

## MTR/MHR MTC/MHC 4

### 1 INTRODUCTION

This multi-task controller features particular flexibility, making it suitable for various applications. Using the vast set of parameters you can obtain the best control on heating (humidification) or refrigeration (dehumidification) plants or on the combination of both. To get best performance, before installing and using it, read this instruction sheet carefully.

**1a** Two outputs are available which are controlled by a microprocessor according to the pre-selected functioning mode and the relative parameters programmed in SETUP.

The four functioning modes are:

**MODE tv^ (MTR/MHR):** one output refrigeration (dehumidification) controller allowing programming of the switch Off (L1) and the switch On (L2) temperature.

**MODE iHS (MTR/MHR):** one output controller allowing programming of the switch Off value (L1) and of the hysteresis (HY1).

**MODE i2L (MTC/MHC../3):** two output controller allowing programming of the main (L1) and of the auxiliary limit (L2).

**MODE i2S (MTC/MHC../4):** two output controller allowing programming of the main limit (L1) and of the relative gap (dt).

**1b** The display, during the basic functioning shows the variable measured by the probe but, when programming, is used to indicate the values chosen for the control parameters and their respective symbols, useful to simplify understanding.

The parameters are shown and set by using the four keys on front.

### 2 INSTALLATION

**2a** To secure the instrument to the wall, remove the locking screw and rotate the cover from the bottom upwards. In this way you have access to the 4 fastening holes located on the angles of the enclosure.

**2b** For proper functioning the instrument needs an ambient temperature between  $-10^{\circ}\dots+50^{\circ}\text{C}$  and 15%...80% relative Humidity. To improve protection of the probe against electro-magnetic interference, which might compromise its function, place its cable and the controller away from power lines.

**CAUTION:** the internal parts of the instrument, when it's connected to the mains, are subjected to high voltage. Contact with them may be fatal to the operator to the instrument.

**2c** Outputs, power supply and probe must be connected strictly following the diagram indicated on the internal label. The probe screen must not be connected to any other leads. As to the maximum load that can be controlled by the output and supply voltage, refer to the maximum value on the label.

**2d** Should the instrument be recalibrated, in consequence of probe replacement or considerable cable lengthening, then proceed as follows: use an accurate thermometer, make sure that the two probes are at the same temperature, immersing them in a liquid if necessary. By means of a screwdriver turn the trimmer located near the transformer. In case of humidity probe replacement, **MHR/MHC** does not need any recalibration. If it's necessary to recalibrate the humidity probe, then consult relevant instruction sheet.

**CAUTION!:**

- If the relays switch large loads frequently, we suggest you contact us to obtain information about the relay contact life.
- Where delicate or valuable products have to be maintained in special conditions, the same instrument should not be used for both control and limit functions. In such cases a separate instrument for each function is recommended.

### 3 FUNCTIONING DESCRIPTION

In the following description reference is made to HEATING (HUMIDIFICATION) or REFRIGERATION (DEHUMIDIFICATION) control to express a different way of controlling the outputs.

In both cases the set point is the On to Off switch point but, in refrigeration (dehumidification) control, values lower than this will confirm the Off status, while in heating (humidification) control they will cause the output to switch On.

**3a** Keys  $\uparrow$  and  $\downarrow$ . After having displayed the parameter to be changed with key  $\leftarrow$  or  $\rightarrow$ , press key  $\uparrow$  briefly to increase the value by one unit or key  $\downarrow$  to decrease it. Keeping it pressed results in a progressively faster variation. The minimum and maximum programmable limits are selected in SETUP; to modify them proceed as per **4a** and subsequent.

**3b** Key  $\text{L}$ . By pressing it during the basic functioning, "L1" is displayed for 2 sec., followed by the pre-programmed value. L1 is the limit which, once reached by the input, causes the output RL1 to switch from On to Off.

