

Всички доставки се извършват съгласно "Общите търговски условия" на Белком ООД

Изм. № 0351 / 28.09.2022

До: АЕЦ Управление Козлодуй ЕАД,  
гр. Козлодуй

На вним. на: г-н Христо Пачев

e-mail: HPatchev@npp.bg

тел.: +359 973 7 6140

## Бюджетна ОФЕРТА за обособена позиция 5

№	Наименование	К-во бр.	Ед. цена в лв. без ДДС	Стойност в лв. без ДДС
1	Доставка на MIC5050 Insulation Resistance Meter, WMGBMIC5050, стандартен обем на доставка, произход EU	3	5 400,00	16 200,00
2	Доставка на MIC-30 Insulation Resistance Meter, WMGBMIC30, стандартен обем на доставка, произход EU	4	1 500,00	6 000,00
3	Доставка на MIC5005 Insulation Resistance Meter, WMGBMIC5005, стандартен обем на доставка, произход EU	1	3 800,00	3 800,00
4	Опаковка, транспорт и застраховка до посочен от Купувача адрес на територията на България с избран от Доставчика превозвач	1	239,50	239,50
			Дан. основа	26 239,50
			ДДС 20%	5 247,90
			Сума за плащане	31 487,40

### УСЛОВИЯ НА ДОСТАВКА:

**Цени:** с платено мито и транспорт, без ДДС до склад на Продавача

**Условия на плащане:** а) при заявка: 70% авансово плащане при потвърждаване на заявката, 30% авансово плащане при наличие в склад на продавача  
б) 100% плащане при заявка - 2% отстъпка

**Срок на доставка:** 35-45 работни дни, подлежи на уточнение след заявка

**Валидност:** 15 дни

**Гаранция:** 24 месеца

**Забележка:**

### При доставка ще бъдат представени следните документи:

Инструкции за експлоатация

Декларация за съответствие

Приемо предавателен протокол

Гаранционна карта

Данъчна фактура - оригинал

### Данни за фирма Белком ООД:

**адрес :** град Бургас, улица Цар Асен 24

**лице за контакт:** Георги Апостолов

**телефонен номер:** 0878 318 028

**електронна поща:** georgi.apostolov@belcom.bg

**фирмен сайт:** www.belcom.bg

Белком ООД

инж. Георги Апостолов



## Damage location and insulation measurements

### Features

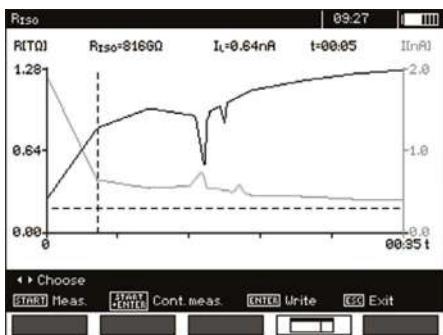
- Insulation resistance measurement
  - up to **40 TΩ** (MIC-10k1)
  - up to **20 TΩ** (MIC-5050)
- Measurement voltage - any in the range of
  - MIC-10k1: **50...10000 V**, 50...1000 V with steps of 10 V, 1...10 kV with steps of 25 V
  - MIC-5050: **50...5000 V**, 50...1000 V with steps of 10 V, 1...5 kV with steps of 25 V
- Continuous indication of measured insulation resistance or 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 - up to **99'59"**
- $T_1$ ,  $T_2$  and  $T_3$  test times for measuring one or two absorption coefficients from the range of 1...600 s
- Polarization index (PI), absorption coefficients  $Ab_1$ ,  $Ab_2$  and dielectric absorption ratio (DAR) measurement
- Indication of actual test voltage during measurement
- **1.2 mA**, **3 mA** or **6 mA** test current
- Insulation resistance measurement using two- or three-wire method
- Measurements with test leads up to 20 m
- Protection against measuring live objects
- Automatic measurement of multiple core cables with the optional **AutoISO-5000 adapter** (for MIC-10k1 max. measuring voltage 5 kV)
- Measurement of capacitance during the measurement of  $R_{ISO}$
- Measurement of temperature (with optional probe ST-1)
- Step voltage insulation resistance measurement (SV)
- Dielectric Discharge calculation (DD)
- Damage location (burnout)
- Digital filters for measurements with strong interferences
- It can work in an environment where electromagnetic interferences of 400 kV occur
- Measurement of DC and AC voltages within the range of 0...750 V



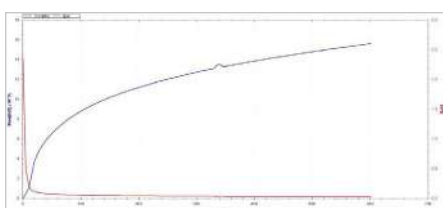
Professional diagnostic tool



Several measurements in one connection



Graphic interpretation of results



Dedicated PC software



For the toughest working conditions

## Application

MIC-10k1 meter is designed to measure the insulation resistance of electro-power objects, i.e. single- and multi-core cables, transformers, motors and generators, capacitors, switches and other devices installed in power stations. Furthermore, it is dedicated for measurements in areas with very high electromagnetic disturbances, e.g. electrical substations with 765 kV voltage or higher.

