



OPERATING MANUAL

Quality control system on the production complies with requirements ISO 9001:2008

Before using the Unit, please, carefully read the Operating Manual.

The Present Operating Manual is intended to familiarize you with the device, the requirements for safety, operation order and maintenance of Voltage Relay PH-104 (voltage Relay PH-106) (hereinafter: the product; relay; PH-104(106)).

Note - Reduction in PH-104 or PH-106 applied when the characteristics of the relay types are different.



ATTENTION! ALL REQUIREMENTS OF THIS MANUAL ARE MANDATORY FOR RUN!

The product meets the requirements:

- Low voltage complect switchgears. Part 1. General rules (IEC 60947-1:2004, IDT).
- Low voltage switch and controller. Part 6-2. The equipment is multifunctional. Switch control and protective devices (IEC 60947-6-2:1992, IDT).
- Electromagnetic compatibility. Equipment is industrial, scientific and medical radio-frequency. Characteristics of electromagnetic interference. Limits and methods of measurement (CISPR 11:2004, IDT).
- Electromagnetic compatibility. Part 4-2 Methods of test and measurement. Testing for immunity to electrostatic discharge (IEC 61000-4-2:2001, IDT).

Harmful substances in amounts exceeding maximum permissible concentrations are not available.

Installation, adjustment and maintenance of the appliance must be performed by qualified personnel, having reviewed this Manual.

In compliance with the requirements of this Manual and regulations the product is safe for use.

Terms and abbreviations: ARL- automatic restart of load; AS- automatic switcher.

1 APPOINTMENT

Voltage Relay PH-104(PH-106) was designed to protect household appliances and electrical equipment (refrigerators, air conditioners, washing machines, television, video and audio equipment, etc.) against unallowable voltage variations in the network and the consequences of breakage of the neutral (zero).

PH-104(106) indicates the effective value of voltage and state of output contacts (load status).

PH-106 is protected from overheating due to exceeding the rated load current.

The controls, overall and mounting dimensions PH-104 are shown in figure 1.



- 1 power load indicator (output contacts status);
- 2 a three digit indicator;
- 3 set time handle The ARL (Ton);
- 4 stick of threshold the relay on the minimum voltage (Umin);
- 5 stick of threshold the relay on maximum voltage(Umax);
- 6 contacts of supply voltage connection;
- 7 contacts to connect the load.

Figure 1 – Controls, overall and mounting dimensions

Note - controls, overall and mounting dimensions PH-106 are similar to PH-104.

2 TECHNICAL CHARACTERISTICS AND OPERATING CONDITIONS 2.1 Specifications are given in table 1.

Table 1

Nomination	Denotation	
	PH-104	PH-106
The maximum switching current with resistive load, A	40	63
Maximum switching power at resistive load, kW	9	14
Maximum electrical power at cos φ =1,0, kVA	9	14
Maximum electrical power at cos φ =0,4, kVA	1.6	2.0
Protection against overheating	no	yes
Nominal voltage, V	220/230	
Network frequency, Hz	47-65	
Adjustment range: - reaction at Umin, V	160 – 210	
- reaction at Umax, V	230 – 280	
- ARL time, s	5 – 900	

Nomination	Denotation	
	PH-104	PH-106
The maximum voltage that maintains the health, V		420
Installation (mounting) of the product	DIN-slat 35 mm	
Front panel protection degree	IP40	
Cleats protection degree	IP10	
Class of protection against electric shock		
Climatic version	NC4	
The permissible degree of pollution		
Overvoltage category		
Rated insulation voltage, V	450	
Rated impulse withstand voltage, kV	2.5	
The cross section of wires for connection to cleats, mm ²	0.5 – 16.0	
The tightening torque of the terminal block screws, N*m	<u>2±0,2</u>	
Harmonic (nonsinusoidal) voltage composition	EN 61000-3-2	
	(IEC 100	0-3-2)
Fixed time at Umax, s	1	
Fixed trip delay for Umin, s	7	
Fixed tripping time delay when a pulsed increase in voltage 420 V and more at a		
pulse duration of 1.5 ms, not more than	0,02	
Fixed tripping time delay when voltage reduction of more than 60 V in the settings		
for Umin or lowering the voltage below 145 V, s	0	,12
Fixed tripping time delay when voltage increase more than 30V from set point by		
Umax or increasing the voltage above 285 V, s	0,12	
Preparation for operation after power-up, s	0.3 - 0.4	
The accuracy of voltage threshold determination, not worse, V	3	
Hysteresis of reset voltage, V	4 – 5	
Current consumption from the network, mA	10	
Electrical lifetime output contacts:		
- electric resource, not less, times	10 000	
- mechanical resource, not less, times	500 000	
Dimensions (three-module S), mm	52.5 x 93 x 66.5	
Mass, not more, kg	0.175	
Housing material self-extinguishing plastic.		

