

***SINGLE PHASE VOLTAGE
MONITORING RELAY***

RN-113



USERS MANUAL

1.APPLICATION

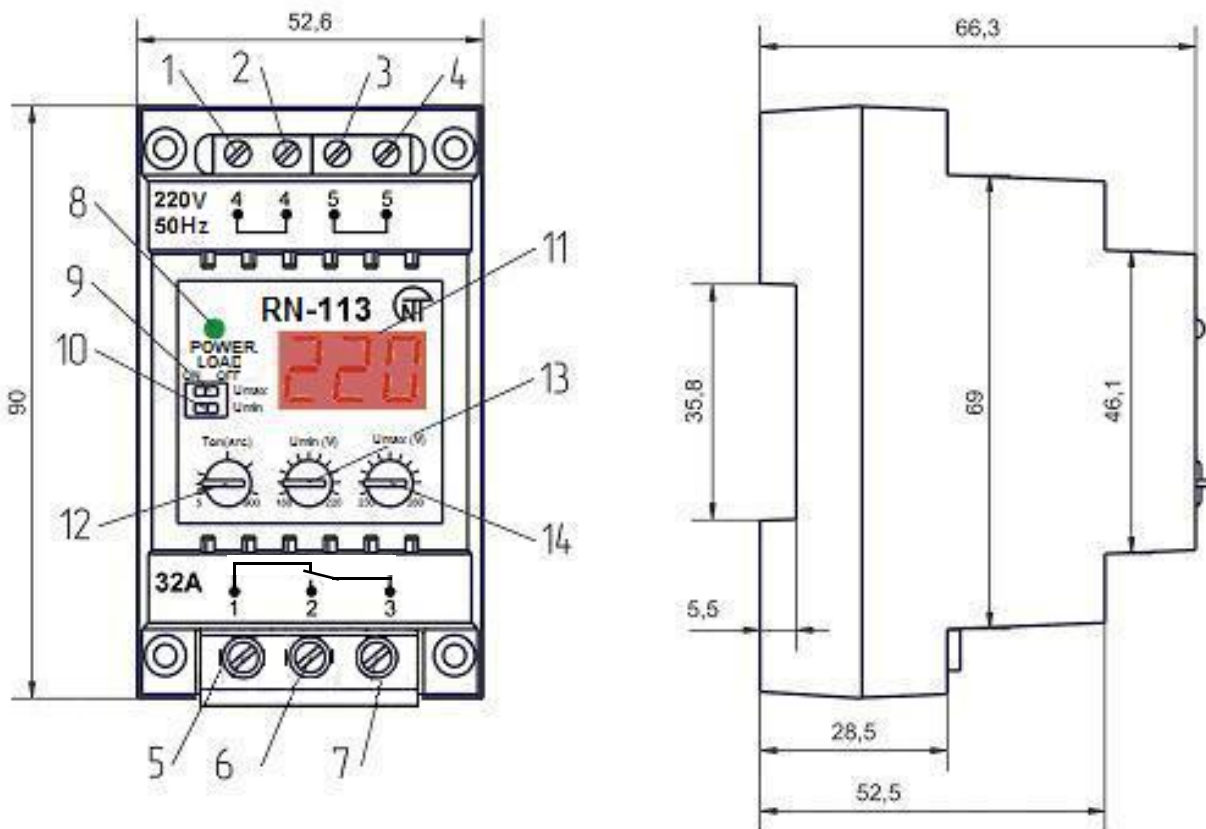
Voltage monitoring relay RN-113 (hereinafter RN-113) is designed to turn **OFF** home used consumer equipment or industrial power load in case of unallowable voltage drops or fluctuations. And when the voltage parameters returns back to normal values after the fault – it automatically turns **ON** the power load with the user adjusted time delay (autoreclosing time).

- If power load is **less than 7,0 kW (32A)** then RN-113 may operate with the power load directly using its own output terminals;
- If power load is **more than 7,0 kW (32A)** then it should be commutated using contactor of appropriate power rating. So RN-113 operates with the magnetic coil of the contactor and thus turn **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-113.