## Capabilities

Highly efficient HV inverter, with test voltage of 10 kV and current of 6 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 measures temperature of tested object, which is necessary to determine the temperature correction factor for  $R_{ISO}$ . In addition, it indicates the absorption coefficient (DAR - Dielectric Absorption Ratio), 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). This solution ensures that a dielectric in good condition will provide the same results, regardless of the applied voltage. Deviations in obtained resistance values of approx. 25%, observed on the chart in the individual steps, may indicate the potential insulation defects.

MIC-10k1 has the unique ability to perform measurements on multi-core cables, within one connection step, using the AutoISO-5000 adapter. This solution reduces the duration of measurements on repetitive of objects, such as cables of street lighting systems. Inverter with a power of almost 60 W is able to intensify the point of cable damage, which facilitates finding the location of the fault using a reflectometric method e.g. with TDR-420 device.

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

## Data analysis

The device, with its backlight graphical screen may display a waveform of insulation resistance, voltage and current as a function of time. The operator, basing on the trend shown by the waveform, may quickly assess the insulation condition right after starting the measurement. This provides full control over the tested object and clear image of the tested insulation. In addition, with movable tags, the operator may trace the course of the measurement and check resistance values obtained for any time of the current measurement and of measurements made in the past.

After installing mobile application, as a part of the set the user receives Sonel Reader software for collecting historical data and comparing it with current results, transferred from the extensive memory of the meter. This solution helps user to prepare a measurements report, track the insulation degradation and plan the maintenance / repair works.

## Comparison

	MIC-10k1	MIC-5050
maximum measuring voltage	10 000 V	5000 V
maximum measuring range	40 TΩ	20 TΩ
resistance to external interference voltages	do 1550 V	do 1550 V
advanced, digital interference filtration	10 / 30 / 60 / 100 / 200 seconds and SMART	10 / 30 / 60 / 100 / 200 seconds and SMART
test leads lock	✓	✓

## Insulation resistance measurement

- Measurement range acc. to IEC 61557-2

$$R_{ISOmin} = U_{ISOnom} / I_{ISOmax} = 5 \text{ M}\Omega \dots 40 \text{ T}\Omega \quad (I_{ISOmax} = 1.2 \text{ mA}, 3 \text{ mA or } (6 \pm 15\%) \text{ mA})$$

Range	Resolution	Accuracy
0...999 kΩ	1 kΩ	
1.00...9.99 MΩ	0.01 MΩ	
10.0...99.9 MΩ	0.1 MΩ	±(3% m.v. + 10 digits)
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**		

\* - only for MIC-5050

\*\* - only for MIC-10k1

Values of measured resistance depending on measurement voltage

$U_{ISO}$ voltage	Range	Range for AutoISO-5000
50 V	200 GΩ	20.0 GΩ
100 V	400 GΩ	40.0 GΩ
250 V	1.00 TΩ	100 GΩ
500 V	2.00 TΩ	200 GΩ
1000 V	4.00 TΩ	400 GΩ
2500 V	10.00 TΩ	400 GΩ
5000 V	20.0 TΩ	400 GΩ
10 000 V	40.0 TΩ*	-

\* - only for MIC-10k1

## Capacitance measurement

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 measuring voltages under 100 V capacitance measurement accuracy not specified

## Temperature measurement

Range	Resolution	Accuracy
-40.0...99.9°C	1°C	±(3% m.v. + 8 digits)

## 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 open case)
power supply	Li-Ion 14.8 V rechargeable battery 90 V ÷ 260 V, 50 Hz/60 Hz from electric grid
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	graphical LCD 5.6"
number of $R_{ISO}$ measurements with battery power supply	min. 1000 acc. to EN 61557-2
data transmission	USB and Bluetooth
memory of measurement results	990 cells (10 000 records / 8 MB)
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.



