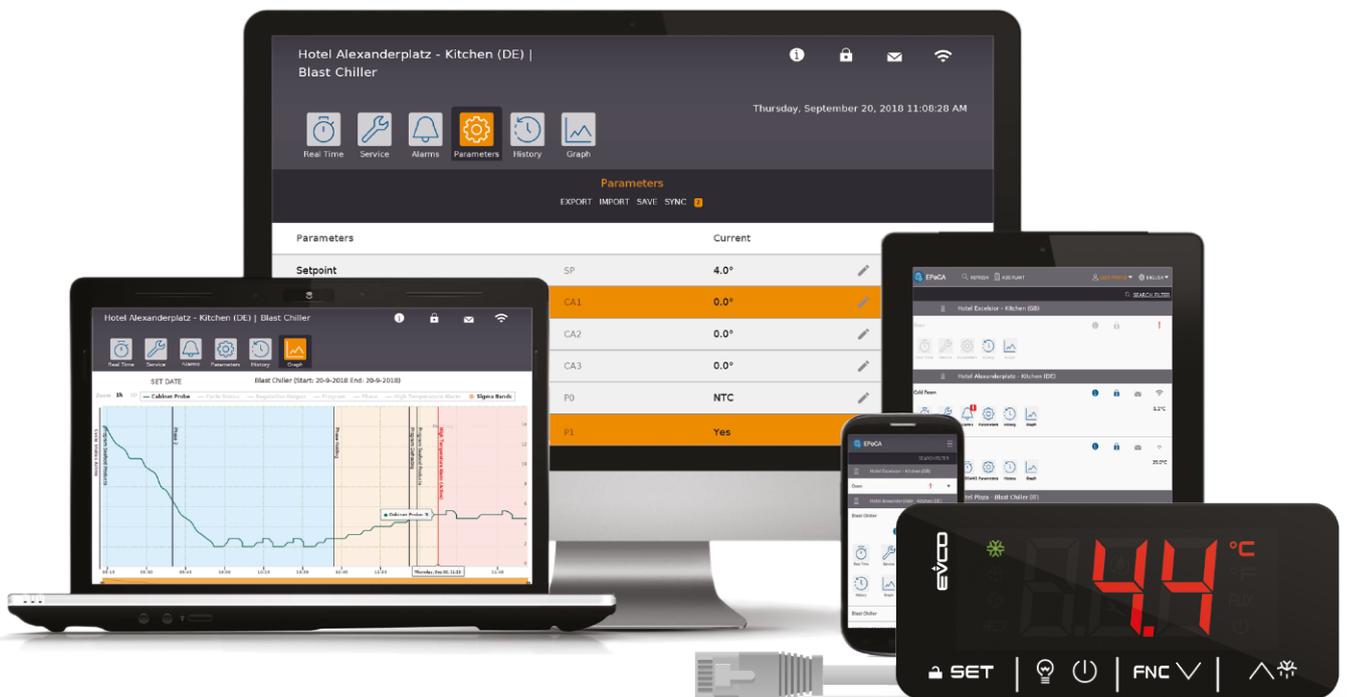


# EV3 200 WEB

Controller - Gateway for a network of up to 10 devices





<b>IMPORTANT INFORMATION</b>	<b>4</b>
<b>IMPORTANT SAFETY INFORMATION</b>	<b>5</b>
<b>SAFETY INFORMATION RELATING TO THE PRODUCT</b>	<b>6</b>
<b>1. INTRODUCTION</b>	<b>7</b>
1.1 DESCRIPTION	7
1.2 FEATURES	7
1.3 ACCESSORIES	7
<b>2. TECHNICAL SPECIFICATIONS</b>	<b>8</b>
2.1 TECHNICAL SPECIFICATIONS	8
2.1.1 EV3 200 WEB	8
2.2 I/O FEATURES	8
2.2.1 EV3 200 WEB	8
<b>3. MECHANICAL ASSEMBLY</b>	<b>10</b>
3.1 BEFORE STARTING	10
3.2 INFORMATION ON INSTALLATION AND THE ENVIRONMENT	10
3.3 DIMENSIONS	11
3.4 INSTALLATION	11
3.4.1 Minimum distances	12
<b>4. ELECTRICAL CONNECTIONS</b>	<b>13</b>
4.1 WIRING BEST PRACTICES	13
4.1.1 Wiring guidelines	13
4.1.2 Fixed screw terminal blocks guidelines	13
4.1.3 Permitted lengths of wiring	14
4.2 WIRING DIAGRAM	14
<b>5. USER INTERFACE</b>	<b>15</b>
5.1 INTERFACE	15
5.2 TOUCH KEYS	15
5.3 ICONS	15
5.4 CONTROLLER OPERATION	16
5.4.1 Switching the controller ON/OFF	16
5.4.2 Unlocking the keypad	16
5.4.3 Setting/changing the setpoint	16
5.4.4 Activating manual defrost	16
5.4.5 Functions that can be activated by key	17
5.4.6 Activating the AUX digital output by key	17
5.4.7 Accessing the parameters	17
<b>6. DEFROST</b>	<b>18</b>
6.1 INTRODUCTION	18
6.1.1 Types of defrost	18



<b>6.2 ADAPTIVE DEFROST</b> .....	<b>18</b>
6.2.1 Defrost with Hours device ON .....	18
6.2.2 Defrost with Hours compressor ON .....	19
6.2.3 Defrost with Evaporator temperature .....	19
6.2.4 Adaptive defrost .....	20
6.2.5 Modular defrost: In real time (RTC) .....	21
<b>6.3 STANDARD DEFROST</b> .....	<b>22</b>
6.3.1 Defrost with electrical heaters .....	22
6.3.2 Defrost with cycle reversed (hot gas) .....	24
6.3.3 Defrost when compressor stops .....	26
<b>7. REGULATORS</b> .....	<b>27</b>
<b>7.1 HEATING/COOLING TEMPERATURE</b> .....	<b>27</b>
7.1.1 Operation .....	27
<b>7.2 HEATING/COOLING TEMPERATURE IN THE NEUTRAL ZONE</b> .....	<b>27</b>
7.2.1 Operation .....	27
<b>7.3 Compressor</b> .....	<b>28</b>
7.3.1 Operating diagrams .....	29
<b>7.4 DOUBLE COMPRESSOR</b> .....	<b>30</b>
7.4.1 Operating Diagram .....	30
<b>7.5 EVAPORATOR FANS</b> .....	<b>31</b>
7.5.1 Regulator operation .....	31
7.5.2 Operating mode .....	31
7.5.3 Operation during defrost .....	31
7.5.4 Fan operation during dripping .....	31
<b>7.6 CONDENSER FANS</b> .....	<b>32</b>
7.6.1 Operation .....	32
<b>7.7 ENERGY SAVING</b> .....	<b>32</b>
7.7.1 Operation .....	32
<b>8. REMOTE COMMUNICATION CONFIGURATION</b> .....	<b>33</b>
<b>8.1 INTRODUCTION</b> .....	<b>33</b>
8.1.1 Configuration diagram when using a smartphone and the EVLink Wi-Fi app .....	33
8.1.2 Configuration diagram when using a PC with direct connection via USB .....	33
8.1.3 Configuration diagram when using a PC with connection via Ethernet .....	34
<b>8.2 FIRST CONFIGURATION</b> .....	<b>34</b>
8.2.1 Configuration using a PC .....	34
8.2.2 Configuration using a smartphone or tablet .....	37
<b>9. REGULATION PARAMETERS</b> .....	<b>40</b>
<b>9.1 TABLE OF REGULATION PARAMETERS</b> .....	<b>40</b>
<b>10. DIAGNOSTICS</b> .....	<b>45</b>
<b>10.1 TABLE OF ALARMS</b> .....	<b>45</b>

# IMPORTANT INFORMATION

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## Liability and residual risks

EVCO assumes no liability for any damage caused by the following (by way of example; this is not an exhaustive list):

- Installation/use for purposes other than those specified and, in particular, not adhering to the safety provisions set out by current regulations in the country in which the product is installed and/or contained in this manual;
- Use in appliances that do not guarantee sufficient protection against electric shocks, water and dust within the installation conditions created;
- Use in appliances that allow access to hazardous parts without the use of a keyed or tooled locking mechanism when accessing the instrument;
- Tampering and/or modifying the product;
- Installation/use in appliances which do not comply with current regulations in the country in which the product is installed.

The customer/manufacturer is responsible for ensuring their machine complies with these regulations.

EVCO's responsibility is limited to the correct and professional use of the product in accordance with regulations and the instructions contained in this manual and other product support documents.

To comply with EMC standards, observe all the electrical connection instructions. As it depends on the wiring configuration as well as the load and the installation type, compliance must be verified for the final machine as specified by the relevant product standard.

## Disclaimer

This document is the exclusive property of EVCO. It contains a general description and/or a description of the technical specifications for the features offered by the products listed herein. This document should not be used to determine the suitability or reliability of these products in relation to specific user applications. Each user or integration specialist should conduct their own complete and appropriate risk analysis, in addition to carrying out a product evaluation and test in relation to its specific application or use. Users can send us comments and suggestions on how to improve or correct this publication.

Neither EVCO nor any of its associates or subsidiaries shall be held responsible or liable for improper use of the information contained herein.

EVCO has a policy of continuous development, therefore reserves the right to make changes and improvements to any product described in this document without prior notice.

The images in this document and other documentation supplied with the product are provided for illustrative purposes only and may differ from the product itself.

The technical data in this manual is subject to change without prior notice.

## Terms and Conditions of use

### Permitted use

The device must be installed and used in accordance with the instructions provided and, in particular, hazardous live parts must not be accessible under normal conditions.

The device must be suitably protected from water and dust with regard to its application and must also only be accessible with the aid of a tool (with the exception of the front panel).

Only qualified personnel may install the product or perform technical support procedures on it.

The customer must only use the product as described in the documentation relating to that product.

### Prohibited use

Any use other than those described in the "**Permitted use**" section and in the product support documentation is prohibited.

## Disposal



The device must be disposed of according to local regulations governing the collection of electrical and electronic equipment.

## Consider the environment



The company strives to respect the environment, taking account of customer requirements, technological innovations in terms of materials and the expectations of the community to which we belong. EVCO places great importance on respecting the environment, encouraging all associates to become involved with company values and guaranteeing safe, healthy and functional working conditions and workplaces.

**Please consider the environment before printing this document.**

## IMPORTANT SAFETY INFORMATION

Read this document carefully before installation and take all precautions before using the device. Only use the device in accordance with the methods described in this document. The following safety messages may be repeated several times in the document, to provide information regarding potential hazards or to attract attention to information which may be useful in explaining or clarifying a procedure.



This symbol is used to indicate a risk of electric shock.  
It is a safety indication and as such, should be observed to avoid potential accidents or fatalities.



This symbol is used to indicate a risk of serious personal injury.  
It is a safety indication and as such, should be observed to avoid potential accidents or fatalities.

### **DANGER**

**DANGER** indicates a situation of imminent danger which, if not avoided, **will result in death or serious injury.**

### **WARNING**

**WARNING** indicates a situation of imminent danger which, if not avoided, **may result in death or serious injury.**

### **CAUTION**

**CAUTION** indicates a potentially hazardous situation which, if not avoided, **could cause minor or moderate injury.**

### **NOTICE**

**NOTICE** indicates a situation not related to physical injuries but which, if not avoided, could damage the equipment.

**N.B.** The maintenance, repair, installation and use of electrical equipment must only be entrusted to qualified personnel.

#### **QUALIFIED PERSONNEL**

Only suitably trained and experienced personnel capable of understanding the content of this manual and all documentation regarding the product are authorised to work on and with this equipment. Furthermore, the personnel must have completed courses in safety and must be able to recognise and prevent the implied dangers. The personnel must have suitable training, knowledge and experience at a technical level, and be capable of anticipating and detecting potential risks caused by using the product, as well as changing the settings and modifying the mechanical, electric and electronic equipment for the entire system in which the product is used. All personnel working on and with the product must be entirely familiar with the relevant standards and directives, as well as safety regulations.

## SAFETY INFORMATION RELATING TO THE PRODUCT

Before carrying out any work on the equipment, read these instructions carefully, making sure you understand everything.

### DANGER

#### RISK OF ELECTRIC SHOCK, EXPLOSION OR ELECTRIC ARC

- Only use electrically insulated measuring devices and equipment.
- Do not install the equipment while the power supply is connected.
- Switch off all equipment, including connected devices, before installing or uninstalling the device.
- Always use a correctly calibrated voltmeter to check the system is switched off.
- Do not touch the unshielded components or the terminals while they are live.
- Do not open, disassemble, repair or modify the product.
- Do not expose the equipment to liquids or chemicals.
- Before applying voltage to the equipment:
  - Make sure all protective elements, such as covers, hatches and grilles, are fitted and/or closed.
  - Check all wiring connections.

### DANGER

#### RISK OF ELECTRIC SHOCK AND FIRE

- Do not use the device with loads greater than those indicated in the technical specifications.
- Do not exceed the temperature and humidity ranges indicated in the technical specifications.
- Use the required safety interlocks (fuses and/or magnetothermal switches) of a suitable size.

### DANGER

#### RISK OF ELECTRIC SHOCK OR MALFUNCTIONING OF THE EQUIPMENT

Do not use damaged products or accessories.

This device was designed to operate in non-hazardous environments, excluding applications that generate, or could potentially generate, hazardous atmospheres. Only install this device in areas and for applications which are reliably free from hazardous atmospheres.

### DANGER

#### RISK OF EXPLOSION

- Only install and use this device in sites that are not at risk.
- Do not install or use this device in applications which are capable of generating hazardous atmospheres, such as applications that use flammable refrigerants.

### WARNING

#### MALFUNCTIONING OF THE EQUIPMENT

- Perform the wiring carefully, in compliance with electromagnetic compatibility requirements.
- Make sure the wiring is correct for the application.
- Use shielded cables for all I/O signal and communication cables.
- Minimise the length of the connections as much as possible and avoid winding the cables around electrically connected parts.
- The signal cables (analogue and digital inputs, communication and corresponding power supplies), power cables and power supply cables for the device must be routed separately.
- Before applying the power supply, check all the wiring connections.
- Use the required safety interlocks where personnel and/or equipment hazards exist.
- Install and operate this equipment in a cabinet appropriately rated for its intended environment and secured by a keyed or tooling locking mechanism.
- Power line and output circuits must be wired and fused in compliance with local and national regulatory requirements for the rated current and voltage of the particular equipment.
- Do not use this equipment in safety-critical machine functions.
- Do not disassemble, repair or modify this equipment.
- Do not connect wires to unused terminals and/or to terminals labelled "No connection "(N.C.)".

# 1. INTRODUCTION

## 1.1 DESCRIPTION

EVCO **EV3 200 Web** controllers remotely monitor up to 10 **EPoCA**-compatible controllers on the **EPoCA** cloud via the on-board Ethernet and RS-485 serial ports.

**EV3 200 Web** is compliant with HACCP regulations for food safety during food processing.

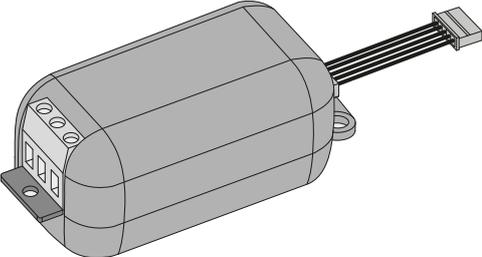
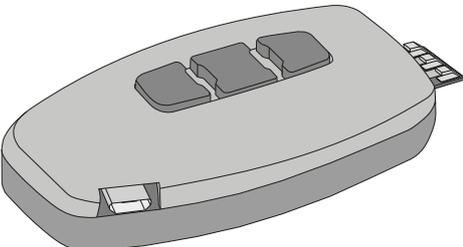
## 1.2 FEATURES

The main features of **EV3 200 Web** are:

- On-board regulation (defrost, compressor, energy saving etc...);
- 2 digital inputs;
- 2 analogue inputs for NTC probes;
- 4 relay outputs;
- 1 Ethernet RJ45 Modbus TCP/IP compatible serial port;
- 1 micro-B USB serial port;
- 1 RS-485 serial port;
- 1 32 MB internal memory;
- 1 year of HACCP data recording with 5-minute intervals, up to 3 probes;
- RTC shared with subnetwork;
- **EPoCA** compatible.

## 1.3 ACCESSORIES

The following accessories are available for **EV3 200 Web** controllers:

Type	P/n	Description
	EVTPN615F200	NTC PROBE THERM. 1.5 M 6x15 COSTFL
	EVTPN630F200	NTC PROBE THERM. 3.0 M 6x15 COSTFL
	0810500023	USB A-micro-B cable 1.5 m
	<b>EVIF22TSX</b>	Module for TTL/RS-485 serial interface
	<b>EV3KEY</b>	Programming key for EV3 regulation parameters

## 2. TECHNICAL SPECIFICATIONS

All the system components of the **EV3 200 WEB** controllers meet the requirements of the European Community (EC) for electric equipment. They must be installed in a casing or other location designated for the specific ambient conditions and to keep the possibility of involuntary contact with dangerous electrical voltages to a minimum. Use metal casings to improve the immunity of the **EV3 200 WEB** system to electromagnetic fields. This equipment meets EU requirements as shown in the tables below.

### WARNING

#### MALFUNCTIONING OF THE EQUIPMENT

Do not exceed the nominal values given in this section.

## 2.1 TECHNICAL SPECIFICATIONS

### 2.1.1 EV3 200 WEB

Type	Description
The product complies with the following harmonised standards:	EN60730-1 and EN60730-2-9
Device construction:	Built-in electronic device
Device purpose:	Operating control device
Type of action:	1
Pollution category:	2
Overvoltage category:	III
Rated impulse withstand voltage:	4000 V
Power supply:	115...230 Vac, $\pm 10\%$ , 50/60 Hz
Consumption:	10 VA maximum
Ambient operating conditions:	-10 ... 50 °C (14 ... 122 °F) 10 ... 90 % RH non-condensing
Transportation and storage conditions:	-20 ... 70 °C (-4 ... 158 °F) 10 ... 90 % RH non-condensing
Software class:	A
Environmental front protection:	IP65
Clock (RTC):	Built-in lithium battery
Clock drift:	$\leq 60$ s/month at 25 °C (77 °F)
Battery life:	30 days
Battery charging time:	24 h through device's power supply
Data memory:	32 MB
Data memory per device:	~2.7 MB

## 2.2 I/O FEATURES

### 2.2.1 EV3 200 WEB

Type	Description
Digital inputs:	2 voltage-free digital inputs
Analogue inputs for temperature:	2 analogue inputs for NTC probes
Digital output with non-hazardous voltage (SELV):	4 relay outputs
Serial:	1 Ethernet RJ45 10/100 MAC serial port 1 USB serial port

### Analogue input features

	Default	NTC 10 k $\Omega$ at 25 °C BETA 3435	PTC KTY 81-121 990 $\Omega$ at 25 °C	RH	Digital input
<b>Pb1</b>	Probe Temperature	•	---	---	---
<b>Pb2</b>	Probe Evaporator	•	---	---	---
<b>Range</b>	---	-40...105 °C (-40...220 °F)	---	---	---
<b>Resolution</b>	---	0.1 °C (1 °F)	---	---	---
<b>Input impedance</b>	---	10 k $\Omega$	---	---	---

### Digital output features

	Default	Description	Load (at 250 Vac)	Type of load
<b>Out1</b>	Compressor	SPDT	16 A	Resistive
<b>Out2</b>	AUX	SPDT	5 A	Resistive
<b>Out3</b>	Fans	SPDT	5 A	Resistive
<b>Out4</b>	Not configured	SPDT	8 A	Resistive

## 3. MECHANICAL ASSEMBLY

### 3.1 BEFORE STARTING

Read this manual carefully before installing the system.

