

# EV204 Digital controller for ventilated refrigerating units, with HACCP and Energy Saving functions

ENGLISH

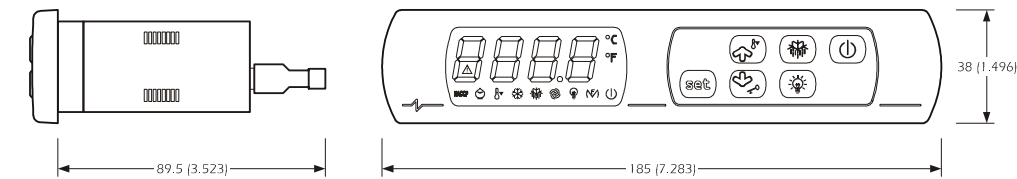
## 1 GETTING STARTED

### 1.1 Important

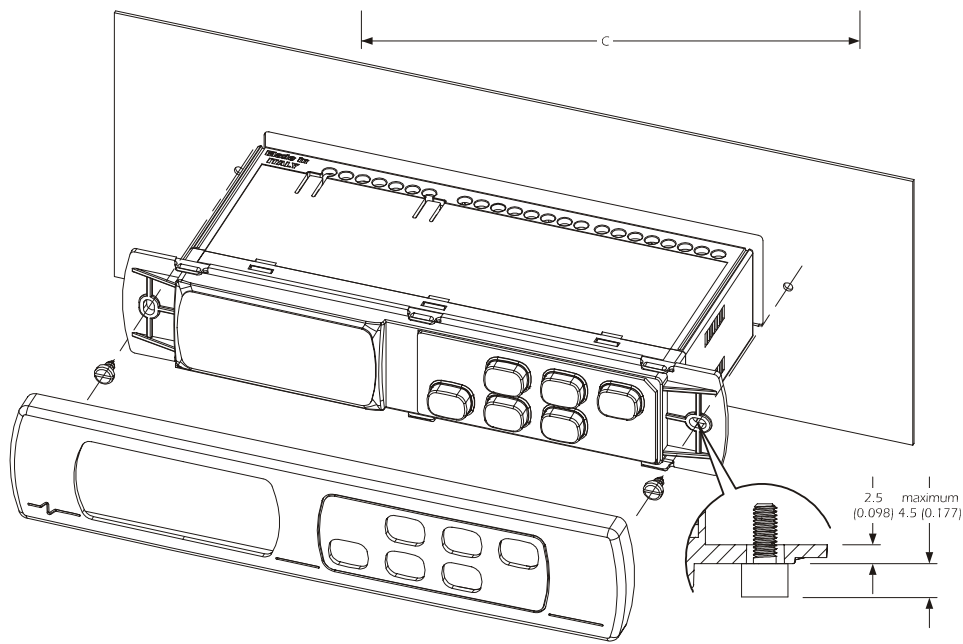
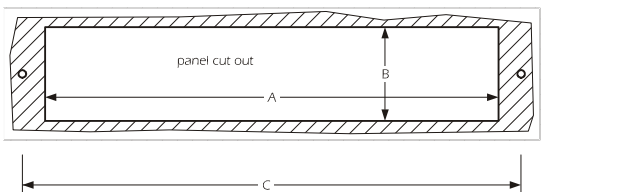
Read these instructions carefully before installing and using the instrument and follow all additional information for installation and electrical connection; keep these instructions close to the instrument for future consultations.

### 1.2 Installing the instrument

Panel mounting, with two screws  $\varnothing$  2.9 mm (0.114 in) or M3; dimensions in mm (in).



Independently on the kind of connections, the maximum depth is 89.5 mm (3.523 in) and refers to the models with faston (with straight female faston properly plugged).



| DIMENS. | MINIMUM       | TYPICAL       | MAXIMUM       |
|---------|---------------|---------------|---------------|
| A       | 150.0 (5.905) | 150.0 (5.905) | 150.5 (5.925) |
| B       | 31.0 (1.220)  | 31.0 (1.220)  | 31.5 (1.240)  |
| C       | 164.0 (6.456) | 165.0 (6.496) | 166.0 (6.535) |

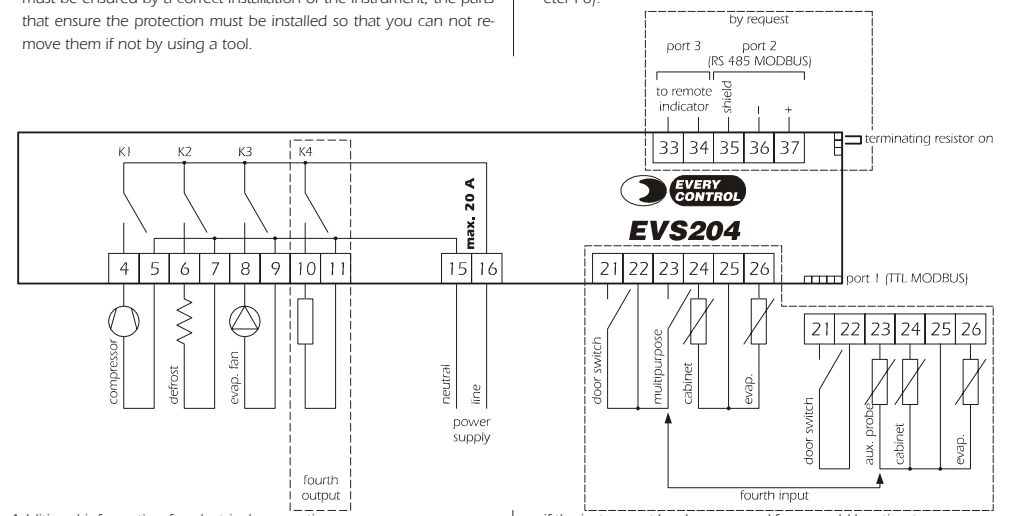
Additional information for installation:

- moderate the clamping torque of the screws, in order not to damage the box
- working conditions (working temperature, humidity, etc.) must be between the limits indicated in the technical data
- do not install the instrument close to heating sources (resistances, hot air ducts, etc.), devices provided with big magnetos (big speakers, etc.), locations subject to direct sunlight, rain, humidity, dust, mechanical vibrations or bumps
- according to the safety norms, the protection against electrical parts must be ensured by a correct installation of the instrument; the parts that ensure the protection must be installed so that you can not remove them if not by using a tool.

### 1.3 Wiring diagram

With reference to the options in the outlines:

- the operation of the fourth input depends on parameter P4
- the user managed by the fourth output depends on parameter u1
- port 1 is the serial port for the communication with the supervision system (through a serial interface) or with the programming key (via TTL, with MODBUS communication protocol); **the port must not be used at the same time for the same purposes**
- port 2 is the serial port for the communication with the supervision system (via RS 485, with MODBUS communication protocol; by request); **port 2 must not be used at the same time to the same purpose of port 1**
- port 3 is the port for the communication with the remote indicator (by request); the indicator shows the quantity you have set with parameter P6).



Additional information for electrical connection:

- do not operate on the terminal blocks with electrical or pneumatic screwdrivers

- if the instrument has been moved from a cold location to a warm one, the humidity could condense on the inside; wait about an hour before supplying it

- test the working power supply voltage, working electrical frequency and working electrical power of the instrument; they must correspond with the local power supply
- disconnect the local power supply before servicing the instrument
- do not use the instrument as safety device
- for repairs and information on the instrument please contact Evco sales network.

## 2 USER INTERFACE

### 2.1 Turning on/off the instrument by hand

- make sure the keyboard is not locked and no procedure is running
- press  $\text{[ON]}$  2 s.
- If the instrument is turned off, the regulators will be turned off, the possibility to turn on/off the cabinet light or the auxiliary output when the instrument is turned off depends on parameter u2.
- Turning off means turning off the instrument via software (the instrument remains connected with the power supply).
- Through the multipurpose input it is also possible to turn on/off the instrument at a distance.

### 2.2 The display

- If the instrument is turned on, during the normal operation the display will show the quantity you have set with parameter P5:
- if P5 = 0, the display will show the cabinet temperature
- if P5 = 1, the display will show the working setpoint
- if P5 = 2, the display will show the evaporator temperature
- if P5 = 3, the display will show "cabinet temperature - evaporator temperature"
- if P5 = 4, the display will show the temperature read by the auxiliary probe (only if parameter P4 has value 1 or 2).
- If the instrument is turned off, the display will be switched off.

### 2.3 Showing the cabinet temperature

- make sure the keyboard is not locked and no procedure is running
- press  $\text{[ON]}$  2 s: the display will show the first available label
- press  $\text{[DOWN]}$  or  $\text{[UP]}$  to select "Pb1"
- press  $\text{[ON]}$

To quit the procedure:

- press  $\text{[ON]}$  or do not operate 15 s
- press  $\text{[DOWN]}$  or do not operate 60 s.
- If during the normal operation the display shows the cabinet temperature (parameter P5 = 0), the label "Pb1" will not be shown.

### 2.4 Showing the evaporator temperature

- make sure the keyboard is not locked and no procedure is running
- press  $\text{[ON]}$  2 s: the display will show the first available label
- press  $\text{[DOWN]}$  or  $\text{[UP]}$  to select "Pb2"
- press  $\text{[ON]}$

To quit the procedure:

- press  $\text{[ON]}$  or do not operate 15 s
- press  $\text{[DOWN]}$  or do not operate 60 s.
- If the evaporator probe is not enabled (parameter P3 = 0), the label "Pb2" will not be shown.

### 2.5 Showing the temperature read by the auxiliary probe (only if parameter P4 has value 1 or 2)

- make sure the keyboard is not locked and no procedure is running
- press  $\text{[ON]}$  2 s: the display will show the first available label
- press  $\text{[DOWN]}$  or  $\text{[UP]}$  to select "Pb3"
- press  $\text{[ON]}$

To quit the procedure:

- press  $\text{[ON]}$  or do not operate 15 s
- press  $\text{[DOWN]}$  or do not operate 60 s.
- If the function of the fourth input is not the one of auxiliary probe (parameter P4 = 0 or 3), the label "Pb3" will not be shown.

### 2.6 Activating the defrost by hand

- make sure the keyboard is not locked, no procedure is running and function Overcooling is not running
- press  $\text{[ON]}$  4 s.

If the function of the evaporator probe is the one of defrost probe (parameter P3 = 1) and to the defrost activation the evaporator temperature is above the one you have set with parameter d2, the defrost will not be activated.

### 2.7 Turning on/off the cabinet light by hand (only if parameter u1 has value 0)

- make sure no procedure is running
- press  $\text{[ON]}$
- Through the door switch input and the multipurpose input it is also possible to turn on/off the cabinet light at a distance; also look at parameter u2.

### 2.8 Turning on the demisting resistances by hand (only if parameter u1 has value 1)

- make sure no procedure is running
- press  $\text{[ON]}$  2 s: the resistances will be turned on the time you will have set with parameter b1.

It is not allowed to turn off the demisting resistances by hand.