## Standard accessories



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

WAPRZ003BUBB10K



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

WAPRZ003BLBBE10K



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

WAPRZ003REBB10K



**Crocodile clip  
blue 11 kV 32 A**

WAKROBU32K09



**Crocodile clip  
black 11 kV 32 A**

WAKROBL32K09



**Crocodile clip  
red 11 kV 32 A**

WAKRORE32K09



**USB cable**

WAPRZUSB



**Mains cable with  
IEC C13 plug**

WAPRZ1X8BLIEC



**L4 carrying case**

WAFUTL4



**Calibration certificate**

## Optional accessories



**Test lead 11 kV  
(banana plugs) blue  
1.8 / 5 / 10 / 20 m**

WAPRZ1X8BUBB10K  
WAPRZ005BUBB10K  
WAPRZ010BUBB10K  
WAPRZ020BUBB10K



**Test lead 11 kV  
(banana plugs,  
shielded) black  
1.8 / 5 / 10 / 20 m**

WAPRZ1X8BLBBE10K  
WAPRZ005BLBBE10K  
WAPRZ010BLBBE10K  
WAPRZ020BLBBE10K



**Test lead 11 kV  
(banana plugs) red  
1.8 / 5 / 10 / 20 m**

WAPRZ1X8REBB10K  
WAPRZ005REBB10K  
WAPRZ010REBB10K  
WAPRZ020REBB10K



**AutoISO-5000  
adapter**

WAADAISO50



**PRS-1 resistance  
test probe**

WASONPRS1GB



**Mini Bluetooth  
keyboard**

WAADAMK



**CS-5kV  
calibration box**

WAADACS5KV



**Resistance calibra-  
tor SRP-10G0-10T0**

WMXXSRP10G010T0



**ST-1 temper-  
ature probe**

WASONT1



**PC software:  
Sonel Reader**

WAPROREADER



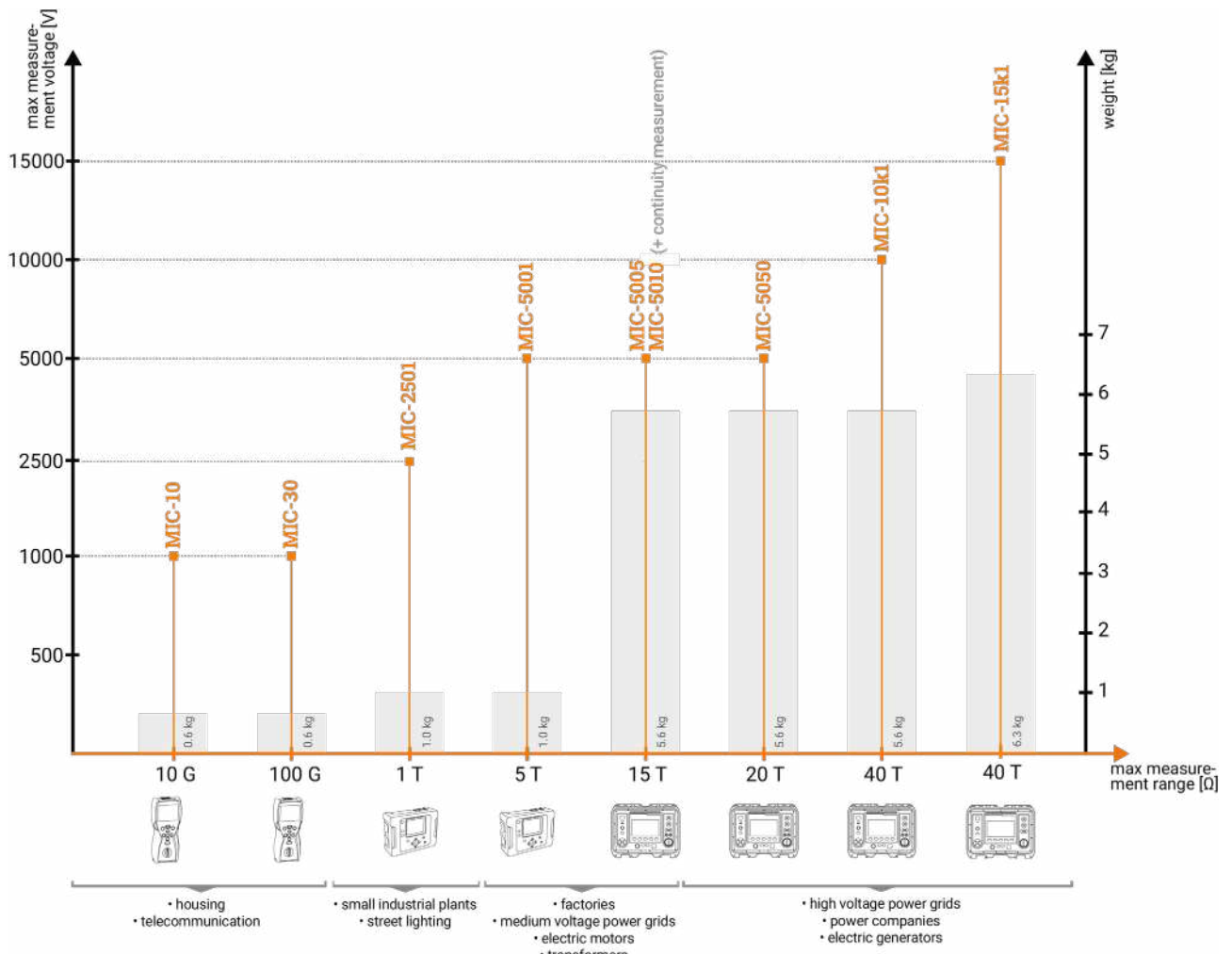
**Calibration cer-  
tificate with  
accreditation**