In particular, the safety instructions, electrical requirements and current regulations for the machine or the process in which this device is involved must be observed. The use and application of the information contained herein require experience in the design and programming of automated control systems. Only the user, system integrator or machine builder can be aware of all the conditions and factors present during the installation, configuration, operation and maintenance of the machine or process, and can therefore determine the associated automation equipment and the related safeties and interlocks which can be effectively and properly used. When selecting automation and control equipment and any other related equipment or software for a particular application, always consider all the applicable local, regional or national standards and/or regulations.

#### **WARNING**

##### **REGULATORY NON-COMPLIANCE**

Make sure all the equipment used and the systems comply with all the applicable local, regional and national regulations.

### 3.2 INFORMATION ON INSTALLATION AND THE ENVIRONMENT

Before carrying out any work on the equipment, read these instructions carefully, making sure you understand everything.

#### **DANGER**

##### **RISK OF ELECTRIC SHOCK, EXPLOSION OR ELECTRIC ARC**

- Only use electrically insulated measuring devices and equipment.
- Do not install the equipment while the power supply is connected.
- Switch off all equipment, including connected devices, before installing or uninstalling the device.
- Always use a correctly calibrated voltmeter to check the system is switched off.
- Do not touch the unshielded components or the terminals while they are live.
- Do not open, disassemble, repair or modify the product.
- Do not expose the equipment to liquids or chemicals.
- Before applying voltage to the equipment:
  - Make sure all protective elements, such as covers, hatches and grilles, are fitted and/or closed.
  - Check all wiring connections.

This device was designed to operate in non-hazardous environments, excluding applications that generate, or could potentially generate, hazardous atmospheres. Only install this device in areas and for applications which are reliably free from hazardous atmospheres.

#### **DANGER**

##### **RISK OF EXPLOSION**

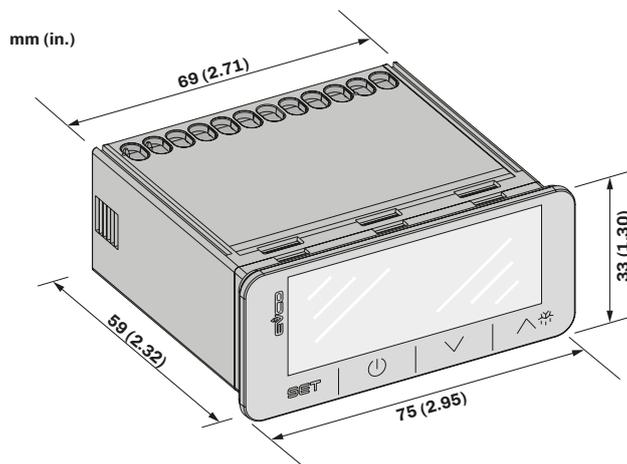
- Only install and use this device in sites that are not at risk.
- Do not install or use this device in applications which are capable of generating hazardous atmospheres, such as applications that use flammable refrigerants.

## **⚠ WARNING**

### **MALFUNCTIONING OF THE EQUIPMENT**

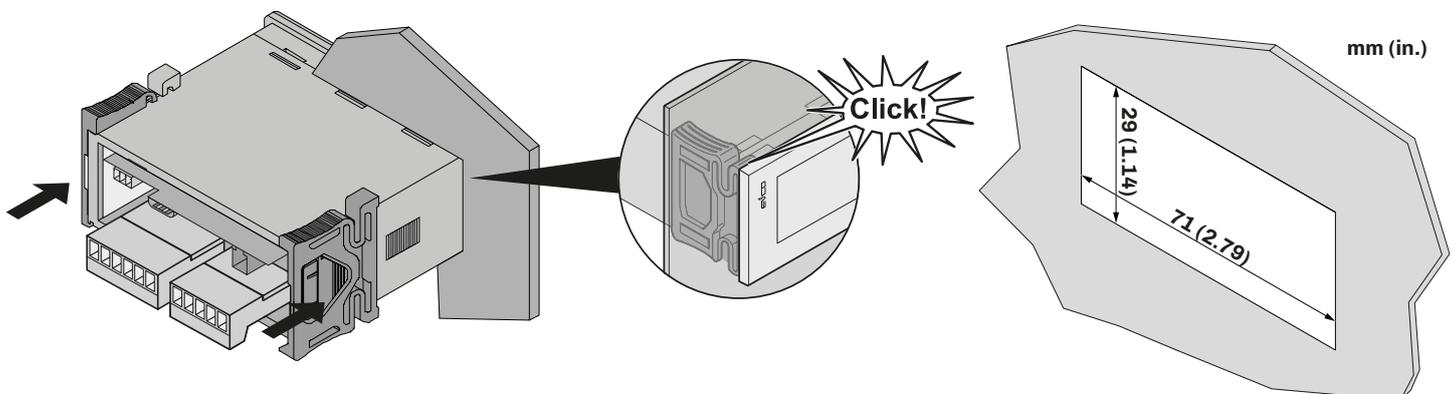
- Perform the wiring carefully, in compliance with electromagnetic compatibility and safety requirements.
- Make sure the wiring is correct for the application.
- Use shielded cables for all I/O signal and communication cables.
- Minimise the length of the connections as much as possible and avoid winding the cables around electrically connected parts.
- The signal cables (analogue and digital inputs, communication and corresponding power supplies), power cables and power supply cables for the device must be routed separately.
- Before applying the power supply, check all the wiring connections.
- Use the required safety interlocks where personnel and/or equipment hazards exist.
- Install and operate this equipment in a cabinet appropriately rated for its intended environment and secured by a keyed or toolled locking mechanism.
- Power line and output circuits must be wired and fused in compliance with local and national regulatory requirements for the rated current and voltage of the particular equipment.
- Do not use this equipment in safety-critical machine functions.
- Do not disassemble, repair or modify this equipment.
- Do not connect wires to unused terminals and/or to terminals labelled "No connection "(N.C.)".

### **3.3 DIMENSIONS**



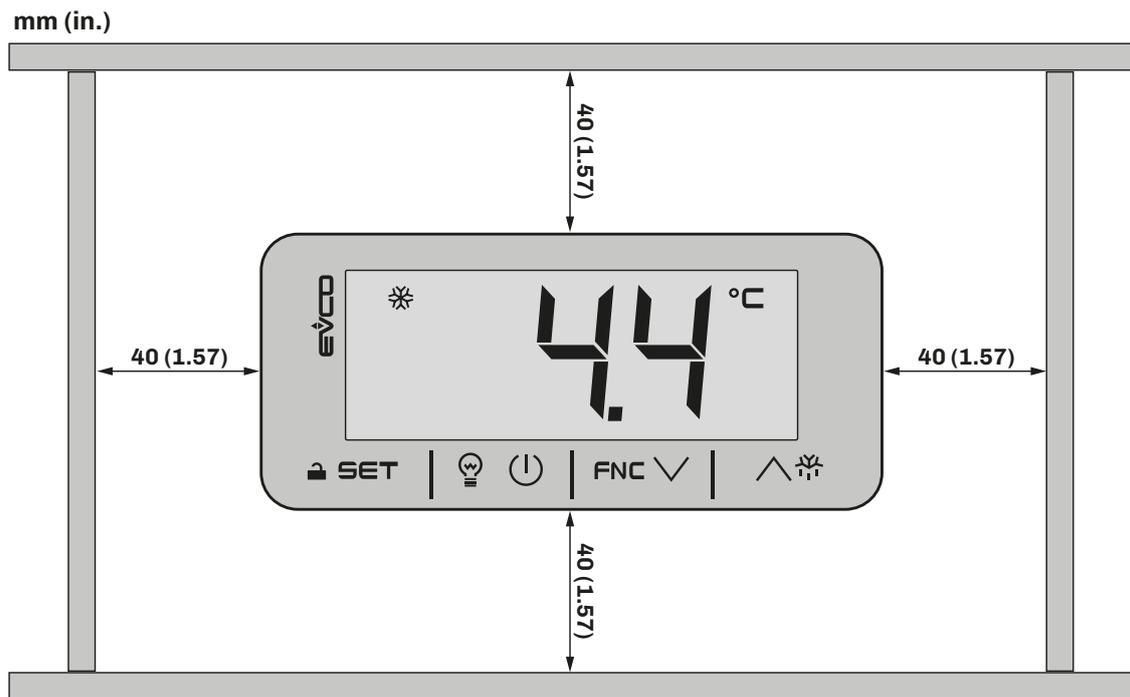
**Fig. 1.** Dimensions EV3 200 Web

### **3.4 INSTALLATION**



**Fig. 2.** Installation EV3 200 WEB

### 3.4.1 Minimum distances



**Fig. 3.** Minimum installation distances EV3 200 Web

## 4. ELECTRICAL CONNECTIONS

### 4.1 WIRING BEST PRACTICES

The following information describes the wiring guidelines and best practices which should be observed when using the equipment described in this manual.

#### DANGER

##### RISK OF ELECTRIC SHOCK, EXPLOSION OR ELECTRIC ARC

- Only use electrically insulated measuring devices and equipment.
- Do not install the equipment while the power supply is connected.
- Switch off all equipment, including connected devices, before installing or uninstalling the device.
- Always use a correctly calibrated voltmeter to check the system is switched off.
- Do not touch the unshielded components or the terminals while they are live.
- Do not open, disassemble, repair or modify the product.
- Do not expose the equipment to liquids or chemicals.
- Before applying voltage to the equipment:
  - Make sure all protective elements, such as covers, hatches and grilles, are fitted and/or closed.
  - Check all wiring connections.

#### 4.1.1 Wiring guidelines

When wiring the controllers, observe the following instructions:

- The I/O and communication wiring must be kept separate from the power supply wiring. These two types of wiring must be routed in separate ducts.
- Make sure the operating environment and conditions fall within the specified values.
- Use wires with the correct diameter, suited to the voltage and current requirements.
- Use copper conductors (compulsory).
- Use shielded twisted pair cables for analogue/digital I/O connections.

Use correctly earthed shielded cables for all analogue inputs or outputs and for communication connections. If shielded cables are not used for these connections, electromagnetic interference could cause the signal to deteriorate. Deteriorated signals can lead to unpredictable operation of the controller or modules and connected equipment.

#### WARNING

##### MALFUNCTIONING OF THE EQUIPMENT

- Perform the wiring carefully, in compliance with electromagnetic compatibility and safety requirements.
- Make sure the wiring is correct for the application.
- Use shielded cables for all I/O signal and communication cables.
- Minimise the length of the connections as much as possible and avoid winding the cables around electrically connected parts.
- The signal cables (analogue and digital inputs, communication and corresponding power supplies), power cables and power supply cables for the device must be routed separately.
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- Power line and output circuits must be wired and fused in compliance with local and national regulatory requirements for the rated current and voltage of the particular equipment.
- Do not use this equipment in safety-critical machine functions.
- Do not disassemble, repair or modify this equipment.
- Do not connect wires to unused terminals and/or to terminals labelled "No connection (N.C.)".

#### 4.1.2 Fixed screw terminal blocks guidelines

##### Suitable wiring for power supply and I/O SELV

Passo 5,08 mm (0.199 in.)

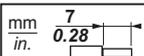
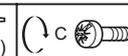
												N•m	0.5...0.6
mm in.	7 0.28									Ø 3.5 mm (0.14 in.)		lb-in	4.42...5.31
mm <sup>2</sup>	0.2...2.5	0.2...2.5	0.25...2.5	0.25...2.5	2 x 0.2...1	2 x 0.2...1.5	2 x 0.25...1	2 x 0.5...1.5					
AWG	24...14	24...14	22...14	22...14	2 x 24...18	2 x 24...16	2 x 22...18	2 x 20...16					

Fig. 4. Suitable wiring for power supply and I/O SELV

### 4.1.3 Permitted lengths of wiring

## NOTICE

### INOPERABLE DEVICE

- When connecting the probes, the digital inputs and the power supply, use cables with a maximum length of 10 m (32.80 ft).
- When connecting the power supply of the controller and the relay outputs, use cables with a maximum length of 10 m (32.80 ft.).

## 4.2 WIRING DIAGRAM

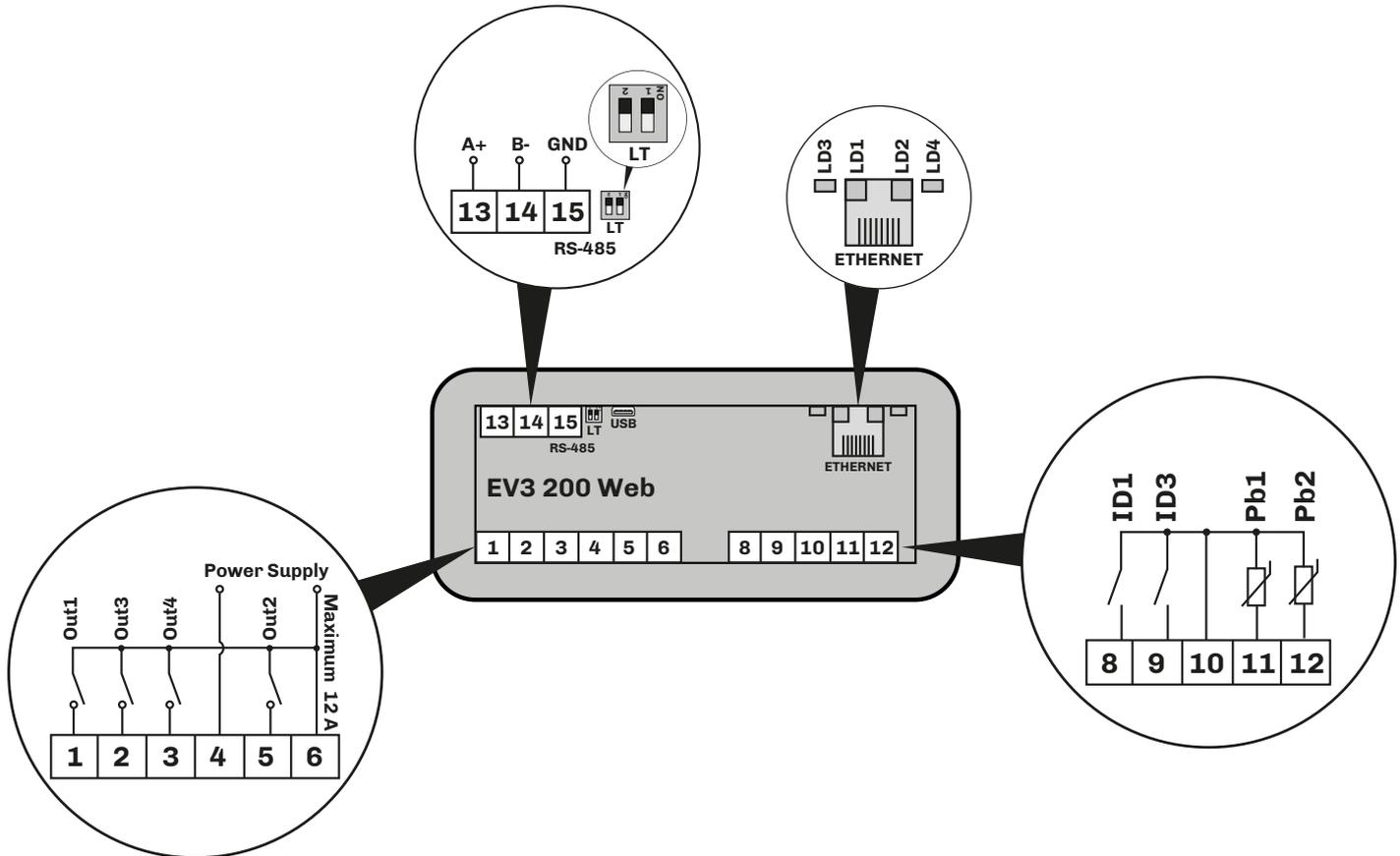


Fig. 5. Wiring diagram

TERMINALS			
1-6	Relay output <b>Out1</b> (Compressor)	13-14-15	RS-485 serial input
2-6	Relay output <b>Out3</b> (Fans)	LT	1 <b>ON</b> = Termination resistor inserted
3-6	Relay output <b>Out4</b> (Defrost)		2 Reserved
4-6	Power supply input	USB	USB 2.0 input for communication
5-6	Relay output <b>Out2</b> (AUX)	ETHERNET	RJ45 connector to connect to Ethernet serial port
8-10	Digital input <b>ID1</b>	LED	<b>LD1</b> Red Flashes with messages from subnetwork
9-10	Digital input <b>ID3</b> (if <b>P4=0</b> )		<b>LD2</b> Green Stays on if connected to EPoCA
	Probe input <b>Pb3</b> (if <b>P4 ≠ 0</b> )		<b>LD3</b> Red Stays on with Ethernet link-up
11-10	Analogue input <b>Pb1</b> (Temperature)		<b>LD4</b> Green Stays on with Ethernet activity
12-10	Analogue input <b>Pb2</b> (Evaporator)	<b>LEDs off:</b> No communication	

## 5. USER INTERFACE

### 5.1 INTERFACE



Fig. 6. EV3 200 Web user interface

### 5.2 TOUCH KEYS

A description of the touch keys is given below:

Key...	Press and release to...	Press for at least 3 seconds to...
	<ul style="list-style-type: none"> <li>• Scroll up through values</li> <li>• Move within a menu</li> </ul>	Activate manual defrost
<b>FNC</b>	<ul style="list-style-type: none"> <li>• Scroll down through values</li> <li>• Move within a menu</li> </ul>	Access the FNC functions menu (functions activated by key)
	Manually activate the light relay	Switch the device on/off (stand-by)
<b>SET</b>	<ul style="list-style-type: none"> <li>• Confirm values on the display</li> <li>• Set the setpoint</li> </ul>	Enter the parameter menu

### 5.3 ICONS

Icon	ON	Flashing	OFF
	Compressor ON	<ul style="list-style-type: none"> <li>• Protection delay compressor ON</li> <li>• Setpoint being changed</li> </ul>	Compressor OFF
	<ul style="list-style-type: none"> <li>• Defrost ON</li> <li>• Pre-dripping ON</li> </ul>	<ul style="list-style-type: none"> <li>• Defrost delay ON</li> <li>• Dripping ON</li> </ul>	---
	Evaporator fans ON	Evaporator fan activation delay ON	Evaporator fans OFF
<b>HACCP</b>	HACCP alarm saved	New HACCP alarm recorded	---
<b>°C</b>	Temperature displayed in °C	---	<ul style="list-style-type: none"> <li>• Over-heating ON</li> <li>• Over-cooling ON</li> </ul>
<b>°F</b>	Temperature displayed in °F	---	
<b>AUX</b>	<ul style="list-style-type: none"> <li>• AUX function ON</li> <li>• AUX digital output ON</li> </ul>	---	AUX function OFF
	Energy saving ON	---	Energy saving OFF
	Compressor maintenance request	<ul style="list-style-type: none"> <li>• Parameters being changed</li> <li>• Access to FNC menu (functions activated by key)</li> <li>• Active connection with EVConnect</li> </ul>	---
	Device off	---	Device on

## 5.4 CONTROLLER OPERATION

### 5.4.1 Switching the controller ON/OFF

With the function enabled (POF = 1), press the  key for at least 3 seconds to switch the controller on/off.

