.3 | 0.9 |
| | | | | | 3 | 1.7 | |
| | | | | | 6 | 0.8 | |
| | | √ | | 1 | 1.2 | 8.7 | 1.0 |
| | | | | | 3 | 3.5 | |
| | | | | | 6 | 1.7 | |
| MIC-15k1 | √ | | | 1 | 1.2 | 4.3 | 1.1 |
| | | | | | 3 | 1.7 | |
| | | | | | 5 | 1.0 | |
| | | | | | 7 | 0.7 | |
| | | | | | 10 | 0.5 | |
| | | √ | | 1 | 1.2 | 8.7 | 1.3 |
| | | | | | 3 | 3.5 | |
| | | | | | 5 | 2.1 | |
| | | | | | 7 | 1.5 | |
| | | | | | 10 | 1.0 | |
| | | | √ | 1 | 1.2 | 13.1 | 1.4 |
| | | | | | 3 | 5.2 | |
| | | | | | 5 | 3.1 | |
| | | | | | 7 | 2.2 | |
| | | | | | 10 | 1.5 | |

## Times of charging and discharging the tested object at measuring voltage of 1.025 $U_{ISO}$

| Meter | Measuring voltage | | | Capacitance | Charging the object | | Discharging the object |
|---|---|---|---|---|---|---|---|
| | 5 kV | 10 kV | 15 kV | [µF] | Current [mA] | Maximal time [s] | down to voltage of 50 V [s] |
| MIC-5005 / MIC-5010 | √ | | | 1 | 1.2 | 4.2 | 0.4 |
| | | | | | 3 | 1.7 | |
| MIC-5050 / MIC-05s1 | √ | | | 1 | 1.2 | 4.2 | 0.4 |
| | | | | | 3 | 1.7 | |
| | | | | | 6 | 0.8 | |
| MIC-10k1 / MIC-10s1 | √ | | | 1 | 1.2 | 4.2 | 0.9 |
| | | | | | 3 | 1.7 | |
| | | | | | 6 | 0.8 | |
| | | √ | | 1 | 1.2 | 8.5 | 1.0 |
| | | | | | 3 | 3.4 | |
| | | | | | 6 | 1.7 | |
| MIC-15k1 | √ | | | 1 | 1.2 | 4.2 | 1.1 |
| | | | | | 3 | 1.7 | |
| | | | | | 5 | 1.0 | |
| | | | | | 7 | 0.7 | |
| | | | | | 10 | 0.5 | |
| | | √ | | 1 | 1.2 | 8.5 | 1.3 |
| | | | | | 3 | 3.4 | |
| | | | | | 5 | 2.0 | |
| | | | | | 7 | 1.4 | |
| | | | | | 10 | 1.0 | |
| | | | √ | 1 | 1.2 | 12.8 | 1.4 |
| | | | | | 3 | 5.1 | |
| | | | | | 5 | 3.0 | |
| | | | | | 7 | 2.1 | |
| | | | | | 10 | 1.5 | |


max measure-
ment voltage [V]
15000
10000
5000
2500
1000
500
MIC-10
MIC-30
MIC-2501
MIC-5001
MIC-5005
MIC-5010
(+ continuity measurement)
MIC-5050
MIC-05s1
(+ wider filtration for result stabilization)
MIC-10k1
MIC-10s1
(+ wider filtration for result stabilization)
MIC-15k1
weight [kg]
7
6
5
4
3
2
1
0.6 kg
0.6 kg
1.0 kg
1.0 kg
5.6 kg
5.6 kg
5.6 kg
6.3 kg
10 G
100 G
1 T
5 T
15 T
20 T
40 T
40 T
max measure-
ment range [Ω]
• housing
• telecommunication
• small industrial plants
• street lighting
• factories
• medium voltage power grids
• electric motors
• transformers
• high voltage power grids
• power companies
• electric generators