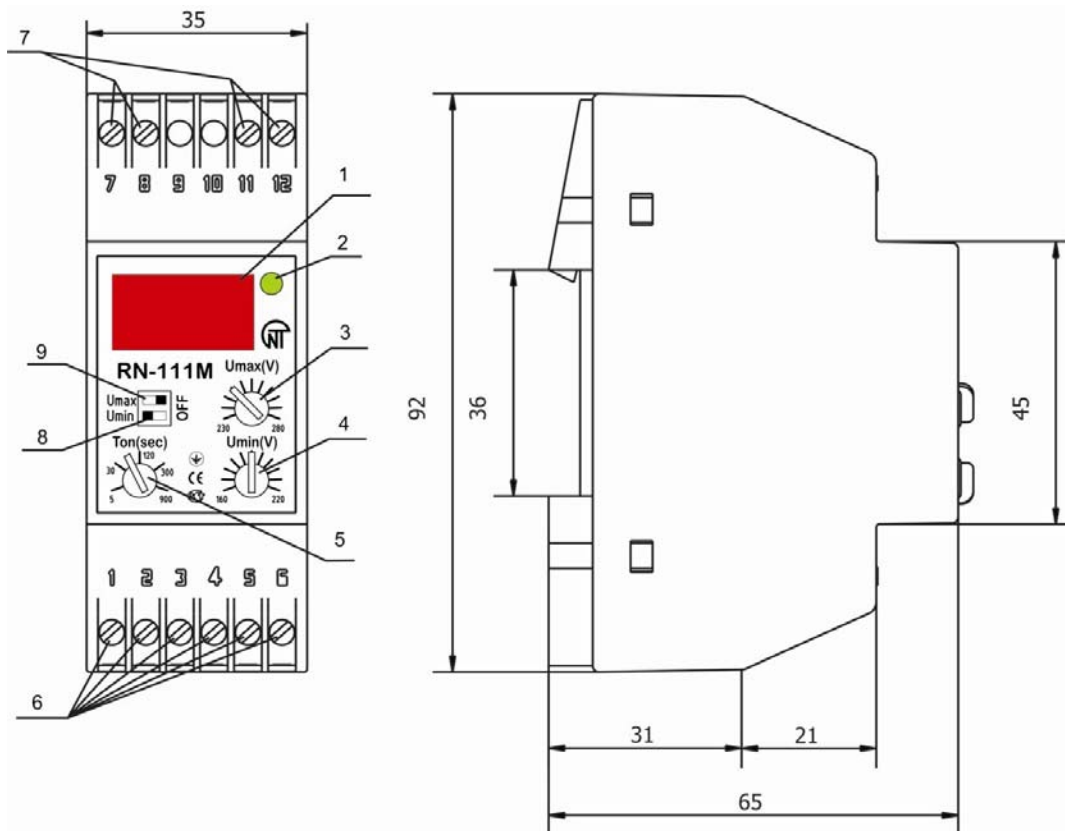


RN-111M

***SINGLE PHASE VOLTAGE
PROTECTION RELAY***



USERS MANUAL



- 1 – Three digits seven segment LED display;
- 2 – Green LED indicator showing **ON/OFF** state of the output contacts (power load);
- 3 – Maximal voltage tripping threshold **U_{max}**;
- 4 – Minimal voltage tripping threshold **U_{min}**;
- 5 – Autoreclosing time delay **Ton (Текл)**;
- 6 – Output terminals;
- 7 – Input terminals;
- 8 – Toggle switch **ON/OFF**: Minimal voltage tripping **U_{min}**;
- 9 – Toggle switch **ON/OFF**: Maximal voltage tripping **U_{max}**;

Figure 1 - Control descriptions and dimensions diagram

1. APPLICATION

Single phase (220V/50Hz) voltage monitoring relay RN-111M (hereinafter RN-111M) is designed to turn **OFF** home used consumer equipment or industrial power load in case of unallowable voltage fluctuations. And when the voltage parameters returned back to normal values after fluctuation – it should automatically turn **ON** the power load with the user adjusted time delay.

- 1 • If power load is **less** than 3,5 kW (16A) then RN-111M may operate with the power load by its own output terminals;
- 2 • If power load is **more** than 3,5 kW (16A) then it should be commutated using contactor of appropriate power rating. So RN-111M operates with the magnetic coil of the contactor and thus turns **ON/OFF** the power load when necessary. Kindly note that contactors of appropriate power rating should be chosen by User and not supplied along with RN-111M.