RN-113 has four independent modes of operation:

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

Digital display of RN-113 indicates the value of **acting voltage** level and the remaining time to **Open/Close** (ON/OFF) state of the output contacts. The position of the contacts is additionally shown using green color LED indicator.



- 1-4 - input terminals
- 5-7- output terminals
- 8- ON/OFF state indicator showing the position of the output contacts (power load)
- 9- toggle switch (ON/OFF): Maximal voltage tripping (U_{max})
- 10- toggle switch (ON/OFF): Minimal voltage tripping (U_{min})
- 11- Digital LED segment display
- 12- Autoreclosing time delay (T_{on})
- 13- Minimal voltage tripping threshold (U_{min})
- 14- Maximal voltage tripping threshold (U_{max})

Figure 1 – Front panel controls and dimensions diagram

2. TECHNICAL CHARACTERISTICS

Rated voltage, V	220
Rated voltage frequency, Hz	48 – 52
Adjustment ranges: - minimal voltage tripping range (U_{min}), V - maximal voltage tripping range (U_{max}), V - autoreclosing time delay (T_{on}), sec	160 – 220 230 – 280 5 – 900
Fixed tripping time delay in case maximal voltage fault (U_{max}) detected, sec	1
Fixed tripping time delay in case minimal voltage fault (U_{min}) detected, sec	12
Fixed tripping time delay in case of voltage decrease more than 50V than the adjusted minimal voltage tripping threshold (U_{min}), sec	0,2
Fixed tripping time delay in case of voltage increase more than 30V than the adjusted maximal voltage tripping threshold (U_{max}), sec	0,2
Maximal commutation current (active power load), A	32
Tripping Voltage level accuracy, V	3
Minimal operation voltage level at which RN-113 will keep working, V	100
Maximal operation voltage level at which RN-113 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, (3 S-modules),mm	52,6 x 90 x 66,3
Weight, kg, no less than	0,150
Mounting to standard 35mm DIN rail	

Specification of the Output contacts 1-2-3

	Maximal current at ~ 250V AC	Maximal power when contacts are closed	Maximal allowed AC/DC Voltage	Maximal current at 30V DC
Cos φ = 1,0	32 A	7200 VA	250/110 V	30 A

3. START-UP PROCEDURE AND CONNECTION

ALL CONNECTIONS MUST BE DONE ONLY ON REENERGIZED RN-113 AND ACCORDING ALL SAFETY REGULATIONS

3.1 Using toggle switches on the front panel set necessary mode of operation(see Section 4);

3.2 In case of using RN-113 as Minimal/Maximal protection relay or Minimal protection relay connect wires according the Wiring Diagram (see below).

If RN-113 is being used as a maximal voltage protection relay power load (contactor coil) should be connected to terminals 1 and 3.

