EVK203/EVK213/EVK223/EVK253 Digital thermostats for ventilated refrigerating units

GB ENGLISH

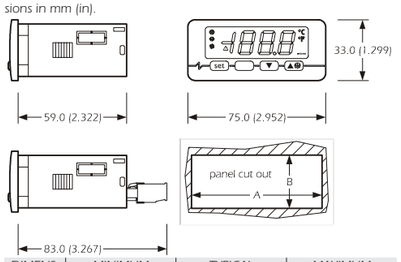
1 GETTING STARTED

1.1 Important

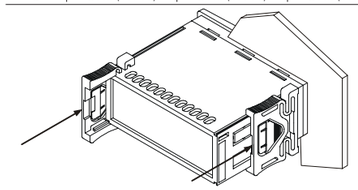
Read these instructions carefully before installing and using the instrument and follow all additional information for installation and electrical connection; keep these instructions close to the instrument for future consultations.

1.2 Installing the instrument

Panel mounting, with click brackets (supplied by the builder); dimensions in mm (in).



DIMENS.	MINIMUM	TYPICAL	MAXIMUM
A	71.0 (2.795)	71.0 (2.795)	71.8 (2.826)
B	29.0 (1.141)	29.0 (1.141)	29.8 (1.173)



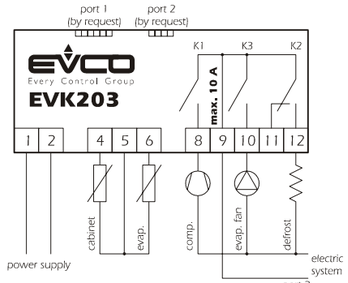
Additional information for installation:

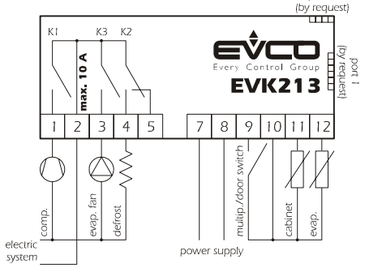
- 59.0 (2.322) is the maximum depth with screw terminal blocks
- 83.0 (3.267) is the maximum depth with extractable terminal blocks
- the panel thickness must not be higher than 8.0 mm (0.314 in)
- working conditions (working temperature, humidity, etc.) must be between the limits indicated in the technical data
- do not install the instrument close to heating sources (heaters, 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 legislation, 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.

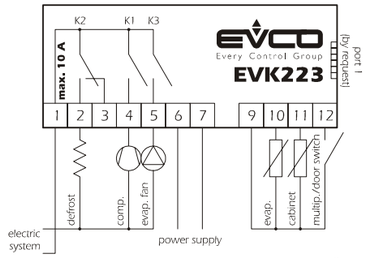
1.3 Wiring diagram

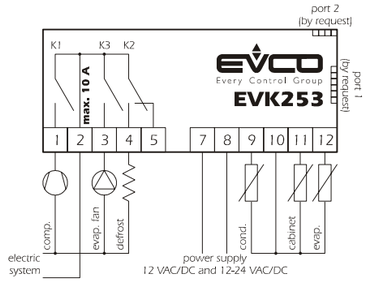
With reference to the wiring diagrams:

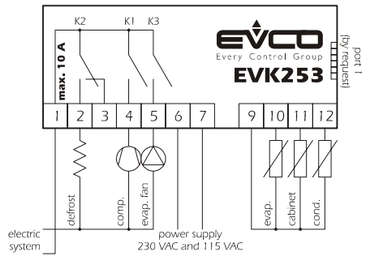
- port 1 (by request) is the serial port for the communication with the supervision system (through a serial interface, via TTL, with MODBUS communication protocol) or with the programming key; the port must not be used at the same time for the same purposes
- port 2 (by request, not available in EVK223 and EVK253 with power supply 230 VAC and 115 VAC) is the port for the communication with the remote indicator; the indicator shows the quantity you have set with parameter P5.











Additional information for electrical connection:

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

To turn on the instrument you have to supply it; to turn it off it is enough to cut off the power supply.

Through the digital input (only EVK213 and EVK223) it is also possible to turn off the instrument at a distance (or turn off the instrument via software; in this case the instrument remains connected to the power supply and the regulators are turned off).

