EV3B21/EV3B31 Basic controllers for normal temperature bottle coolers, refrigerated cabinets, tables and pizza counters, with energy saving strategies

GB ENGLISH

IMPORTANT

Read this document thoroughly before installation and before use of the device and follow all recommendations; keep this document with the device for future consultation.

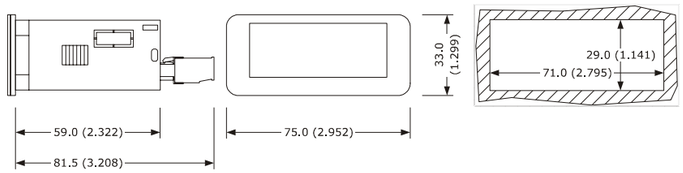
Only use the device in the way described in this document; do not use the same as a safety device.

The device must be disposed of in compliance with local standards regarding the collection of electric and electronic equipment.

1 DIMENSIONS AND INSTALLATION

1.1 Dimensions

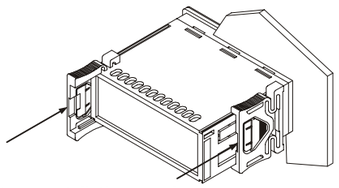
Dimensions are expressed in mm (in).



59.0 (2.322) is the depth with fixed screw connection terminal blocks; 81.5 (3.208) is the depth with removable screw connection terminal blocks.

1.2 Installation

Panel installation with snap-in brackets.

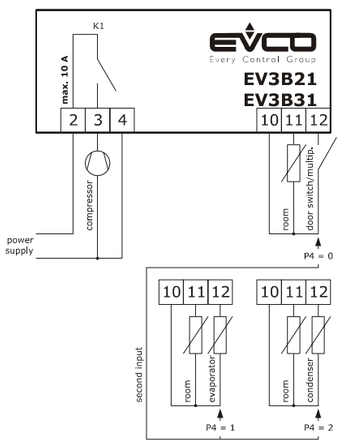


1.3 Installation warnings

- the thickness of the panel on which the devise is to be installed must be between 0.8 and 2.0 mm (0.031 and 0.078 in)
- make sure that the device work conditions (temperature of use, humidity, etc.) lie within the limits indicated; see chapter 8
- do not install the device near to any heat sources (heating elements, hot air ducts etc.), equipment containing powerful magnets (large diffusers, etc.), areas affected by direct sunlight, rain, humidity, excessive dust, mechanical vibrations or shocks
- in compliance with safety standards, the device must be installed correctly and in a way to protect against any contact with electric parts; all parts that ensure protection must be fixed in a way that they cannot be removed without the use of tools.
- disconnect the device power supply before proceeding with any type of maintenance
- position the power cables as far away as possible from the signal cables
- for repairs and information regarding the device, contact the EVCO sales network.

2 ELECTRIC CONNECTION

2.1 Electric connection



2.2 Warnings for the electric connection

- do not use electric or pneumatic screwdrivers on the device terminal board
- if the device has been taken from a cold to hot place, humidity could condense inside; wait about 1 hour before powering it
- check that the power supply voltage, mains frequency and electric power fall within the set limits; see chapter 8

3 USER INTERFACE

3.1 Preliminary notes

Operating statuses:

- "on" status (the device is powered and is on; utilities may be on
- stand-by" status (the device is powered but is switched off via software; utilities are off
- the "off" status: the device is not powered; utilities are off.

Hereafter, if the POF parameter is set to 0, with the word "switch-on" means the passage from "off" status to "on" status; the word "switch-off" means the passage from "on" status to "off" status.

If the POF parameter is set to 1, with the word "switch-on" means the passage from "stand-by" status to "on" status; the word "switch-off" means the passage from "on" status to "stand-by" status.

When the power is switched back on, the device displays the status that it was in at the time it was disconnected.

3.2 Device switch-on/off

If the POF parameter is set to 0:

1. Connect/disconnect the device power supply.

If the POF parameter is set to 1:

2. Make sure that the keyboard is not locked and that no procedure is in progress.
3. Touch the | ⏻ | key for 4 s: the ⏻ LED will flash, after which it will turn off/on.

3.3 The display

If the device is switched on, during normal operation, the display will show the magnitude established with P5, except during defrost, when the device will show the temperature established with d6 parameter.

If the device is switched off, the display will be switched off; the ⏻ LED shall be on.

