SPECIAL DESIGN BUREAU OF ELECTRIC INSTRUMENT ENGINEERING
high - voltage circuit breakers and transformers control instruments

1A Kokkalevskaya, Shushary, St. Petersburg, Russia, 196140
Multi-line phone: +7 (3952) 719-148, 755-607; e-mail: skb@skbpribor.com;
www.skbpribor.com www.milliommetr.com

Modern microohmmeter MIKO-21

Certificates:
Safety Test Certificate IEC 61010-1:2001 on the MIKO-21
EMC Compatibility 61326-1:2005 on the MIKO-21

MIKO-2.3 is included in Russian Register of Innovative Products under #272, valid until 30.03.2019
MIKO-21 is included in Russian State Register under #63180-16, valid until 17.02.2021

Warranty: 36 months
Service life: 10 years

Measurement of transient resistances of electric circuits in the range of 0.1 μΩ ÷ 2 Ω, the lowest error being ±0.05%:

- in high-voltage circuit breaker contacts,
- in disconnecting switches, separators, and short-circuiters,
- in packaged switchgears,
- in contact couplings,
- in weld seams, etc.

Description:

- **Measurements using the rated current up to 200A**. Amperage in the MIKO-21 can be set in several ways: By selecting from a number of specified values: 10A, 50A, 100A, and 200A; 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 1A.

- **Special algorithms for measuring the transient resistances of high-voltage circuit breakers with in-built current transformers.** Only SKB EP microohmmeters measure transient resistances ($R_{transient}$) of minimum-oil and bulk-oil circuit breakers using separate automatic modes optimized for those circuit breakers.

- **There are four methods programmed in the instrument for resistance measurement start-up:**
  - "Single-shot start-up", i.e., start-up by pressing START button;
  - "Start-up against circuit closing". In this case the measurement is started up after occurrence of electric contact between tested circuit and current or potential contacts of the test cable;
  - "Regular star-up". Measurements are started up in the pre-specified time intervals. This mode can be used for items rejecting.
  - "Regular circuit". This mode is intended for regular automatic measurement start-up against the test circuit closing.

- Archive of the instrument contains passports of HV circuit breakers with indication of maximum and/or minimum permissible transient resistances of contacts, and passports for rejected resistors with indication of permissible values of the upper and lower thresholds of resistances.

- Availability of an in-built archive of passport values of eclectic resistances (main circuit of HV circuit breakers) facilitates automatic detection, and the device beeps if the results of measurements go beyond the permissible limits.

- The Instrument can be manipulated either from the film keyboard or from the sensor display, as suits.
  Communication with PC via USB or a flash card facilitates data transfer from the Instrument to the Company's data base.
  The instrument can be built-in into testing systems under control of software complexes of diagnosis laboratories and equipment manufacturers.

Availability of an energy-independent memory and a mode of "automatic storage of the results of measurements" considerably reduce the full time of the circuit breaker test owing to transfer of the data obtained from the substation area to the Company's office.

Specifications

Specifications	Value
Range of resistance measurements, Ohm	0.1 μΩ ÷ 2 Ω
Range of test current amperage, A	1 ÷ 200
Error of measurements, %	±0.05
Time of measurement in Mode 1, sec	not more than 2.0
Time of measurement in Mode 2 on a bulk-oil circuit breaker, sec	10 ÷ 30
Time of measurement in Mode 3 on a bulk-oil circuit breaker with battery charge saving	5 ÷ 15
Period of continuous operation (in normal conditions), hrs, no less than	5
Number of tests (in normal conditions), no less than	500
Display of the instrument	Sensor, color, graphic, 480x272 dots
Types of data transfer channels	USB/USB Flash
Consumed power does not exceed, V	60
Operating temperature range, ºC	-20 ÷ +50
IP for transportation	IP64
IP rating in operating state	IP40
Weight of the test block, kg, not more than	3.1
Dimensions, mm	270x250x130
Interface language	English
User manuals language	English
Calibration period, year	3

