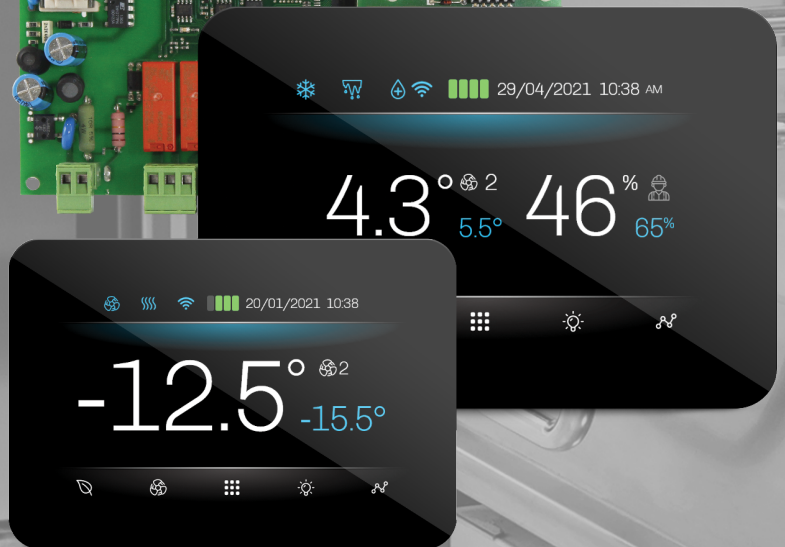
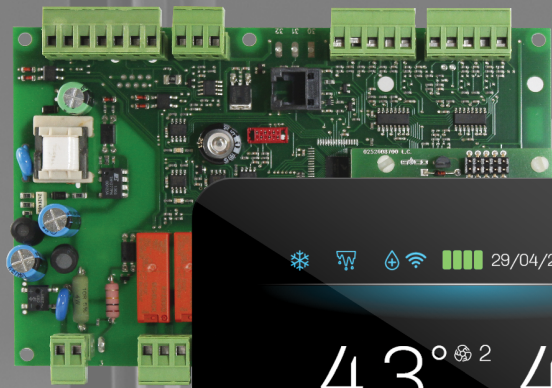


# Vcolor 229/249 series

Electronic controllers with 5" or 7" TFT graphic display for cabinets, counters and temperature- and humidity-controlled cold rooms



**WARNING**  
Make sure you read and fully understand the user manual before using this device.  
Non-observance of these instructions will result in death or serious injury.



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# 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 services 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, EVCO 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 in accordance with local regulations regarding the collection of electrical and electronic appliances.

## Consider the environment



The company works towards protecting the environment, while taking account of customer requirements, technological innovations in 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

Please read this document carefully before installation; study all the warnings 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 lead to death or serious injury**.

### **WARNING**

**WARNING** indicates a situation of imminent danger which, if not avoided, **may lead to 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.

**NOTE:** 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.
- Cut off the power supply to all equipment, including any connected devices, before installing/uninstalling the device.
- Always use a properly calibrated Voltmeter to make sure the system is powered 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 data section.
- Do not exceed the temperature and humidity ranges indicated in the technical data section.
- 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.

### WARNING

#### MALFUNCTIONING OF THE EQUIPMENT

- Perform the wiring carefully, in compliance with electromagnetic compatibility requirements.
- Make sure the wiring is correct for its application.
- Use shielded cables for all I/O signal and communication cables.
- Minimise the length of the connections as much as possible, to avoid winding the cables around electrically connected parts.
- The signal (digital and analogue inputs, communication and corresponding power supplies) and power cables for the device must be routed separately.
- Before applying the power supply, check all the wiring connections.
- Use the necessary safety interlocks wherever the risk of injury to personnel and/or equipment damage exists.
- Install and use this device in a cabinet of a suitable class for the intended environment, protected by a keyed locking mechanism or other suitable instruments.
- In terms of connection and the fuses used in the circuits for the power supply and output lines, observe local and national regulatory requirements relating to the nominal current and voltage for the equipment in use.
- Do not use this equipment for machine functions that are critical to safety.
- Do not disassemble, repair or modify the equipment.
- Do not connect wires to unused terminals and/or terminals marked with the text "No connection" ("N.C").

# 1. INTRODUCTION

---

## 1.1 DESCRIPTION

**Vcolor 229/249 M/L** controllers are the EVCO solution designed for the full management of LT or NT (Low temperature or Normal temperature) refrigerated cabinets and for temperature-/humidity-controlled cold rooms.

**Vcolor 229/249 M/L** controllers consist of:

- Base power board;
- User display interface.

The user interface consists of a colour TFT graphic display featuring capacitive touchscreen technology, available in two sizes with horizontal alignment:

- 5" touchscreen TFT display;
- 7" touchscreen TFT display.

Depending on the machine configuration, humidity management can also be integrated using standard transducers at a 4...20 mA current or, alternatively, a dedicated EVCO temperature+humidity probe (see "**1.4 Accessories**" on page 10).

The innovative **Vcolor 229/249 M/L** programmable platform allows the customer fully independent management of the following:

- Controller graphics customisation;
- Food menu management (by adding high-quality photos);
- The addition of other languages other than those made available by EVCO.

## 1.2 AVAILABLE MODELS

The **Vcolor 229/249 M/L** series includes 4 controllers:

- **Vcolor 229 M** - Controller for refrigerated cabinets with a 5" display and PWM output;
- **Vcolor 229 L** - Controller for refrigerated cabinets with a 7" display and PWM output;
- **Vcolor 249 M** - Controller for refrigerated cabinets with a 5" display and 0...10 V output;
- **Vcolor 249 L** - Controller for refrigerated cabinets with a 7" display and 0...10 V output;

## 1.3 FEATURES




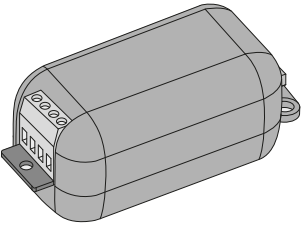
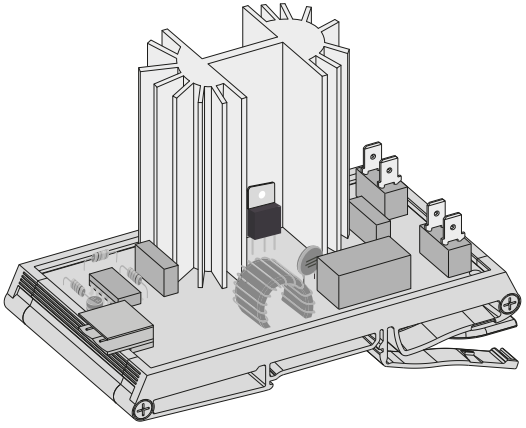
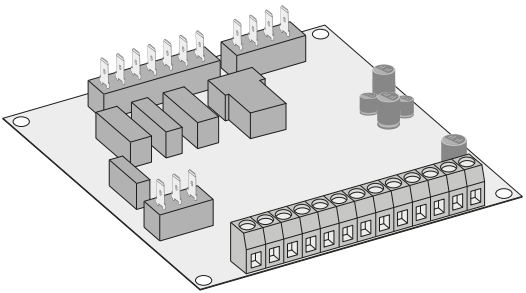
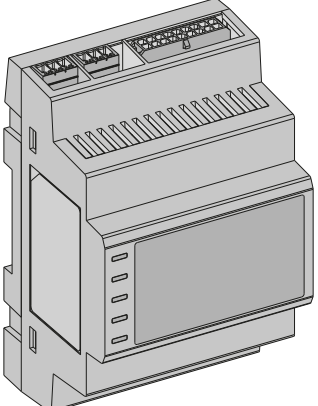
The main features of the **Vcolor 229/249 M/L** series are:

- 5 analogue inputs, of which:
  - 3 analogue inputs for temperature (PTC/NTC/Pt1000);
  - 1 analogue input for humidity probe **EVHTP520**;
  - 1 analogue input for humidity probe, 4...20 mA;
- 4 volt-free digital inputs;
- 9 sealed relay outputs;
  - Digital output expansion device also available on request, for a further 4 non-sealed relay outputs;
- 1 PWM output (**Vcolor 229 M/L** only);
- 1 analogue output, 0...10 V (**Vcolor 249 M/L** only);
- 1 RS-485 MODBUS RTU serial port;
- 1 USB-A port;
- **EPoCA**-compatible;

**NOTE:** for further information regarding input and output specifications, please refer to paragraph "**2.1 Technical specifications**" on page 11.

## 1.4 ACCESSORIES

The Vcolor 229/249 M/L range is supplemented with the following accessories:

Type	P/n	Description
	---	NTC/PTC/Pt1000 temperature probes
	<b>EVHTP520</b>	NTC temperature/humidity probe
	<b>EVHP523</b>	Humidity probe 4...20 mA
	<b>EVIF25SWX</b>	EVlinking RS-485/Wi-Fi module
	<b>EVDFAN1</b>	Evaporator fan PWM module
---	<b>CJAV55</b>	Kit for removable terminals on the power base
	<b>EVC20P52N9XXX10</b>	Expansion device with 4 unsealed digital outputs
	<b>EVC20P52N9XXX12</b>	Expansion device with 4 sealed digital outputs
	<b>EVPS9B</b>	Backup module



## 2. TECHNICAL DATA

All the system components of **Vcolor 229/249 M/L** controllers satisfy European Community (EC) requirements for built-in equipment. They must be installed in casing or another location designated on the basis of specific environmental conditions and in order to minimise the risk of involuntary contact with hazardous voltage. Use metal casing to improve immunity to the electromagnetic fields of the **Vcolor 229/249 M/L** system. This equipment satisfies the EC requirements as indicated in the tables below.

### WARNING

#### MALFUNCTIONING OF THE EQUIPMENT

Do not exceed any of the nominal values specified in this section.

## 2.1 TECHNICAL SPECIFICATIONS

### 2.1.1 User interface

Type	Description
The product complies with the following harmonised standards:	EN60730-1 and EN60730-2-9
Device construction:	Incorporated electronic device
Device purpose:	Operating control device
Type of action:	1
Pollution category:	2
Overvoltage category:	I
Nominal pulse voltage:	330 V
Power supply:	<b>Vcolor 229/249 M:</b> 12 Vdc from base board <b>Vcolor 229/249 L:</b> 12 Vac/dc $\pm 10\%$ , 50/60 Hz (from power supply unit)
Consumption:	10 VA maximum
Ambient operating conditions:	0 ... 55 °C (32 ... 131 °F) 10 ... 90 % RH non-condensing
Transportation and storage conditions:	-25 ... 70 °C (-13 ... 158 °F) 10 ... 90 % RH non-condensing
Software class:	A
Ambient front protection:	IP65
RTC:	Built-in lithium battery
RTC drift:	$\leq 60$ s/month at 25 °C (77 °F)
Battery life:	> 6 months at 25 °C (77 °F)
Battery charging time:	24 h using instrument power supply

### 2.1.2 Base board

Type	Description
The product complies with the following harmonised standards:	EN60730-1 and EN60730-2-9
Device construction:	Incorporated electronic device
Device purpose:	Operating control device
Type of action:	1
Pollution category:	2
Overvoltage category:	II
Nominal pulse voltage:	2500 V
Power supply:	115...230 Vac, $\pm 10\%$ , 50/60 Hz
Consumption:	10 VA maximum
Ambient operating conditions:	0 ... 55 °C (32 ... 131 °F) 10 ... 90 % RH non-condensing
Transportation and storage conditions:	-25 ... 70 °C (-13 ... 158 °F) 10 ... 90 % RH non-condensing
Software class:	A
Ambient front protection:	IP00

## 2.2 I/O SPECIFICATIONS

### 2.2.1 Base board

Type	Description
Digital inputs:	4 voltage-free digital inputs
Analogue inputs for temperature:	3 analogue inputs for NTC, PTC, Pt1000 probes
Analogue inputs for humidity:	2 analogue inputs for humidity probes: 1 input for probe EVHTP520 1 input for probe 4...20 mA
Low voltage (SELV) digital output:	9 low voltage digital outputs
PWM digital output:	1 PWM output ( <b>Vcolor 229 M/L</b> only)
Analogue output 0...10 V:	1 analogue output 0... 10 V ( <b>Vcolor 249 M/L</b> only)
Serial port:	1 RS-485 RTU SLAVE communication serial port 1 HMI user interface communication serial port

#### Analogue input specifications

	Default	NTC 10 k $\Omega$ at 25 °C BETA 3435	PTC KTY 81-121 990 $\Omega$ at 25 °C	Pt1000 Class B	Current 4...20 mA	RH EVHTP520
<b>Pb1</b>	Cold room probe	•	•	•	---	---
<b>Pb2</b>	Evaporator probe	•	•	•	---	---
<b>Pb3</b>	Not configured	•	•	•	---	---
<b>Pb4</b>	Humidity (EVHTP520)	---	---	---	---	•
<b>Pb5</b>	Humidity	---	---	---	•	---
<b>Range</b>	---	-50...120 °C (-58...248 °F)	-50...150 °C (-58...302 °F)	-50...110 °C (-58...230 °F)	5 ...95 % RH	5 ...95 % RH
<b>Solution</b>	---	0.1 °C (1 °F)		0.1 °C (1 °F)	±3 % 5...80 %, ±5 otherwise.	1 %
<b>Input impedance</b>	---	10 k $\Omega$	990 $\Omega$	---	---	---

#### Digital output specifications

Relay output	Default	Description	Load (at 250 Vac)	Load type
<b>Out1</b>	Compressor 1	SPST	16 A	Resistive
<b>Out2</b>	Light	SPST	8 A	Resistive
<b>Out3</b>	Condenser 1 fans	SPST	8 A	Resistive
<b>Out4</b>	Evaporator fans (maximum speed)	SPST	8 A	Resistive
<b>Out5</b>	Alarm	SPDT	8 A	Resistive
<b>Out6</b>	Defrost	SPST	16 A	Resistive
<b>Out7</b>	Heaters	SPST	16 A	Resistive
<b>Out8</b>	Door heaters	SPST	8 A	Resistive
<b>Out9</b>	Sanitising	SPST	8 A	Resistive

## 3. MECHANICAL ASSEMBLY

### 3.1 BEFORE YOU START

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 requires experience in the design and programming of automated control systems. Only the user, integrator or manufacturer of the machine can be familiar with all the conditions and factors which arise during installation and configuration, operation and maintenance of the machine or the process, and as such can identify the relevant automation equipment and the corresponding interlocks and safety systems which can be used effectively and appropriately. When selecting automation and control equipment and other connected equipment and software, for a particular application, you must consider all applicable local, regional and national standards and/or regulations.

#### **WARNING**

##### **REGULATORY INCOMPATIBILITY**

Make sure all the equipment used and the systems conform to all applicable local, regional and national regulations and standards.

### 3.2 INFORMATION CONCERNING INSTALLATION AND THE SURROUNDING 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.
- Cut off the power supply to all equipment, including any connected devices, before installing/uninstalling the device.
- Always use a properly calibrated Voltmeter to make sure the system is powered 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.

#### **WARNING**

##### **MALFUNCTIONING OF THE EQUIPMENT**

- Perform the wiring carefully, in compliance with electromagnetic compatibility and safety requirements.
- Make sure the wiring is correct for its application.
- Use shielded cables for all I/O signal and communication cables.
- Minimise the length of the connections as much as possible, to avoid winding the cables around electrically connected parts.
- The signal (digital inputs, analogue inputs, communication and corresponding power supplies) and power cables for the device must be routed separately.
- Before applying the power supply, check all the wiring connections.
- Use the necessary safety interlocks wherever the risk of injury to personnel and/or equipment damage exists.
- Install and use this device in a cabinet of a suitable class for the intended environment, protected by a keyed locking mechanism or other suitable instruments.
- In terms of connection and the fuses used in the circuits for the power supply and output lines, observe local and national regulatory requirements relating to the nominal current and voltage for the equipment in use.
- Do not use this equipment for machine functions that are critical to safety.
- Do not disassemble, repair or modify the equipment.
- Do not connect wires to unused terminals and/or terminals marked with the text “No connection” (“N.C.”).