If the device is in "low consumption" mode, the display will be switched off and the ◐ LED shall be on.

3.4 Temperature display as detected by the probes

1. Make sure that the keyboard is not locked and that no procedure is in progress.
2. Touch the | ∨ | key for 4 s: the display will show the first label available.
3. Touch the | ∧ | or | ∨ | key to select a label.
4. Touch the | SET | key.

The following table shows the correspondence between the labels and the temperature displayed.

Label	Displayed temperature
Pb1	room temperature
Pb2	if the P4 parameter is set to 1, evaporator temperature if the P4 parameter is set to 2, condenser temperature

To exit the procedure:

5. Touch the | SET | key or do not operate for 60 s.
6. Touch the | ⏻ | key.

If the second input functions as digital input (that is to say, if the P4 parameter is set to 0), the "**Pb2**" label shall not be displayed.

3.5 Defrost manual activation

1. Make sure that the keyboard is not locked and that no procedure is in progress.
2. Touch the | ❄ | key for 4 s.

If the second input functions as evaporator probe (that is to say, if the P4 parameter is set to 1) and when the defrost starts the evaporator temperature exceeds the value set with the d2 parameter, the defrost shall not be activated.

3.6 Keyboard locking/unlocking

To lock the keyboard proceed as follows:

1. Make sure no procedure is in progress.
2. Do not operate for 30 s: the display will show the message "**Loc**" for 1 s and the keybord shall lock automatically.

To unlock the keyboard:

3. Touch a key for 1 s: the display will show the message "**UnL**" for 1 s.

4 SETTINGS

4.1 Setting the working setpoint

1. Make sure that the keyboard is not locked and that no procedure is in progress.
2. Touch the | SET | key: the LED ❄ will flash.
3. Touch the | ∧ | or | ∨ | key within 15 s; see also r1 and r2 parameters.
4. Touch the | SET | key or do not operate for 15 s: the LED ❄ will switch off after which, the device will exit the procedure.

To exit the procedure before the operation is complete:

5. Touch the | ⏻ | (any changes will not be saved).

The working setpoint can also be set via SP parameter.

4.2 Setting the configuration parameters

To access the procedure:

1. Make sure no procedure is in progress.
2. Touch the | SET | key for 4 s: the display will show "**PA**".
3. Touch the | SET | key.
4. Touch the | ∧ | or | ∨ | key within 15 s to set the value determined with the "**PAS**" parameter (the parameter is set at "**-19**" by default).
5. Touch the | SET | or do not operate for 15 s: the display will show "**SP**".

To select a parameter:

6. Touch the | ∧ | or | ∨ | key.

To set a parameter:

7. Touch the | SET | key.
8. Touch the | ∧ | or | ∨ | key within 15 s.
9. Touch the | SET | key or do not operate for 15 s.

To exit the procedure:

10. Touch the | SET | key for 4 s or do not operate for 60 s (any changes will be saved).

After setting the parameters, suspend power supply flow to the device.

4.3 Manufacturer's settings

To access the procedure:

1. Make sure no procedure is in progress.
2. Touch the | SET | key for 4 s: the display will show "**PA**".
3. Touch the | SET | key.

To restore the manufacturer's settings:

4. Touch the | ∧ | or | ∨ | key within 15 s to set "**149**".
5. Touch the | SET | key or do not operate for 15 s: the display will show "**dEF**".
6. Touch the | SET | key.
7. Touch the | ∧ | or | ∨ | key within 15 s to set "**4**".
8. Touch the | SET | key or do not operate for 15 s: the display will show a flashing "**- - -**" for 4 s, after which the device will exit the procedure.
9. Cut the device power supply off.

Make sure that the manufacturer's settings are appropriate; see chapter 9.

To store customized settings as manufacturer's:

10. Set the configuration parameters (with the procedure described in paragraph 4.2).
11. From step 4. touch the | ∧ | or | ∨ | key within 15 s to set "**161**".
12. Touch the | SET | key or do not operate for 15 s: the display will show "**MAP**".
13. Repeat steps 6. 7. 8. and 9.

