

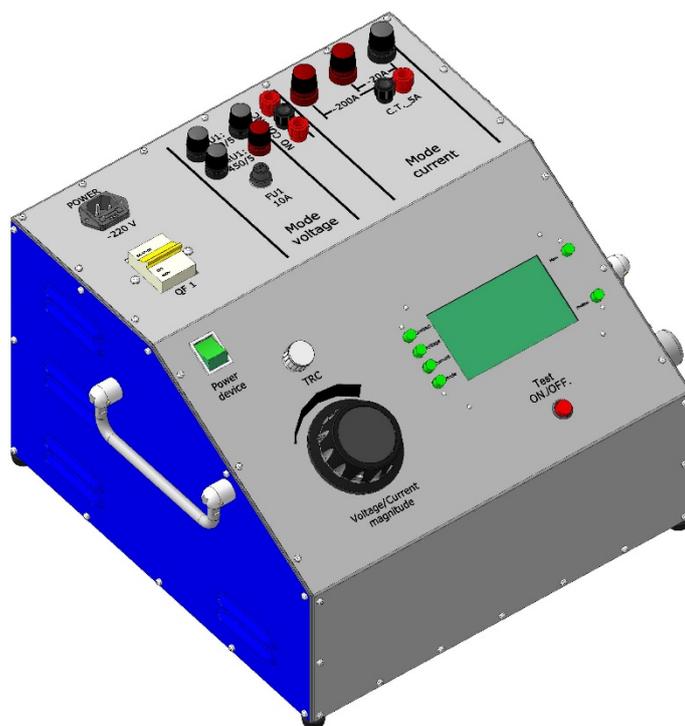
Testing device

UPZ - 450/200

Technical Description and

User manual

User Manual



2019

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1. Designation:

UPZ - 450/200 relays and circuit breakers testing device (hereinafter UPZ-450/200 device) intended for:

- Testing and adjusting of simple relay protection, which already installed on power plants, substations, industrial-governmental enterprises or laboratories.
- Testing and adjusting automation elements (electromagnetic relays, contactors, motor starters, etc.).
- Testing, commissioning and adjusting circuit breakers.

The device made in a single case, which creates additional convenience during operation. Package contents includes wires, cables to connect items under tests.

2. Package contents:

- 2.1 UPZ-450/200 device 1 unit
- 2.2 Set of test cables 1 set
- 2.3 Power cable of the device 1pcs
- 2.4 Transportation bag for storage and transportation of interconnection cables set 1 pcs
- 2.5 User Manual of the device UPZ-450/200 1pcs.

3. Technical parameters:

Basic data:

Supply voltage,	AC 230 ± 10% V (50Hz)
Current consumption, max	50 A
Power consumption, max	3000 VA
Operation ambient temperature	-10 ... + 45 ° C
Storage temperature	-20 ... + 45 ° C
Relative humidity at 25°C, max	80 %,
Atmospheric pressure	from 630 to 800 mm Hg.
Weight of the device, without interconnection cables	30 kg
Operating mode	Continuous at least 120 min
Average device life	10 years

Output voltage:

Range of output AC sinusoidal voltage that formed by the device divided into three sub ranges:

0 - 50 (V);

0 - 250 (V);

0 - 450 (V).

Range of output DC rectified voltage that generated by the device divided into three sub ranges:

0 - 50 (V);

0 - 250 (V);

0 - 450 (V).

Output voltage measurement accuracy 1.5 %

Resolution of output voltage measurement 10 mV

Output current:

Range of output AC sinusoidal current that formed by the device divided into two sub ranges:

0 - 20 (A);

0 - 200 (A);

Output current measuring accuracy 1.5 %

Resolution of output current measurement (mA) 10

Complementary:

Tripping time intervals meter 0 - 9999.9 sec

Tripping time intervals measurement accuracy, max 0.2 msec

Tripping time intervals measurement resolution 0.1 msec

Specification of UPZ-450/200 output parameters.

U1 OUTPUT: ~450/5 ADJUSTABLE AC VOLTAGE			
Output voltage adjustment range, V	0,2..50	2,0..250	4,0..450
Nominal output current, A	5	5	3
Max output current, A	8	8	5
Nominal output power, kVA,	1,5		
Maximum output power, kVA,	2,5		
Discretion of output voltage adjustment during operation with RNO voltage regulator, V, max	0,1	0,25	0,45
Protection fuse FU1 , A	10		
U1 OUTPUT: ±450/5 ADJUSTABLE DC VOLTAGE			
Output voltage adjustment range, V	0,2..50	2,0..250	4,0..450
Nominal output current, A	5	5	3
Max output current, A	8	8	5
Nominal output power, kVA,	1,5		
Maximum output power, kVA	2,5		
Discretion of output voltage adjustment during operation with RNO voltage regulator, V, max	0,1	0,25	0,45
Protection fuse FU1 , A	10		
U2 OUTPUT: ADJUSTABLE AC CURRENT AND VOLTAGE			
Output voltage adjustment range, V	0,05.....10		
Output current measuring range, A	0...20	0...200	
Nominal output current during operation with RNO voltage regulator, A	20	200	
Max output current during operation with inbuilt RNO voltage regulator, A	22	220	
Protection: C25 circuit breaker of the device, I_m of current meter	22	220	

4. Safety rules:

- 4.1 Note that in order to provide staff security it is necessary to feed the device, using outlet with serviceable protective grounding circuit.
- 4.2 Strictly prohibited to operate the device when removed housing panels.
- 4.3 Read carefully this user manual before operating the device.
- 4.4 All voltage sources at output terminals of the device are galvanically isolated from the mains supply. During the presence of voltage at output terminals of the device, avoid touching the electrically uninsulated live parts of the device.
- 4.5 Do not connect to the device any homemade parts or wires. Strictly forbidden to make any modifications to the equipment or accessories, as this could lead to additional risk. In order to be fully confident in safety, any repair or modification must be performed by the manufacturer (VENKO Sp. Z o.o.) or by authorized service.

