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# *Transformer temperature control device RTT 15.*


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### *1. Introduction.*

Electronic device RTT-15 is ment to control temperature of dry and resin transformers equipped with PTC or NTC sensors.

### *2. Use.*

Device is able to control maximum three temperature thresholds. The relay with switching contacts is applied as the device's outputs for each temperature threshold. The fourth relay works as the time relay, which switches on with 5 sec. delay after power turning on.

### *3. Technical data.*

| | |
|---|---|
| Supply voltage: | 42-240VAC or 42-240VDC |
| Max. power consuption: | 6 VA |
| Number of inputs: | 3 (max. 3 PTC or NTC sensors can be serial connected to each-series connection, total nominal resistance lower than 1 kΩ) and timer |
| Nominal threshold resistance: | 1 kΩ |
| Delay to turn off track D (t1) | 5 sec. |
| Delay to turn on track D (t2) | min. 0,2 sec. |
| Number of outputs: | 4 switching contacts |
| Maximum switch voltage: | 400V AC |
| Maximum switch power: | 2kVA |
| Maximum switch current: | 250V AC/8A |
| Ambient temperature (operation): | -25 to 55°C |
| Ambient temperature (storage): | -25 to 80°C |
| Protection: | Automatic disconnection of supply |
| Dielectric strenght | > 2,5 kV, 50Hz , 1minute |
| Protection: | IP 56 |
| Width: | 160 mm +24 mm (cable glands) |
| Length: | 188 mm |
| Height: | 106 mm |
| Weight: | 0,5 kg |
| Cable glands: | 3xPG11/M20 |

**Individual change the descriptions on the front panel strictly according to customer requirements (data provided on request)**

### *4. Instalation.*

The system should be installed mechanically to the base, by means of M4 or M5 screws, through the holes in the bottom part of housing (see Fig. 2). Set the configuration jumpers on PCB, according to the description below. Connect protective earth, power supply, and the sensors. Connect output's contacts in a needed way. The system does not require adjustment and can operate in any position. Section of the cable that can be connected to terminals cannot be larger than 2.5 $mm^2$. It is recommended to use a line of 1 $mm^2$ or 1.5 $mm^2$ section. No regulation or conservation is required by the device. System does not require maintenance.

### *5. Construction.*

Maximum three sensors with 1kΩ nominal resistance can be connected to the device's inputs. Each sensor is tested in a bridge configuration, by its own comparator with hysteresis. Comparator activates or disables the corresponding actuator. Actuators are RM96P relays.

Channel D is attached after 5 seconds after power-on system. Used in the device switching mode power supply allows the correct operation of the power supply voltage in the range 42-240V DC / AC without any switching.

The solution implemented in the system is reserved. External connection diagram is shown in figure inside the casing and below.

### *6. Programming.*

To set the type of work (mode) RTT-15 serve two jumpers placed on switches Z1 and Z2 (Fig.1).

Z1 and Z2 switches allow you to configure the type of work (mode PTC or mode NTC). The following combinations are possible:

- ***for PTC sensors:***

The Z1 and Z2 switches are short connected. Relays are switched off when temperature is correct. The relays are switched on when temperature is too high. In this position system does not control the temperature in the absence of power supply.

The Z1:1 is short connected with Z2:1 and Z1:2 with Z2:2. Relays are switched on when temperature is correct. The relays are switched off when temperature is too high. In the absence of power this combination causes the relay pass in the state such as the over-temperature, which protects the transformer in case of power failure.

- ***for NTC sensors:***

The Z1 and Z2 switches are short connected. Relays are switched on when temperature is correct. The relays are switched off when temperature is too high. In the absence of power this combination causes the relay pass in the state such as the over-temperature, which protects the transformer in case of power failure.

The Z1:1 is short connected with Z2:1 and Z1:2 with Z2:2. Relays are switched off when temperature is correct. The relays are switched on when temperature is too high. In this position system does not control the temperature in the absence of power supply.