### 3.3 FRONT-MOUNTING MODEL DIMENSIONS

#### 3.3.1 Vcolor 229/249 M user interface

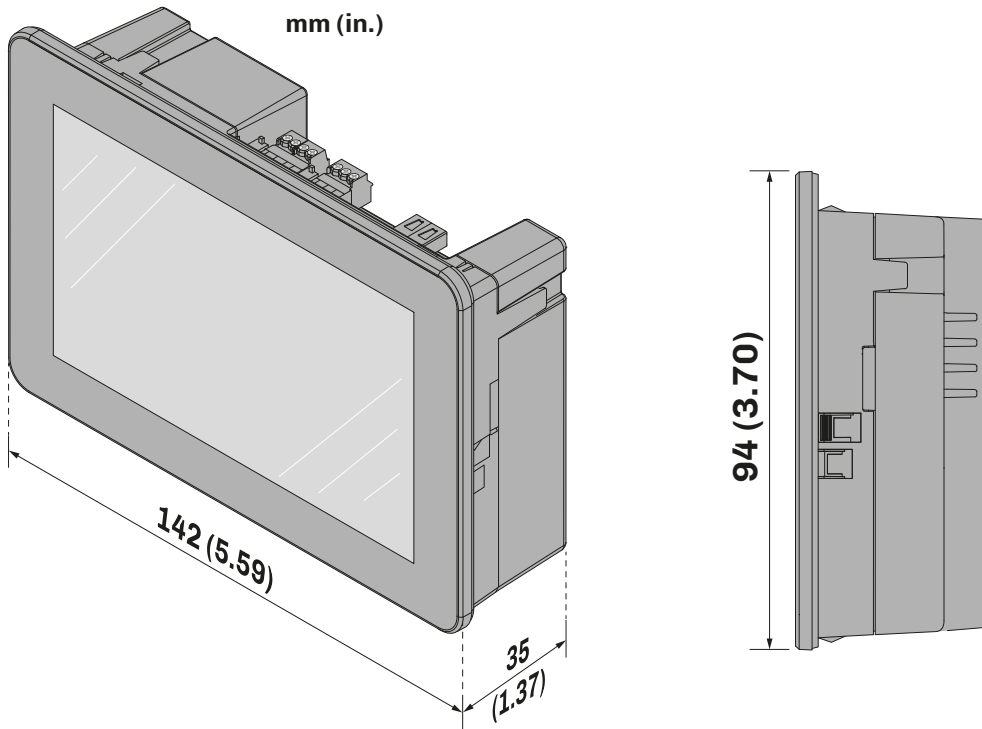


Fig. 1. Front-mounting Vcolor 229-249 M user interface dimensions

#### 3.3.2 Vcolor 229/249 L user interface

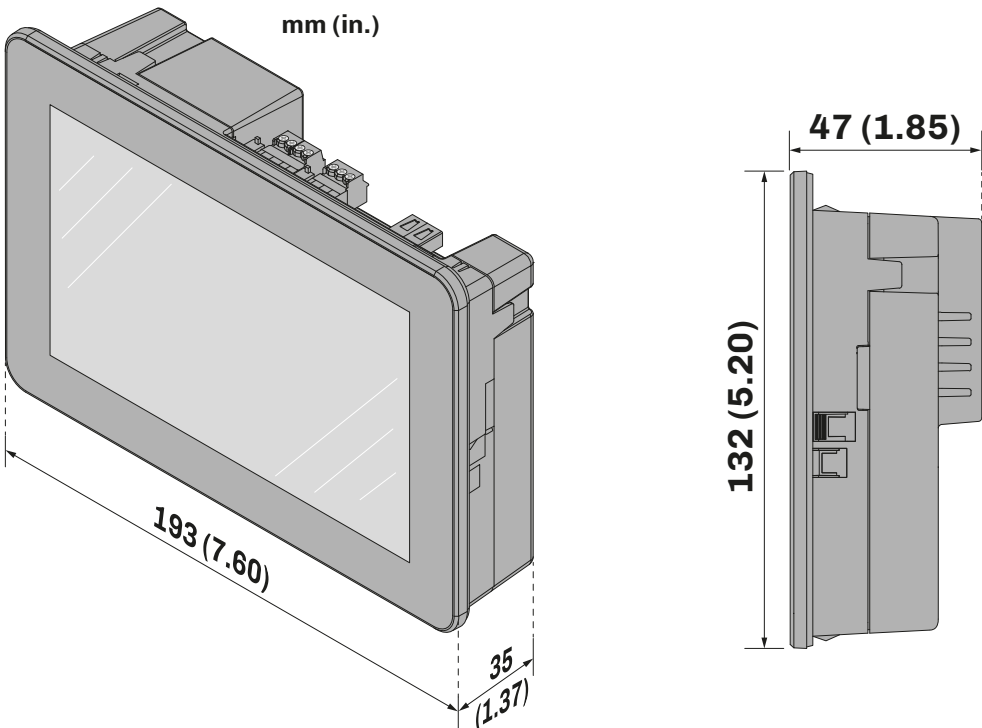


Fig. 2. Front-mounting Vcolor 229-249 L user interface dimensions

## 3.4 PANEL-BACK MOUNTING MODEL DIMENSIONS

### 3.4.1 Vcolor 229/249 M user interface

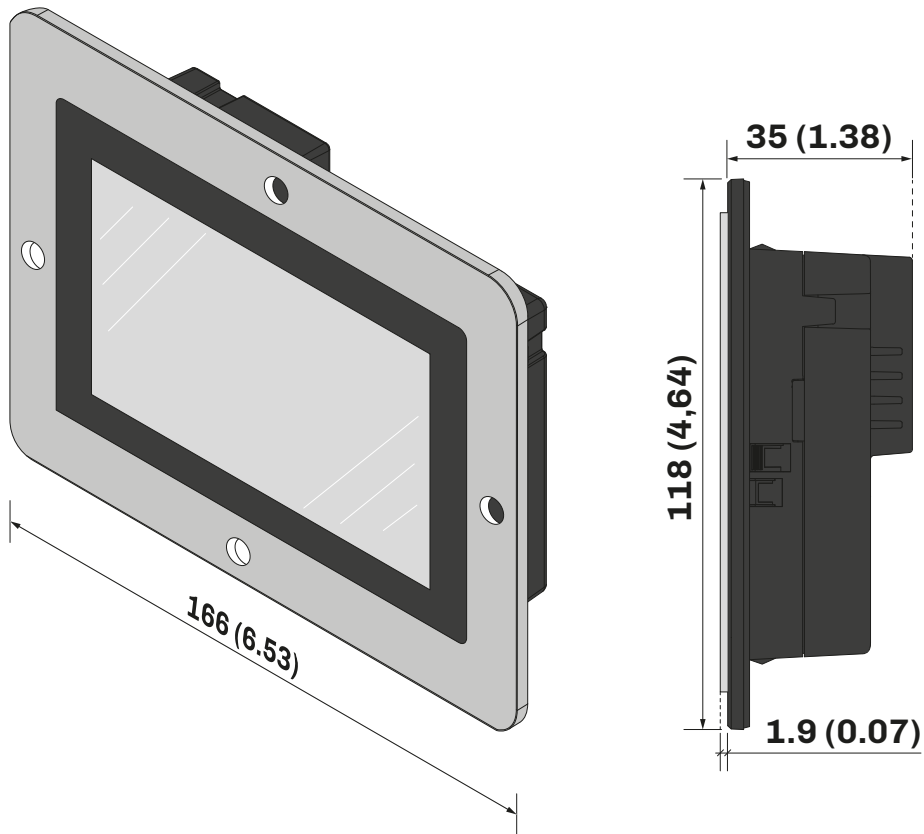


Fig. 3. Panel-back mounting Vcolor 229-249 M user interface dimensions

### 3.4.2 Vcolor 229/249 L user interface

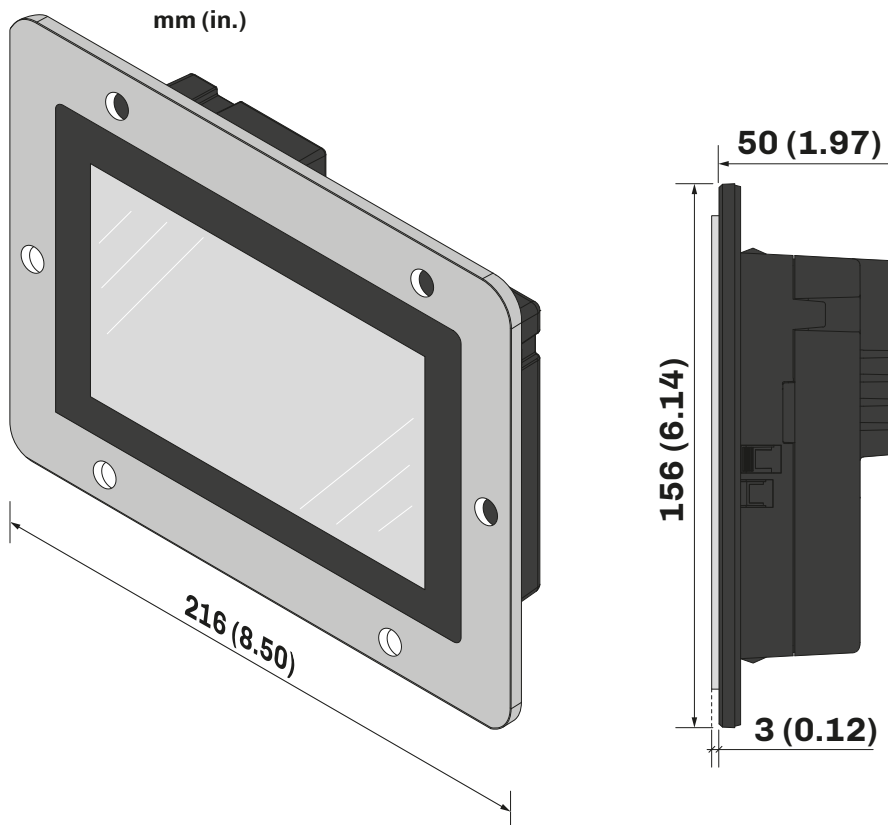


Fig. 4. Panel-back mounting Vcolor 229-249 L user interface dimensions

### 3.5 BASE BOARD DIMENSIONS

mm (in.)

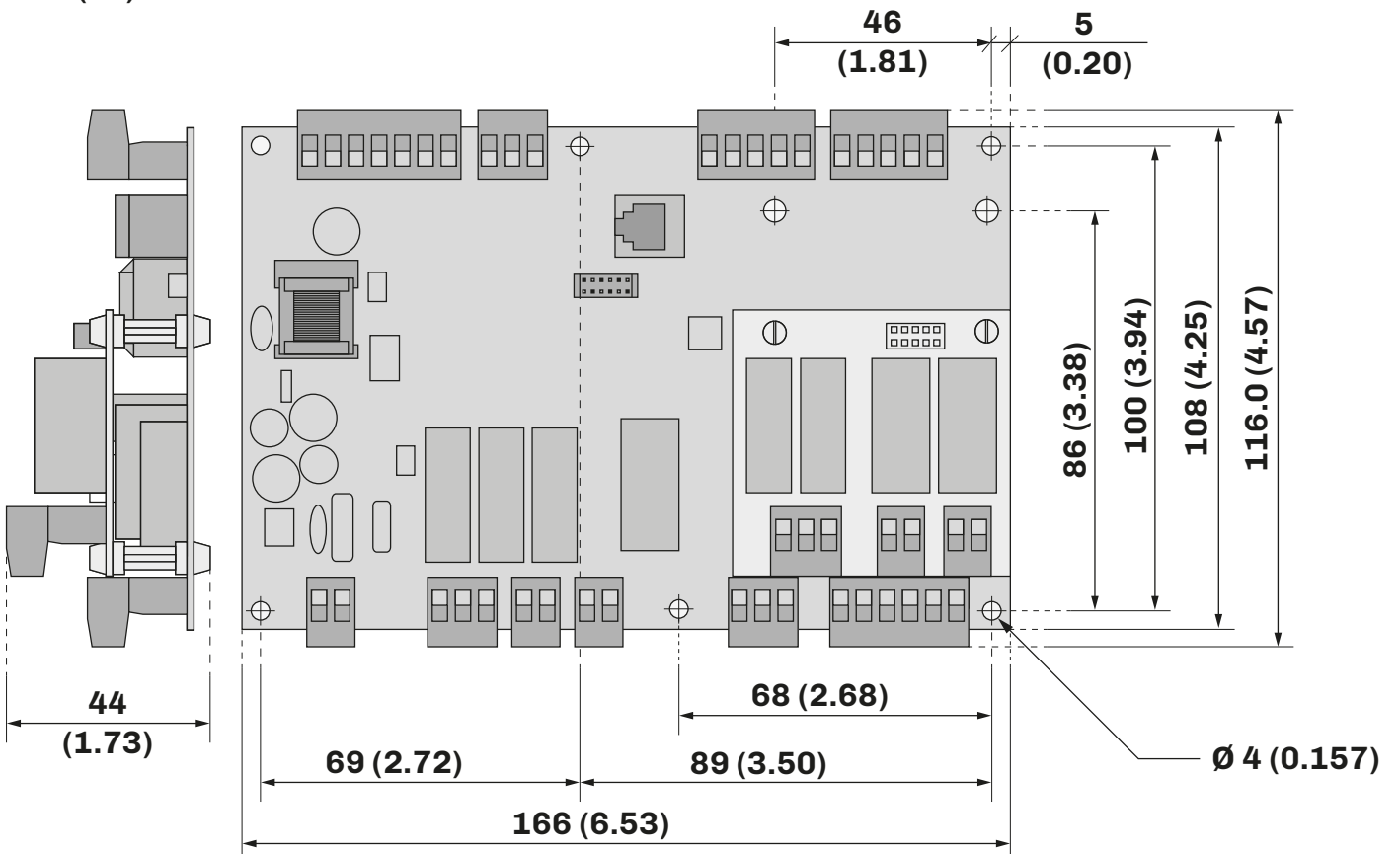


Fig. 5. Vcolor 229/249 M/L base board dimensions



## 3.6 VCOLOR 229/249 INSTALLATION

### 3.6.1 Wall mounting

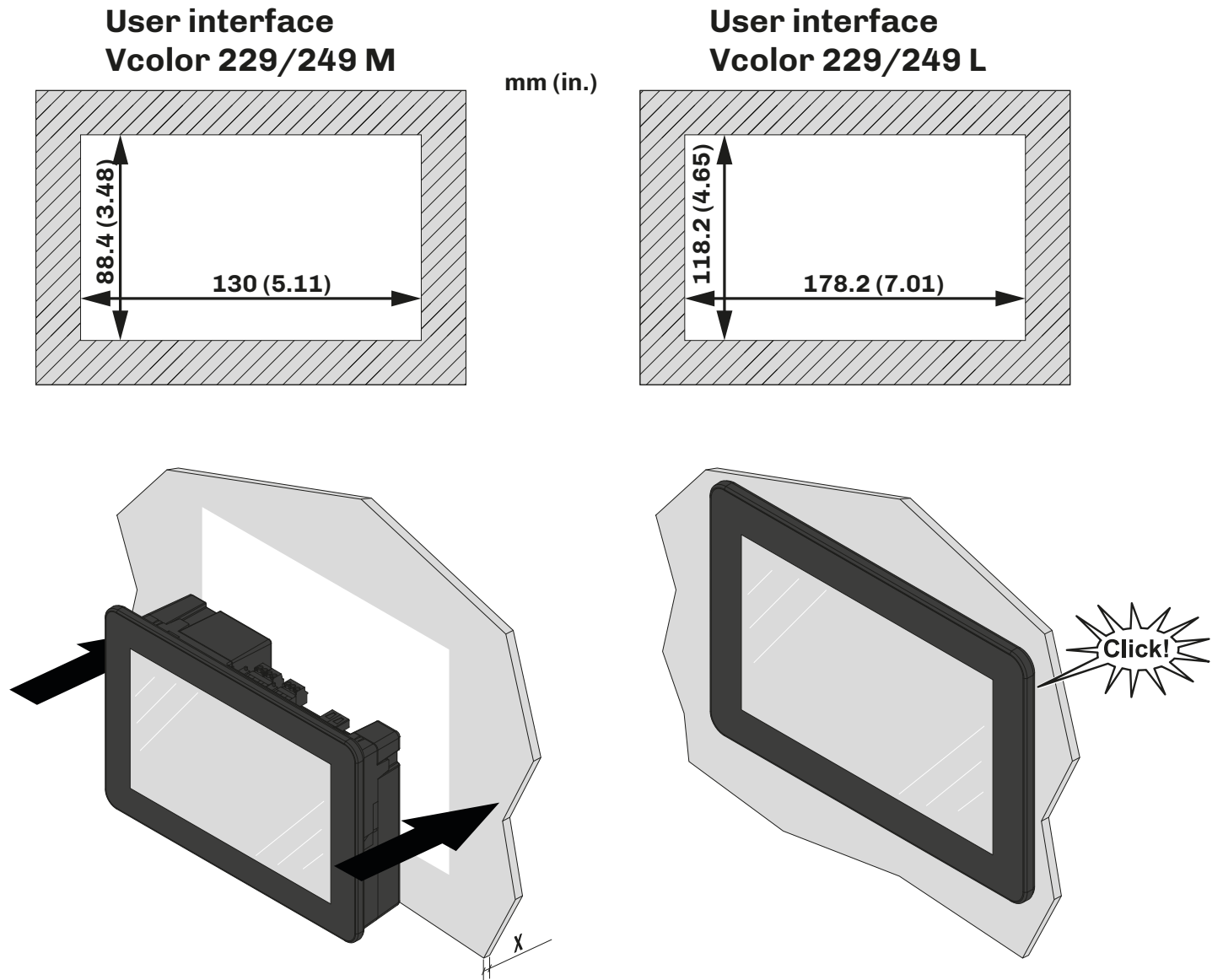


Fig. 6. Wall mounting the Vcolor 229-249 M / Vcolor 229-249 L user interface

#### Panel thickness

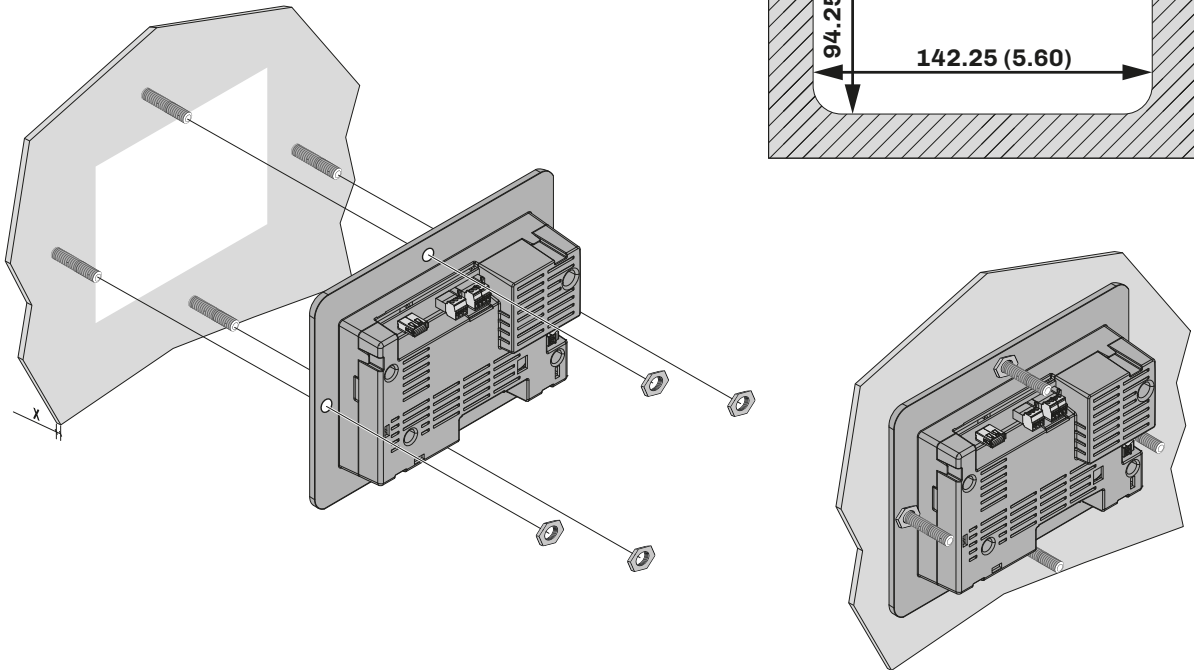
This panel thickness varies depending on the material used to make it:

Material	Thickness (X) [mm (in.)]
Metal	0.8...1.5 (0.03...0.06)
Plastic	0.8...3.4 (0.03...0.13)

### 3.6.2 Panel-back mounting

#### Vcolor 229/249 M user interface

mm (in.)



#### Vcolor 229/249 L user interface

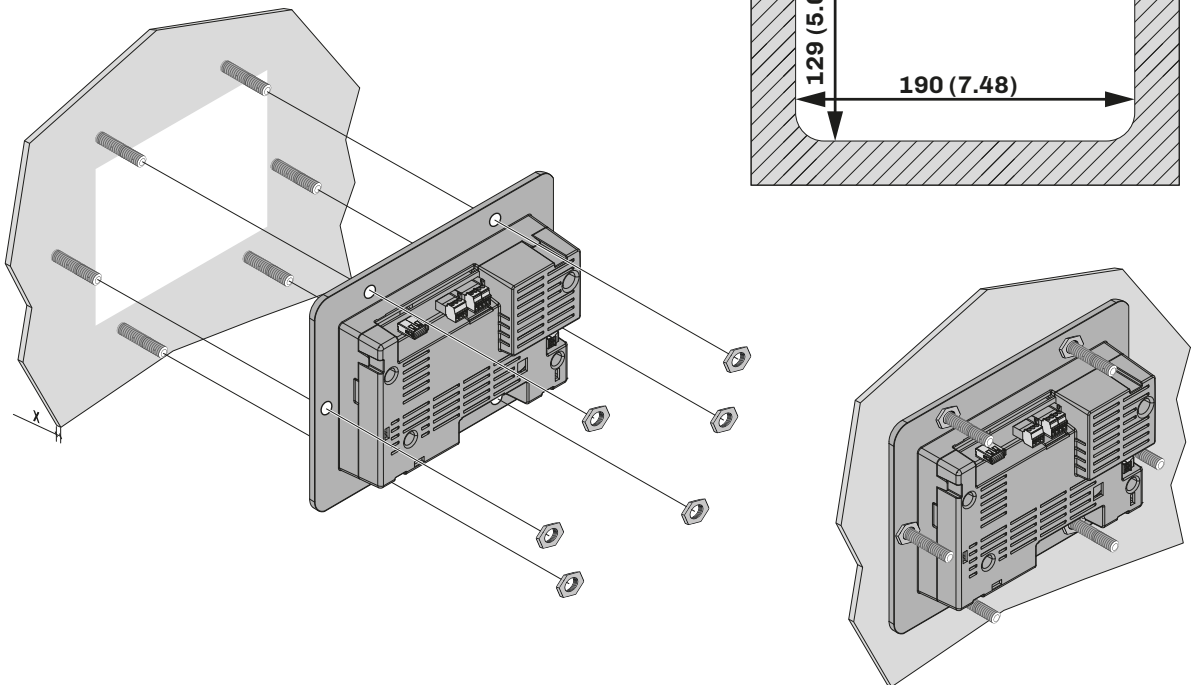


Fig. 7. Mounting the Vcolor 229-249 M / Vcolor 229-249 L user interface on the back of a panel

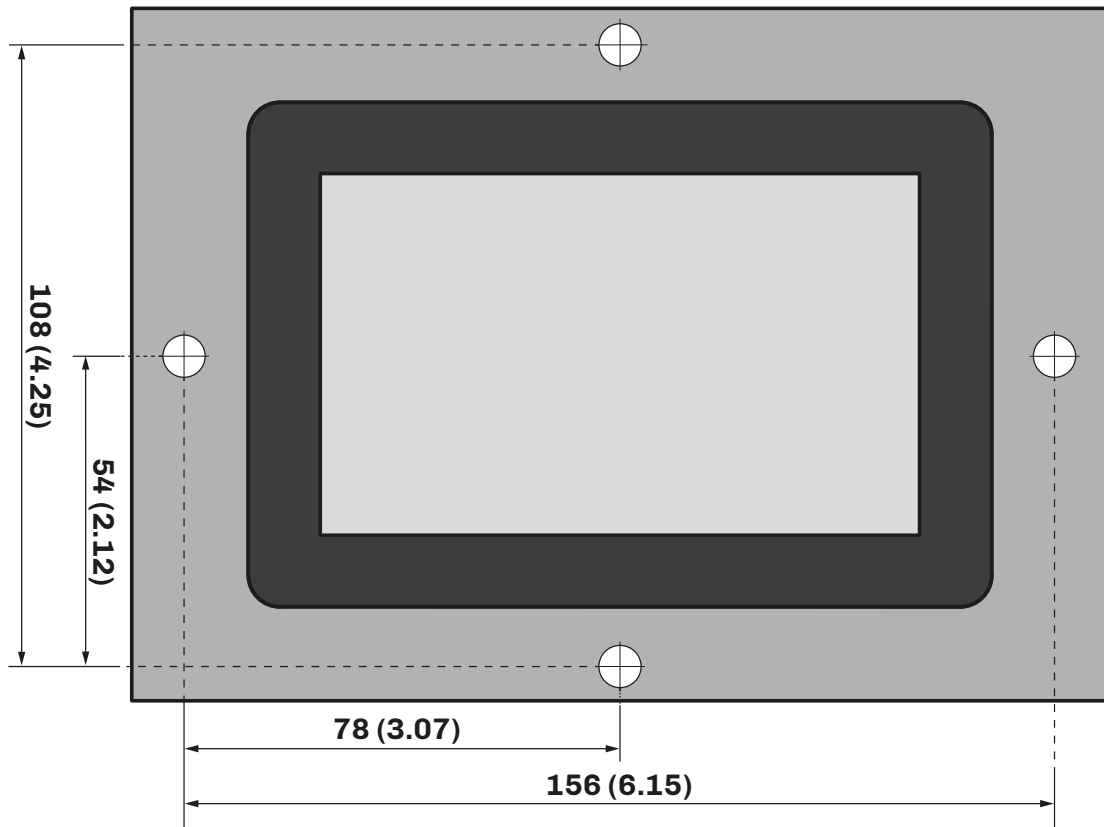
#### Panel thickness

The thickness of the metal panel used for installation on the back of a panel varies depending on the model:

Model	Thickness (X) [mm (in.)]
Vcolor 229/249 M	1.9 (0.07)
Vcolor 229/249 L	3.0 (0.12)

**Captive screw hole spacing for Vcolor 229/249 M user interface**

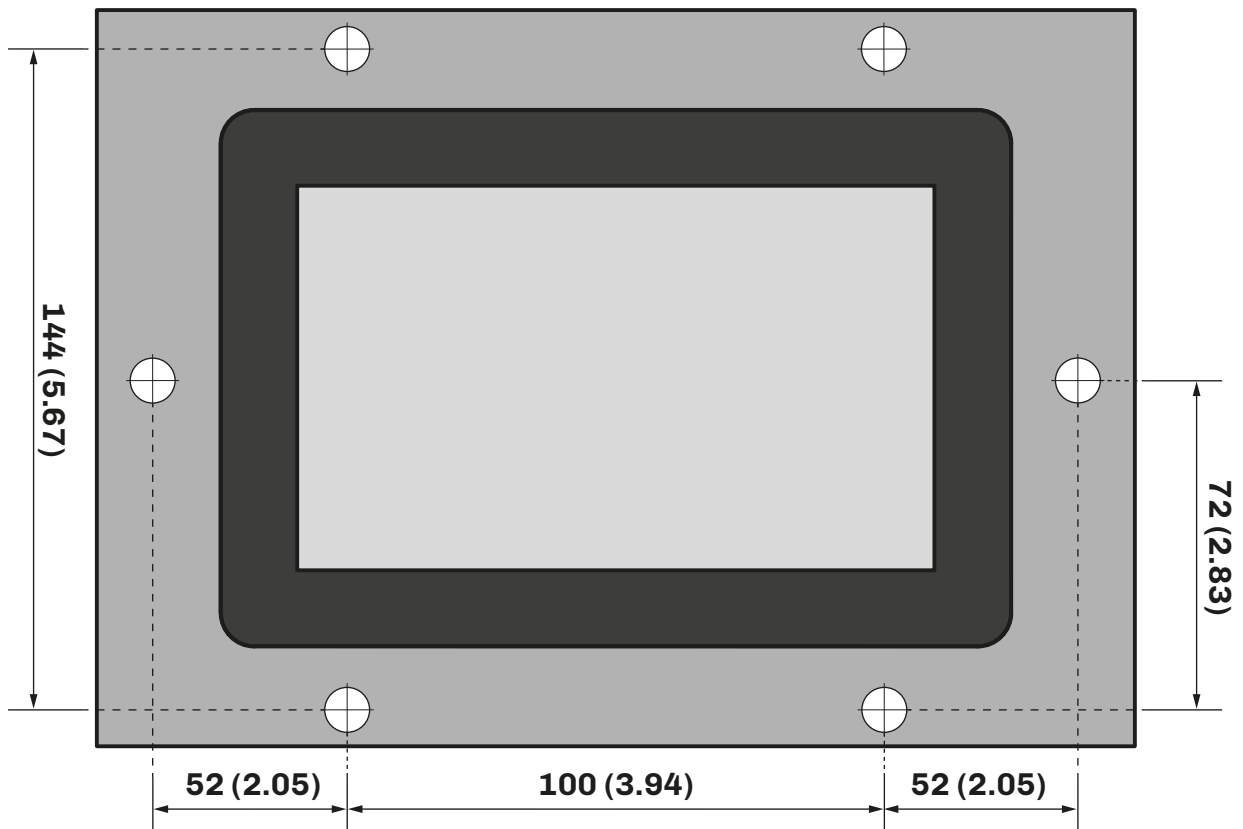
The metal panel used for installation on the back of a panel should take account of the captive screws to be fitted to it, in accordance with the following measurements:



**Fig. 8.** Captive screw hole spacing measurements for Vcolor 229/249 M

**Captive screw hole spacing for Vcolor 229/249 L user interface**

The metal panel used for installation on the back of a panel should take account of the captive screws to be fitted to it, in accordance with the following measurements:



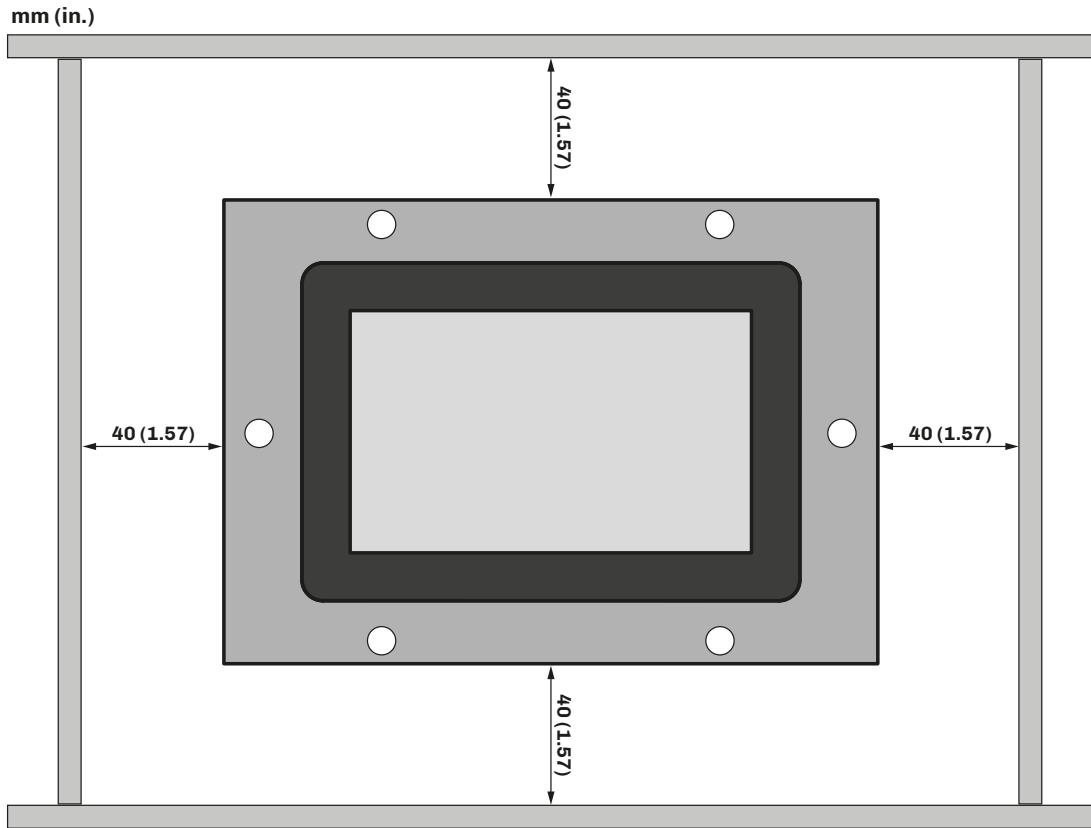
**Fig. 9.** Captive screw hole spacing measurements for Vcolor 229/249 L user interface

### 3.7 BASE POWER BOARD INSTALLATION

Base power board installation anticipates the use of plastic spacers (not supplied).

### 3.8 MINIMUM INSTALLATION DISTANCES

#### 3.8.1 Vcolor 229/249 M/L user interface



**Fig. 10.** Vcolor 229/249 M/L user interface minimum installation distances

#### 3.8.2 Base board

Observe the minimum distance of 40 mm (1.57 in.) on each side when installing the base board.

## 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 user 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.
- Cut off the power supply to all equipment, including any connected devices, before installing/uninstalling the device.
- Always use a properly calibrated Voltmeter to make sure the system is powered 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 standards:

- 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 inputs or analogue outputs and for communication connections. If shielded cables are not used for these connections, electromagnetic interference may cause signal degradation. Degraded signals can result in unpredictable operation of the controller or the 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 its application.
- Use shielded cables for all I/O signal and communication cables.
- Minimise the length of the connections as much as possible, to avoid winding the cables around electrically connected parts.
- The signal (digital inputs, analogue inputs, communication and corresponding power supplies) and power cables for the device must be routed separately.
- Before applying the power supply, check all the wiring connections.
- Use the necessary safety interlocks wherever the risk of injury to personnel and/or equipment damage exists.
- Install and use this device in a cabinet of a suitable class for the intended environment, protected by a keyed locking mechanism or other suitable instruments.
- In terms of connection and the fuses used in the circuits for the power supply and output lines, observe local and national regulatory requirements relating to the nominal current and voltage for the equipment in use.
- Do not use this equipment for machine functions that are critical to safety.
- Do not disassemble, repair or modify the equipment.
- Do not connect wires to unused terminals and/or terminals marked with the text “No connection” (“N.C.”).

### 4.1.2 Guidelines for screw terminals

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

Step 5.08 mm (0.199 in.)

												N•m lb-in.	0.5...0.6 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. 11. Suitable wiring for the power supply

#### Suitable wiring for I/O SELV

Step 3.5 mm (0.137 in.)

												N•m lb-in.	0.22...0.25 1.94...2.21
mm <sup>2</sup>	0.14...1.5	0.14...1.5	0.25...1.5	0.25...0.5	2 x 0.08...0.5	2 x 0.08...0.5	2 x 0.25...0.34	2 x 0.5...0.5					
AWG	28...16	28...16	22...16	22...20	2 x 28...20	2 x 28...20	2 x 22...21	2 x 20...20					

Fig. 12. Suitable wiring for I/O SELV

### 4.1.3 Permitted cable lengths

NOTICE

**INOPERABLE EQUIPMENT**

- When connecting the probes, the digital inputs and the power supply, use cables that are no longer than 10 m (32.80 ft.).
- When connecting the TTL serial port, use cables that are no longer than 1 m (3.28 ft.).
- When connecting the controller power supply and the relay outputs, use cables that are no longer than 10 m (32.80 ft.).

## 4.2 WIRING DIAGRAM

### 4.2.1 Vcolor 229/249 M user interface

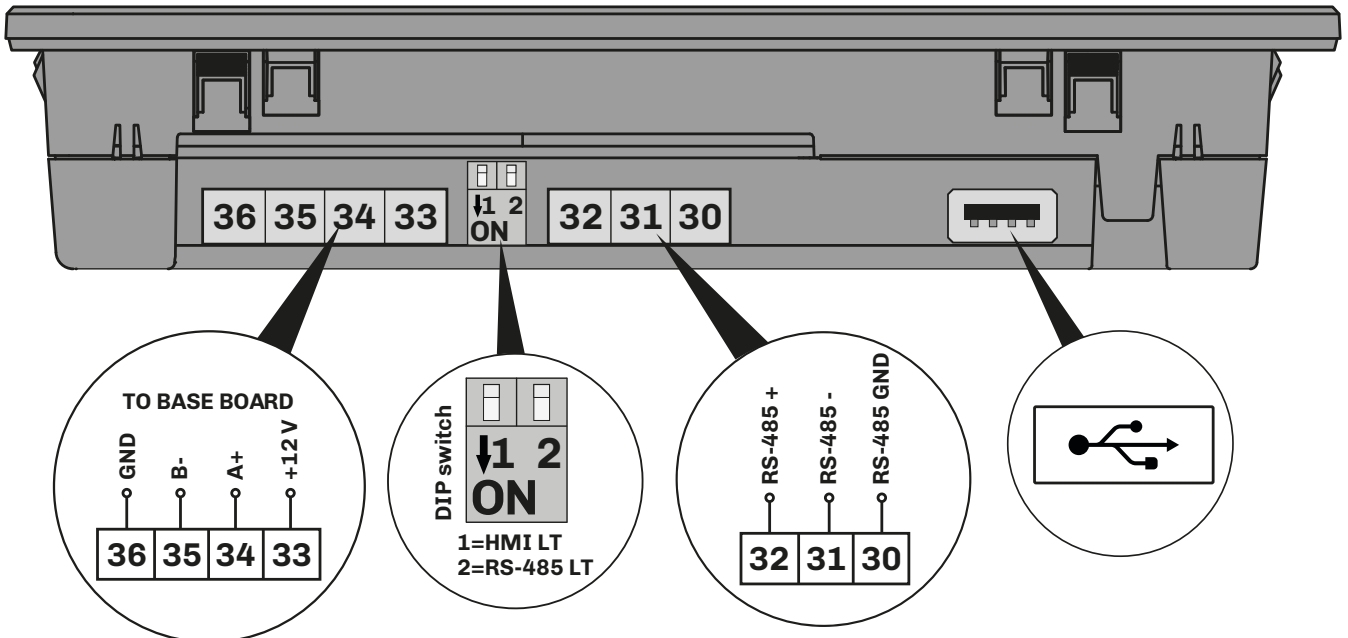


Fig. 13. Vcolor 229/249 M/L user interface wiring diagram

TERMINALS	
<b>30</b>	RS-485 GND serial port connection
<b>31</b>	RS-485 - serial port connection
<b>32</b>	RS-485 + serial port connection
<b>33-36</b>	Power supply input (12 Vdc from base board)
<b>34-35</b>	Connection for communication with the base board
<b>PE</b>	Earth connection
<b>DIP switch</b>	<b>1</b> = Activation of HMI serial port termination resistor
	<b>2</b> = Activation of RS-485 serial port termination resistor



## 4.2.2 Vcolor 229/249 L user interface

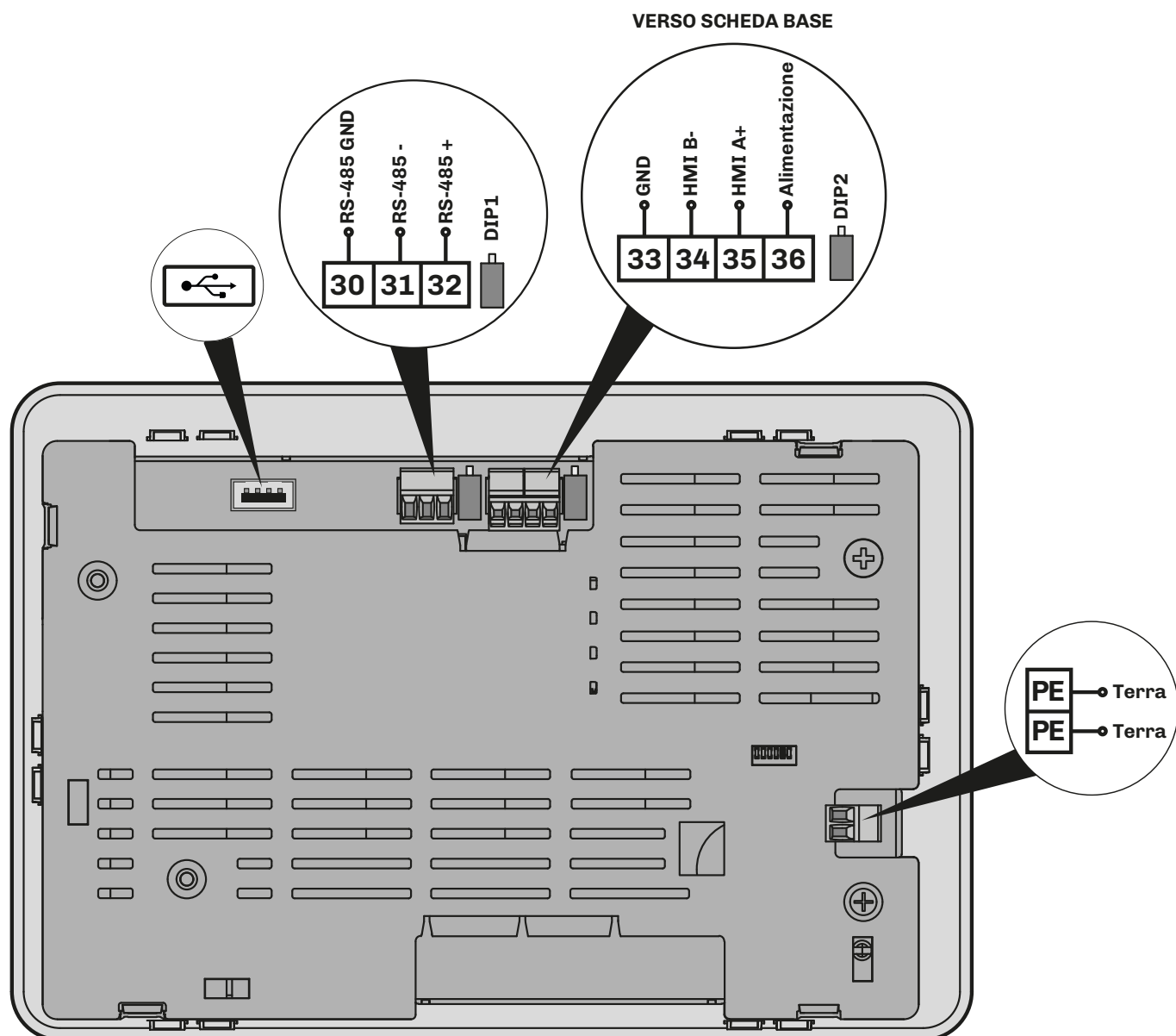


Fig. 14. Vcolor 229/249 L user interface wiring diagram

TERMINALS			
30	RS-485 GND serial port connection	34-35	Connection for communication with the base board
31	RS-485 - serial port connection	PE	Earth connection
32	RS-485 + serial port connection	DP1	Activation of RS-485 serial port termination resistor
33-36	12 Vac/dc power supply input	DP2	Activation of HMI serial port termination resistor

## 4.2.3 Vcolor 229 M/L base board

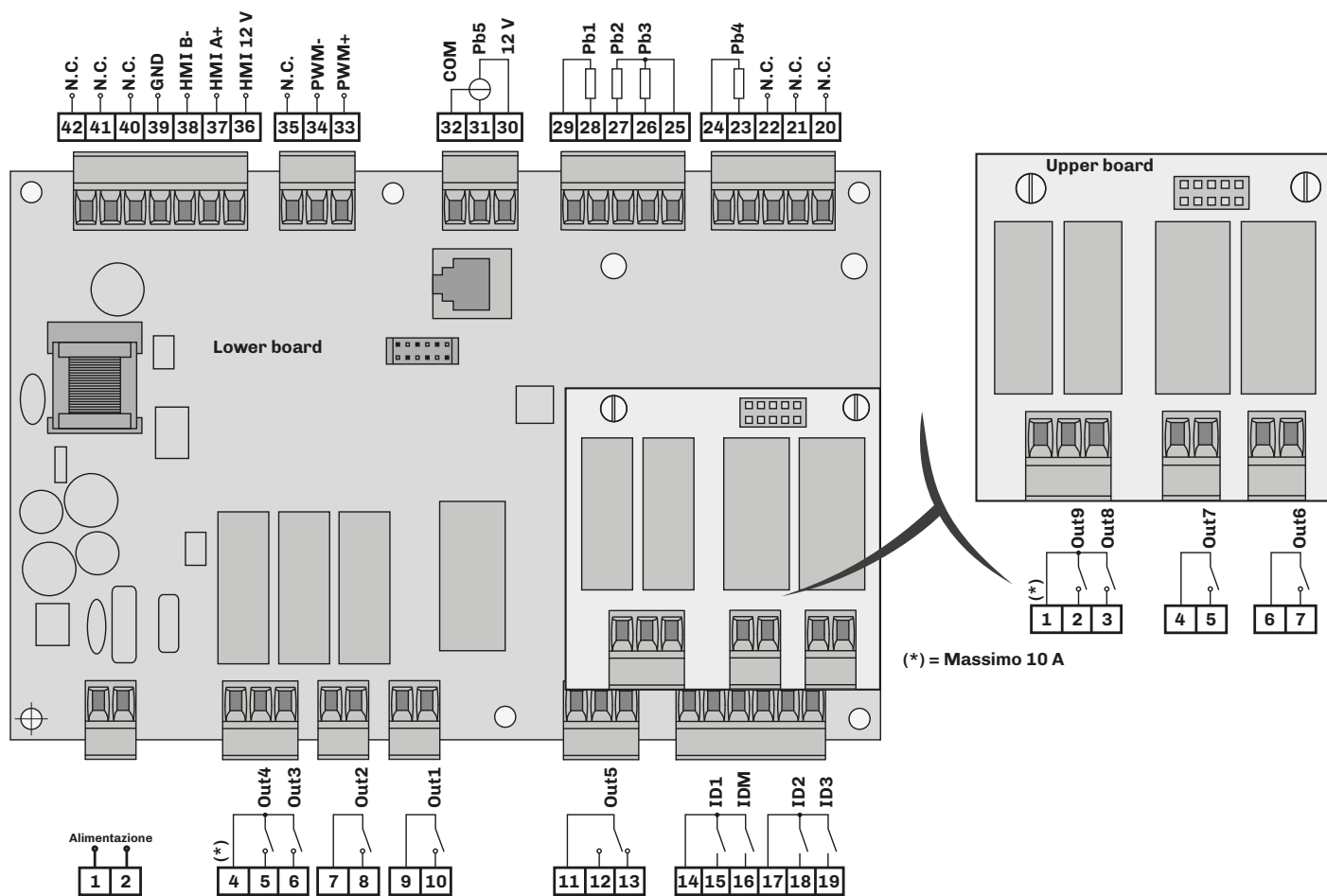


Fig. 15. Vcolor 229 M/L base board wiring diagram

LOWER BOARD TERMINALS			
1-2	Power supply input	23-24	Analogue input Pb4 (humidity probe EVHTP520)
4-5	Digital output Out4 (see u4c)	25-26	Analogue input Pb3 (see Pr3)
4-6	Digital output Out3 (see u3c)	25-27	Analogue input Pb2 (see Pr2)
7-8	Digital output Out2 (see u2c)	28-29	Analogue input Pb1 (see Pr1)
9-10	Digital output Out1 (see u1c)	30...32	Analogue input Pb5 (humidity probe 4...20 mA)
11...13	Digital output Out5 (see u5c)	33	Analogue output PWM- for fan driver
14-15	Digital input ID1 (see i4)	34	Analogue output PWM+ for fan driver
14-16	IDM door switch digital input	35	No connection N.C.
17-18	Digital input ID2 (see i7)	36-39	12 Vdc power supply output for Vcolor 229/249 M user interface
17-19	Digital input ID3 (see i11)	37-38	HMI user interface communication serial port connection
UPPER BOARD TERMINALS			
1-2	Digital output Out9 (see u9c)	4-5	Digital output Out7 (see u7c)
1-3	Digital output Out8 (see u8c)	6-7	Digital output Out6 (see u6c)

