

## **POWER LIMITING RELAY OM-163**



## **OPERATING MANUAL**

*Quality control system on the development and production complies with requirements 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.

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



**WARNING! THE 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 INSTALLATION WORKS AND MAINTENANCE WITHOUT DISCONNECTING THE DEVICE FROM THE MAINS;**

**– TO OPEN AND REPAIR THE DEVICE WITHOUT ANY PROFESSIONAL HELP;**

**– TO OPERATE THE DEVICE WITH MECHANICAL DAMAGES OF THE HOUSING.**

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

**ATTENTION! THE DEVICE IS NOT INTENDED FOR THE LOAD COMMUTATION IN CASE OF SHORT CIRCUIT. THEREFORE THE DEVICE SHOULD BE OPERATED IN THE ELECTRICAL MAINS PROTECTED BY THE CIRCUIT BREAKER WITH INTERRUPTING CURRENT OF 63 A MAXIMUM OF CLASS B.**

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 in Operation of Electrical Installations;

Installation, adjustment and maintenance of the device must be performed by the skilled professionals having studied this Operation Manual.

The device is safe for use under keeping of the operating rules.

This Operation Manual is intended to familiarize you with the design, the requirements for safety, operation and maintenance procedures of the power limiting relay OM-163 (hereinafter referred to as the "device", OM-163).

**The device meets the requirements of the following:**

- IEC 60947-1, Low-voltage switchgear and controlgear; Part 1; General rules;
- IEC 60947-6-2, Low-voltage switchgear and controlgear; Part 6-2; Multiple function equipment; Control and protective switching devices;
- CISPR 11, Electromagnetic compatibility; Industrial, scientific and medical RF equipment; Electromagnetic interference characteristics; Limits and methods of measurements;
- IEC 61000-4-2, Electromagnetic compatibility; Part 4-2; Testing and measurement techniques; Electrostatic discharge immunity test.

Harmful substances in amounts exceeding maximum permissible concentrations are not available.

**Terms and abbreviations:**

- **controlled parameter** is the parameter selected by the user (total power, active power, reactive power, load current, mains voltage), in case of exceeding of which the device open contacts 1 - 3 (Fig. 1);
- **AR** is automatic reclosing delay time which is counted after opening contacts 1 - 3 (Fig. 1);
- **display** - three-digit seven-segment indicator;
- **ACB** is automatic circuit breaker.

**1. SERVICE**

**1.1. Device service**

OM-163 is designed to protect (disconnect) the equipment connected to it in the following cases:

- exceeding the threshold value of the controlled parameter;
- deviation of the mains voltage from the set values;
- excess of the temperature of the contact group (85 °C).

The ranges of measured and controlled parameters are given in Table 1.

**Table 1** – The ranges of measured and controlled parameters

| Description          | Controlled range | Measured range |
|----------------------|------------------|----------------|
| Total power, kVA     | 1 – 14           | 0 – 14         |
| Active power, kW     | 1 – 14           | 0 – 14         |
| Reactive power, kVAr | 1 – 14           | 0 – 14         |
| Load current, A      | 1 – 63           | 0.5 – 63       |
| Input voltage, V     | 160 – 280        | 120 – 350      |

OM-163 opens contacts 1 - 3, if the controlled parameter exceeds the limits set by the user.

The user sets the maximum power, off-delay time and AR time using the buttons (it. 2, 3, 4, Fig. 1).

OM-163 can be used as:

- power consumption limiting relay;
- voltage relay;
- digital multi-meter (indication of total, active, reactive power, current consumption and mains voltage).

OM-163 is powered by the circuit that feeds the load.

OM-163 displays the value of the parameters and the status of the relay using indicators.

**1.2. Controls and overall dimensions of OM-163**

Controls and overall dimensions are shown in Fig. 1.