Times of charging and discharging the tested object at measuring voltage of 1.05 U<sub>ISO</sub>

Meter	Measuring voltage			Capacitance [μF]	Charging the object		Discharging the object down to voltage of 50 V [s]
	5 kV	10 kV	15 kV		Current [mA]	Maximal time [s]	
MIC-5005 / MIC-5010	✓			1	1.2	4.3	0.4
					3	1.7	
MIC-5050	✓			1	1.2	4.3	0.4
					3	1.7	
					6	0.8	
MIC-10k1	✓			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	
		✓		1	1.2	8.7	1.3
					3	3.5	
					5	2.1	
					7	1.5	
			✓	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<sub>ISO</sub>

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

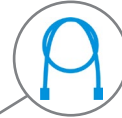




For measurement of wiring in flats, houses and public buildings



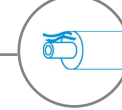
For measurement of telephone and IT wiring



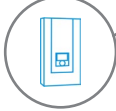
For measurement of low voltage motors



For measurement of pre-insulated pipes



For measurement of home appliances



For measurements in anti-icing systems

**CAT III****1000 V****CAT IV****600 V****IP67****BLUETOOTH**

## Measure insulation resistance up to 100 GΩ using the MIC-30 meter

### Main features

- measurement of insulation resistance up to 100 GΩ thanks to max 1000 V measurement voltage
- designed for harsh environmental conditions conditions – IP67 ingress protection
- excellent for repeatable measurements – memory of 12,000 records and UNI-Schuko adapter for sockets
- allows for testing electrical continuity –  $R_{\text{CONT}}$  200 mA function
- checking start capacitors in motors thanks to capacity measurement function

### ...and much more

- measurement voltage selected from: 50, 100, 250, 500, 1000 V or freely configurable within the range of 50...1000 V in steps of 10 V
- continuous reading of measured insulation resistance or leakage current
- automatic discharge of the measured object's capacitance upon completion of insulation resistance measurement
- sound signalling of five-second time intervals, facilitating capture of time characteristics
- timing of measurement times  $T_1$ ,  $T_2$  and  $T_3$  for measurement of one or two absorption coefficients, within the range of 1... 600 seconds
- readings of actual measurement voltage during measurement
- protection against measurement of live objects
- three-lead measurement – additional lead GUARD
- capacitance measurement during measurement of  $R_{\text{ISO}}$
- low-voltage measurement of circuit continuity and resistance
- continuity test of protective conductors and equipotential bonding with current  $I_{\text{ISO}} \geq 200$  mA flowing in two directions in compliance with EN 61557-4
- measurement of direct and alternating voltages within the range of 0...600 V





## Application

MIC-30 insulation resistance meter is perfectly suited for the needs of all users, who often examine the condition of electrical systems in single- and multi-family buildings as well as in public buildings and in small workshops or factories. With its test voltage settings from 50 V to 1000 V (in 10 V steps), the device is perfect for diagnosing the electrical, control, communication and telecommunications objects.



## Features

Test voltage settings of 500 V or 1000 V perfectly match the requirements for assessing the protection of power supply lines but also of floors and walls in places where the insulation of the stand was used as a means of protection against electric shock – PRS-1 probe (optional accessory) is very useful for this purpose.

The dedicated UNI-Schuko adapter enables user to configure the tested cable pairs – this ensures quick and efficient inspection of the insulation resistance from the side of sockets.



