RN-16TM

MULTIFUNCTIONAL RELAY

OPERATING MANUAL

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 products.
You will be able to use properly the product after carefully studying the Operating Manual.
Keep the Operating Manual throughout the service life of the product.

Review the Operating manual before using the unit.
Store the unit in the operating environment for 2 hours before switching to the mains.

NEVER ATTEMPT TO REMOVE AND REPAIR THE UNIT.
Some of the unit components may be live.
NEVER ATTEMPT TO OPERATE THE UNIT WITH THE MECHANICAL DAMAGE OF THE HOUSING.
NEVER ATTEMPT TO OPERATE THE UNIT UNDER CONDITIONS OF HIGH HUMIDITY.
Do not let water into the unit.

1 APPLICATION

Multifunctional relay RN-16TM (hereinafter **RN-16TM**) performs the following functions:

- Programmable real time switch (daily-weekly timer)
- voltage relay
- Light-sensitive photo relay
- Voltage indicator

The RN-16TM is designed for:

- Turning ON/OFF the power load (equipment) according to the time schedule preset by the user;

- Turn OFF home used or industrial single phase (230V / 50Hz) power load (equipment) in case the unallowable voltage fluctuations are detected. When the voltage returns back to normal parameters - the device will automatically turn ON the power load (equipment) with the user defined time delay;

- Turn ON/OFF the power load according to the curtain illumination level that the user may set

Relay works in 3 basic operation modes (I-III) and 2 mixed modes (IV-V):

I. H – daily-weekly timer;
II. U –voltage relay;
III. F – photo-relay;
IV. HU – daily-weekly timer with voltage control function;
V. FU – photo-relay with voltage control function.

Depending on the preset operation mode the LED display of the RN-16TM indicates the following information (please see article “6” on Figure1).

I. **Mode H** - current time in format : hours – blinking point - minutes

16.45 16 hours 45 minutes

II. **Mode U** - present voltage level correct to the nearest tenth

221.5 221.5 Volts

III. **Mode F** - letter F - space – illumination level

F 35 illumination level 35

IV. **Mode HU** - time and voltage values are shown one after another divided by dashed line

16.45 **- - - -** **221.5** **- - - -**

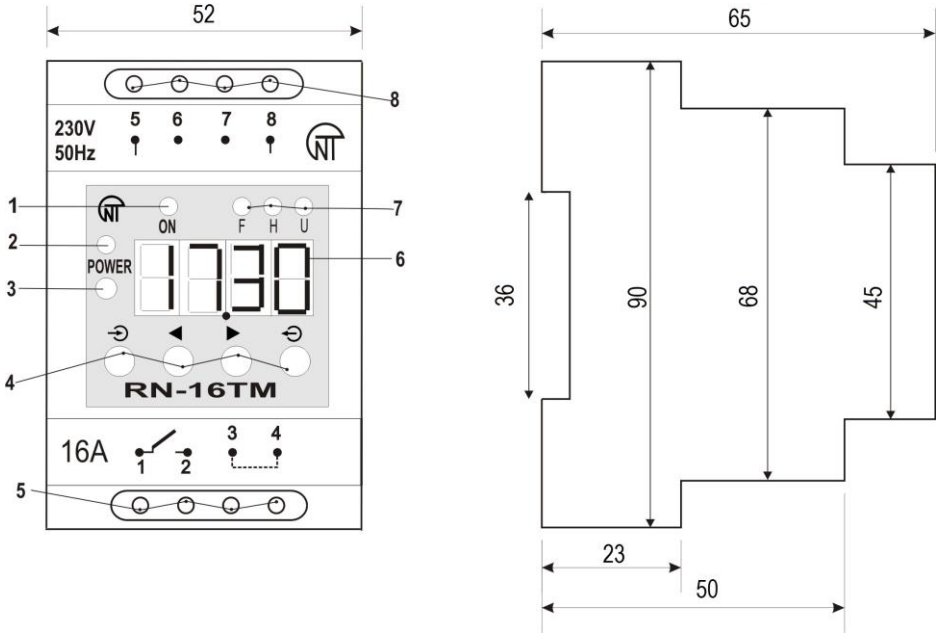
V. **Mode FU** - illumination level and voltage level are shown one after another divided by dashed line

F 35 **- - - -** **221.5** **- - - -**

The User may create 2 different independent sets of parameters **SP1**, **SP2** and may delete any of these sets if necessary.

