

TX-i40

Microcontroller instruction manual

Cooling units for electric enclosures



CE
UK
CA
EAC



C17000905R00

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1. General Warnings

This manual, together with the rest of the hardcopy/digital documentation, is considered an integral part of the product. Ensure that all persons who use the product and authorised maintenance personnel can easily locate it for consultation when required.

⚠ WARNING
Do not use the regulator for functions other than those described; do not use it as a safety device.

⚠ CAUTION
Check the limits of application.

⚠ CAUTION
Isolate the power to the device before commencing any maintenance work.

i NOTICE
Contact TEXA INDUSTRIES S.r.l. immediately in writing in the event of faults or malfunctions.

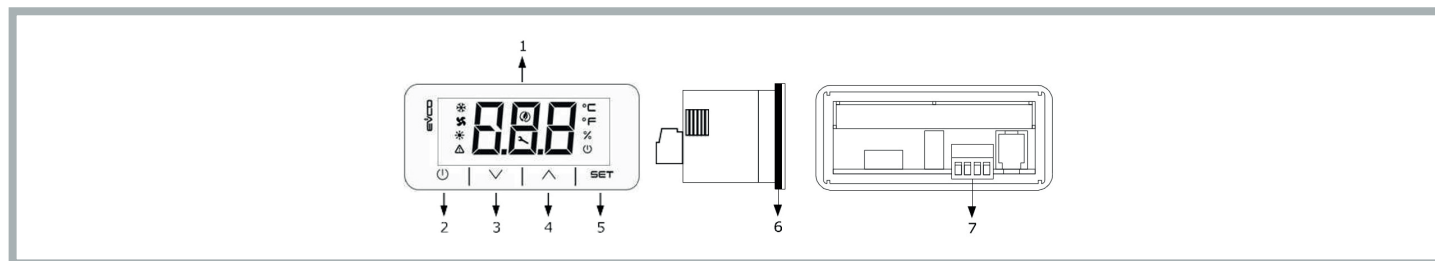
i NOTICE
TEXA INDUSTRIES S.r.l. shall bear no liability in the event of faults or malfunctions due to failure to comply with the instructions given.

2. General Information

The TX-i40 is a microcontroller suitable for applications on cooling units at normal temperature; it is composed of an electronic control board installed in the evaporation zone and a display for managing and configuring the device.

2.1 TX-i40 Display Description

The following drawing shows the layout of the TX-i40 display:

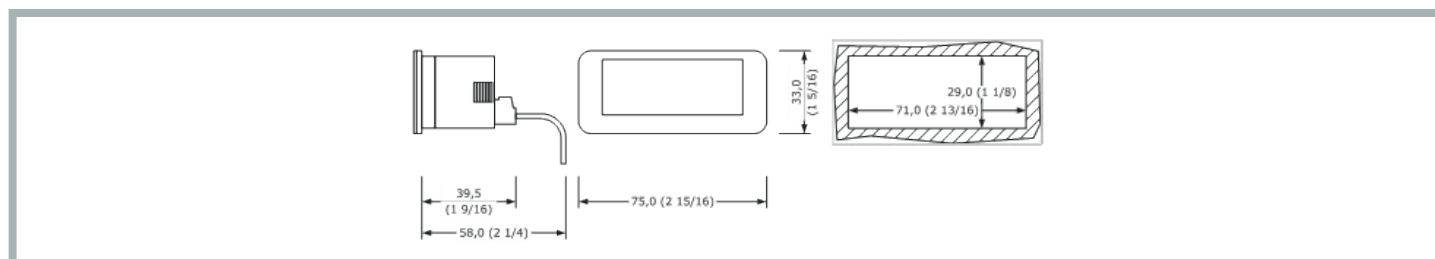


The following table illustrates the meaning of the parts of the TX-i40 display:

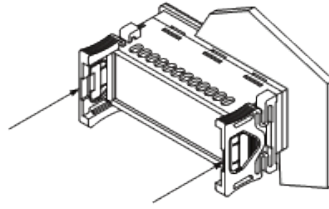
Part	Description
1	Display
2	ON/Stand-by key
3	DOWN key
4	UP key
5	SET key
6	Seal
7	Terminal board for quick connection of the power supply and the INTRABUS port

2.2 Dimensions and Installation

The following drawing illustrates the dimensions of the TX-i40 display; the dimensions are given in mm (in).



