VOLTAGE RELAY

PH-125, PH-125t
PH-132, PH-132t
PH-140, PH-140t
PH-150, PH-150t
PH-163, PH-163t

OPERATING MANUAL

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Quality control system on the development and production complies with requirements ISO 9001:2015

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

Review the Operating manual before using the device

ATTENTION! ALL REQUIREMENTS OF THIS OPERATING MANUAL ARE COMPULSORY TO BE MET!

WARNING! – DEVICE TERMINALS AND INTERNAL COMPONENTS ARE UNDER POTENTIALLY LETHAL VOLTAGE.

TO ENSURE THE DEVICE SAFE OPERATION **IT IS STRICTLY FORBIDDEN THE FOLLOWING:**

- TO CARRY OUT MOUNTING WORKS AND MAINTENANCE **WITHOUT DISCONNECTING THE DEVICE FROM THE MAINS**;
- TO OPEN AND REPAIR THE DEVICE INDEPENDENTLY;
- TO OPERATE THE DEVICE WITH MECHANICAL DAMAGES OF THE CASE.

IT IS NOT ALLOWED WATER PENETRATION ON TERMINALS AND INTERNAL ELEMENTS OF THE DEVICE.

During operation and maintenance the regulatory document requirements must be met, namely:

- Regulations for Operation of Consumer Electrical Installations;
- Safety Rules for Operation of Consumer Electrical Installations;
- Occupational Safety when in Operation of Electrical Installations.

Installation, adjustment and maintenance of the device must be performed by qualified personnel having studied this Operating Manual.

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

This Operation Manual is intended to let you know about the device, safety requirements, operation and maintenance procedures for the voltage relay of the following models: PH-125, PH-125t, PH-132, PH-132t, PH-140, PH-140t, PH-150, PH-150t, PH-163, PH-163t (hereinafter in the text: a device, a voltage relay).

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.

Terms and abbreviations:
AR - automatic re-closure of the load;
QF - circuit breaker.

1. DESIGNATION

1.1. Designation of the device

The voltage relay is designed to protect household appliances and electrical equipment (refrigerators, air conditioners, washing machines, television, video and audio equipment, etc.) against unacceptable voltage fluctuations in the mains and the effects of a neutral (zero) conductor breakage.

The voltage relay indicates the actual value of the voltage in the mains and the state of the load.

Relay PH-125t (PH-132t, PH-140t, PH-150t, PH-163t) has overheat protection and it will trip off the load if the temperature inside the device body exceeds 80 °C (due to exceeding of the rated load current, poor contact due to weak clamping terminal block screws, etc.).

Table 1 shows the distinctive features of the voltage relays.

Table 1

Name of the device	Max. switching current at the active load, A	Max. switching power at the active load (cos φ= 1.0), kW	Max. switching power at the active-inductive load (cos φ= 0.4), kVA	Protection against overheating
PH-125	25	5	1.2	-
PH-125t	25	5	1.2	+
PH-132	32	7	1.4	-
PH-132t	32	7	1.4	+
PH-140	40	9	1.6	-
PH-140t	40	9	1.6	+
PH-150	50	11	1.8	-
PH-150t	50	11	1.8	+
PH-163	63	14	2.0	-
PH-163t	63	14	2.0	+

1.2. Controls, overall and installation dimensions of the voltage relay

Controls, overall and installation dimensions of the voltage-response relay are shown in Fig.1.