Recommended package of the Instrument

Photo	Item, Index	Application	Recommended complete set (pcs.)
Standard complete set:			
	Прибор МИКО-21	Instrument and covering documents, Main cable, Earth wire, bag for transportation of cables, documentation and other accessories.	1
	**Set #2** СКБ039.27.00.000	Includes: Test cable with crocodile clips (up to 50 mm jaw capacity) for circuit breakers of up to 10kV. Current and potential wires. (2 m, 0.56 kg, 2 pcs. per set).	2
Additional complete set (on order):			
-	USB 2.0 A-B Cable	For computer connection and data transfer.	1
Test cables, should the instrument be placed near the circuit breaker			
	**Set #1** СКБ039.19.00.000 СКБ039.19.00.000 -01	Includes: Test cable with springloaded needle-type contacts for measurements in busbars or in arc extinguish chambers. Current and potential wires. (1.5 m, 0.5 kg, 2 pcs. per set).	-
	**Set #3** СКБ039.25.00.000	Includes: Test cable with with a G-cramp (up to 80 mm jaw capacity) for all the circuit breakers of up to 35kV, and for some circuit breakers of up to 110kV. Current and potential wires. (4.5 m, 1.86 kg, 2 pcs. per set).	-
	**Set #4** СКБ039.26.00.000	Includes: Test cable with with a G-cramp (up to 80 mm jaw capacity) for all the circuit breakers of up to 110kV and some circuit breakers of up to 220kV. Current and potential wires. (6 m, 2.83 kg, 2 pcs. per set).	-

	To be used together with **Set #2** length - 2 m СКБ039.24.00.000	For precision measurements and for measurements on the sections of the circuit to the end points of which the test current is applied. It includes: crocodile clips A25C (2 pcs.), and a probe (2 pcs.).	-
	To be used together with **Set #3** length – 4.5 m СКБ039.24.00.000 -01		-
	To be used together with **Set #4** length - 6 m СКБ039.24.00.000 -02		-
Test cables, should the instrument be placed in the lift cradle			
A test kit consists of two cables for circuit breakers of up to 220kV:			
	**Set #5:** СКБ039.20.00.000 СКБ039.21.00.000	Test cable with crocodile clips (up to 50 mm jaw capacity). Current and potential wires. (1 m, 0.5 kg).	-
		Test cable with a G-cramp (up to 70 mm jaw capacity). Current and potential wires. (3 m, 1.0 kg).	-
A test kit consists of two cables for circuit breakers of up to 330kV, and some for up to 500kV:			
	**Set #6:** СКБ039.20.00.000 СКБ039.21.00.000-01	Test cable with crocodile clips (up to 50 mm jaw capacity). Current and potential wires. (1 m, 0.5 kg)	-
		Test cable with a G-cramp (up to 70 mm jaw capacity). Current and potential wires. (6 m, 2.0 kg).	-
A test kit consists of two cables for circuit breakers of up to 750kV:			
	**Set #7:** СКБ039.20.00.000 СКБ039.21.00.000-02	Test cable with a crocodile clip (up to 50 mm jaw capacity). Current and potential wires. (1 m, 0.5 kg).	-
		Test cable with a G-cramp (up to 70 mm jaw capacity). Current and potential wires. (9 m, 4.0 kg).	-
Additional accessories to the set			
	Potential spring-loaded contact (2 pcs.) СКБ023.21.00.000	Together with test cables for avoiding high transient resistances between an input pin and a cramp of the device. To be used together with **Sets ##3-7**	-
	Potential pin contact (2 pcs.) СКБ023.22.00.000		-

-	Manipulating rod for equipment of up to 35kV (2.2 m) СКБ010.41.00.000	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.	-
	Manipulating rod for equipment of up to 110kV (3.7 m) СКБ010.41.00.000-01		-
	Manipulating rod for equipment of up to 220kV (5.1 m) СКБ010.41.00.000-02		-

Area of the Instrument application

Test methods	Recommended Instrument
High-voltage circuit breakers	
Measuring of transient electrical resistivity of contact connections	**MIKO-21**, MIKO-10, MIKO-2.3
Measuring of electrical resistance of current leads	
Disconnecting, isolating and short-circuiting switches	
Measuring of direct-current resistance	**MIKO-21**, MIKO-10, MIKO-2.3
Metal-clad switchgear of internal and external installation	
Measuring of direct-current resistance	**MIKO-21**, MIKO-10, MIKO-2.3
Collecting and connecting bus-bars	
Testing of cable and bus connections	**MIKO-21**, MIKO-10, MIKO-2.3
Cut-outs and fuse-disconnectors for the voltage of more than 1kV	
Measuring of direct-current resistance of conducting part of fusedisconnector cartridge	**MIKO-21**, MIKO-10, MIKO-2.3
Wagons and rails	
Monitoring of rail resistance	**MIKO-21**, MIKO-10, MIKO-2.3
Monitoring of wagon wheel pairs resistance	
Load-break switches (electromagnetic, sulfur hexafluoride, vacuum)	
Measuring of direct-current resistance	**MIKO-21**, MIKO-10, MIKO-2.3
Electric installations of buildings and structures (circuit breakers)	
Testing of contacts	**MIKO-21**, MIKO-10, MIKO-2.3