The device is designed for panel mounting using the supplied snap-on brackets. The thickness of the panel must be between 0.8 and 2.0 mm (1/32 and 1/16 in).






3. User Interface

3.1 Keypad

3.1.1 Key Functions

The following table illustrates the functions of the device's keys:

Key	Name	Function
	ON/Stand-by	<ul style="list-style-type: none"> • A long press turns the device on or off and returns to the main screen if an internal menu is currently displayed • A short press during parameter setting cancels the editing and acts as the “back” key
SET	SET	<ul style="list-style-type: none"> • A long press enters the settings menu • A short press enters the Set Point menu directly (Set Menu) • A single press confirms the edit • In menu navigation, it acts as the “Enter” key
	UP	<ul style="list-style-type: none"> • A short press moves around the menu • A long press from the main screen resets the filter hours counter
	DOWN	<ul style="list-style-type: none"> • A short press moves around the menu • A long press from the main screen locks (Loc) / unlocks (UnL) the keypad

3.1.2 Testing Sequence from Keypad

The testing sequence is activated by entering the testing menu **CoL** and setting the parameter to **ON**.

The phases of the testing sequence are given below:











- 1) Check that the digital input **IN4**, configured as “Generic alarm (**NO**)” is closed.
 - 2) Activation of the evaporator fan (**PUM**).
 - 3) Activation of the compressor (**COM**).
 - 4) Activation of the condensing fan (**PUM**).
 - 5) After activation of the condensing fan, the two fans and the compressor remain active for 3 minutes.
 - 6) Once 3 min has passed, the testing sequence concludes.
- The sequence can be concluded before this by the operator by opening the digital input **IN4** (by opening the external contact between Pins 4-5 of the alarms connector). By opening this digital input, all loads are shut off and the alarm relay **DO1** switches (between Pins 1-2-3 of the alarms connector). The operator then recloses the digital input **IN4** and the regulator exits the testing sequence.

3.2 Display

The following drawing shows the layout of the icons on the TX-i40 display:



The following table illustrates the meaning of the icons on the display:

Icon	Meaning	Description
	Compressor	ON if the compressor is running OFF if the compressor is not running BLINK if timers are in progress FAST BLINK if the compressor is running in support of a high load (connection in sequence configuration)
	Condensing fan	ON if the fan is running BLINK if the Pre- or Post-ventilation cycle is in progress OFF if the fan is not running
	Heating element (Optional)	ON if the heating element is on OFF if the heating element is off BLINK if timers are in progress
	Alarm	ON if at least one manual reset alarm is active BLINK if only automatic reset alarms are active OFF if no alarm is active
	Energy Saving	ON if the evaporator fan economy cycle is in progress OFF if the evaporator fan economy cycle is not in progress
	Gear	ON if the device is not in primary display BLINK maintenance indication OFF during normal operation
	Degrees Celsius	Unit of measurement °C
	Degrees Fahrenheit	Unit of measurement °F
	Unit of measurement %	OFF
	On/stand-by	ON if the regulation is not active OFF if the regulation is active

4. Menu

4.1 Accessibility

When browsing the menus there are 3 access levels, of which 2 require password entry:

- U** User: always visible
- S** Installer: visible if the maintenance password has been entered (for sole use of TEXA authorised personnel)
- M** Manufacturer: visible if the manufacturer password has been entered (for sole use of TEXA designers)

4.2 Menu Access

With the machine on, the main screen displays the regulation temperature.
 With the machine off, the main screen displays the "ON/Stand-by" icon and the regulation temperature.
 A short press of the **SET** key provides access to the **COO** parameter for setting of the Set Point.
 A long press of the **SET** key enters the "User" menu level.
 Press the **UP** or **DOWN** keys to navigate between the menus.
 Press the **SET** key to access the selected menu.
 Pressing the **ON/Stand-by** key exits the active menu.