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 condenser temperature (only EVK253).

2.3 Showing the cabinet temperature

- make sure the keyboard is not locked and no procedure is running
- press [▼] 2 s: the display will show the first available label
- press [▲] or [▼] to select "**Pb1**"
- press [set]

To quit the procedure:

- press [set] or do not operate 60 s
- press [▲] or [▼] as long as the display shows the quantity you have set with parameter P5 or do not operate 60 s.

2.4 Showing the evaporator temperature

- make sure the keyboard is not locked and no procedure is running
- press [▼] 2 s: the display will show the first available label
- press [▲] or [▼] to select "**Pb2**"
- press [set]

To quit the procedure:

- press [set] or do not operate 60 s
- press [▲] or [▼] as long as the display shows the quantity you have set with parameter P5 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 condenser temperature (only EVK253)

- make sure the keyboard is not locked and no procedure is running
- press [▼] 2 s: the display will show the first available label
- press [▲] or [▼] to select "**Pb3**"
- press [set]

To quit the procedure:

- press [set] or do not operate 60 s
- press [▲] or [▼] as long as the display shows the quantity you have set with parameter P5 or do not operate 60 s.

If the condenser probe is not enabled (parameter P4 = 0), the label "**Pb3**" will not be shown.

2.6 Activating the defrost by hand

- make sure the keyboard is not locked and no procedure is running
- press [▲] 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 Locking/unlocking the keyboard

To lock the keyboard:

- make sure no procedure is running
- press [set] and [▼] 2 s: the display will show "**Loc**" 1 s.

If the keyboard is locked, you will not be allowed to:

- show the evaporator temperature
- show the condenser temperature (only EVK253)
- activate the defrost by hand
- modify the working setpoint with the procedure related in paragraph 3.1 (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 [set] and [▼] 2 s: the display will show "**UnL**" 1 s.

2.8 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 SETTINGS

3.1 Setting the working setpoint

- make sure the keyboard is not locked and no procedure is running
- press [set] LED ❄ will flash
- press [▲] or [▼] in 15 s; also look at parameters r1, r2 and r3
- press [set] or do not operate 15 s.

You also can modify the working setpoint through parameter SP.

3.2 Setting configuration parameters

To gain access the procedure:

- make sure no procedure is running
- press [▲] and [▼] 4 s: the display will show "**PA**"
- press [set]
- press [▲] or [▼] in 15 s to set "**-19**"
- press [set] or do not operate 15 s
- press [▲] and [▼] 4 s: the display will show "**SP**".

To select a parameter:

- press [▲] or [▼]

To modify a parameter:

- press [set]
- press [▲] or [▼] in 15
- press [set] or do not operate 15 s

To quit the procedure:

- press [▲] and [▼] 4 s or do not operate 60 s.

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

3.3 Restoring the default value of configuration parameters

- make sure no procedure is running
- press [▲] and [▼] 4 s: the display will show "**PA**"
- press [set]
- press [▲] or [▼] in 15 s to set "**743**"
- press [set] or do not operate 15 s
- press [▲] and [▼] 4 s: the display will show "**dEF**"
- press [set]
- press [▲] or [▼] in 15 s to set "**149**"
- press [set] or do not operate 15 s: the display will show "**dEF**" flashing 4 s, after which the instrument will quit the procedure
- switch off/on the power supply of the instrument.

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

4 SIGNALS

4.1 Signals

LED	MEANING
❄	LED compressor if it is lit, the compressor will be turned on if it flashes: ▪ the modification of the working setpoint will be running ▪ a compressor protection will be running (parameters C0, C1, C2 and i7)
❄	LED defrost if it is lit, the defrost will be running if it flashes: ▪ the defrost will be required but a compressor protection will be running (parameters C0, C1 and C2) ▪ the dripping will be running (parameter d7) ▪ the heating of the freezing fluid will be running (parameter dA)
	LED evaporator fan if it is lit, the evaporator fan will be turned on if it flashes, the after dripping evaporator fan delay will be running (parameter F3)
⚠	LED alarm if it is lit, an alarm will be running
°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)

CODE	MEANING
Loc	the keyboard and/or the working setpoint are locked (parameter r3); also look at paragraph 2.7
- - - -	the quantity to show is not available (for example because the probe is not enabled)