RN-111M has four independent modes of operation:

- 1 1. **Minimal/Maximal** voltage protection relay;
- 2 2. **Minimal** voltage protection relay;
- 3 3. **Maximal** voltage protection relay;
- 4 4. Turn **ON** time delay relay.

On the LED digital display RN-111M indicates the value of **acting voltage** level and the **Open/Close (ON/OFF)** state of the output terminals.

2. TECHNICAL CHARACTERISTICS

Rated voltage, V	220
Rated voltage frequency, Hz	48 – 52
Adjustment ranges: - minimal voltage tripping range (Umin), V - maximal voltage tripping range (Umax), V - autoreclosing time delay (Ton), sec	160 – 220 230 – 280 5 – 900
Fixed tripping time delay in case maximal voltage fault (Umax) detected, sec	1
Fixed tripping time delay in case minimal voltage fault (Umin) detected, sec	12
Fixed tripping time delay in case of voltage decrease more than 60V than the adjusted minimal voltage tripping threshold (Umin), sec	0,2
Fixed tripping time delay in case of voltage increase more than 30V than the adjusted maximal voltage tripping threshold (Umax), sec	0,2
Maximal commutation current (active power load), A (no less than)	16
Tripping Voltage level accuracy, V	3
Minimal operation voltage level at which RN-111M will keep working, V	100
Maximal operation voltage level at which RN-111M will keep working, V	420
Voltage hysteresis, V (no less than)	5
Operational temperature range, °C	from -35 to + 55
Storage temperature, °C	from -45 to + 70
Total power consumption, mA	15
Commutation life of the output contacts: - under 16A power load, times (no less than) - under 5A power load, times (no less than)	100 000 1 000 000
Outer dimensions, (2 S-modules),mm	35 x 92 x 65
Weight, kg, no less than	0,150
Mounting to standard 35mm DIN rail	

Specification of the Output contacts 1-3(4)-6

	Maximal current at ~ 250V AC	Maximal power when contacts are closed	Maximal commutation power	Maximal allowed AC/DC Voltage	Maximal current at 30V DC
Cos φ = 0,4	5 A	5000 VA	4000 VA	380/150 V	5 A
Cos φ = 1	16A				

3. GENERAL DESCRIPTION AND OPERATION

RN-111M has several functional states:

– **Normal operation mode:** Power load is **ON**, Green LED indicator – **ON**. Digital LED display shows measured voltage value;

– **Alarm mode:** Power load is **OFF**, Green LED indicator – **OFF**. Digital LED display shows blinking value of the measured voltage;

– **Indication of the remaining time to turn ON the power load (Ton):** Power load is **OFF**, Green LED indicator – **OFF**. Digital LED display shows the remaining time to turn **ON** the power load (in seconds) and dot is being displayed in the lower digit. After the **Ton** time elapse RN-111M will return to **Normal operation mode** if voltage parameters on the input terminals are within the permitted range adjusted by the user.

User may select four independent operation modes:

3.1. Minimal/Maximal voltage protection relay

This mode is active when both toggle switches (**Umin**, **Umax**) are set to the Left position. In case the voltage level will get **lower/higher** than the user adjusted allowable values – the power load will be turned **OFF**. RN-111M will turn **ON** the power load with the user preset time delay (**Ton**) only after voltage parameters returned back to normal.

Power load (contactor coil) should be connected to the output terminals **3(4)**, **6**.

If RN-111M was initially deenergized or the power load was **OFF** due to the wrong voltage parameters – then after correct voltage appear on the input terminals and after the time delay **T_{on}** contacts **1,3(4)** will open and contacts **3(4),6** will close.

If input voltage get lower than minimal voltage threshold for more than 12 seconds RN-111M becomes to **Alarm mode** – contacts **1,3(4)** close and contacts **3(4), 6** open and thus the power load should be turned **OFF**.

If input voltage gets 60V lower than the minimal voltage tripping threshold – RN-111M turns **OFF** the power load within 0,1 sec (accelerated tripping time). After the recovery of the voltage parameters to the value of hysteresis (4-5V) – RN-111M turns **ON** the power load with the user adjusted time delay **T_{on}**.

If input voltage gets higher than the maximal tripping voltage threshold for more than 1 s or accelerated tripping time of 0,1 sec is applied if the voltage is 30V higher than the maximal tripping threshold – then the RN-111M comes to **Alarm mode** – contacts **3(4), 6** open and contacts **1,3(6)** close. When voltage level decrease lower than the maximal tripping voltage threshold to the hysteresis value (4-5V) – RN-111M turns **ON** the power load with the user adjusted time delay **T_{on}**.