**1.3. Operation conditions**

The device is intended for operation in the following conditions:

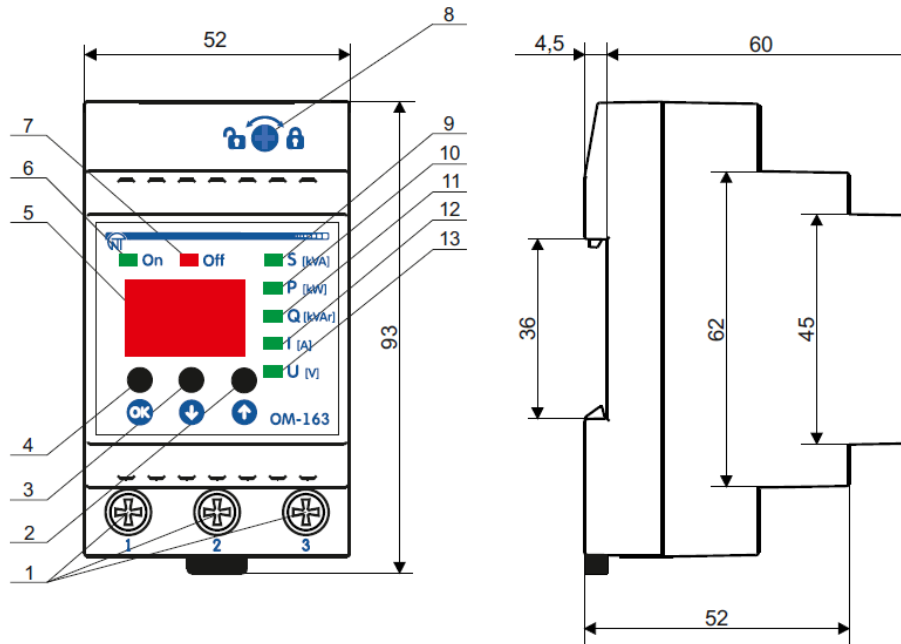
- Ambient temperature: from minus 35 to +55 °C;
- Atmospheric pressure: from 84 to 106.7 kPa;
- Relative humidity (at temperature of +25 °C): 30 ... 80 %.

*If the temperature of the device after transportation or storage differs from the ambient temperature at which it is supposed to be operated, then before connecting to the mains keep the device under the operating conditions within two hours (because of condensation may be on the device elements).*

**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 – terminals for connecting the device;
- 2 – button (UP) serves for navigation in the menu;
- 3 – button (DOWN) serves for navigation in the menu;
- 4 – button **OK** is used to enter the menu;
- 5 – seven-segment three-digit display (hereinafter referred to as the display);
- 6 – green LED **On**: it is on when the load relay is closed; it does not light up when the load relay is off; it flashes when the load off-delay time is counted;
- 7 – red LED **Off**: it is on when the device is operated in the **Fault** condition; it flashes when the load off-delay time is counted;
- 8 – switch for write protection;
- 9 – green LED **S [kVA]** is on when the display shows the total power value;
- 10 – green LED **P [kW]** is on when the display shows the active power value;
- 11 – green LED **Q [kVAr]** is on when the display shows the reactive power value;
- 12 – green LED **I [A]** is on when the display shows the actual value of load current;
- 13 – green LED **U [V]** is on when the display shows the value of the mains voltage.

Fig. 1 – Controls and overall dimensions of OM-163

## 2. TECHNICAL SPECIFICATIONS

The basic technical specifications are given in Table 2.

The load relay output contacts specifications are given in Table 3.

**Table 2** – The Basic Technical Specifications

| Description  | Value   |
|--|---------|
| AC single-phase operating supply voltage, V                          | 230/240 |
| Mains frequency, Hz  | 47 – 65 |
| Rated voltage of insulation, V                                       | 450     |
| Rated impulse withstand voltage, kV                                  | 2.5     |
| Accuracy of total power measurement, min., %                         | 5       |
| Accuracy of active power measurement, min., %                        | 5       |
| Accuracy of reactive power measurement, min., %                      | 5       |
| Accuracy of current measurement, min., %                             | 2.5     |
| Accuracy of voltage measurement in the range of 120 – 350 V, min., % | 2       |
| On-delay, min  | 1 – 600 |
| Off-delay, s   | 1 – 300 |
| Voltage on-delay, s  | 1 – 900 |
| Readiness time, max, s   | 0.8     |
| Maximum switched current with active load, A                         | 63      |
| Power consumption when load is not connected, max., W                | 3       |