Output terminals of the RN-16TM may commutate the power load up to 3,5 kW (16A).

If total power load connected to the RN-16TM is more than 3,5 kW (16A) then it will be necessary to commutate the required power load with a use of appropriate contactor (magnetic starter). The RN-16TM should operate with the magnetic coil of contactor and thus the required power load will be turned ON/OF.



1 – green LED indicates the "ON" state of relay;
2 – green/red LED signal indicates the input voltage presence;
3 – light sensor (photodiode); 4 – menu control buttons:
– entry into menu, parameter input;
– save the parameter and menu exit;
◄► – scrolling buttons;
5, 8 – wiring terminals; 6 – seven-segment indicator (display);
7 – green LEDs to indicate the operation mode of the relay;
9 – strap of internal accumulator (set at the use of relay), during storage to take off a strap.

FIGURE 1

2 TECHNICAL PARAMETERS

Rated voltage, V	230
Lowest voltage level sufficient for the RN-16TM operation, V	140
Highest permissible voltage, V	320
Harmonical configuration (nonsinusoidality) of power supply voltage	EN 61000-3-2 (IEC 1000-3-2)
Tripping voltage thresholds, V: - Lower threshold…… - Upper threshold…..……..	 150 – 210 230 – 320
Adjustment accuracy for the voltage tripping thresholds, V	1
Illumination level adjustment range, Lx	0 – 175
Voltage measurement accuracy, V (doesn't exceed)	1
Voltage hysteresis (returning ratio), V	± 5
Illumination level hysteresis (returning ratio), %	12
Adjustable reaction time delay to Max/Min voltage interruptions, sec	0 – 9,9
Tripping time delay, sec	0 – 9,9
Fixed reaction time to changes in illumination level, sec	12

Accuracy of the time clocks, seconds per day (not exceed)	3
Accuracy to adjust schedule time setting, min (not exceed)	1
Maximal number of events per day, Include : - switching ON…….. - switching OFF……. Events per week…….	60 30 30 60x7=420
Endurance to the voltage absence (retention of settings when supply voltage is absent), no less than	1 month
Protection degree: - relay - terminal	IP40 IP20
Commutation life for the output contacts: - under load 16A, no less than, operations - under load 5A, no less than, operations	 100 000 1 000 000
Power consumption (under load), VA, not more than	3,0
Weight, not more than, kg	0,150
Outer dimensions	Figure 1
Operating temperature, °C	from -10 to +55
Storage temperature, °C	from -20 to +60

3 GENERAL DESCRIPTION

The mains power supply should be connected to ***«5 – 8»*** terminals of the **RN-16TM**. Output contacts have changeover relay **1 – 2**.

In a time of exploitation of relay a strap is set 3-4. This strap is connect the internal accumulator of reserve clock motion. For warehousing of device it is recommended to take off this strap that will substantially increase lifetime of accumulator.

Power load is being connected using terminals **1-2**.

Output contacts characteristics (terminals 1-2)

	Max. current under U~250V A.C.	**Max. power when contacts are closed**	**Max. switch. power**	**Max. long-term safe voltage A.C./D.C.**	**Max. current under U=30V D.C.**
Cosφ=0.4	5A	3000VA	2000VA	380/150 V	5A
Cosφ=1.0	16A				

If the **RN-16TM** detects the unallowable OVER/UNDER voltage, then it will turn **OFF** the power load by opening the contacts **1-2** and in case of using the contactor that will turn **OFF** the power for the magnetic coil of the contactor and thus disconnect any required equipment. As soon as voltage parameters restore – **RN-16TM** will automatically turn ON the power load within the preset autoreclosing time delay.