2.2 OPERATING CONDITIONS

The product is designed for operation in the following conditions:

- Ambient temperature from minus 35 to +55 ° C;
- Atmospheric pressure from 84 to 106.7 kPa;
- Relative humidity (temperature +25 ° C) 30 ... 80%

The product is not intended for use:

- in significant vibration and shock conditions;

- in high humidity conditions;
- in harsh environments with air content of acids, alkalis, etc., as well as stubborn dirt (grease, oil, dust, etc.).

If the temperature of the product after transportation or storage differs from the temperature at which it is expected to operate, keep the product in operation for two hours before connection to the power greed (because of the elements possible condensation).

3 PRODUCT DESCRIPTION

PH-104(106) continuously monitors the voltage values in the network, comparing them with the values set by the User product controls

PH-104(106) disables the protected equipment, if the voltage values are beyond the limits specified by the User.

Automatically load re-enabling will be after restoring the set voltage (hereinafter ARL).

4 SAFETY RULES

During operation and maintenance it is necessary to comply with the requirements of normative documents: "Rules of electrical consumers installations technical operation";

"Safety operation rules of electrical consumers installations";

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"Labor safety at electrical installations operation".

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TO ENSURE SAFE OPERATION OF THE PRODUCT IT IS STRICTLY FORBIDDEN:

-TO PERFORM INSTALLATIONS WORKS AND MAINTENANCE WITHOUT PRODUCT DISCONNECTION FROM THE POWER NETWORK;

- TO OPEN INDEPENDENTLY AND REPAIR THE PRODUCT;
- TO USE THE PRODUCT WITH MECHANICAL DAMAGES OF THE CASE;
- NOT ALLOWED TO SPILL WATER ON THE PRODUCT.

5 INTENDED USE

5.1 GENERAL INSTRUCTIONS

The product is not intended for load switching in case of short circuits.

The product shall be operated on the network, protected by circuit breaker with tripping current of not more than 40 A (PH-104), 63 A (PH-106) class B.

To ensure secure electrical connections, it is recommended to use stranded copper wires, the ends of which it is necessary to clean off the insulation, compress the sleeve tips.

IN THE PROCESS OF INSTALLATION IT IS NOT ALLOWED TO LEAVE EXPOSED PORTIONS OF WIRES PROTRUDING OUT OF THE TERMINAL BLOCK.

Wire gauge for connection of the protected equipment depends on the current (power) load and should be: for current 40 A (9 kW) – not less than 6 mm², for current 63 A (14 kW) – not less than 10 mm².

5.2 PREPARATION FOR USE

ATTENTION! ALL WIRING CONNECTIONS MUST BE PERFORMED ONLY ON FULLY DEENERGIZED DEVICE.

- Error at installation works performance may damage the product and connected devices.

- For a reliable contact it is necessary to produce a tightening of terminal block screws with a force given in table.1.

When reducing the torque, the connection will heat up, the terminal board can melt and wire can burn. If you increase the torque - the terminal block screws carving or connecting wire compression may fail.

5.2.1 To switch off the power supply with automatic breaker (AS).

5.2.2 Connect the equipment according to the scheme specified in Fig.2 (without load connection).

5.2.3 To check the correctness of connection according to the scheme specified in Fig.2.

5.2.4 To install by using the handles, located on the front panel, the values of maximum (**Umax**) and minimum (**Umin**) voltage which must operate the product (the thresholds) with and also ARL time (**Ton**).

ATTENTION! In order not to break or pull the handle, please do not use excessive force when performing installation operations.

5.2.5 To switch on AS, "5LA" briefly appears on a three digit indicator.

Product enters mode timing ARL if the voltage is within the preset limits.