|  |            |
|--|------------|
| Maximum voltage when maintaining serviceability (effective value), V   | 450        |
| Minimum voltage when maintaining serviceability (effective value), V   | 130        |
| Fixed off-delay due to $U_{max}$ , s   | 1          |
| Fixed off-delay due to $U_{min}$ , s   | 12         |
| Fixed time of response in case of voltage spike of more than 450 V and pulse duration reaching more than 1.5 ms, max., s                       | 0.05       |
| Fixed time of response when voltage reducing more than 60 V of set point for $U_{min}$ or when voltage reducing less than 145 V, s             | 0.12       |
| Fixed time of response in case of voltage spike of more than 30 V of set point for $U_{max}$ or in case of voltage spike of more than 285 V, s | 0.12       |
| Accuracy of determination of the voltage operation threshold, V  | 3          |
| Hysteresis of voltage, V   | 5          |
| Rated operating condition  | Continuous |
| Protection class rating of the device  | IP10       |
| Electric shock protection class  | II         |
| Climatic design version  | UHL 3.1    |
| Permissible contamination level  | II         |
| Overvoltage category   | II         |
| Conductor cross-section for connecting to terminals, mm <sup>2</sup>   | 0.5 – 16.0 |
| Tightening torque of the terminal screws, N*m  | 2±0.2      |
| Weight, max., kg   | 0.2        |
| Overall dimensions, HxBxL, mm  | 93x52x64.5 |
| Installation is on standard 35 mm DIN-rail   |            |
| The device remains operational capability in any position in space   |            |
| Housing material - self-extinguishing plastic  |            |
| <i>If the mains voltage is less than 120 V and more than 350 V, the voltage value measured by the device is not correct.</i>                   |            |

**Table 3** – Relay Output Contacts Specifications

| Description   | Value        |
|---|--------------|
| Max. current at voltage of ~220 V ( $\cos \varphi = 1$ ), A | 63           |
| Max. power when contacts are closed, kVA                    | 14           |
| Max. switching power ( $\cos \varphi = 0.4$ ), kVA          | 1.4          |
| Max. permissible AC voltage, V                              | 250          |
| Service life:   |              |
| – mechanical, min., time;                                   | 500 thousand |
| – electrical, min., time;                                   | 10 thousand  |

### 3. THE INTENDED USE

#### 3.1. Preparation for operation

##### 3.1.1. Preparation for connection:

- Unpack the device (we recommend to keep the original packing for the entire warranty period of the device operation);
- 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 Operation Manual.

##### 3.1.2. Device connection

**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 cross-section of the wire for connecting the protected equipment depends on the current (power) of the load, and should be: for current of 40 A (9 kW) - no less than 6 mm<sup>2</sup>; for current of 63 A (14 kW) - no less than 10 mm<sup>2</sup>. The wire ends 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.

If necessary, it is allowed using the wire with cross-section of 0.5-1 mm<sup>2</sup> for connecting the power supply of the device (terminal 2 in Fig. 1).