4.3 List of Menus

The available menus are as follows:

- SEt** Provides access to the regulation Set Points quick setting
- ALM** Displays the list of current alarms
- PAr** Displays/allows editing of the device parameters
- OHr** Displays the hours of operation of the device and components
- HiS** Displays the alarms history
- nFo** Displays device information
- PSS** Used to enter the passwords for access to the "Maintenance" and "Manufacturer" levels
- CoL** For starting the testing sequence

4.3.1 PAr Menu

In the PAr menu, the parameters are grouped on the basis of function (identified on the display with a label), while each parameter incorporates an alphabetical index followed by 2 digits, in accordance with the following table:

<i>Group</i>	<i>Identifying label</i>	<i>Parameter index</i>
General	PG	G
Alarms	PA	A
I/O	PI	I
Regulation	Pr	r
Compressors	PC	C
Condensing fans	PF	F
Evaporator fan	PP	P
Electrical heating element	PH	H

4.3.2 OHr Menu

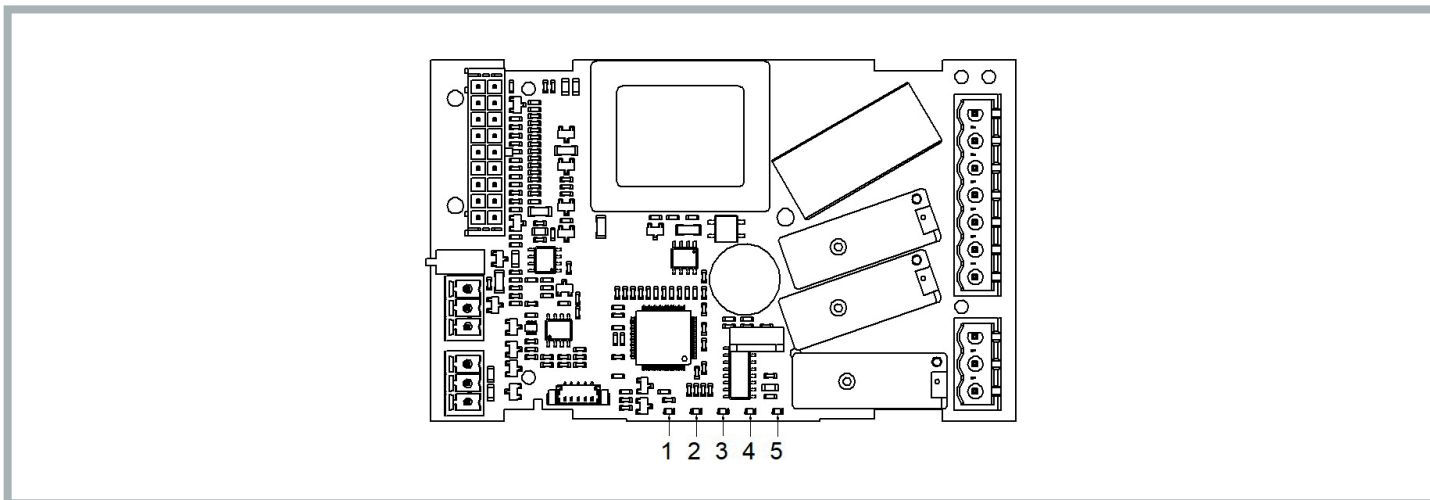
The OHr menu displays the hours of operation of:

<i>Index</i>	<i>Component</i>
Ou	Unit
OC1	Compressor 1
OP	Evaporator fan
OF1	Condensing fan 1
OFi	Filter

5. Electronic Board

5.1 LED Indicators Layout

The following drawing illustrates the layout of the LED indicators of the electronic board:

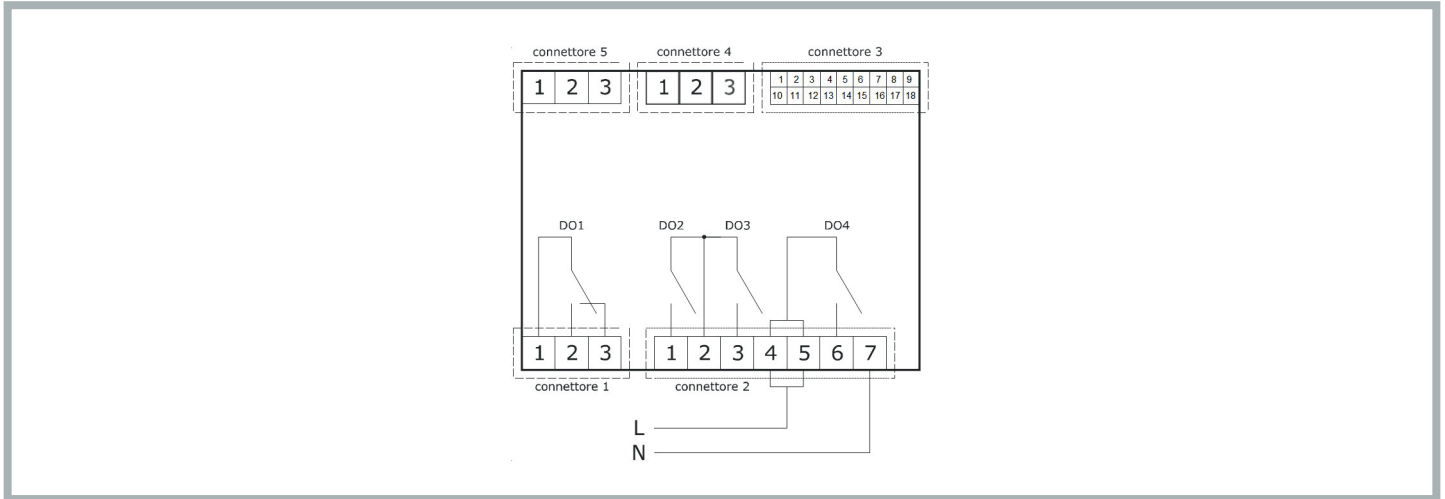


The following table illustrates the meaning of the LED indicators of the electronic board:

LED no.	Colour	Meaning
1	GREEN	POWER LED - ON if the controller is powered - OFF if the controller is not powered
2	GREEN	LED RUN - ON if the regulation is active - OFF if the regulation is not active
3	RED	ALARM LED - ON if one manual reset alarm is active - BLINK if an automatic reset alarm is active - OFF if no alarm is active
4	AMBER	INTRABUS LED - ON if a non-functioning Sequencing communication is in progress between two air conditioners - BLINK if a Sequencing communication is in progress between two air conditioners - OFF if no Sequencing communication is in progress
5	AMBER	RS-485 LED - BLINK if an RS-485 communication is in progress - OFF if no communication is in progress

5.2 I/O Connections

The following drawing illustrates the layout of the I/O connections of the electronic board:



The following table illustrates the meaning of CONNECTOR 1:

Part	Meaning	Function
1	Digital output DO1: common [C1]	Alarm
2	Digital output DO1 (8 A SPDT): normally open [NO1]	Alarm
3	Digital output DO1 (8 A SPDT): normally closed [NC1]	Alarm

The following table illustrates the meaning of CONNECTOR 2:

Part	Meaning	Function
1	Digital output DO2 (8 A SPST): normally open [NO2]	Evaporator fan
2	Relay digital output DO2 and D03: common [C23]	
3	Digital output DO3 (8 A SPST): normally open [NO3]	Condensing fan
4-5	Digital output DO4 (16 A SPDT): board supply common (115-230 VAC isolated) [L-C4]	
6	Digital output DO4 (16 A SPDT): normally open [NO4]	Compressor
7	Board supply (115-230 VAC isolated) [N]	

The following table illustrates the meaning of CONNECTOR 3:

Part	Meaning	Function
1	Analogue output AO1 (0-10 V/ PWM)	
2	Analogue input IN1 (DI / NTC / 4-20 mA / 0-10 V / 0-5 V)	Condensation temperature / pressure
3	Analogue input IN2 (DI / NTC / 4-20 mA / 0-10 V / 0-5 V)	Intake sensor (internal temperature) REGULATION SENSOR
4	Analogue input IN3 (DI/NTC)	External temperature sensor
5	Analogue input IN4 (DI/NTC)	Generic alarm (door microswitch contact)
6	Analogue input IN5 (DI/NTC)	Phase sequence relay

Part	Meaning	Function
7	Dry contact digital input IN6	
8	Analogue inputs power supply 4-20 mA (12 VDC, max. 120 mA)	
9	Reference (GND) for analogue inputs, digital inputs and analogue outputs	
10	Analogue output AO2 (0-10 V/ PWM)	
11	Reference (GND) for analogue inputs, digital inputs, analogue outputs and INTRABUS powered port	
12	Analogue input IN10 (DI/NTC)	Low pressure switch
13	Analogue input IN9 (DI/NTC)	High pressure switch
14	Dry contact digital input IN8 (FAST)	Condensing fan stepping pressure switch (outdoor versions)
15	Dry contact digital input IN7 (FAST)	Sequencing communication protocol reception
16	Reference (GND) for analogue inputs, digital inputs and analogue outputs	Sequencing communication protocol reference
17	Ratiometric analogue inputs power supply (5 VDC, max. 40 mA)	
18	Open collector digital output OC1 (12 V, max. 40 mA)	Sequencing communication protocol transmission

The following table illustrates the meaning of CONNECTOR 4:

Part	Meaning	Function
1	RS-485 MODBUS port: reference (GND) [G]	Modbus protocol slave, configurable, for supervision and device programming use
2	RS-485 MODBUS port: - [B-]	
3	RS-485 MODBUS port: + [A+]	

The following table illustrates the meaning of CONNECTOR 5:

Part	Meaning	Function
1	Reference (GND) for display power and INTRABUS powered port [G]	IB master communication protocol for communicating with display
2	INTRABUS powered port signal [IB]	
3	Display power supply [VS]	

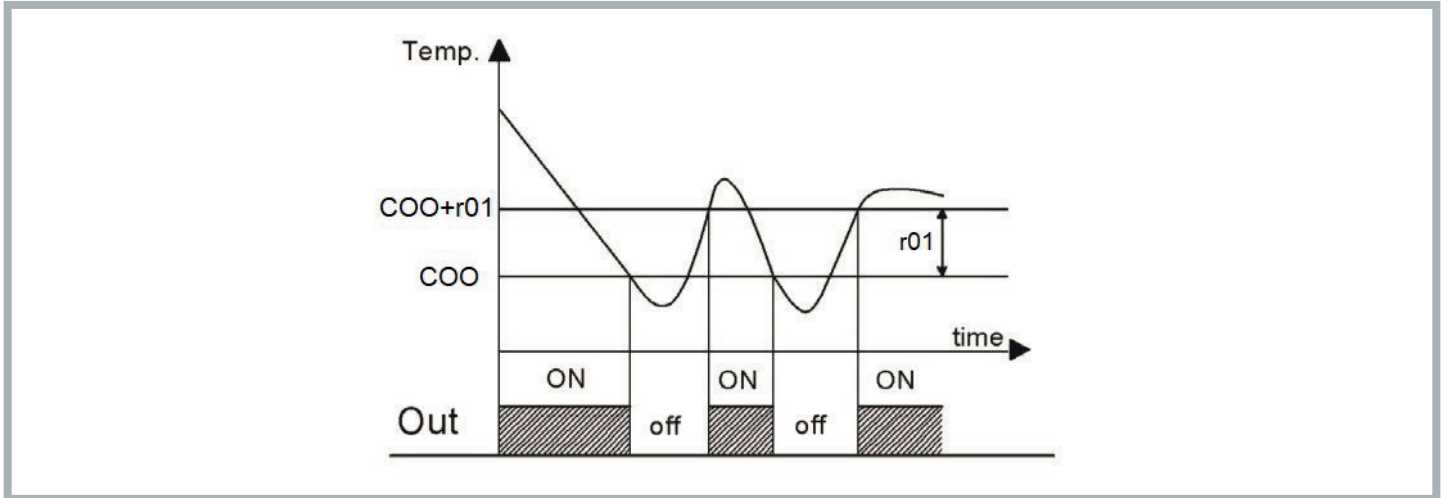
6. Regulation

6.1 Temperature Regulation

The compressor relay is activated to maintain a given temperature set by the Set Point. The hysteresis (**r01**) is automatically added to the Set Point (**COO**). If the temperature increases and reaches the Set Point plus the hysteresis, the compressor is activated, before being shut off when the temperature returns to the Set Point value (see figure).

In the event of a fault with the thermostat sensor, the duration of the compressor duty cycles is calculated as the weighted average of the duration of the cycles preceding the sensor fault.

The value of the Set Point (**COO**) and hysteresis (**r01**) parameters can be set from the “**SEt**” and “**PAr**” menus, respectively.



6.2 Evaporator Fan Management

Parameter **P01** defines the operating mode of the evaporator fan:

- -1: on regulation request
- 0: evaporator fan always active
- >0: OFF time (in minutes) in “Energy Saving” mode