1.3 Operation conditions

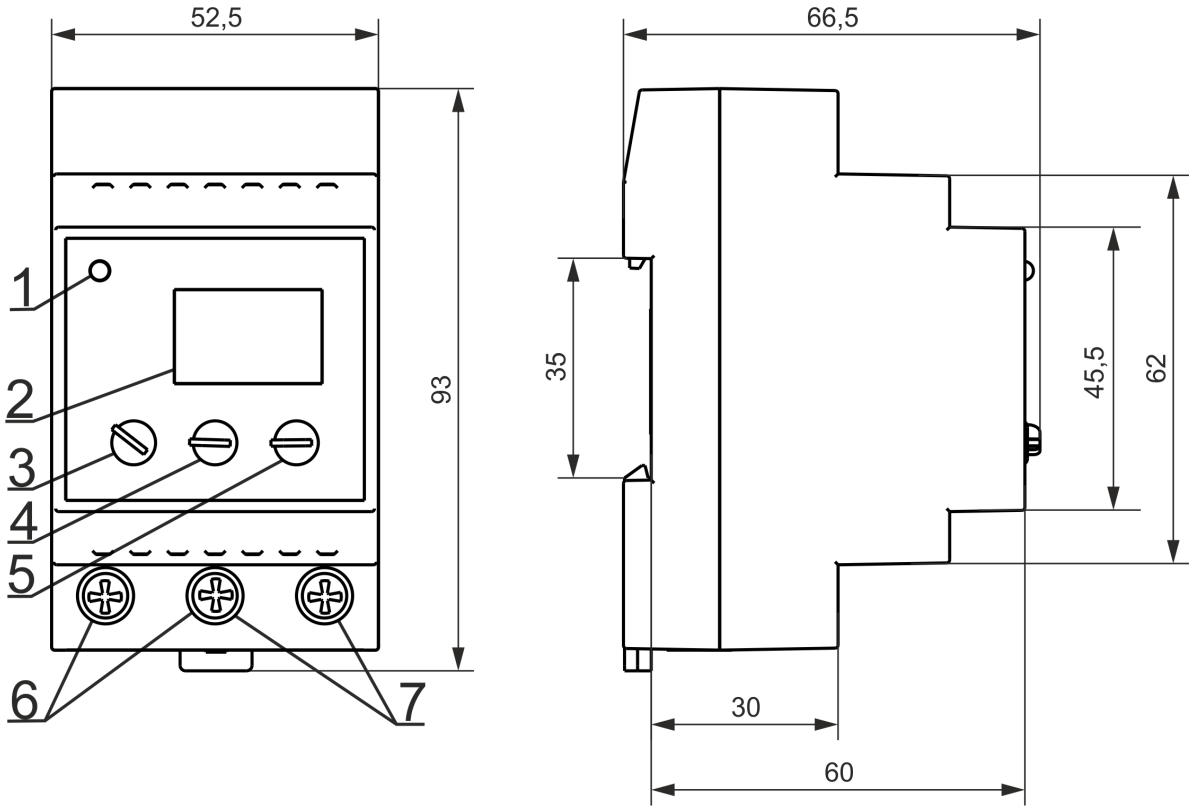
The device is designed for operation in the following conditions:

- 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.).



1 – load tripping-on indicator (LOAD);
2 – three-digit indicator;
3 – re-closure time setting controller (T_{on} (s));
4 – minimal voltage operating threshold setting controller (Umin (V));
5 – maximum voltage operating threshold setting controller (Umax (V);
6 – supply voltage contacts;
7 – load connection contacts.

Figure 1 - Controls, overall and installation dimensions of the voltage relay

Note - controls, overall and installation dimensions of all voltage relays are similar.

2. TECHNICAL SPECIFICATIONS

The technical specifications are shown in Table 2.

Table 2

Description	Value
Rated AC one-phase supply voltage, V	230/240
Mains frequency, Hz	47 – 65
Adjustment range: - undervoltage release, U_{min}, V - overvoltage release, U_{max}, V - automatic re-closure time, s	160 – 210 230 – 280 5 – 900
Maximal voltage at which operability is retained, V	420
Front panel protection	IP40
Terminal protection	IP10
Electric shock protection class	II
Climatic version	NF 3.1
Permissible pollution	II
Overvoltage category	II
Rated insulation voltage, V	450
Rated impulse withstand voltage, kV	2,5
Wire cross section for connecting to terminals, mm^2	0,5 – 16,0
The moment of tightening the screws of terminals of the input contacts, N * m	2±0.2
Harmonic composition (unsinusoidality) of the supply voltage	EN 50160
Fixed response time at Umax, s	1
Fixed turnoff delay at Umin, s	7
Fixed response time at pulse voltage increase by more than 420 V with a pulse duration of a pulse of more than 1.5 ms, not more	0.02

Table 2 (Continued)

Fixed response time at voltage drop by more than 60 V compared to the U_{min} setting or when voltage drops below 145 V, s	0.12
Fixed response time at voltage increase by more than 30 V compared to the U_{max} setting or at voltage increase above 285 V, s	0.12
Preparation time for operation after power supply, s	0,3 – 0.4
Accuracy of determining operation threshold by voltage, V, not more	3
Voltage return hysteresis, V	4 – 5
Current consumption from the mains, mA, no more	10
Switching resource of output contacts: - electrical resource, times, no less than - mechanical resource, times, no less than	 10 th. 500 th.
Overall dimensions (three modules S), mm	52.5 x 93 x 66.5
Mass, kg, not more	0.175
Installation (wiring) of the device - standard 35 mm DIN rail	
The device retains its operability in any position in the space	
Material of the body frame - self-extinguishing plastic	

3. DESCRIPTION OF THE DEVICE

The voltage relay continuously controls voltage values in the mains, comparing them with the values set by User of the device control regulators.