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

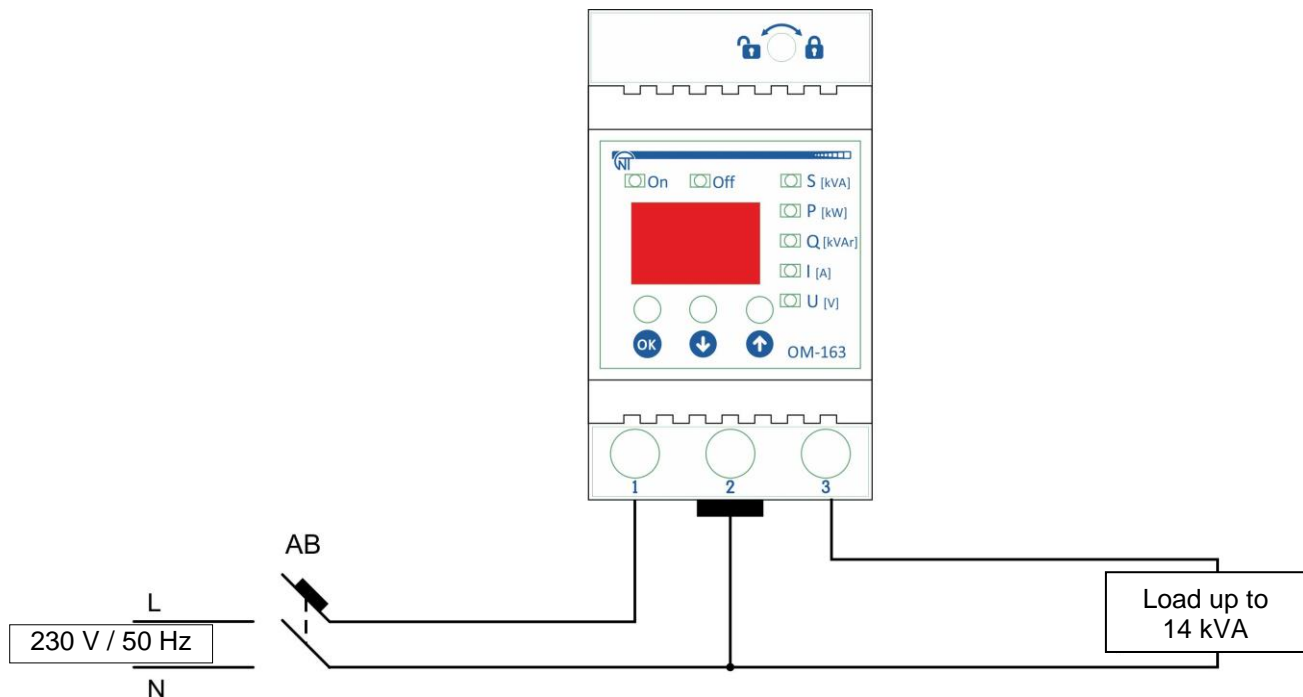
**For a reliable contact, tighten the terminal screws with the force indicated in Table 2.**

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.

**3.1.2.1.** Disable the supply voltage using the automatic circuit breaker (ACB).

**3.1.2.2.** Connect the device according to the diagram shown in Fig. 2.

**3.1.2.3.** Check that the connection is correct according to the diagram shown in Fig. 2.



**Fig. 2 – Device connection diagram**

**3.1.2.4.** Turn on ACB to supply power to OM-163.

After connecting the device to the mains, the display will briefly display "5tA" (LED **On** is off, LED **Off** is on), then it will display AR voltage delay time countdown.






After the completion of AR voltage delay time, if the value of the mains voltage is within the limits set by the user, the device closes the contacts 1 - 3 (Fig. 1), the LED **On** will light up, the LED **Off** will off.

The display shows the measured parameter that was selected in the settings (parameter "d 5", Table 4), and the corresponding LED will light (it. 9 – 13, Fig.1).

*If the "Voltage protection" parameter (parameter "UPr", Table 4) is disabled and the voltage value of the mains is within the limits of 160 V to 280 V, after the finishing the AR voltage delay time, the device closes contacts 1 to 3; the On LED will on, the Off LED will turn off.*

**3.1.2.5.** If the factory settings (Table 4) do not satisfy the user's requirements, they can be changed, following it. 3.1.3.











**3.1.3.** Before changing the parameters, it is necessary to do the following:

- Set the "write-protection" switch (it. 8, Fig. 1) to position "🔒" (after the settings are completed, set the "write-protection" switch to position "🔓");
- Press and hold the button  for 3 seconds to enter the main menu;
- Release the button , the display will show the password entry field (the inscription "000") with the flashing highest order digit;
- Using the buttons  or  set the value of the password high-order digit and briefly press the button  to go to the next digit. Similarly, enter the middle and lower digits of the password. If the password is entered




correctly, the first menu item will appear on the display (parameter “PrL”, Table 4). If the password was entered incorrectly, the device will enter the "Normal operation" condition.

**The default password is “123”.**

To change any of the parameters, it is necessary to do the following:


- Using the buttons  or  move to the desired parameter and select it by briefly pressing the button . The device enters the "Settings" condition (menu items are described in Table 4);
- Using the buttons  or  change the value of the selected parameter. When editing the parameter with briefly pressing the buttons:  – the parameter value will be increased by one,  – the parameter value will be decreased by one. During the change of the numerical parameters, with long holding of the buttons  or  the values will change every 0.5 s:
  - in the range from 1 to 60 - in increments of one;
  - in the range from 60 to 100 - in increments of five;
  - in the range of 100 or more - in increments of twenty.
- to save the parameter value, briefly press the button , in this case the device will go to the main menu;



- to go from the main menu to the "Normal Operation" condition, press and hold the button  for 3 s.
- To change the password it is required to do the following:

- go to the menu item “PAS”;
- Using the buttons  and  set the required value of the high-order digit of the password and briefly press the button . Similarly set the middle and lower order digits of the password. After entering the value in the low-order digit of the password, the device will store the password and exit to the main menu.

