



# M48I

## ANALOGUE TEMPERATURE CONTROLLER



## OPERATING INSTRUCTIONS

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### PREFACE



This manual contains the information necessary for the product to be installed correctly and also instructions for its maintenance and use; we therefore recommend that the utmost attention is paid to the following instructions and to save it.

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Whenever a failure or a malfunction of the device may cause dangerous situations for persons, thing or animals, please remember that the plant has to be equipped with additional electromechanical devices which will guarantee safety.

## 1. INSTRUMENT DESCRIPTION

**M48I** is a family of analogue instruments, versatile and easy to use. The options (type of input, operating temperature range, action and control mode) must be selected when ordering. It works with an input signal from thermocouple (type J or K) or PT100 resistance thermometer. The process temperature is controlled by a relay output. The control mode is **ON/OFF** or **Proportional Derivative (PD)** type.

## 1.1 Front panel pescription



1. Knob for setting the Set Point;
2. **LED ON**: indicates that the instrument is powered;
3. **LED OUT**: Indicates that the control output is ON (energized).

## 2. OPERATION

### 2.1 Mode of operation

The M48I has 2 distinct control modes:

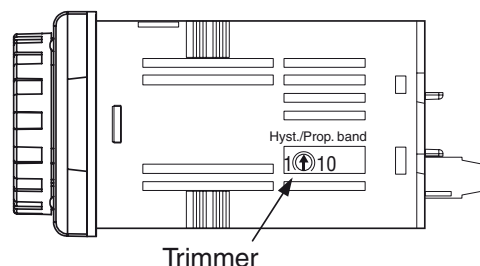
– **ON/OFF**;

– **Proportional derivative**.

The control mode cannot be changed because, like other instrument features, (input, temperature scale, cooling/heat-ing action), it was selected when ordering.

By means of a trimmer located on the right side (looking at the instrument panel), the following characteristics can be changed:

- The **hysteresis** (if the purchased instrument has ON/OFF control mode);
- The **proportional band** (if the purchased instrument has Proportional Derivative control mode).



### 2.2 Set Point setting

To adjust the Set Point of the temperature controller, simply turn the knob and position the orange arrow on the desired temperature value.

### 2.3 ON/OFF Control

**ON/OFF** control operates in **Asymmetrical** mode with **hys-teresis** selectable using the **side trimmer** from a **minimum** of 1°C to a **maximum** of 10°C.

### 2.4 Proportional (P) control

PD control operates in **Asymmetrical** mode with a **propor-tional band** selectable using the **side trimmer** from a **mini-mum** of 1% to a **maximum** of 10% of the full scale, with a **manual Reset** equal to 1/5 of the proportional band, a **derivative time** of 20 s and **cycle time** of 20 s.

### 3. USAGE WARNINGS

#### 3.1 Admitted use



The instrument has been projected and manufactured as a measuring and control device to be used according to EN60730-1 at altitudes operation below 2000 m.

Using the instrument for applications not expressly permitted by the above mentioned rule must adopt all the necessary protective measures. The instrument **MUST NOT BE USED** in dangerous environments (flammable or explosive) without adequate protections. The installer must ensure that the EMC rules are respected, also after the instrument installation, if necessary using proper filters.

### 4. INSTALLATION WARNINGS

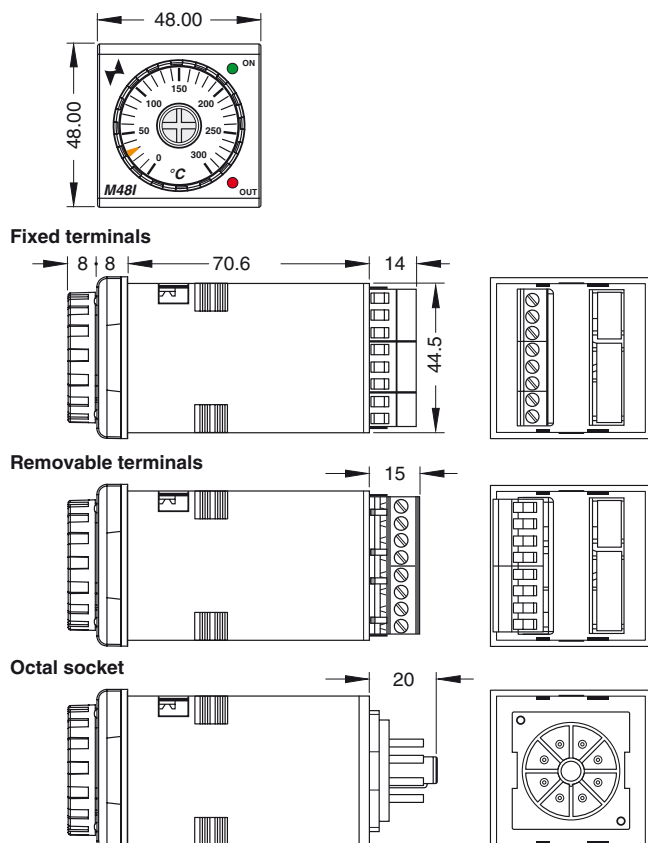
#### 4.1 Mechanical mounting

The instrument, in DIN case 48 x 48 mm, is designed for flush-in panel mounting. Make a hole 45 x 45 mm and insert the instrument, fixing it with the provided special bracket. To obtain the declared front protection degree, the optional gasket must be mounted.