### 2.9 Turning on/off the auxiliary output by hand (only if parameter u1 has value 2)

- make sure the keyboard is not locked and no procedure is running
- press  $\text{[ON]}$
- Through the multipurpose input it is also possible to turn on/off the auxiliary output at a distance.
- If the auxiliary output has been turned on by hand, it will be allowed to turn it off only in the same way (analogous matter if the auxiliary output has been turned on at a distance); also look at parameter u2.

### 2.10 Activating/deactivating function Overcooling (quick cooling)

- make sure the keyboard is not locked, no procedure is running and the defrost, the dripping or the after dripping evaporator fan delay are not running
- press  $\text{[ON]}$  4 s: the working setpoint will be increased of the temperature you will have set with parameter r5 (the time you will have set with parameter r6).

During function Overcooling the defrost is never activated; if the defrost interval expires when the function is running, the defrost will be activated to the end of the function.

### 2.11 Locking/unlocking the keyboard

To lock the keyboard:

- make sure no procedure is running
- press  $\text{[ON]}$  and  $\text{[DOWN]}$  2 s: the display will show "Loc" 1 s.
- If the keyboard is locked, you will not be allowed to:
- turn on/off the instrument by hand
- show the evaporator temperature
- show the temperature read by the auxiliary probe
- activate the defrost by hand
- turn on/off the auxiliary output by hand
- activate/deactivate function Overcooling
- show the information on the HACCP alarms
- erase the HACCP alarms list
- modify the working setpoint with the procedure related in paragraph 4.1 (you also can modify the working setpoint through parameter SP).

These operations provoke the visualization of the label "Loc" 1 s.

To unlock the keyboard:

- press  $\text{[ON]}$  and  $\text{[DOWN]}$  2 s: the display will show "Unl" 1 s.

### 2.12 Silencing the buzzer

- make sure no procedure is running
- press a button (the first pressure of the button does not provoke its usual effect).

## 3 HACCP

### 3.1 Preliminary information

The instrument can store up to 3 HACCP alarms and supplies information on:

- the critical value
- the alarm duration (between 1 min and 99 h and 59 min, partial if the alarm is running).

| CODE | KIND OF ALARM (AND CRITICAL VALUE)  |
|------|---|
| AL   | lower temperature alarm (the lowest temperature during a whatever alarm of this type)                                     |
| AH   | upper temperature alarm (the highest temperature during a whatever alarm of this type)                                    |
| id   | door switch input alarm (the highest cabinet temperature during a whatever alarm of this type); also look at parameter i4 |

### PAY ATTENTION:

- **the instrument stores the lower temperature alarm and the upper temperature alarm on condition that the temperature joined to the temperature alarm is the cabinet one (parameters A0 and A3 = 1) or the one read by the auxiliary probe, on condition that its function is the one of display probe (parameters A0 and A3 = 1 and parameter P4 = 1)**
- **the instrument updates the information on the alarm on condition that the critical value of the new alarm is more critical than the one the instrument has stored or on condition that the information has already been shown**
- **the alarm duration refers to the one that has provoked the update of the critical value**
- **if the instrument is turned off, it will store no alarm.**

When the cause that has provoked the alarm disappears, the display restores the normal operation.

### 3.2 Showing the information on the alarms

- make sure the keyboard is not locked and no procedure is running
- press  $\text{[ON]}$  2 s: the display will show the first available label
- press  $\text{[DOWN]}$  or  $\text{[UP]}$  to select "LS"
- press  $\text{[ON]}$  the display will show one of the codes related in the chart of paragraph 3.1
- press  $\text{[DOWN]}$  or  $\text{[UP]}$  to select a code, for example "AH".
- To show the information on the alarm:
- press  $\text{[ON]}$  LED HACCP will stop flashing to remain lit up permanently and the display will show in succession (for example):

| EXAMPLE    | MEANING   |
|------------|---|
| <b>8</b>   | the critical value is 8 °C/°F                   |
| <b>dur</b> | the display is about to show the alarm duration |
| <b>h 1</b> | the alarm has lasted 1 h (to be continued...)   |
| <b>n15</b> | the alarm has lasted 1 h and 15 min             |
| <b>AH</b>  | the code you had selected                       |

Each information lasts 1 s.

To escape from the succession of information:

- press  $\text{[DOWN]}$  the display will show the code you had selected.
- To quit the procedure:
- press  $\text{[DOWN]}$  twice or do not operate 15 s.

### 3.3 Erasing the alarms list

- make sure the keyboard is not locked and no procedure is running
- press  $\text{[ON]}$  2 s: the display will show the first available label
- press  $\text{[DOWN]}$  or  $\text{[UP]}$  to select "rLS"
- press  $\text{[ON]}$

- press  $\text{[DOWN]}$  or  $\text{[UP]}$  in 15 s to set "149"
- press  $\text{[ON]}$  or do not operate 15 s: the display will show "----" flashing 4 s and LED HACCP will go out, after which the instrument will quit the procedure.

## 4 SETTINGS

### 4.1 Setting the working setpoint

- make sure the instrument is turned on, the keyboard is not locked and no procedure is running
- press  $\text{[ON]}$  LED  $\text{[DOWN]}$  will flash
- press  $\text{[DOWN]}$  or  $\text{[UP]}$  in 15 s; also look at parameters r1, r2 and r3
- press  $\text{[ON]}$  or do not operate 15 s.

You also can modify the working setpoint through parameter SP.