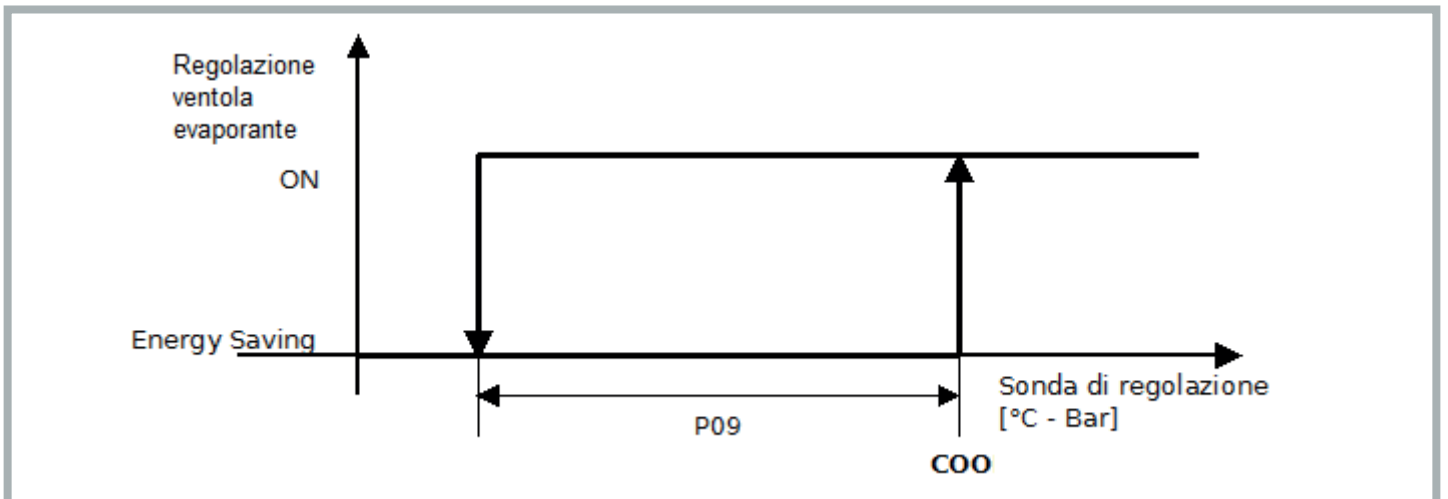
If the machine is in standby or the evaporator fan operates on temperature regulation request, the evaporator fan is shut off with a delay.

“Energy Saving” regulation is active only if:

- o The energy saving operating mode is selected (Parameter **P01**>0)
- o The regulation sensor is not in alarm status
- o The machine is working in cooling mode

In all other cases, the evaporator fan is on.

6.2.1 Energy Saving Regulation



When energy saving mode is set (**P01**>0), when the regulation temperature falls below the value **COO-P09**, the fan alternates 15 seconds of operation with **P01** minutes of inactivity. With each cycle, a check is made that the regulation temperature is below the Set Point (**COO**). Energy saving mode is exited when the regulation temperature reaches the Set Point value (**COO**).

6.3 Automatic Conversion of Units of Measurement

By modifying parameter **G07**, on the next device restart all temperature and pressure parameters will be converted.

Value G07	Temperature unit of measurement	Pressure unit of measurement
0	°C	bar
1	°F	PSI

To render the parameter modification effective, the device must be left unpowered for 10 seconds before switching back on.

6.4 Restoring Default Parameters

At the “installer” level, it is possible to restore the default parameters (contact TEXA authorised personnel).

6.5 Connection in Sequence of Two Units

Two units can be connected in sequence using a dedicated cable (optional accessory). The communication between the two units is established by setting the parameter **G20=1** on both machines (menu **PAr**, general parameters **PG**). In the event that there is no communication between the units, the error message “CoM” will be displayed on the main screen.

6.6 Behaviour Following a Generic Alarm (ALL): door contact open or other remote contact (PIN 4-5 alarms connector)

Following opening of the external contact, the behaviour of the unit will depend on the value of parameter **A85**:

- A85=0: generic alarm immediately shuts off all components (compressor, evaporator fan and condensing fan)
- A85=1: generic alarm immediately shuts off all components with the exception of the evaporator fan

6.7 Alarm Relay Behaviour (PIN 1-2-3 alarms connector)

The behaviour of the alarm relay in response to the various fault conditions will depend on the value set for parameter **A84**:

- A84=0: generic alarm DOES NOT switch the alarm relay; maintenance alarms DO NOT switch the alarm relay
- A84=1: generic alarm switches the alarm relay; maintenance alarms DO NOT switch the alarm relay
- A84=2: generic alarm DOES NOT switch the alarm relay; maintenance alarms switch the alarm relay
- A84=3: generic alarm switches the alarm relay; maintenance alarms switch the alarm relay