At the end of the countdown time ARL the current value of the voltage will be displayed.

The flashing indication of voltage value means the voltage is more (or less) of the values given by the User.

If necessary, set the specified trip thresholds values for the maximum (Umax) and minimum (Umin) voltage, and time ARL.

When rotating knobs, three digit indicator displays the corresponding value parameter together with points blinking.

Time ARL is recommended to set for conditioners, refrigerators and other compressor devices not less than 180-240 seconds, for other equipment - according to their operating instructions.

5.2.6 **To disable the AS power supply voltage**, connect the protected equipment to the contacts 2,3 according to the scheme (Fig.2).

5.2.7 Enable AS. Product is ready to use.

5.3 PRODUCT USAGE

5.3.1 Operating modes

5.3.1.1 The product can be in the following modes: normal operation; fault voltage; time delay ARL.

5.3.1.2 Normal operation mode:

-network voltage is in limits set by User according to product settings;

- -ARL time is up;
- protected equipment is connected to the network, load inclusion led lamp is on;

- three digit indicator displays the voltage.



L – phase; N - neutral

Figure 2 – Connection scheme PH-104(106)

5.3.1.3 Voltage fault mode:

- voltage went outside of User specified in product settings, at more time that specified in technical specifications (see tab. 1);

- protected equipment is disconnected from network, load inclusion led lamp is off;

- three digit indicator displays the value of voltage in flashing mode.

5.3.1.4 Exposure time mode ARL

The countdown time ARL starts from the occurrence accident moment or since power-up.

During the countdown time ARL the three digit indicator displays:

- input voltage real value in flashing mode, if PH-104(106) is in accident mode;

- time in seconds remaining until the end of ARL time, if the voltage parameters are recovered after the accident. A point in the low-order indicator is on.

After the end of ARL time product will enter normal operation, if the voltage parameters are recovered after the accident.

5.3.2 PH-106. Load shedding when excess temperature is inside the housing:

- product will switch off the load if temperature inside the housing exceeds 80 °C;

- three digit indicator displays "ALo".
- To unlock you have to:
- disconnect this product from the power supply;
- check the connected load power, if exceeded disable unnecessary load;
- wait 20-30 minutes for cooling the housing;
- apply power to PH-106, including AS.

6 MAINTENANCE

6.1 SAFETY RULES



THIS PRODUCT USES DANGEROUS HIGH VOLTAGE.

DURING MAINTENANCE IT IS NECESSARY TO DISABLE THE PRODUCT AND CONNECTED DEVICES FROM POWER SUPPLY.

6.2 Maintenance of the appliance must be performed by persons authorized by the operator, and having the appropriate permission.

Recommended frequency of maintenance is every six months.

6.3 MAINTENANCE PROCEDURE

1) to check the reliability of wire connections, if necessary – clamp force as specified in table.1.

2) check visually the integrity of housing.

3) if necessary, wipe front panel and housing with a cloth.

Do not use abrasive materials and solvents for cleaning.

7 SERVICE LIFE AND MANUFACTURER'S WARRANTY

7.1 Product lifetime is 10 years. Contact the manufacturer upon service term expiration.

7.2 Shelf life is 3 years.

7.3 Warranty period of the product is 5 years from date of sale.

During warranty period manufacturer is responsible for free product repair, if Consumer has complied with the requirements of this Manual.

IF THE UNIT HAS BEEN OPERATED WITH VIOLATION OF THE REQUIREMENTS OF THIS OPERATING MANUAL, THE MANUFACTURER HAS THE RIGHT TO REFUSE WARRANTY SERVICE.

7.4 Warranty service is performed at purchase place or by product manufacturer.

7.5 Post-guarantee service is performed by manufacturer at current rates.

7.6 Before sending for repair product must be packed in original or other packaging excluding mechanical damage.

Earnest request: indicate the reason for return in the notice of faults field at the return of the device or in case of submitting for warranty service or post-warranty service.

8 TRANSPORTATION AND STORAGE

Product in original package is permitted to transport and to store at temperature from minus 45 to +60 °C, relative humidity of 80 %, not in a hostile environment.

9 ACCEPTANCE CERTIFICATE

PH-104(106) is made and accepted in accordance with the requirements of current technical documentation and is acknowledged fit for service.