### 4.2 Setting configuration parameters

To gain access the procedure:

- make sure no procedure is running
- press  $\text{[DOWN]}$  and  $\text{[DOWN]}$  4 s: the display will show "PA".
- press  $\text{[ON]}$
- press  $\text{[DOWN]}$  or  $\text{[UP]}$  in 15 s to set "19"
- press  $\text{[ON]}$  or do not operate 15 s
- press  $\text{[DOWN]}$  and  $\text{[DOWN]}$  4 s: the display will show "SP".

To select a parameter:

- press  $\text{[DOWN]}$  or  $\text{[UP]}$
- To modify a parameter:
- press  $\text{[DOWN]}$  or  $\text{[UP]}$  in 15 s
- press  $\text{[ON]}$  or do not operate 15 s.

To quit the procedure:

- press  $\text{[DOWN]}$  and  $\text{[DOWN]}$  4 s or do not operate 60 s.

### Switch off/on the power supply of the instrument after the modification of the parameters.

### 4.3 Restoring the default value of configuration parameters

To gain access the procedure:

- make sure no procedure is running
- press  $\text{[DOWN]}$  and  $\text{[DOWN]}$  4 s: the display will show "PA".
- press  $\text{[ON]}$
- press  $\text{[DOWN]}$  or  $\text{[UP]}$  in 15 s to set "743"
- press  $\text{[ON]}$  or do not operate 15 s
- press  $\text{[DOWN]}$  and  $\text{[DOWN]}$  4 s: the display will show "DEF"
- press  $\text{[ON]}$
- press  $\text{[DOWN]}$  or  $\text{[UP]}$  in 15 s to set "149"
- press  $\text{[ON]}$  or do not operate 15 s: the display will show "DEF" flashing 4 s, after which the instrument will quit the procedure.

### Make sure the default value of the parameters is appropriate, in particular if the probes are PTC probes.

## 5 SIGNALS

### 5.1 Signals

| LED | MEANING  |
|-----|--|
|     | LED compressor<br>if it is lit, the compressor will be turned on<br>if it flashes:<br>• the modification of the working setpoint will be running<br>• a compressor protection will be running (parameters C0, C1 and C2)   |
|     | LED defrost<br>if it is lit, the defrost will be running<br>if it flashes:<br>• the defrost will be required but a compressor protection will be running (parameters C0, C1 and C2)<br>• the dripping will be running (parameter d7)<br>• the heating of the freezing fluid will be running (parameter dA)   |
|     | LED evaporator fan<br>if it is lit, the evaporator fan will be turned on<br>if it flashes, the after dripping evaporator fan delay will be running (parameter F3)  |
|     | LED cabinet light<br>if it is lit, the cabinet light will have been turned on by hand<br>if it flashes, cabinet light will have been turned on at a distance (parameter i0)  |
|     | LED multipurpose<br>if parameter u1 has value 1 (or the user managed by the fourth output are the demisting resistances):<br>if it is lit, the demisting resistances will be turned on because of the regulator (parameter b0)<br>if it flashes, the demisting resistances will have been turned on by hand (parameter b1)<br>if parameter u1 has value 2 (or the user managed by the fourth output is the auxiliary output):<br>if it is lit, the aux. output will have been turned on by hand<br>if it flashes, the auxiliary output will have been turned on at a distance (parameter i5) |
|     | LED alarm<br>if it is lit, an alarm will be running  |
|     | LED Overcooling<br>if it is lit, function Overcooling will be running (parameters r5 and r6)   |
|     | LED Energy Saving<br>if it is lit, function Energy Saving will be running (parameters r4 and i5)   |

## HACCP

- LED HACCP  
if it is lit, the instrument will have stored one HACCP alarm at least and you will have already shown all the information on the alarms  
if it flashes, the instrument will have stored one HACCP alarm at least but you will not have shown all the information on the alarms
- °C  
LED Celsius degree  
if it is lit, the unit of measure of the temperatures will be Celsius degree (parameter P2)
- °F  
LED Fahrenheit degree  
if it is lit, the unit of measure of the temperatures will be Fahrenheit degree (parameter P2)
- $\text{[ON]}$   
LED on/stand-by  
if it is lit, the instrument will be turned off

## 6 ALARMS

| CODE              | MEANING  |
|-------------------|--|
| Loc               | the keyboard and/or the working setpoint are locked (parameter r3); also look at paragraph 2.1.1   |
| ----              | the quantity to show is not available (for example because the probe is not enabled)   |
| <b>6.1 Alarms</b> |  |
| <b>AL</b>         | Lower temperature alarm (HACCP alarm)<br>Remedies:<br>• check the temperature joined to the alarm<br>• look at parameters A0, A1 and A2<br>Effects:<br>• if the critical value is lower than the one the instrument has stored, if you have already shown the information on the alarm or if the instrument has stored no alarm, the instrument will store the alarm   |
| <b>AH</b>         | Upper temperature alarm (HACCP alarm)<br>Remedies:<br>• check the temperature joined to the alarm<br>• look at parameters A3, A4 and A5<br>Effects:<br>• if the critical value is higher than the one the instrument has stored, if you have already shown the information on the alarm or if the instrument has stored no alarm, the instrument will store the alarm  |
| <b>id</b>         | Door switch input alarm (HACCP alarm)<br>Remedies:<br>• check the reasons that have provoked the activation of the input<br>• look at parameters i0, i1 and i4<br>Effects:<br>• the effect you have set with parameter i0; if parameter i4 has value 1 and the critical value is higher than the one the instrument has stored, if you have already shown the information on the alarm or if the instrument has stored no alarm, the instrument will store the alarm |
| <b>iA</b>         | Multipurpose input alarm (only if parameter P4 has value 3)<br>Remedies:<br>• check the reasons that have provoked the activation of the input<br>• look at parameters i5 and i6<br>Effects:<br>• if parameter i5 has value 4, there will be no effect<br>• if parameter i5 has value 5, the compressor will be turned off   |
| <b>iSd</b>        | Instrument locked alarm (only if parameter P4 has value 3)<br>Remedies:<br>• check the reasons that have provoked the activation of the multipurpose input<br>• turn off/on the instrument or switch off/on its power supply<br>• look at parameters i5, i6, i7, i8 and i9<br>Effects:<br>• the regulators will be turned off  |
| <b>COH</b>        | Overheated condenser alarm (only if parameter P4 has value 2)<br>Remedies:<br>• check the condenser temperature<br>• look at parameter C6<br>Effects:<br>• no effect   |
| <b>CSd</b>        | Compressor locked alarm (only if parameter P4 has value 2)<br>Remedies:<br>• check the condenser temperature<br>• turn off/on the instrument: if the condenser temperature is still above the one you have set with parameter C7, you will have to disconnect the power supply and clean the condenser<br>• look at parameter C7<br>Effects:<br>• the compressor will be turned off  |