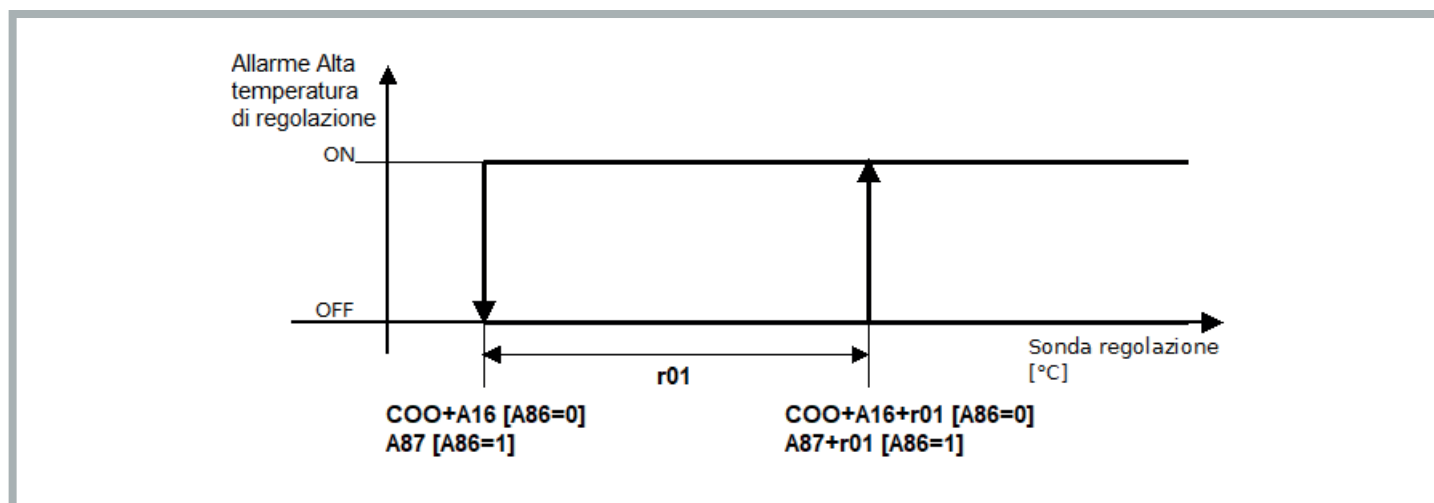
6.8 Alarms

6.8.1 Low/High Regulation Temperature Alarms

The intervention thresholds of the low and high regulation temperature alarms may relate to the regulation Set Point or be absolute values on the basis of the value of parameter **A86** (choice of High/Low Regulation Temperature alarm threshold type):

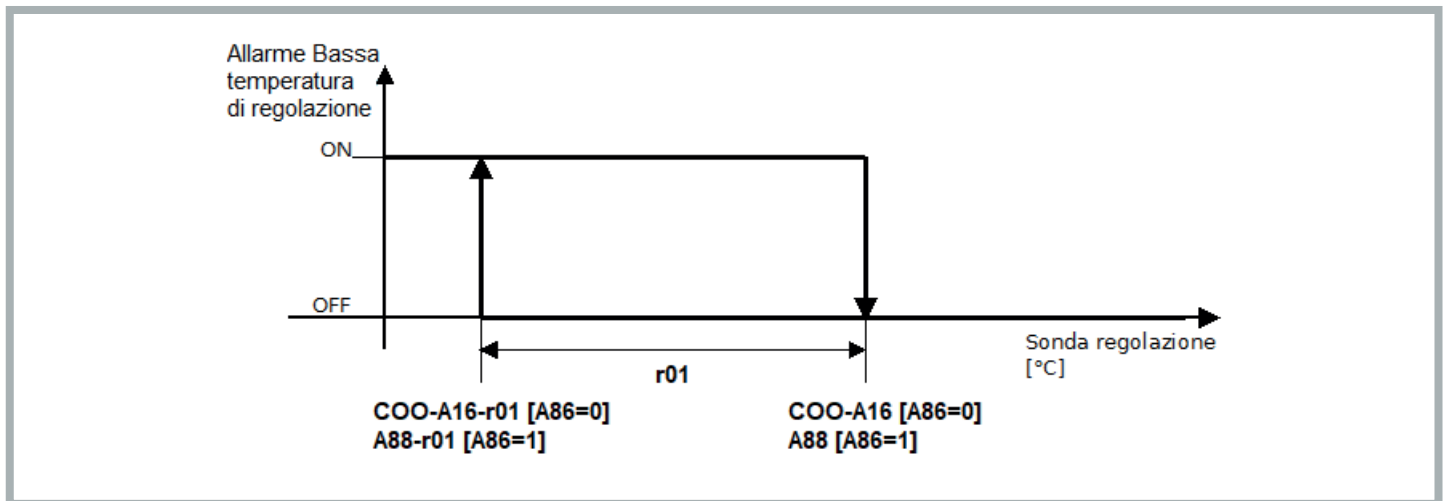
- A86=0 = thresholds relating to the regulation Set Point
- A86=1 = absolute thresholds A87, A88:
 - A87 High Regulation Temperature alarm absolute set point
 - A88 Low Regulation Temperature alarm absolute set point