3.2. Minimal voltage protection relay

This mode is active when toggle switch **U_{min}** is set to the Left position and **U_{max}** is set to the right position. RN-111M will turn **OFF** the power load if voltage level will get lower than the Minimal voltage threshold preset buy the user (Figure 1; item - 4).

Power load (contactor coil) should be connected to the output terminals **3(4), 6**.

If RN-111M was initially deenergized or the power load was **OFF** due to the wrong voltage parameters – then after correct voltage appear on the input terminals and after the time delay **T_{on}** contacts **1,3(4)** will open and contacts **3(4),6** will close.

If input voltage get lower than minimal voltage threshold for more than 12 seconds RN-111M becomes to **Alarm mode** – contacts **1,3(4)** close and contacts **3(4), 6** open and thus the power load should be turned **OFF**.

If input voltage gets 60V lower than the minimal voltage tripping threshold – RN-111M turns **OFF** the power load within 0,1 sec (accelerated tripping time). After the recovery of the voltage parameters to the value of hysteresis (4-5V) – RN-111M turns **ON** the power load with the user adjusted time delay **T_{on}**.

3.3. Maximal voltage protection relay

This mode is active when toggle switch **U_{max}** is set to the Left position and **U_{min}** is set to the right position. RN-111M will turn **OFF** the power load if voltage level will get higher than the Maximal voltage threshold preset buy the user (Figure 1; item - 3).

Power load (contactor coil) should be connected to the output terminals **1, 3(4)**.

When normal voltage applied to the input terminals of RN-111M – the state of the output relay doesn't change so the RN-111M stay in the "cold" state: contacts **1,3(4)** are closed and contacts **3(4),6** are opened.

If input voltage gets higher than the maximal tripping voltage threshold for more than 1 s or accelerated tripping time of 0,1 s is applied if the voltage is 30V higher than the maximal tripping threshold – then the RN-111M comes to **Alarm mode** – contacts **1, 3(4)** open and contacts **3(4),6** close. When voltage level decrease lower than the maximal tripping voltage threshold to the hysteresis value (4-5V) – RN-111M turns **ON** the power load with the user adjusted time delay **T_{on}**.

3.4. Turn ON time delay relay

This mode is active when both toggle switches (**U_{min}**, **U_{max}**) are set to the Right position. In this mode voltage parameters are not controlled and RN-111M will turn **ON** the power load with the user preset time delay (**T_{on}**) if the input voltage parameters are within the operation voltage range. Power load (contactor coil) should be connected to the output terminals **3(4), 6**.

If the input voltage is more than 160V RN-111M will turn **ON** the power load after the delay time will finish. If the voltage will get lower than 120V RN-111M will go to **Alarm mode** – contacts **1,3(4)** close and contacts **3(4), 6** open and thus the power load should be turned **OFF**.

ATTENTION!!! At first start-up or after the RN-111M was completely deenergized additional time

delay of 0,3-0,4 second is required for self testing. During this time LED display indicates “StA” and then start showing the remaining time to turn **ON** the power load.

Thus turn **ON** time will be 0,3 s + **Ton** time.

If RN-111M is being used as maximal voltage protection relay – then no time delay for the first start-up.

ATTENTION!!! ALL CONNECTIONS MUST BE DONE ONLY ON DEENERGIZED RN-111M AND ACCORDING ALL SAFETY REGULATIONS

4. START-UP PROCEDURE AND CONNECTION

Using toggle switches on the front panel set necessary mode of operation (see Section 3); In case of using RN-111M as Minimal/Maximal protection relay or Minimal protection relay connect wires according the **Wiring Diagram** (see below). If RN-111M is being used as a maximal voltage protection relay power load (contactor coil) should be connected to terminals **1** and **3(4)**.

If power load is less than 16A (3,5 kW) then it could be commutated directly by the output contacts of the RN-111M; if the power load is more than 16A – then it should be commutated using contactor of appropriate rated parameters and the RN-111M should operate with the magnetic coil of the contactor.

Connect RN-111M to the power circuit. For easier wiring purposes there are coupled input terminal contacts **7-8** and **11-12**.