5. Design and operation

- 5.1 UPZ-450/200 is designed as a single unit. Exterior and front panels shown in figures № 1,2,3. Schematic circuit diagram of the device on page № 11. Operating position of the device – horizontal. Transportation handles located on the front panel.
- 5.2 The front panel of the device Fig.№1- 3 functionally divided for power panel and control panel. Current and voltage output terminals for testing and adjustment relay protection and automation devices located on the power panel. Terminals are grouped into three groups.
- 5.3 First group labelled "**CURRENT MODE**" designed to test and calibrate current protection elements: current relays; automatic circuit breakers; current transformers, etc. Current and voltage parameters of these terminals are specified in tables on pages 5-6. In addition, this group includes terminals "**C.S._5A**" for connecting an external current transformer with output current 5A.
- 5.4 Second group labelled "**VOLTAGE MODE**" intended to test and calibrate voltage protection elements: voltage relays, voltage transformers, etc. Current and voltage parameters of these terminals are specified in tables on pages 5-6. In the area of the second group located protective fuse «**FU1**», to protect the outer circuits from overcurrent and short-circuits.
- 5.5 The third group of auxiliary terminals located between the first and second groups. Auxiliary terminal symbols "**NC; COM; NO**" intended to test time characteristics of relay protection and automation. These terminals are connected to "dry contacts" of external devices. With these auxiliary terminals, together with power terminals of the first or second groups are measured following parameters: tripping and releasing voltage of electromagnetic relays of AC and DC voltage; opening and closing of electromagnetic relays contacts; tripping time characteristics of AC current circuit breakers.
- 5.6 Left part of the power panel of the device includes power outlet, power circuit-breaker QF1 and switch of current adjusting method: single-phase voltage regulator or thyristor regulator. Via power outlet the unit is energized. QF1 circuit breaker turns on/off and protects against overcurrent the device. Main components of the device are: the power thyristor switch Q2, voltage regulator T1 and matching transformer T2.

5.7 Exterior of control panel shown in Fig. 3. Upper left corner of the control panel contains switch "POWER" with light. This switch turns on the device. Voltage and current regulator knob №10 designed for smooth adjustment of output test current and voltage. Fully counterclockwise is the minimum value of adjustment knob.

5.8 The right part of control panel contains graphic display and buttons arranged vertically to the right and left of the display. Buttons of operator panel located to the right and left of the display are used to select the operating mode, range of voltages and currents, the parameter of the intervals meter. Each button has a text that describes its function. The main operating button "CURRENT / VOLTAGE ON / OFF" located lower the display. By pressing this button sequentially enables or disables the voltage and current at the output power terminals of the device.

5.9 Operation of all modes and measurement of output values of voltage, current and time of the device is based on the control program with 12-bit ADC. Circuit solutions and modern components of the device, provide reliable and accurate measurements True RMS, simplicity and reliability.

Note. The manufacturer reserves the right to make changes to the control program and the construction of the device, without impairing its basic characteristics, without prior notification of the customer..

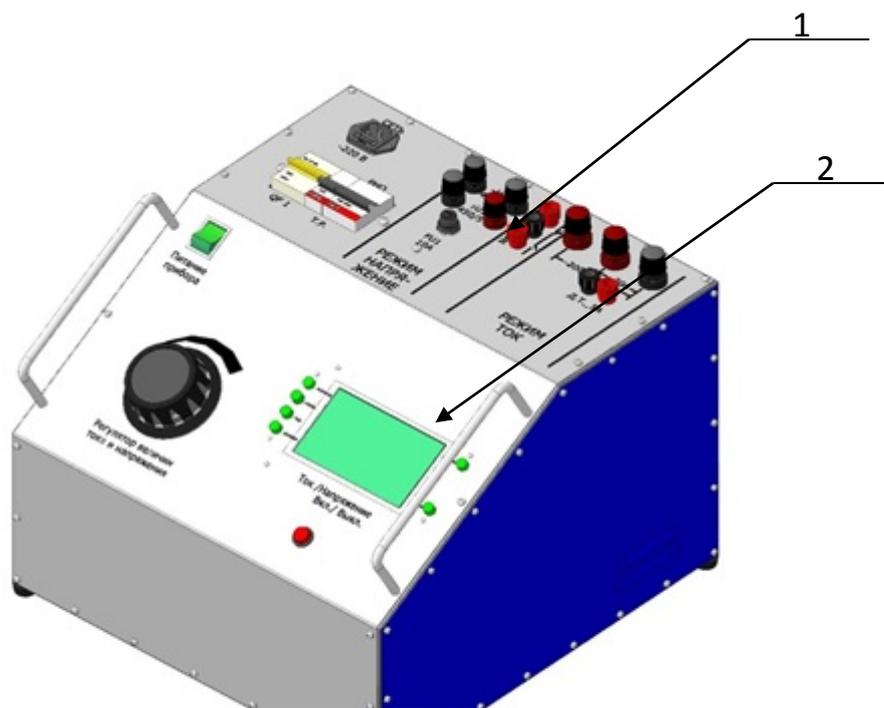
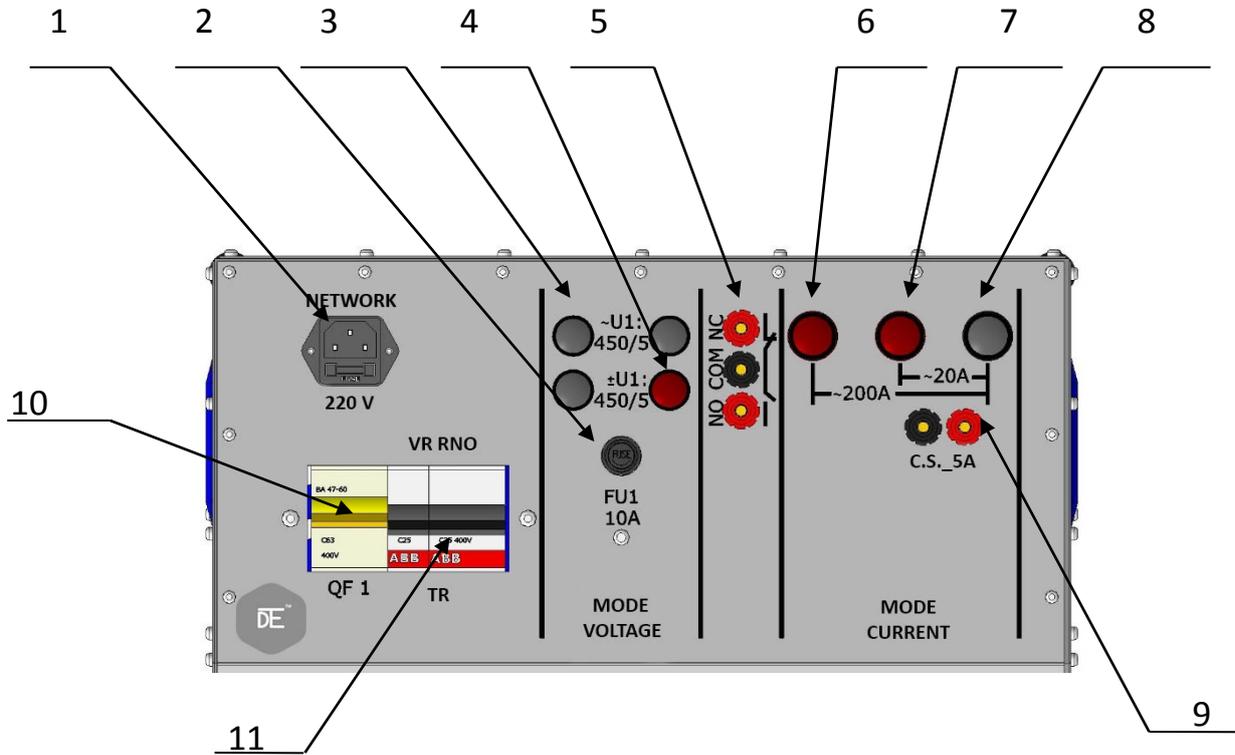