## 4.2.4 Vcolor 249 M/L base board

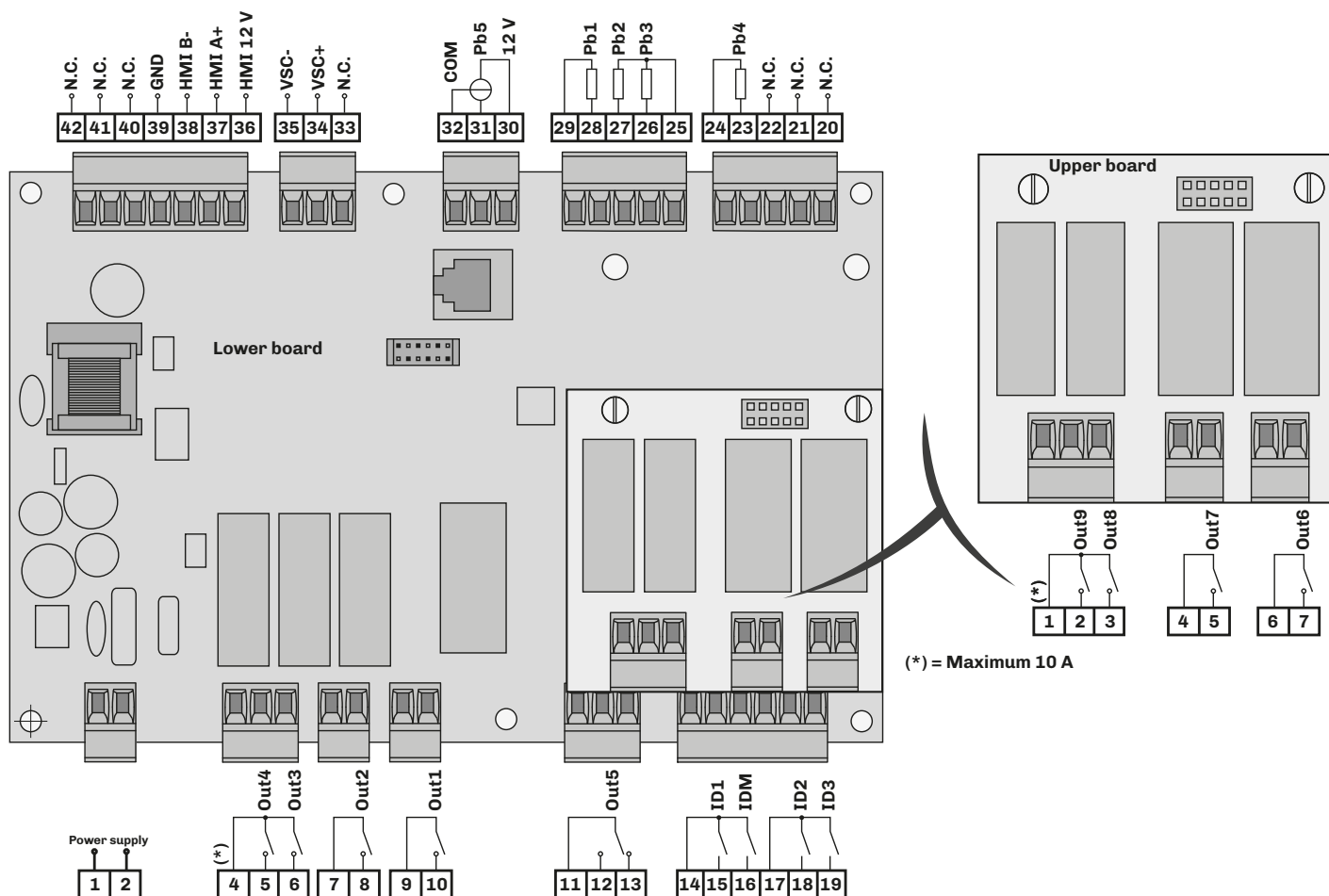
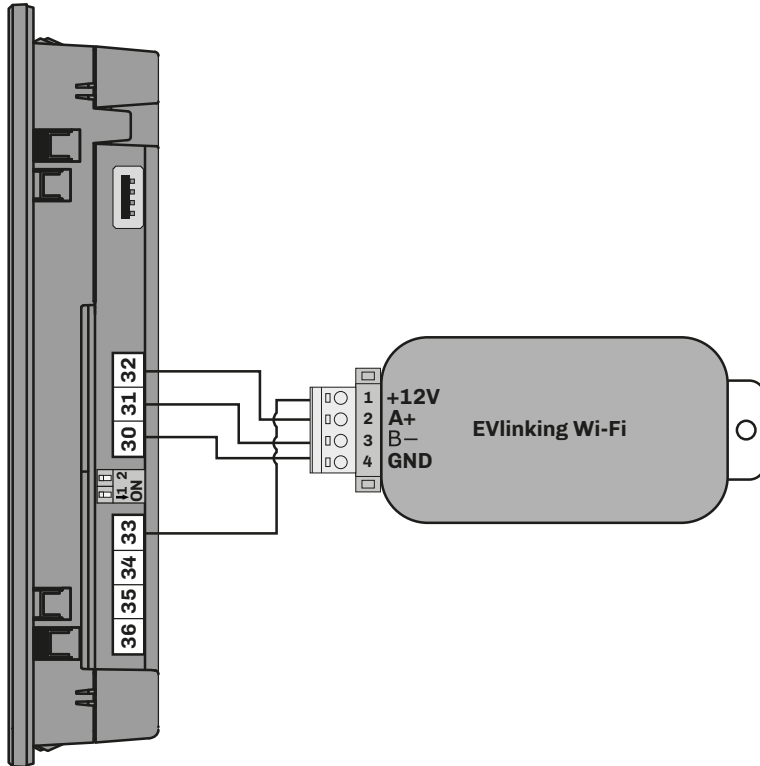


Fig. 16. Vcolor 249 M/L base board wiring diagram

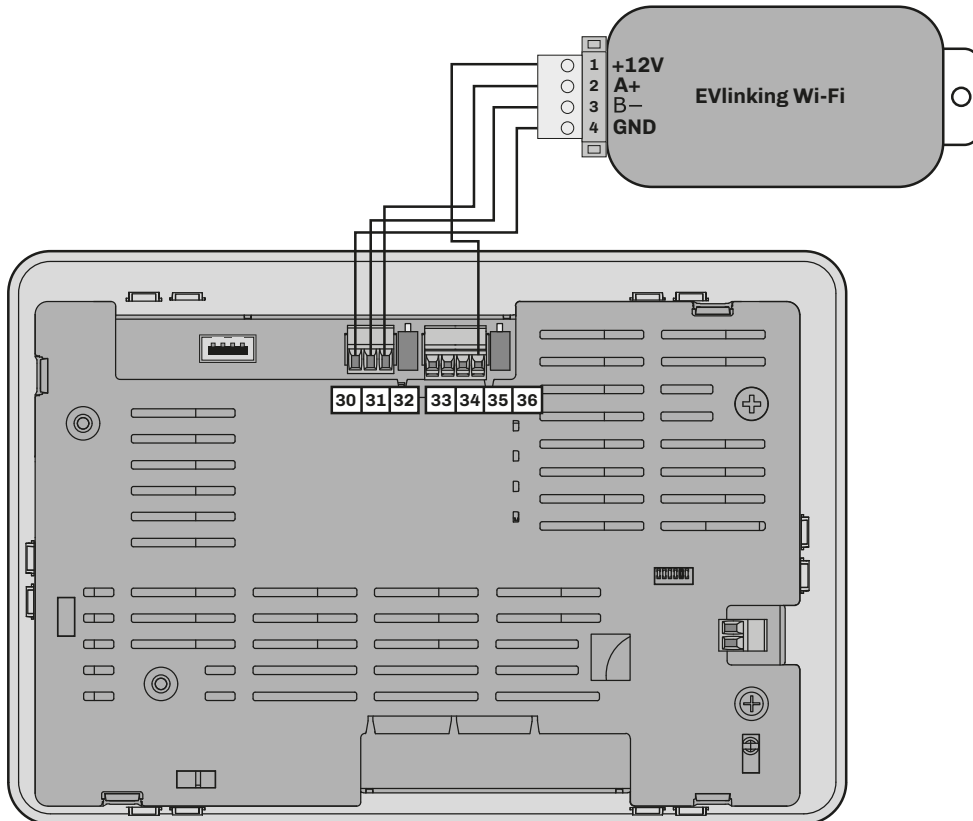
LOWER BOARD TERMINALS			
1-2	Power supply input	23-24	Analogue input <b>Pb4</b> (humidity probe <b>EVHTP520</b> )
4-5	Digital output <b>Out4</b> (see <b>u4c</b> )	25-26	Analogue input <b>Pb3</b> (see <b>Pr3</b> )
4-6	Digital output <b>Out3</b> (see <b>u3c</b> )	25-27	Analogue input <b>Pb2</b> (see <b>Pr2</b> )
7-8	Digital output <b>Out2</b> (see <b>u2c</b> )	28-29	Analogue input <b>Pb1</b> (see <b>Pr1</b> )
9-10	Digital output <b>Out1</b> (see <b>u1c</b> )	30...32	Analogue input <b>Pb5</b> (humidity probe 4...20 mA)
11...13	Digital output <b>Out5</b> (see <b>u5c</b> )	33	No connection N.C.
14-15	Digital input <b>ID1</b> (see <b>i4</b> )	34	Analogue output 0...10 V <b>VSC+</b>
14-16	<b>IDM</b> door switch digital input	35	Analogue output 0...10 V <b>VSC-</b>
17-18	Digital input <b>ID2</b> (see <b>i7</b> )	36-39	12 Vdc power supply output for <b>Vcolor 229/249 M</b> user interface
17-19	Digital input <b>ID3</b> (see <b>i11</b> )	37-38	<b>HMI</b> user interface communication serial port connection
UPPER BOARD TERMINALS			
1-2	Digital output <b>Out9</b> (see <b>u9c</b> )	4-5	Digital output <b>Out7</b> (see <b>u7c</b> )
1-3	Digital output <b>Out8</b> (see <b>u8c</b> )	6-7	Digital output <b>Out6</b> (see <b>u6c</b> )

**EVlinking Wi-Fi connection**

**Vcolor 229/249 M user interface**



**Vcolor 229/249 L user interface**



**Fig. 17. EVlinking Wi-Fi connection diagram**

## 5. USER INTERFACE

### 5.1 INTERFACE

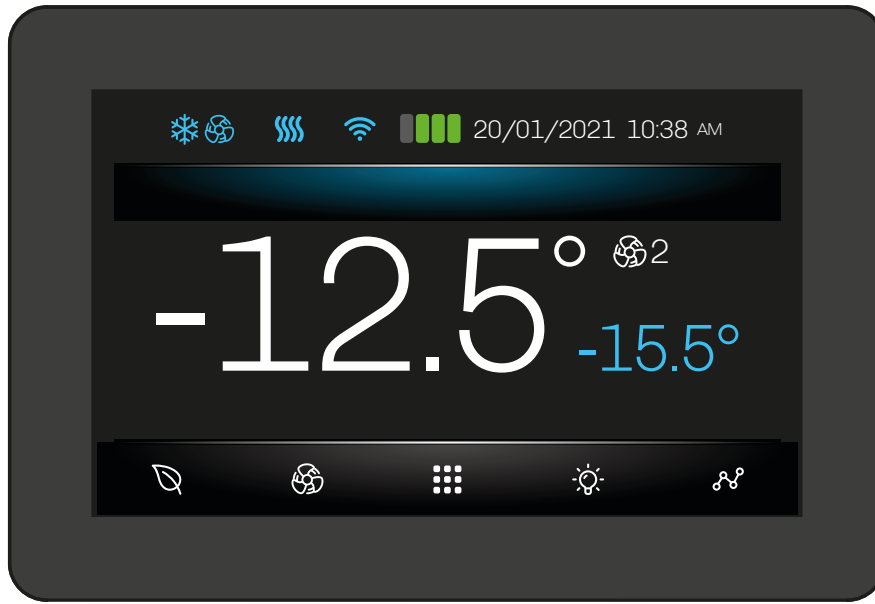







Fig. 18. User interface

### 5.2 ICONS

Icon	Lit steadily	Flashing	OFF
	Compressor ON	Protection delay ON	Compressor OFF
	Defrosting in progress	Dripping	---
	Evaporator fans ON	---	Evaporator fans OFF
	Humidification in progress	---	---
	Dehumidification in progress	Dehumidification delay with compressor ON	---
	Heating ON	---	Heating OFF
	Device connected to the monitoring system	Attempting to connect to the monitoring system	Device not connected to the monitoring system
	Energy Saving mode ON	---	Energy Saving mode OFF
	Energy Saving mode OFF	---	Energy Saving mode ON
	Selected fan speed 1	---	---
	Selected fan speed 2	---	---
	Selected fan speed 3	---	---
	Selected fan speed 4	---	---
	Selected fan speed 5	---	---
	Access to User level	---	---
	Access to Expert level (if configured)	---	---
	Access to Admin level (if configured)	---	---

## 5.3 TOUCH KEYS

The touch key functions are described below:

Keys...	Tap and release to...
	Access the temperature data-logger chart
	(If configured) Switch the cold room light on/off
	Access the menu
	(If configured) Select the evaporator fan speed
	Enable/disable energy saving mode

## 5.4 USING THE CONTROLLER

### 5.4.1 Controller ON/OFF

To switch the controller on or off, proceed as follows:

#### Power on




#### Power off



Fig. 19. Controller ON/OFF

**NOTE:** By switching on/off we mean switching from STANDBY to ON and vice-versa.

While the controller is in standby, tap ; the light will come on.



### 5.4.2 Screensaver

After a period of inactivity, which can be set via parameter **E8** ≠ 0, the controller launches its screensaver function, only showing the values of the connected probes on the display. When **E8** = 0, the screensaver function is disabled.

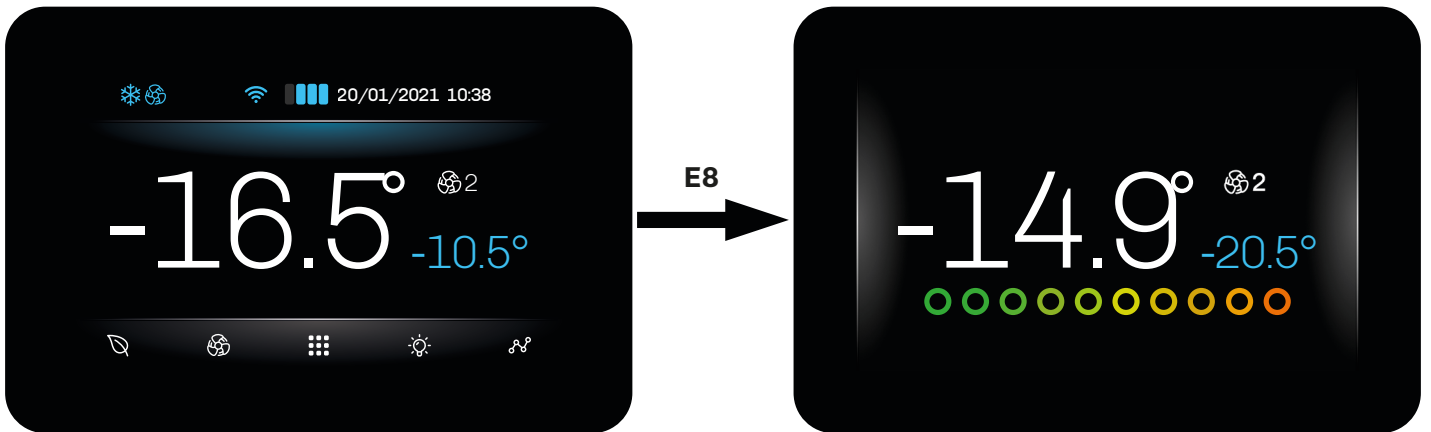


Fig. 20. Display during screensaver mode

### 5.4.3 Accessing and using the menu

The menu key on the Home screen is used to enter the menu offering access to the main functions used to configure and manage the **Vcolor 229/249**. To move on to the next page, tap **<** or **>**.



Fig. 21. Menu access

The menu can be used to access the following functions:

- Switch off the device;
- Start manual defrost;
- View active alarms and/or event log;
- Access the lists of food to store (pre-set and favourites);
- Access special cycles;
- Access general settings, advanced functions and parameter management;
- Service menu;
- Lock/unlock the keyboard;
- Manage the connected humidifier.

## 5.5 DATA LOG

In the **data log** menu, you can view:

- Compressor counter log;
- Defrost log;
- Door open log;
- Setup log;
- Delete data log.



Fig. 22. Data log

### Compressor counter log

- Total hours of machine operation;
- Total hours of compressor operation;
- Average compressor ON time;
- Average compressor OFF time;
- Percentage daily on time;
- Percentage compressor on time in the last hour.

### Defrost log

- Report of the last 30 defrost cycles:
  - Defrost type;
  - Defrost start date and time;
  - Defrost duration.

### Door open log

- Report of the last 30 door open events:
  - Total number of door open events;
  - Number of door open events that triggered a door open alarm;
  - Total door open time.

### HACCP.CSV FILE configuration

- Enable/disable data to be stored in the log.

### Delete log

- Delete one or more data groups individually or delete all data.

## 5.6 DOOR LOCK/UNLOCK

The menu can be used to lock/unlock the door as follows:



Fig. 23. Door lock/unlock

## 5.7 GENERAL SETTINGS

The general settings of the controller can be used to:

- Change the date and time;
- Change the language;
- Assign a name to the unit;
- Add a welcome page;
- Delete the list of favourite food.




Fig. 24. General settings

### 5.7.1 Change Date and Time



Fig. 25. Change Date and Time

You can choose a format, by tapping 

- Europe (EU);
- United States (USA).

## 5.7.2 Change language



**Fig. 26.** Change language

The default languages are:

- English;
- Italiano (Italian);
- Spanish;
- German;
- French;
- Russian;
- Simplified Chinese;
- Traditional Chinese.

## 5.7.3 Assign a name to the unit

In this section you can assign a name to the unit, or change an existing name. The name and the serial number can be up to 10 characters long.

The name of the unit features in the naming convention of the files that can be downloaded onto the USB stick.



**Fig. 27.** Assign a name to the unit

### 5.7.4 Delete favourite foods to store

This function is used to delete all data in the list **Favourite foods to store**. The password (99) is required to confirm the procedure.



Fig. 28. Delete favourite foods to store

### 5.7.5 Welcome page


When the welcome page is enabled, the next time the controller is switched on it will ask you to perform some settings. The settings requested are:

- Unit name;
- Date and time;
- Device language;
- Temperature unit of measure.



Fig. 29. Welcome page

## 5.8 CHANGE EVAPORATOR FAN SPEED

Depending on the configuration of parameter **E13**, you can change the speed of the evaporator fans by tapping  (or not).

