

Extra burden resistors set for instrument transformers



**POWER SYSTEM PROTECTION
EQUIPMENT**

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1. MANUFACTURER COMMENTS

1.1. General safety rules

**WARNING!**

During normal operation of the device, some of its parts are under hazardous voltage. Inappropriate or improper use of the device can pose a danger to persons serving, also leads to damage of the device.

1.2. List of applied standards

The device described in this manual has been designed and manufactured for industrial purposes. In the process of development and production, compliance with the standards has been assumed, the fulfillment of which ensures the implementation of the assumed principles and safety measures, provided that the user complies with the installation and startup and operating instructions.

This device complies with the essential requirements of the Low Voltage Directive (2014/35/UE) and the Electromagnetic Compatibility Directive (2014/30 / EU), in compliance with the following standards:

- **PN-EN 60664-1:2011** Insulation coordination for equipment within low-voltage systems - Part 1: Principles, requirements and tests
- **PN-EN 61010-1:2011** Safety requirements for electrical equipment for measurement, control, and laboratory use -- Part 1: General requirements



Related standards:

- **PN-EN 140200-2002** Sectional Specification: Fixed power resistors

1.3. Storage and transport

The devices are packed in individual packages to protect them from damage during transport and storage. Equipment should be stored in transport packs, indoors, free of vibration and direct atmospheric, dry, airy, free from harmful vapors and gases. Ambient air temperature should not be below -20 ° C and above + 70 ° C and relative humidity should not exceed 80%.

1.4. Place of installation

Resistors are able to operate in outdoor metering cabinets of IP 40 or higher. The equipment should work in areas free of water, dust and gases and explosive, flammable and chemically active gases where the mechanical exposure is moderate. Installation height should not exceed 2000 m above sea level at an ambient temperature of -5 ° C to + 40 ° C and relative humidity not exceeding 80%. The device terminal marked with the PE symbol should be connected to ground potential. It is recommended to use stranded wire of cross section min. 2,5 mm² and insulation strenght min. 500 V with a lenght of no more than 3 m.

1.5. Device documentation

The device comes with:

- Operating manual
- Test protocol
- Warranty Card

1.6. Disposal

The device has been manufactured mostly from materials that can be recycled or disposed of without endangering the environment. A recalled device may be recaptured for re-processing, provided that its condition corresponds to normal wear and tear. All components that are not regenerated will be removed in an environmentally friendly manner. The device should be disposed of in accordance with local law or passed on to an electronic waste disposal company.

1.7. Warranty and service

The warranty period is 24 months from the date of sale, unless a longer period agreed in the contract or the sales contract.

The warranty covers free of charge removal of defects revealed during use, under the conditions specified in the warranty card.

ZEG-ENERGETYKA SP. Z O.O. gives a guarantee subject to the following conditions:

- the installation and operation of the device should be in accordance with that manual
- the seal on the device's housing must not be affected
- no corrections or changes can be made to the warranty card

THE WARRANTY DOES NOT COVER

- defects caused in result of inappropriate transport or storage conditions
- defects caused in result of inappropriate installation or operation of the device
- defects caused in result of tampering within the unit, structural modifications, alterations and repairs carried out without the consent of the manufacturer

BUYER TIPS:

- Proper and trouble-free operation of the device requires proper transport, storage, mounting and commissioning, as well as proper operation, maintenance and service.
- The equipment must be handled by properly trained and qualified personnel
- When complaining, please state the reason for the complaint (symptoms related to malfunction) and factory serial number
- After receiving of the complaint confirmation, send the complaint device with the warranty card to the manufacturer's address
- The warranty period is extended by the time of successful complaint settle

1.8. How to order

The order should specify the full name of the device and all the necessary parameters:

- type and version of the device
- RDZ-3 {parameters}

Example of order:

- RDZ-3 x 2000R – 50W

1.9. Manufacturers data

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2. TECHNICAL DESCRIPTION

2.1. Application

Modern energy meters characterises very low burden of measuring inputs. On the other hand current or voltage transformer works properly if its secondary winding burden lays between 25 - 100% of its rated output. In case of old type transformers the situation of not enough burden can occur. Burden resistors RDZ-3 are installed in order to add extra load of secondary winding of current or voltage transformer. The RDZ-3 resistors can be also applied in order to eliminate ferro-resonance phenomena.

