

MIKO-21

Advanced
microohmmeter



Features and benefits:

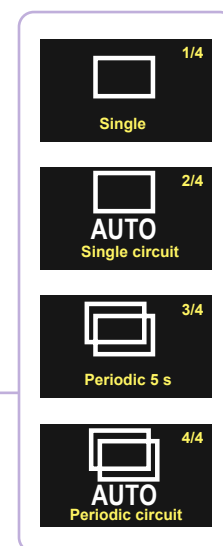
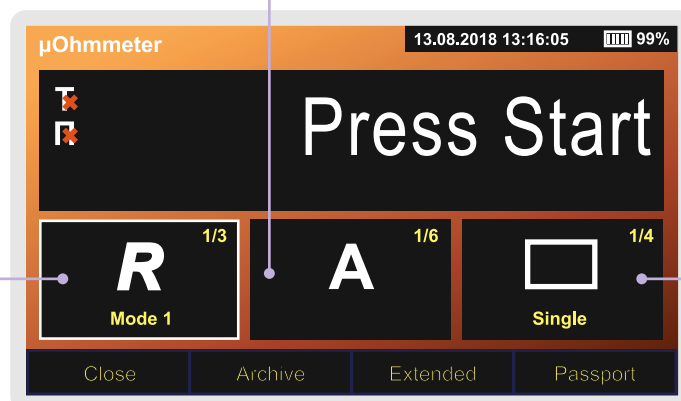
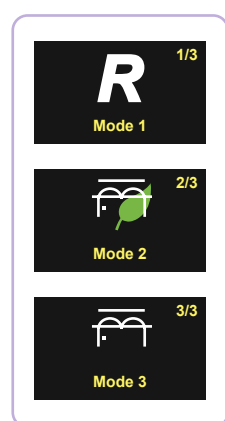
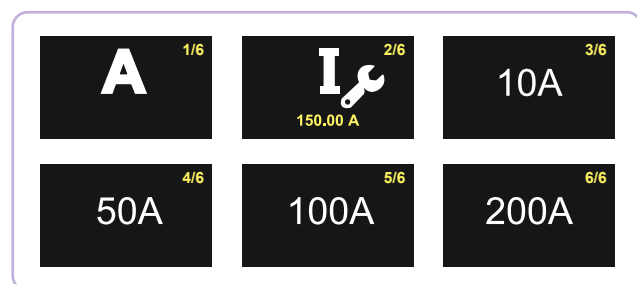
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|  Wide functionality and high precision $\pm 0.05\%$ |  Automatic indication of measured resistance thresholds |
|  Adjustable test current up to 200 A |  Automatic storage of measurement results |
|  4 ways of resistance measurement start-up |  Battery-operated power supply, light weight and size |
|  Special algorithms for measuring contact resistance of HV circuit breakers with in-built current transformers (CT) |  Color graphic touch-screen, intuitive interface |





Wide functionality and high precision $\pm 0.05\%$

MIKO-21 is ahead of similar instruments represented in the market due to a number of functional and technical features. For example, special measuring technologies ensure MIKO-21 compliance with the most stringent accuracy requirements. MIKO-21 is ideally applicable for high-precision resistance tests in the $\mu\Omega$ range.



Adjustable test current up to 200 A

Innovative power electronics provides quick and easy current ranges selection up to 200 A. The amperage can be set in several ways:

- By selecting from specified values: 10 A, 50 A, 100 A, and 200 A;
- By setting the automatic mode for selecting the test amperage;
- Manual mode for setting the test current in the range from 1 to 200 A at a step of 1 A.



Special algorithms for measuring contact resistance of HV circuit breakers with in-built current transformers (CT)

SKB EP microohmmeters are the only instruments enabling to measure contact resistance of live tank and dead tank circuit breakers using separate automatic modes optimized for those circuit breakers.

- **Mode 1** makes it possible to carry out measurement in the circuits without CT;
- **Mode 2** enables to operate measurement in the circuits with CT with minimal battery power consumption;
- **Mode 3** enables to operate measurement in the circuits with CT using 100 A or 200 A current (set by a user) without saving the battery power.



4 resistance measurement modes

- **Single** is launched once the cable clamps are contacted to the tested object and followed by pressing the START button.
- **Auto single circuit** is initiated by pressing the START button. The instrument will start measurement when the electric contact between the tested circuit and the test cable contacts is set. The test can be repeated by pressing the START button again.
- **Periodic** is used in pre-specified time intervals when both hands are occupied with cable probes pressing against the test points. The user can choose time interval between the tests. The instrument will work continuously until the user stops the mode.
- **Auto periodic circuit** is initiated by pressing the START button and used for continuous measurements. The user connects the current cable, and as soon as the potential contacts are connected, the measurement will start automatically. To repeat a test, simply break contact with potential probes and reconnect.

AUTO

Automatic indication of measured resistance thresholds

Archive of the instrument contains passports of HV circuit breakers with indication of maximum and/or minimum permissible contact resistance. The user can add/delete/edit passport values of the tested objects. Once the measured value exceeds the passport value the instrument indicates it acoustically.