5 ALARMS

5.1 Alarms

CODE	MEANING
AL	Lower temperature alarm Remedies: ▪ check the temperature joined to the alarm ▪ look at parameters A0, A1 and A2 Effects: ▪ no effect
AH	Upper temperature alarm Remedies: ▪ check the temperature joined to the alarm ▪ look at parameters A3, A4 and A5 Effects: ▪ no effect
id	Door switch input alarm (only EVK213 and EVK223 and if parameter i0 has value 2 or 3) Remedies: ▪ check the reasons that have provoked the activation of the input ▪ look at parameters i0 and i1 Effects: ▪ the effect you have set with parameter i0
iA	Multipurpose input alarm (only EVK213 and EVK223 and if parameter i0 has value 0) Remedies: ▪ check the reasons that have provoked the activation of the input ▪ look at parameters i1 and i5 Effects: ▪ if parameter i5 has value 3, there will be no effect ▪ if parameter i5 has value 4, the compressor will be turned off
iSd	Instrument locked alarm (only EVK213 and EVK223 and if parameter i0 has value 0) Remedies: ▪ check the reasons that have provoked the activation of the multipurpose input ▪ switch off/on the power supply of the instrument ▪ look at parameters i1, i5, i7, i8 and i9 Effects: ▪ the regulators will be turned off
COH	Overheated condenser alarm (only EVK253) Remedies: ▪ check the condenser temperature ▪ look at parameter C6 Effects: ▪ no effect
CSd	Compressor locked alarm (only EVK253) Remedies: ▪ check the condenser temperature ▪ cut off the power supply of the instrument and clean the condenser ▪ look at parameter C7 Effects: ▪ the compressor and the evaporator fan 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 switch off/on the power supply of the instrument.

6 INTERNAL DIAGNOSTICS

6.1 Internal diagnostics

CODE	MEANING
Pr1	Cabinet probe error Remedies: ▪ look at parameter P0 ▪ check the integrity of the probe ▪ check the connection instrument-probe ▪ check the cabinet temperature Effects: ▪ the compressor activity will depend on parameters C4 and C5
Pr2	Evaporator probe error Remedies: ▪ the same you saw in the previous case but related to the evaporator probe Effects: ▪ if parameter P3 has value 1, the defrost will last the time you will have set with parameter d3 ▪ if parameter P3 has value 1 and parameter d8 has value 2, the instrument will work as if parameter d8 had value 0 ▪ if parameter F0 has value 3 or 4, the instrument will work as if the parameter had value 2
Pr3	Condenser probe error (only EVK253) Remedies: ▪ the same you saw in the previous case but related to the condenser probe Effects: ▪ the overheated condenser alarm (code "**COH**") and the compressor locked alarm (code "**CSd**") will never be activated

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

7 TECHNICAL DATA

7.1 Technical data

Box: self-extinguishing grey.

Frontal protection: IP 65.

Connections: screw terminal blocks (power supply, inputs and outputs), 6 poles connector (serial port; by request), 4 poles connector (to the remote indicator; by request, not available in EVK223 and EVK253 with power supply 230 VAC and 115 VAC); extractable terminal blocks (power supply, inputs and outputs) by request.

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

Power supply EVK203 and EVK253: 230 VAC, 50/60 Hz, 3 VA (approximate); 115 VAC or 12-24 VAC/DC or 12 VAC/DC by request.

Power supply EVK213: 12 VAC/DC, 50/60 Hz, 3 VA (approximate); 12-24 VAC/DC by request.

Power supply EVK223: 230 VAC, 50/60 Hz, 3 VA (approximate); 115 VAC by request.

Alarm buzzer: by request.

Measure inputs EVK203, EVK213 and EVK223: 2 (cabinet probe and evaporator probe) for PTC/NTC probes.

Measure inputs EVK253: 3 (cabinet probe, evaporator probe and condenser probe) for PTC/NTC probes.

Digital inputs (only EVK213 and EVK223): 1 (multipurpose/door switch) for NO/NC contact (free of voltage, 5 V 1 mA).

Working range: from -50.0 to 150.0 °C (-50 to 300 °F) for PTC probe, from -40.0 to 105.0 °C (-40 to 220 °F) for NTC probe.