The device disconnects the equipment to be protected, if the voltage values in the mains exceed the limits specified by the User.

After restoration of the set parameters of the mains voltage, the load will be automatically tripped on.

4. THE INTENDED USE

4.1 Preparation for operation

4.1.1 Preparation for connection:

- unpack and check the device for damage absence after transportation; in case of such damages detection, contact the supplier or the manufacturer;
- carefully study the Operation Manual;
- If you have any questions regarding the installation of the device, please contact the manufacturer by telephone number indicated at the end of this Operating Manual.

4.1.2 Connection

ATTENTION! THE DEVICE IS NOT INTENDED FOR LOAD SWITCHING IN CASE IF SHORT CIRCUITS.

The voltage relay should be used in the network protected with a circuit breaker of class «B», at release current of no more than:

25 A – for PH-125 (PH-125t);
32 A – for PH-132 (PH-132t)'
40 A – for PH-140 (PH-140t);
50 A – for PH-150 (PH-150t)'
63 A – for PH-163 (PH-163t).

ATTENTION! ALL CONNECTIONS MUST BE PERFORMED WHEN THE DEVICE IS DE-ENERGIZED.

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 mm^2;
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 (11 kW) – at least 10 mm^2;

IT IS NOT ALLOWED TO LEAVE EXPOSED PORTIONS OF WIRE PROTRUDING BEYOND THE TERMINAL BLOCK.

For a reliable contact, tighten the terminal screws with the force indicated in Table 2.

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.

4.1.2.1 Switch off the power supply with a circuit breaker (QF).

4.1.2.2 Connect the device according to the circuit shown in Fig. 2 (without connecting the load) and check the connection for correctness.

4.1.2.3 By using the controllers on the front panel, set the maximum and minimum voltage at which the device should operate (thresholds of operation), as well as the automatic re-closure time.

ATTENTION! Do not use excessive force when performing operations on installation.

4.1.2.4 Turn on the circuit breaker, inscription "SEA" will appear on the three-digit display for a short period of time.

The device with move to the automatic re-closure time delay mode, if the voltage is within the limits set by the User.

At the end of the automatic re-closure time, a current value of the mains voltage will be displayed and the indicator of load switching-on will light up.

A flashing indication of the voltage value means that the voltage in the mains is more (or less) than the values specified by the User.

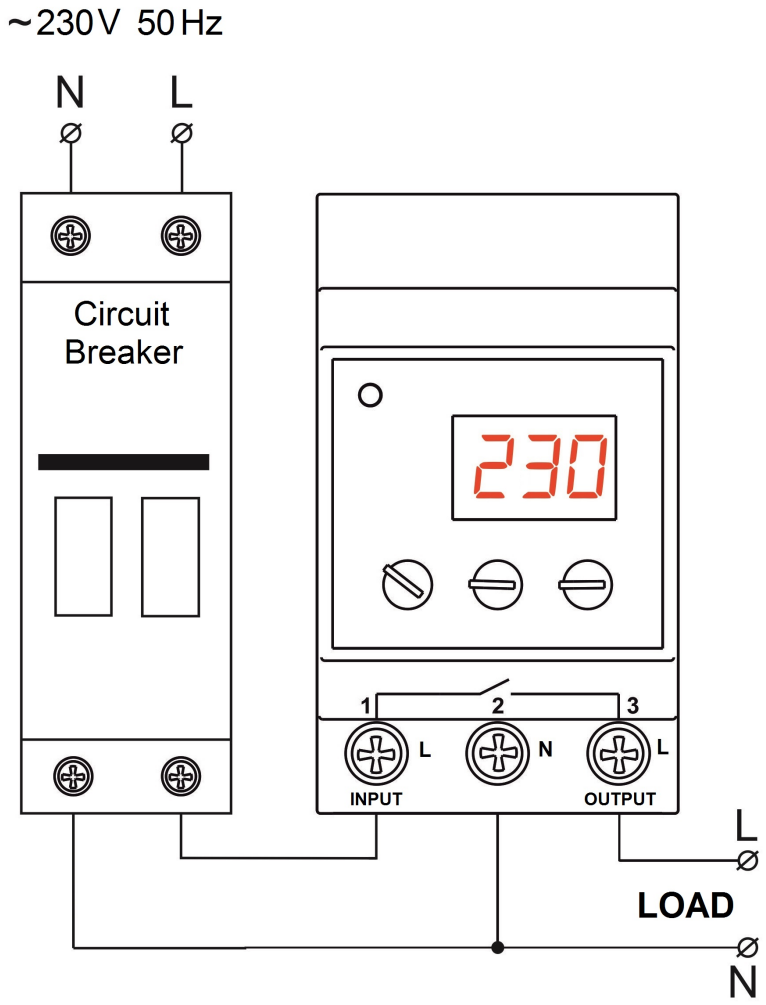
If necessary, set the adjusted threshold values for the maximum and minimum voltages, as well as the automatic re-closure time.