2.2. Construction

Particular resistive components of RDZ-3 resistors set are made in thick-film technology which allows to reduce inductance. Resistors are very reliable, they withstand high temperature conditions and pulse loads. Load resistors set contains three resistors (for three phase network) enclosed in special purpose casing with lock for industrial purposes and possibility of sealing. The resistors are connected to measuring circuit with terminal block type UK5 TWIN of Phoenix Contact. The terminal can be configured for Y or delta connection. The access to terminal block is possible by breaking the seal placed in the door lock. The value of resistors on demand of individual order. Dimensional drawing are presented on fig. 2, 3, 4.

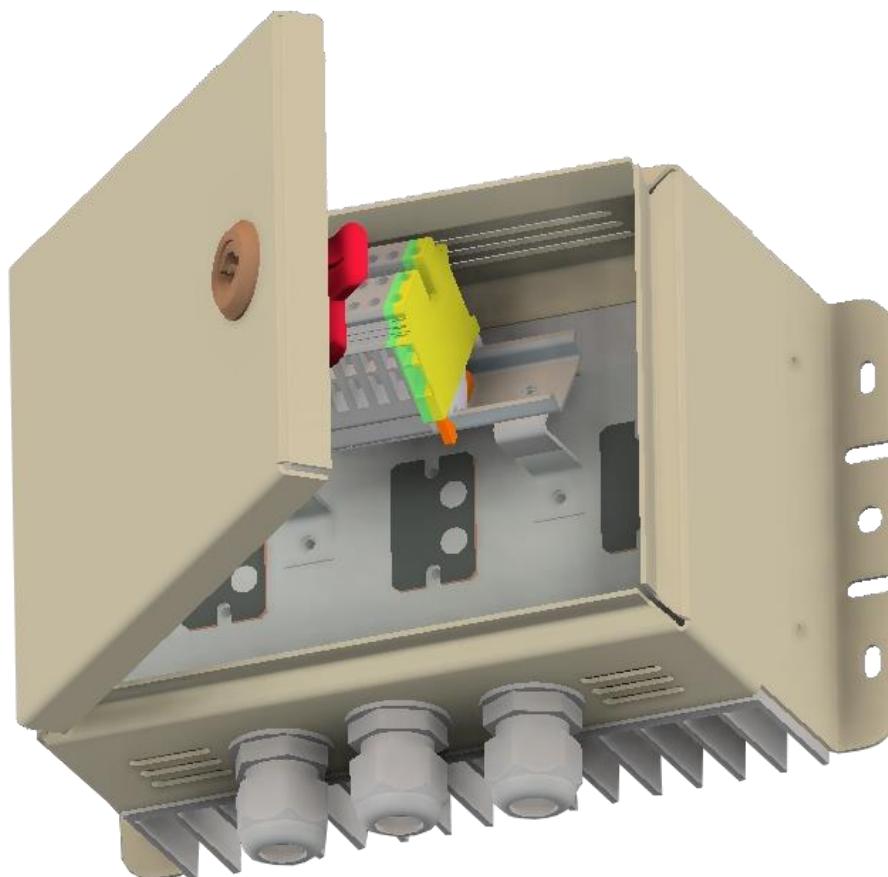


Fig. 1. Enclosure is equipped with lock with possibility of sealing

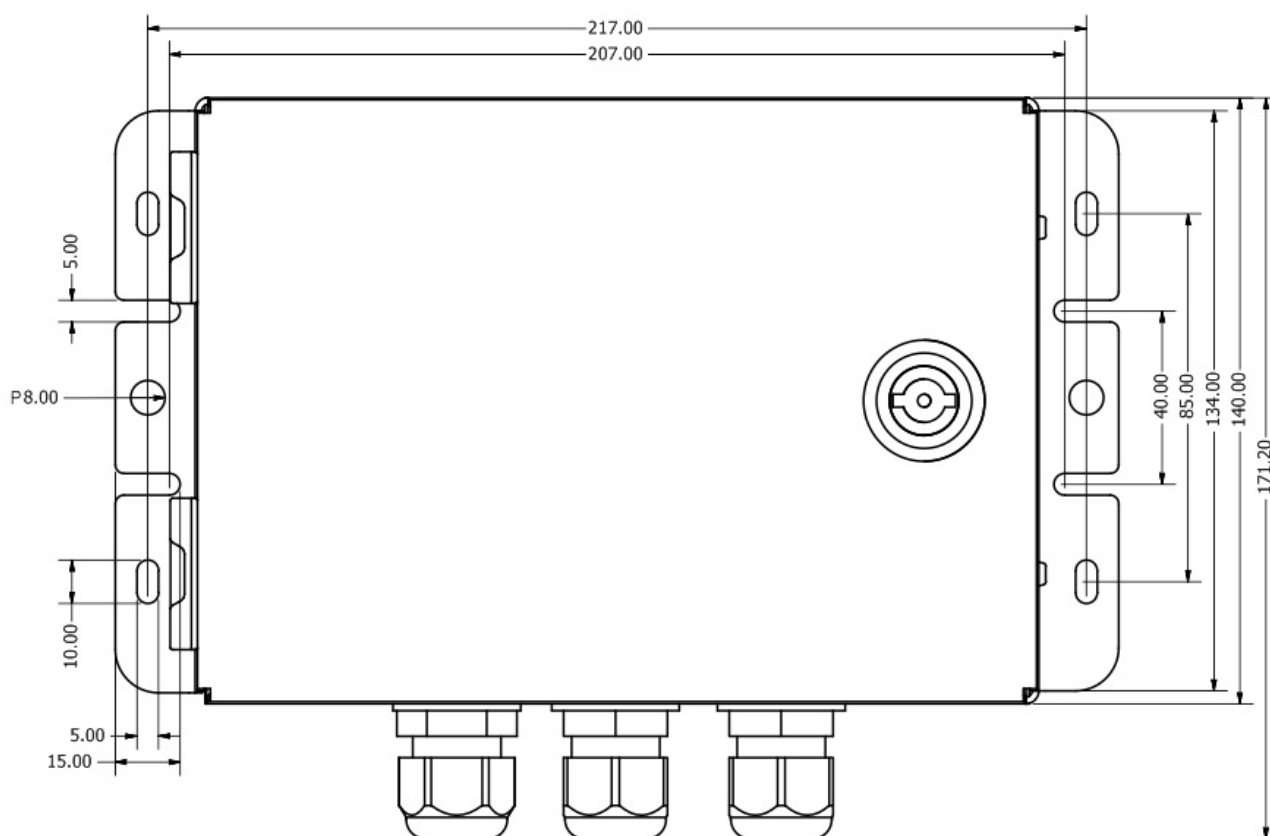


Fig. 2. Dimensional drawing of mountg holes arrangement