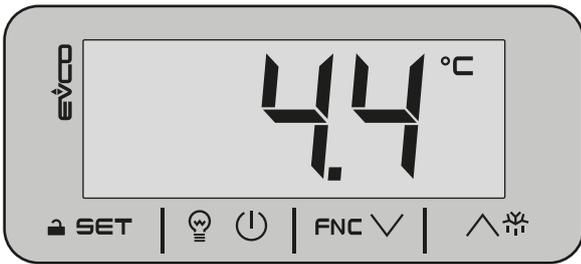


Fig. 7. Main screen



Fig. 8. Controller off

### 5.4.2 Unlocking the keypad

After about one minute of inactivity, the device automatically locks the keypad (the code **Loc** appears for a few seconds). To unlock the keypad, hold down any key for about 3 seconds until the code **UnL** appears to confirm the keypad has been unlocked.

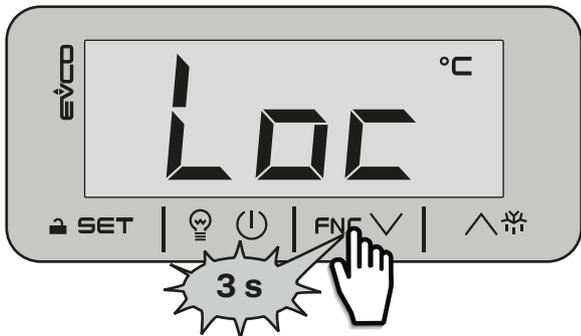


Fig. 9. Keypad locked



Fig. 10. Confirmation keypad unlocked

### 5.4.3 Setting/changing the setpoint

With the keypad unlocked, touch and release the  SET key to access the setpoint menu. Scroll the values with the FNC  or  keys and touch  SET to confirm the setpoint value.

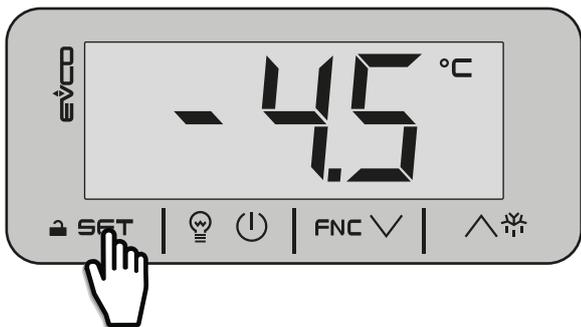


Fig. 11. Accessing the setpoint menu

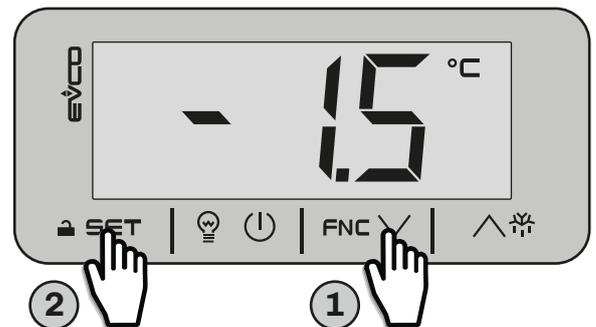


Fig. 12. Changing the setpoint

### 5.4.4 Activating manual defrost

With the keypad unlocked, touch the  key for at least 3 seconds to activate manual defrost. The defrost icon will come on. To deactivate, switch the device off and then on again.

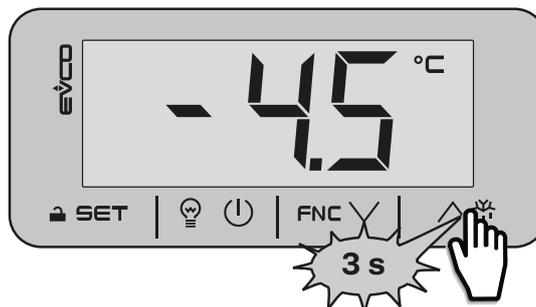


Fig. 13. Activating manual defrost

### 5.4.5 Functions that can be activated by key

To choose the function, touch the **FNC**  $\nabla$  key for at least 3 seconds to access the function menu; use the **FNC**  $\nabla$  or  $\wedge$   $\text{⌂}$  keys to scroll through and choose the following functions:

- **RTC**: sets/changes the clock;
- **Pb1**: displays the temperature read by probe Pb1;
- **Pb2**: displays the temperature read by probe Pb2;
- **CH**: displays the compressor operating hours;
- **rCH**: resets the compressor operating hours.

### 5.4.6 Activating the AUX digital output by key

With the keypad unlocked, touch and release the  $\text{💡}$   $\text{⏻}$  key to manually activate the AUX digital output. The AUX icon will come on.

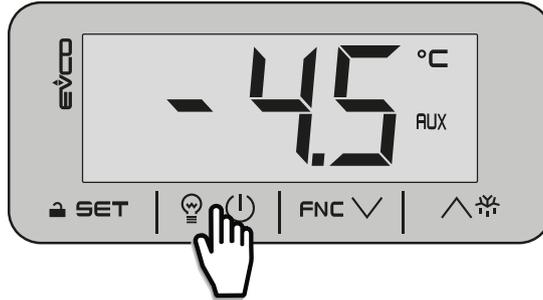


Fig. 14. Activating the AUX output by key

### 5.4.7 Accessing the parameters

With the keypad unlocked, touch the  $\text{🔒}$  **SET** key for at least 3 seconds to access and change the parameters. The code **PA** will appear. Touch the  $\text{🔒}$  **SET** key to enter the password, scrolling with the **FNC**  $\nabla$  or  $\wedge$   $\text{⌂}$  keys and confirming with the  $\text{🔒}$  **SET** key; then use the **FNC**  $\nabla$  or  $\wedge$   $\text{⌂}$  keys to scroll the list of parameters.

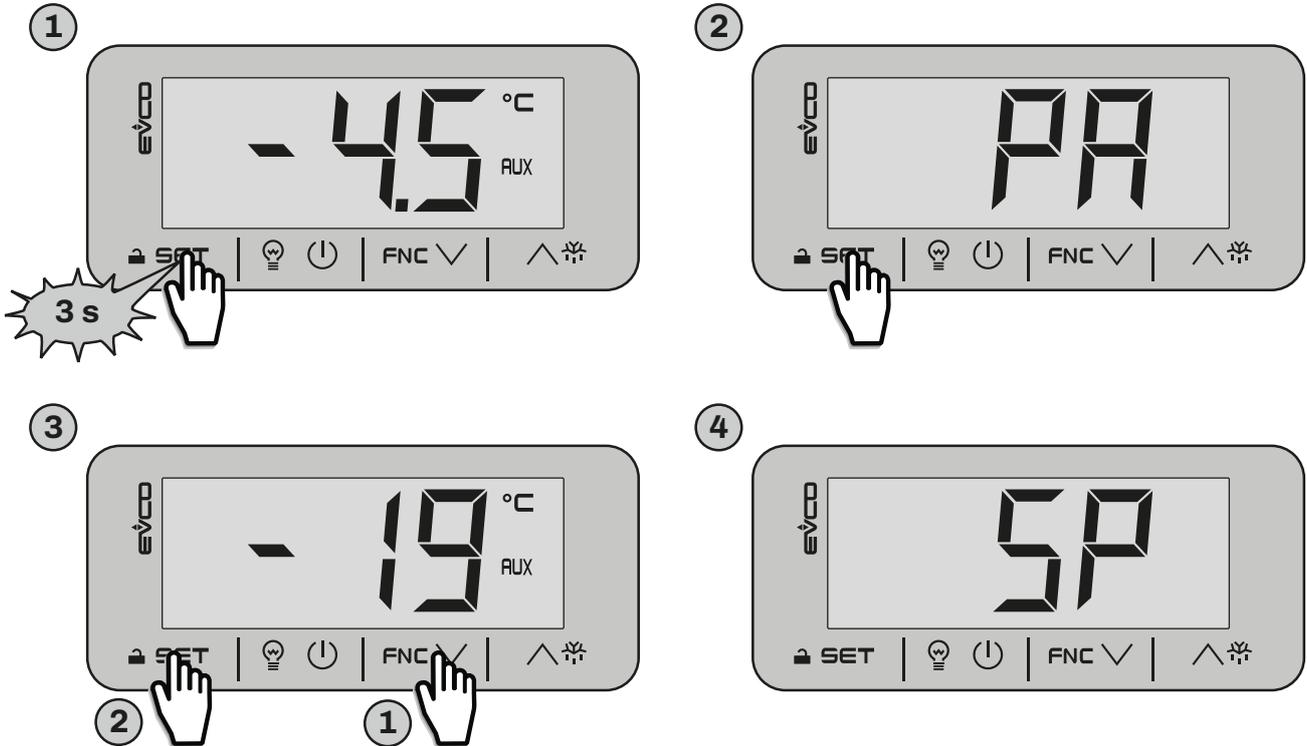


Fig. 15. Accessing the parameters

## 6. DEFROST

### 6.1 INTRODUCTION

Defrosting removes ice from the surface of the evaporator. The defrost cycle consists of 4 phases:

1. Defrost;
2. Pre-dripping;
3. Dripping;
4. Post-dripping.

At the end of each phase, the controller starts up the next one; when the entire defrost cycle is finished, the controller returns to normal operation.

With **d0** = 0, defrost is set to manual operation. For automatic mode, set **d0** > 0.

#### 6.1.1 Types of defrost

The controller can operate with two different types of defrost:

- Modular;
- Standard.

### 6.2 ADAPTIVE DEFROST

Adaptive defrost is set by the following parameters:

Par.	Description	MU	Range
<b>d0</b>	Automatic defrost interval. <b>0</b> = Manual defrost only <b>N.B.:</b> if <b>d8</b> = 3, the maximum interval is considered.	h	0... 99
<b>d8</b>	Defrost interval count mode. <b>0</b> = Hours device ON; <b>1</b> = Hours compressor ON; <b>2</b> = Hours evaporator temperature < <b>d9</b> ; <b>3</b> = Adaptive; <b>4</b> = In real time (RTC).	---	0...4
<b>d9</b>	Evaporation threshold for automatic defrost interval count.	°C/°F	-99.0...99.0
<b>d18</b>	Adaptive defrost interval. <b>0</b> = Manual only.	min	0...999
<b>d19</b>	Adaptive defrost threshold (relative to optimal evaporation temperature).	°C/°F	0.0...40.0
<b>d22</b>	Evaporation threshold for adaptive defrost interval count (relative to optimal evaporation temperature).	°C/°F	-10.0...10.0

#### 6.2.1 Defrost with Hours device ON

Defrost with **Hours device ON** is set with the following parameters:

Par.	Description	MU	Range
<b>d0</b>	Automatic defrost interval. <b>0</b> = Manual defrost only <b>N.B.:</b> if <b>d8</b> = 3, the maximum interval is considered.	h	0... 99
<b>d8</b>	Defrost interval count mode. <b>0</b> = Hours device ON;	---	0...4

#### Operation

The controller begins counting the operating hours from when the device is switched on. If **d0** > 0 and **d8** = 0, once time **d0** has elapsed, the device carries out defrost of the duration of **d3**.

The **d0** count is set to zero (and restarts) every time defrost starts up.

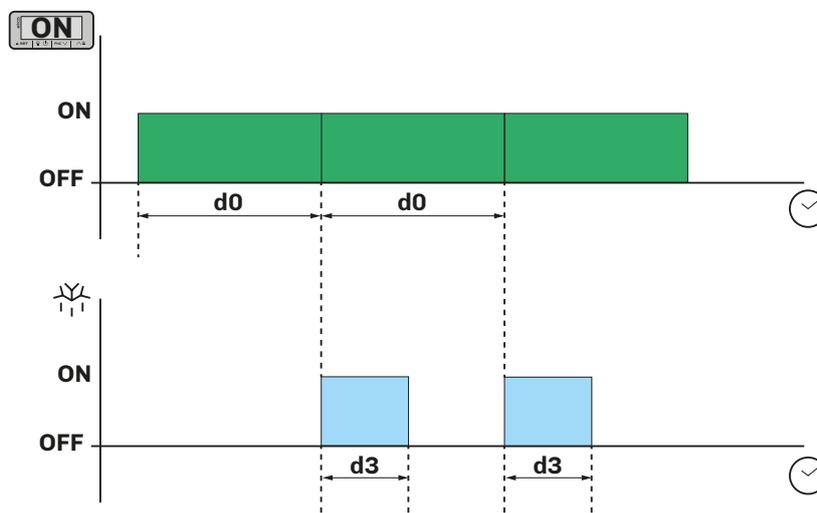


Fig. 16. Modular defrost: Hours device ON

### 6.2.2 Defrost with Hours compressor ON

Defrost with **Hours compressor ON** is set with the following parameters:

Par.	Description	MU	Range
d0	Automatic defrost interval. <b>0</b> = Manual defrost only <b>N.B.:</b> if <b>d8</b> = 3, the maximum interval is considered.	h	0... 99
d8	Defrost interval count mode. <b>1</b> = Hours compressor ON;	---	0...4

#### Operation

When the compressor operating time is the same as time **d0**, defrost is activated.

The controller accumulates all the compressor operating hours, even if they are not consecutive.

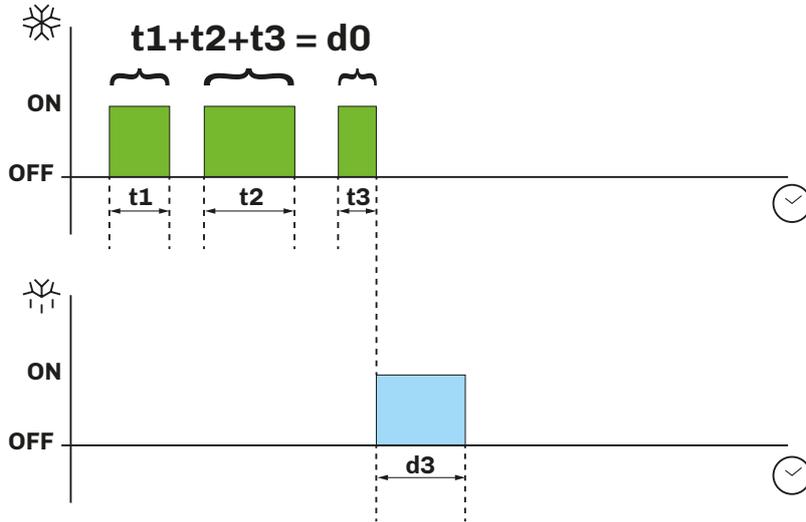


Fig. 17. Modular defrost: Hours compressor ON

### 6.2.3 Defrost with Evaporator temperature

Defrost with **Evaporator temperature** is set with the following parameters:

Par.	Description	MU	Range
P3	Evaporator probe operation. <b>1</b> = Defrost + fans	---	0...3
d0	Automatic defrost interval. <b>0</b> = Manual defrost only <b>N.B.:</b> if <b>d8</b> = 3, the maximum interval is considered.	h	0... 99
d8	Defrost interval count mode. <b>2</b> = Hours evaporator temperature < <b>d9</b> ;	---	0...4
d9	Evaporation threshold for automatic count of defrost intervals.	°C/°F	-99.0...99.0

#### Operation

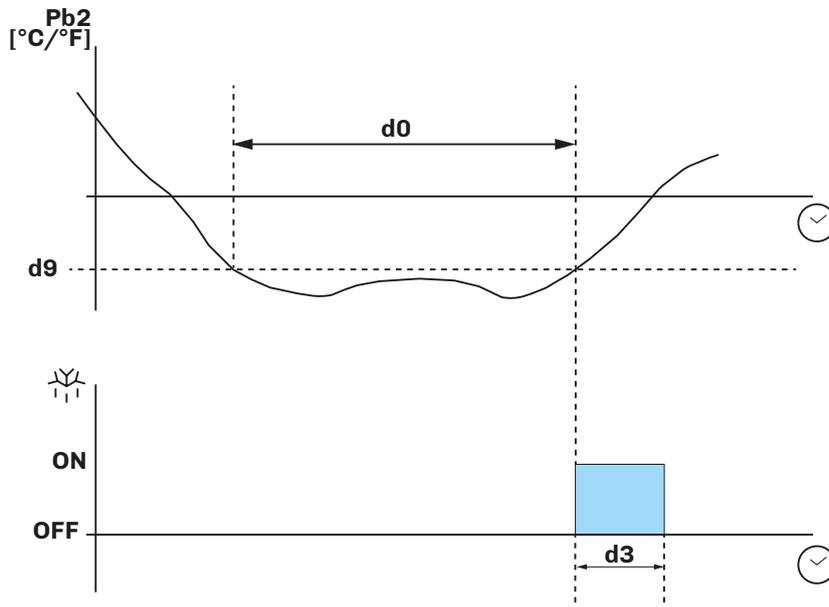


Fig. 18. Modular defrost: Evaporator temperature

## 6.2.4 Adaptive defrost

Adaptive defrost is set with the following parameters:

Par.	Description	MU	Range
SP	Temperature setpoint.	°C/°F	r1...r2
d8	Defrost interval count mode. <b>3</b> = Adaptive;	---	0...4
d18	Adaptive defrost interval.	min	0...999
d19	Adaptive defrost threshold (relative to optimal evaporation temperature).	°C/°F	0.0...40.0
d22	Evaporation threshold for adaptive defrost interval count (relative to optimal evaporation temperature).	°C/°F	-10.0...10.0

### Operation

Adaptive defrost works by dividing temperature regulation into two phases:

- Calibration phase and;
- Normal working phase.