Possible configurations are:


Par.	Description	MU	Range
<b>E13</b>	Evaporator fan configuration. <b>0</b> = Fans at speed 1 (with an output <b>u1c...u13c</b> = 3); <b>1</b> = Fans at speed 2 (with an output <b>u1c...u13c</b> = 3 and <b>u1c...u13c</b> = 11); <b>2</b> = Fans at speed 5 via output 0...10 Vdc; <b>3</b> = Fans at speed 5 via PWM output; <b>4</b> = Fans at speed 2 with 2 relays (with an output <b>u1c...u13c</b> = 3 and <b>u1c...u13c</b> = 11).	---	0...4

Example of speed change using a key with E13 = 1



Fig. 30. Change evaporator fan speed

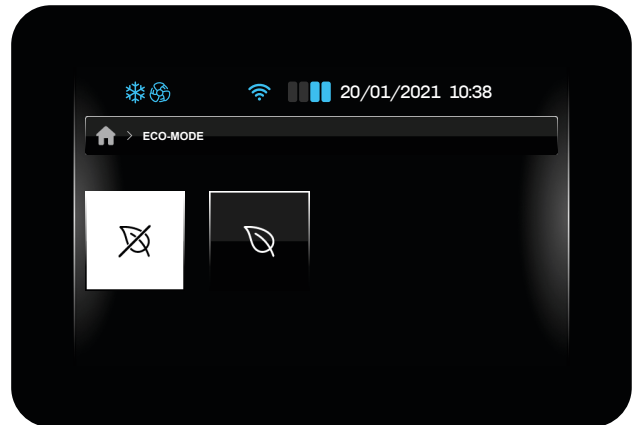
### 5.9 ENERGY SAVING / ECO MODE

Depending on the configuration of parameter **ES0**, you can adjust the Energy Saving/Eco function of the controller by pressing  on the Home screen.

Possible configurations are:

Par.	Description	MU	Range
<b>ES0</b>	Energy saving mode. 0 = 1 level (Disabled/High saving); 1 = 3 levels (Disabled/Low saving/Medium saving/High saving).	num	0/1

**ES0 = 0**



**ES0 = 1**

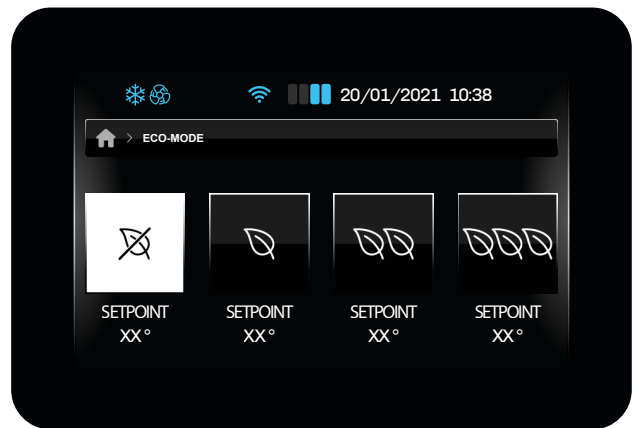
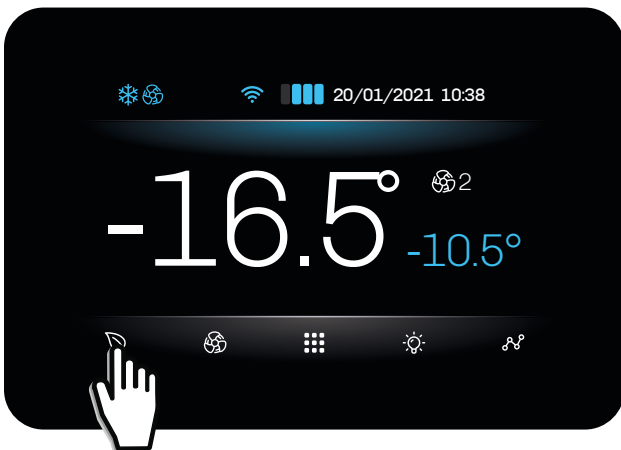


Fig. 31. Energy saving mode activation

## 5.10 COLD ROOM LIGHT

You can switch the cold room light on or off from the Home screen. Switching on the cold room light takes priority over the door switch: if the light is switched on via key, opening and closing the door will have no effect on the light, which remains on, until it is switched off with the key. The cold room light can also be switched on/off even when the instrument is OFF.



Fig. 32. Switching cold room light on/off

## 5.11 MANUAL DEFROST

In the required conditions, a manual defrost can be launched from the menu. Proceed as follows:



Fig. 33. Manual defrost



If the conditions are not as required for a manual defrost, the following screen appears on the display:



**Fig. 34.** Manual defrost not possible

## 5.12 FAVOURITE FOODS TO STORE (PRE-SET AND FAVOURITES)

Vcolor 229/249 is factory-set with two groups of foods:

- **OEM** group;
- **USER** group.

### 5.12.1 OEM group

The **OEM** is mainly intended for manufacturers who need full autonomy in customising food storage.

Up to 72 foods grouped into up to 8 categories can be configured in the OEM group. Each category can contain up to 12 foods accompanied by a photo and recipe name (with the corresponding translation in all desired languages).

### 5.12.2 USER group

The **USER** group is dedicated to end users; up to 48 foods can be saved, starting with a product saved in the OEM group. Categories cannot be created in the **USER** group.

If no products are placed in a category, that category is not shown.



Fig. 35. Favourite foods to store - pre-set and favourites

Action	USER group	OEM group
Import	√	√
Export	√	X
Change	√ <sup>(1)</sup>	√
Add	√ <sup>(1)</sup>	√
Delete	√	X
Favourites	√	√
Overwrite	√ <sup>(1)</sup>	X

<sup>(1)</sup> Recipes in the USER group can be added, changed or overwritten, beginning with at least one recipe from the OEM group.

### 5.13 ALARMS

In the event of an alarm indication, the description of the current alarm appears in red on the home screen (as in the example below) and the buzzer sounds (if enabled).

If there are several active alarms, they alternate on the home screen, each appearing for 3 seconds at a time.

Touch the screen next to the alarm indication to silence the buzzer; the controller will automatically switch to showing the list of active alarms.



Fig. 36. Alarm indications

### 5.13.1 Active alarm list

Press Alarm list to access the active alarms screen. This list includes:

- Standard alarms (on resetting they are not saved in the alarm log and are deleted from the list of active alarms);
- HACCP alarms (on resetting they are saved in the alarm log).

The alarms menu is accessed from the general menu, and can be used to:

- View the active alarm list;
- View the alarm log;
- Delete the alarm log.



**Fig. 37.** Alarm indications

To view the full list of all alarms, please refer to the section "**9. Diagnostics**" on page 79.

### 5.13.2 Delete alarm log

To delete the alarm log:



Fig. 38. Delete alarm log

### 5.14 SPECIAL CYCLES

Vcolor 229/249 offers special cycles designed to allow the user full control of refrigerated cabinets or cold rooms.

The special cycles available are:

- Cooling;
- Continuous cycle;
- Sanitising (if SA0 ≠ 0);
- Thawing (if th23 ≠ 0).

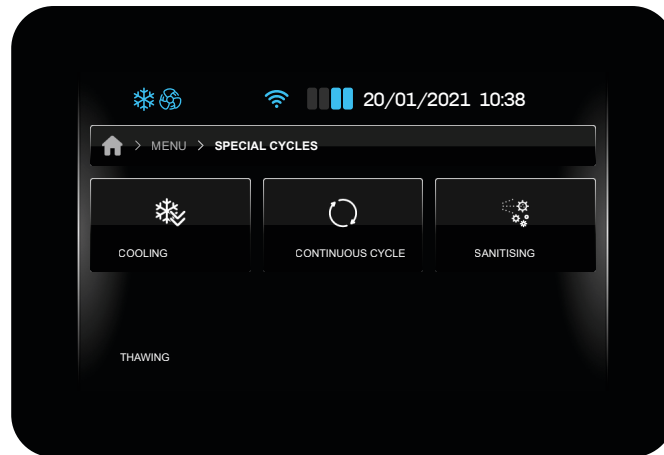


Fig. 39. Available special cycles display

While the **Cooling** and **Continuous cycle** are taking place, the controller automatically shows the HOME screen. The cycle in progress is shown at the top of the display. Touch the screen next to the cycle in progress indication to return to the special cycle screen.

While the **Sanitising** and **Thawing**, cycles are taking place, the controller remains on the screen for that cycle, until it has been completed.

### 5.14.1 Cooling

The **Cooling** cycle is used when the refrigerated cabinet is loaded for the first time. The controller runs a cabinet cooling cycle at maximum power until the setpoint is reached, or until the maximum time set during the cycle startup phase has elapsed. During the **Cooling** cycle, to view the remaining time, return to the special cycle screen.



Fig. 40. Cooling cycle

### 5.14.2 Continuous cycle

The **Continuous cycle** special cycle is used to pre-chill the cold room before foods are placed inside. The controller starts a cycle which will only end due to the maximum time period being reached (this value can be set during cycle startup), while the temperature is not checked.

During the **Continuous cycle**, to view the remaining time, return to the special cycle screen.



Fig. 41. Continuous cycle

### 5.14.3 Sanitising

If **SA0**  $\neq$  0, the **Special cycles** menu will include the **Sanitising** cycle among the options available for selection.

**Sanitising** can be carried out with:

- A UV lamp, if **SA0** = 1;
- An Ioniser/Ozone generator, if **SA0** = 2.

Both **Sanitising** methods can only be activated when the door is closed.

The conditions required to start the **Sanitising** cycle are:

- Door closed;
- Cold room probe temperature (Pb1) > **SA1**;

The duration of the cycle is determined by **SA2**; if **SA0** = 2, the cycle duration is **SA2+SA3** (in addition to time SA2, a time SA3 is added).

## CAUTION

### RISK OF ULTRAVIOLET RADIATION AND POISONING

Do not open the door while sanitising is in progress.

While the cycle is in progress, the fan is ON (when the door is open the fan switches off), while regulation is disabled until the end of the cycle.



Fig. 42. Sanitising cycle



### 5.14.4 Thawing

If **TH23** = 1, the **Special cycles** menu will include the **Thawing** cycle among the options available for selection.

**Thawing** is managed in accordance with the amount of product which needs to be thawed, in relation to the maximum amount as declared by the manufacturer.

The cycle runs with a neutral zone (hot-cold) during thawing and in cold-only mode during storage.

While **Thawing** is in progress, the controller inhibits normal operation until the user ends the cycle manually.

There are 3 levels of thawing:

- Low;
- Medium;
- High.

Depending on the selected level, suitable parameters must be configured:

Level...	Initial cold room setpoint	End cold room setpoint	Cycle duration
Low	tH01	tH04	tH07
Medium	tH02	tH05	tH08
High	tH03	tH06	tH09

The thawing cycle is divided into 5 phases, distinguished by the abovementioned parameters:

#### LOW level

Phase...	Working setpoint...
1	Phase 1 = tH01
2	Phase 2 = Phase 1 setpoint - [(tH01-tH04)/4]
3	Phase 3 = Phase 2 setpoint - [(tH01-tH04)/4]
4	Phase 4 = Phase 3 setpoint - [(tH01-tH04)/4]
5	Phase 5 = tH04

#### MEDIUM level

Phase...	Working setpoint...
1	Phase 1 = tH02
2	Phase 2 = Phase 1 setpoint - [(tH02-tH05)/4]
3	Phase 3 = Phase 2 setpoint - [(tH02-tH05)/4]
4	Phase 4 = Phase 3 setpoint - [(tH02-tH05)/4]
5	Phase 5 = tH05

#### HIGH level

Phase...	Working setpoint...
1	Phase 1 = tH03
2	Phase 2 = Phase 1 setpoint - [(tH03-tH06)/4]
3	Phase 3 = Phase 2 setpoint - [(tH03-tH06)/4]
4	Phase 4 = Phase 3 setpoint - [(tH03-tH06)/4]
5	Phase 5 = tH06

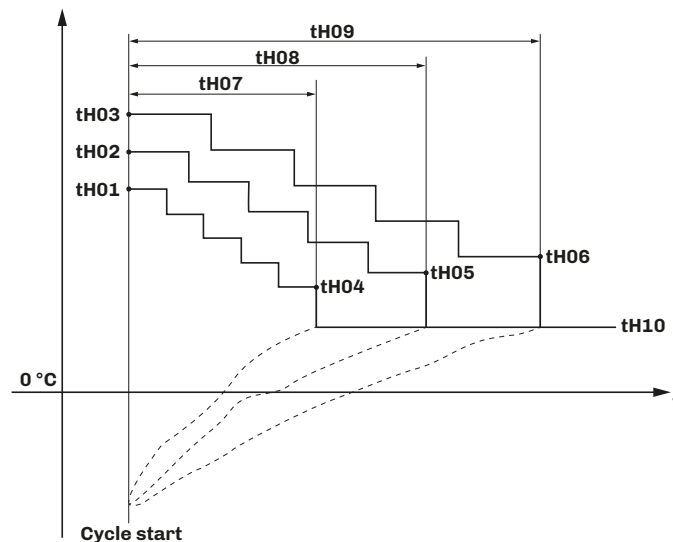
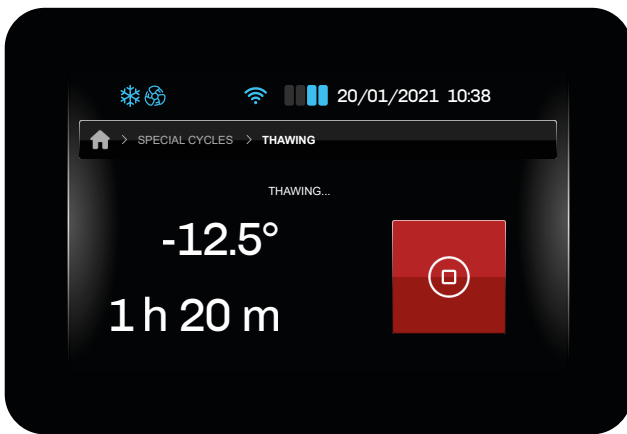
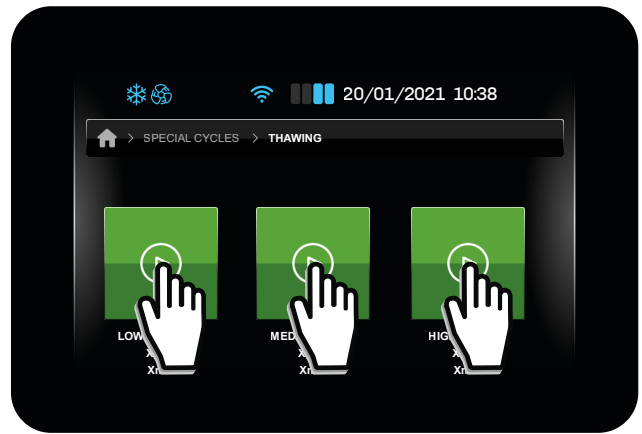
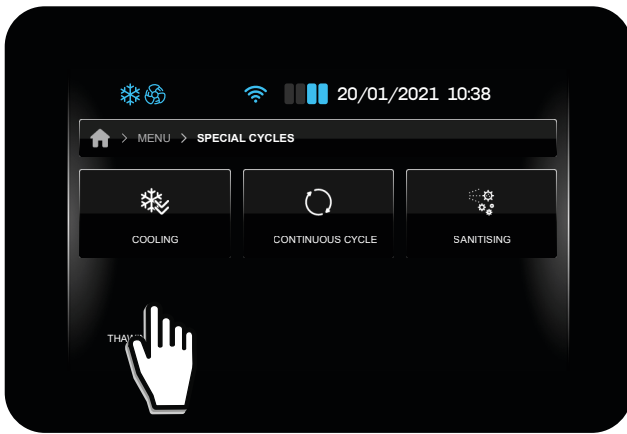


Fig. 43. Thawing cycle operation



**Fig. 44.** Thawing cycle

The option of setting the evaporator fan speed is available for each phase of the thawing cycle.

Par.	Description	MU	Range
tH11	Evaporator fan speed during thawing phase 1.	---	1...5
tH12	Evaporator fan speed during thawing phase 2.	---	1...5
tH13	Evaporator fan speed during thawing phase 3.	---	1...5
tH14	Evaporator fan speed during thawing phase 4.	---	1...5
tH15	Evaporator fan speed during thawing phase 5.	---	1...5

Once the thawing cycle has ended, the buzzer sounds and the machine starts its storage phase, with setpoint **tH10**, for a limitless time. During this phase, the speed of the fans can be set via **tH16**:

Par.	Description	MU	Range
tH10	Storage phase setpoint.	°C/°F	-50.0...99.9
tH16	Fan speed for thawing storage phase.	---	1...5

During the thawing cycle, defrosting is inhibited, while during the storage cycle, defrosting is only performed at certain time/temperature intervals.

## 5.15 TEMPERATURE CHART

The **Temperature chart** which can be used to view the temperature data-logger chart can be accessed via the menu.

Parameter **L1** can be used to set the timescale of the chart in steps of 5 minutes.

Par.	Description	MU	Range
L1	Data-logger sampling interval.	min	1...60

The sampling logic is as follows:

- **L1** = 1, then the controller takes 12 samples at intervals of 1 minute ( $\pm 12$  min);
- **L1** = 5, then the controller takes 12 samples at intervals of 5 minutes ( $\pm 1$  h);
- **L1** = 10, then the controller takes 12 samples at intervals of 10 minutes ( $\pm 2$  h);
- **L1** = 60, then the controller takes 12 samples at intervals of 60 minutes ( $\pm 12$  h);

---

The chart shows the temperature trends over the last 12 samples.

#### Key to line colours

- **Green line:** Cold room temperature;
- **Blue line:** Product temperature;
- **Yellow line:** Evaporator temperature;
- **Red line:** Condenser temperature.

The X-axis shows a vertical dotted line indicating sampling.

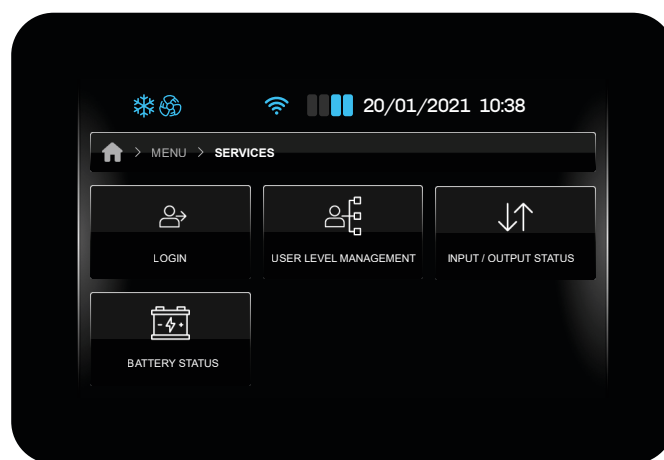
The Y-axis shows the minimum and maximum values detected, so as to show all the data within the display.

**NOTE:** After changing **L1**, delete the data log on the machine to cross-reference consistent saved data.

## 5.16 SERVICE

The **Service** menu can be used to:

- Manage users (only if **E18** = 1);
- View I/O status;
- View the battery status (only if **E19** = 2 or 3);
- Log in (access) (only if **E18** = 1).



**Fig. 45.** Service menu

### 5.16.1 Login

The controller can be managed through 3 user levels:

- User;
- Expert (**PW: 125**);
- Admin (**PW: 250**) (menu access for the **Admin** level cannot be changed and always remain enabled).

Users are disabled by default (**E18** = 0).

Each user, if they have logged in, views all registered users, but editing individual users is only possible for users at a lower level, e.g. ADMIN users can edit all users, while EXPERT users can only edit USER users.

It is possible to set or change the password and enable/disable access to various menus and functions for each user, depending on their access level.

**NOTE:** once a user has logged out, the controller automatically enters USER level, and the Homepage displays the  icon.

**NOTE:** ADMIN and EXPERT level passwords can only be changed if you logged in as ADMIN.

### 5.16.2 I/O status

In the **Input-output status** section, you can consult the status of the inputs (analogue and digital) and outputs (digital and analogue). Only the values for the inputs and outputs configured via parameters are shown; other non-configured inputs and outputs will be followed by “—”.

### 5.16.3 Battery status

In the **Battery status** section, if the battery module is enables (**E19** = 2 or 3), the following will be displayed:

- The battery status (voltage);
- Whether the battery is charging or in use.

## 5.17 PARAMETER MANAGEMENT

The **Parameter management** menu can be used to edit parameters, or to restore all parameters to their factory values.