When the cause that has provoked the alarm disappears, the instrument restores the normal operation, except for the instrument locked alarm (code "iSd") and the compressor locked alarm (code "CSd") that need you turn off/on the instrument or switch off/on its power supply.

## 7 INTERNAL DIAGNOSTICS

### 7.1 Internal diagnostics

| CODE       | MEANING   |
|------------|---|
| <b>Pr1</b> | Cabinet probe error<br>Remedies: <ul style="list-style-type: none"><li>look at parameter P0</li><li>check the integrity of the probe</li><li>check the connection instrument-probe</li><li>check the cabinet temperature</li></ul> Effects: <ul style="list-style-type: none"><li>the compressor activity will depend on parameters C4 and C5</li></ul>   |
| <b>Pr2</b> | Evaporator probe error<br>Remedies: <ul style="list-style-type: none"><li>the same you saw in the previous case but related to the evaporator probe</li></ul> Effects: <ul style="list-style-type: none"><li>if parameter P3 has value 1, the defrost will last the time you will have set with parameter d3</li><li>if parameter P3 has value 1 and parameter d8 has value 2, the instrument will work as if parameter d8 had value 0</li><li>if parameter F0 has value 3 or 4, the instrument will work as if the parameter had value 2</li></ul> |
| <b>Pr3</b> | Auxiliary probe error (only if parameter P4 has value 1 or 2)<br>Remedies: <ul style="list-style-type: none"><li>the same you saw in the previous case but related to the auxiliary probe</li></ul> Effects: <ul style="list-style-type: none"><li>if parameter P4 has value 2, the overheated condenser alarm (code <b>COH</b>) and the compressor locked alarm (code <b>CSd</b>) will never be activated</li></ul>  |

When the cause that has provoked the alarm disappears, the instrument restores the normal operation.

## 9 WORKING SETPOINTS AND CONFIGURATION PARAMETERS

### 9.1 Working setpoints

|    | MIN. | MAX.      | U.M. | DEF. | WORKING SETPOINTS |
|----|------|-----------|------|------|-------------------|
| r1 | r2   | °C/°F (1) | 0.0  |      | working setpoint  |

### 9.2 Configuration parameters

| PARAM. | MIN.  | MAX. | U.M.      | DEF.  | WORKING SETPOINTS  |
|--------|-------|------|-----------|-------|--|
| SP     | r1    | r2   | °C/°F (1) | 0.0   | working setpoint   |
| PARAM. | MIN.  | MAX. | U.M.      | DEF.  | MEASURE INPUTS   |
| CA1    | -25.0 | 25.0 | °C/°F (1) | 0.0   | cabinet probe offset   |
| CA2    | -25.0 | 25.0 | °C/°F (1) | 0.0   | evaporator probe offset  |
| CA3    | -25.0 | 25.0 | °C/°F (1) | 0.0   | auxiliary probe offset (only if P4 = 1 or 2)   |
| P0     | 0     | 1    | ---       | 1     | kind of probe<br>0 = PTC<br>1 = NTC  |
| P1     | 0     | 1    | ---       | 1     | decimal point Celsius degree (for the quantity to show during the normal operation)<br>1 = YES   |
| P2     | 0     | 1    | ---       | 0     | unit of measure temperature (2)<br>0 = °C<br>1 = °F  |
| P3     | 0     | 2    | ---       | 1     | evaporator probe function<br>0 = probe not enabled<br>1 = defrost probe and thermostat probe for the evaporator fan<br>2 = thermostat probe for the evaporator fan   |
| P4     | 0     | 3    | ---       | 3     | fourth input function<br>0 = input not enabled<br>1 = measure input (auxiliary probe, display probe)<br>2 = measure input (auxiliary probe, condenser probe)<br>3 = digital input (multipurpose input)   |
| P5     | 0     | 4    | ---       | 0     | quantity to show during the normal operation<br>0 = cabinet temperature<br>1 = working setpoint<br>2 = evaporator temperature<br>3 = "cabinet temperature - evaporator temperature"<br>4 = temperature read by the auxiliary probe (only if P4 = 1 or 2) |
| P6     | 0     | 4    | ---       | 0     | quantity shown by the remote indicator<br>0 = cabinet temperature<br>1 = working setpoint<br>2 = evaporator temperature<br>3 = "cabinet temperature - evaporator temperature"<br>4 = temperature read by the auxiliary probe (only if P4 = 1 or 2)       |
| PARAM. | MIN.  | MAX. | U.M.      | DEF.  | MAIN REGULATOR   |
| r0     | 0.1   | 15.0 | °C/°F (1) | 2.0   | working setpoint differential  |
| r1     | -99.0 | r2   | °C/°F (1) | -50.0 | minimum working setpoint   |
| r2     | r1    | 99.0 | °C/°F (1) | 50.0  | maximum working setpoint   |
| r3     | 0     | 1    | ---       | 0     | locking the working setpoint modification (with the procedure related in paragraph 4.1)<br>1 = YES   |
| r4     | 0.0   | 99.0 | °C/°F (1) | 0.0   | temperature increase during function Energy Saving (only if P4 = 3); also look at i5   |
| r5     | 0.0   | 99.0 | °C/°F (1) | 0.0   | temperature decrease during function Overcooling; also look at r6  |
| r6     | 0     | 99   | min       | 30    | duration of function Overcooling; also look at r5  |
| PARAM. | MIN.  | MAX. | U.M.      | DEF.  | COMPRESSOR PROTECTIONS   |
| C0     | 0     | 240  | min       | 0     | compressor delay since you turn on the instrument (3)  |
| C1     | 0     | 240  | min       | 5     | minimum time between two activations in succession of the compressor; also compressor delay since the end of the cabinet probe error (4) (5)   |
| C2     | 0     | 240  | min       | 3     | minimum time the compressor remains turned off (4)   |
| C3     | 0     | 240  | s         | 0     | minimum time the compressor remains turned on  |
| C4     | 0     | 240  | min       | 10    | time the compressor remains turned off during the cabinet probe error; also look at C5   |
| C5     | 0     | 240  | min       | 10    | time the compressor remains turned on during the cabinet probe error; also look at C4  |