If no buttons were pressed for 30 seconds, the device will enter the "Normal Operation" condition automatically, but when you will subsequently enter the menu, the device will go to the parameter that was active before the exit.

**Notes:**

- If the password value is “000”, the password will not be requested when entering the menu;
- If the "write protection" switch is set to the position , the parameters cannot be changed; only reading is available. The exceptions are “d.5” and “d.1” parameters, which are available for change at any position of the "write-protection" switch.

**3.1.4.** To reset the parameters to the factory settings, it is required to set the “write-protection” switch to the position , disconnect the device from the mains and, while holding down the button , turn on the device (the password will be set to the value “123”).

**Table 4 – Settings for OM-163**

| Menu items and their symbols on the display |                           | Adjustable parameter and range of values  | Default settings |
|---|---------------------------|---|------------------|
| PrL   | Controlled parameter      | <ul style="list-style-type: none"> <li>– «5» – Total power;</li> <li>– «P» – Active power;</li> <li>– «Q» – Reactive power;</li> <li>– «L» – Load current.</li> </ul> | 5                |
| Pou   | Power                     | Values from 1 to 14 kW (kVA, kVAr).   | 1                |
| LUr   | Current                   | Values from 1 to 63 A.  | 5                |
| doF   | Load off-delay time       | Values from 1 to 300 s.   | 1                |
| don   | AR delay time             | Values from 1 to 580 min.<br>If the value is more than 580 min - AR is prohibited “oFF”   | 1                |
| UPr   | Voltage protection        | <ul style="list-style-type: none"> <li>– «on» – protection is enabled;</li> <li>– «oFF» – protection is disabled.</li> </ul>  | on               |
| UrL   | Minimum voltage threshold | Values from 160 to 220 V.   | 195              |

|            |                             |  |            |
|------------|-----------------------------|--|------------|
| <b>UrH</b> | Maximum voltage threshold   | Values from 230 to 280 V.  | <b>245</b> |
| <b>Udo</b> | AR voltage delay time       | Values from 1 to 900 s.  | <b>15</b>  |
| <b>d15</b> | Default displayed parameter | <ul style="list-style-type: none"> <li>– «<b>dS</b>» – Total power;</li> <li>– «<b>dP</b>» – Active power;</li> <li>– «<b>dQ</b>» – Reactive power;</li> <li>– «<b>dI</b>» – Consumption current;</li> <li>– «<b>dU</b>» – Mains voltage.</li> </ul>   | <b>dS</b>  |
| <b>d1d</b> | Parameter display mode      | <ul style="list-style-type: none"> <li>– «<b>Ln0</b>» – the parameter value is displayed continuously;</li> <li>– «<b>d10</b>» – the parameter value is displayed for 15 s (then the default setting is displayed);</li> <li>– «<b>LYL</b>» – continuous cyclic displaying of parameter values.</li> </ul> | <b>Ln0</b> |
| <b>PR5</b> | Password setting            | Permitted values from 000 to 999   | <b>123</b> |

### 3.2. The device use

#### 3.2.1. Operating condition

The device can be in one of the following conditions:

- "Normal operation";
- "Parameter setting";
- "Fault".

The device is in the "Normal operation" condition if:

- the controlled parameter does not exceed the value set by the user;
- AR time countdown has been completed.

The parameter values are changed (Table 4) in the "Parameter settings" condition.

In the "Fault" condition: at the time of the fault, the device opens contacts 1 to 3 (the **On** LED is off, the **Off** LED lights up continuously).

#### 3.2.2. The device operation

##### 3.2.2.1. Power and current control

If the value of the controlled parameter is exceeded (menu item "**PrL**", Table 4), the off-delay time countdown begins (parameter "**daF**", Table 4). At the same time, the LED **Off** (it. 7, Fig. 1) and LED **On** (it. 6, Fig. 1) are flashing alternately.