Present status of the relay - **ON/OFF** states of the output contacts are indicated by green LED light "**ON**" in the left upper corner of the front panel (Figure 1; point – 1). Current operation mode of the **RN-16TM** is marked by LEDs **F**, **U**, **H** on the front panel (Figure 1; point – 7).

All the adjustments and parameter settings could be subdivided into two groups: BASIC and PARAMETER settings.

BASIC SETTINGS:

P = __ - to set the operation mode of the **RN-16TM**;

SP 1 - to set the operation mode and curtain user required set of parameters (there are 1 or 2 - independent sets of parameters (programs);

SE 1 - to choose one of the available set of parameters (**1** or **2**);

CL 1 - to clear (delete) current set of parameters.

PARAMETER SETTINGS:

SCAN - to view the events (parameters) in the **RN-16TM**;

H-PA - to enter the menu for adjustment of parameters (events);

CLOC - current time setting menu;

E01.x - time setting for turn **ON**;

d01.x - time setting for turn **OFF**;

DAY_ - setting for the required day of the week;

U-PA - menu to set the voltage threshold values;

H_ _ - upper voltage threshold setting;

L_ _ - lower voltage threshold setting;

dH._ - time delay to turn **OFF** when high voltage detected ;

dL._ - time delay to turn **OFF** when low voltage is detected;

dE._ - time delay to turn **OFF**;

L_ _ _ - illumination level threshold setting.

Important notes:

*Quality of the mains voltage power supply doesn't influence on the preprogrammed operation schedule of the **RN-16TM**. So after the normalization of the voltage parameters power load will be turned ON again, but according to the time schedule preset by the user.*

*If mains voltage was absent not more than 1 month all the parameters and settings will be safely kept in the **RN-16TM** memory. Output contacts of the relay will be kept in a cold initial state.*

*For example RN-16TM was preprogrammed such a way that every day of a week it turn **ON** the power load at 22:00 and then at 8:00 in the morning of next day it turns the power load **OFF**. Let's assume that at 22:30 on Monday mains voltage disappeared and then recovered back only on Wednesday at 6:00 in the morning. So when voltage disappeared contacts **1-2** opened.*

*As soon as the power load restore and return back to normal values **RN-16TM** will turn ON the power load again but according to the preprogrammed schedule of operation. So at 6:00 when the power return – it will turn **ON** the power load and at 8:00 in the morning that will turn it **OFF** according the schedule.*

4 START-UP PROCEDURES AND OPERATION ALGORHYTM

For preservation of working capacity of an inner clock when disappearance of voltage, it is necessary to establish a strap 3,4 (Figure 1).

Preliminary start up procedures include the following steps:

- setting of the current time and the day of a week;
- setting the schedule of events (exact time values and days of a week when the power load should be turned **ON** and turned **OFF** as per users requirements);
- setting the voltage tripping thresholds for MIN/MAX allowed voltage values
- setting the delay times to turn **ON** for UPPER/LOWER voltage thresholds
- setting the autoreclosing time delay
- setting the level of illumination

If in the menu some parameter or event is seen blank "_" then the event or parameter in not set.

When setting the time event schedule it's possible to adjust the following parameters:

E01.x - turn **ON** time; **d01.x** - turn **OFF** time; **CLOC** - ccurrent time where: "01" – is number of event (**ON/OFF**);

x – days of a week, it's possible to set 1-7 values;

A – all days of a week;
B – working days (1-5);
C – weekend days (6, 7);

To give the power supply to the RN-16TM it's necessary to connect mains voltage wires to 5, 8 input contact terminals.

ATTENTION!! ALL CONNECTIONS MUST BE DONE ONLY ON DEENERGIZED RN-16TM ACCORDING TO SAFETY REGULATIONS!

To every operation mode there is a curtain set of the items in menu shown on display (see Figure 1; point 6). To view all those items it's to press → button and then scroll the parameters by pressing ► button.