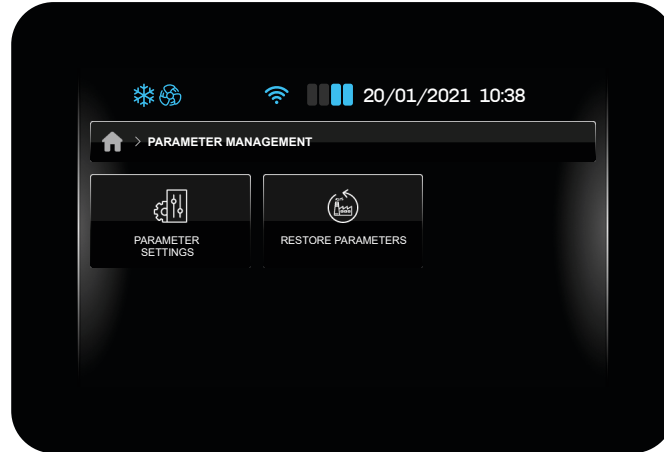


Fig. 46. Parameter management menu

### 5.17.1 Parameter settings

To access the **Parameter settings** section, you must enter the access password (-19). Once you have entered the password, you can access the **Parameter groups** screen, where you can select the group of parameters you wish to edit.



Fig. 47. Parameter settings

### 5.17.2 Restore parameters

To restore the parameters to their factory values, select the corresponding entry in the menu and enter the password 149.

## 5.18 ADVANCED FUNCTIONS

The **Advanced Functions** menu can be used to:

- Test the outputs;
- Run a test cycle.

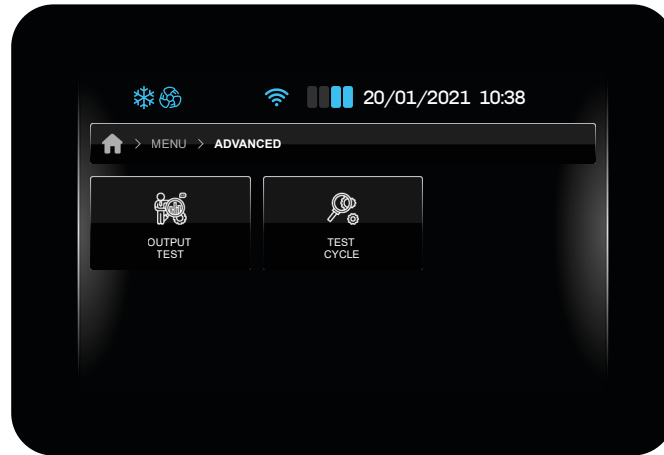


Fig. 48. Advanced functions menu

### 5.18.1 Output test

In the **Output test** section, you can activate/deactivate all outputs (digital/analogue) configured on the controller, regardless of the regulation currently taking place.

In this section, you can manually pause the regulation currently taking place; on exiting the menu, regulation resumes the paused task automatically.

Each output can be activated/deactivated individually.

### 5.18.2 Test cycle

All loads are switched off in the **Test cycle**.

The test cycle function automatically performs a test cycle consisting of 7 phases:

1. **Start test cycle:** Tap START;



Fig. 49. Start test cycle

2. **Cold room temperature for cycle start**

The cycle starts automatically as soon as  $Pb1$  (cold room temperature)  $> T1$ ;

3. **Pulldown phase**

The controller runs in cold mode until setpoint  $T2$  is reached.

Correct probe connection is checked. §

The temperature of the evaporator probe should be lower than the temperature of the cold room, while the temperature of the condenser should be higher than that of the cold room. If it is not exceeded, the test ends.

The maximum Test duration is determined by  $T7$ ; if the Test exceeds the time period  $T7$ , the text **MAX TIME** appears and the test ends.

#### 4. Thermostat control phase

This phase runs with a Setpoint (T3) and Hysteresis (T4).

During this phase, the compressor performs a number of cycles T5 before moving on to the Defrost phase.

**NOTE:** by cycles we mean the compressor ON phase and OFF phase time.

#### 5. Defrost phase

Once the Thermostat control phase has ended, the controller runs a forced defrost (determined by the defrost parameters).

If the defrost cycle ends due to Time, the text **DEFR. TIME** appears and the test ends.

#### 6. Recovery phase

Once defrosting has ended, the controller waits for the temperature of the cold room to reach the setpoint T6.

#### 7. Test complete

The controller switches off all loads and remains on the test screen, showing the results.



Fig. 50. Test cycle phases

## 5.19 MISTRAL HUMIDIFIER MANAGEMENT

Vcolor 229/249 M/L can manage the **Mistral** humidifier directly.

To enable management of the Mistral humidifier, set **E10** = 2.

The configuration parameters for the **Mistral** humidifier are:

Par.	Description	MU	Range
HS1	Minimum humidity setpoint value. With <b>CFG</b> = 2, 3, 4, 7, 8, 9.	%	0...100
HS2	Maximum humidity setpoint value. With <b>CFG</b> = 2, 3, 4, 7, 8, 9.	%	0...100
HS3	Minimum delay time between two consecutive humidity production activations. With <b>CFG</b> ≠ 10.	s	1...240
HS4	Fan speed. <b>0</b> = Fan off; <b>1</b> = Speed <b>F1</b> ; <b>2</b> = Speed <b>F2</b> ; <b>3</b> = Speed <b>F3</b> .	---	0...3
HS5	Water conductivity.	μS*cm	70...1250
HS6	Number of continuous idle hours causing the water reservoir to empty. <b>0</b> = Function disabled.	h	0...250
HS7	Number of operating hours causing the water reservoir to empty. <b>0</b> = Function disabled.	h	0...250



Fig. 51. Humidifier management

### 5.19.1 Operating mode

Displays the humidifier operating values.

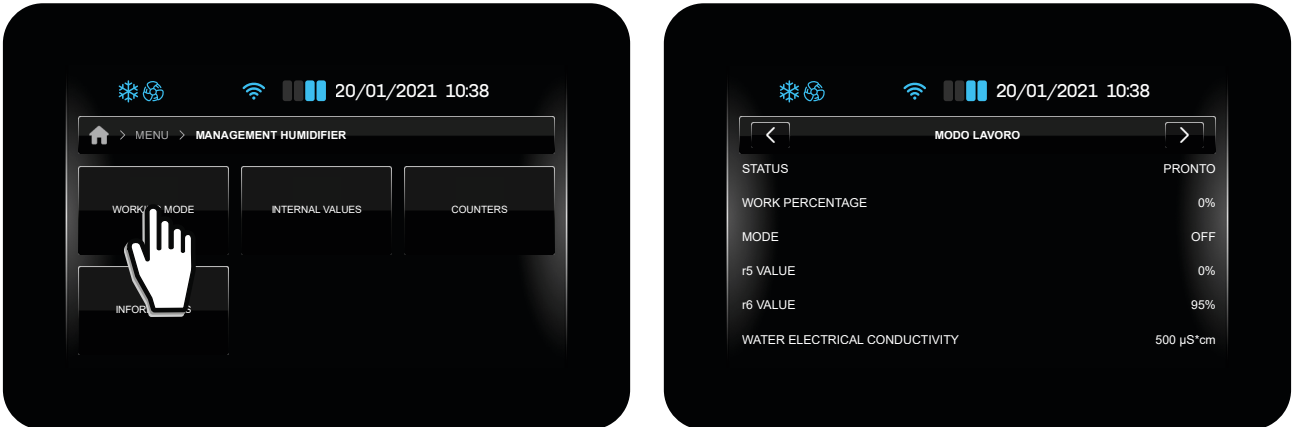


Fig. 52. Operating mode

### 5.19.2 Internal values

Displays the values of the humidifier operating variables.



Fig. 53. Internal values

### 5.19.3 Counters

Displays the mist-maker and fan operating hours.



Fig. 54. Counters



## 5.19.4 Information



**Fig. 55.** Information

## 6. DEFROSTING

### 6.1 INTRODUCTION

Defrosting is used to remove ice from the surface of the evaporator.

By default defrost is set to manual operation **d0** = 0. For automatic operation, set **d0** > 0.

The defrost configuration parameters are:

Par.	Description	MU	Range
<b>d0</b>	Automatic defrost interval.	h	0...99
<b>d1</b>	Defrost type. <b>0</b> = Electric heaters; <b>1</b> = Cycle inversion (hot gas); <b>2</b> = On compressor stoppage.	---	0...3
<b>d2</b>	Evaporator temperature over which defrost ends with evaporator probe ( <b>Pr1...Pr3</b> = 1).	°C/°F	-99.0...99.0
<b>d3</b>	Defrost duration.	min	0...99
<b>d4</b>	Enable defrost after power failure. <b>0</b> = No; <b>1</b> = Yes.	---	0/1
<b>d5</b>	Defrost delay after power failure (if <b>d4</b> = 1).	min	0...99
<b>d6</b>	Display during defrost. <b>0</b> = Regulation temperature; <b>1</b> = Display locked; <b>2</b> = <b>Defrosting in progress</b> text.	---	0...2
<b>d7</b>	Evaporator drip time after a defrost.	min	0...15
<b>d11</b>	Enable alert for defrost end due to maximum duration. <b>0</b> = No; <b>1</b> = Yes.	---	0/1
<b>d15</b>	Consecutive compressor ON time before hot gas defrost.	min	0...99

Defrost starts once the time set in **d0** has elapsed, with the method set by **d1**.

The defrost duration is determined by **d3**, while the temperature threshold for the end of defrosting is determined by **d2**, if at least one analogue input **Pr1...Pr3** = 1 (evaporator probe active).

With **d11** = 1, an alert appears on the display (**dFd**), if the defrost has a duration greater than **d3** (only if **Pr1...Pr3** = 1).

When **d15** = 0, the function is disabled. If **d15** > 0, the compressor is forced to ON for the set time.

#### 6.1.1 Operating conditions

Defrosting starts automatically, if the following conditions are met:

- Pb2 temperature below **d2**;
- Interval **d0** elapsed and Pb3 temperature under **d2**.

If a manual defrost is active or one of these two conditions is not satisfied, defrosting **does not** start automatically.

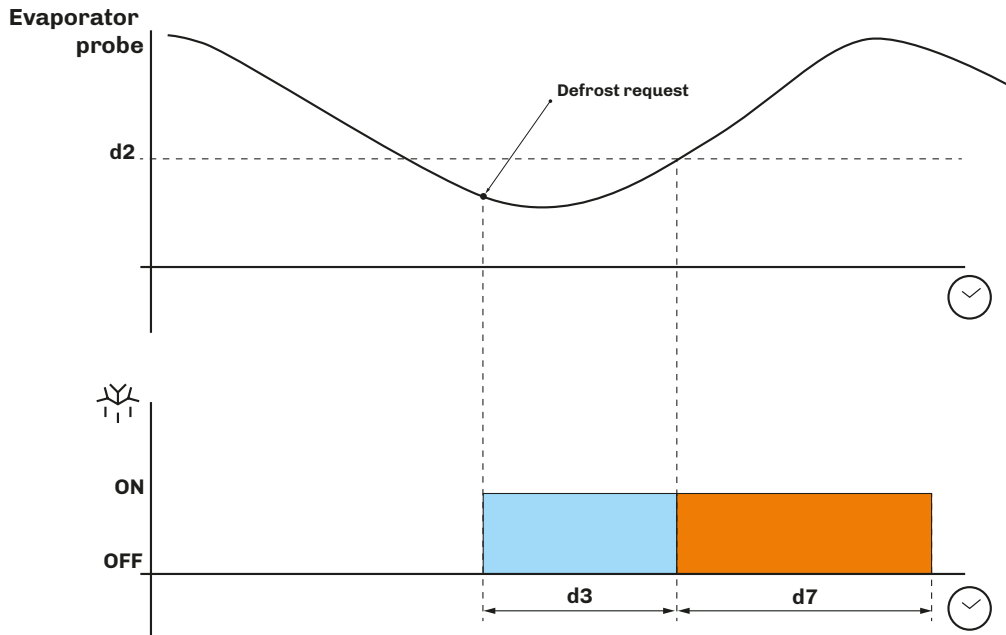


Fig. 56. Defrost with **Pr1...Pr3** = 1

#### 6.1.2 Dripping interval

A dripping interval can be set following a defrost, by setting **d7** > 0, to prevent water from accumulating inside the evaporator and then freezing.

## 6.2 STANDARD DEFROST

To use this mode, set parameter **d1**.

Defrosting takes place by means of evaporator heating using one of the following methods:

Par.	Description	MU	Range
<b>d1</b>	Defrost type. <b>0</b> = Electric heaters; <b>1</b> = Cycle inversion (hot gas); <b>2</b> = On compressor stoppage.	---	0...3

### 6.2.1 Electric heater defrost

Electric heater defrost is achieved by setting **d1** = 0.

#### Defrost activation

When defrosting is activated:

- The compressor stops;
- The relay output to which the electric heaters are connected (configured as a defrost output) is activated.

#### Defrost end conditions

The defrost end conditions are:

- The defrost duration **d3** is reached;
- The defrost end temperature **d2** is reached.

The electric heater defrost 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>d0</b>	Automatic defrost interval.	h	0...99
<b>d1</b>	Defrost type. <b>0</b> = Electric heaters; <b>1</b> = Cycle inversion (hot gas); <b>2</b> = On compressor stoppage.	---	0...3
<b>d2</b>	Evaporator temperature over which defrost ends with evaporator probe ( <b>Pr1...Pr3</b> = 1).	°C/°F	-99.0...99.0
<b>d3</b>	Defrost duration.	min	0...99
<b>d7</b>	Evaporator drip time after a defrost.	min	0...15

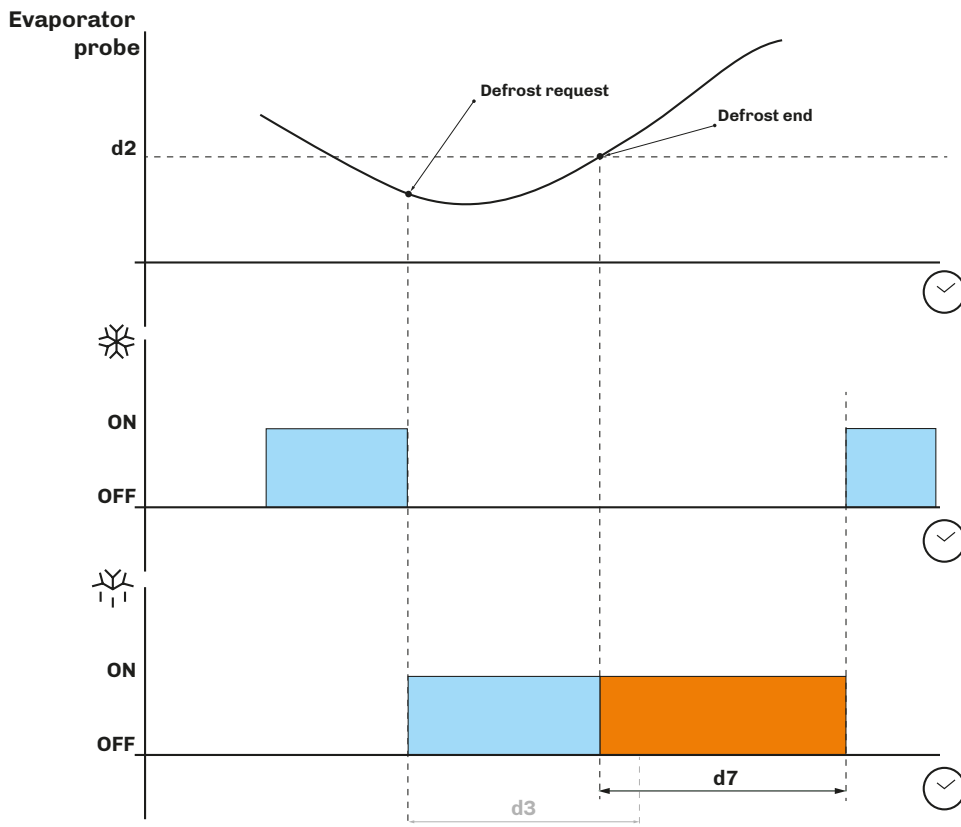


Fig. 57. Electric heater defrost - Defrost end due to temperature

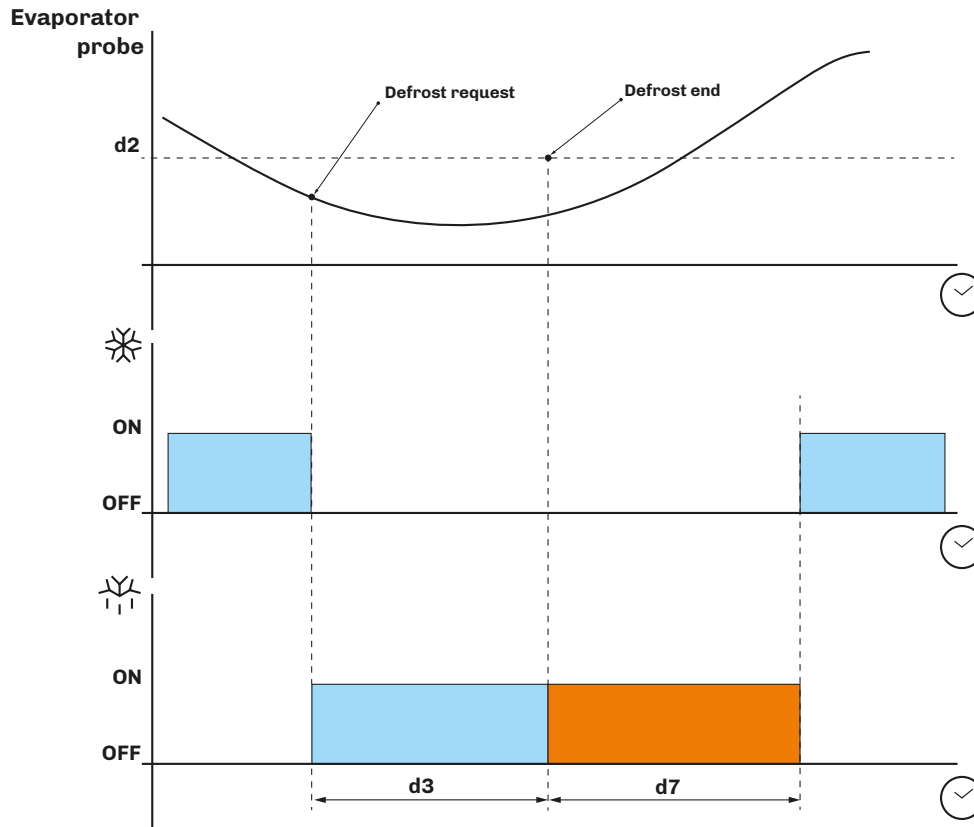


Fig. 58. Electric heater defrost - Defrost end due to maximum time

### 6.2.2 Cycle inversion (hot gas) defrost

Cycle inversion defrost is achieved by setting **d1** = 1.

#### Defrost activation

When defrosting is activated:

- The compressor is activated (or it has already been active for a time period **d15**) and remains so for the duration of the defrost;
- The relay output to which the valve is connected (solenoid if the system operates with a thermostatic valve) is activated.

