

Circuit breaker analyzers PKV/U3.1

Certificates:

Safety Test Certificate IEC 61010-1:2001 on the PKV/U3
EMC Compatibility 61326-1:2005 on the PKV/U3

PKV/U3 is included in Russian Register of Innovative Products under #230, valid until 12.10.2018
PKV/U3.1 and PKV/U3.0 - TC № RU Д- RU.ME97.B.00020; valid until 26.08.2019

Warranty: 13 months
Service life: 10 years



Maintenance check of oil, vacuum, sulfur-hexafluoride (SF₆) and air-blast circuit breakers for all voltage classes from 10kV to 500kV:

- checkout of speed and travel parameters of oil, vacuum, SF₆ and air-blast circuit breakers with up to 20 breaks per pole;
- checkout of time characteristics of high-voltage disconnecting, isolating and short-circuiting switches;
- measuring of electromagnet currents and voltages and solenoid heavy currents with the help of clamp meters;
- built-in remote control for setting of ordinary operations and compound cycles for circuit breakers with the current of up to 35A for DC/AC drives;

Description:

- PKV/U3.1 is complete with attachment devices for the installation of measuring transducers on all types of Russian- and foreign-manufactured high-voltage circuit breakers (ABB, AREVA, ALSTOM, SIEMENS, etc.);
- Wide ranges of measurement by time (up to 8.1 sec), speed (up to 20 m/sec) and travel (up to 900 mm), covering the needs for monitoring of all existing high-voltage circuit breakers. For instance, the smaller time range of similar instruments does not allow for monitoring the operation of circuit breakers in compound cycles;
- High measurement accuracy when measuring time characteristics (± 0.1 ms), as well as travel and speed characteristics is ensured by digital angular and linear movement transducers with the accuracy grade of 0.09° and 0.5 mm;
- PKV/U3.1 is a measuring "brain" which performs all necessary calculations. In order to view the results of diagnostics you need to connect the instrument to a portable personal computer (PC) with special software;
- Along with the tables of digital values of parameters more detailed information on circuit breaker condition can be obtained from the following registered graphs of processes: relation between speed and time, speed and travel; relation between electromagnet currents and voltages, and time and travel; diagrams of contact opening-closing.
- PKV/U3.1 is equipped with a power switch for control of switching device drive with solenoid current of up to 35A (direct and alternating) which allows performing both simple switching close or switching open operations and compound cycles "Open-Close", "Close-Open", "Open-Close-Open".

One of the main characteristics of PKV/U3 is that it is produced in two modifications which differ in the number of channels of movement transducers (1 or 3) and number of channels of variable-resistance transducers monitoring (2 or 12): PKV/U3.1 and PKV/U3.0, correspondingly.

Thereby, PKV/U3.1 allows monitoring of all types of air-blast circuit breakers, except for models VO-750, VO-1150, VNV-1150, which is available in the other instrument version.




	PKV/U3.0	PKV/U3.1
Number of variable-resistance transducer channels	12	2
Number of movement transducer channels	3	1
Number of movement transducers in the set	DP21 (up to 3 pcs.) and DP12 (up to 3 pcs.)	DP21 (1 pcs.) and DP12 (1pcs.)
Circuit breakers subject to verification	all	all, except for VO-750, VO-1150, VNV-1150
Simultaneous measuring of basic shaft turn angle and drive arm turn angle and pole	available	not available



Specifications

Specifications	Value
Number of discrete channels for circuit breaker contacts monitoring, pcs.	20
Range of measurement and recording of time intervals, sec	0.004 ÷ 8
Maximum permissible intrinsic error of time interval measurement, ms	$\pm[0.1 + 0.0001 \cdot T_x]$, where T_x – measured time interval
Number of channels of incremental movement transducers, pcs.	1 (for DP12 or DP21 transducers)
Range of linear movements measurement by DP12 transducer, mm	0.5 ÷ 900
Resolution of linear movements measurement by DP12 transducer, mm	0.5
Maximum permissible intrinsic error of linear movements measurement by DP12 transducer, mm	± 1
Range of angular movements measurement by DP21 transducer, degree	0.09 ÷ 360
Resolution of angular movements measurement by DP21 transducer, degree	0.09
Maximum permissible intrinsic error of angular movements measurement by DP12 transducer, mm	$\pm[0.2 + 0.001 \cdot a]$, where a – measured movement
Range of moving speed measurement, m/sec	0.02 ÷ 20
Maximum permissible intrinsic relative error of speed measurement by DP12 transducer in the range of 0.02 ÷ 10 m/sec, %	± 2
Maximum commutated current (actual value), A	35
Response level of power switch at short-circuiting and excessive current (peak value), A	58 ± 8
Current measuring range (peak value), A	± 50
Range of measured voltages of switch voltage channel (peak value), V	± 350
Range of voltage measuring by shunt voltage channel (peak value), mV	± 75
Voltage measuring range for "Input 1" and "Input2" channels, V	0 ÷ 12 (monopolar mode), ± 6 (bipolar mode)
Resistance measuring range for "Input 1" and "Input2" channels, Ohm	0 ÷ 2400 Ohm (output current of 4 mA); 0 ÷ 160 Ohm (output current of 60 mA)