MODE	MENU INDICATION
H	SP 1 SCAN H-PA
U	SP 1 U-PA
F	F-PA
HU	SP 1 SCAN H-PA U-PA
FU	SP 1 F-PA U-PA

Kindly remember that maximal number of events in **H** mode is 60 (30 Turn **ON** events and 30 turn **OFF** events). Number of **ON/OFF** events is not necessarily the same.

Notes: To set the time it's necessary to input all digits including "0". For example; 7:35 morning time should be set as 07:35, but 7.35 evening time should be set as 19:35. Unspecified time is displayed in a look "_ _ _ _".

After setting the schedule of events for RN-16TM it's necessary to connect the power load to the output contacts of **RN-16TM.**

ATTENTION! All the connections of the power load should be performed according safety regulations and on the de-energized RN-16TM.

To preprogram the **RN-16TM** according to the desired mode of operation and input the required time schedule it's necessary to follow the steps shown in the table below:
(values of parameters are shown and the User may change them as per requirements)

Steps	Action	Button	Indication	Button	Action	Indication
I. TO SET THE REQUIRED MODE OF OPERATION:						
1	Press and enter the menu	→	SP 1			
2	Press	→	P=			
3	Press again and while keeping button pressed choose the required operation mode	→	P.= (blinking dot)	◄►	Choose the operation mode	P.= U P.= H P.= F P.= HU P.= FU

Steps	Action	Button	Indication	Button	Action	Indication
4	Press	←	P= H	←	To exit menu press 2 times	SP 1
II. TO SET MIN/MAX VOLTAGE THRESHOLDS AND TIME DELAY SETTINGS						
Perform steps 1-4 from the previous table section 1 (choose the operation mode).						
1	Press end enter the menu	→	SP 1			
2	By scrolling buttons find **U-PA** mode	◄►	U – PA			
3	Press and choose upper voltage threshold	→	H_ _ _			
4	Press and while keeping button pressed set the required upper voltage threshold, then release the button when the setting is done	→	H._ _ _ (blinking dot)	◄►	Set upper voltage threshold value in the range 230-320	H.240 (blinking dot)
5	Press and save the selected value in the device memory (Save and Exit)	←	H240			
6	Select LOWER voltage threshold	◄►	L_ _ _			
7	Press and while keeping button pressed set the required lower voltage threshold, then release the button when the setting is done	→	L._ _ _ (blinking dot)	◄►	Set lower voltage threshold value in the range 150-210	L.205 (blinking dot)
8	Press and save the selected value in the device memory (Save and Exit)	←	L205	◄►	Press (calibration of the present voltage)	221.5 **NOT RECOM-MENDED TO MAKE ANY CHANGES ON THIS STEP!**
This function allows to perform precise calibration to the curtain power supply circuit. If there is strong requirement it's possible to change calibration voltage when having voltmeter connected in parallel and setting the value shown on the voltmeter.						
9	Press and while keeping button pressed set the required value, then release the button when the setting is done	→	*221.5* (blinking dot)	◄►	Set the voltage shown on voltmeter	
10	Press and save the selected value in the device memory (Save and Exit)	←				
ATTENTION! The turn **ON/OFF** delay time values are set in tenths of second, i.e. value 10 to the right from dot mean one second, and etc.						
Steps	**Action**	**Button**	**Indication**	**Button**	**Action**	**Indication**