#### Calibration phase

When the refrigerating machine is switched on or after defrost, the device calculates the ideal evaporator working temperature to reach the setpoint **SP**.

#### Normal working phase

During the normal working phase, the device adds up the compressor ON times while the temperature read by Pb2 is lower than the ideal evaporator temperature.

Defrost is activated if:

- The count exceeds the time **d18**;
- The temperature read by Pb2 goes below the ideal temperature calculated of a threshold **d19**.

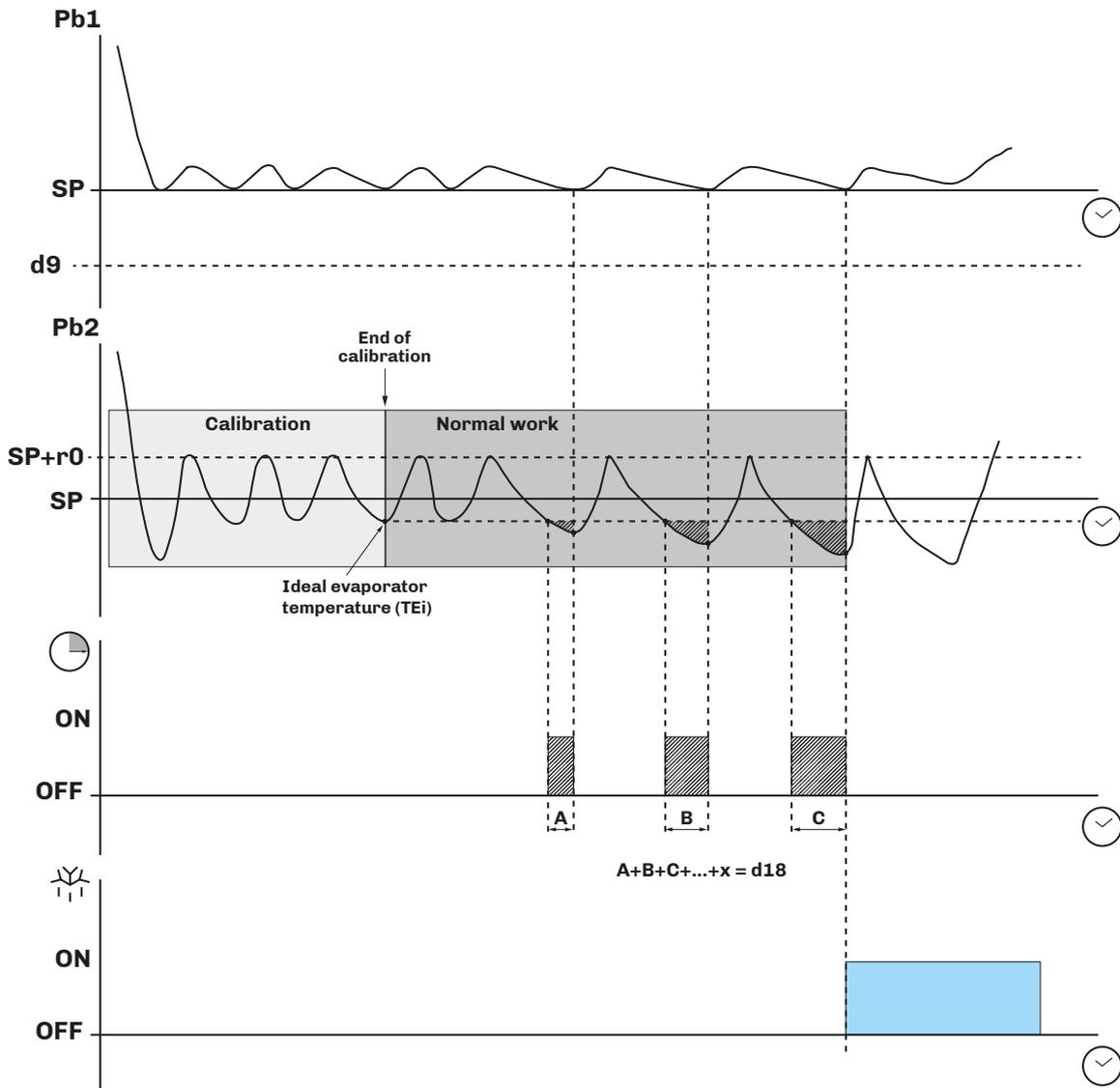


Fig. 19. Modular defrost: Adaptive - start defrost due to time

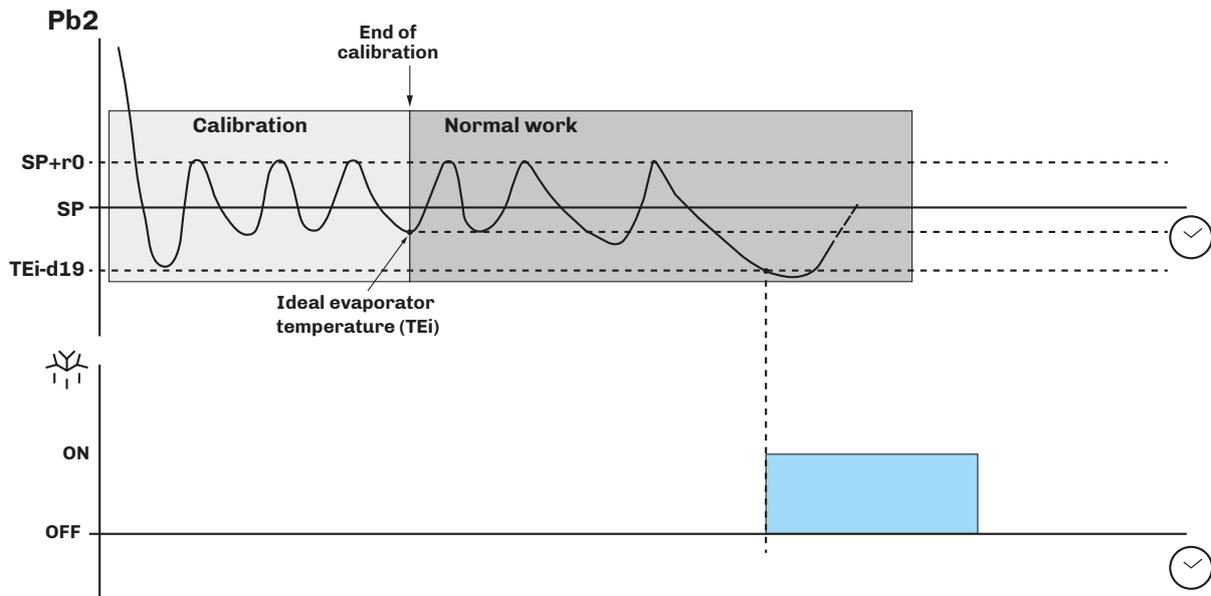


Fig. 20. Modular defrost: Adaptive - start defrost due to temperature

### 6.2.5 Modular defrost: In real time (RTC)

Defrost **In real time (RTC)** is set with the following parameters:

Par.	Description	MU	Range
d8	Defrost interval count mode. <b>4</b> = In real time (RTC).	---	0...4
d9	Evaporation threshold for automatic defrost interval count.	°C/°F	-99.0...99.0
Hd1	Defrost 1 activation time. "----" = Disabled.	h	----, 0...23
Hd2	Defrost 2 activation time. "----" = Disabled.	h	----, 0...23
Hd3	Defrost 3 activation time. "----" = Disabled.	h	----, 0...23
Hd4	Defrost 4 activation time. "----" = Disabled.	h	----, 0...23
Hd5	Defrost 5 activation time. "----" = Disabled.	h	----, 0...23
Hd6	Defrost 6 activation time. "----" = Disabled.	h	----, 0...23
Hr0	Activate the clock. <b>0</b> = No; <b>1</b> = Yes.	---	0/1

#### Operation

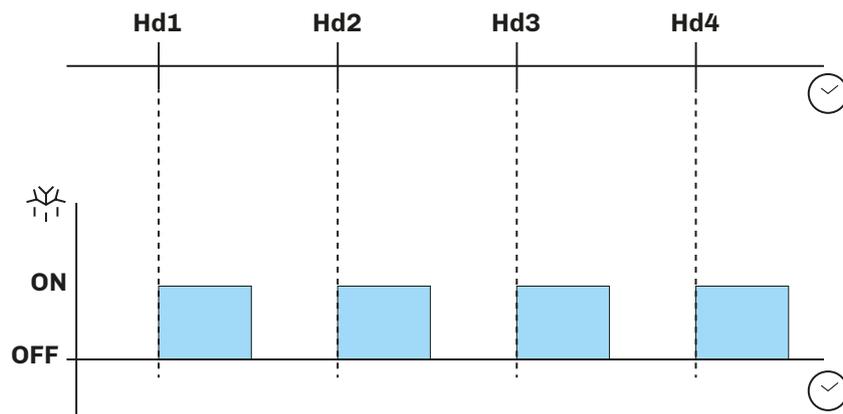


Fig. 21. Modular defrost: In real time (RTC)

## 6.3 STANDARD DEFROST

Parameter **d1** must be set to use this mode.

Defrost is carried out by heating the evaporator in one of the following ways:

Par.	Description	MU	Range
<b>d1</b>	Type of defrost. <b>0</b> = Electrical heaters; <b>1</b> = Cycle reversed (hot gas); <b>2</b> = When compressor stops.	---	0...2

### 6.3.1 Defrost with electrical heaters

Defrost with electrical heaters is obtained by setting **d1** = 0.

#### Activating defrost

When defrost is activated:

- The compressor stops;
- The relay output, where the electrical heaters are connected and which is configured as the defrost output, is activated.

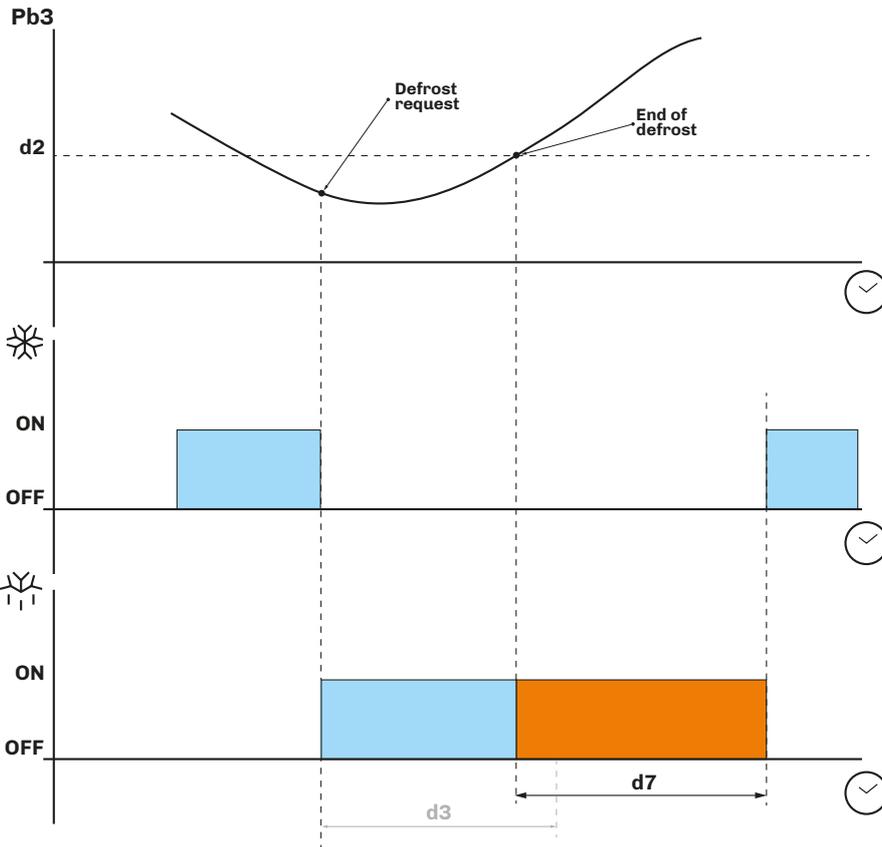
#### Conditions for defrost end

The conditions for defrost end are:

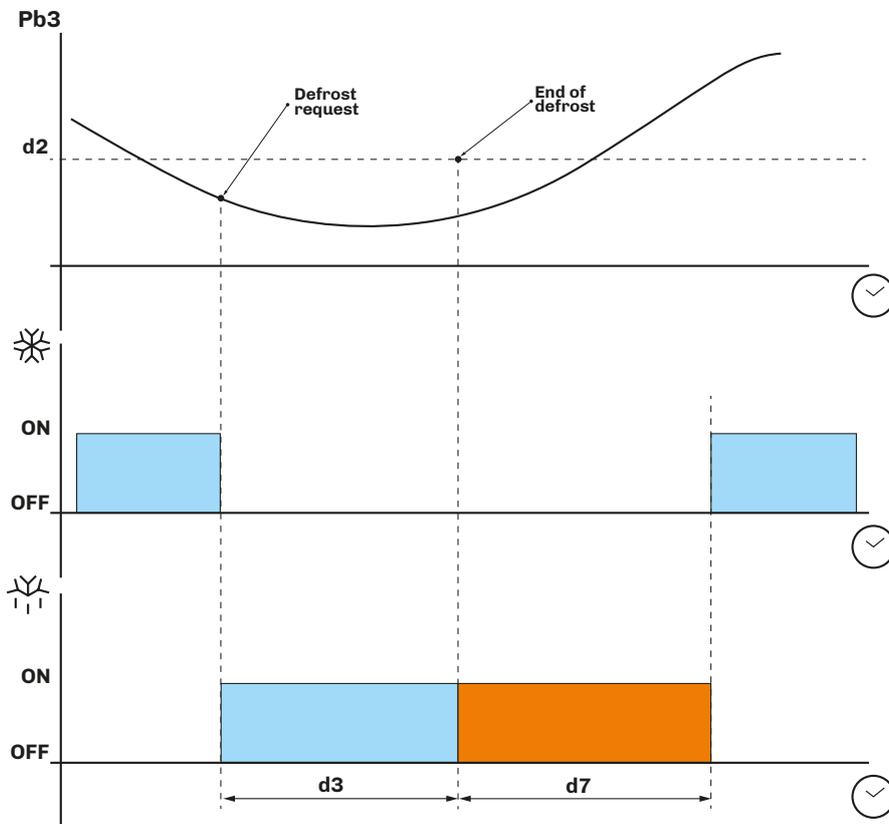
- Defrost duration **d3** must be reached;
- Temperature to end defrost **d2** must be reached.

The defrost configuration parameters with electrical heaters are:

Par.	Description	MU	Range
<b>C0</b>	Compressor ON delay from power-on.	min	0...240
<b>C2</b>	Minimum compressor OFF time.	min	0...240
<b>d0</b>	Defrost interval.	h	0...99
<b>d1</b>	Type of defrost. <b>0</b> = Electrical heaters; <b>1</b> = Cycle reversed (hot gas); <b>2</b> = When compressor stops.	---	0...2
<b>d2</b>	Evaporator temperature above which defrost with evaporator probe terminates ( <b>Pr3</b> = 5).	°C/°F	-99.0...99.0
<b>d3</b>	Defrost duration.	min	0...99
<b>d7</b>	Evaporator dripping time after defrost.	min	0...15



**Fig. 22.** Defrost with electrical heaters - End of defrost due to temperature



**Fig. 23.** Defrost with electrical heaters - End of defrost due to maximum time

### 6.3.2 Defrost with cycle reversed (hot gas)

Defrost with cycle reversed is obtained by setting **d1** = 1.

#### Activating defrost

When defrost is activated:

- The compressor is activated (or has already been active for time **d15**) and remains active for the entire duration of defrost;
- The relay output where the valve is connected (a solenoid valve if the system has a thermostatic valve) is activated.

#### Conditions for defrost end

The conditions for defrost end are:

- Maximum defrost duration, set by parameter **d3**, must be reached.
- Temperature to end defrost, set by parameter **d2**, must be reached.