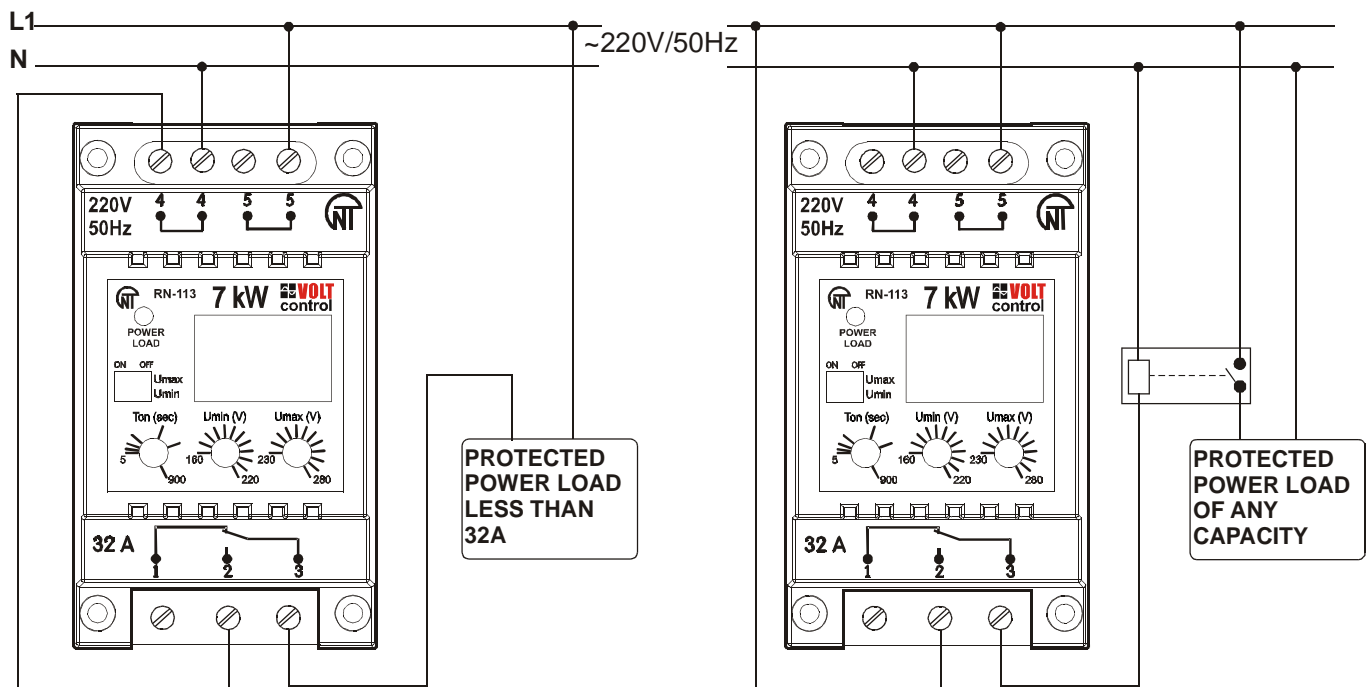
If power load is less than 7kW (32A) then it could be commutated directly by the output contacts of the RN-113; if the power load is more than 7 kW – then it should be commutated using contactor of appropriate rated parameters and the RN-113 should operate with the magnetic coil of the contactor.

3.3 Connect RN-113 to the power circuit. For easier wiring purposes there are coupled input terminal contacts **4-4 and 5-5**.

3.4 By spinning the knobs on the front panel set the required Minimal and Maximal voltage tripping thresholds (**U_{min}** and **U_{max}**) and set necessary turn **ON** time delay (**T_{on}**). Please pay attention that the **T_{on}** 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.

3.5 Give the power supply to the input terminals of the RN-113 and by spinning the adjustment knobs set precisely the required values for the **U_{min}**, **U_{max}** and **T_{on}**.

When spinning the knobs on the LED digital display it is shown the exact value of the adjusted parameter.



Variant A

If power is less than 32 A, then RN113 operates with the power load directly by output terminals

Variant B

If power is more than 32 A, then RN113 commutates the power load by operating the magnetic coil of the contactor.

Figure 2 – Connecting diagram

4. RN-113 OPERATION MODE

4.1 RN-113 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-113 will return to Normal operation mode if voltage parameters on the input terminals are within the permitted range adjusted by the user.

4.2 User may select four independent operation modes:

- **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-113 will turn **ON** the power load with the user preset time delay (**Ton**) only after voltage parameters returned back to normal.

- Minimal voltage protection relay

This mode is active when toggle switch **Umin** is set to the Left position and **Umax** is set to the right position. RN-113 will turn **OFF** the power load if voltage level will get lower than the Minimal voltage threshold preset buy the user.

- Maximal voltage protection relay

This mode is active when toggle switch **Umax** is set to the Left position and **Umin** is set to the right position. RN-113 will turn **OFF** the power load if voltage level will get higher than the Maximal voltage threshold preset buy the user.

- Turn ON time delay relay

This mode is active when both toggle switches (**Umin**, **Umax**) are set to the Right position.