Key  $\text{L}$ , if pressed when programming a parameter, allows its immediate storage with subsequent controller switchover to control function. The same sequence takes place automatically if no key is pressed within 6 sec.

**3c** Key  $\text{R}$ . It allows to display the second control parameter which, according to the functioning mode, is:

**MODE tv^:** "L2" appears on display followed by RL1 output switch On temperature. Since this mode is dedicated to refrigeration (dehumidification), the minimum programmable value will always be higher than limit L1.

Ex.: L1 =  $-05^{\circ}\text{C}$ ; L2 =  $-03^{\circ}\text{C}$

**MODE iHS:** "HY1" appears on display followed by the switching hysteresis, positive for refrigeration (dehumidification) control, negative for heating (humidification). The hysteresis represents the difference between the switch On and the switch Off value.

Ex.: L1 =  $+25^{\circ}\text{C}$ ; HY1 =  $-03^{\circ}\text{K}$

If programmed in this way, RL1 will carry out heating control; it will switch Off at a temperature of  $+25^{\circ}\text{C}$  and switch On at  $+22^{\circ}\text{C}$ .

**MODE t2L:** "L2" appears on display followed by the On-Off threshold of RL2 output. Since L2 is the auxiliary set point, its programmable limits are conditioned by the value programmed for L1 and the respective control actions.

This bond is useful to avoid control zone overlap. In other words, assuming that RL1 has been programmed for heating (humidification) control (neg. HY1) and RL2 for refrigeration (dehumidification) (pos. HY2), L2 will have a minimum programmable limit equal to L1 value. By inverting the respective signs of hysteresis HY1 and HY2, L1 will be considered the maximum value which can be programmed for L2.

Ex.: L1 = +18°C; HY1 = -02° K; L2 = +20°C; HY2 = +03° K

With these parameters RL1 will be switched Off at +18°C and switched On again at +16°C; RL2 will be Off at +20°C and On at +23°C. L2 minimum programmable value will be +18°C, equal to L1.

**MODE t2S:** "dt" appears on display followed by the difference between the On-Off switch point of RL2 and RL1 output. Since this is a relative gap, RL2 will change its switch point as a result of the variations of L1.

This functioning mode is the best solution for "neutral zone", two step control or if you have to set an alarm threshold above or below set point.

Ex.: L1 = -15°C; HY1 = +02° K; dt = +05° K; HY2 = +01° K

If programmed in this way, RL1 will be switched Off at -15°C and switched On at -13°C. If temperature rises to -09°C (L1 + dt + HY2) RL2 will be also switched On and switched Off at -10°C.

**3d** RL1 and RL2 On status is displayed by the lighting up of respectively the 1st and 2nd Led, located on the upper part of display. As a result of probe failure, its connection breakdown or overrange, PFA is displayed and RL1 and RL2 outputs will permanently operate as programmed in SETUP.

#### 4 SETUP

**MTC/MHC** configuration is made in SETUP through programming of the functioning modes and of the control parameters. Access to configuration is possible through a sequence of operations preventing accidental activation.

**4a** Press key  $\square$  and  $\square$  and, by keeping them pressed, push RESET key shortly. RESET key is located on the upper-left side inside the instrument on the bottom board. "PAR" is displayed; if only the present control parameters must be changed then press key  $\square$  and proceed as described in **4b**.

To change functioning modes press  $\square$ . "tyP" appears; by pressing key  $\square$  the present functioning mode is displayed. By means of key  $\square$  skip through the various modes until the desired one is achieved, then confirm it by pressing  $\square$ .

**4b** The number of the parameters requested in SETUP varies according to the programmed functioning mode; to skip through the whole set press key  $\square$  repeatedly. Parameter change is achieved by pressing key  $\square$  and  $\square$ ; storage occurs with  $\square$ . It's also possible to select a specific parameter and change its value by following the diagram attached.