## 8 TECHNICAL DATA

### 8.1 Technical data

**Box:** self-extinguishing grey.

**Frontal protection:** IP 65.

**Connections:** faston 6.3 mm (0.248 in) wide (power supply and outputs), screw terminal block (inputs), 5 poles connector (serial port); extractable terminal blocks or screw terminal blocks (power supply and outputs) by request.

**Working temperature:** from 0 to 55 °C (32 to 131 °F, 10 ... 90% of relative humidity without condensate).

**Power supply:** 230 Vac, 50/60 Hz, 3.5 VA; 115 Vac, 50/60 Hz, 3.5 VA by request.

**Alarm buzzer:** by request.

**Measure inputs:** 2 (cabinet probe and evaporator probe) for PTC/NTC probes.

**Digital inputs:** 1 (door switch) for NO/NC contact (free of voltage, 5 V 1 mA); fourth input configurable for measure input (display probe or condenser probe, for PTC/NTC probes) or digital input (multipurpose, free of voltage, 5 V 1 mA).

**Working range:** from -50 to 150 °C (-50 to 300 °F) for PTC probe, from -40 to 105 °C (-40 to 220 °F) for NTC probe.

**Resolution:** 0.1 °C/1 °C/1 °F.

**Relay outputs:** 4 relays:

• **compressor relay:** 8 A @ 250 Vac (NO contact)

• **defrost relay:** 8 A @ 250 Vac (NO contact)

• **evaporator fan relay:** 8 A @ 250 Vac (NO contact)

• **cabinet light/demisting resistances/auxiliary output relay:** 8 A @ 250 Vac (NO contact).

**The maximum current allowed on the loads is 20 A.**

**Serial port:** port for the communication with the supervision system (through a serial interface) or with the programming key (via TTL, with MODBUS communication protocol).

**Further communication ports (by request):** port for the communication with the supervision system (via RS 485, with MODBUS communication protocol), port for the communication with the remote indicator.