Maximum consumed power, W	60
Operation temperature range, °C	-15 ÷ +40
IP rating in operating state	IP20
Maximum measuring unit weight, kg	10
Dimensions, mm	300x140x400
Calibration interval, year	3

Recommended package of the Instrument

Photo	Item, Index	Application	Recommended complete set (pcs.)
Standard complete set:			
	PKV/U3.1 measuring unit SKB021.00.00.000-01	Instrument and accompanying documents, Linear movement transducer DP12 and Angular movement transducer DP21, Measuring stick (length – 700 mm), Transducer cable (length – 12 m), Mains cable, LAN cable, RS-232 cable, Switch input voltage cable, Local start cable, Remote start cable, A, B, C, D poles cables (4 pcs.), Pole cable (20 channels), Variable-resistance transducer cable (2 pcs.), Shunt voltage measuring cable, Ground wire, Attachment devices set (clamps, boards, connector adapters, etc.), Attachment devices set kit and Instrument carrying case.	1
Additional complete set (on order):			
	Measuring stick length – 1000 mm length – 550 mm SKB012.00.00.000/-01	Measuring stick in a box. Used together with linear movement transducer DP12 (length – 700 mm in standard complete set).	-
	Transducer cable length – 7 m SKB010.06.00.000-02	For connecting linear (DP12) or angular (DP21) movement transducer to the instrument. Cable insulation – silicone (length – 12 m in standard complete set).	-
	Attachment devices set (for foreign-made circuit breakers)	For attaching of DP21 angular movement transducer to SF6 circuit breakers manufactured by Siemens, ABB, Areva, etc.	1
	Power cable adapter length – 2 m SKB010.25.00.000	Power cable adapter with a rectifier up to 32A (embodiment 2). Connecting to the network with a europlug. Temperature range: -25°C ÷ +40°C	-
	length – 5 m SKB010.25.00.000-01		1
	length – 10 m SKB010.25.00.000-02		-
	Cable for voltage measurement by "Analog input" channel SKB026.19.00.000	For measuring voltage in the range between 0 ÷ 12V and -6 ÷ +6V. Equipped with M5 screw end caps (length – 2.5 m).	1

	Clamp meters SKB026.21.00.000	For measuring currents of electromagnets and solenoids. Supplied complete with a coupler. Current of up to 600A (cable length – 2.5 m).	1
	DP32.1 variable-resistance linear movement transducer SKB026.22.00.000	For measuring linear movements of moving parts of vacuum circuit breakers with open insulating housing in the range of 25 mm.	-
	Fixing device No.49 SKB010.33.00.000	For fixing of DP32.1 transducer position behind the movable contact of the arch chute with diameter of up to 25 mm.	-
	Board No.2 SKB010.11.00.000	For fixing of DP32.1 transducer position behind the insulating frame of VVTE-M-10 vacuum circuit breaker pole.	-
	Attaching clamp No.20 SKB010.17.00.000	Installed instead of housing below the drive for fixing of DP12 linear movement transducer to VGU and similar type high-voltage circuit breakers.	-
	Nozzle No.12 SKB009.11.00.000	For installation of DP21 linear movement transducer on VE or VES type (or other type) high-voltage circuit breakers.	-
	Fixing bracket No.22 SKB010.14.00.000	Installed on the axis of the main movable contact of VE or VES type high-voltage circuit breakers. After that DP21 linear movement transducer is attached to the brackets.	-
	Notebook	For PKV/M7 control from computer as well as for measurement data processing in a special program.	-
	Paid subscription for graph analysis service (5 requests)	Read more on the company's website.	-

Area of the Instrument application

Test methods	Recommended Instrument
High-voltage circuit breakers	
Measuring of time characteristics	PKV/U3.1, PKV/U3.0, PKV/M7
Measuring of travel and velocity parameters	
Multiple-blow test	
Disconnecting, isolating and short-circuiting switches	
Measuring of switch on/switch off time	PKV/U3.1, PKV/U3.0, PKV/M7
Multiple-blow test	
Metal-clad switchgear of internal and external installation	
Measuring of time characteristics	PKV/U3.1, PKV/U3.0, PKV/M7
Measuring of travel and velocity parameters	
Load-break switches (electromagnetic, sulfur hexafluoride, vacuum)	
Multiple-blow test	PKV/U3.1, PKV/U3.0, PKV/M7