To exit the procedure in advance:

14. Touch the | SET | key for 4 s during the procedure (i.e. before setting "**4**": Restore will not be performed).

5 WARNING LIGHTS AND DIRECTIONS

5.1 Signals

LED	Meaning
❄	Compressor LED If the LED is on, the compressor is on If the LED is flashing: - the working setpoint is in the process of being set (via the procedure described in paragraph 4.1) - a compressor protection will be in progress
❄	Defrost LED If the LED is on, defrost is in progress If the LED is flashing, dripping will be in progress
◐	Energy saving LED If the LED is on and the display is switched on, the "energy saving" function is in progress If the LED is on and the display is switched off, the "low consumption" function is in progress; touch a key to restore normal display
°C	Celsius degrees LED If the LED is on, the unit of measurement for temperature is Celsius degrees
°F	Fahrenheit degrees LED If the LED is on, the unit of measurement for temperature is Fahrenheit degrees
⏻	LED on/stand-by If the LED is on, the device is switched off

5.2 Signals

Code	Meaning
Loc	the keyboard is blocked; see paragraph 3.6
- - -	the operation requested is not available

6 ALARMS

6.1 Alarms

Code	Meaning
AL	Minimum temperature alarm Solutions: - check the room temperature; see A1 parameter Main consequences: - the device will continue to operate normally
AH	Maximum temperature alarm Solutions: - check the room temperature; see A4 parameter Main consequences: - the device will continue to operate normally
id	Door switch input alarm Solutions: - check the causes of the activation of the input; see i0 and i1 parameters Main consequences: - the effect established with the i0 parameter
iA	Multifunction input alarm or pressure switch alarm Solutions: - check the causes of the activation of the input; see i0 and i1 parameters Main consequences: - the effect established with the i0 parameter
COH	Condenser overheated alarm Solutions: - check the condenser temperature; see C6 parameter Main consequences: - the device will continue to operate normally
CSd	Compressor shut down alarm Solutions: - check the condenser temperature; see C7 parameter - switch the device off and back on again: if when the device is switched back on, the temperature of the condenser is still higher than that established in C7 parameter, disconnect the power supply and clean the condenser Main consequences: - the compressor will be switched off
dFd	Defrost alarm switched off because maximum time has been reached Solutions: - check the integrity of the evaporator probe; see d2, d3 and d11 parameters - touch a key to restore normal display Main consequences: - the device will continue to operate normally

When the cause of the alarm disappears, the device restores normal operation, except for the following alarms:

- compressor shut down alarm (code "**CSd**") which requires the switching off of the device or the temporary suspension of the power supply
- defrost alarm switched off because maximum time has been reached (code "**dFd**") which requires the touching of a key.

7 ERRORS

7.1 Errors

Code	Meaning
Pr1	Room temperature probe error Solutions: - check that the probe is the PTC or NTC type; see P0 parameter - check the device-probe connection - check room temperature Main consequences: - compressor activity will depend on C4 and C5 parameters - the defrost will not be activated
Pr2	Evaporator probe or condenser probe error Solutions: - the same as in the previous example, but with regard to the evaporator probe or the condenser probe Main consequences: - if P4 parameter is set at 1, the defrost interval will last for the amount of time set with d3 parameter - if P4 parameter is set at 1 and d8 parameter is set at 2 or to 3, the device will operate as if d8 parameter were set at 0 - if P4 parameter is set at 2, the condenser overheated alarm (code "**COH**") will never be activated - if P4 parameter is set at 2, the compressor shut down alarm (code "**CSd**") will never be activated

When the cause of the error disappears, the device restores normal operation.

8 TECHNICAL DATA

8.1 Technical data

Purpose of the command device: operating command device.

Construction of the command device: built-in electronic device.

Container: grey self-extinguishing.

Heat and fire protection class: D.

Dimensions: according to model:

- 75.0 x 33.0 x 59.0 mm (2.952 x 1.299 x 2.322 in; L x H x P) with fixed screw connection terminal blocks
- 75.0 x 33.0 x 81.5 mm (2.952 x 1.299 x 3.208 in; L x H x P) with removable screw connection terminal blocks.

Method of mounting the command device: on panel, with snap-in brackets.

Shell protection rating: IP65 (the front one).

Connection method: according to model:

- fixed screw connection terminal blocks for wires up to 2.5 mm² (0.0038 in²): power supply, analog inputs, digital inputs and digital outputs
- removable screw connection terminal blocks for wires up to 2.5 mm² (0.0038 in²): power supply, analog inputs, digital inputs and digital outputs.

The maximum lengths of the connection cables are:

- power supply: 10 m (32.8 ft)
- analog inputs: 10 m (32.8 ft)
- digital inputs: 10 m (32.8 ft)
- digital outputs: 10 m (32.8 ft).