With MIC-30 meter you can check whether an object is under voltage (measuring range up to 600 V), both in overhead and cable networks (measuring category of the device: CAT IV 600 V). You can verify the continuity of cables, e.g. PE connections and equipotential bonding – using the current of at least 200 mA, according to EN 61557-4. You can check the capacity of the start-up capacitors in household appliances and drives of any type (measuring range up to 10  $\mu$ F). With the third socket (GUARD), you can verify the amount of leakage current, which may “escape” through faulty or contaminated insulation.

Built-in memory and wireless transmission ensure gathering and transmission of data to software that provides archiving and analysis (Sonel Reader). All of this makes MIC-30 meter an essential tool for every service technician.



## Durable housing

Handy and ergonomic housing provides protection of IP67, ensuring reliability of the meter even in the harshest environmental conditions (moisture, dust, high temperature, etc.)

### Insulation resistance measurement

Range	Resolution	Accuracy	$U_n$	Measuring range
0.0...999.9 k $\Omega$	0.1 k $\Omega$	$\pm$ (3% m.v. + 8 digits) [ $\pm$ (5% m.v. + 8 digits)]*	50 V	50 k $\Omega$ ...250.0 M $\Omega$
1.000...9.999 M $\Omega$	0.001 M $\Omega$		100 V	100 k $\Omega$ ...500.0 M $\Omega$
10.00...99.99 M $\Omega$	0.01 M $\Omega$		250 V	250 k $\Omega$ ...2.000 G $\Omega$
100.0...250.0 M $\Omega$ (for $U_n = 50$ V) 100.0...500.0 M $\Omega$ (for $U_n = 100$ V) 100.0...999.9 M $\Omega$ (for $U_n \geq 250$ V)	0.1 M $\Omega$		500 V	500 k $\Omega$ ...20.00 G $\Omega$
1.000...2.000 G $\Omega$ (for $U_n = 250$ V)	0.001 G $\Omega$	$\pm$ (4% m.v. + 6 digits) [ $\pm$ (6% m.v. + 6 digits)]*	1000 V	1000 k $\Omega$ ...100.00 G $\Omega$
1.000...9.999 G $\Omega$ (for $U_n \geq 500$ V)	0.001 G $\Omega$			
10.00...20.00 G $\Omega$ (for $U_n \geq 500$ V)**	0.01 G $\Omega$			
10.00...99.99 G $\Omega$ (for $U_n = 1000$ V)	0.01 G $\Omega$			
100.0 G $\Omega$ (for $U_n = 1000$ V)	0.1 G $\Omega$			

\* for WS-04 adapter

\*\* for WS-04 adapter, range up to 10 G $\Omega$

Abbreviation „m.v.” used in the specification of measurement means a measured value.

page 2 / 4

## Low-voltage measurement of continuity of circuit and resistance

Measuring range according to EN 61557-4: 0.10...1999  $\Omega$

Range	Resolution	Accuracy
0.00...19.99 $\Omega$	0.01 $\Omega$	$\pm(2\% \text{ m.v.} + 3 \text{ digits})$
20.0...199.9 $\Omega$	0.1 $\Omega$	
200...1999 M $\Omega$	1 $\Omega$	$\pm(4\% \text{ m.v.} + 3 \text{ digits})$

## DC and AC voltage measurement

Range	Resolution	Accuracy
0...299.9 V	0.1 V	$\pm(2\% \text{ m.v.} + 6 \text{ digits})$
300...600 V	1 V	$\pm(2\% \text{ m.v.} + 2 \text{ digits})$

• Frequency range: 45...65 Hz

## Capacitance measurement

Range	Resolution	Accuracy
1...999 nF	1 nF	$\pm(5\% \text{ m.v.} + 10 \text{ digits})$
1.00...9.99 $\mu\text{F}$	0.01 $\mu\text{F}$	

- Capacitance measurement result displayed after measurement of  $R_{\text{ISO}}$
- For measurement voltages below 100 V and measured resistance of less than 10 M $\Omega$ , the error of capacitance measurement is unspecified

## Low-current resistance measurement

Range	Resolution	Accuracy
0.00...199.9 $\Omega$	0.1 $\Omega$	$\pm(3\% \text{ m.v.} + 3 \text{ digits})$
200...1999 M $\Omega$	1 $\Omega$	

## Technical specification

type of insulation	double, according to EN 61010-1 and EN 61557
measurement category	IV 600 V (III 1000 V) according to EN 61010-1
degree of housing protection acc. to EN 60529	IP67
power supply of the meter	4 x AA alkaline batteries or rechargeable batteries
dimensions	200 x 100 x 60 mm
meter weight	approx. 0.6 kg
operating temperature	-10°C...+50°C
display	LCD segment
memory of measurement results	990 cells
data transmission	wireless link
quality standard for design, construction and manufacturing compliant with the device meets the requirements of	ISO 9001
the product meets EMC requirements (immunity for industrial environment) according to the following standards	EN 61557 standard EN 61326-1:2006 EN 61326-2-2:2006