The defrost configuration parameters with cycle reversed are:

Par.	Description	MU	Range
<b>C0</b>	Compressor ON delay from power-on.	min	0...240
<b>C2</b>	Minimum compressor OFF time.	min	0...240
<b>d0</b>	Defrost interval.	h	0...99
<b>d1</b>	Type of defrost. <b>0</b> = Electrical heaters; <b>1</b> = Cycle reversed (hot gas); <b>2</b> = When compressor stops.	---	0...2
<b>d2</b>	Evaporator temperature above which defrost with evaporator probe terminates ( <b>Pr3</b> = 5).	°C/°F	-99.0...99.0
<b>d3</b>	Defrost duration.	min	0...99
<b>d7</b>	Evaporator dripping time after defrost.	min	0...15
<b>d15</b>	Compressor ON consecutive time before hot gas defrost.	min	0...99

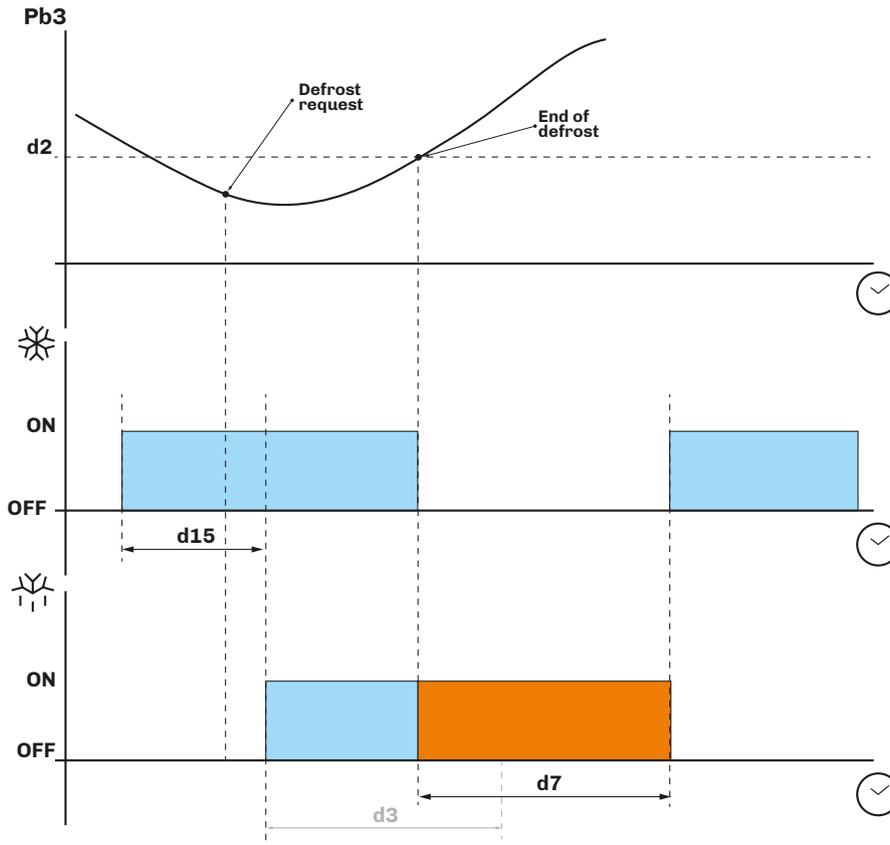
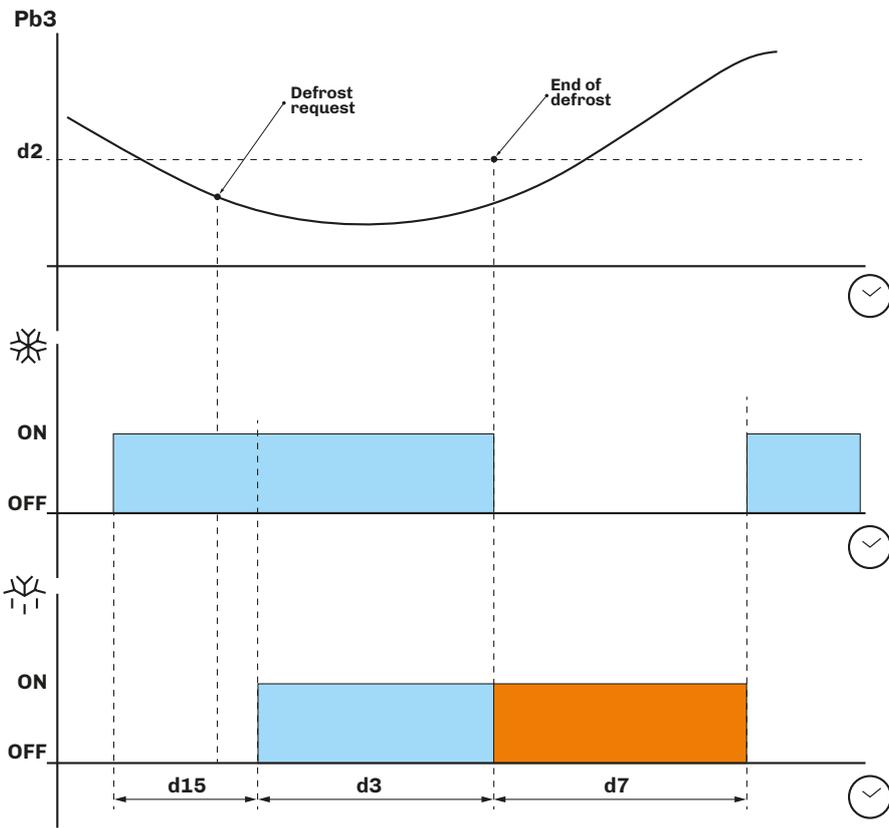


Fig. 24. Defrost with cycle reversed - End of defrost due to temperature



**Fig. 25.** Defrost with cycle reversed - End of defrost due to maximum time

### 6.3.3 Defrost when compressor stops

Defrost when the compressor stops is obtained by setting **d1** = 2.

The defrost configuration parameters with cycle reversed are:

Par.	Description	MU	Range
<b>d0</b>	Defrost interval.	h	0...99
<b>d1</b>	Type of defrost. 0 = Electrical heaters; 1 = Cycle reversed (hot gas); 2 = When compressor stops.	---	0...2
<b>d3</b>	Defrost duration.	min	0...99
<b>d7</b>	Evaporator dripping time after defrost.	min	0...15

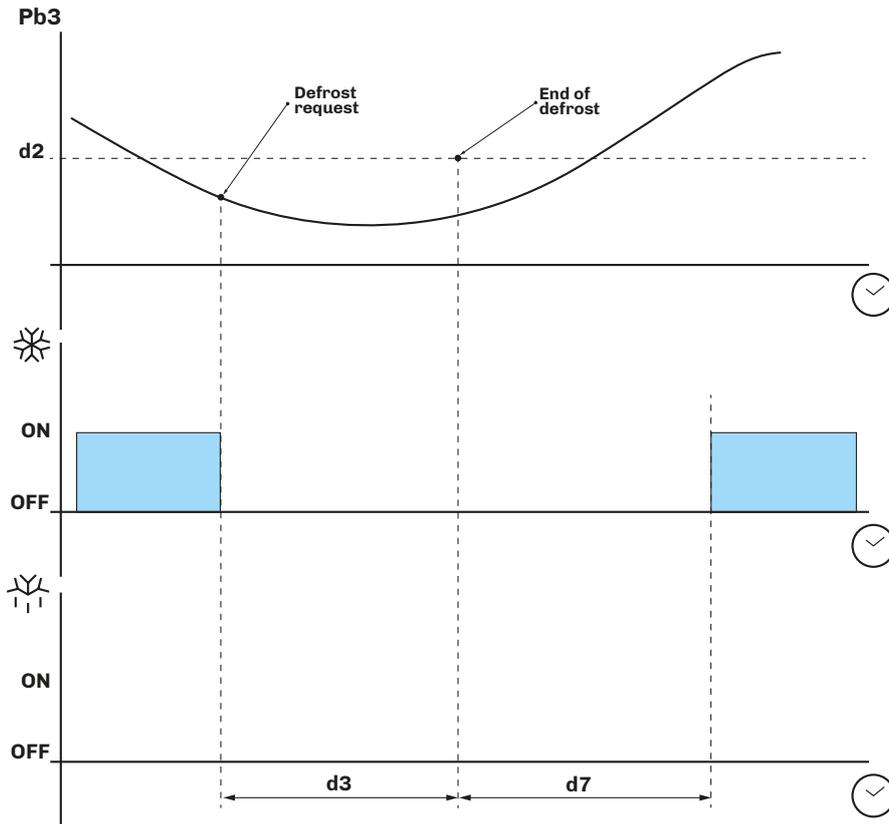


Fig. 26. Defrost with cycle reversed - End of defrost due to maximum time

## 7. REGULATORS

### 7.1 HEATING/COOLING TEMPERATURE

The temperature regulation configuration parameters are:

Par.	Description	MU	Range
r0	Cooling regulation differential; temperature to be added to the setpoint ( <b>Setpoint + r0</b> )	°C/°F	0.1...25.0
r1	Minimum value attributable to setpoint.	°C/°F	-30.0...r2
r2	Maximum value attributable to setpoint.	°C/°F	r1...99.0
r12	Differential position r0. <b>0</b> = Asymmetrical; <b>1</b> = Symmetrical.	---	0/1
u7	Neutral zone threshold for heating.	°C/°F	-99.0...99.0

#### 7.1.1 Operation

The controller manages the temperature according to the type of request (heating/cooling).

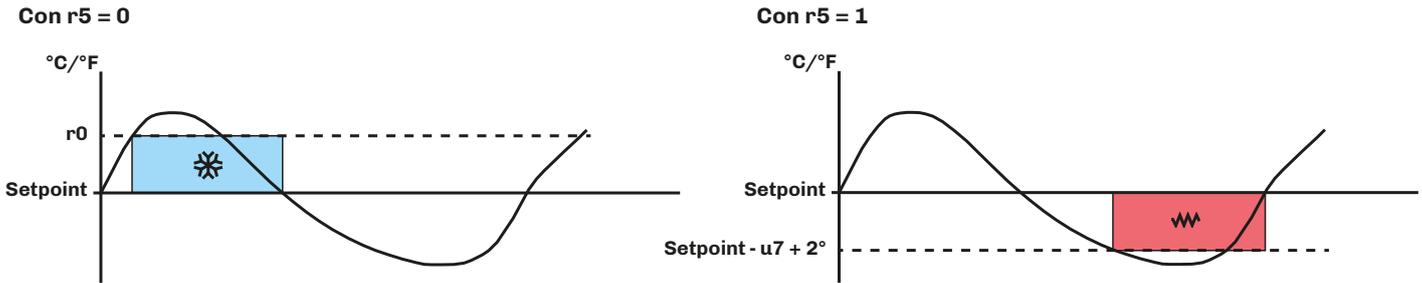


Fig. 27. Operation of temperature regulator

#### Cooling

If the controller receives a cooling request:

- Cooling output (Compressor) between **Setpoint + r0** and **Setpoint**.

When the temperature read by Pb1 reaches the value of **Setpoint + r0**, the controller activates the compressor output to cool until the temperature goes below the threshold set by **Setpoint**.

#### Heating

If the controller receives a heating request:

- Heating output (Heaters) between **Setpoint** and **Setpoint - u7 + 2°**.

When the temperature read by Pb1 reaches the value of **Setpoint - u7**, the controller activates the heater output to produce heat until the temperature goes above the threshold set by **Setpoint - u7 + 2°**.

### 7.2 HEATING/COOLING TEMPERATURE IN THE NEUTRAL ZONE

The temperature regulation configuration parameters in the neutral zone are:

Par.	Description	MU	Range
r0	Cooling regulation differential; temperature to be added to the setpoint ( <b>Setpoint + r0</b> )	°C/°F	0.1...25.0
r1	Minimum value attributable to setpoint.	°C/°F	-30.0...r2
r2	Maximum value attributable to setpoint.	°C/°F	r1...99.0
u7	Neutral zone threshold for heating.	°C/°F	-99.0...99.0

#### 7.2.1 Operation

Regulation in the neutral zone is activated if **r11** ≠ 0 (if **r11** < 0, the neutral zone is activated with a heating request).

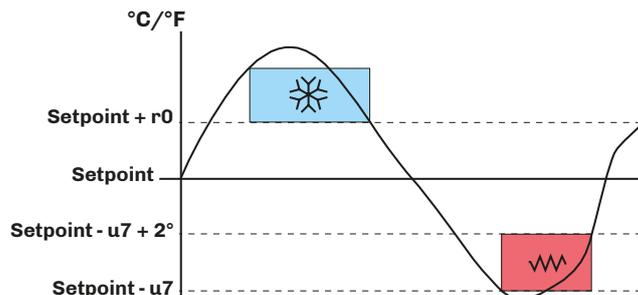


Fig. 28. Operation of temperature regulator in the neutral zone

## Cooling

If the controller receives a cooling request:

- Cooling output (Compressor) between **Setpoint + r0** and **Setpoint** .

When the temperature read by Pb1 reaches the value of **Setpoint + r0**, the controller activates the compressor output until the temperature goes below the threshold set by **Setpoint**.

## Heating

If the controller receives a heating request:

- Heating output (Heaters) between **Setpoint - u7** and **Setpoint - u7 + 2°**.

When the temperature read by Pb1 reaches the value of **Setpoint - u7**, the controller activates the heater output to produce heat until the temperature goes above the threshold set by **Setpoint - u7 + 2°**.

## 7.3 COMPRESSOR

The compressor regulator is active in relay output **out1** (not configurable).

The switching on/off of the compressor is controlled by:

- Temperature read by probe Pb1;
- Configuration of heat regulation;
- Defrost and dripping.

### Conditions for activation

The compressor is activated if the following conditions are met:

- The controller is on (regulation is blocked when the controller is in stand-by);
- Probe Pb1 is working;
- Compressor activation delay **C0** from switch-on is terminated;
- Compressor switch-on delay **C2** between 2 consecutive activations;
- If **d1** = 0.2, defrost and dripping must be terminated.

If a delay **C0** or **C2** is set and there is a request for compressor activation, the controller waits for the delay to end before activating the compressor. During the wait, the ❄ icon flashes until the compressor is activated, after which it stays on.

The compressor regulation configuration parameters are:

Par.	Description	MU	Range
<b>C0</b>	Compressor ON delay from power-on.	min	0...240
<b>C2</b>	Minimum compressor OFF time.	min	0...240
<b>C3</b>	Minimum compressor ON time.	s	0...240
<b>C4</b>	Compressor OFF time in cabinet probe alarm.	min	0...240
<b>C5</b>	Compressor ON time in cabinet probe alarm.	min	0...240
<b>C6</b>	Condensation temperature above which the condenser overheat alarm sounds.	°C/°F	0...199
<b>C7</b>	Condenser temperature above which the compressor locked alarm sounds, once <b>C8</b> time has elapsed.	°C/°F	0...199
<b>C8</b>	Delay in activation of compressor locked alarm due to threshold <b>C7</b> being exceeded.	min	0...15
<b>C10</b>	Compressor days for maintenance.	days	0...990
<b>C11</b>	Second compressor switch-on delay from first compressor switch-on.	s	0...240

### 7.3.1 Operating diagrams

#### Normal compressor operation

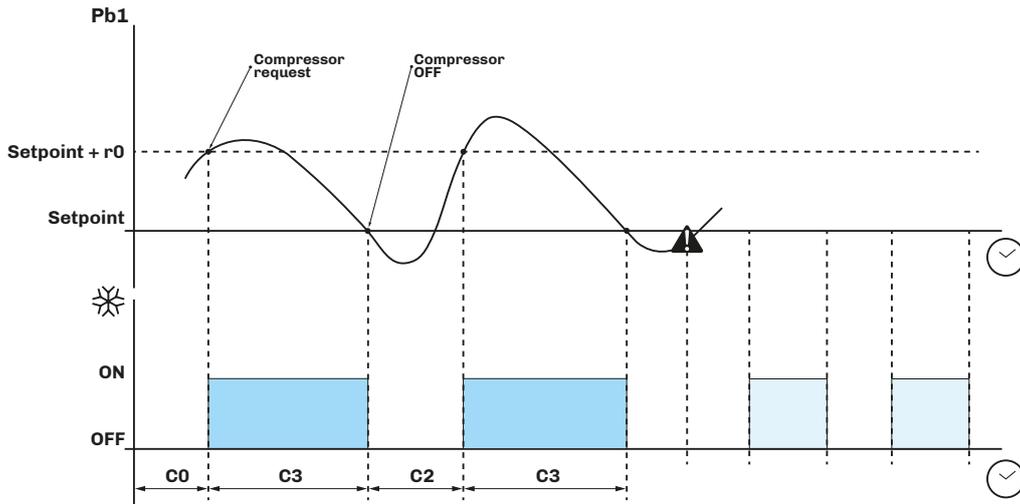


Fig. 29. Normal compressor operation

#### Compressor operation with alarm probe

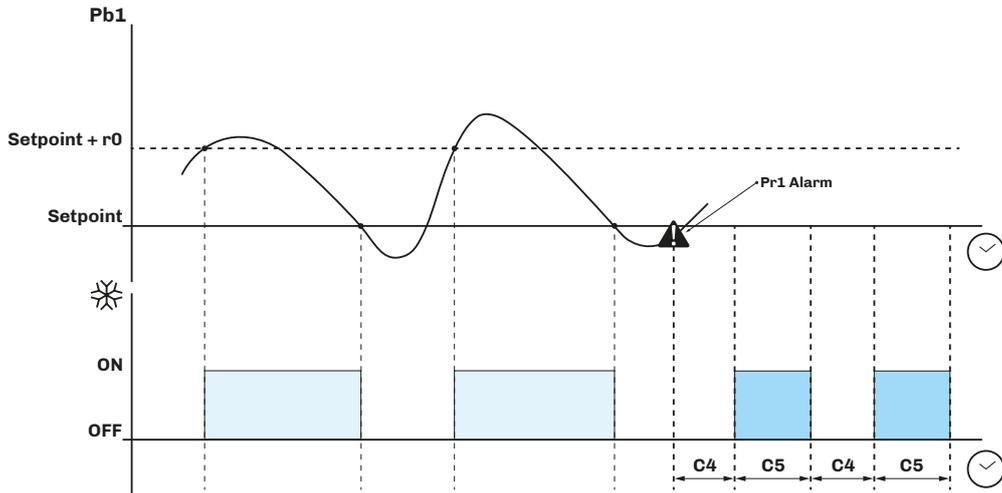


Fig. 30. Operation with compressor alarm probe

## 7.4 DOUBLE COMPRESSOR

If output **out4** is configured **u1 = 8**, the controller manages 2 compressors.

### Activating compressor 2

Compressor 2 is activated after a delay **C11** from compressor 1 switch-on.

If active, compressor 2 uses the:

- Setpoints;
- Differentials;
- Delays and
- Protections

set for compressor 1.

### 7.4.1 Operating Diagram

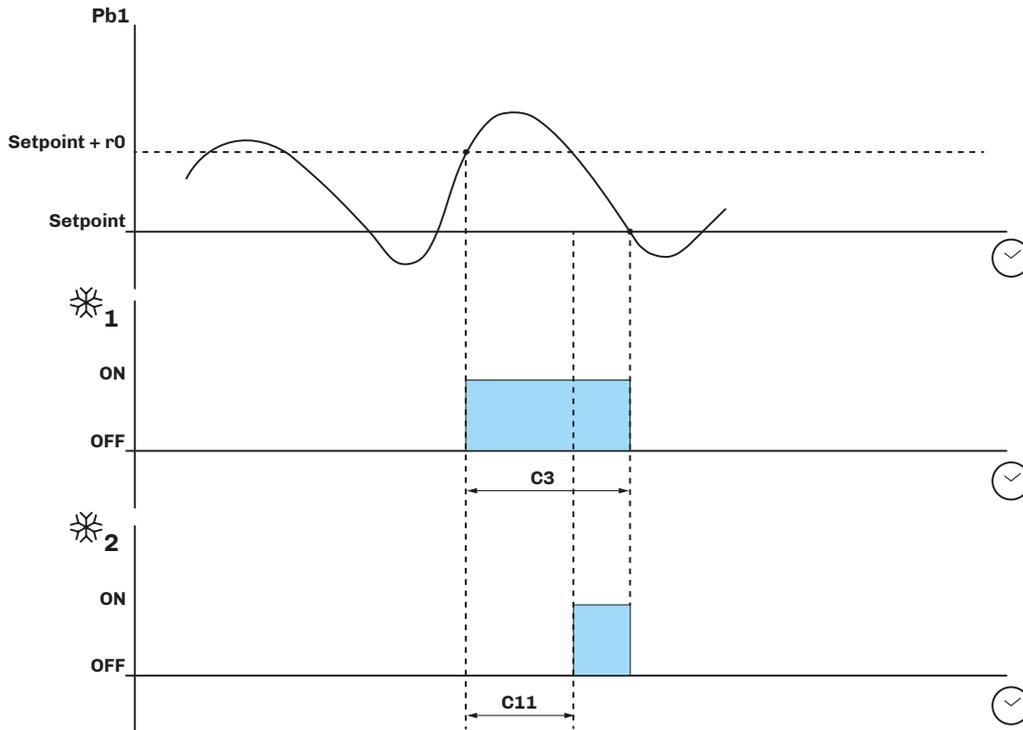


Fig. 31. Normal compressor 2 operation

## 7.5 EVAPORATOR FANS

The evaporator fan regulator is activated in the following conditions:

- The delay **F3** has elapsed at the end of dripping;
- The temperature of the evaporator probe Pb3 is higher than the threshold **F1** (if **F0** = 3, 4);
- The fans are not deactivated during defrost **F2** = 0;
- There is no dripping active **d7**.