Operating temperature: from 0 to 55 °C (from 32 to 131 °F).

Storage temperature: from -25 to 70 °C (from -13 to 158 °F).

Humidity for use: from 10 to 90 % relative humidity without condensate.

Command device pollution situation: 2.

Environmental standards:

- RoHS 2011/65/CE
- WEEE 2012/19/EU
- REACH (CE) regulation n. 1907/2006.

EMC standards:

- EN 60730-1
- IEC 60730-1.

Power supply: 230 VAC (+10 % -15%), 50... 60 Hz (±3 Hz), 2 VA.

Control device grounding method: none.

Rated impulse voltage: 4 KV.

Overvoltage category: III.

Class and structure of software: A.

Analog inputs: 1 input (room temperature) configurable via configuration parameter for PTC or NTC probes.

Analog inputs PTC (990 Ω @ 25 °C, 77 °F)

Type of sensor:	KTY 81-121.
Measurement field:	from -50 to 150 °C (from -58 to 302 °F).
Resolution:	0,1 °C (1 °F).

Analog inputs NTC (10 KΩ @ 25 °C, 77 °F)

Type of sensor:	ß3435.
Measurement field:	from -40 to 105 °C (from -40 to 221 °F).
Resolution:	0,1 °C (1 °F).

Others inputs: 1 input configurable via configuration parameter for analog input (evaporator probe or condenser probe) or digital input (door switch or multifunction).

Digital inputs (free of voltage contact 5 VDC 1.5 mA)

Displays: 3 digit custom display, with function icons.

Digital outputs:

- 1 output (SPST electromechanical relay with 16 A res. @ 250 VAC) for compressor management in model EV3B21
- 1 output (SPST electromechanical relay with 30 A res. @ 250 VAC) for compressor management in model EV3B31.

The maximum allowable current on the load in 10 A.

Classification of the command device according to protection against electric shock: class II, according to the EMC standard EN 60730-1 §2.7.5.

Type 1 or Type 2 actions: type 1.

Complementary features of Type 1 or Type 2 actions: C.

9 WORKING SETPOINT AND CONFIGURATION PARAMETERS

9.1 Working Setpoint

	MIN.	MAX.	U.M.	DEF.	WORKING SETPOINT
	r1	r2	°C/°F (1)	0,0	working setpoint; see also r0 and r12