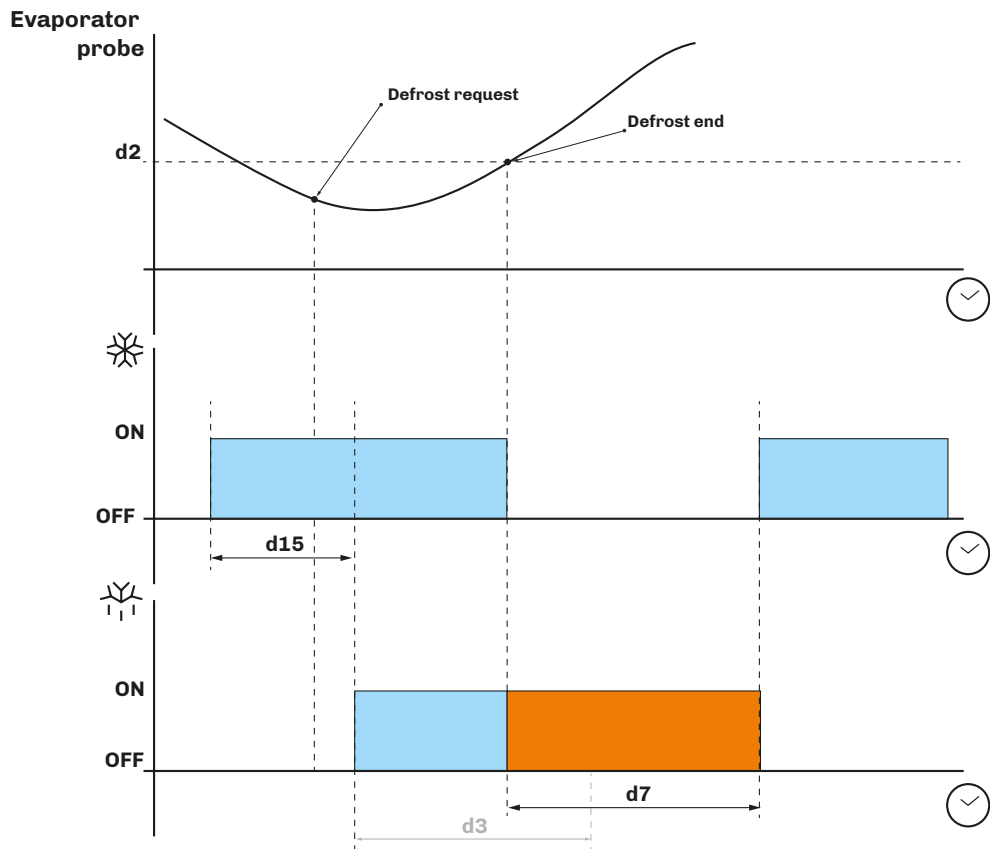
#### Defrost end conditions

The defrost end conditions are:

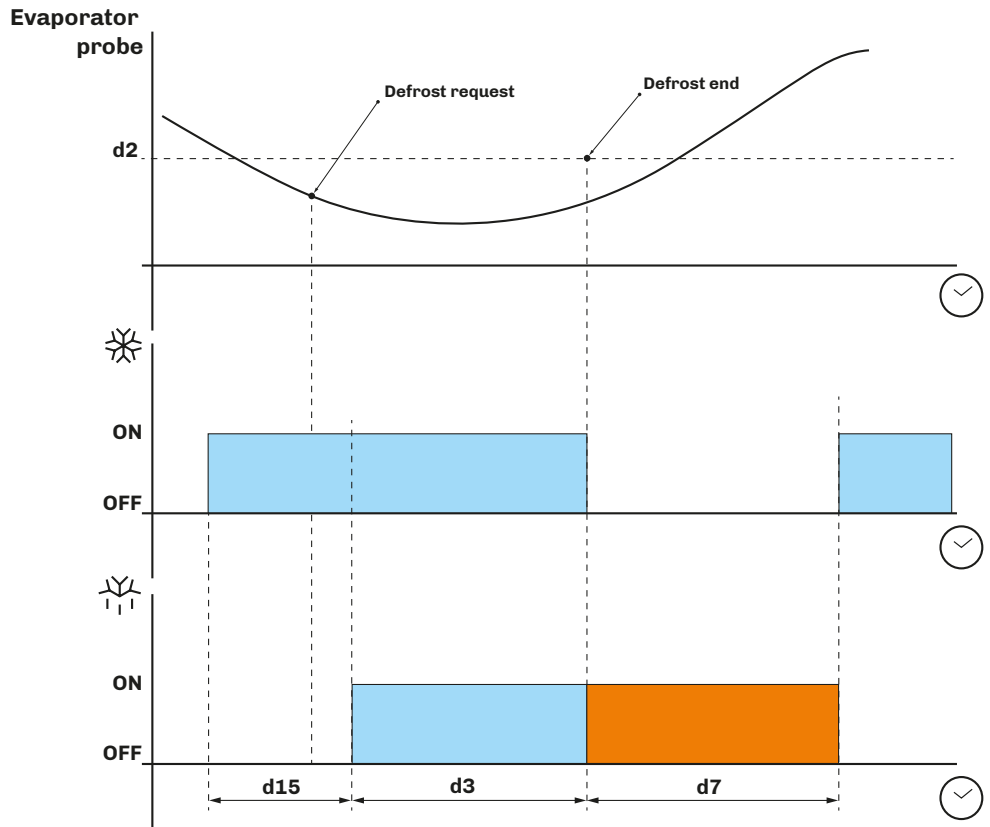
- The maximum defrost duration, set via parameter **d3**, is reached.
- The defrost end temperature, set via parameter **d2**, is reached.

The cycle inversion defrost 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>d0</b>	Defrost interval.	h	0...99
<b>d1</b>	Defrost type. 0 = Electric heaters; 1 = Cycle inversion (hot gas); 2 = On compressor stoppage.	---	0...3
<b>d2</b>	Evaporator temperature over which defrost ends with evaporator probe ( <b>Pr1...Pr3</b> = 1).	°C/°F	-99.0...99.0
<b>d3</b>	Defrost duration.	min	0...99
<b>d7</b>	Evaporator drip time after a defrost.	min	0...15
<b>d15</b>	Consecutive compressor ON time before hot gas defrost.	min	0...99



**Fig. 59.** Cycle inversion defrost - Defrost end due to temperature



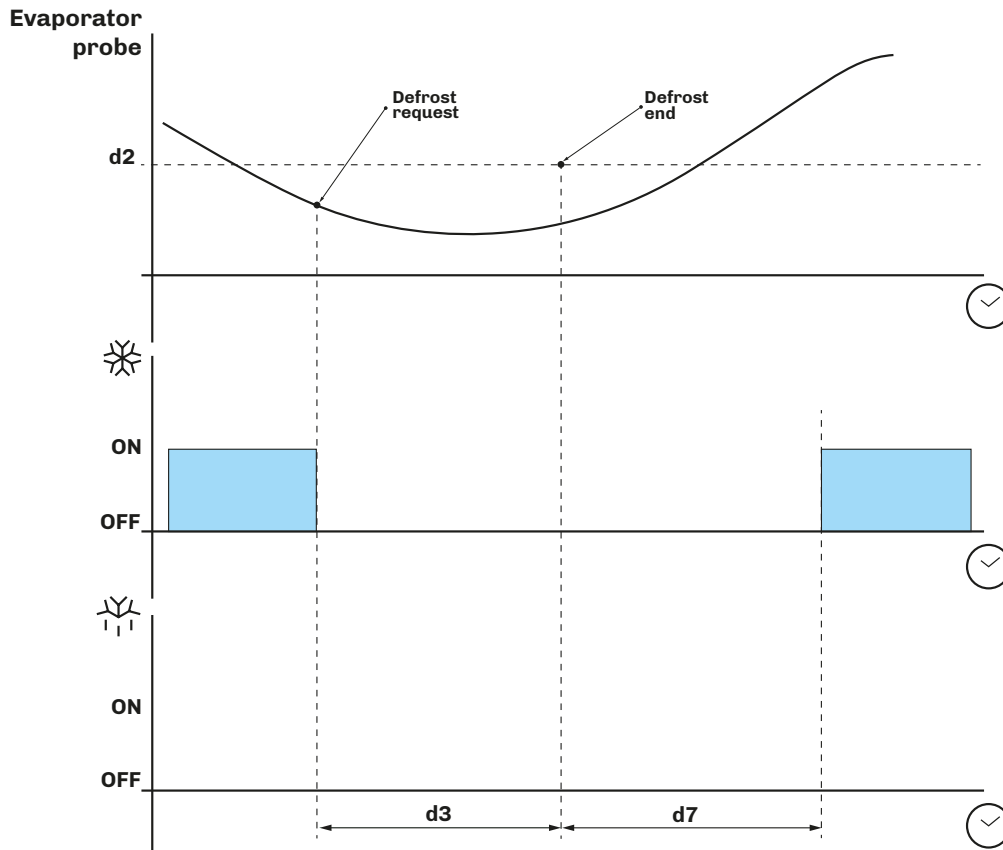
**Fig. 60.** Cycle inversion defrost - Defrost end due to maximum time

### 6.2.3 Defrost on compressor stoppage

Compressor stoppage defrost is achieved by setting **d1** = 2.

The compressor stoppage defrost configuration parameters are:

Par.	Description	MU	Range
<b>d0</b>	Defrost interval.	h	0...99
<b>d1</b>	Defrost type. 0 = Electric heaters; 1 = Cycle inversion (hot gas); 2 = On compressor stoppage.	---	0...3
<b>d3</b>	Defrost duration.	min	0...99
<b>d7</b>	Evaporator drip time after a defrost.	min	0...15



**Fig. 61.** Defrost on compressor stoppage

## 7. REGULATORS

### 7.1 HOT/COLD TEMPERATURE

The temperature regulation configuration parameters are:

Par.	Description	MU	Range
<b>P15</b>	Regulation type. <b>0</b> = Cold <b>1</b> = Hot; <b>2</b> = Hot/Cold with neutral zone.	---	0...2
<b>rC0</b>	Cold temperature regulation differential, to be added to setpoint 1 (setpoint 1 + <b>rC0</b> )	°C/°F	0.1...15.0
<b>rC1</b>	Minimum value that can be assigned to setpoint 1.	°C/°F	-99.9... <b>rC2</b>
<b>rC2</b>	Maximum value that can be assigned to setpoint 1.	°C/°F	<b>rC1</b> = 99.0
<b>rH0</b>	Hot temperature regulation differential, to be added to setpoint 1 (setpoint 1 + <b>rH0</b> ).	°C/°F	0.1...15.0

#### 7.1.1 Operation

The controller manages the temperature on the basis of the type of request (Hot/Cold).

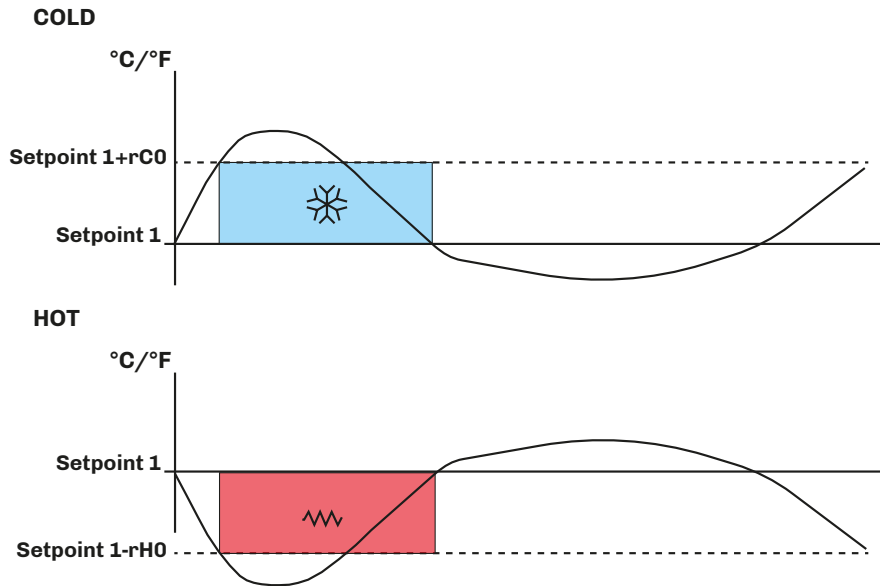


Fig. 62. Temperature regulator operation

#### Cold

If the controller receives a cold request:

- Cold output (compressor) between **Setpoint 1** and **Setpoint 1 + rC0**.

When the temperature read by Pb1 reaches the value of **Setpoint 1 + rC0**, the controller activates the compressor output to produce a cold effect until the temperature falls below the threshold set by **Setpoint 1**.

#### Hot

If the controller receives a hot request:

- Hot output (heaters) between **Setpoint 1** and **Setpoint 1 - rH0**.

When the temperature read by Pb1 reaches the value of **Setpoint 1 - rH0**, the controller activates the heater output to produce a hot effect until the temperature rises above the threshold set by **Setpoint 1**.

## 7.2 HOT/COLD TEMPERATURE WITH NEUTRAL ZONE

The temperature regulation configuration parameters for the neutral zone are:

Par.	Description	MU	Range
<b>P15</b>	Regulation type. 0 = Cold 1 = Hot; 2 = Hot/Cold/humidity with neutral zone.	---	0...2
<b>rC0</b>	Cold temperature regulation differential, to be added to the setpoint (setpoint 1 + rC0).	°C/°F	0.1...15.0
<b>rC1</b>	Minimum value that can be assigned to Setpoint 1.	°C/°F	-99.9...rC2
<b>rC2</b>	Maximum value that can be assigned to Setpoint 1.	°C/°F	rC1 = 99.0
<b>rC3</b>	Cold management neutral zone value to be added to the differential.	°C/°F	0.0...10.0
<b>rH0</b>	Hot temperature regulation differential, to be added to setpoint 1 (setpoint 1 + rH0).	°C/°F	0.1...15.0
<b>rH3</b>	Hot management neutral zone value to be added to the differential.	°C/°F	0.0...10.0

### 7.2.1 Operation

Regulation in the neutral zone occurs if:

- **P15** = 2;
- **rC3** > 0, for cold management;
- **rH3** > 0, for hot management;

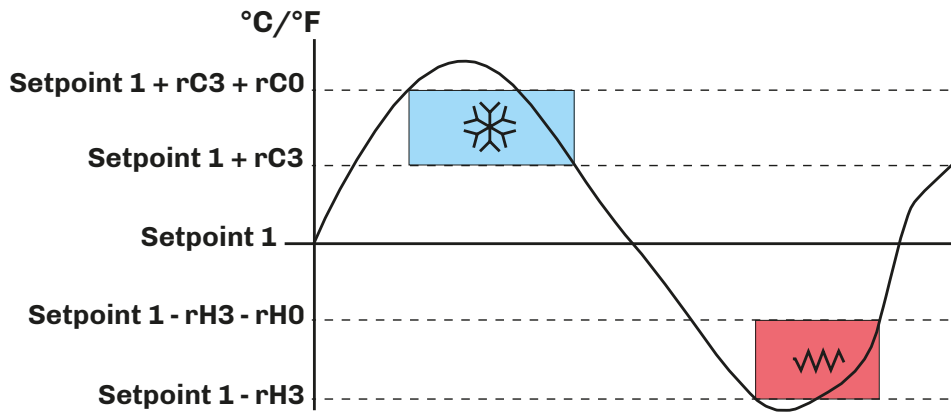


Fig. 63. Temperature regulator operation in the neutral zone

#### Cold

If the controller has received a cold request:

- Cold output (compressor) between **Setpoint 1 + rC3 + rC0** and **Setpoint 1 + rC3**.

When the temperature read by Pb1 reaches the value of **Setpoint 1 + rC3 + rC0**, the controller activates the compressor output until the temperature falls below the threshold set by **Setpoint 1 + rC3**.

#### Hot

If the controller has received a hot request:

- Hot output (heaters) between **Setpoint 1 - rH3 - rH0** and **Setpoint 1 - rH3**.

When the temperature read by Pb1 reaches the value of **Setpoint 1 - rH3 - rH0**, the controller activates the heater output to produce a hot effect until the temperature rises above the threshold set by **Setpoint 1 - rH3**.

## 7.3 HUMIDITY

The humidity regulation configuration parameters are:

Par.	Description	MU	Range
<b>rU5</b>	Dehumidification regulation differential, to be added to setpoint 2 (setpoint 2 + rU5).	% R.H.	1...100
<b>rU8</b>	Humidification regulation differential, to be added to setpoint 2 (setpoint 2 + rU8).	% R.H.	1...100

Humidity regulation can be managed by means of the evaporator fan or, if there is a humidity sensor, regulation can take place with a neutral zone.



### 7.3.1 Operation

The controller manages humidification and dehumidification requests by setting parameters **rU5** and **rU8**.

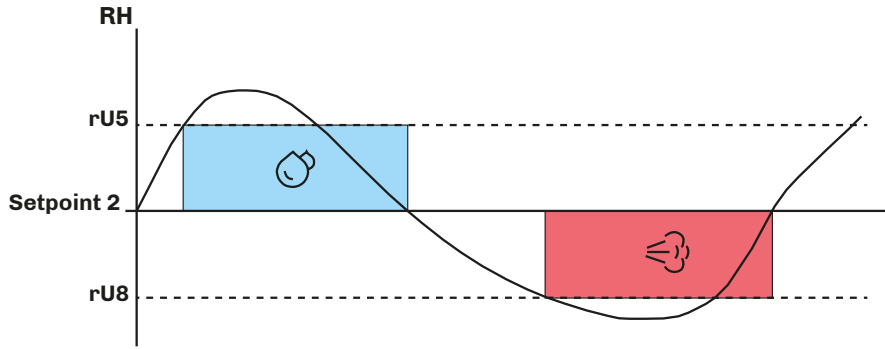


Fig. 64. Humidity regulator operation

## 7.4 HUMIDITY WITH NEUTRAL ZONE

The humidity regulation configuration parameters with a neutral zone are:

Par.	Description	MU	Range
<b>rU5</b>	Dehumidification regulation differential, to be added to setpoint 2 (setpoint 2 + <b>rU5</b> ).	% R.H.	1...100
<b>rU6</b>	Dehumidification neutral zone value to be added to the differential.	% R.H.	0...100
<b>rU8</b>	Humidification regulation differential, to be added to setpoint 2 (setpoint 2 + <b>rU8</b> ).	% R.H.	1...100
<b>rU9</b>	Humidification neutral zone value to be added to the differential.	% R.H.	0...100
<b>rU13</b>	Maximum value that can be assigned to Setpoint 2.	% R.H.	0...100

### 7.4.1 Operation

Regulation in the neutral zone occurs if:

- **P15** = 2;
- For humidification, if **rU9** ≠ 0;
- For dehumidification, if **rU6** ≠ 0;

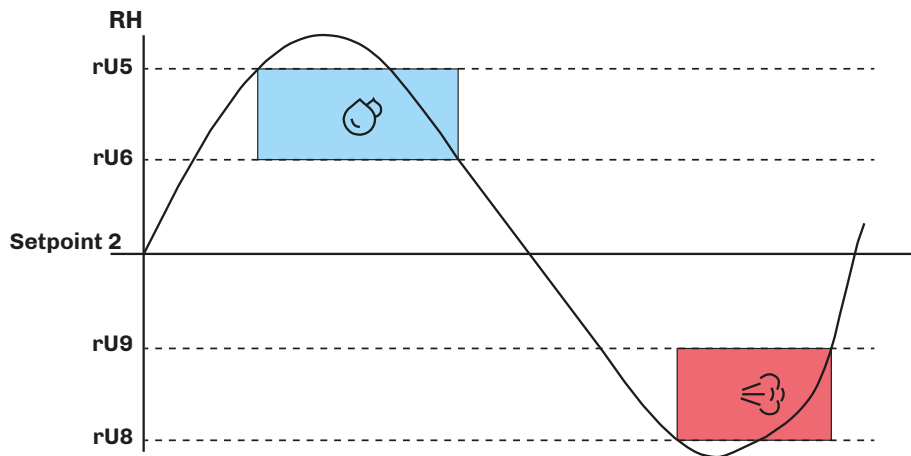


Fig. 65. Humidity regulator operation in the neutral zone

In operation with a neutral zone, values above and below the humidity setpoint (setpoint 2) are set, thereby defining the zone within which the humidification or dehumidification outputs will not be activated.

When:

- Humidity > **Setpoint 2** + **rU6** + **rU5**, then the controller activates the dehumidification output;
- Humidity < **Setpoint 2** - **rU9** - **rU8**, then the controller activates the humidification output.

### 7.4.2 Humidification management

Humidity management is assigned to two different outputs based on the configuration of parameter **E10**:

- Humidity generator output;
- Humidifier output.

Par.	Description	MU	Range
<b>E10</b>	Humidifier type. <b>0</b> = Isothermal humidifier (steam generators); <b>1</b> = Adiabatic humidifier with direct generation.	---	0/1

## Isothermal humidifier

If **E10** = 0, the steam generator output remains active for the entire time period for which humidification management is set. The direct generation humidifier output is activated proportionally when the humidity value < **Setpoint 2 - rU9 - rU8**. The humidifier output activation time percentage is proportional to the humidity value in relation to the proportional band value defined by parameter **rU10**.

The humidifier output activation/deactivation time can be set via parameter **rU11**, while the activation duration is defined by parameter **rU12**.

## Direct generation humidifier

If **E10** = 1, the steam generator output is only activated when:

- Humidity < **Setpoint 2 - rU9 - rU8**

Meanwhile, the humidifier output is activated in ON/OFF cycles when requested, always beginning with the OFF time so as to allow the generator to be ready to generate steam.

Par.	Description	MU	Range
<b>SP2</b>	Humidity Setpoint 2.	% R.H.	0... <b>rU13</b>
<b>rU8</b>	Humidification regulation differential, to be added to setpoint 2 (setpoint 2 + <b>rU8</b> ).	% R.H.	1...100
<b>rU9</b>	Humidification neutral zone value to be added to the differential.	% R.H.	0...100
<b>rU10</b>	Humidification proportional band value.	% R.H.	0...100
<b>rU11</b>	Cycle time for humidification proportional regulation.	s	0...255
<b>rU12</b>	Time base for humidification proportional regulation cycle time. <b>0</b> = Seconds; <b>1</b> = Minutes.	---	0/1
<b>rU13</b>	Maximum value that can be assigned to Setpoint 2.	% R.H.	0...100

## 7.4.3 Dehumidification management

Dehumidification can be managed in two ways:

- If **u3** = 0, by means of an extractor fan/external dehumidifier;
- If **u3** = 1, through activation of the refrigeration system.

### Dehumidification via external fan

If **u3** = 0, the output will be activated when:

- Humidity < **Setpoint 2 + rU6 + rU5**

While it is deactivated when the humidity falls within the dehumidification neutral zone values.

### Dehumidification via refrigeration system

If **u3** = 1, no digital output should be configured as dehumidification.

## 7.5 COMPRESSOR

The compressor regulator is running when at least one relay output is configured as compressor **u1c...u9c** = 4.

Compressor switch-on/off is regulated by:

- Temperature read by the regulation probe;
- Temperature adjustment configuration;
- Defrosting and dripping.