11	Select dH.10 item	◄►	**dH.10** (blinking dot)	(turn **OFF** time delay in case overvoltage detected)		
12	Press and while keeping button pressed set the required value, then release the button when the setting is done	→	**dH.10** (blinking dot)	◄►	Set the desired value	**dH.15** (blinking dot)
13	Press and save the selected value in the device memory (Save and Exit)	←	**dH.15**			
14	Select dL.90 item	◄►	**dL.90** (blinking dot)	(turn **OFF** time delay in case undervoltage detected)		
15	Press and while keeping button pressed set the required value, then release the button when the setting is done	→	**dL.95** (blinking dot)	◄►	Set the desired value	**dL.95** (blinking dot)
16	Press and save the selected value in the device memory (Save and Exit)	←	**dL.95** (blinking dot)			
17	Select dE.50 item	◄►	**dE.50** (blinking dot)	(turn **ON** time delay)		
18	Press and while keeping button pressed set the required value, then release the button when the setting is done	→	**dE.50** (blinking dot)	◄►	Set the desired value	**dE.55** (blinking dot)
19	Press and save the selected value in the device memory (Save and Exit)	←	**dE.55** (blinking dot)	←	Press and exit the menu	
III. CURRENT TIME SETTING						
Perform steps 1-4 from the previous table section “1” (choose the operation mode).						
1	Press and enter the menu	→	**SP 1**			
2	By scrolling the menu items find **H-PA**	◄►	**H – PA**			
3	Press and enter the menu	→	**CLOC**			
4	Press and enter the menu	→	**dAY._**	◄►	Set the value in the range 1-7 that corresponds to the actual day of a week	**dAY.1**
5	Press and enter the menu to set the current hour	→	**_ _._ _** (blinking tens of hours position)	◄►	Set the value from 0 to 2 to that corresponds to current hour	**1 _._ _**
Steps	**Action**	**Button**	**Indication**	**Button**	**Action**	**Indication**

6	Press and set the current hours	→	**1 _. _ _** (blinking hours position)	◄►	Set the value from 0 to 9 to that corresponds to current hour	**1 5. _ _**
7	Press and set current minutes	→	**1 5. _ _** (blinking tens of minutes position)	◄►	Set the value from 0 to 5 that corresponds to current tens of minutes	**1 5. 2 _**
8	Press and set current minutes	→	**1 5. 2 _** (blinking minutes position)	◄►	Set the value from 0 to 9 that corresponds to current of minutes	**1 5. 2 5**
9	Press and Exit the menu if the time was set successfully	←	**CLOC**			
IV. SETTING THE TIME SCHEDULE						
1	Perform steps 1-3 of the previous section III.		**CLOC**			
2	Select E01. item	◄►	**E01._**			
3	Press and set the day of a week	→	**dAY._**	◄►	Set the day of a week (1-7, A, b, c, _)	**dAY.3**
4	Press and set time to turn **ON** the power load	→	**_ _. _ _**	Repeat Steps 5-8 of section 3		**1 0. 2 5**
5	Press and exit the menu	←	**E01.3**	◄►	Set the next turn **ON** time if necessary	**E02._**
*To set the time program for all next turn **ON** events it's necessary to perform 2-5 points of section "4".*						
6	Select d01. item	◄►	**d01._**			
7	Perform steps 3-5 of the section "4"		←	←	Exit the menu	
V. SETTING THE ILLUMINATION LEVEL THRESHOLD						
Perform steps 1-4 from the previous table section "1" (choose the operation mode).						
1	Press and enter the menu	→				
2	By scrolling find **F-PA** mode	◄►	**F-PA**			
3	Press and while keeping button pressed set the required value, then release the button when the setting is done	→	**L. _ _ _** (blinking dot)	◄►	Set the value in the range 0-175	(blinking dot)