| C6     | 0.0   | 200.0 | °C/°F (1) | 80.0  | condenser temperature above which the overheated condenser alarm is activated (only if P4 = 2) (6)  |
|--------|-------|-------|-----------|-------|---|
| C7     | 0.0   | 200.0 | °C/°F (1) | 90.0  | condenser temperature above which the compressor locked alarm is activated (only if P4 = 2)   |
| C8     | 0     | 15    | min       | 1     | compressor locked alarm delay (only if P4 = 2) (7)  |
| PARAM. | MIN.  | MAX.  | U.M.      | DEF.  | DEFROST   |
| d0     | 0     | 99    | h         | 8     | defrost interval; also look at d8 (8)<br>0 = the defrost at intervals will never be activated   |
| d1     | 0     | 1     | ---       | 0     | kind of defrost<br>0 = electric defrost<br>1 = hot gas defrost  |
| d2     | -99.0 | 99.0  | °C/°F (1) | 2.0   | defrost cutoff temperature (only if P3 = 1)   |
| d3     | 0     | 99    | min       | 30    | defrost duration if P3 = 0 or 2; defrost maximum duration if P3 = 1<br>0 = the defrost will never be activated  |
| d4     | 0     | 1     | ---       | 0     | defrost when you turn on the instrument (3)<br>1 = YES  |
| d5     | 0     | 99    | min       | 0     | defrost delay when you turn on the instrument (if d4 = 1); also look at i5 (3)  |
| d6     | 0     | 1     | ---       | 1     | temperature shown during the defrost<br>0 = cabinet temperature<br>1 = if to the defrost activation the cabinet temperature is below "working setpoint + r0", at most "working setpoint + r0"; if to the defrost activation the cabinet temperature is above "working setpoint + r0", at most the cabinet temperature to the defrost activation (9)   |
| d7     | 0     | 15    | min       | 2     | dripping duration   |
| d8     | 0     | 2     | ---       | 0     | kind of defrost interval<br>0 = the defrost will be activated when the instrument will have remained turned on the time d0<br>1 = the defrost will be activated when the compressor will have remained turned on the time d0<br>2 = the defrost will be activated when the evaporator temperature will have remained below the temperature d9 the time d0 (10)  |
| d9     | -99.0 | 99.0  | °C/°F (1) | 0.0   | evaporator temperature above which the count of the defrost interval is suspended (only if d8 = 2)  |
| dA     | 0     | 99    | min       | 0     | minimum time the compressor must be remained turned on (to the defrost activation) in order that the defrost can be activated (only if d1 = 1) (11)   |
| PARAM. | MIN.  | MAX.  | U.M.      | DEF.  | ALARMS  |
| A0     | 0     | 2     | ---       | 0     | temperature joined to the lower temperature alarm<br>0 = cabinet temperature<br>1 = temperature read by the auxiliary probe (only if P4 = 1 or 2) (12)<br>2 = evaporator temperature (13)   |
| A1     | -99.0 | 99.0  | °C/°F (1) | -10.0 | temperature below which the lower temperature alarm is activated; also look at A0 and A2 (6)  |
| A2     | 0     | 2     | ---       | 1     | kind of lower temperature alarm<br>0 = alarm not enabled<br>1 = relative to the working setpoint (or "working setpoint - A1"; consider A1 without sign)<br>2 = absolute (or A1)   |
| A3     | 0     | 1     | ---       | 0     | temperature joined to the upper temperature alarm<br>0 = cabinet temperature<br>1 = temperature read by the auxiliary probe (only if P4 = 1 or 2) (12)  |
| A4     | -99.0 | 99.0  | °C/°F (1) | 10.0  | temperature above which the upper temperature alarm is activated; also look at A3 and A5 (6)  |
| A5     | 0     | 2     | ---       | 1     | kind of upper temperature alarm<br>0 = alarm not enabled<br>1 = relative to the working setpoint (or "working setpoint + A4"; consider A4 without sign)<br>2 = absolute (or A4)   |
| A6     | 0     | 240   | min       | 120   | upper temperature alarm delay since you turn on the instrument (only if A3 = 0 or if A3 = 1 and P4 = 1) (3)   |
| A7     | 0     | 240   | min       | 15    | temperature alarm delay   |
| A8     | 0     | 240   | min       | 15    | upper temperature alarm delay since the end of the after dripping evaporator fan delay (only if A3 = 0 or if A3 = 1 and P4 = 1) (14)  |
| A9     | 0     | 240   | min       | 15    | upper temperature alarm delay since the deactivation of the door switch input (only if A3 = 0 or if A3 = 1 and P4 = 1) (15)   |
| PARAM. | MIN.  | MAX.  | U.M.      | DEF.  | EVAPORATOR FAN  |
| F0     | 0     | 4     | ---       | 1     | evaporator fan activity during the normal operation<br>0 = turned off<br>1 = turned on<br>2 = according to the compressor<br>3 = according to F1 (16)<br>4 = turned off if the compressor is turned off, according to F1 if the compressor is turned on (16)  |
| F1     | -99.0 | 99.0  | °C/°F (1) | -1.0  | evaporator temperature above which the evaporator fan is turned off (only if F0 = 3 or 4) (6)   |
| F2     | 0     | 2     | ---       | 0     | evaporator fan activity during the defrost and the dripping<br>0 = turned off<br>1 = turned on<br>2 = according to F0   |
| F3     | 0     | 15    | min       | 2     | duration of the after dripping evaporator fan delay   |
| PARAM. | MIN.  | MAX.  | U.M.      | DEF.  | DIGITAL INPUTS  |
| i0     | 0     | 5     | ---       | 1     | effect provoked by the activation of the door switch input; also look at i4 (17)<br>0 = no effect<br>1 = the cabinet light will be turned on (as long as the input will be deactivated)<br>2 = the evaporator fan will be turned off (at most the time i3 or as long as the input will be deactivated)<br>3 = the compressor and the evaporator fan will be turned off (at most the time i3 or as long as the input will be deactivated)<br>4 = the evaporator fan will be turned off (at most the time i3 or as long as the input will be deactivated) and the cabinet light will be turned on (as long as the input will be deactivated)<br>5 = the compressor and the evaporator fan will be turned off (at most the time i3 or as long as the input will be deactivated) and the cabinet light will be turned on (as long as the input will be deactivated) |
| i1     | 0     | 1     | ---       | 0     | kind of contact door switch input<br>0 = NO (the input will be active if you close the contact)<br>1 = NC (the input will be active if you open the contact)  |
| i2     | -1    | 120   | min       | 30    | delay to signal the door switch input alarm<br>-1 = no signal   |
| i3     | -1    | 120   | min       | 15    | maximum duration of the effect provoked by the activation of the door switch input on the compressor and on the evaporator fan<br>-1 = the effect will last as long as the input will be deactivated  |
| i4     | 0     | 1     | ---       | 0     | storing the door switch input alarm (18)<br>1 = YES   |