### 7.5.1 Regulator operation

The evaporator fan regulator may be activated following a request from another regulator as follows:

- Compressor request, to encourage production and diffusion of cool air (heat regulation function);
- Defrost request, to control/limit the diffusion of hot air;
- Humidification/dehumidification request, to spread or limit the diffusion of humidity.

### 7.5.2 Operating mode

The evaporator fans operate according to parameter **F0**:

Par.	Description	MU	Range
<b>F0</b>	Evaporator fan mode in normal operating mode. With <b>F0</b> = 0 it is possible to manage cycles by setting <b>F11</b> , <b>F12</b> . <b>0</b> = In cycles; <b>1</b> = Always ON; <b>2</b> = On with compressor ON; <b>3</b> = Thermostat controlled ( <b>F1</b> relative to temperature control); <b>4</b> = Thermostat controlled with compressor ON ( <b>F1</b> relative to temperature control).	---	0...4

#### Evaporator fan cycles with **F11** > 0

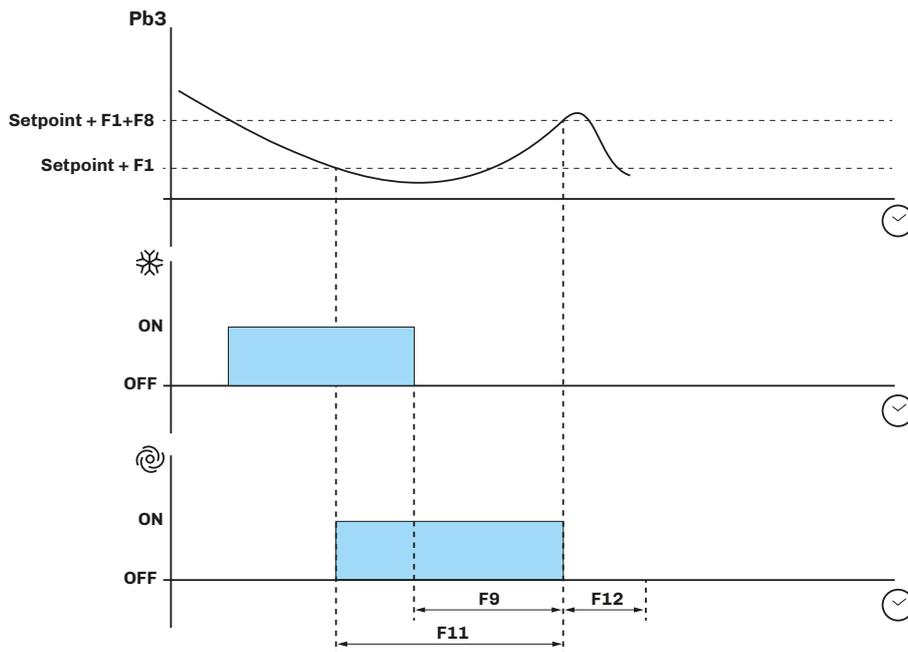


Fig. 32. Operation of evaporator fans with **F11** > 0

### 7.5.3 Operation during defrost

Operation of the evaporator fans during defrost depends on **F2**.

Par.	Description	MU	Range
<b>F2</b>	Evaporator fan mode during defrost. <b>0</b> = OFF; <b>1</b> = ON; <b>2</b> = According to <b>F0</b> .	---	0...2

### 7.5.4 Fan operation during dripping

During dripping, the evaporator fans stay off for the time set by **d7**. A further delay of **F3** may be set when the evaporator fans are activated after dripping. In this case, the fans are activated after **F3** has elapsed.

Par.	Description	MU	Range
<b>d7</b>	Evaporator dripping time after defrost.	min	0...15
<b>F3</b>	Maximum time evaporator fans off after dripping.	min	0...15

## 7.6 CONDENSER FANS

### 7.6.1 Operation

The condenser fans are activated in the following conditions:

- The digital output **u1** = 6 (configured as condenser fans);
- If **P4** ≠ 1, the condenser fans are activated in parallel with the compressor;
- With **F11**, the fans are activated at threshold **F11 + 2°** and switch off at threshold **F11**;
- During hot gas defrost, they are activated if the temperature **Pb3** goes above the alarm threshold **C6**.

## 7.7 ENERGY SAVING

### 7.7.1 Operation

Energy saving can be activated:

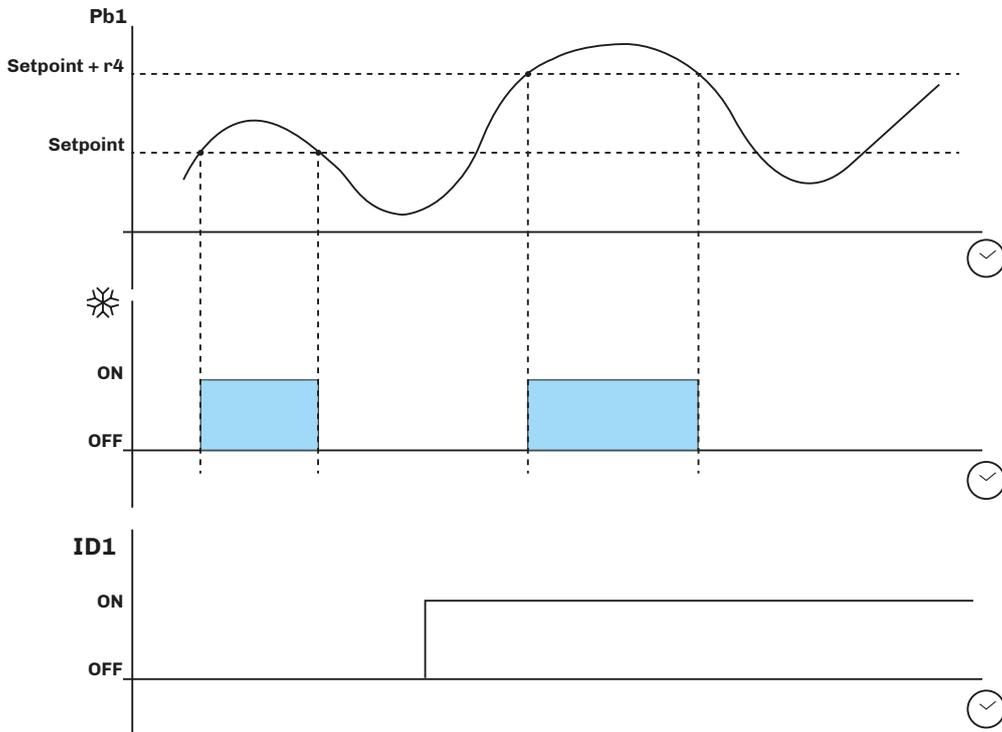
- By digital input, if **i5** = 2;
- By key, if **r8** = 2;
- If the door stays open > **i10**: energy saving is then activated for the time **HE2**;
- By the RTC clock, activating the energy saving function every day at the time **H01** for a time of **H02**.

With energy saving active:

- **Setpoint** is replaced by **Setpoint + r4**.

The energy saving configuration parameters are:

Par.	Description	MU	Range
<b>r4</b>	Setpoint offset in energy saving added to setpoint value.	°C/°F	0.0...99.0
<b>HE2</b>	Manual energy saving duration.	min	0...999
<b>H01</b>	Daily start time of energy saving temperature.	h	0...23
<b>H02</b>	Duration of daily energy saving.	h	0...24



**Fig. 33.** Operation in energy saving function

## 8. REMOTE COMMUNICATION CONFIGURATION

### 8.1 INTRODUCTION

EV3 200 Web can be configured to connect with EPoCA in two different ways:

- From a PC (Windows only) through **EPoCA.exe** (online/offline) which can be downloaded from the website: [https://www.evco.it/assets/doc/EVCO-EV3200Web\\_configurator\\_for\\_EPoCA.zip](https://www.evco.it/assets/doc/EVCO-EV3200Web_configurator_for_EPoCA.zip)
- From a smartphone/tablet using the **EVLink Wi-Fi** app.

In both cases, the devices must be visible on the local network. If the local network requires a static IP address, configure using the micro-B USB cable.

If used in a subnetwork, configure the **BLE** parameter for every device from 1 to 10 before searching on the network.

#### 8.1.1 Configuration diagram when using a smartphone and the EVLink Wi-Fi app.

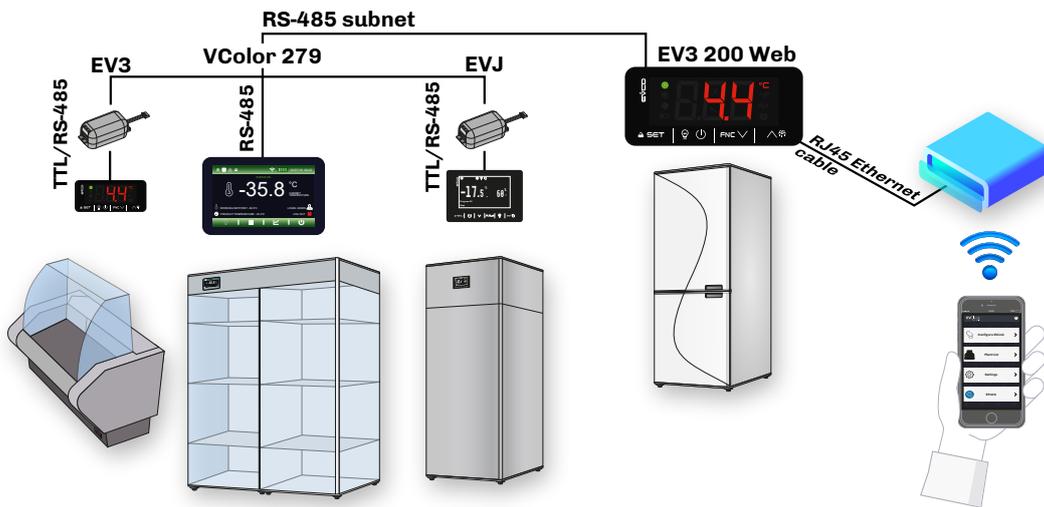


Fig. 34. Configuration diagram when using a smartphone

#### 8.1.2 Configuration diagram when using a PC with direct connection via USB

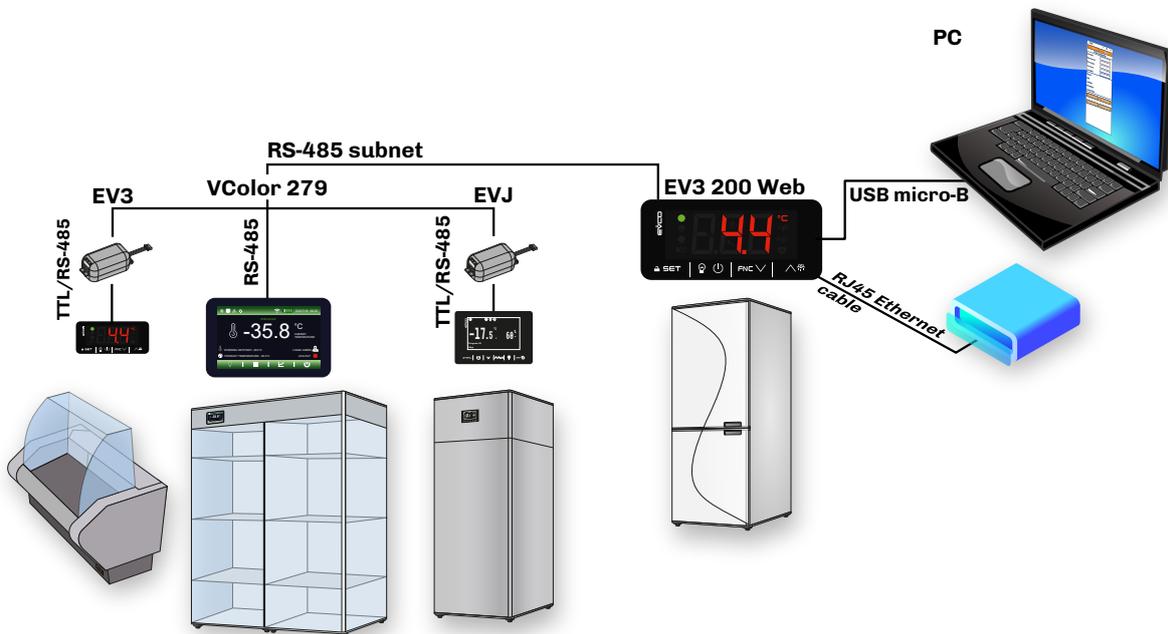


Fig. 35. Configuration diagram when using a PC - USB

### 8.1.3 Configuration diagram when using a PC with connection via Ethernet

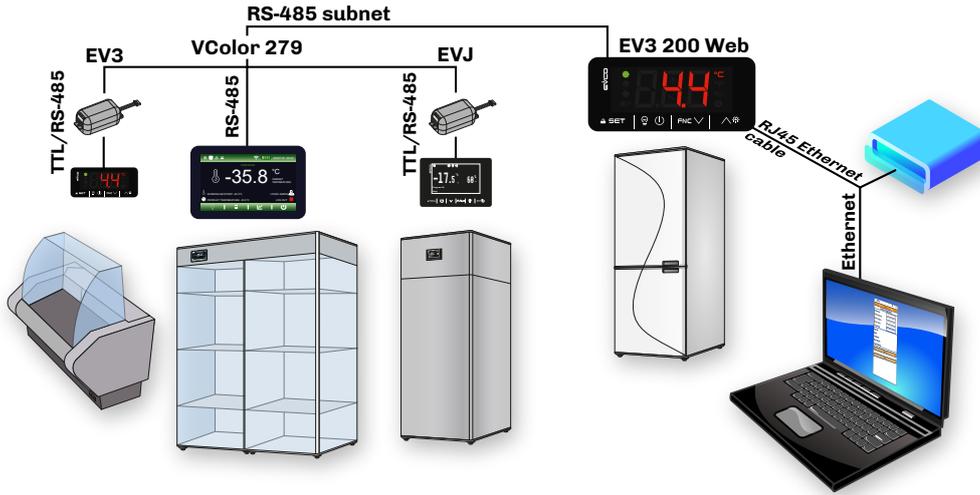


Fig. 36. Configuration diagram when using a PC - Ethernet

## 8.2 FIRST CONFIGURATION

### 8.2.1 Configuration using a PC

#### Connecting using a micro-B USB cable

1. Connect the micro-B USB cable from the PC to the device;
2. Make sure **EPoCA.exe** has been installed in the PC;
3. Boot up **EPoCA.exe**;
4. Set the Plant and Device data, save the configuration by pressing **Save Config.** and continue by pressing **Next**;

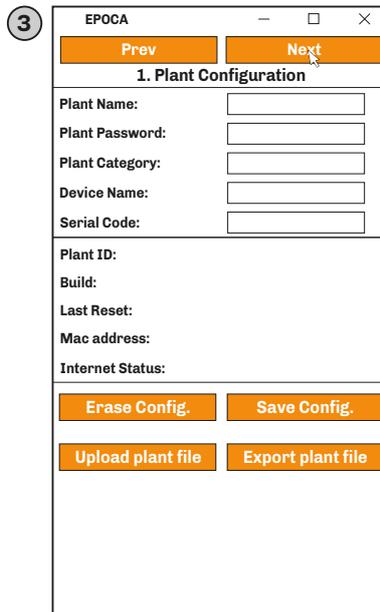


Fig. 37. Selecting the device and configuring the Plant and Device

**N.B.:** Save to continue with configuration.

## NOTICE

### WRONG OR FORGOTTEN ACCESS CREDENTIALS

Keep your access credentials in a safe place.

Contact your sales channel if your access credentials are wrong or have been lost.

#### Other commands:

Command	Description
Erase Config.	Cancels current configuration
Save Config.	Saves current configuration
Upload Plantfile	Uploads a previously saved plant file
Export Plantfile	Saves the plant file in a folder chosen by the user

5. Set the date, time and local time used and press **Next**;
6. Set the name of the controllers connected via RS-485 to **EV3 200 Web** and press **Next**;

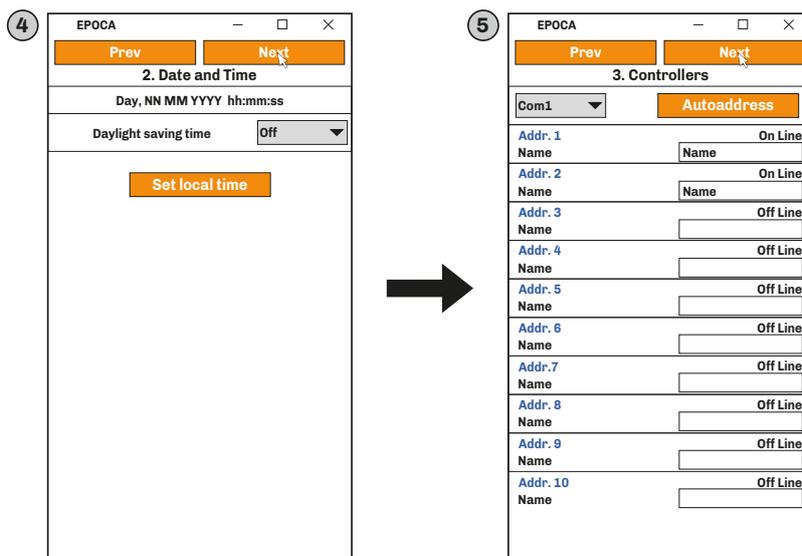


Fig. 38. Selecting the device and configuring the Plant and Device

**Autoaddress**: if the devices are switched on one at a time, this key automatically configures the **BLE** parameter of the device being switched on.

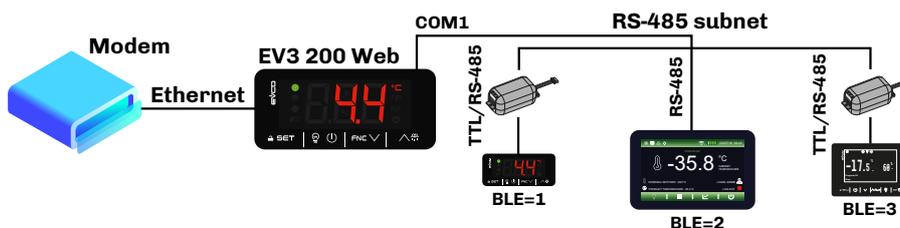


Fig. 39. Diagram of subnetwork and BLE configuration

To erase a device and its failed configuration, press **Addr. X**. A pop-up appears where you can choose to erase the recordings or the configuration of the device.