Resolution: 0.1 °C/1 °C/1 °F.

Digital outputs: 3 relays:

- **compressor relay:** 16 res. A @ 250 VAC (NO contact) in EVK203, EVK213 and EVK253 (this last with power supply 12 VAC/DC and 12-24 VAC/DC); 8 res. A @ 250 VAC otherwise
- **defrost relay:** 8 res. A @ 250 VAC (change-over contact)
- **evaporator fan relay:** 8 res. A @ 250 VAC (NO contact) in EVK203, EVK213 and EVK253 (this last with power supply 12 VAC/DC and 12-24 VAC/DC); 5 res. A @ 250 VAC otherwise.

The maximum current allowed on the loads is 10 A.

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

Further communication ports: port for the communication with the remote indicator; by request, not available in EVK223 and EVK253 with power supply 230 VAC and 115 VAC.

8 WORKING SETPOINTS AND CONFIGURATION PARAMETERS

8.1 Working setpoints

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

8.2 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	condenser probe offset (only EVK253)
P0	0	1	- - -	1	kind of probe 0 = PTC 1 = NTC
P1	0	1	- - -	1	decimal point Celsius degree (for the quantity to show during the normal operation) 1 = YES
P2	0	1	- - -	0	unit of measure temperature (2) 0 = °C 1 = °F
P3	0	2	- - -	1	evaporator probe function 0 = probe not enabled 1 = defrost probe and thermostat probe for the evaporator fan 2 = thermostat probe for the evaporator fan
P4	0	1	- - -	1	enabling the condenser probe (only EVK253) 1 = YES
P5	0	4	- - -	0	quantity to show during the normal operation 0 = cabinet temperature 1 = working setpoint 2 = evaporator temperature 3 = "cabinet temperature - evaporator temperature" 4 = condenser temperature (only EVK253, not visible otherwise)
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 3.1) 1 = YES
r4	0.0	99.0	°C/°F (1)	0.0	temperature increase during function Energy Saving (only EVK213 and EVK223); also look at i5
PARAM.	MIN.	MAX.	U.M.	DEF.	COMPRESSOR PROTECTIONS
C0	0	240	min	0	compressor delay since you turn on the instrument
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 (3)
C2	0	240	min	3	minimum time the compressor remains turned off
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
C6	0.0	199.0	°C/°F (1)	80.0	condenser temperature above which the overheated condenser alarm is activated (only EVK253) (4)
C7	0.0	199.0	°C/°F (1)	90.0	condenser temperature above which the compressor locked alarm is activated (only EVK253)
C8	0	15	min	1	compressor locked alarm delay (only EVK253) (5)
PARAM.	MIN.	MAX.	U.M.	DEF.	DEFROST
d0	0	99	h	8	defrost interval; also look at d8 (6) 0 = the defrost at intervals will never be activated
d1	0	1	- - -	0	kind of defrost 0 = electric defrost 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 0 = the defrost will never be activated
d4	0	1	- - -	0	defrost when you turn on the instrument 1 = YES
d5	0	99	min	0	defrost delay when you turn on the instrument (only if d4 = 1); also look at i5
d6	0	1	- - -	1	temperature shown during the defrost 0 = cabinet temperature 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 (7)
d7	0	15	min	2	dripping duration
d8	0	2	- - -	0	kind of defrost interval 0 = the defrost will be activated when the instrument will have remained turned on the time d0 1 = the defrost will be activated when the compressor will have remained turned on the time d0 2 = the defrost will be activated when the evaporator temperature will have remained below the temperature d9 the time d0 (8)
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) (9)
PARAM.	MIN.	MAX.	U.M.	DEF.	ALARMS
A0	0	2	- - -	0	temperature joined to the lower temperature alarm 0 = cabinet temperature 1 = evaporator temperature (10) 2 = condenser temperature (only EVK253, not visible otherwise) (11)
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 (4)
A2	0	2	- - -	1	kind of lower temperature alarm 0 = alarm not enabled 1 = relative to the working setpoint (or "working setpoint - A1"; consider A1 without sign) 2 = absolute (or A1)
A3	0	1	- - -	0	temperature joined to the upper temperature alarm (only EVK253, not visible = 0 otherwise) 0 = cabinet temperature 1 = condenser temperature (11)
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 (4)
A5	0	2	- - -	1	kind of upper temperature alarm 0 = alarm not enabled 1 = relative to the working setpoint (or "working setpoint + A4"; consider A4 without sign) 2 = absolute (or A4)
A6	0	240	min	120	upper temperature alarm delay since you turn on the instrument (only if A3 = 0)