Fig. №1. UPZ-450/200 exterior

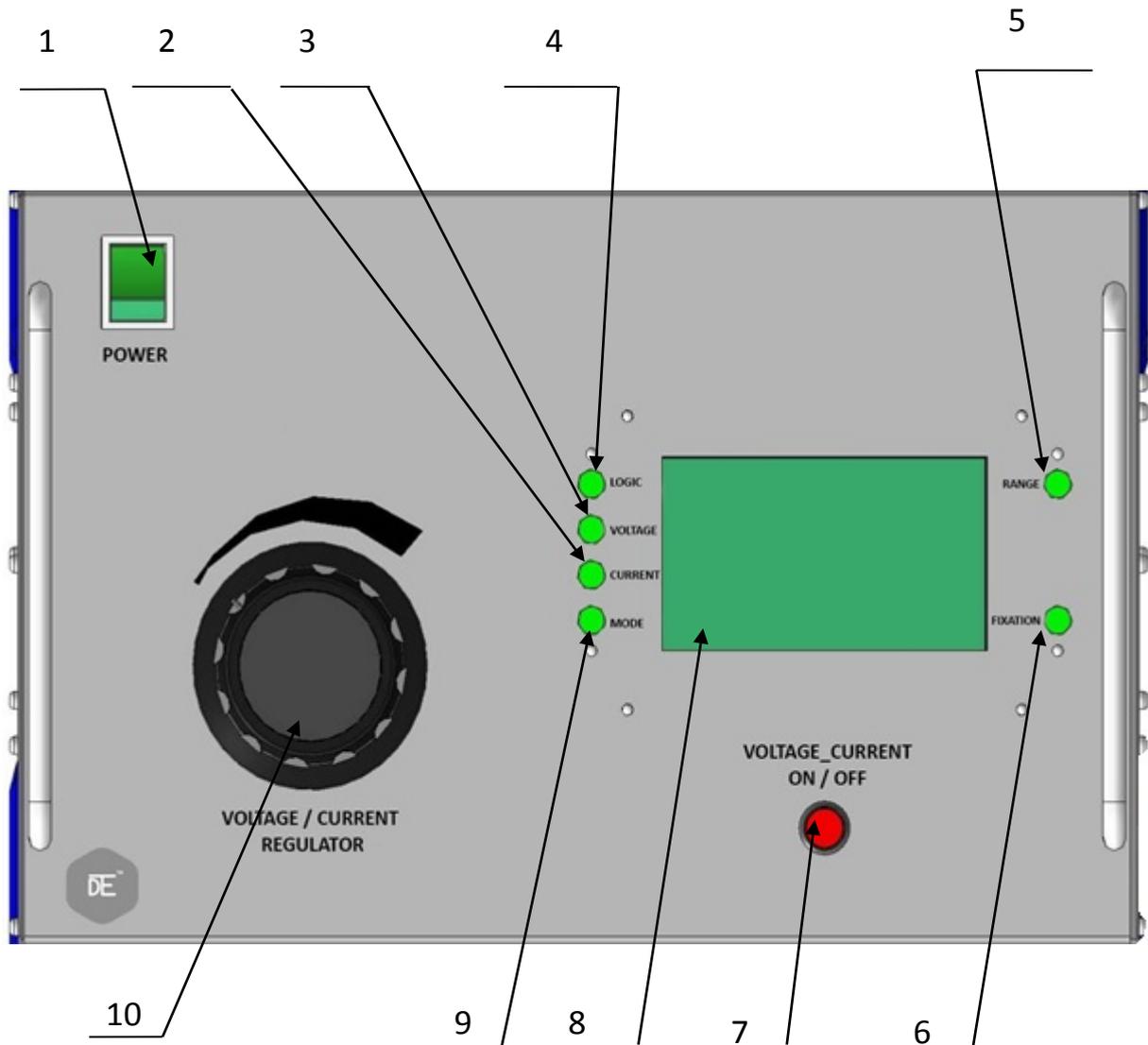
- 1- Power panel;
- 2- Control panel

Fig №2. UPZ-450/200 power panel



1- power outlet; 2-fuse holder; 3-screw terminal of AC voltage mode; 4-screw terminal of DC voltage mode; 5-Screw terminal «NC»,«COM», NO»; 6-Screw terminal of «Current» 200A mode; 7-Screw terminal of «Current» 20A mode; 8-General screw terminal of «Current» mode; 9-Screw terminals of current sensor 5A; 10-Automatic circuit breaker QF1; 11-Voltage regulator of thyristor regulator switch;