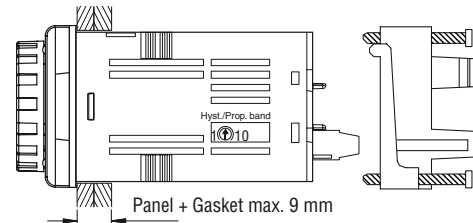
- Avoid installing the instrument in places where high humidity can generate condensation or where dirt could lead to the introduction of conductive substances into the instrument.
- Ensure the adequate ventilation to the instrument and avoid the installation within boxes where are placed devices which may overheat or have, as a consequence, the instrument functioning at temperature higher than allowed and declared.
- Connect the instrument as far as possible from source of electromagnetic disturbances so as motors, power relays, relays, electrovalves, etc..

#### 4.2 Dimensions [mm]

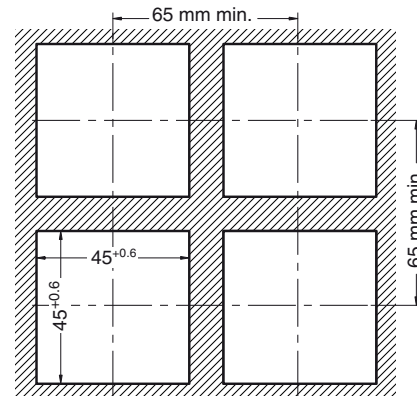
##### 4.2.1 Controller



##### 4.2.2 Mounting bracket



##### 4.2.3 Panel cutout



#### 4.3 Electrical connections

Carry out the electrical wiring by connecting only one wire to each terminal, according to the following diagram, checking that the power supply is the same as that indicated on the instrument and that the load current absorption is no higher than the maximum electricity current permitted. As the instrument is built-in equipment with permanent connection inside housing, it is not equipped with switches or internal devices to protect it against current overloads: the installation must include an **overload protection** and a **two-phase circuit-breaker**, placed as near as possible to the instrument, located in a position that can easily be reached by the user and marked as instrument disconnecting device which interrupts the power supply to the equipment. Further recommendations:

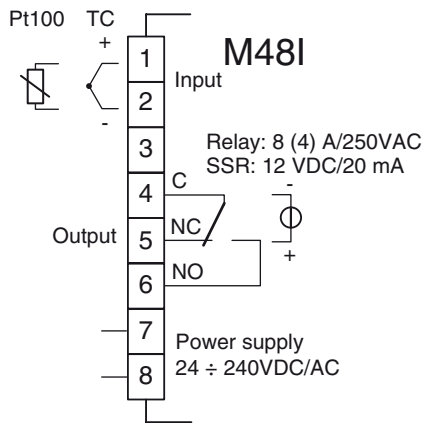
- The supply of all the electrical circuits connected to the instrument must be properly protected using devices (ex. fuses) proportionate to the circulating currents;
- Use cables with proper insulation, according to the working voltages and temperatures;
- Make sure that the input sensor cables are kept separate from line voltage wiring in order to avoid induction of electromagnetic disturbances;
- If some cables are shielded, the protection shield must be connected to ground at only one side;



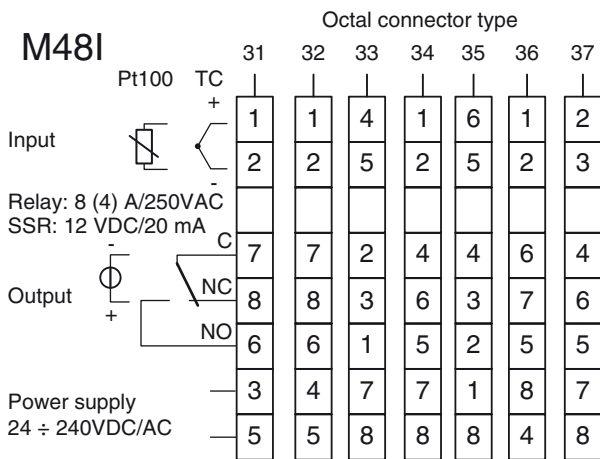
**Before connecting the outputs to the actuators**, check that the parameters set are the desired ones and the application works correctly in order to avoid malfunctions in the plant that could cause damage to people, things or animals.

4.3.1 Electrical wiring diagram

Screw type terminal models



Models with octal socket

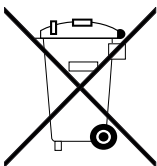


5. MAINTENANCE AND WARRANTY

5.1 Cleaning

We recommend cleaning of the instrument only with a slightly wet cloth using water and not abrasive cleaners or solvents.

5.2 Disposal



The appliance (or the product) must be disposed of separately in compliance with the local standards in force on waste disposal.