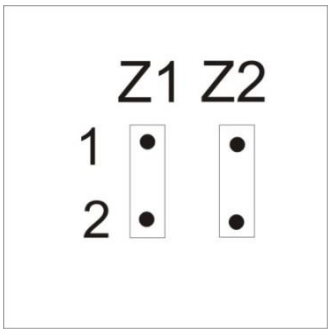


**Fig. 1** – Configuration connector (jumpers) Z1-Z2.

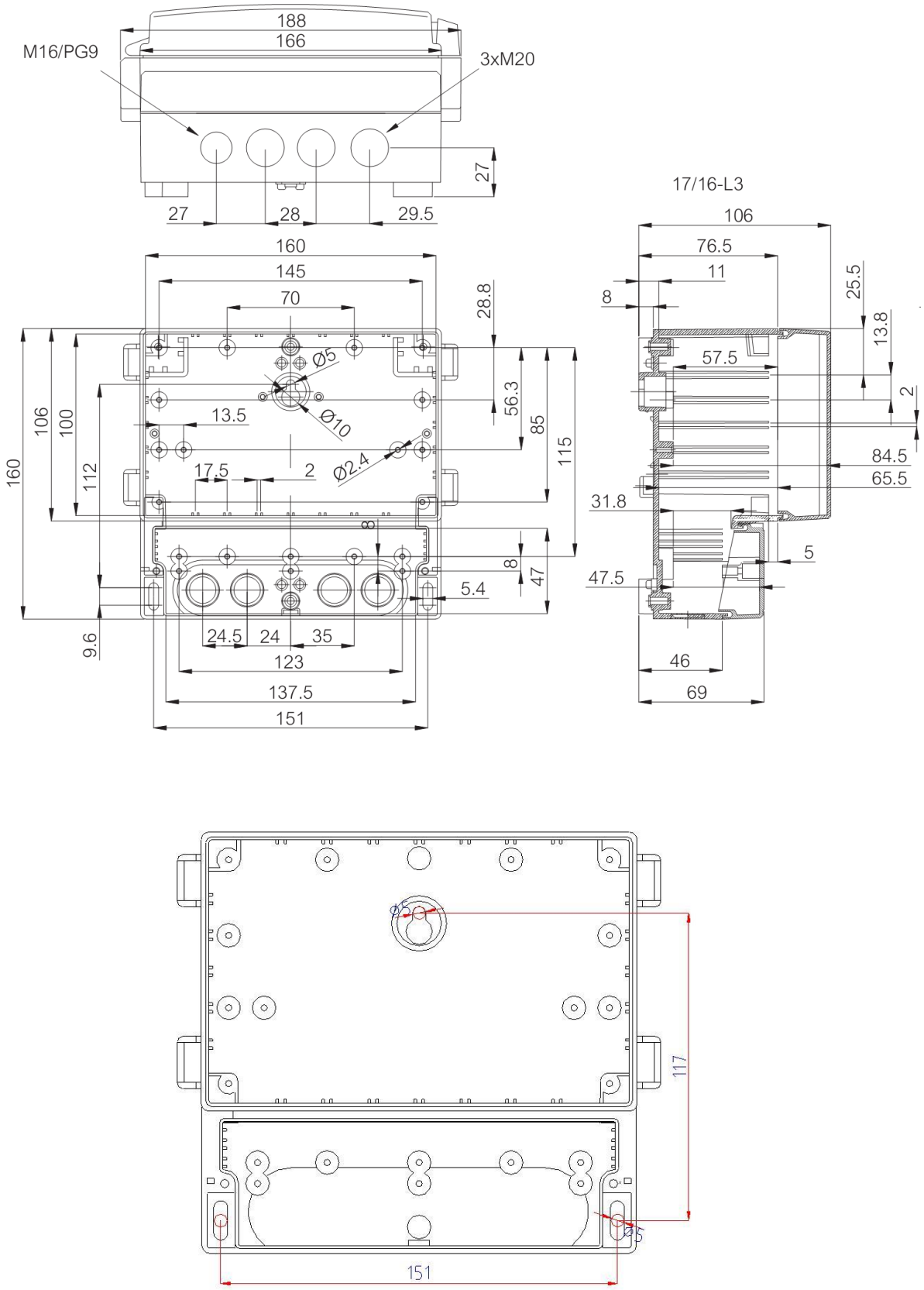


**Fig. 2** – Housing dimensions of RTT-15

## *7. Failures.*

- The relays do not switch on , although the sensors work correctly:

- check  supply voltage - lamp Power should be lit on,

- check if the jumpers are properly installed on the system encoding, if the symptom persists, consult the manufacturer. These symptoms may occur if the system has been destroyed or blocked power supply. This may be an instance of high potentials between the sensors or the appearance of a supply voltage of a series of voltage pulses with an energy that allows the internal blown fuses or protective varistor (eg, lightning).

- The system switches by connecting the sensors on the outside and does not work on the transformer:

- check for proper connection of sensors and their resistance.

In case of problems please contact: hitin@hitin.pl

**Connection example that causes turn off transformer after power loss.**

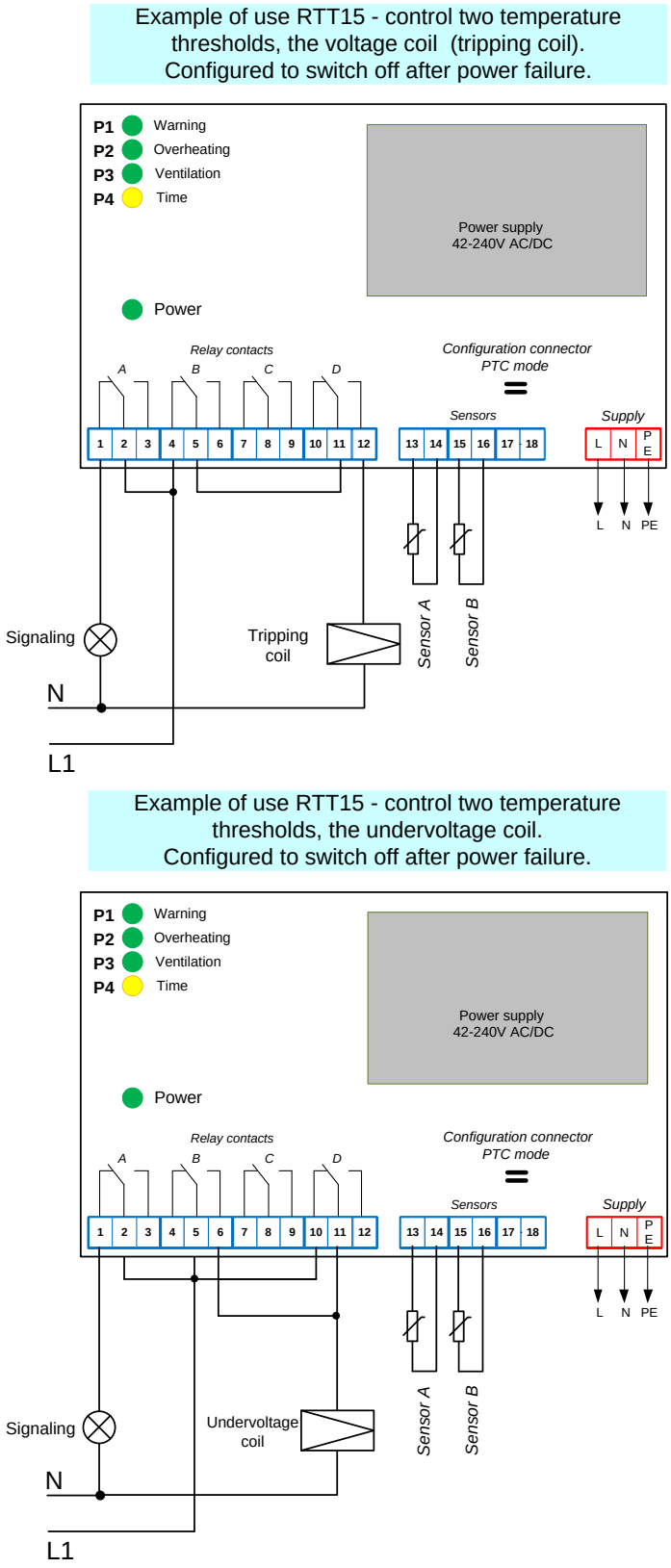


**Fig. 3** – Examples of the use of RTT-15 equipped with two PTC temperature sensors.
(turn off transformer after power loss)