## Standard accessories



test probe with banana socket; 1 kV; black

WASONBLOGB1



test probe with banana socket; 1 kV; red

WASONREOGB1



blue "crocodile" clip 1 kV 20 A

WAKROBU20K02



shielded test lead with banana plugs; 1 kV; 1.2 m; black

WAPRZ1X2BLBBE



test lead with banana plugs; 1 kV; 1.2 m; red

WAPRZ1X2REBB



test lead with banana plugs; 1 kV; 1.2 m; blue

WAPRZ1X2BUBB



M-6 carrying case

WAFUTM6



meter strap (type M-1)

WAP0ZSZE4



M-1 housing holder - hanger

WAP0ZUCH1



Sonel Reader PC software

WAPROREADER

Abbreviation „m.v.“ used in the specification of measurement means a measured value.

page 3 / 4

## Additional accessories



**black "crocodile"  
clip 1 kV 20 A**  
WAKROBL20K01



**red "crocodile"  
clip 1 kV 20 A**  
WAKRORE20K02



**pin probe, blue  
1 kV (banana  
socket)**  
WASONBU0GB1



**test lead 5 m,  
black, 1 kV (banana  
plugs, shielded)**  
WAPRZ005BLBBE



**test lead 5 m, red,  
1 kV (banana plugs)**  
WAPRZ005REBB



**test lead 5 m, blue,  
1 kV (banana plugs)**  
WAPRZ005BUBB



**WS-04 adapter  
with UNI-SCHUKO  
angular plug**  
WAADAWS04



**PRS-1 resistance  
test probe**  
WASONPRS1GB



**CS-1 cable simulator**  
WAADACS1



**AGT-16P three-  
phase socket  
adapter 16 A**  
WAADAAGT16P



**AGT-32P three-  
phase socket  
adapter 32 A**  
WAADAAGT32P



**AGT-63P three-  
phase socket  
adapter 63 A**  
WAADAAGT63P



**AGT-16C three-  
phase socket  
adapter 16 A (PEN)**  
WAADAAGT16C



**AGT-32C three-  
phase socket  
adapter 32 A (PEN)**  
WAADAAGT32C



**AGT-16T industrial  
socket adapter 16 A**  
WAADAAGT16T



**AGT-32T industrial  
socket adapter 32 A**  
WAADAAGT32T



Virtual instrument application gives you an unique real-like experience with the meter. The application of the virtual instrument is a real visualization of the meter e.g. its functions and display. The user has a possibility to make a setup of the instrument and all possible measurements like in the reality. Such opportunity gives the user a closer look and a feeling for the functioning of the instrument.

# MIC-5010 / 5005

index: WMGBMIC5010 / WMGBMIC5005



CAT III

1000 V

CAT IV

600 V

IP67

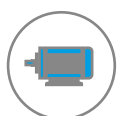
BLUETOOTH



Insulation of cables



Transformers



Electric machines



Power objects



Pole transformer 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  $Ab_1$ ,  $Ab_2$ , 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  $R_{\text{CONT}}$  resistance (**MIC-5010**)
- High resistance to interferences - digital filters (10 s, 30 s, 60 s)
- Measurement of capacitance during the measurement of  $R_{\text{ISO}}$
- 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

$$R_{ISOmin} = U_{ISO} / I_{ISOmax} = 50 \text{ k}\Omega \dots 15.0 \text{ T}\Omega \quad (I_{ISOmax} = 1.2 \text{ mA or } 3 \text{ mA})$$

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	±(3.5% m.v. + 10 digits)
10.0...99.9 GΩ	0.1 GΩ	
100...999 GΩ	1 GΩ	
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 <sub>ISO</sub> voltage	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

## 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<sub>ISO</sub> 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 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 <sub>ISO</sub> 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.