6. WARRANTY AND REPAIRS

The instrument is under warranty against manufacturing flaws or faulty material, that are found within 18 months from delivery date. The warranty is limited to repairs or to the replacement of the instrument. The eventual opening of the housing, the violation of the instrument or the improper use and installation of the product will bring about the immediate withdrawal of the warranty effects. In the event of a faulty instrument, either within the period of warranty, or further to its expiry, please contact our sales department to obtain authorisation for sending the instrument to our company. The faulty product must be shipped to Ascon Tecnologic with a detailed description of the faults found, without any fees or charge for Ascon Tecnologic, except in the event of alternative agreements.

7. TECHNICAL DATA

7.1 Electrical characteristics

- Power supply:** 24 ÷ 240 VAC/VDC ±10%;
- AC frequency:** 50/60 Hz;
- Power consumption:** About 3 VA;
- Temperature input:** J/K thermocouple or Pt100 2 wire resistance thermometer (selectable when ordering);
- Temperature ranges:** 0 ÷ 100°C (J, K, Pt100),  
0 ÷ 200°C (J, K, Pt100),  
0 ÷ 250°C (J, K, Pt100),  
0 ÷ 300°C (J, K, Pt100),  
0 ÷ 350°C (J, K, Pt100),  
0 ÷ 600°C (J, K, Pt100),  
0 ÷ 800°C (J, K),  
0 ÷ 1000°C (K),  
0 ÷ 1100°C (K),  
0 ÷ 1200°C (K);
- Precision:** 2% of the range;
- Output:** 1 SPDT relay output 8 (3) A @250 VAC cosφ = 1 or 12 VDC/20 mA output for SSR drive;
- Relay output Electrical life:** 100000 operations;
- Action:** Type 1.B (EN 60730-1);
- Action type:** Selectable when ordering: Heating or Cooling;
- Control action:** Selectable when ordering: ON/OFF or Proportional Derivative;
- Overvoltage category:** II;
- Protection class:** Class II;
- Insulation:** Reinforced insulation between low voltage parts (supply and relay output) and front panel; Reinforced insulation between the low voltage section (supply and relay output) and the extra low voltage section (inputs), Reinforced between power supply and relay outputs, No insulation between input and output for SSR.
- 7.2 Mechanical characteristics**
- Housing:** Self-extinguishing plastic, UL 94 V0;
- Protection degree:** IP65 (with optional gasket) for indoor use according to EN 60070-1 standard;
- Terminals protection:** IP20 according to EN 60070-1 standard;
- Installation:** Front panel mounting;
- Dimensions:** 48 x 48 mm, depth 70.6 mm +14, +15, +20 mm (1.77 x 1.77 x 2.78 in. +0.55, +0.59, +0.79 in.) according to the terminal block or socket used;
- Mounting:** Incorporated flush in panel in a 45(+0.6) x 45(+0.6) mm [1.78(+0.023) x 1.78(+0.023) in.];
- Weight:** About 150 g;
- Pollution degree:** 2;
- Operating temperature:** 0 ÷ 50°C;
- Operating humidity:** 35 ÷ 65 RH% with no condensation;
- Storage temperature:** -10 ÷ +60°C.

7.3 Functional features

**Temperature Control:** ON/OFF or Proportional-Derivative mode;  
**ON/OFF control hysteresis:** Adjustable by trimmer 1 ÷ 10°C;  
**Proportional band:** Adjustable by trimmer 1 ÷ 10% f.s.;  
**Manual Reset (Proportional Band Offset):** 1/5 of the Proportional Band;  
**Derivative time:** 20 seconds;  
**PD regulation cycle time:** 20 seconds;  
**Total Accuracy:** ±(5% f.s.);  
**Compliance:** LV Directive 2014/35/EU (EN 61010-1);  
EMC Directive 2014/30/EU (EN 61326).

8. HOW TO ORDER

Model	
M48I	= Controller 48 x 48 mm
A = Power supply	
U	= 24 ÷ 240 VAC/VDC
B = Temperature input type	
J	= J (FE-CO)
K	= K (CR-AL)
P	= Pt100
C = Output type	
R	= Relay SPDT 8A @ 250 VCA (resistive load)
T	= 12 VDC/20 mA to drive an SSR
D = Full scale temperature	
1	0 ÷ 100°C (J, K, Pt100)
2	0 ÷ 200°C (J, K, Pt100)
3	0 ÷ 350°C (J, K, Pt100)
4	0 ÷ 600°C (J, K, Pt100)
5	0 ÷ 800°C (J, K)
6	0 ÷ 1000°C (K)
7	0 ÷ 1200°C (K)
8	0 ÷ 250°C (J, K, Pt100)
9	0 ÷ 1100°C (K)
E	0 ÷ 300°C (J, K, Pt100)
E = Control action	
O	= ON/OFF
P	= Proportional
F = Action	
H	= Heating
C	= Cooling
G = Connection type	
V-	= Screw terminals not removable (std.)
E-	= Removable screw terminals
N-	= Removable terminals (fixed part only)
31	= OCTAL 31 (TC)
32	= OCTAL 32 (Pt100)
33	= OCTAL 33 (TC)
34	= OCTAL 34 (TC)
35	= OCTAL 35 (TC)
36	= OCTAL 36 (TC)
37	= OCTAL 37 (Pt100)