4.3 At first start-up procedure

At first start-up or after the RN-113 was completely reenergized additional time delay of 0,3-0,4 sec 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. If RN-113 is being used as maximal voltage protection relay – then no time delay for the first start-up.

4.4 Minimal voltage protection relay

Power load (contactor coil) should be connected to the output terminals 2,3.

If RN-113 was initially reenergized 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 **Ton** contacts **1,3** will open and contacts **2,3** will close.

If input voltage get lower than minimal voltage threshold for more than 12 sec RN-113 becomes to **Alarm mode** – contacts **1,3** close and contacts **2,3** open and thus the power load should be turned **OFF**.

If input voltage gets 50V lower than the minimal voltage tripping threshold – RN-113 turns **OFF** the power load within 0,2 sec (accelerated tripping time). After the recovery of the voltage parameters to the value of hysteresis (4-5V) – RN-113 turns **ON** the power load with the user adjusted time delay **Ton**.

4.5 Maximal voltage protection relay

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

When normal voltage applied to the input terminals of RN-113 – the state of the output relay doesn't change so the RN-113 stay in the "cold" state: contacts **1,3** are closed and contacts **2,3** are opened.

If input voltage gets higher than the maximal tripping voltage threshold for more than 1 sec or accelerated tripping time of 0,2 sec is applied if the voltage is 30V higher than the maximal tripping threshold – then the RN-113 comes to **Alarm mode** – contacts **1, 3** open and contacts **2,3** close.

When voltage level decrease lower than the maximal tripping voltage threshold to the hysteresis value 4-5V – RN-113 turns **ON** the power load with the user adjusted time delay **Ton**.

4.6 Minimal/Maximal voltage protection relay

Power load (contactor coil) should be connected to the output terminals 2,3.

If RN-113 was initially reenergized 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 **Ton** contacts **1,3** will open and contacts **2,3** will close.

If input voltage get lower than minimal voltage threshold for more than **12 sec** RN-113 becomes to **Alarm mode** – contacts **1,3** close and contacts **2,3** open and thus the power load should be turned **OFF**.

If input voltage gets 50V lower than the minimal voltage tripping threshold – RN-113 turns **OFF** the power load within 0,2 sec (accelerated tripping time). After the recovery of the voltage parameters to the value of hysteresis (4-5V) – RN-113 turns **ON** the power load with the user adjusted time delay **Ton**.

If input voltage gets higher than the maximal tripping voltage threshold for more than 1 sec or accelerated tripping time of 0,2 sec is applied if the voltage is 30V higher than the maximal tripping threshold – then the RN-113 comes to **Alarm mode** – contacts **1, 3** open and contacts **2,3** close.

When voltage level decrease lower than the maximal tripping voltage threshold to the hysteresis value 4-5V – RN-113 turns **ON** the power load with the user adjusted time delay **Ton**.

4.7 Turn ON time delay relay

In this mode voltage parameters are not controlled and RN-113 will turn **ON** the power load with the user preset time delay (**Ton**) if the input voltage parameters are within the operation voltage range.

Power load (contactor coil) should be connected to the output terminals 2,3.

If the input voltage is more than 160V RN-113 will turn **ON** the power load after the delay time will finish. If the voltage will get lower than 152V RN-113 will go to **Alarm mode** – contacts **1,3** close and contacts **2,3** open and thus the power load should be turned **OFF**.

5. WARRANTY AND CLAIMS CONDITIONS

Novatek-Electro Ltd. company warrants a trouble-free operation of the RN-113 device within three years 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.

6 TRANSPORTATION

Transportation of RN-113 in package may be effected by any type of transport according to the transportation rules and regulations valid for such mode transportation.

During transportation, shipping and storing in a warehouse RN-113 must be protected form blows, shocks and moisture.

7 QUALITY ASSURANCE NOTES

The RN-113 multifunctional time delay relay has been manufactured and accepted in conformity with the requirements of current technical documentation, and is approved fit for operation.

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