After completion of the off-delay time countdown (if the controlled parameter has not accepted value up to this moment):

- Contacts 1 – 3 are opened;
- LED **On** goes out;
- LED **Off** goes out;
- The display shows the AR time in minutes and one of the LEDs blinks (it. 9-13, Fig. 1), corresponding to the parameter, over which the protection has tripped.

If the AR countdown relative to power or current is inhibited (parameter "**don**", value "**oFF**", Table 4), the device does not turn on the load, the display will show "**oFF**". To turn on the load, you should turn off the OM-163 power and turn it on again, or set the AR time (parameter "**don**", Table 4) as 580 min or less.

**Note:** when selecting the controlled parameter (menu item "**PrL**", Table 4) the other parameters of this item are not controlled.

##### 3.2.2.2. Voltage control

If the mains voltage exceeds the thresholds set by the user (parameter "**UrL**" or "**UrH**", Table 4), the load off-delay time countdown begins (fixed off-delay, Table 2). At the same time, the LED **Off** (it. 7, Fig. 1) and LED **On** (it. 6, Fig. 1) are flashing alternately. After completion of the off-delay time countdown (if the voltage has not accepted value up to this moment):

- Contacts 1 – 3 are opened;
- LED **On** goes out;
- the display alternately shows the voltage AR time in seconds and the actual value of the mains voltage, the LED **Off** lights up continuously (it. 7, Fig. 1). At the same time, when the AR time relative to voltage is displayed, the dot in the low-order display is on and the indicator (it. 13, Fig. 1) does not light, and when the voltage value is displayed, the indicator (it. 13, Fig. 1) lights up.

After the AR time countdown relative to voltage is over, the contacts 1 - 3 are closed, if the mains voltage value is acceptable (the LED **On** lights up, the LED **Off** goes off).



If the voltage protection has been tripped by the upper voltage threshold, contacts 1 to 3 will close when the voltage drops to the value  $U_{rH}$  minus the hysteresis value. If the voltage protection has been tripped by the lower voltage threshold, then the load relay contacts will close when the voltage rises to the  $U_{rL}$  plus hysteresis value. The device will go to the "**Normal operation**" condition.

If the voltage protection (parameter  $UP_r$ , Table 4) is disabled, when the voltage drops below 120 V, the device opens contacts 1 to 3, the LED **Off** lights up, the LED **On** goes off and the AR delay time countdown relative to voltage is started. After the AR delay time has finished, the device closes contacts 1 to 3 if the mains voltage is more than 165 V. If the mains voltage exceeds 280 V, the device will open contacts 1 to 3, the LED **Off** will on, the LED **On** light will turn off and the AR delay time countdown relative to voltage will begin. After the countdown has finished, the device closes contacts 1 - 3 if the mains voltage is less than 275 V.

When the supply voltage is disconnected, the device opens contacts 1 to 3.

**Note:**

*If the overheating protection of the contact group is activated (temperature above 85°C), contacts 1 - 3 open and further operation of the device is blocked. The display will show "ErP", the LED **Off** will light up; all the other LEDs will be off. To resume the device operation, you should disconnect the device from the mains, and then re-enable it.*

## 4. MAINTENANCE

### 4.1. Safety precautions



**THE DEVICE INTERNAL ELEMENTS CONTAINS POTENTIALLY LETHAL VOLTAGE. DURING MAINTENANCE IT IS NECESSARY TO DISABLE THE DEVICE AND CONNECTED DEVICES FROM THE MAINS.**

### 4.2. Recommended frequency of maintenance is every six months.

### 4.3. 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 housing of the device with cloth.

**Do not use abrasives and solvents for cleaning.**

## 5. SERVICE LIFE AND MANUFACTURER WARRANTY

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

**5.2.** Shelf life is 3 years.

**5.3.** 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 IN VIOLATION OF THE REQUIREMENTS OF THIS OPERATION MANUAL, THE MANUFACTURER HAS THE RIGHT TO REFUSE IN WARRANTY SERVICE.**

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

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

**5.6.** 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.**

## 6. 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 %.

## 7. ACCEPTANCE CERTIFICATE

OM-163 has been manufactured and accepted in accordance with the requirements of current technical documentation and classified as fit for operation.