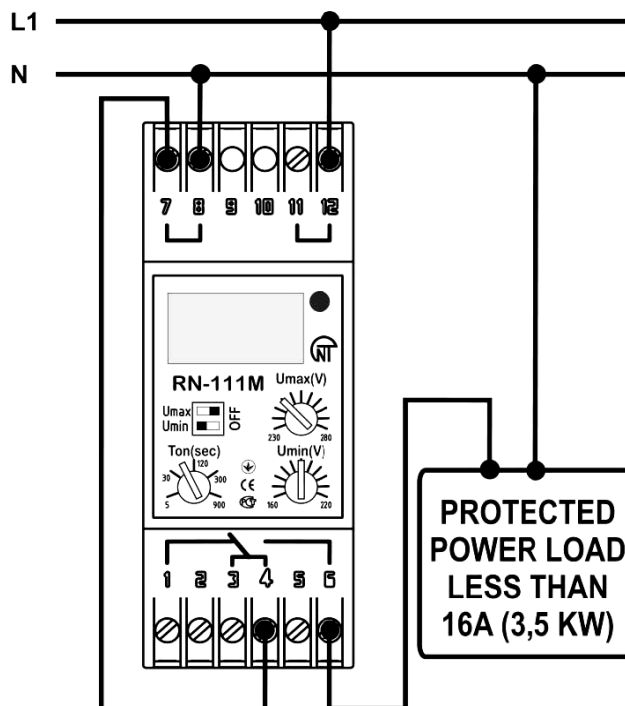
By spinning the knobs on the front panel set the required Minimal and Maximal voltage tripping thresholds (**Umin** and **Umax**) and set necessary turn **ON** time delay (**Ton**). Please pay attention that the **Ton** time should be adjusted taking into consideration the technical documentation and requirements of the protected power load – for example – air-conditioners, refrigerators and other compressor containing equipment usually need 3-4 minutes pause before turn **ON** again after they were disconnected.

Give the power supply to the input terminals of the RN-111M and by spinning the adjustment knobs set precisely the required values for the **Umin**, **Umax** and **Ton**. When spinning the knobs on the LED digital display it is shown the exact value of the adjusted parameter.

WIRING DIAGRAMMS

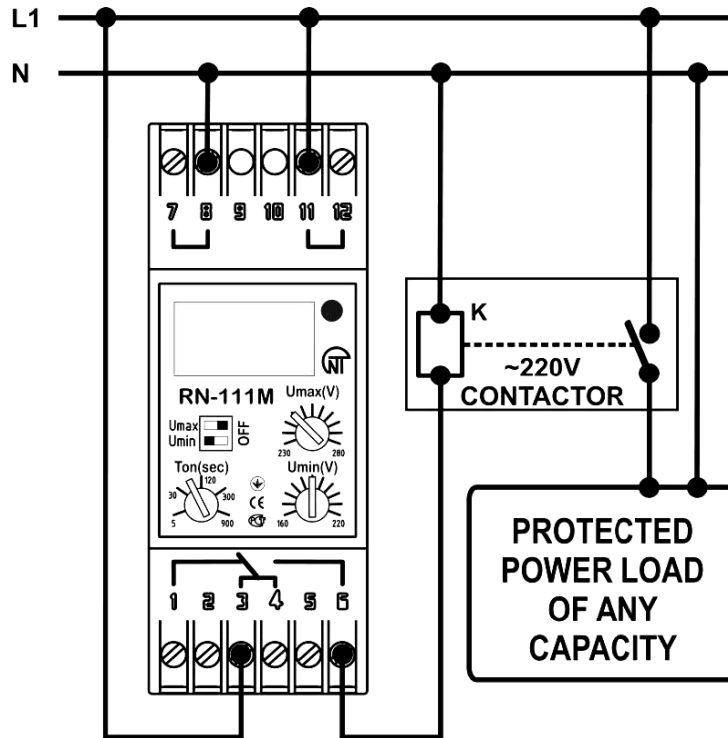
Variant A

If power load is less than 16A, then RN-111M operates with the power load directly by output terminals



Variant B

If power load is more than 16A, then RN-111M commutates the power load by operating the magnetic coil of the contactor.



ATTENTION!!! Position of the output contacts are shown as if RN-111M is no voltage on input terminals ("cold" state).

5. STORAGE AND TRANSPORTATION CONDITIONS

RN-111M should be stored in a factory package in enclosed rooms with ambient temperature from - 45 to +75 °C and exposed to not more than 80% of relative humidity. It should be no fumes in the air that may exert a deleterious effect on package and the RN-111M components. The Buyer must provide the protection of the relay against possible mechanical damages in transit.

6. WARRANTY AND CLAIMS CONDITIONS

Novatek-Electro Ltd. company warrants a trouble-free operation of the RN-111M device within 36 months from the date of sale, on condition that following terms are provided:

- the proper connection;
- the safety of the inspection quality control department seal;
- the integrity of the case, no traces of opening, cracks, spalls etc.

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