

## INSTRUCTION MANUAL

### 1. DESCRIPTION

The digital temperature relay TR-42 has been created as accessory of primary importance for resin or air insulated three-phase MT transformer, as protection against dangerous over temperatures on the insulating coil on the winding and to manage the intervention of cooling fans. Temperature is detected by 3 or 4 thermal detectors PT 100 DIN 43760, three of them dislocated inside the transformer coils and the fourth in the core.

#### Features:

<ul style="list-style-type: none"><li>- Display of the actual temperature of the 4 RTD</li><li>- Display &amp; storage of the highest temperature of each RTD</li><li>- 3 programmable output contacts from 0° to 220°C level 1, level 2 and FAN control.</li><li>- Automatic and manual fan mode</li></ul>	<ul style="list-style-type: none"><li>- Alarm of TR-42 failure or PT100 disconnection.</li><li>- Automatic fan start every week. (bearings problems)</li><li>- Insulated RS-485 communication port (Model TR-42C1 only), modbus RTU protocol.</li></ul>
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### 2. INSTALLATION

Install the equipment according the characteristics of humidity and temperature that has been designed to work in. To avoid noise pickup and interference the relay should be placed away from high current conductors or sources of strong magnetic fields.. The TR-42 has been designed for the installation on a panel board with a cutout of 92x92 mm using the fixing accessories that come with the relay. Before doing the installation, it is recommended to disconnect the power supply on the working area and qualified technician must do the installation. Orion Italia recommend to follow security procedures during this installation.

### 3. WIRING CONNECTION

For the connection, follow the diagram (see on page 4). Here in after the description of the different electric connections :

#### 3.1 POWER SUPPLY

The power supply range is: 24-240 Vcc/Vca (50 – 60Hz), -15%, +10% and power must be connected between the terminals 40 and 42.

**NOTE:** The TR-42 does not have internal fuses. This is in order to allow the selection of the desired external protection.

**IMPORTANT:** Before doing the dielectric strength test of panel board, where the TR-42 relay is installed, is necessary to disconnect it from the power line voltage.

#### 3.2 SENSORS CONNECTION

Each sensor Pt100 has one white wire and two red ones according to the UNI 7937 normative.

- Sensor cables should be made with shielded twisted pairs and the shield should be connected to the system's ground.
- In order to compensate the resistance of the wire is necessary to connect each sensor with three (3) wires of the same section (at least 1 mm<sup>2</sup>).
- The probes wiring should be placed away from high current conductors, high tension and from inductive elements such as remote control switch , etc. If the wires travel on the same route as the power lines, separate the wires with suitable elements.

#### 3.3 OUTPUT CONTACTS CONNECTIONS

In the back side of the TR-42 is possible to see the output contacts (in absence of power supply).

The ALARM relays (L1), trip relay (L2) and fan control (FAN) activate only when temperature reach the setpoint. The FAULT relay (FAULT) activate when power supply is connected and it will be inactive when internal failure occurs, failure of the RTD or failure to the power supply. The FAN contact can be used as a control of the cooling system.

**NOTE:** Using the contacts for control of inductive loads in Vac (coils of relays, contactors, solenoids), is necessary to limit the over current, or place a R/C group in parallel to the inductor. If it works in DC, a diode in anti-parallel should be connected. The internal relays are isolated 4 kV between contact and coil.

#### 3.4 SERIAL COMMUNICATION CONNECTIONS (Type TR-42C1 only)

Communication capabilities are available in the TR-42 connecting the RS-485 port in a network (up to 32 devices) controlled by a supervisor device (PC). The protocol used is Modbus RTU. The connections have to be made with shielded twisted wires.

### 4. FUNCTIONS AND SIGNALS

**DISPLAY:** On the display "TEMPERATURE °C" (3 digits) you can observe the value of the temperature and program the settings; through the display "SENSOR" (1 digit) you can see the corresponding Pt Channel.

**LED "SET/PROG":** If "on" indicates that the user is viewing the SET mode. If "flashing" means that the user is in the PROGRAM mode.

**LED " °C MAX" :** If "on" indicates that the user is in the °C MAX mode.

**LED "L1, L2":** If "on", the temperature of one RTD reach the corresponding L1 or L2 programmed threshold and the corresponding relay is active.