Fig.№3 UPZ-450/200 control panel



1-Power switch; 2- «Current» button; 3- «Voltage» button; 4- «Logic» button;
5- «Range» button; 6- «Fixation» button; 7-Voltage and current switch
button; 8 - LCD display; 9 - «Mode» button; 10 – Voltage regulator knob.

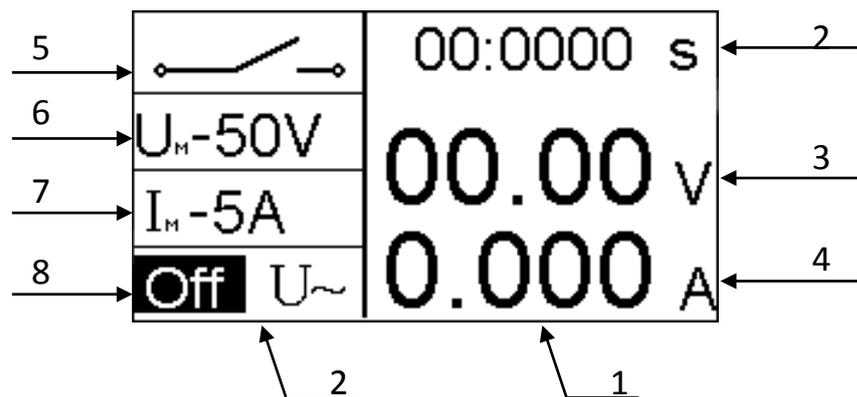
6. Operating the device:

6.1 Check safety requirements fulfillment before operating the device.

6.2 Before turning ON the device, transfer switch "POWER" and automatic circuit-breaker QF1 in OFF position.

6.3 Feed power supply the device by inserting the plug in network power outlet. Turn ON the switch "POWER". LCD display will show the device name and software version. After three seconds, the display shows the main operational graphic image,

fig .№4.



6.4 Display graphically divided into two main areas. Measuring zone 1, see. fig.№4, designed to display the measured values of time (2), voltage (3) and current (4). Operating zone 2 - operating of all modes of the device. Zone 2 divided into four information fields 5-8. Each field corresponds with button of operating panel to the left of display, see. fig.№3. Buttons and corresponding display fields are the following:

Press "**MODE**" button to select operating mode. Press it to choose operating mode. Additionally, this information area displays the icon about the status of output terminals of the device - "Off" or "On".

Press "**CURRENT**" button to select current measuring range. Press it to select range.

Press "**VOLTAGE**" button to select voltage measuring range applied to the output terminals of the device or to select the range of voltage meter.

Press "**LOGIC**" button to select time intervals algorithm of «NC; COM; NO» terminals.

"**RANGE**" button is not active in this version of device.

«**MENU**» button is used for selection of:

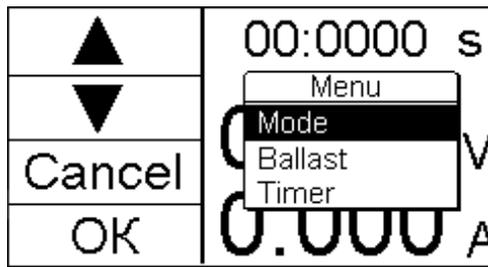
1– Mode of test voltage and current values adjustment, «**Mode**»;

2– Ballast resistor value, «**Ballast**»;

3– Timer setting, «**Timer**».

Main menu screen after pressing MENU button, see Fig.№5

Fig.№5

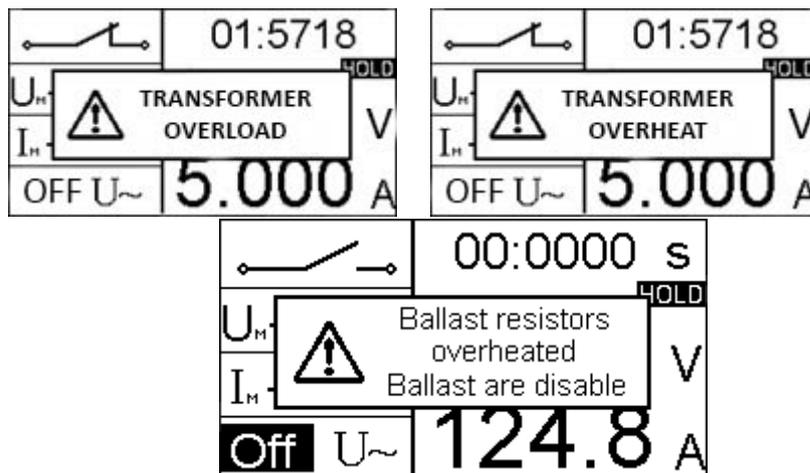


Side buttons functions will change in accordance with display lines.

Press "FIXATION" button to activate the fixation of measured values of the device from signals of auxiliary terminals, according to the algorithm of time intervals meter. Enabling fixation displayed on the LCD with word HOLD.

Press "**FIXATION**" button to activate the fixation of measured values of the device from signals of auxiliary terminals, according to the algorithm of time intervals meter. Enabling fixation displayed on the LCD with word HOLD.