All the contacts shown in de-energized position.
1. The jumpers must be set to PTC.
2. Signaling and the breaker coil connected as shown (Fig.3).

## Connection example that doesn't cause turn off transformer after power loss.

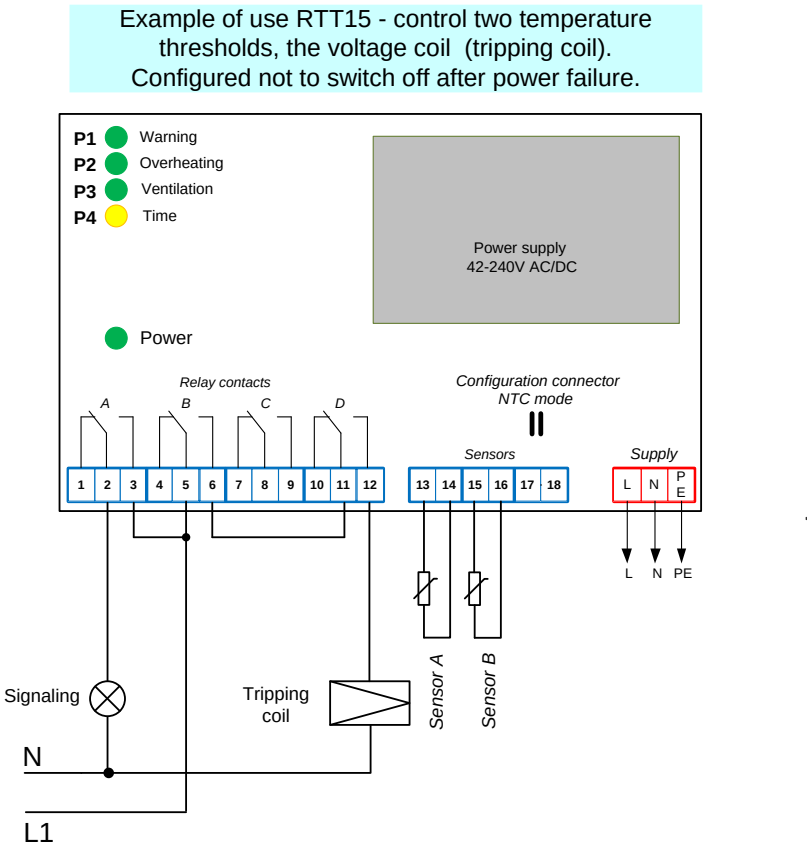


**Fig. 4** – Example of the use of RTT-15 equipped with two PTC temperature sensors. (not to turn off transformer after power loss)

1. The jumpers must be set to NTC.
2. Signaling and the breaker coil connected as shown (Fig.4).

# Sensors PTC

PTC sensors (Positive Temperature Coefficient) characterized by the a very large resistance change to temperature variations around nominal temperature value ($T_{REF}$).
The nominal temperature value are based on the construction and is not adjustable (see the chart below). This sudden increase of resistance is detected by the temperature control system of RTT device.

