NOVATEK ELECTRO
ISO 9001

VOLTAGE RELAY PH-25t / PH-32t / PH-40tc / PH-50tc / PH-63tc

OPERATING MANUAL

The quality management system of development and production complies with the requirements of ISO 9001:2015

Dear Customer,
NOVATEK-ELECTRO Ltd. Company thanks you for purchasing our products. You will be able to use properly the device after carefully studying the Operating Manual. Store the Operating Manual throughout the service life of the device.

DEVICE SERVICE

The voltage relay PH-25t; PH-32t; PH-40tc; PH-50tc; PH-63tc (hereinafter in the text: a device, a voltage relay; abbreviations: PH-25t; PH-32t; PH-40tc; PH-50tc; PH-63tc are used when the characteristics of the types of voltage relays differ) is designed to protect household and industrial electrical equipment (refrigerators, air conditioners, washing machines, tele-, video and audio equipment, etc.) against unacceptable voltage fluctuations in the network and the consequences of a neutral (zero) break.

The voltage relay:

- indicates the effective value of voltage at the input contacts in the range from 100 V to 350 V and indicates the presence of voltage at the output contacts;
- saves information about the last five troubles in the non-volatile memory.

The adjustable parameters of the voltage relay are shown below.

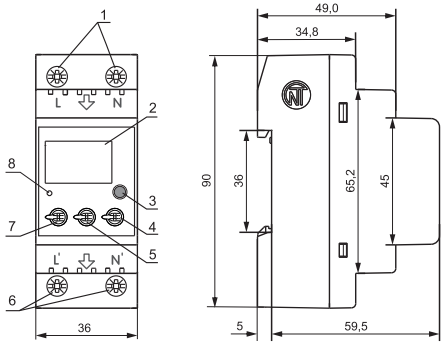
Name	Range
Under-voltage protection threshold	120 – 230 V
Overvoltage protection threshold	240 – 290 V
AR time	5 - 900 s

The voltage relay is protected against overheating and will disconnect the load if the temperature inside the product case exceeds 85 °C (due to excess of the rated load current, poor contact due to weak clamping of the terminal block screws, etc.).

PH-40tc, PH-50tc, PH-63tc – additionally control temperature of each contact and, if the temperature of any contact is more than 85 °C, disconnect the load.

The device gets its supply from the circuit that supplies the load.

CONTROLS



1 – terminals for connecting the product to the network;
2 – a display;
3 – a button for entering the menu;
4 – a knob for setting the relay operating threshold for maximum voltage (Umax);
5 – a knob for setting the minimum voltage relay operating threshold (Umin);
6 – terminals for connecting the load;
7 – a knob for setting AR time (t);
8 – indicator ⁄ (hereinafter referred to as Load) is on when there is voltage at the terminals for connecting the load.

Figure 1

OPERATION CONDITIONS

The device 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 air humidity (at temperature of +25°C):30...80 %.

If the temperature of the device after transportation or storage differs from the environment temperature at which it is expected to operate, then before connection to electric mains keep the device under the operating conditions within two hours (because the device elements may have moisture condensation).

ATTENTION! The device is not intended for operation in the following conditions:

– Significant vibration and shocks;
– High humidity;
– Aggressive environment with content in the air of acids, alkalis, etc., as well as severe contaminations (grease, oil, dust, etc.).

ACCEPTANCE CERTIFICATE

The voltage relay has been manufactured and accepted in accordance with the requirements of valid technical documentation and classified as fit for operation.

Head of QCD _____

Date of manufacture _____

Seal

TECHNICAL SPECIFICATIONS

The technical specifications

Name	Value
Rated single-phase AC supply voltage	230/240 V
Mains frequency	47 – 65 Hz
Harmonic composition (non-sinusoidality) of the supply voltage	EN 50160
Accuracy of voltage measurement within the range 100 - 350 V, not worse*	2 %
Automatic re-closure time in voltage	5 - 900 s
Ready time	≤ 0.8 s
Voltage at which operability is maintained (effective value)	from 90 to 450 V
Protection response time according to Umax	1 s
Off-delay at voltage raised above 430 V and pulse duration more than 1.5 ms	≤ 0.05 s
Off -delay at voltage raised above 30 V as of the set value in Umax	0.12 s
Protection response time for Umin	7 s
Off-delay when voltage drops below 100 V	0.25 s
Accuracy of voltage response threshold determination	3 V
Voltage hysteresis	4 V
Power consumption at unconnected load	≤ 2 W
Typical operating mode	Long
Climatic version	NF 3.1
Device protection	IP 10
Allowable pollution	II
Overvoltage category	II
Class of electrical shock protection	II
Overvoltage category	450 V
Rated pulse withstand voltage	2.5 kV
Cross-section of wires for connection to terminals	0.5-16.0mm²
Tightening torque for terminal screws	2±0.2 N*m
Weight	≤ 0.2 kg
Overall dimensions, HxBxL	90x36x60 mm
The device meets the requirements of the following: EN 60947-1; EN 60947-6-2; EN 55011; EN 61000-4-2	
Harmful substances, in more than allowed concentration, are not available	
Installation (assembling) of the device - standard DIN rail 35 mm	
The device retain their its operability in any position in space	
Material of the body frame - self-extinguishing plastic	
** - With the mains voltage below 90 V and above 350 V the voltage value measured by the device is not correct*	