**LED “FAN”** : If “ON” the “always ON” mode is active and the FAN relay will be always active. If “Blinking”, the temperature of one RTD reach the corresponding FAN programmed threshold or the weekly fan activation function is active and the FAN relay is active.

**LED “In1, In2, In3, In4”**: If “on”, the temperature of one of the corresponding RTD reach the L1 or L2 programmed threshold and the corresponding relay is active. If “flashing”, the respective RTD is in fault.

**LED “FAULT”**: If “flashing”, will indicate that the flashing “In1, In2, In3, In4”, is in fault. The fault cause will be showed through the °C display when positioned with the arrow buttons on the faulty sensor: ”Fcc” in case of short circuit and “Fco” for open circuit.

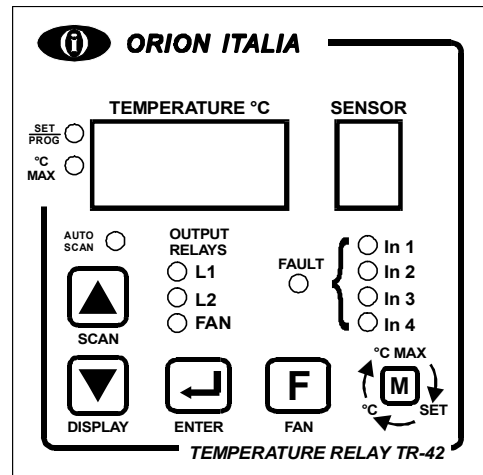
**DISPLAY BUTTON**: If pressed on the first position in any mode will execute a test to the display and leds. It is also used for changing views or for selecting programming values.

**SCAN BUTTON**: If pressed for 2 seconds in any mode the TR-42 will scan between each RTD temperature showing it on the display every 5 sec allowing the user to see all the temperatures automatically. To exit from the “**auto scan**” function, press any arrow button.

**FAN BUTTON**: it allows to switch between “always ON” or Automatic Fan Operation. In “always ON” mode, the Fan will be always ON and the led FAN will be ON.

In automatic mode, the Fan will be ON and the fan led will Blink when one RTD reach the corresponding FAN programmed threshold; the Fan and the fan led will be OFF when temperature does not reach the corresponding FAN programmed threshold.

**LED “AUTO SCAN”**: If “on” means the user is in the AUTO SCAN mode.



## 5. FUNCTIONS & PROGRAMMING

Each time the TR-42 is powered, a control is been made inside, turning on all leds and displays for about 2 seconds. Once this operation is over, the TR-42 begins to function automatically in the °C mode. The TR-42 relay has four (4) main functions:

### 5.1 °C MODE

In this mode the user will see the actual temperature on the “°C” display and the RTD input number on the “SENSOR” display. To see the other RTD, press the UP/DOWN buttons. The SET/PROG and °C MAX leds are “off”.

### 5.2 °C MAX MODE

Pressing once the “M” button the user enters in this mode. The user will see the maximum temperature reached on the “°C” display and the RTD input number on the “SENSOR” display. To see the other RTD press the UP/DOWN buttons. By pressing the “ENTER” button for 2 seconds the last maximum temperature of the visualized RTD is cleared, and taking the next °C reading as the maximum reading. The °C MAX led is “on”, and the SET/PROG is “off”.

### 5.3 SET MODE

Pressing once the “M” button in the °C MAX MODE the user enters in the SETTING MODE. The user can “only see” the TR-42 settings. To see the settings press the UP/DOWN buttons. The SET/PROG led is “on”. To get back to the °C mode press the “M” button once.

### 5.4 PROGRAMMING MODE

In this mode the user can modify the TR-42 settings by pressing the “PROG” button located in the back side of the TR-42. At this point the SET/PROG led will be flashing.

**Note:** It is possible to exit from this mode by pressing the “M” button without saving the modifications. If no operations are made for 20 seconds, the TR-42 returns to °C mode.

1. On the display °C appears the word “Pro”. Press “ENTER”.
2. On the display °C appears the word “Pt” and on the display SENSOR appears the number of Pt connected (3 or 4 Pt). Select the number of RTD connected.
3. In this setting, by UP/DOWN buttons, select the L1 value (Range: 0 to 220°C). At this temperature the L1 contact will close.
4. In this setting select the L2 value, (Range: 0 to 220°C). At this temperature the L2 contact will close.
5. If a fan is connected to the TR-42 select “on”, otherwise select “off”. If you choose “off” the programming procedure finishes.
6. In this setting select the temperature when the FAN contact is “off” (Range: 0 to 220°C). On the SENSOR display will appear “L”.
7. In this setting select the temperature when the FAN contact is “on” (Range: 0 to 220°C). On the SENSOR display will appear “H”.