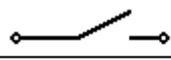
The device has overcurrent and overheating protection of power divider transformer. If protection trips the display show following screens:



Operating the device in "voltage" mode

6.5 When you first turn on the device program sets the default voltage range 0-50 V.

6.6 Press "**MODE**" button to select AC or DC operating mode.

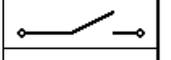
	00:0000 s
U _M -50V	00.00 V
I _M -5A	0.000 A
Off U~	

AC mode selected →

	00:0000 s
U _M -50V	00.00 V HOLD
I _M -5A	0.000 A
Off U=	

DC mode selected →

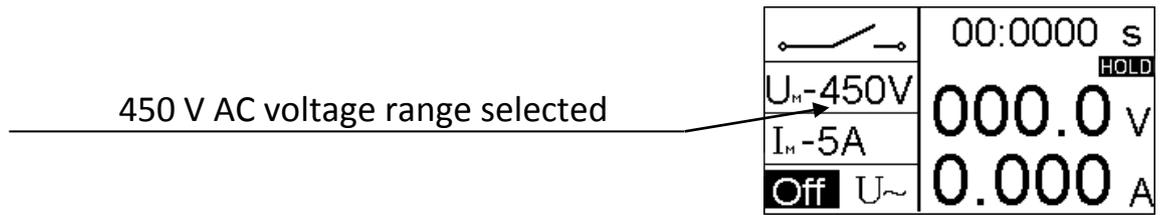
6.7 Pressing the "**VOLTAGE**" button select required voltage range:

	00:0000 s
U _M -50V	00.00 V HOLD
I _M -5A	0.000 A
Off U~	

50 V AC voltage range selected →

	00:0000 s
U _M -250V	000.0 V HOLD
I _M -5A	0.000 A
Off U~	

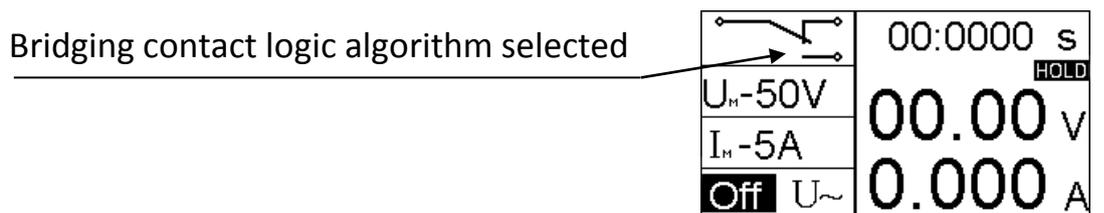
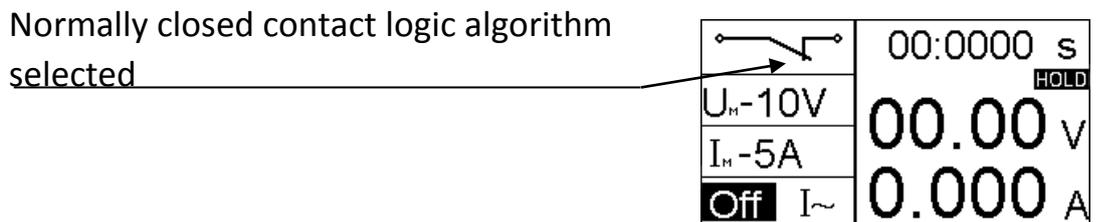
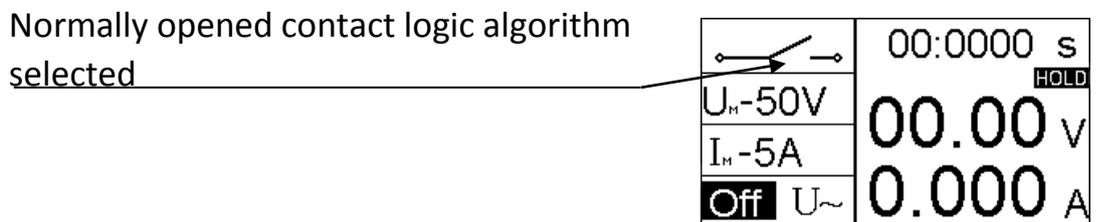
250 V AC voltage range selected →