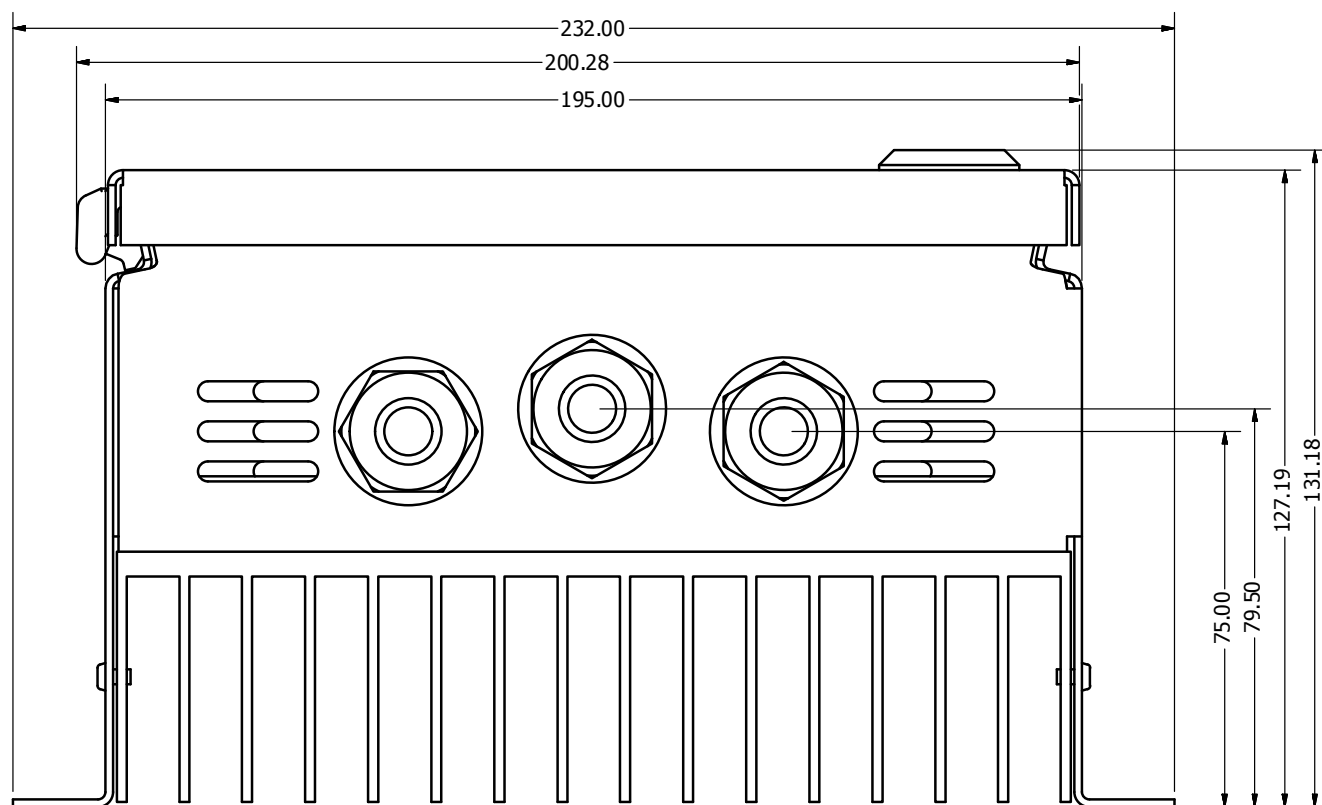


Fig. 3. RDZ-3 resistors set – bottom view

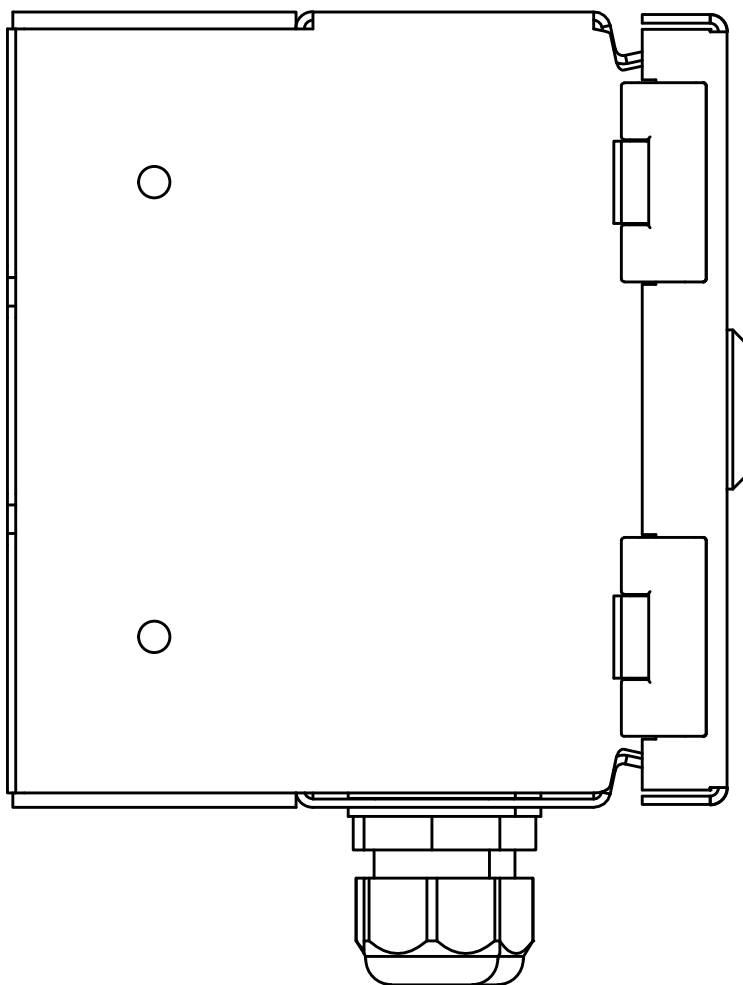


Fig. 4. RDZ-3 Resistors set – side view

2.3. Electrical diagram of resistors set

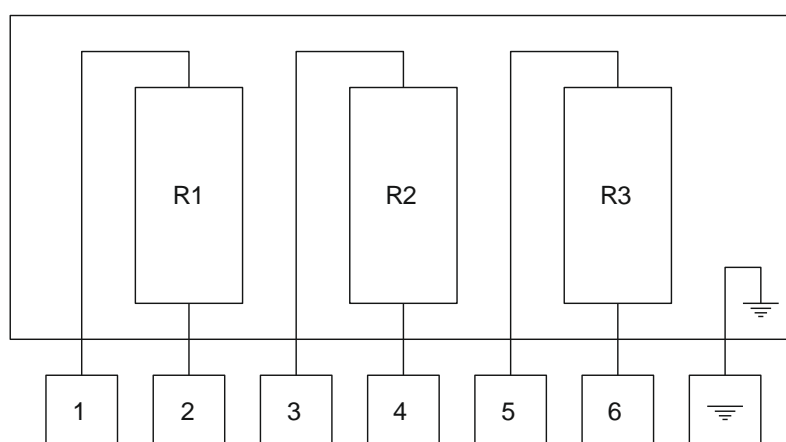


Fig. 5. Electrical diagram of RDZ-3 resistors set

2.4. Example values of resistors

Table 1. Example values of resistors dedicated to voltage transformers

Burden added by resistors set dedicated to potential transformers of nominal voltage $3 \times 100/\sqrt{3}$		
Resistance value	Burden added by resistors	
	Y connection	Delta connection
3 x 5 k Ω	3 x 0,67 W	3 x 2,00 W
3 x 2 k Ω	3 x 1,68 W	3 x 5,00 W
3 x 1,2 k Ω	3 x 2,77 W	3 x 8,33 W
3 x 1 k Ω	3 x 3,36 W	3 x 10,0 W
3 x 670 Ω	3 x 5,00 W	3 x 14,9 W
3 x 400 Ω	3 x 8,40 W	3 x 25,0 W
3 x 240 Ω	3 x 14,0 W	3 x 41,7 W
3 x 100 Ω	3 x 33,6 W	3 x 100 W

Table 2. Example values of resistors dedicated to 1 A current transformers