Features of the output contacts

Name	PH-25t	PH-32t	PH-40tc	PH-50tc	PH-63tc
Maximum switched current at active load	25 A	32 A	40 A	50 A	63 A
Maximum switched power at active load (cos =1.0)	5 kW	7 kW	9 kW	11 kW	14 kW
Maximum switched power at active-inductive load (cos =0.4)	1.2 kW	1.4 kW	1.6 kW	1.8 kW	2.0 kW
Maximum permissible AC voltage	275 V				
Life time: - mechanical number, not less	500 000	500 000	500 000	500 000	500 000
- electric number, not less	20 000	10 000	20 000	10 000	10 000

TERMS AND ABBREVIATIONS

AR - automatic re-closing delay, which is counted after voltage is taken off the output terminals of the relay after a voltage failure and the recovery of the network parameters;
Display - a three-digit seven-segment indicator;
QF – circuit breaker.

THE DEVICE CONNECTION

DEVICE TERMINALS AND INTERNAL COMPONENTS ARE UNDER POTENTIALLY LETHAL VOLTAGE.

Attention! The device is not intended for load switching in case if short circuits.

The voltage relay should be operated in a network protected by an automa-tic circuit breaker of «B» class with a current no more than:

25 A – for PH-25t; 32 A – for PH-32t; 40 A – for PH-40tc; 50 A – for PH-50tc; 63 A – for PH-63tc.

All connections must be performed when the device is de-energized.

It is not allowed to leave exposed portions of wire protruding beyond the terminal block.

Error when performing the installation works may damage the device and connected devices.

To ensure the reliability of electrical connections the flexible (stranded) wires with insulation for voltage of at least 450 V should be used, the ends of which it is necessary to be striped of insulation for 5±0.5 mm and tightened with bootlaces. Wires fastening should exclude mechanical damage, twisting and abrasion of the wire insulation.

The cross-section of the wire for connection to the equipment to be protected depends on current (power) of the load and it should be:

for current of 25 A (5 kW) – at least 4 mm²;

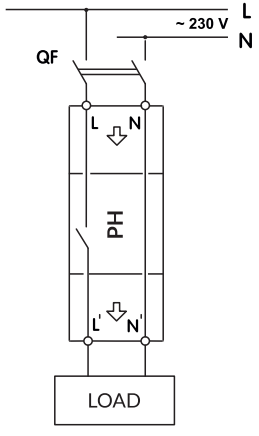
for current of 32 A (7 kW) – at least 6 mm^2;
for current of 40 A (9 kW) – at least 6 mm^2;
for current of 50 A (11 kW) – at least 10 mm^2;
for current of 63 A (14 kW) – at least 16 mm^2.

For a reliable contact, tighten the terminal screws with the force indicated 2 N*m.

When reducing the tightening torque, the junction point is heated, the terminal block may be melted and wire can burn. If you increase the tightening torque, it is possible to have thread failure of the terminal block screws or the compression of the connected wire.

1. Connect the input contacts L and N of the device to the electrical network through a two-pole circuit breaker in accordance with Fig. 2

Attention! Observance of the phasing when connecting the device to the network is obligatory.



QF - two-pole circuit breaker

Figure 2

2. Connect the load to the output terminals L' and N' of the device.

3. Check if the product is connected correctly.

4. By using the knobs located on the front panel, set the maximum ("Umax") and minimum ("Umin") voltage values at which the device should operate (response thresholds), as well as the AR time ("t"). It is recommended to set the AR time for air conditioners, refrigerators and other compressor devices at least 180-250 seconds, for other equipment - according to their operating instructions.

5. Turn on the QF to supply power to the device. The display will briefly show message "StA", and then the countdown of the AR time. During the countdown of the automatic reclosing time, the dot in the least significant digit of the display is glowing.

After the end of the AR time, if the value of the mains voltage is within the limits set by the User, voltage will be applied to the output contacts of the device and the LOAD indicator will light up. The display will show the actual voltage at the LN terminals L and N.