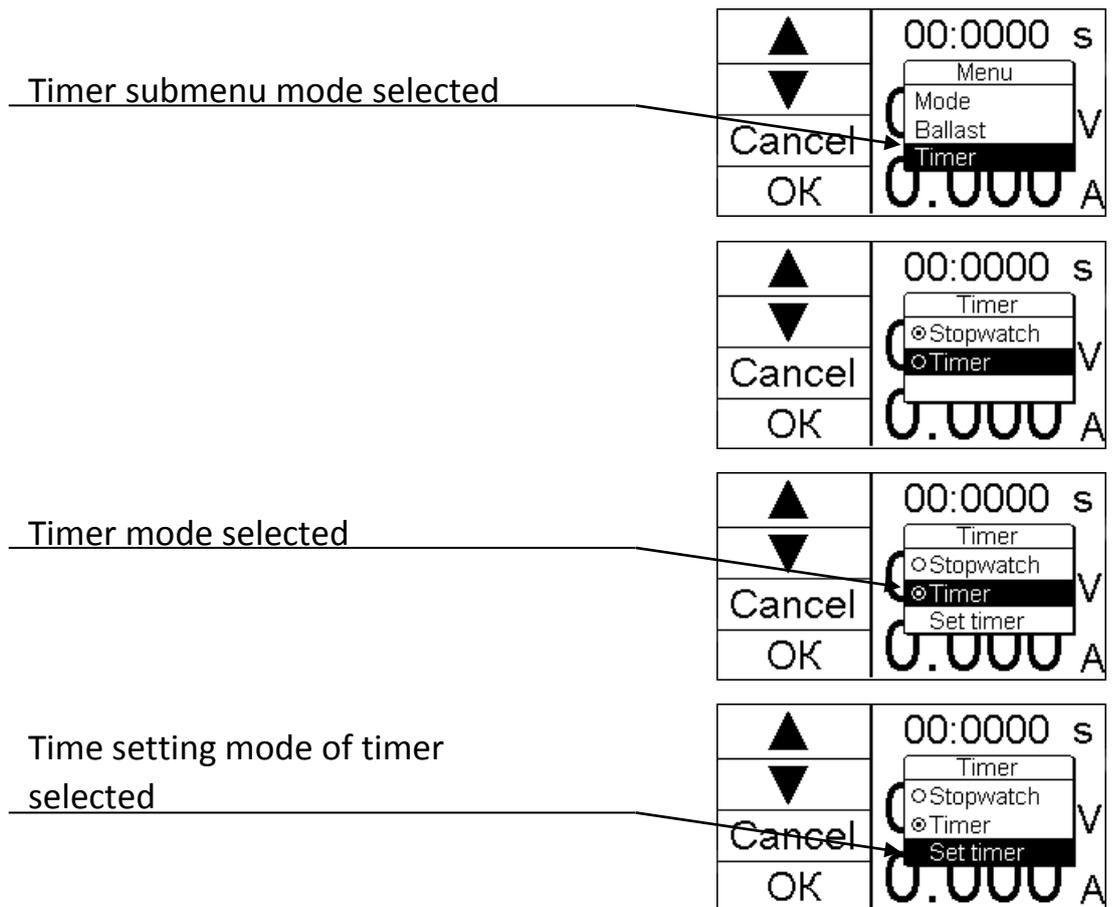
6.8 During voltage feeding to the output terminals on the power panel of the device, "VOLTAGE" button on the operator panel is locked.

6.9 "CURRENT" button during "VOLTAGE" mode is locked. Range of current meter is equal to 5 A and cannot be changed in "VOLTAGE" mode.

6.10 Press "LOGIC" button on to select required algorithm of the time intervals meter and fixation the measured values of voltage and current.



6.11 Press briefly "MENU" button to activate timer during test process if necessary to use it. The display will show fig. №5. Using navigation buttons, to the left of the display enter the "TIMER" submenu.



6.12 Set the required timer setting by navigation buttons in this mode. All further voltage and current tests will have selected time settings.

6.13 Turn the knob 10, fig.No3 of voltage and current regulator fully counterclockwise.

6.14 Turn the handle 11, fig.No3 of TRC regulator fully clockwise. This provides the maximum conduction angle of the thyristor key Q2.

6.15 Connect a relay protection or automation device to voltage terminals and to auxiliary terminals on the power panel of the device, by electric cables supplied with the device.

6.16 Turn on QF1 switch (10 fig. No.2).

6.17 Single press the main operating button "TEST ON / OFF" 7 (fig.No.3) turn on the voltage feeding at the output terminals of the device. The display field 8. see fig.4. will have a text message - "ON".



6.18 Turn the voltage and current regulator knob 10 (fig.3) to set the required voltage value, using display data.

6.19 Time intervals meter starts from the moment of voltage feeding on output terminals of the device. Time measurement is made in seconds with the automatic transition of decimal point. Timing stops using signals of auxiliary contacts «NC; COM; NO» or by turning off button 7, fig.3.

6.20 Turn off voltage supply to output voltage terminals by single pressing "TEST ON / OFF" (7, fig.3), the display will show "OFF".

6.21 Turn off QF1 (10, fig. 2) switch after test completion. Then turn off power supply of the device using button 1, fig.3.

6.22 Disconnect all test cables and network cable and gently lay them in the transportation bag.

Operating mode "Current"

6.23 When you first turn on the device, control program sets the default voltage range 0-50 V.

6.24 Press "MODE" button on the operator panel to select required mode of AC current.

	00:0000 s <small>HOLD</small>
U _m -10V	00.00 V
I _m -5A	0.000 A
Off I~	

AC current mode selected

6.25 Press "CURRENT" button on the operator panel to select required range of current meter:

	00:0000 s <small>HOLD</small>
U _m -10V	00.00 V
I _m -5A	0.000 A
Off I~	

5A metering range selected

	00:0000 s <small>HOLD</small>
U _m -10V	00.00 V
I _m -20A	00.00 A
Off I~	

20A metering range selected

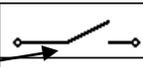
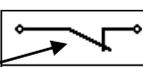
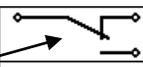
	00:0000 s <small>HOLD</small>
U _m -10V	00.00 V
I _m -200A	000.0 A
Off I~	

200A metering range selected

6.26 Range 5A of current meter is used to test current transformers. Measuring coil of secondary current of external current transformer must be connected to the terminals of power panel labeled "C.S._5A." Current meter of device will measure current of an external current transformer.

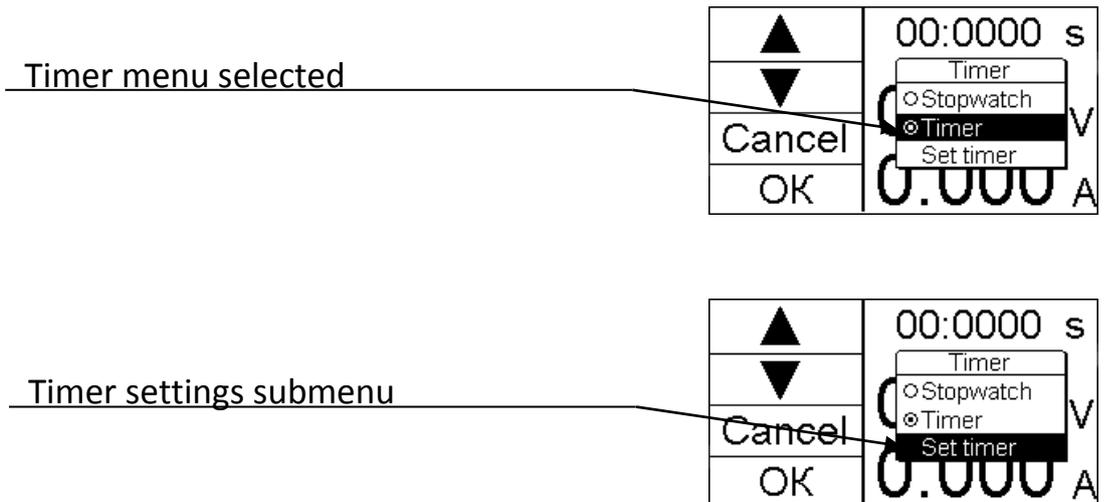
6.27 Button "**VOLTAGE**" in the "current" mode is blocked. The display field 6 (fig.4) will indicate maximum voltage on current terminals.