With rotation of controllers, a three-digit indicator displays the value of the corresponding parameter simultaneously at the same time as the dots flash.

It is recommended to set the re-closure time for air conditioners, refrigerators and other compressor devices for at least 180 - 240 seconds, for other kinds of equipment - according to their operating instructions.

4.1.2.5 Switch off the supply voltage for the circuit breaker, connect the equipment to protect to contacts 2, 3 according to the diagram (Fig. 2).

4.1.2.6 Switch on the circuit breaker. The device is ready for operation.



L – phase; N – neutral.

Figure 2 – Device connection diagram

4.2 Use of the device

4.2.1 Modes of operation

The device may be in the following modes of operation:

- normal operation;
- voltage alarm;
- automatic re-closure time delay.

4.2.1.1 Normal mode of operation:

- the mains voltage is within the limits specified by the User when setting the device;
- the re-closure time has expired;
- the protected equipment is connected to the mains, the load-on indicator lights;
- the three-digit indicator displays the current value of the mains voltage.

4.2.1.2 Voltage alarm mode:

- the mains voltage is beyond the limits specified by the User when setting the device, for a time longer than indicated in the technical specifications (see Table 2);
- the protected equipment is disconnected from the mains, the power-on indicator does not light;
- the three-digit indicator displays the current value of the mains voltage in a flashing mode.

4.2.1.3 Automatic re-closure time delay mode

The time countdown of the automatic re-closure period starts from the moment of the alarm or from the moment of power supply.

During the time countdown of automatic re-closure period, the three-digit indicator displays:

- the effective value of the input voltage in a flashing mode, if the device is in the voltage alarm mode;
- the time in seconds remaining before the end of the re-closure time if the mains voltage parameters are restored after the alarm. The dot in the lowest digit of the indicator lights up.

After the end of the re-closure time, the device will go into normal mode of operation if the mains voltage parameters have recovered after the alarm.

4.2.2 PH-125t (PH-132t, PH-140t, PH-150t, PH-163t)

Load disconnection when the temperature inside the enclosure is exceeded:

- the device will disconnect the load if the temperature inside the case exceeds 80 ° C;
- the three-digit indicator displays inscription “□□□”,the device will be blocked.

To unlock, you must:

- disconnect the device from the supply voltage;
- check the power of the connected load; if exceeded, disconnect the excess load;
- wait for 20-30 minutes to cool the case;
- apply power to the device by turning on the circuit breaker.

5 MAINTENANCE

5.1 Safety precautions

THE TERMINALS AND THE DEVICE INTERNAL ELEMENTS CONTAINS POTENTIALLY LETHAL VOLTAGE.

DURING MAINTENANCE IT IS NECESSARY TO DISABLE THE DEVICE AND CONNECTED DEVICES FROM THE MAINS.

5.2 Recommended frequency of maintenance is **every six months.**

5.3 Maintenance Procedure:

1) Check the connection reliability of the wires, if necessary, clamp with the force specified in Table 2;
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 and solvents for cleaning.

6 SERVICE LIFE AND MANUFACTURER WARRANTY

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

6.2 Shelf life is 3 years.

6.3 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 WITH THE VIOLATION OF THE REQUIREMENTS OF THIS USER MANUAL, THE USER WILL LOSE THE RIGHT TO WARRANTY MAINTENANCE.

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

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

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

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.

7 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 %.

8 CLAIMS DATA

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

9 CLAIMS DATA

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

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For all questions, please contact the manufacturer:

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Date of sale: _____ **VN210402**