Once inside this mode, repeat this steps:

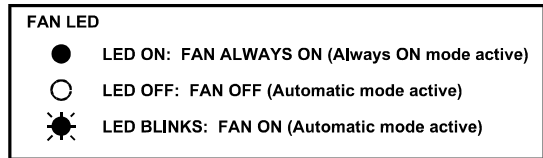
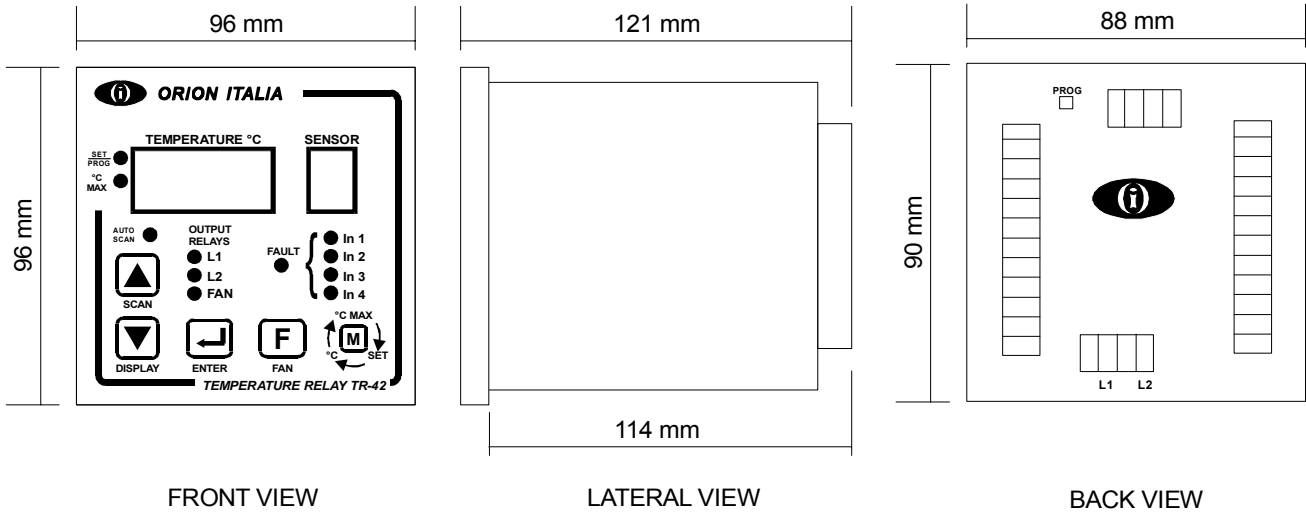
- STEP 1:** use the direction buttons to set the desired value.  
**STEP 2:** press the “ENTER” button for the next setting.

**Note:** The setting mode will not allow **L1 > L2**  
When programming if L2 or L1 < actual temperature of any RTD the L1 led will be flashing.

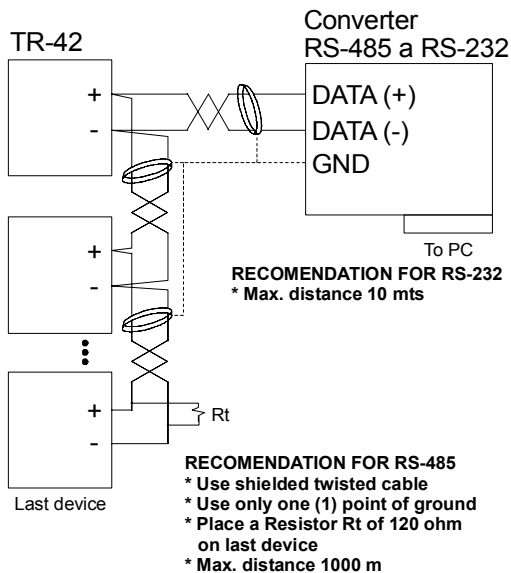
**Note:** The setting mode will not allow **L > H**



DIMENSIONS



COMMUNICATION WIRING (TR-42C1 only)



ELECTRICAL WIRING