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) (12)
A9	0	240	min	15	upper temperature alarm delay since the deactivation of the door switch input (only EVK213 and EVK223) (13)
PARAM.	MIN.	MAX.	U.M.	DEF.	EVAPORATOR FAN
F0	0	4	- - -	1	evaporator fan activity during the normal operation 0 = turned off 1 = turned on 2 = according to the compressor 3 = according to F1 (14) 4 = turned off if the compressor is turned off, according to F1 if the compressor is turned on (14)
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) (4)
F2	0	2	- - -	0	evaporator fan activity during the defrost and the dripping 0 = turned off 1 = turned on 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 (only EVK213 and EVK223)
i0	0	3	- - -	2	kind of digital input 0 = MULTIPURPOSE INPUT - in this case look at parameters i1, i5, i7, i8 and i9 1 = RESERVED 2 = DOOR SWITCH INPUT - in this case look at parameters i1, i2 and i3; the activation of the input will turn off the evaporator fan (at most the time i3 or as long as the input will be deactivated) 3 = DOOR SWITCH INPUT - in this case look at parameters i1, i2 and i3; the activation of the input will turn off the compressor and the evaporator fan (at most the time i3 or as long as the input will be deactivated) (15)
i1	0	2	- - -	0	kind of contact digital input 0 = NO (the input will be active if you close the contact) 1 = NC (the input will be active if you open the contact) 2 = input not enabled
i2	-1	120	min	30	delay to signal the door switch input alarm -1= no signal
i3	-1	120	min	15	maximum duration of the effect provoked by the activation of the door switch input -1= the effect will last as long as the input will be deactivated
i5	0	5	- - -	3	effect provoked by the activation of the multipurpose input 0 = no effect 1 = SYNCHRONIZING THE DEFROSTS - spent the time d5 the defrost will be activated (16) 2 = ACTIVATING THE ENERGY SAVING - function Energy Saving will be activated (as long as the input will be deactivated); also look at r4 (16) 3 = ACTIVATING THE EXTERNAL ALARM - spent the time i7 the display will show the code "**iA**" flashing and the buzzer will be activated (as long as the input will be deactivated) 4 = ACTIVATING THE MANOSTAT - the compressor will be turned off, the display will show the code "**iA**" flashing and the buzzer will be activated (as long as the input will be deactivated); also look at i7, i8 and i9 5 = TURNING OFF THE INSTRUMENT - the instrument will be turned off via software (as long as the input will be deactivated); also look at C0, d4 and A6
i7	0	120	min	0	if i5 = 3, delay to signal the multipurpose input alarm if i5 = 4, compressor delay since the deactivation of the multipurpose input (17)
i8	0	15	- - -	0	number of multipurpose input alarms such as to provoke the instrument locked alarm (only if i5 = 4) 0 = alarm not enabled
i9	1	999	min	240	time without multipurpose input alarms in order that the alarm counter is cleared (only if i5 = 4)
PARAM.	MIN.	MAX.	U.M.	DEF.	SERIAL NETWORK (MODBUS)
LA	1	247	- - -	247	instrument address
Lb	0	3	- - -	2	baud rate 0 = 2,400 baud 1 = 4,800 baud 2 = 9,600 baud 3 = 19,200 baud
LP	0	2	- - -	2	parity 0 = none 1 = odd 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 P2**

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

(4) the differential of the parameter is 2.0 °C/4 °F

(5) 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

(6) 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

(7) 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)

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

(9) 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

(10) if parameter P3 has value 0, the instrument will work as if parameter A0 had value 0

(11) if parameter P4 has value 0, the instrument will work as if parameter had value 0

(12) during the defrost, the dripping and the evaporator fan delay the temperature alarms are not enabled, on condition that they have arisen after the activation of the defrost

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

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

(15) 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

(16) the effect is not signalled

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

The instrument must be disposed according to the local legislation about the collection for electrical and electronic equipment.

PT ▪ 18/06

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