**Automatic storage of measurement results**

Automatic storage of measurement results significantly reduces the time of circuit breakers test due to data transferring from the substation to the company's office.

**Battery-operated power supply, light weight and size**

The above peculiarities ensure complete autonomy and high mobility of the instrument over the vast substation or facility territory, as they allow to avoid troubles with a power cable, extension rod, and grounding.

**Color graphic touch-screen, intuitive interface**

The instrument can be manipulated either from the keyboard or from the touch-screen, as suits.



Application field: for use at high-voltage substations and industrial environments

General features

Mains voltage	AC 90-264 V, 47-63 Hz DC 127-370 V
Consumed power does not exceed	60 W
Battery type	Li-ion battery
Battery lifetime (in continuous operation)	8 hours
Battery recharge time	< 2 hours
In-built memory	64 MB
Number of records	up to 2000
Dimensions	270 x 246 x 124 mm
Test block weight	3.3 kg
Accessories weight (standard complete set)	2.45 kg
Warranty	3 years
Calibration period	3 years

Measurement features

Measurement principle	4-wire Kelvin method
Resistance range	0.1 $\mu\Omega$ ÷ 2 Ω
Resistance resolution	up to 10 $\mu\Omega$
Number of digits in the output of the measurement result	5
Current range	1 ÷ 200 A
Accuracy	±0.05%
Measurement time	
Mode 1	≤2 s
Mode 2	10 ÷ 30 s
Mode 3	5 ÷ 15 s

Environment

Environmental protection	IP 67 (with closed cover) IP 40 (with open cover)
Storage temperature	from -20 °C to + 60 °C
Operating temperature	from -20 °C to + 50 °C
Relative humidity	95% (non condensing)

Interface

PC communication	USB / USB Flash
Display	Color graphic touch-screen, 480 x 272 pix
PC software	Windows®-based analysis software
Interface language	English
User's manual language	English

Safety and Certificates

Thermal protection	Protects all sensitive components, avoiding any damage due to overheating
Safety	IEC 61010-1
EMC	IEC 61326-1

Mode	Resistance subrange, $\mu\Omega$	Current, A	Accuracy, %
1	0.1 ... 2·10 ³	200	$\pm[0.05+0.005\cdot(R_K/R_X-1)^{0.75}]$
	0.1 ... 10·10 ³	100	$\pm[0.05+0.005\cdot(R_K/R_X-1)^{0.65}]$
	0.1 ... 30·10 ³	50	$\pm[0.05+0.005\cdot(R_K/R_X-1)^{0.6}]$
	10 ... 200·10 ³	10	$\pm[0.1+0.001\cdot(R_K/R_X-1)^{0.7}]$
	100 ... 2·10 ⁶	1	$\pm[0.1+0.01\cdot(R_K/R_X-1)^{0.5}]$
2	0.1 ... 2·10 ³	200 and 10	$\pm[0.1+0.01\cdot(R_K/R_X-1)^{0.8}]$
3	0.1 ... 2·10 ³	200 and 100	

R_K – final value of the electrical resistance of the subrange, Ω

R_X – measured electrical resistance, Ω

**High-voltage or auto circuit breakers**

(oil-blast, SF6, vacuum, air-blast, electromagnetic)

- DC electrical resistance measurement of contact connections;
- DC electrical resistance measurement of current leads.

Load-break switches

- DC electrical resistance measurement of main contacts.

**Releasing, connecting, disconnecting switches**

- DC electrical resistance measurement of contact connections.

**Cut-outs and fuse-disconnectors**

- DC electrical resistance measurement of conducting cartridge of fuse-disconnector.

**Metal-clad switchgear of internal and external installation**

- DC resistance measurement.

**Busbars and connecting bars**

- Testing of cable and bus connections.

**Railways**

- Monitoring of rail resistance;
- Monitoring of wagon wheel pairs resistance.



MIKO-10



MIKO-2.3

We recommend you to check our offer for **MIKO-10** and **MIKO-2.3**. More information is available at our website www.skbecp.com

Standard complete set

Nº	Item	Description	Order Nº
1	MIKO-21 test block	Test block and documents: Calibration Certificate, User's Manual and Log book.	SKB139.00.00.000
2	Set #2	Current cables 2 x 2 m (0.56 kg) with crocodile clips (jaw up to 50 mm) for circuit breakers of up to 10 kV.	SKB039.27.00.000
3	Mains cable	Mains cable 1 x 2 m (0.24 kg) for connecting the instrument to the power line, as well as for charging the instrument battery through the in-built charger.	SKB018.09.00.000
4	Ground cable	Ground cable 1 x 1.75 m (0.07 kg) for instrument grounding. The cable is equipped with a ground clamp and a screw end cap. Rated current is 50 A.	SKB010.01.00.000
5	Shunt	Type 75ShSMM3 (75ШСММ3) for checking the operability of the instrument.	-
6	Safety devices	Type VP2B-1V-2A (ВП2Б-1В-2А) (2 pcs) for the power source protection.	-
7	Tool bag	Robust, convenient, wear proof bag for transportation of cables, documentation, and other accessories. The bag is especially useful when the set is carried to an object, so that all the needed accessories are kept together.	SKB126.06.00.000