**4c** Parameter description:

**uSP:** L1 and L2 minimum set point limit (-50°...+150°); (0...100%).

**^SP:** maximum set point limit (uSP...+150°); (uSP...100%).

**rt1:** minimum Off time for RL1. It determines the minimum Off time between the switch Off and the switch On of RL1, regardless of the input values (0...10 minutes).

**PF1:** permanent status programmed for RL1 output in case of probe failure (On...Off).

**ADJ:** offset which, added to the value read by the input, allows to alter the read out (-20...+20).

**HY1 (tHS, t2L, t2S):** in mode tHS it determines the RL1 Off-On switching hysteresis programmable range; in mode t2L and t2S it represents the hysteresis value. With the sign + or - you select the control carried out by RL1: refrigeration (dehumidification) with positive sign, heating (humidification) with negative sign (-25...+25).

**HY2 (t2L and t2S):** RL2 Off-On switching hysteresis. Also in this case the sign determines the control, positive for refrigeration (dehumidification), negative for heating (humidification) (-25...+25).

**rt2 (t2L and t2S):** minimum Off time for RL2. It determines the minimum Off time between the switch Off and the switch On of RL2, regardless of the input values (0...10 minutes).

**PF2 (t2L and t2S):** permanent status programmed for RL2 output in case of probe failure (On...Off).

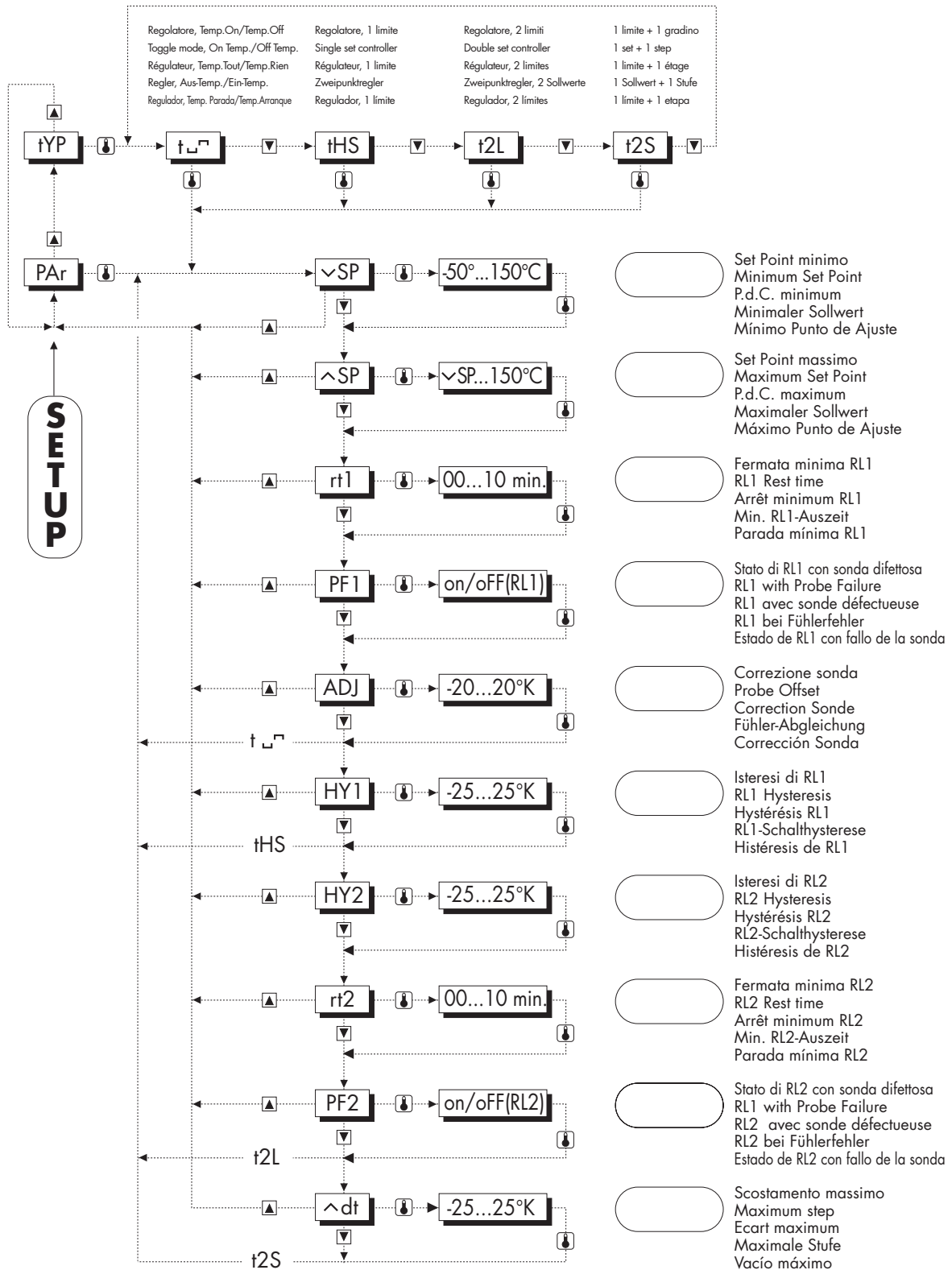
**^dt (t2S):** dt maximum limit; the parameter has always the same sign as HY2 (-25...+25).