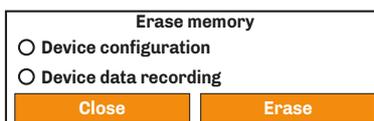


Fig. 40. Pop-up to erase memory

7. Set the type of IP address and press **Next**;
8. Press **Configure** to complete configuration of the device.

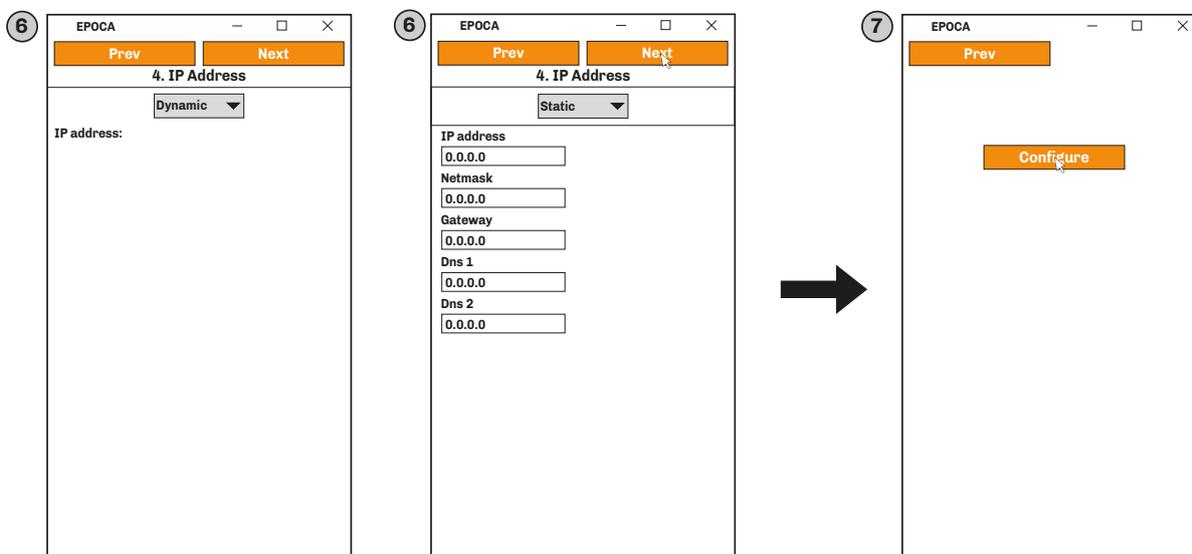
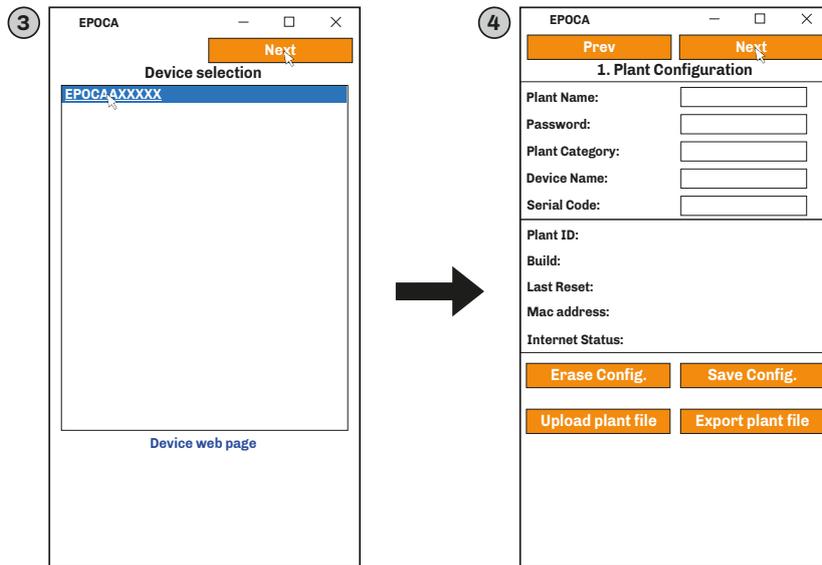


Fig. 41. Selecting the type of IP address and end of configuration

**Connecting using an Ethernet cable (with connection to modem)**

1. Make sure **EPoCA.exe** has been installed in the PC;
2. Boot up **EPoCA.exe**, the programme scans the local network (LAN) which the PC is connected to to detect the devices;
3. Select the device to configure and press **Next**;
4. Set the Plant and Device data, save the configuration by pressing **Save Config.** and continue by pressing **Next**;



**Fig. 42.** Selecting the device and configuring the Plant and Device

**N.B.:** Save to continue with configuration.

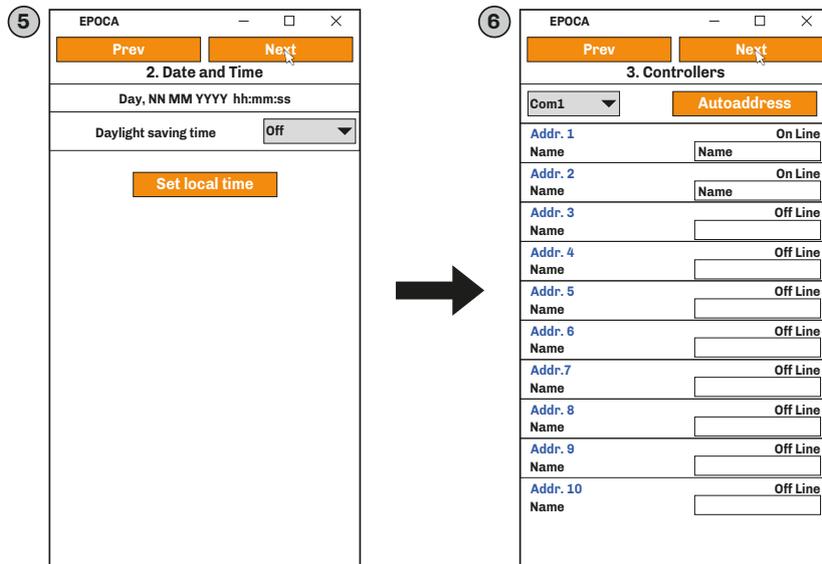
NOTICE

**WRONG OR FORGOTTEN ACCESS CREDENTIALS**

Keep your access credentials in a safe place.

Contact your sales channel if your access credentials are wrong or have been lost.

5. Set the date, time and local time used and press **Next**;
6. Set the name of the controllers connected via RS-485 to **EV3 200 Web** and press **Next**;



**Fig. 43.** Selecting the device and configuring the Plant and Device

Set the type of IP address and press **Next**;

7. Press **Configure** to complete configuration of the device.

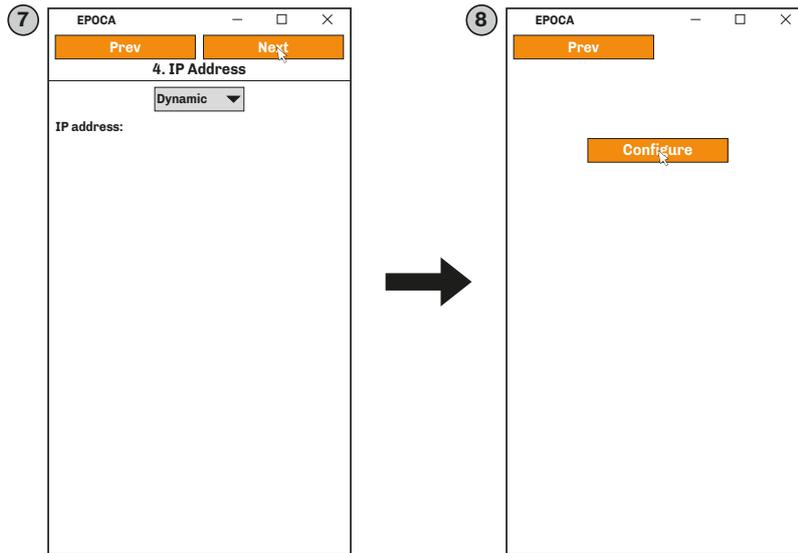


Fig. 44. Selecting the type of IP address and end of configuration

### 8.2.2 Configuration using a smartphone or tablet

To configure **EV3 200 Web** using a **smartphone or tablet** follow these steps:

1. Make sure the **EVLink Wi-Fi** app has been downloaded to the smartphone or tablet (otherwise download it from:
  - *Google Play Store* for smartphone/tablet **Android 5.0** or later);

To download the **EVLink Wi-Fi** app from the *Google Play Store*, scan the **QR code** in the image below; this takes you directly to the download page.

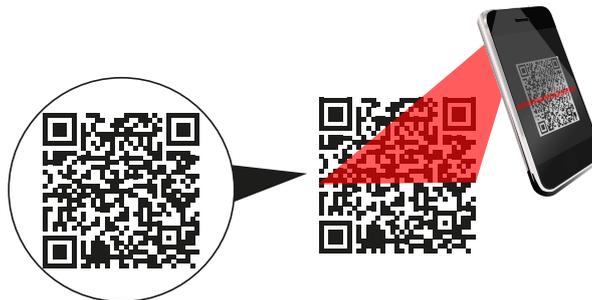


Fig. 45. Scanning the QR code to download the EVLink app

2. Boot up **EVlink Wi-Fi**;
3. Touch **Configure EVLink**;
4. Select the device to configure;

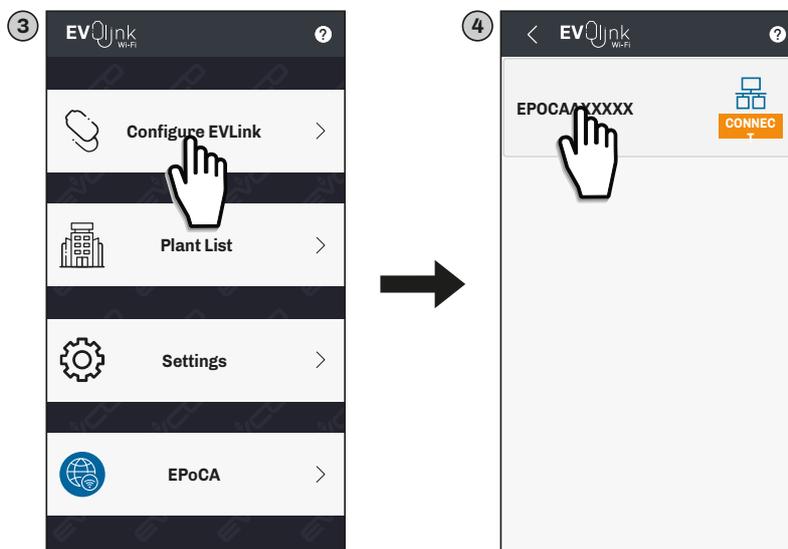


Fig. 46. HOME screen and selecting the device

5. Touch **Configure**, set the Plant data and touch **Next**;

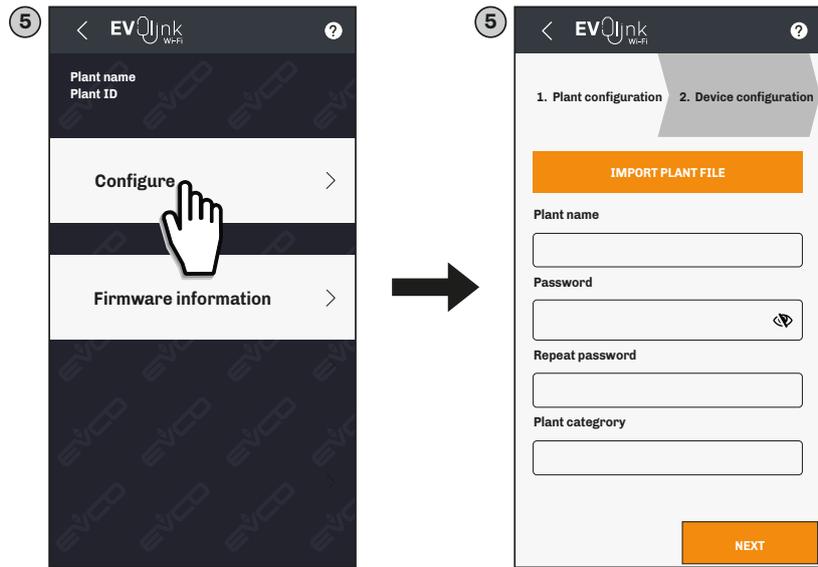


Fig. 47. Configuring the plant

6. Insert the device data and touch **Next**;

7. Set the date, time and local time used and touch **Next**;

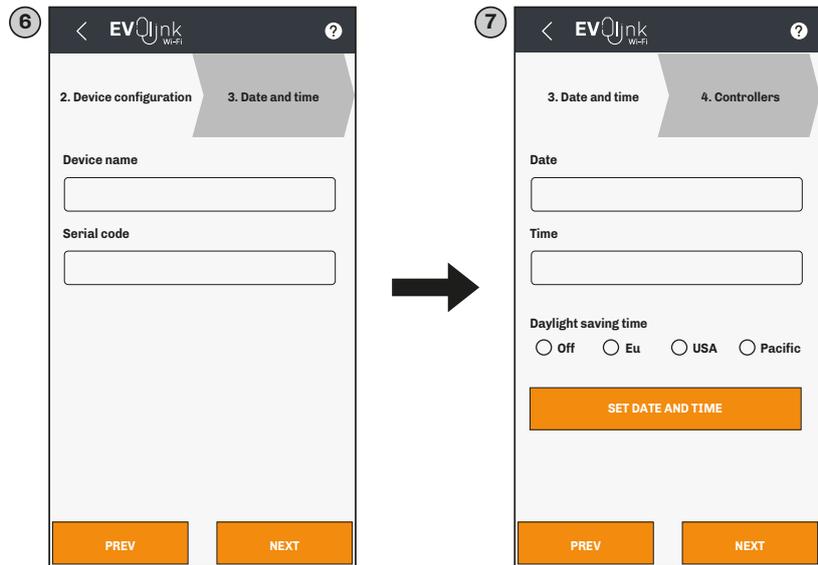


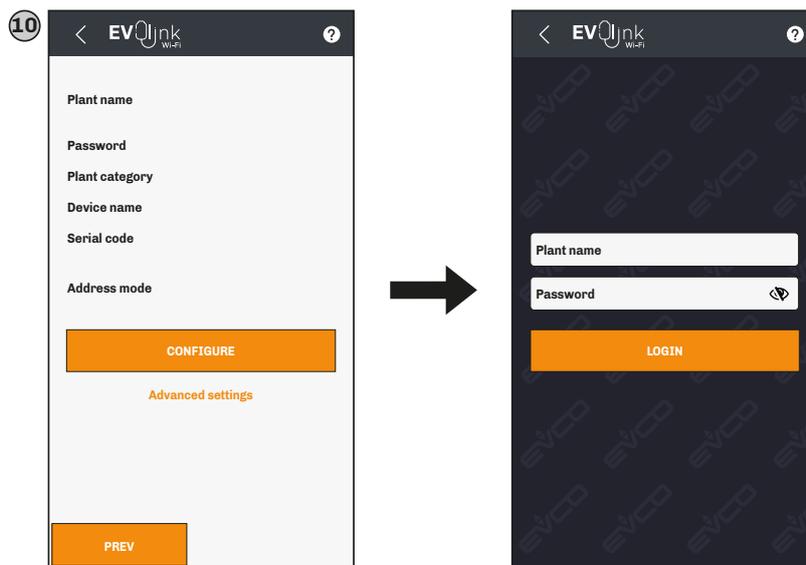
Fig. 48. Configuring the device, date and time

8. Set the name of the controllers connected via RS-485 to **EV3 200 Web** and touch **Next**;
9. Set the type of IP address of the network and touch **Next**;



**Fig. 49.** Configuring the addresses of the controllers and type of IP address

10. Touch **Configure** to complete configuration of the device;  
The next time the device is accessed, it will ask for the access credentials (Plant name, Password).



**Fig. 50.** End of configuration

## 9. REGULATION PARAMETERS

### Description of columns in the Table of Parameters

- **Par.:** List of configurable device parameters;
- **Description:** Indicates parameter operation and any possible selections;
- **MU:** Measurement unit relating to the parameter;
- **Range:** Describes the interval of values that the parameter can assume. This can be correlated with other instrument parameters (indicated with the parameter code).  
*NOTE: if the actual value is outside the permitted limits for that parameter (for example, because other parameters defining the aforementioned limits have been altered), the value of the violated limit is displayed instead of the actual value;*
- **Default:** Indicates the pre-set factory configuration;
- **PW:** Indicates the access level for the parameter.
- **MODBUS address:** Indicates the address of the MODBUS register containing the resource you want to access.