## 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 (ba-  
nana 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 cali-  
bration box**

WAADACS5KV



**PRS-1 resist-  
ance test probe**

WASONPRS1GB



**PC software:  
Sonel Reader**

WAPROREADER



**Calibration certifi-  
cate issued by an  
accredited laboratory**

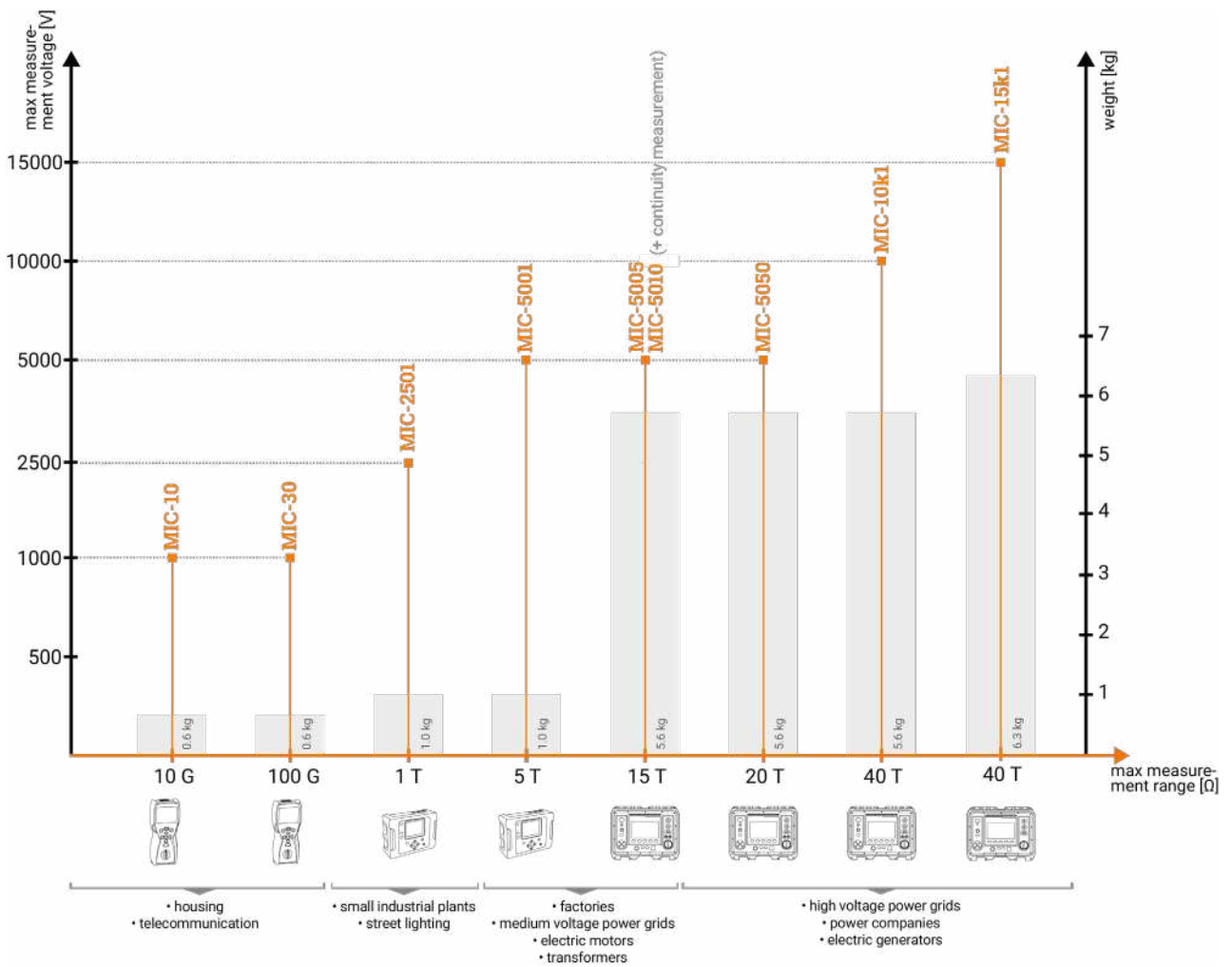
Times of charging and discharging the tested object at measuring voltage of 1.05 U<sub>ISO</sub>

Meter	Measuring voltage			Capacitance [μF]	Charging the object		Discharging the object down to voltage of 50 V [s]
	5 kV	10 kV	15 kV		Current [mA]	Maximal time [s]	
MIC-5005 / MIC-5010	✓			1	1.2	4.3	0.4
					3	1.7	
MIC-5050	✓			1	1.2	4.3	0.4
					3	1.7	
					6	0.8	
MIC-10k1	✓			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	
		✓		1	1.2	8.7	1.3
					3	3.5	
					5	2.1	
					7	1.5	
			✓	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<sub>ISO</sub>

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







## MEASUREMENT INSTRUMENTS

Świdnica, 01.02.2022

**SONEL S.A.**  
ul. Wokulskiego 11  
58-100 Świdnica  
[www.sonel.pl](http://www.sonel.pl)  
[sonel@sonel.pl](mailto:sonel@sonel.pl)