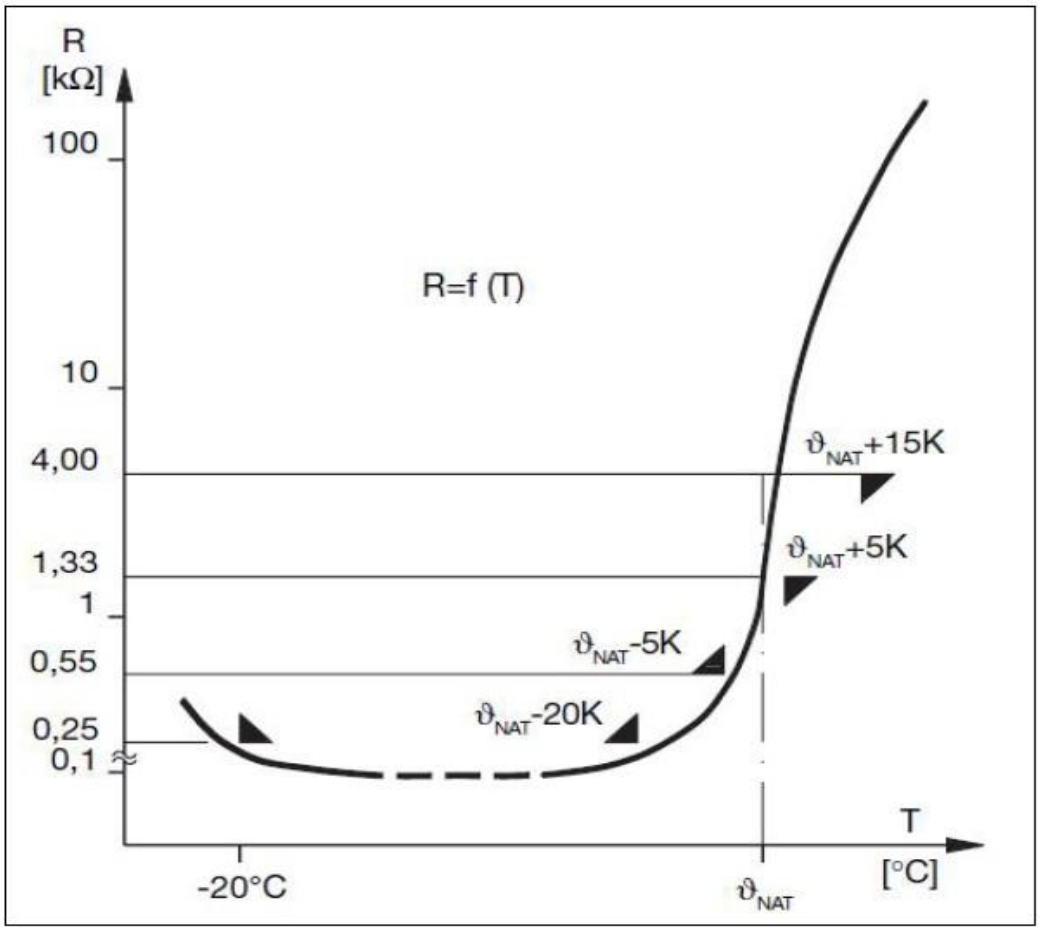


Fig. 1 - Sensor characteristics of PTC

Color-coded markings (60-190°C) standard type sensors PTC shows the table below . The color code is compatible with DIN 44081/44082.

| 60 | 70 | 80 | 90 | 100 | 105 | 110 | 115 | 120 | 125 | 130 |
|---|---|---|---|---|---|---|---|---|---|---|
| white | white | white | green | red | blue | brown | blue | grey | red | blue |
| grey | brown | white | green | red | grey | brown | green | grey | green | blue |

| 135 | 140 | 145 | 150 | 155 | 160 | 165 | 170 | 180 | 190 |
|---|---|---|---|---|---|---|---|---|---|
| red | white | white | black | blue | blue | blue | white | white | black |
| brown | blue | black | black | black | red | brown | green | red | brown |

Fig. 2 – Mark sensor PTC color code in DIN 44081/44082.