9.2 Parametri di configurazione

PARAM.	MIN.	MAX.	U.M.	DEF.	WORKING SETPOINT
SP	r1	r2	°C/°F (1)	0,0	working setpoint; see also r0 and r12
PARAM.	MIN.	MAX.	U.M.	DEF.	ANALOG INPUTS
CA1	-25	25,0	°C/°F (1)	0,0	room probe offset
CA2	-25	25,0	°C/°F (1)	0,0	if P4 = 1, evaporator probe offset if P4 = 2, condenser probe offset
P0	0	1	- - -	1	probe type (0 = PTC; 1 = NTC)
P1	0	1	- - -	1	degree Celsius decimal point (during normal operation) 1 = YES
P2	0	1	- - -	0	unit of measurement for temperature (2) 0 = °C (Celsius degree; resolution depends on P1 parameter) 1 = °F (Fahrenheit degree; resolution is 1 °F)
P4	0	2	- - -	0	second input function 0 = digital input (door switch or multifunction) 1 = analog input (evaporator probe) 2 = analog input (condenser probe)
P5	0	2	- - -	0	magnitude displayed during normal operation 0 = room temperature 1 = working setpoint 2 = if P4 = 0, "- - -" if P4 = 1, evaporator temperature if P4 = 2, condenser temperature
P8	0	250	0,1 s	5	delayed display of temperature changes as detected by the probes
PARAM.	MIN.	MAX.	U.M.	DEF.	MAIN REGULATOR
r0	0,1	15,0	°C/°F (1)	2,0	working setpoint differential; see also r12
r1	-99	r2	°C/°F (1)	-40	minimum working setpoint
r2	r1	99,0	°C/°F (1)	50,0	maximum working setpoint
r4	0,0	99,0	°C/°F (1)	0,0	working setpoint increase during the "energy saving" function; see also i0, i10 and HE2
r5	0	1	- - -	0	cooling or heating operation (3) 0 = cooling 1 = heating
r12	0	1	- - -	1	working setpoint differential type 0 = asymmetric 1 = symmetric
PARAM.	MIN.	MAX.	U.M.	DEF.	COMPRESSOR PROTECTION SYSTEM
C0	0	240	min	0	delay in switching on of compressor after the device switches on (4)
C2	0	240	min	3	minimum compressor switch-off duration (5)
C3	0	240	s	0	minimum duration of compressor switch on time
C4	0	240	min	0	duration of compressor switch off time during a room temperature probe error (code "**Pr1**"); see also C5
C5	0	240	min	10	duration of compressor switch on time during a room temperature probe error (code "**Pr1**"); see also C4
C6	0,0	199	°C/°F (1)	80,0	condenser temperature is higher than that at which the condenser overheating alarm is activated (code "**COH**") (6)
C7	0,0	199	°C/°F (1)	90,0	condenser temperature above which the compressor shut down alarm is activated (code "**CSd**")
C8	0	15	min	1	compressor shut down alarm delay (code "**CSd**") (7)
PARAM.	MIN.	MAX.	U.M.	DEF.	DEFROST
d0	0	99	h	8	if d8 = 0, 1 or 2, defrost interval 0 = interval defrost will never be activated if d8 = 3, maximum defrost interval
d2	-99	99,0	°C/°F (1)	2,0	evaporator temperature at end of defrost; see also d3
d3	0	99	min	30	if P4 = 0 or 2, defrost duration if P4 = 1, maximum defrost duration; see also d2 0 = defrost will not be activated
d4	0	1	- - -	0	defrost when device is switched on (4) 1 = YES
d5	0	99	min	0	if d4 = 0, minimum time between switching on of device and activation of defrost (4) if d4 = 1, delay in activation of defrost after device is switched on (4)
d6	0	2	- - -	1	temperature displayed during defrost (only if P5 = 0) 0 = room temperature 1 = if on activation of defrost, the room temperature is below the "work setpoint + + Δt", at maximum " work setpoint + Δt"; if on activation of defrost, the room temperature is above "work setpoint + Δt", at maximum the room temperature on activation of defrost (8) (9) 2 = label "**dEF**"
d7	0	15	min	2	dripping duration (during dripping the compressor will remain switched off)
d8	0	3	- - -	0	defrost activation methods 0 = AT INTERVALS - FOR TIME - defrost will be activated once the device has altogether been running for time d0 1 = AT INTERVALS - FOR COMPRESSOR SWITCH-ON - defrost will be activated once the compressor has altogether been switched on for time d0 2 = AT INTERVALS - FOR EVAPORATOR TEMPERATURE - defrost will be activated when the evaporator temperature has remained below the temperature d9 for a total time of d0 (10) 3 = ADAPTIVE - defrost will be activated at intervals, whose duration will each time depend on the duration of compressor switch-ons, the evaporator temperature and the door switch input activation; see also d18, d19, d20, d22, i13 and i14 (10)
d9	-99	99,0	°C/°F (1)	0,0	evaporator temperature is higher than that at which the defrost interval counter is suspended (only if d8 = 2)
d11	0	1	- - -	0	defrost alarm switches off once maximum time limit has been reached (code "**dFd**"; only if P4 = 1 and in absence of evaporator probe error (code "**Pr2**") 1 = YES
d18	0	999	min	40	defrost interval (defrost will be activated when the compressor has been on totally, with the evaporator temperature below that of d22, for time d18; only if d8 = 3) 0 = defrost will never be activated due to the effect of this condition
d19	0,0	40,0	°C/°F (1)	3,0	evaporator temperature below which the defrost is activated (relative to the evaporator temperatures average, or "evaporator temperatures average - d19"; only if d8 = 3)
d20	0	999	min	180	minimum consecutive time the compressor must be switched on such as to provoke the defrost activation 0 = defrost will never be activated due to the effect of this condition