A flashing voltage reading means that the voltage in the network is higher (or lower) than the values set by the User.

6. If necessary, set the refined values of the maximum ("Umax") and minimum ("Umin") response threshold voltages, as well as the AR time. When turning the knobs, the display shows the value of the corresponding parameter simultaneously with the flashing of the dot.

7. To view the details of the last five voltage failures, press and release the button. The display will show information about troubles in accordance with Table .

Procedure of data-out	Information on the display	Display time	Note
1	« I = U »	1 s	" I" – the number of the last in time failure " =U" – failure code at the maximum voltage
2	" 2 4 5"	2 s	Voltage value at which the failure was recorded
...	...	1 s	
...	...	2 s	
9	"5 = U"	1s	" =U " – failure code at the minimum voltage
10	" 1 7 5"	2 s	Voltage value at which the failure was recorded

Notes:
1 – Information on the display is given as an example;
2 – In case of a failure due to the under-voltage below 100 V, the value of 0 will be entered to the alarm log;
3 – In case of a failure due to the due to the impulse overvoltage, the value of 420 will be entered to the alarm log.

OPERATION OF THE DEVICE

The device is in a state of normal operation if the mains voltage is within the limits set by the User and the AR time has expired.

In this state, the protected equipment is connected to the mains, the display shows the actual value of the mains voltage and the LOAD indicator lights up.

If the mains voltage goes beyond the limits set by the User, for a time longer than indicated in the technical characteristics, then the device will go into a voltage fault state.

In this state, the protected equipment is disconnected from the mains, the LOAD indicator is off, and the value of the monitored voltage is displayed in the flashing mode.

Upon recovery of the voltage parameters, the AR time starts counting down and the device switches to the AR time indication state. In this state, the display indicates the time in seconds remaining until the device switches to the normal operation state, and the dot in the lowest digit of the display is lit. After the end of the AR time, the device switches to the normal operation state.

PH-25t (PH-32t) will disconnect the load when the temperature inside the case is more than 85 °C. In this case, the LOAD indicator does not light up, and the display shows the code «Ert» in the flashing mode.

PH-40tc, PH-50tc, PH-63tc – additionally control the temperature of each contact and, if the temperature of any contact exceeds 85 °C, the load will be disconnected. In this case, the LOAD indicator does not light up, and the display shows the code «Ert» in the flashing mode.

To resume the operation of the device:

- it is necessary to disconnect the device from the mains;
- check for absence of contamination of the contacts, check for reliability of the wire connection, if necessary, clamp it with a force of 2 N*m;
- after that, turn on the device again.

Attention! If this failure repeats, then take the device out of service and send it for repair.

SAFETY PRECAUTIONS

Attention! Under maintenance, disconnect the device and units connected to it from the mains.

Do not make any attempt to open and repair the device yourself.

Do not use the device with mechanical damage to the case.

Do not allow water to enter the internal parts of the device, the receptacle and the plug.

During operation and maintenance, meet the requirements of the «Rules for the technical operation of electriity-generating equipment of consumers», «The safety regulations for operation of electricity-generating equipment of consumers» and «Labor protection during operation of electricity-generating equipment».

MAINTENANCE

The maintenance rate recommended is every six months.

Maintenance procedure:

1) Check the connection reliability of the wires, if necessary, clamp with the force specified;
2) Visually check the integrity of the housing, in case of detection of cracks and damages take the device out of service and send for repair;
3) If necessary, wipe the front panel and the housing of the device with cloth.

Do not use abrasives or solvents for cleaning.

SERVICE LIFE AND WARRANTY

The lifetime of the device is 10 years. Upon expiration of the service life, contact the manufacturer.

Shelf life is 3 years.

Warranty period of the device operation is 5 years from the date of sale.

During the warranty period of operation (in the case of failure of the device) the manufacturer is responsible for free repair of the device.

Attention! If the device has been operated in violation of the requirements of this Manual, the user will lose the right to warranty service.

Warranty service is performed at the place of purchase or by the manufacturer of the device.

Post-warranty service of the device is performed by the manufacturer at current rates.

Before sending for repair, the device should be packed in the original or other packing excluding mechanical damage.

TRANSPORTATION AND STORAGE

The device in the original package is permitted to be transported and stored at the temperature from minus 45 to +60 °C and relative humidity of no more than 80 %.

CLAIMS DATA

You are kindly requested, in case of the device return and transfer it to the warranty (post-warranty) service please indicate detailed reason for the return in the field of the claims data.

The Company is grateful to you for the information about the quality of the device and suggestions for its operation.

For all questions, please contact the manufacturer:

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Date of sale _____

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