**Reception**  
tel. +48 74 85 83 800  
fax +48 74 85 83 809

**Management**  
tel. +48 74 85 83 802  
fax +48 74 85 83 809

**Sales Dept:**  
tel. +48 74 85 83 860  
fax +48 74 85 83 809  
[export@sonel.pl](mailto:export@sonel.pl)

**Services Sales Dept:**  
tel. +48 74 85 83 851  
fax +48 74 85 83 809

**Purchasing Dept:**  
tel. +48 74 85 83 894  
fax +48 74 85 83 807

**R&D Dept:**  
ul. Stargardzka 10  
54-156 Wrocław  
tel. +48 71 78 25 610  
fax +48 74 85 83 806  
[wro@sonel.pl](mailto:wro@sonel.pl)

HX/2021/115

### DISTRIBUTOR CERTIFICATE

#### TO WHOM IT MAY CONCERN

We undersigned,

**SONEL S.A.**  
Ul. Wokulskiego 11  
58-100 Świdnica  
POLAND

herby certify that we are doing business with the following company who distributes our products in Bulgaria:

**Belcom Ltd**  
P.O.Box 322  
24 Zar Assen  
Burgas 8000  
Bulgaria

This authorization is with one year of validity.

Заличено на основание 33ЛД

Paweł Żemojcin

Export Department  
**SONEL S.A.**  
ul. Wokulskiego 11,  
58-100 ŚWIDNICA,  
[www.sonel.pl](http://www.sonel.pl)

**SONEL S.A.** (33)  
58-100 Świdnica, ul. Wokulskiego 11  
tel. (74) 8583800, fax (74) 8583809  
NIP 894-00-33-448 REG.890236667

tel: +48 74 8583861; fax: +48 74 8583809

VAT No. PL8840033448  
REGON 890236667  
Registration number: GIOŚ E0001980WZBW  
Registered: District Court for Wrocław Fabryczna no. KRS0000090121  
Stock Capital: 1.400.000 PLN - fully paid.

**Managment:** M.Eng. Krzysztof Wieczorkowski - President  
M.Eng. Jan Walulik - Vice President  
M. Wojciech Kwiatkowski - Member  
**Procurist:** M.Eng. Jolanta Drozdowska

**Account Number:** INGBPLPW PL 23 1050 1575 1000 0022 9080 6427 **USD**, ING Bank Śląski S.A. o/Wrocław  
**Account Number:** INGBPLPW PL 12 1050 1575 1000 0023 5114 2274 **EUR**, ING Bank Śląski S.A. o/Wrocław

## Пачев, Христо Б.

---

**From:** Богоева, Юлия К.  
**Sent:** 30 септември 2022 г. 14:30  
**To:** Пачев, Христо Б.  
**Cc:** Александров, Пламен Г.; Лазарова, Милена Т.  
**Subject:** FW: ПОКАНА ЗА ПАЗАРНА КОНСУЛТАЦИЯ No 50039  
**Attachments:** 22 Bo 0351 SO AEC-Kozloduy IB.pdf; MIC-10k1 SO DS EN 26 01 2021.pdf; MIC-30 SO DS EN 26 01 2021.pdf; MIC-5005 SO DS EN 26 01 2021.pdf; 3. To whom it may concern\_Belcom GA изпратено.pdf

VX-E-5428/30.09.2022

---

**From:** Georgi Apostolov <georgi.apostolov@belcom.bg>  
**Sent:** Friday, September 30, 2022 1:46 PM  
**To:** commercial <commercial@npp.bg>; Пачев, Христо Б. <HPatchev@npp.bg>  
**Cc:** info@belcom.bg  
**Subject:** ПОКАНА ЗА ПАЗАРНА КОНСУЛТАЦИЯ No 50039

До: АЕЦ ЕАД  
Град Козлодуй

На вниманието на г-н Христо Пачев

Във връзка с получена покана за пазарна консултация No 50039, Ви изпращаме поисканата информация.

Поздрави.

**Георги Апостолов**  
**Мениджър екип**

**БЕЛКОМ ООД**

8000 Бургас, ул. Цар Асен 24  
тел.: 0878 318 028  
georgi.apostolov@belcom.bg www.belcom.bg

До 10 дни след фактуриране на стоки и услуги за над 1 200 лв. клиентите могат да закупят налични в сайта прибори с 15% отстъпка

**Технически решения**

- [Компенсация на реактивна енергия](#)
  - [Мониторинг на електрически съоръжения](#)
  - [Измервателни и изпитателни прибори](#)
  - [Измервателни трансформатори](#)
- Промоции и разпродажби**
- [Налични, мострени и употребявани прибори](#)