d22	0,0	19,9	°C/°F (1)	2,0	evaporator temperature above which the defrost interval count shall be suspended (relating to the average of evaporator temperatures, that is to say, "evaporator temperatures average + d22"; only if d8 = 3); see also d18
PARAM.	MIN.	MAX.	U.M.	DEF.	TEMPERATURE ALARMS (11) (12)
A1	0,0	99,0	°C/°F (1)	10,0	room temperature below which the minimum temperature alarm is triggered (code "**AL**"; it concerns the working setpoint, that is to say, "working setpoint - A1"); see also A11 0 = alarm absent
A4	0,0	99,0	°C/°F (1)	10,0	room temperature above which the maximum temperature alarm is triggered (code "**AH**"; it concerns the working setpoint, that is to say, "working setpoint + A4"); see also A11 0 = alarm absent
A6	0	99	10 min	12	delay in maximum temperature alarm (code "**AH**") after the device is switched on (4)
A7	0	240	min	15	minimum temperature alarm delay (code "**AL**") and maximum temperature alarm delay (code "**AH**")
A11	0,1	15,0	°C/°F (1)	2,0	differential of A1 and A4 parameters
PARAM.	MIN.	MAX.	U.M.	DEF.	DIGITAL INPUTS
i0	0	4	- - -	1	effect caused by the activation of the digital input 0 = no effect 1 = DOOR SWITCH - DOOR SWITCH INPUT ALARM ACTIVATION (code "**id**") - the compressor will be switched off (at maximum for time i3 or until the input is deactivated); see also i2 (13) 2 = MULTIFUNCTION - ACTIVATION OF "ENERGY SAVING" FUNCTION - the "energy saving" function will be activated (just with effect on the compressor, until the input is deactivated); see also r4 3 = MULTIFUNCTION - ACTIVATION OF MULTIFUNCTION INPUT ALARM (code "**iA**") - the device will continue to operate normally; see also i2 4 = MULTIFUNCTION - ACTIVATION OF THE MAXIMUM PRESSURE SWITCH ALARM (code "**iA**") - the compressor will be switched off (until the input is deactivated); see also i2
i1	0	1	- - -	0	type of digital input contact 0 = normally open (active input with closed contact) 1 = normally closed (active input with open contact)
i2	-1	120	min	30	if i0 = 1, delay in signalling of door switch input alarm (code "**id**") -1 = the alarm will not be signalled if i0 = 3, delay in signalling of multifunction input alarm (code "**iA**") -1 = the alarm will not be signalled if i0 = 4, delay in switching on of compressor after the deactivation of the maximum pressure switch alarm (code "**iA**") -1 = reserved
i3	-1	120	min	15	maximum duration of the effect caused by the activation of the door switch input on the compressor -1 = the effect will last until the input is deactivated
i10	0	999	min	0	time that must pass in absence of door switch input activations (after the room temperature has reached the working setpoint) for the "energy saving" function to be activated; see also r4 and HE2 0 = the function will never be activated due to the effect of this condition
i13	0	240	- - -	180	number of door switch input activations such as to provoke the defrost activation 0 = defrost will never be activated due to the effect of this condition
i14	0	240	min	32	minimum duration of the door switch input activation such as to provoke the defrost activation 0 = defrost will never be activated due to the effect of this condition
PARAM.	MIN.	MAX.	U.M.	DEF.	ENERGY SAVING
HE2	0	999	min	0	maximum duration of the "energy saving" function activated due to the effect of absence of door switch input activation; see also r4 and i10 0 = the function will last until the input is activated
HE3	0	240	min	2	time interval with no key strokes, after which the "low consumption" function is activated 0 = the mode shall never be aactivated
PARAM.	MIN.	MAX.	U.M.	DEF.	VARIOUS
POF	0	1	- - -	1	⏻ key activation 1 = YES
PAS	-99	999	min	-19	access password for the configuration parameters 0 = the password need not be set

Notes:

(1) the unit of measurement depends on P2
(2) properly set the parameters corresponding to the regulators after setting P2 parameter
(3) if r5 parameter is set at 1, the "energy saving" function and the defrost management will be switched off
(4) the parameter has effect even after an interruption in the power supply that occurs while the device is switched on
(5) the time set by paramenter C2 is counted also when the device is off
(6) the differential of parameter is 2.0°C/4°F
(7) if when the device is switched on, the condenser temperature is already above that established in C7 parameter, then C8 parameter will not have effect
(8) the value Δt depends on r12 parameter (r0 if r12 = 0, r0/2 if r12 = 1)
(9) the display restores normal operation when, at the end of the dripping phase, room temperature falls below the value that locked the display (or if a temperature alarm is triggered)
(10) if P4 parameter is set at 0 or 2, the device will function as if d8 parameter were set at 0
(11) during defrost and dripping, the maximum temperature alarm is absent, provided that it was triggered after defrost activation.
(12) during activation of the door switch input, the maximum temperature alarm is absent, provided the alarm was signaled after the activation of the input
(13) the compressor is switched off 10 s after the activation of the input.

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