6.28 Press "**LOGIC**" button to select the required algorithm of the time intervals meter and fixation of the measured values of current.

Normally opened contact logic algorithm selected		<table border="0" style="width: 100%; text-align: right;"> <tr> <td style="width: 50%;">00:0000 s</td> <td style="width: 10%; text-align: center;">HOLD</td> <td style="width: 40%;"></td> </tr> <tr> <td>U_m-10V</td> <td></td> <td>00.00 V</td> </tr> <tr> <td>I_m-5A</td> <td></td> <td>0.000 A</td> </tr> <tr> <td>Off I~</td> <td></td> <td></td> </tr> </table>	00:0000 s	HOLD		U _m -10V		00.00 V	I _m -5A		0.000 A	Off I~		
00:0000 s	HOLD													
U _m -10V		00.00 V												
I _m -5A		0.000 A												
Off I~														
Normally closed contact logic algorithm selected		<table border="0" style="width: 100%; text-align: right;"> <tr> <td style="width: 50%;">00:0000 s</td> <td style="width: 10%; text-align: center;">HOLD</td> <td style="width: 40%;"></td> </tr> <tr> <td>U_m-10V</td> <td></td> <td>00.00 V</td> </tr> <tr> <td>I_m-5A</td> <td></td> <td>0.000 A</td> </tr> <tr> <td>Off I~</td> <td></td> <td></td> </tr> </table>	00:0000 s	HOLD		U _m -10V		00.00 V	I _m -5A		0.000 A	Off I~		
00:0000 s	HOLD													
U _m -10V		00.00 V												
I _m -5A		0.000 A												
Off I~														
Bridging contact logic algorithm selected		<table border="0" style="width: 100%; text-align: right;"> <tr> <td style="width: 50%;">00:0000 s</td> <td style="width: 10%; text-align: center;">HOLD</td> <td style="width: 40%;"></td> </tr> <tr> <td>U_m-10V</td> <td></td> <td>00.00 V</td> </tr> <tr> <td>I_m-5A</td> <td></td> <td>0.000 A</td> </tr> <tr> <td>Off I~</td> <td></td> <td></td> </tr> </table>	00:0000 s	HOLD		U _m -10V		00.00 V	I _m -5A		0.000 A	Off I~		
00:0000 s	HOLD													
U _m -10V		00.00 V												
I _m -5A		0.000 A												
Off I~														

6.29 Press briefly "MENU" button to activate timer during test process if necessary to use it. The display will show fig. №5. Using navigation buttons, to the left of the display enter the "TIMER" submenu.

Time submenu selected		<table border="0" style="width: 100%; text-align: right;"> <tr> <td style="width: 50%;">00:0000 s</td> <td style="width: 10%; text-align: center;">HOLD</td> <td style="width: 40%;"></td> </tr> <tr> <td style="text-align: center;">Menu</td> <td></td> <td></td> </tr> <tr> <td style="text-align: center;">Mode</td> <td></td> <td>V</td> </tr> <tr> <td style="text-align: center;">Ballast</td> <td></td> <td>V</td> </tr> <tr> <td style="text-align: center;">Timer</td> <td></td> <td>A</td> </tr> </table>	00:0000 s	HOLD		Menu			Mode		V	Ballast		V	Timer		A
00:0000 s	HOLD																
Menu																	
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Timer		A															
		<table border="0" style="width: 100%; text-align: right;"> <tr> <td style="width: 50%;">00:0000 s</td> <td style="width: 10%; text-align: center;">HOLD</td> <td style="width: 40%;"></td> </tr> <tr> <td style="text-align: center;">Timer</td> <td></td> <td></td> </tr> <tr> <td style="text-align: center;">Stopwatch</td> <td></td> <td>V</td> </tr> <tr> <td style="text-align: center;">Timer</td> <td></td> <td>A</td> </tr> </table>	00:0000 s	HOLD		Timer			Stopwatch		V	Timer		A			
00:0000 s	HOLD																
Timer																	
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Timer		A															



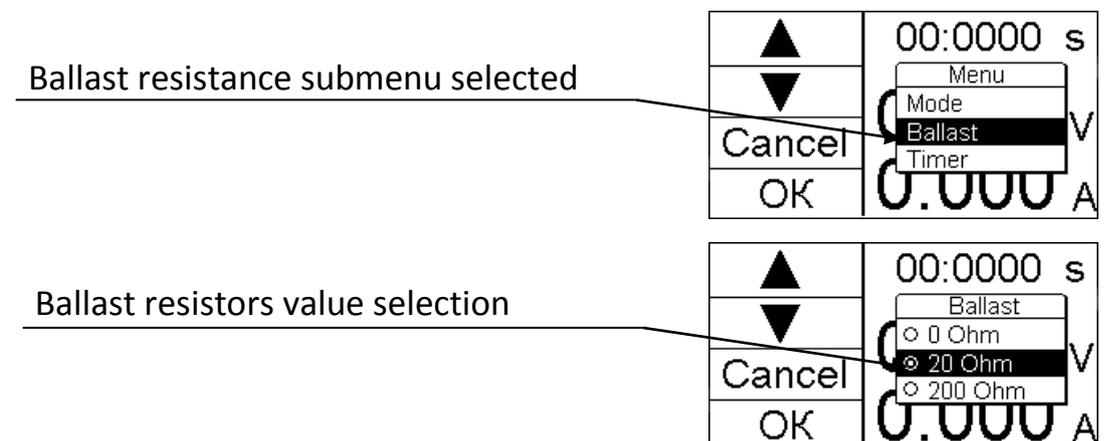
6.30 Set the required timer setting by navigation buttons in this mode. All further voltage and current tests will have selected time settings.