6.8.1.1 High Regulation Temperature - Hrt



This alarm is generated if the regulation sensor exceeds the value $(COO+A16)+r01$ if the relative set points are used ($A86 = 0$), or $A87+r01$ if the absolute set points are used ($A86 = 1$) for a time $A17$. It is cancelled when the regulation sensor falls below the value $COO+A16$ if the relative set points are used ($A86 = 0$), or $A87$ if the absolute set points are used ($A86 = 1$). Warning only.

6.8.1.2 Low Regulation Temperature - Lrt



This alarm is generated if the regulation sensor falls below the value (COO-A16)-r01 if the relative set points are used (A86 = 0), or A88-r01 if the absolute set points are used (A86 = 1) for a time A17. It is cancelled when the regulation sensor reaches the value COO-A16 if the relative set points are used (A86 = 0), or A88 if the absolute set points are used (A86 = 1). Warning only.

6.8.2 Filter Maintenance Warning - HFI

The filter maintenance warning (HFI) is displayed whenever the number of hours of operation set in parameter A91 (PAr menu, PA alarms) is reached, which defines the filter maintenance interval.

The filter is an optional component; if the filter is not installed, when the filter maintenance warning is displayed it will be necessary to clean the condenser coil; see the use and maintenance manual C17000903.

The maintenance interval is factory set to 3000 hours (A91=300). Parameter A91 can be set from the PAr menu: the value entered is multiplied by 10 to define the number of hours of operation before the maintenance warning is displayed (e.g. setting A91=1 corresponds to an interval of 10 hours of operation of the filter before the maintenance warning is displayed).

The filter maintenance warning can be reset by resetting the filter operating hours counter (OFi) by pressing and holding the UP button from the main screen (during the reset, the "ON/stand-by" icon will blink rapidly on the display for 2 seconds).

6.8.3 Maximum Pressure - HP1

Activated when the maximum pressure switch intervenes, and the compressor is shut off.

This alarm is resolved automatically when the pressure switch is reset, and the compressor is therefore restarted.

If the alarm reoccurs 3 times within the space of an hour, a manual reset will be necessary to restart the compressor (see sec. 6.8.10).

6.8.4 Minimum Pressure - HP1

Activated when the minimum pressure switch intervenes, and the compressor is shut off.

This alarm is resolved automatically when the pressure switch is reset, and the compressor is therefore restarted.

If the alarm reoccurs 3 times within the space of an hour, a manual reset will be necessary to restart the compressor (see sec. 6.8.10).

6.8.5 Phase Sequence - PH

Triggered in air conditioners with three-phase power supply when the correct phase sequence is not used.

Restore the correct phase sequence, then perform a manual reset (see section 6.8.10) to resolve the alarm.

6.8.6 High Condensation Pressure - HP

Generated if the condensation pressure/temperature sensor, where configured and not in error state, exceeds the value A97. Resets when the condensation pressure/temperature sensor falls below the value A98-A07. Warning only.

Alarm present only in "Advanced" models.

6.8.7 Low Condensation Pressure - LP

Generated if the external condensation pressure/temperature sensor, where configured and not in error state, falls below the value A98. Resets when the condensation pressure/temperature sensor exceeds the value A99+A04. Warning only.

Alarm present only in "Advanced" models.

6.8.8 High External Temperature - HtO

Generated if the external temperature sensor, where configured and not in error state, exceeds the value A96+A83. Resets when the external temperature sensor falls below the value A96. Warning only.
Alarm present only in "Advanced" models.

6.8.9 Low External Temperature - LtO

Generated if the external temperature sensor, where configured and not in error state, falls below the value A97-A83. Resets when the external temperature sensor exceeds the value A97. Warning only.
Alarm present only in "Advanced" models.

6.8.10 Manual Alarms: Reset Procedure

In order to disable manual reset alarms, press and hold the "ON/Stand-by" button to place the machine in standby, then restart.