### 9.1 TABLE OF REGULATION PARAMETERS

Par.	Description	MU	Range	Default
<b>SETPOINT Group</b>				
<b>SP</b>	Temperature setpoint.	°C/°F	<b>r1...r2</b>	0.0
<b>ANALOGUE INPUTS Group</b>				
<b>CA1</b>	Probe Pb1 offset.	°C/°F	-25.0...25.0	0.0
<b>CA2</b>	Probe Pb2 offset.	°C/°F	-25.0...25.0	0.0
<b>CA3</b>	Probe Pb3 Offset.	°C/°F	-25.0...25.0	0.0
<b>P0</b>	Type of probe. <b>0</b> = PTC; <b>1</b> = NTC.	---	0/1	1
<b>P1</b>	Enable decimal point in °C. <b>0</b> = No; <b>1</b> = Yes.	---	0/1	1
<b>P2</b>	Temperature measurement unit (if the value is changed, the temperature parameter limits must be reset manually). <b>0</b> = °C; <b>1</b> = °F.	---	0/1	0
<b>P3</b>	Probe Pb2 function. <b>0</b> = Disabled; <b>1</b> = Defrost + fans; <b>2</b> = Fans.	---	0...3	1
<b>P4</b>	Configuration of input Pb3/ID3. <b>0</b> = Digital input ID3; <b>1</b> = Condenser probe; <b>2</b> = Critical temperature probe; <b>3</b> = External air probe (display only).	---	0...3	0
<b>P5</b>	Value displayed. <b>0</b> = Regulation temperature. <b>1</b> = Setpoint. <b>2</b> = Probe Pb2 temperature. <b>3</b> = Probe Pb3 temperature. <b>4</b> = Incoming air temperature.	---	0...4	1
<b>P7</b>	Incoming air coefficient to calculate product temperature ( <b>CPT</b> ). <b>CPT</b> = $\{[(P7 \times (\text{incoming air})) + [(100 - P7) \times (\text{outgoing air})] : 100\}$	---	0...10	5
<b>P8</b>	Refresh time display <b>1</b> .	s	0...250/10	5
<b>TEMPERATURE REGULATION Group</b>				
<b>r0</b>	Cooling mode setpoint differential.	°C/°F	0.1...15.0	2.0
<b>r1</b>	Minimum setpoint.	°C/°F	-99.0... <b>r2</b>	-50.0
<b>r2</b>	Maximum setpoint.	°C/°F	<b>r1</b> ...199	50.0
<b>r4</b>	Setpoint offset in energy saving added to SET value.	°C/°F	0.0...99.0	0.0
<b>r5</b>	Heating/Cooling regulation. <b>0</b> = Cooling; <b>1</b> = Heating.	---	0/1	0
<b>r6</b>	Setpoint offset in over-cooling/over-heating.	°C/°F	0.0...99.0	0.0
<b>r7</b>	Duration of over-cooling/over-heating.	min	0...240	0
<b>r8</b>	Down key additional function <b>FNC</b> ✓. <b>0</b> = Disabled; <b>1</b> = Over-cooling/over-heating; <b>2</b> = Energy saving.	---	0...2	0

Par.	Description	MU	Range	Default
<b>r12</b>	Differential position <b>r0</b> . <b>0</b> = Asymmetrical; <b>1</b> = Symmetrical.	---	0/1	0
<b>COMPRESSOR Group</b>				
<b>C0</b>	Compressor ON delay from power-on.	min	0...240	0
<b>C2</b>	Minimum compressor OFF time.	min	0...240	3
<b>C3</b>	Minimum compressor ON time.	s	0...240	0
<b>C4</b>	Compressor OFF time in cabinet probe alarm.	min	0...240	10
<b>C5</b>	Compressor ON time in cabinet probe alarm.	min	0...240	10
<b>C6</b>	Condensation temperature above which the condenser overheat alarm sounds.	°C/°F	0.0...199	80.0
<b>C7</b>	Condenser temperature above which the compressor locked alarm sounds, once <b>C8</b> time has elapsed.	°C/°F	0.0...199	90.0
<b>C8</b>	Delay in activation of compressor locked alarm due to threshold <b>C7</b> being exceeded.	min	0...15	1
<b>C10</b>	Compressor hours for maintenance. <b>0</b> = Disabled.	h	0...999*100	0
<b>C11</b>	Second compressor switch-on delay from first compressor switch-on.	s	0...240	10
<b>C13</b>	Number of start-ups per compressor rotation. <b>0</b> = Disabled.	num	0...10	0
<b>DEFROST Group</b>				
<b>d0</b>	Defrost interval. <b>0</b> = Manual defrost only. If <b>d8</b> = 3, maximum interval.	h	0...99	8
<b>d1</b>	Type of defrost. <b>0</b> = Electrical heaters; <b>1</b> = Cycle reversed (hot gas); <b>2</b> = When compressor stops.	---	0...2	0
<b>d2</b>	Evaporation temperature above which defrost with evaporator probe terminates ( <b>Pr3</b> = 5).	°C/°F	-99.0...99.0	8.0
<b>d3</b>	Defrost duration. If <b>P3</b> = 1, maximum duration.	min	0...99	30
<b>d4</b>	Enable defrost when device is switched on. <b>0</b> = Disabled; <b>1</b> = Enabled.	---	0/1	0
<b>d5</b>	Defrost activation delay from power-on.	min	0...99	0
<b>d6</b>	Value displayed during defrost. <b>0</b> = Regulation; <b>1</b> = Locked display; <b>2</b> = Code "DEF".	---	0...2	1
<b>d7</b>	Evaporator dripping time after defrost.	min	0...15	0
<b>d8</b>	Defrost interval count mode. <b>0</b> = Hours device ON; <b>1</b> = Hours compressor ON; <b>2</b> = Hours evaporator temperature < <b>d9</b> ; <b>3</b> = Adaptive; <b>4</b> = In real time (RTC).	---	0...4	0
<b>d9</b>	Evaporation threshold for automatic defrost interval count.	°C/°F	-99.0...99.0	0.0
<b>d11</b>	Enable defrost terminated warning due to maximum duration (code <b>dFd</b> ). <b>0</b> = No; <b>1</b> = Yes.	---	0/1	0
<b>d15</b>	Compressor ON time before hot gas defrost.	min	0...99	0
<b>d16</b>	Pre-dripping time for hot gas defrost.	min	0...99	0
<b>d18</b>	Adaptive defrost interval. <b>0</b> = Manual defrost only.	min	0...999	40
<b>d19</b>	Adaptive defrost threshold (relative to optimal evaporation temperature).	°C/°F	0.0...40.0	3.0
<b>d20</b>	Compressor-on consecutive time for defrost.	min	0...999	180
<b>d21</b>	Compressor-on consecutive time for defrost from power-on and from over-cooling.	min	0...500	200
<b>d22</b>	Evaporation threshold for adaptive defrost interval count (relative to optimal evaporation temperature).	°C/°F	-10.0...10.0	-2.0
<b>ALARM Group</b>				
<b>AA</b>	Select value for high/low temperature alarms <b>0</b> = Regulation temperature; <b>1</b> = Evaporator temperature; <b>2</b> = Probe Pb3 temperature.	---	0...2	0
<b>A1</b>	Low temperature alarm threshold.	°C/°F	-99.0...99.0	-10.0

Par.	Description	MU	Range	Default
<b>A2</b>	Type of low temperature alarm. 0 = Disabled; 1 = Relative to SET; 2 = Absolute.	---	0...2	2
<b>A4</b>	High temperature alarm threshold.	°C/°F	-99.0...99.0	10.0
<b>A5</b>	Type of high temperature alarm. 0 = Disabled; 1 = Relative to SET; 2 = Absolute.	---	0...2	2
<b>A6</b>	Delay in activation of temperature and humidity alarms due to threshold exceeded when device is switched on.	min	0...99*10	12
<b>A7</b>	Minimum and maximum temperature alarm delay.	min	0...240	15
<b>A8</b>	Delay in activation of alarm due to threshold exceeded after defrost.	min	0...240	15
<b>A9</b>	Delay in activation of alarm due to threshold exceeded after door closed.	min	0...240	15
<b>A10</b>	Duration of power failure to record alarm.	min	0...240	15
<b>A11</b>	Hysteresis referring to <b>A1</b> and <b>A4</b> to determine alarm reset threshold.	°C/°F	1.0...15.0	2.0
<b>EVAPORATOR/CONDENSER FANS Group</b>				
<b>F0</b>	Evaporator fan mode in normal operating mode. With <b>F0</b> = 0 it is possible to manage cycles by setting <b>F11</b> , <b>F12</b> . 0 = In cycles; 1 = Always ON; 2 = On with compressor ON; 3 = Thermostat controlled ( <b>F1</b> relative to temperature control); 4 = Thermostat controlled with compressor ON ( <b>F1</b> relative to temperature control).	---	0...4	1
<b>F1</b>	Evaporator fan regulation threshold with <b>F0</b> = 3, 4.	°C/°F	-99.0...99.0	-4.0
<b>F2</b>	Evaporator fan mode during defrost. 0 = OFF; 1 = ON; 2 = According to <b>F0</b> .	---	0...2	0
<b>F3</b>	Maximum time evaporator fans off after dripping.	min	0...15	0
<b>F4</b>	Time evaporator fans OFF in energy saving.	s	0...240*10	0
<b>F5</b>	Time evaporator fans ON in energy saving.	s	0...240*10	10
<b>F7</b>	Evaporator fans ON threshold from dripping.	°C/°F	-99.0...99.0	5.0
<b>F9</b>	Evaporator fan switch-off delay from compressor switch-off	s	0...240	5
<b>F11</b>	Condenser fans ON threshold.	°C/°F	-99.0...99.0	15.0
<b>F12</b>	Condenser fans OFF delay from compressor OFF.	s	0...240	30
<b>F15</b>	Time evaporator fans OFF with compressor OFF.	s	0...240	0
<b>F16</b>	Time evaporator fans ON with compressor OFF.	s	0...240	1
<b>DIGITAL INPUT PROPERTIES Group</b>				
<b>i0</b>	Digital input ID1 function. 0 = Disabled; 1 = Compressor + evaporator fans OFF; 2 = Evaporator fans OFF; 3 = Light ON; 4 = Compressor + evaporator fans OFF, light ON; 5 = Evaporator fans OFF, light ON.	---	0...5	5
<b>i1</b>	Digital input ID1 activation (polarity). 0 = Contact closed (NC); 1 = Contact open (NO).	---	0/1	0
<b>i2</b>	Delay in alarm signal from door open. -1 = Disabled.	min	-1...120	30
<b>i3</b>	Maximum time for inhibiting regulation with door open. -1 = Disabled.	min	-1...120	15
<b>i5</b>	Digital input ID3 function. 0 = Disabled; 1 = Energy saving; 2 = iA alarm; 3 = AUX ON; 4 = Stand-by; 5 = Cth alarm; 6 = th alarm.	---	0...6	0
<b>i6</b>	Digital input ID3 activation (polarity). 0 = Contact closed (NC); 1 = Contact open (NO).	---	0/1	0
<b>i7</b>	Delay in alarm signal from door open. -1 = Disabled.	min	-1...120	0
<b>i10</b>	Door closed consecutive time for energy saving.	min	0...999	0
<b>i13</b>	Number of door openings for defrost. 0 = Disabled.	num	0...240	180
<b>i14</b>	Door open consecutive time for defrost. 0 = Disabled.	min	0...240	32

Par.	Description	MU	Range	Default
<b>DIGITAL OUTPUT Group</b>				
<b>u1</b>	Configuration output <b>out4</b> . Use the AUX key for manual control. <b>0</b> = Cabinet light; <b>1</b> = Demisting heaters; <b>2</b> = AUX output; <b>3</b> = Alarm; <b>4</b> = Door heaters; <b>5</b> = Neutral zone; <b>6</b> = Condenser fans; <b>7</b> = ON/Stand-by; <b>8</b> = Compressor 2.	---	0...8	0
<b>u2</b>	Enable cabinet light and load in stand-by using the key. <b>0</b> = Disabled; <b>1</b> = Enabled.	---	0/1	0
<b>u4</b>	Enable silencing alarm output. <b>0</b> = Disabled; <b>1</b> = Enabled.	---	0/1	0
<b>u5</b>	Door heaters activation threshold.	°C/°F	-99.0...99.0	
<b>u6</b>	Duration demisting ON.	min	1...120	
<b>u7</b>	Neutral zone threshold for heating.	°C/°F	-99.0...99.0	0.0
<b>ENERGY SAVING Group</b>				
<b>HE2</b>	Maximum duration energy saving.	min	0...999	0
<b>ENERGY SAVING IN REAL TIME (RTC) Group</b>				
<b>H01</b>	Energy saving time Monday.	h	0...23	0
<b>H02</b>	Maximum duration energy saving Monday.	h	0...24	0
<b>H03</b>	Energy saving time Tuesday.	h	0...23	0
<b>H04</b>	Maximum duration energy saving Tuesday.	h	0...24	0
<b>H05</b>	Energy saving time Wednesday.	h	0...23	0
<b>H06</b>	Maximum duration energy saving Wednesday.	h	0...24	0
<b>H07</b>	Energy saving time Thursday.	h	0...23	0
<b>H08</b>	Maximum duration energy saving Thursday.	h	0...24	0
<b>H09</b>	Energy saving time Friday.	h	0...23	0
<b>H10</b>	Maximum duration energy saving Friday.	h	0...24	0
<b>H11</b>	Energy saving time Saturday.	h	0...23	0
<b>H12</b>	Maximum duration energy saving Saturday.	h	0...24	0
<b>H13</b>	Energy saving time Sunday.	h	0...23	0
<b>H14</b>	Maximum duration energy saving Sunday.	h	0...24	0
<b>RTC DEFROST CONFIGURATION Group</b>				
<b>Hd1</b>	Defrost 1 activation time. "----" = Disabled.	h	----, 0...23	----
<b>Hd2</b>	Defrost 2 activation time. "----" = Disabled.	h	----, 0...23	----
<b>Hd3</b>	Defrost 3 activation time. "----" = Disabled.	h	----, 0...23	----
<b>Hd4</b>	Defrost 4 activation time. "----" = Disabled.	h	----, 0...23	----
<b>Hd5</b>	Defrost 5 activation time. "----" = Disabled.	h	----, 0...23	----
<b>Hd6</b>	Defrost 6 activation time. "----" = Disabled.	h	----, 0...23	----
<b>PASSWORD Group</b>				
<b>POF</b>	Enable stand-by key (ON/OFF). <b>0</b> = Disabled; <b>1</b> = Enabled.	---	0/1	1
<b>PAS</b>	Level 2 password to access parameters (installer).	---	-99... 999	-19
<b>PA1</b>	EVlink/EVConnect user password (not entered on device).	---	-99... 999	426
<b>PA2</b>	EVlink/EVConnect service password (not entered on device).	---	-99... 999	824
<b>CLOCK Group</b>				
<b>Hr0</b>	Enable clock. <b>0</b> = Disabled; <b>1</b> = Enabled.	---	0/1	0
<b>REMOTE COMMUNICATION Group</b>				
<b>BLE</b>	Reserved. <b>Do not change</b> .	---	---	1
<b>rE0</b>	Recording interval.	min	0...240	15

Par.	Description	MU	Range	Default
<b>rE1</b>	Value to record. <b>0</b> = No value to record; <b>1</b> = Only probe Pb1 value; <b>2</b> = Only probe Pb2 value; <b>3</b> = Only probe Pb3 value; <b>4</b> = Probe Pb1 and Pb2 value; <b>5</b> = Value of all the probes.	---	0...5	1
<b>MODBUS CONFIGURATION Group</b>				
<b>LA</b>	MODBUS protocol controller address.	---	0...247	247
<b>Lb</b>	MODBUS transmission speed (baud rate). <b>0</b> = 2400; <b>1</b> = 4800; <b>2</b> = 9600; <b>3</b> = 19200.	baud	0...3	3

## 10. DIAGNOSTICS

The table below lists alarms with their corresponding solutions. To signal an alarm, the LED alarm lights up  and the buzzer sounds. Every alarm is recorded in the Alarm menu.

### 10.1 TABLE OF ALARMS

Code	Description	Cause	Effects	Resolution
<b>Pr1</b>	Probe error	<ul style="list-style-type: none"> <li>Probe not working</li> <li>Probe incorrectly connected</li> <li>Incorrect type of probe</li> </ul>	<ul style="list-style-type: none"> <li>Code <b>Pr1</b> displayed</li> <li>Alarm output ON</li> <li>Compressor regulated according to <b>C4</b> and <b>C5</b></li> <li>Defrost suspended</li> </ul>	<ul style="list-style-type: none"> <li>Check the type of probe (<b>PO</b>)</li> <li>Check probe wiring</li> <li>Change type of probe</li> </ul>
<b>Pr2</b>			<ul style="list-style-type: none"> <li>Code <b>Pr2</b> displayed</li> <li>Alarm output ON</li> <li>If <b>P4</b> = 1, defrost active for time <b>d3</b></li> </ul>	
<b>Pr3</b>			<ul style="list-style-type: none"> <li>Code <b>Pr3</b> displayed</li> <li>No effect on regulation</li> </ul>	
<b>rtc</b>	Clock alarm	Clock (RTC) alarm not working	Clock-connected functions not present or not synchronised with the actual time	Set the right time. If the error persists, replace the device (RTC battery dead)
<b>AL</b>	Low temperature alarm Pb1	Temperature Pb1 > <b>A1</b> for a time equal to <b>A7</b>	<ul style="list-style-type: none"> <li>Code <b>AL</b> displayed</li> <li>No effect on regulation</li> </ul>	Wait until the temperature read by Pb1 goes below the alarm threshold ( <b>A1-A11</b> )
<b>AH</b>	High temperature alarm Pb1	Temperature Pb1 > <b>A4</b> for a time equal to <b>A7</b>	<ul style="list-style-type: none"> <li>Code <b>AH</b> displayed</li> <li>No effect on regulation</li> </ul>	Wait until the temperature read by Pb1 goes above the alarm threshold ( <b>A4+A11</b> )
<b>id</b>	Door open alarm	Digital input activated for a time > <b>i2</b>	<ul style="list-style-type: none"> <li>Code <b>id</b> displayed</li> <li>Regulators blocked depending on the current function in <b>iC1</b> = 7, 8 or 9</li> </ul>	<ul style="list-style-type: none"> <li>If <b>i2</b> = -1 the alarm is disabled;</li> <li>Check <b>i2</b> and <b>iP1</b></li> </ul>
<b>PF</b>	Power failure alarm	Power failure for longer than <b>A10</b>	Code <b>PF</b> is recorded	Check the power supply wiring
<b>COH</b>	Condenser overheat signal	Condenser temperature > <b>C6</b>	<ul style="list-style-type: none"> <li>Code <b>COH</b> displayed</li> <li>No effect on regulation</li> </ul>	Check <b>C6</b>
<b>CSd</b>	High condensation alarm	Condenser temperature > <b>C7</b> for a time equal to <b>C8</b>	<ul style="list-style-type: none"> <li>Code <b>CSd</b> displayed</li> <li>Compressor locked</li> </ul>	<ul style="list-style-type: none"> <li>Switch the device off then on again;</li> <li>Check <b>C7</b> and <b>C8</b></li> </ul>
<b>iA</b>	Multi-purpose input alarm	Digital input activated ( <b>iC1</b> = 2) for a time equal to <b>i5</b>	<ul style="list-style-type: none"> <li>Code <b>iA</b> displayed</li> <li>No effect on regulation</li> </ul>	Check <b>i5</b> and <b>i6</b>
<b>CtH</b>	Compressor thermal switch alarm	Digital input activated ( <b>iC1</b> = 5)	The regulator counts the number of events <b>i8</b> in the time <b>i7</b> from the first one	<ul style="list-style-type: none"> <li>If <b>i7</b> = 0 alarm is always automatically reset</li> <li>Check <b>i5</b> and <b>i6</b></li> </ul>
<b>th</b>	Thermal switch global alarm	Digital input activated ( <b>iC1</b> = 5)	The regulator counts the number of events <b>i8</b> in the time <b>i7</b> from the first one	<ul style="list-style-type: none"> <li>Switch the device off then on again;</li> <li>Check <b>i5</b> and <b>i6</b></li> </ul>
<b>dFd</b>	Defrost timeout alarm	Defrost terminated due to timeout and not to reaching temperature <b>d2</b>	<ul style="list-style-type: none"> <li>Code <b>dFd</b> displayed</li> <li>No effect on regulation</li> </ul>	<ul style="list-style-type: none"> <li>Touch any key</li> <li>Check <b>d2</b>, <b>d3</b> and <b>d11</b></li> </ul>

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