Burden added by resistors set dedicated to current transformers of nominal current 3×1 A	
Resistance value	Burden added by resistors
3 x 1 Ω	3 x 1 W
3 x 5 Ω	3 x 5 W
3 x 10 Ω	3 x 10 W
3 x 20 Ω	3 x 20 W

Table 3. Example values of resistors dedicated to 5 A current transformers

Burden added by resistors set dedicated to current transformers of nominal current 3×5 A	
Resistance value	Burden added by resistors
3 x 0,5 Ω	3 x 12,5 W
3 x 0,2 Ω	3 x 5,0 W
3 x 0,1 Ω	3 x 2,5 W

3. TECHNICAL DATA

Table 4. Technical details

Resistance value	specified by the order
Power rating	3 x 50 W
Tolerance	5%
Temperature coefficient	100 ppm/°C
Insulation resistance	>100 MΩ
Electric strenght	2,5kV (50Hz 1 min.)
Continous withstand	2 x In lub 2 x Un
Dimensions (width x height x depth)	195 x 140 x 132
Weight	3 Kg
Ambient temperature <ul style="list-style-type: none">• operating• storage	-40 ÷ 85 °C -10 ÷ 40 °C
Relative humidity	<80%

4. FUNCTIONALITY

Extra load resistors characterises wide range of application such as:

- ferro-resonance phenomena elimination in MV networks
- adding extra burden of voltage transformers
- adding extra burden of current transformers

5. INSTALLATION AND COMMISSIONING

5.1. Storage and preparation resistors set for operation

RDZ-3 resistors set is delivered to the user in packages to ensure protection against external influences that could cause damage. Therefore, do not unpack them for storage. Transport packages should be transported and reloaded with care, avoiding shocks and maintaining the position specified on their packaging. Storage is possible in indoors, dry (relative humidity <80%), free of corrosive vapors at -20 °C to +70 °C.

5.2. Operation and maintenance

During routine tests of resistors set, its correct operation should be checked by using clamp meter. Routine tests should be carried out at least once a year.

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