After programming, press RESET key briefly. The new configuration will be operative immediately.

**ATTENTION:** when programming the hysteresis HY1/HY2, please consider the number of switchings that can be performed by the relay, and if necessary adjust the rest time rt1/rt2 to limit the switching frequency.

#### WARRANTY

LAE electronic SPA guarantees its products against defects due to faulty materials or workmanship for one (1) year from the date of manufacture shown on the container. The Company shall only replace products which are shown to be defective to the satisfaction of its own technical services. The Company shall not be under any liability and gives no warranty in the event of defects due to exceptional conditions of use, misuse or tampering. LAE electronic does not accept units back unless LAE electronic has previously given its allowance or request.



**TECHNICAL DATA**

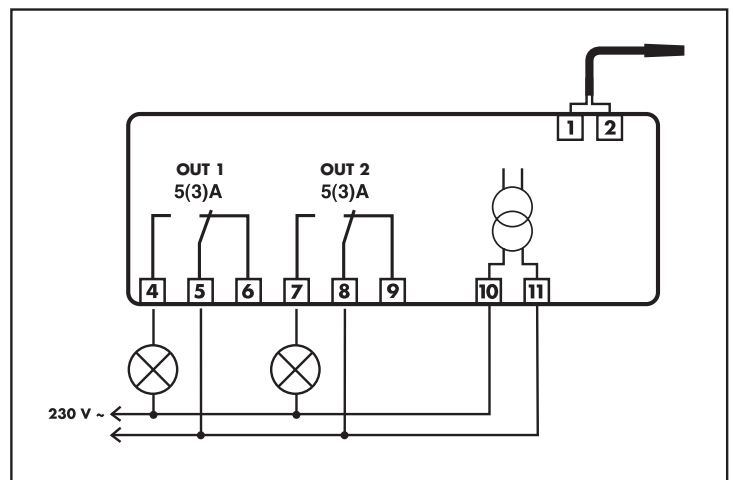
**MTR4-MTC4 / MHR4-MHC4**

Dimensions	79x115x42 mm (WxHxD)
Operating temp.	-10°...+50°C
Range	-50°...+150°C / 0...100% r.H.
Resolution	1°C / 1% r.H.
Input	PTC 1000 / 0...1V
Relay power rating	refer to data on unit
Connections	screw terminal blocks, Ø 2 mm <sup>2</sup>
Supply voltage	230 Vac, 3 VA
Front protection	IP40
Enclosure inflammability	fire-retardant

We reserve the right to make modifications without prior notice.

**WIRING DIAGRAM**

**MTC4 - MTR4**



**MHC4 - MHR4**