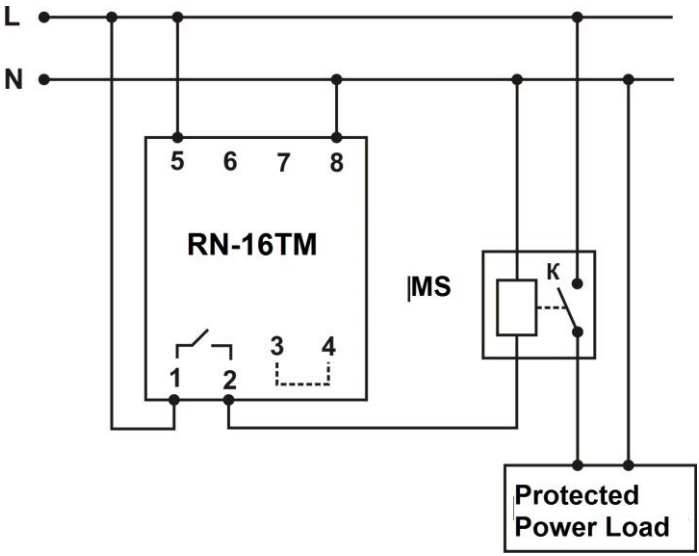
Steps	Action	Button	Indication	Button	Action	Indication
4	Press (calibration of the illumination level)	◄►	F 127 **NOT RECOM-MENDED TO MAKE ANY CHANGES ON THIS STEP!**			L. 55
This function allows to perform precise calibration of the illumination level. It it is really necessary to calibrate the illumination level turn the Luxmeter ON and expose to equally lightened surface or wall. Make sure that there are no undesired shadows on it. Then set the the values shown on Luxmeter into the RN-16TM according to the point 3 of section V.						
VI. VIEW OF THE PREPROGRAMMED TIME SCHEDULE						
Perform steps 1-4 from the previous table section I (choose the operation mode).						
1	Press and enter the menu	→	SP 1			
2	By scrolling find **SCAN** mode	◄►	SCAn			
3	Press and enter the menu	→	CLOC	Automatic view of the parameters followed by exit to the initial indication		
VII. CHANGING THE SET OF PARAMETERS						
1	Press and enter the menu	→	SP 1			
2	Press	→	P= _ _			
3	By scrolling find **SE 1** item in the menu	◄►	SE 1			
4	Press and while kee-ping button pressed set the required value, then release the button when the setting is done	→	SE.1 (blinking dot)	◄►	Press 5 times to change the value	SE.2 (blinking dot)
5	Press and Exit the menu	←				
VIII. TO DELETE CURRENT SET OF ADJUSTMENTS						
1	Perform steps 1-3 of the section VII		CL 1			
2	Press and while keeping button pressed delete the settings, then release the button	→	CL.1 (blinking dot)	◄►	Press 5 times to delete all settings	CL.1c
3	Press and Exit the menu	←				

ATTENTION! *While making changes in time schedule the numeration of the settings doesn't change so when viewing them on the display there will be shown all settings made (those that are valid and the deleted settings also).*

To set the time schedule for the **RN-16TM** it's recommended to prepare first such a table and then to preprogamm the device.

Event №	Turn **ON** №	Turn **ON** comments	Turn **OFF** №	Turn **OFF** comments

WIRING DIAGRAMMS



5 MAINTENANCE

5.1 SAFETY PRECAUTIONS

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

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

5.2. Maintenance of the product must be performed by qualified service personnel.

5.3 Recommended interval of maintenance is each 6 months.

5.4 ORDER OF MAINTENANCE

1) Check the connection reliability of the wires, if necessary, clamp with the force 0.4 Nm;

2) Visually check the integrity of the housing, in case of detection of cracks and damages to remove the product from service and send for repair;

3) If necessary, wipe with cloth the front panel and the product housing.

Do not use abrasives and solvents for cleaning.

6 WARRANTY AND CLAIMS CONDITIONS

6.1 Service life is 10 years.

6.2 Shelf life is 3 years.

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

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

ATTENTION! IF THE PRODUCT HAS BEEN OPERATED IN VIOLATION OF THE REQUIREMENTS OF THIS MANUAL, THE MANUFACTURER HAS THE RIGHT TO REFUSE IN WARRANTY SERVICE.

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

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

6.6. Before sending for repair, the product should be packed in the original or other packing 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.

7 QUALITY ASSURANCE NOTES

The RN-16TM multifunctional time delay relay has been manufactured and accepted in conformity with the requirements of current technical documentation, and is approved fit for operation.

Head of QCD Production date

Seal

_____ _____

8 NOTICES OF CLAIMS

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

Contact:
"Novatek-Electro" Ltd.
59, Admiral Lazarev str.,
Odessa, Ukraine, 65007
Tel:+38 048 738-00-28;
+38 0482 37-48-27;
Tel./fax: (0482) 34-36-73.
www.novatek-electro.com

Sale date_____