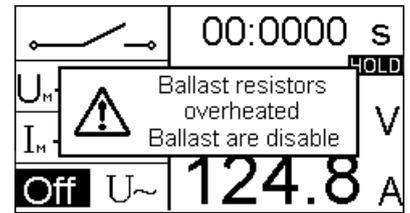
6.31 Turn the knob 10, fig.Nº3 of voltage regulator fully counterclockwise.

6.32 Turn the knob 11 fig.Nº3 TR fully clockwise until it stops. This will provide the maximum conduction angle of the thyristor key Q2.

6.33 While operating in test currents mode up to 200A by default is used "RNO" type for current adjusting. This type in current mode within 200A current range, is preferable, because output waveform – sinusoidal with minimum harmonics coefficient.

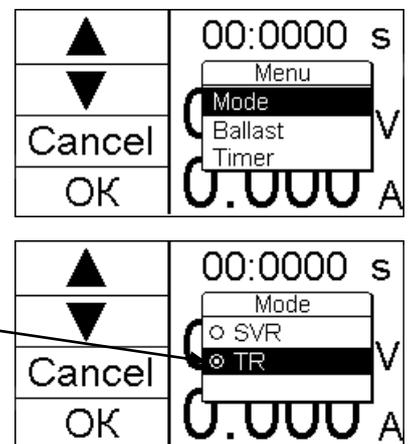
6.34 The device has ballast resistors which are connected in "RNO" voltage adjustment circuit for smooth adjusting of test current during testing of current relays with low resistance winding values. Ballast resistor value is preselected through main menu of the device. Press "MENU" button for this. The display will have the same view as on Fig. 5. Using navigation buttons to the left of display enter the submenu "BALLAST" and select required value of ballast resistor. Ballast resistances protected from overheating with thermal sensors. If overheated, controlling program of the device automatically deactivate testing process and display the screen as on figure below. Operator can continue tests without ballast resistance. After temperature decreasing the operating program will allow to use ballast resistance again.





6.35 While operating currents higher than 200A terminals activated, terminals 12, located on the right panel of device, see Fig. 2. Using these terminals set **TR** adjusting mode of test current. For this, press “**MENU**” button briefly. Display will have screen as on Fig #5. Using navigation buttons to the left of display enter the submenu “**MODE**” and change adjusting type from «RNO», set by default, to «TR». Use TRC knob for output current adjustment in this mode. Output waveform is phase-pulse with network power supply frequency. The device’s meter measures RMS output current (True RMS). Using ballast resistances in this mode is not allowed.

Selection of TR mode of current and voltage adjusting



- 6.36 Connect a relay protection or automation device to current terminals and auxiliary terminals on the power panel, by means of electric cables included in package.
- 6.37 Turn-breaker QF1 (10, fig.2) on the power panel of the device.
- 6.38 Press once the main operating button "TEST ON / OFF" (7, fig.3) to feed up current on output current terminals of the device. The display field 8 will have "ON" inscription.
- 6.39 Time intervals meter starts from the moment of current feeding on output terminals of the device. Time measurement is made in seconds with the automatic transition of decimal point. Timing stops using signals of auxiliary contacts «NC; COM; NO» or by turning off button 7, fig.3.
- 6.40 Turn the voltage and current regulator knob (10 fig.3) to set the required current value, using display data.
- 6.41 Turn off current feeding by single press “TEST ON / OFF” (7, fig.3), the display will show OFF.
- 6.42 Turn off QF1 (10, fig. 2) switch after test completion. Then turn off power supply of the device using button 1, fig.3.
- 6.43 Disconnect all test cables and network cable and gently lay them in the transportation bag.

7. Marking

7.1 Rear panel of the device has plate with markings:

The serial number consists of 6 digits:

The first two - the serial number,
the last four - the date of production.



8. Packing

8.1 Device UPZ-450/200 wrapped with packaging film so that no access of dust and moisture and put in a wooden crate with marks of transportation and storage.

8.2 The gaps between the walls of the crate and the device are tightly filled with cushioning material.

8.3 Documentation and components to the device are stacked in a separate compartment of the packaging crate.

9. Transport and Storage

9.1 Transportation of goods is permitted only in a package described in section №8 of this manual.

9.2 When transporting the product strictly check position according to markings, to avoid vibrations and shocks.

9.3 Conditions of storage products in terms of the impact of climatic factors correspond to a group of storage conditions A12 in accordance with standards. The storage areas are not allowed to have acid and other materials which have harmful effect on the materials of the device.

Note: Storage conditions A1 - heated and ventilated storehouses with air conditioning located in all macroclimatic regions where variations in temperature from + 5 ° C to + 45 ° C and relative humidity of 80% at + 20 ° C.

10. Warranty

10.1 The manufacturer guarantees operation (complying with technical data) of product within 12 months from the date of transfer (shipment) device to a customer.

The warranty period start _____

Head of the quality department _____

10.2 During the warranty period, the manufacturer will perform repair or replace (at our option) defective parts or devices.

10.3 The manufacturer reserves the right to determine the cause of failure.

10.4 Delivery of defective products for repair should be performed in the packaging crate of manufacturer.

10.5 The manufacturer may refuse warranty repair in case of mechanical damage or defects caused by violations of the rules of transportation, storage, or operation with the device.