**Optional accessories**

Nº	Item	Description	kV	L	W	Order Nº
8	Manipulating rod 35 kV	The rod is designed to ensure convenient connection to contacts of a high-voltage item. The rod is completed with a clamp with current and potential contacts connected by wires with the measurement platform. Test cables are connected to the measurement platform from the ground.	35	2.2 m	3.4 kg	SKB110.41.00.000
	Manipulating rod 110 kV		110	3.7 m	4 kg	SKB110.41.00.000-01
	Manipulating rod 220 kV		220	5.1 m	4.6 kg	SKB110.41.00.000-02



Recommended complete set

Nº	Item	Description	Order Nº
9	Set #4	Current cables 2 x 6 m (2.83 kg) with a G-clamp (jaw up to 80 mm) for all the circuit breakers of up to 110 kV and some circuit breakers of up to 220 kV.	SKB039.26.00.000
10	Test cable for Set #4	Test cable 1 x 6 m with crocodile clips A25C (2 pcs) and probes (2 pcs) for precision measurements and for measurements on the sections of the circuit to the end points of which the test current is applied.	SKB039.24.00.000-02
11	USB 2.0 A-B Cable	USB cable 1 x 2 m. For computer connection and data transfer.	-

**Optional complete set**

Nº	Item	Description	Order Nº
12	Set #1	Current cables 2 x 1.5 m (0.87 kg) with spring-loaded needle-type contacts for measurements in busbars or in arc extinguish chambers.	SKB039.19.00.000 SKB039.19.00.000-01
13	Set #3	Current cables 2 x 4.5 m (3.79 kg) with a G-clamp (jaw up to 80 mm) for all the circuit breakers of up to 35 kV and for some circuit breakers of up to 110 kV.	SKB039.25.00.000
14	Test cable for Set #2	Test cable 1 x 2 m with crocodile clips A25C (2 pcs) and probes (2 pcs) for precision measurements and for measurements on the sections of the circuit to the end points of which the test current is applied.	SKB039.24.00.000
15	Test cable for Set #3	Test cable 1 x 4.5 m with crocodile clips A25C (2 pcs) and probes (2 pcs) for precision measurements and for measurements on the sections of the circuit to the end points of which the test current is applied.	SKB039.24.00.000-01
16	Set #5	Test kit for circuit breakers of up to 220 kV. Current cable 1 x 1 m (0.5 kg) with crocodile clips (jaw up to 50 mm). Current cable 1 x 3 m (1 kg) with a G-clamp (jaw up to 70 mm).	SKB039.20.00.000 SKB039.21.00.000
17	Set #6	Test kit for circuit breakers of up to 330 kV, and some for up to 500kV. Current cable 1 x 1 m (0.5 kg) with crocodile clips (jaw up to 50 mm). Current cable 1 x 6 m (2 kg) with a G-clamp (jaw up to 70 mm).	SKB039.20.00.000 SKB039.21.00.000-01
18	Set #7	Test kit for circuit breakers of up to 750 kV. Current cable 1 x 1 m (0.5 kg) with crocodile clips (jaw up to 50 mm). Current cable 1 x 9 m (4 kg) with a G-clamp (jaw up to 70 mm).	SKB039.20.00.000 SKB039.21.00.000-02
19	Potential spring-loaded contact (2 pcs)	The item is used together with Sets ##3-7 for avoiding high transient resistance between an input pin and a clamp of the device.	SKB023.21.00.000
20	Potential pin contact (2 pcs)	The item is used together with Sets ##3-7 for avoiding high transient resistance between an input pin and a clamp of the device.	SKB023.22.00.000

SKB EP, LLC is an innovative enterprise founded in 1991 in Russia.

We offer a wide range of test instruments for control and diagnostics of electrical switching equipment, such as high-voltage circuit breakers, transformers, generators, motors, etc. Our instruments are reliable, highly accurate, and user-friendly. They provide fast and complex test result measurements.

Among our services are:



Calibration and testing



Warranty and post warranty service



Technical support



Trainings and seminars



Implementation of new measurement and analysis methods of the high-voltage equipment condition



Development and manufacture of special fixing units and measuring cables

Innovative approach is one of the basic principles of our development and production cycle. Application of the instruments produced by our company makes it possible:

- to save time for diagnostics and control of high-voltage equipment;
- to simplify working process;
- to reduce the costs for equipment repairs.

>13,000

Today we have more than 13 000 loyal customers. Our instruments are successfully applied in:

- energy systems;
- industrial enterprises;
- railways.

Please visit our website to find more information about our company, instruments and provided services.

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