| i5     | 0     | 7    | ---       | 4    | effect provoked by the activation of the multipurpose input (only if P4 = 3) (19)<br>0 = no effect<br>1 = <b>SYNCHRONIZING THE DEFROSTS</b> - spent the time d5 the defrost will be activated<br>2 = <b>ACTIVATING THE ENERGY SAVING</b> - function Energy Saving will be activated (as long as the input will be deactivated), on condition that function Overcooling is not running; also look at r4<br>3 = <b>CLOSING THE LOCK</b> - the cabinet light will be turned off (only if it will have been turned on by hand) and function Energy Saving will be activated (as long as the input will be deactivated), on condition that function Overcooling is not running; also look at r4<br>4 = <b>ACTIVATING THE EXTERNAL ALARM</b> - spent the time i7 the display will show the code <b>IA</b> flashing and the buzzer will be activated (as long as the input will be deactivated)<br>5 = <b>ACTIVATING THE MANOSTAT</b> - the compressor will be turned off, the display will show the code <b>IA</b> flashing and the buzzer will be activated (as long as the input will be deactivated); also look at i7, i8 and i9<br>6 = <b>ACTIVATING THE AUXILIARY OUTPUT</b> - the auxiliary output will be turned on (as long as the input will be deactivated)<br>7 = <b>TURNING OFF THE INSTRUMENT</b> - the instrument will be turned off (as long as the input will be deactivated) |
|--------|-------|------|-----------|------|---|
| i6     | 0     | 1    | ---       | 0    | kind of contact multipurpose input (only if P4 = 3)<br>0 = NO (the input will be active if you close the contact)<br>1 = NC (the input will be active if you open the contact)  |
| i7     | 0     | 120  | min       | 0    | if i5 = 4, delay to signal the multipurpose input alarm (only if P4 = 3)<br>if i5 = 5, compressor delay since the deactivation of the multipurpose input (only if P4 = 3) (20)  |
| i8     | 0     | 15   | ---       | 0    | number of multipurpose input alarm such as to provoke instrument locked alarm (only if P4 = 3 and i5 = 5)<br>1 = alarm not enabled  |
| i9     | 1     | 999  | min       | 240  | time without multipurpose input alarm in order that the alarm counter is cleared (only if P4 = 3 and i5 = 5)  |
| PARAM. | MIN.  | MAX. | U.M.      | DEF. | OUTPUTS   |
| u1     | 0     | 2    | ---       | 0    | user managed by the fourth output (21)<br>0 = cabinet light<br>1 = demisting resistances<br>2 = auxiliary output  |
| u2     | 0     | 1    | ---       | 0    | possibility to turn on/off the cabinet light or the auxiliary output by hand when the instrument is turned off (22)<br>1 = YES  |
| PARAM. | MIN.  | MAX. | U.M.      | DEF. | DEMISTING RESISTANCES (only if u1 = 1)  |
| b0     | -99.0 | 99.0 | °C/°F (1) | -1.0 | cabinet temperature above which the demisting resistances are turned off (only if the resistances have been turned on because of the regulator, not by hand) (6)  |
| b1     | 0     | 120  | min       | 5    | time the demisting resistances remain turned on (only if the resistances have been turned on by hand)   |
| PARAM. | MIN.  | MAX. | U.M.      | DEF. | SERIAL NETWORK (MODBUS)   |
| LA     | 1     | 247  | ---       | 247  | instrument address  |
| Lb     | 0     | 3    | ---       | 2    | baud rate<br>0 = 2,400 baud<br>1 = 4,800 baud<br>2 = 9,600 baud<br>3 = 19,200 baud  |
| LP     | 0     | 2    | ---       | 2    | parity<br>0 = none<br>1 = odd<br>2 = even   |

(1) the unit of measure depends on parameter P2

(2) **set the parameters related to the regulators appropriately after the modification of the parameter**

(3) the parameter also has effect after an interruption of power supply that arises when the instrument is turned on

(4) the time you have set with the parameter is also counted when the instrument is turned off

(5) if parameter C1 has value 0, the delay since the end of the cabinet probe error will however be 2 min

(6) the differential of the parameter is 2 °C/4 °F

(7) if (when you turn on the instrument) the condenser temperature is above the one you have set with parameter C7, parameter C8 will have no effect

(8) the instrument stores the count of the defrost interval every 30 min; the modification of parameter d0 has effect since the end of the previous defrost interval or since the activation of a defrost by hand

(9) the display restores the normal operation as soon as the after dripping evaporator fan delay ends and the cabinet temperature falls below the one that has locked the display (or if a temperature alarm arises)

(10) if parameter P3 has value 0 or 2, the instrument will work as if parameter d8 had value 0

(11) if (to the defrost activation) the duration of the activation of the compressor is shorter than the time you have set with parameter dA, the compressor will further remain turned on the fraction of time required to complete it

(12) if parameter P4 has value 0 or 3, the instrument will work as if the parameter had value 0 (but it will not store the alarm)

(13) if parameter P3 has value 0, the instrument will work as if parameter A0 had value 0 (but it will not store the alarm)

(14) during the defrost, the dripping and the evaporator fan delay the temperature alarms are not enabled

(15) during the activation of the door switch input the upper temperature alarm is not enabled, on condition that it has arisen during the activation of the input

(16) if parameter P3 has value 0, the instrument will work as if parameter F0 had value 2

(17) the compressor is turned off spent 10 s since the activation of the input; if the input is activated during the defrost, the dripping or the after dripping evaporator fan delay, the activation will provoke no effect on the compressor

(18) the instrument stores the alarm spent the time you have set with parameter i2 since the input activation, on condition that the parameter has not value -1

(19) if parameter i5 has value 1, 2, 3, 6 or 7, the effect will not be signalled

(20) make sure the time you have set with parameter i7 is shorter than the one you have set with parameter i9

(21) to avoid damaging the connected user, modify the parameter when the instrument is turned off

(22) if parameter u2 has value 0, when you turn off the instrument the cabinet light or the auxiliary output will also be turned off; next time you turn on the instrument the user will be turned off.