### Activation conditions

The compressor is activated automatically, if the following conditions are met:

- The controller is on (regulation is inhibited while the controller is in standby);
- Regulation probe working;
- Compressor activation delay time from switch-on **C0** elapsed;
- Compressor switch-on delay time **C2** between 2 consecutive activations;
- If **d1** = 0, 2, defrosting and dripping must be completed.

If a delay time **C0** or **C2** is set and there is a compressor activation request, the controller waits for the delay time to elapse before activating the compressor. During this wait period, the ✖ icon flashes until the compressor is activated, after which it remains lit steadily.

The compressor regulation configuration parameters are:

Par.	Description	MU	Range
<b>C0</b>	Compressor ON delay from power-on.	min	0...240
<b>C1</b>	Delay between two consecutive compressor switch-ons.	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 ON time in dehumidification.	min	0...240

Par.	Description	MU	Range
<b>C6</b>	Condensation temperature over which the condenser overheat alert is triggered.	°C/°F	0.0...164.0
<b>C7</b>	Condenser temperature over which the compressor lock alarm is triggered, once time period <b>C8</b> has elapsed.	°C/°F	0.0...164.0
<b>C8</b>	Compressor lock alarm activation delay from when threshold <b>C7</b> was exceeded.	min	0...15
<b>C9</b>	Consecutive cold room temperature time in proportional band for compressor at maximum capacity.	h	0...99
<b>C10</b>	Total compressor operation time for maintenance alert.	days	0...999
<b>C11</b>	Compressor 2 switch-on delay from compressor 1 switch-on.	s	0...999
<b>C12</b>	Compressor OFF time in cold room probe alarm mode.	min	0...240
<b>C13</b>	Compressor ON time in cold room probe alarm mode.	min	0...240

### 7.5.1 Operating diagrams

#### Normal compressor operation

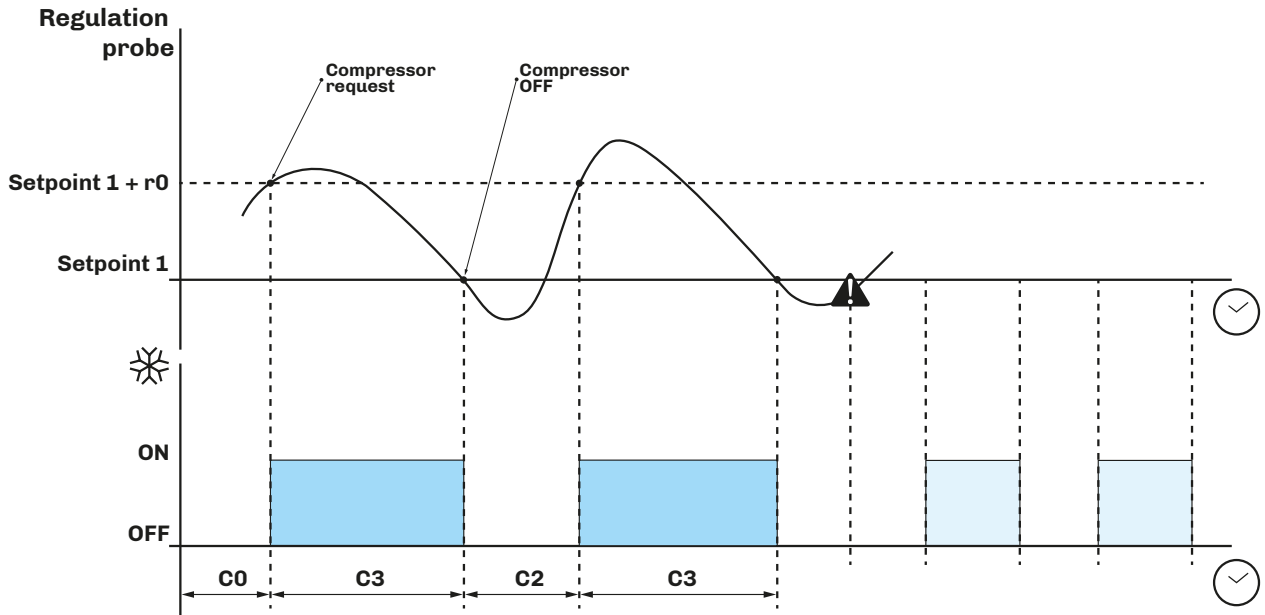


Fig. 66. Normal compressor operation

#### Compressor operation with probe alarm

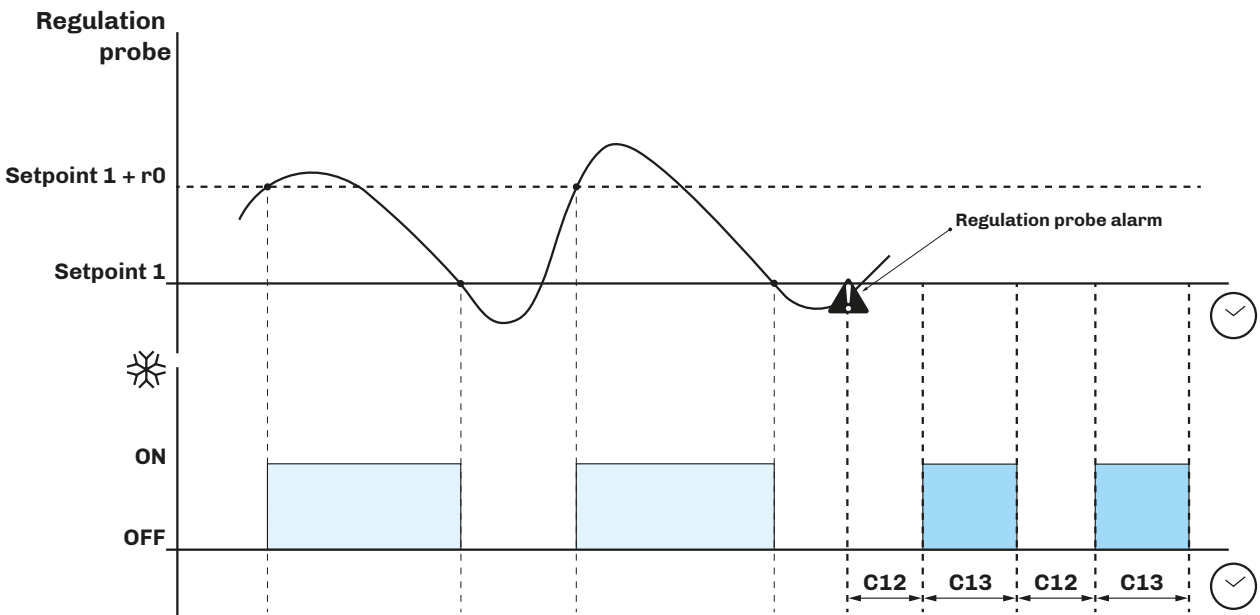


Fig. 67. Compressor operation with probe alarm

## 7.5.2 Variable speed compressor

A variable speed compressor provides an alternative to compressor ON/OFF operation. Models that can be used are identified by parameter **VC3**.

Regulation for this compressor is the PI type defined by parameters **VC1** and **VC2**; parameter **VC4** can be used to set for how long, at the first power-on, the compressor runs at a speed of 85 Hz, before PI regulation is taken into account.

The compressor speed can be forced to maximum if, after a time period set in parameter **C9**, the compressor is still within the proportional band.

If the cold room temperature is under **SP1 - rH0**, the compressor is switched off immediately, even if the entire time has not yet elapsed.

Par.	Description	MU	Range
<b>VC1</b>	Proportional band.	°C/°F	0.0...99.0
<b>VC2</b>	Full time action.	min	0...99
<b>VC3</b>	Compressor type. <b>1</b> = Embraco VEM – VES; <b>2</b> = Embraco VEG – VES; <b>3</b> = Embraco VNEK – VNEU – FMFT; <b>4</b> = Secop VNL 50...150 Hz (40 Hz in OFF); <b>5</b> = Secop 33...133 Hz; <b>6</b> = Tecumseh 85...150 Hz; <b>7</b> = Tecumseh 68...150 Hz;	---	1...7
<b>VC4</b>	Compressor time at 85 Hz from power-on.	s*10	0...100
<b>VC5</b>	Percentage for increasing the minimum compressor frequency. If <b>VC5</b> =0 the minimum operating frequency is the value identified by the compressor manufacturer.	%	0...100
<b>VC6</b>	Percentage for decreasing the compressor frequency. If <b>VC6</b> =100 the maximum operating frequency is the value identified by the compressor manufacturer.	%	0...100
<b>C9</b>	Consecutive cold room temperature time in proportional band for compressor at maximum capacity.	h	0...99

## 7.6 EVAPORATOR FANS

The evaporator fan regulator is activated on the basis of the following conditions:

- Delay **F3** has elapsed in the event of dripping end;
- The temperature of evaporator probe Pb2 exceeds the threshold **F1** (if **F0** = 3, 4);
- The fans are not deactivated during defrost **F2** = 0;
- Dripping **d7** is not active.

### 7.6.1 Regulator operation

Evaporator fan regulator activation can take place according to requests made by other regulators in the following ways:

- On the compressor's request, to encourage the production and distribution of cold temperatures (temperature control function);
- To regulate/limit hot air distribution during a defrost request;
- On the humidifying/dehumidifying regulator's request, to propagate or limit the distribution of humidity.

### 7.6.2 Operating modes

The evaporator fans run in accordance with parameters **F0** and **E13**:

Par.	Description	MU	Range
<b>F0</b>	Evaporator fans in normal operating mode. <b>0</b> = Always OFF; <b>1</b> = Always ON; <b>2</b> = Active depending on loads; <b>3</b> = Temperature-controlled ( <b>F1</b> relating to temperature regulation); <b>4</b> = Active depending on loads and temperature-controlled ( <b>F1</b> relating to temperature regulation); <b>5</b> = With ON/OFF cycles, while the compressor is off, on the basis of parameters <b>F14</b> and <b>F15</b> ; <b>6</b> = Thermostat-controlled based on <b>F1</b> (as an absolute value); <b>7</b> = Thermostat-controlled based on <b>F1</b> with the compressor on (as an absolute value); <b>8</b> = With ON/OFF cycles; in this case the humidity probe performs a read-only function and does not take part in regulation.	---	0...8
<b>E13</b>	Evaporator fan configuration. <b>0</b> = Fans at speed 1 (with an output <b>u1c...u13c</b> = 3); <b>1</b> = Fans at speed 2 (with an output <b>u1c...u13c</b> = 3 and <b>u1c...u13c</b> = 11); <b>2</b> = Fans at speed 5 via output 0...10 Vdc; <b>3</b> = Fans at speed 5 via PWM output; <b>4</b> = Fans at speed 2 with 2 relays (with an output <b>u1c...u13c</b> = 3 and <b>u1c...u13c</b> = 11).	---	0...4

Cyclical evaporator fans with F11 > 0

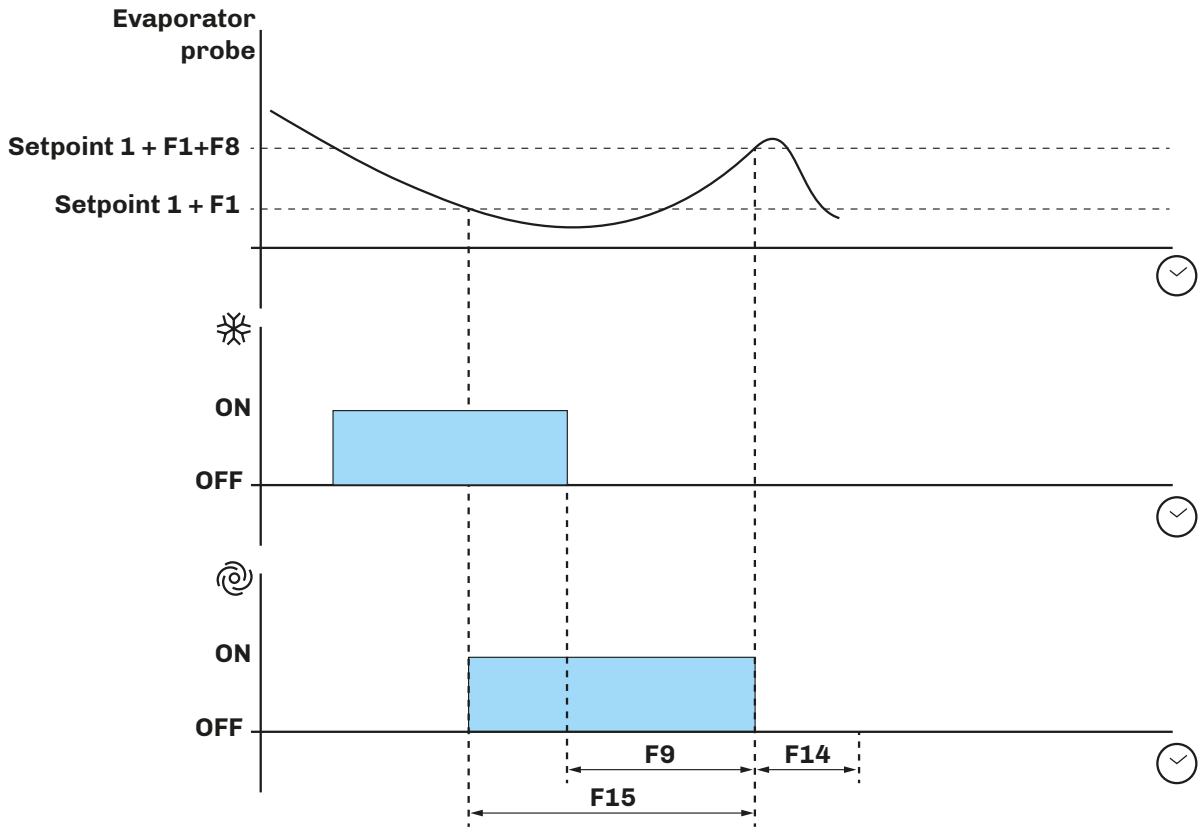


Fig. 68. Evaporator fan operation with F15 > 0

7.6.3 Operation during a defrost

Evaporator fan operation during a defrost depends on F2.

Par.	Description	MU	Range
F2	Evaporator fan mode during defrosting. 0 = OFF; 1 = ON.	---	0/1

7.6.4 Evaporator fan operation during dripping

During a dripping phase, the evaporator fans remain off for the time set in d7, plus a further delay F3 can be set for the activation of evaporator fans after dripping. In this case the fans will be activated once F3 has elapsed.

7.7 CONDENSER FANS

Fan operating mode is determined by parameter F11:

Par.	Description	MU	Range
F11	Condenser fan mode. 0 = Temperature-controlled; 1 = Temperature-controlled if compressor OFF; 2 = Temperature-controlled if compressor ON; 3 = Temperature-controlled if compressor and defrost OFF.	---	0...3

7.7.1 Operation

The condenser fans are activated on the basis of the following conditions:

- A digital output u1c...u9c = 4 or 12 (configured as condenser fans);
- If no analogue input is configured as condenser probe, the condenser fans are activated in parallel with the compressor;
- If Pr1...Pr3 = 2, and depending on F11, the condenser fans are activated when the temperature of the condenser exceeds F12 + 2 °C, while it switches off when the temperature < F12.
- During hot gas defrosting, they are activated when the condenser temperature exceeds alarm threshold C6;
- During defrosting the condenser fans switch off.

## 7.8 ENERGY SAVING / ECO

The energy saving function, depending on the machine configuration, offers 1 to 3 saving levels.

### 7.8.1 Operation

Energy saving can be activated via:

- Digital input, if **i4**, **i7**, **i10** = 8;
- Key (see "**5.9 Energy saving / Eco mode**" on page 35");
- RTC, by enabling energy saving every day, at the time **ES3** for a time period +.

#### Activation conditions

The conditions activating energy saving are:

- **ES4** = 0
  - Setpoint reached and door closed for at least **ES2** minutes.
  - Closure of the digital input configured as energy saving.
- **ES4** > 0
  - Energy saving mode activation scheduled time reached (**ES3**).

The conditions which disable energy saving are:

- **ES4** = 0
  - Door opening;
  - Machine power-off;
  - Disabling energy saving via the keypad;
  - Presence of a cold room high temperature alarm or a high temperature alarm.
  - If energy saving had been enabled via digital input, in addition to the conditions in the point above, it will also be disabled by the opening of the digital input or due to the time set in parameter **ES1** elapsing (if parameter **ES1**=0 only the opening of the digital input will be taken into account).
- **ES4** > 0
  - Door opening, machine switch-off, energy disabling via keypad, presence of a cold room high temperature alarm or a product high temperature alarm.
  - In addition to the aforementioned conditions, it is deactivated when the time period in **ES4** has elapsed.

**NOTE:** If a defrost starts during energy saving mode, the defrost has no effect on the energy saving status.

The energy saving configuration parameters are:

Par.	Description	MU	Range
<b>ES0</b>	Energy saving mode. <b>0</b> = 1 level (Disabled/High saving); <b>1</b> = 3 levels (Disabled/Low saving/Medium saving/High saving).	num	0/1
<b>ES1</b>	Maximum energy saving duration.	min	0...999
<b>ES2</b>	Consecutive time door closed for energy saving mode activation.	min	0...999
<b>ES3</b>	Energy saving mode activation scheduled time.	h	0...24
<b>ES4</b>	Energy saving duration.	h	0...24

The parameters for **Low saving** selection are:

Par.	Description	MU	Range
<b>ES5</b>	Setpoint delta corresponding to <b>Low saving</b> .	°C/°F	0.0...10.0
<b>ES8</b>	<b>Low saving</b> differential	°C/°F	0.0...10.0
<b>ES11</b>	<b>Low saving</b> door heater ON time.	min	0...100

The parameters for **Medium saving** selection are:

Par.	Description	MU	Range
<b>ES6</b>	Setpoint delta corresponding to <b>Medium saving</b> .	°C/°F	0.0...10.0
<b>ES9</b>	<b>Medium saving</b> differential.	°C/°F	0.0...10.0
<b>ES12</b>	<b>Medium saving</b> door heater ON time.	min	0...100

The parameters for **High saving** selection are:

Par.	Description	MU	Range
<b>ES7</b>	Setpoint delta corresponding to <b>High saving</b> .	°C/°F	0.0...10.0
<b>ES10</b>	<b>High saving</b> differential.	°C/°F	0.0...10.0
<b>ES13</b>	<b>High saving</b> door heater ON time.	min	0...100

---

## 7.9 HEATERS

During a heat request, the controller activates the output set as heaters **uc1...uc13c** = 7, in order to manage an on-off duty cycle defined by parameters **rH6** and **rH7**.

## 7.10 STEAM GENERATOR OUTPUT

Management of the steam generator user depends on parameter **E10**:

- If **E10=0**: the steam generator is always active when regulation requires humidification;
- If **E10=1**: the steam generator output is only active when regulation requires humidification.

## 7.11 HUMIDIFIER OUTPUT

Humidifier output management

The humidifier user (if enabled) can be managed with or without the use of the humidity transducer (**rU0**) and varies on the basis of the type of humidifier selected (**E10**).

### 7.11.1 Humidifier output management without probe or transducer

Set:

- **rU0** = 2;
- **E10** = 0 or 1.

The humidifier output remains active for a duty-cycle which varies according to the humidity setpoint selected for the phase in progress.

On/OFF duration is determined by parameters **rU2** and **rU3**.

The humidification on/off times are re-proportioned based on the percentage set for the humidity setpoint on the basis of parameter **rU3**, and will repeat every time the cycle set with **rU2** is performed.

### 7.11.2 Isothermal humidifier | Humidifier output management with probe or transducer

Set:

- **rU0** = 3;
- **E10** = 0.

The humidifier output is activated when the humidity value inside the cold room falls below the value of the neutral zone (**rU9**) as well as the threshold defined by the humidification differential (**rU8**).

The humidifier output activation duration is proportional to the humidity value in relation to the humidification proportional band value (**rU10**).

Parameter **rU11** defines the cycle time, while parameter **rU12** represents the time base on which the output activation duration is calculated.

### 7.11.3 Adiabatic humidifier | Humidifier output management with transducer

Set:

- **rU0** = 3;
- **E10** = 1.

The humidifier output is activated when the humidity value inside the cold room falls below the value of the neutral zone (**rU9**) as well as the threshold defined by the humidification differential (**rU8**), carrying out ON/OFF cycles with a duration as established by parameters **rU15** and **rU16**. The counter always begins with **OFF** time.

## 7.12 ALARM OUTPUT MANAGEMENT

The alarm output is activated in accordance with the value of parameter **A17** when an alarm condition is present, while it is deactivated once the alarm condition has disappeared. It is also deactivated on the basis of the configuration of parameter **u4**.

## 7.13 DOOR FRAME HEATER MANAGEMENT

The door frame heater, if configured, is activated when the cold room temperature falls below parameter **u5**; it is deactivated when the cold room temperature is higher than **u5+rC0**.

## 7.14 STANDBY/ON OUTPUT MANAGEMENT

This output is independent of any regulation; it is activated when the controller is ON and is deactivated when the controller is in STANDBY.

## 7.15 COLD ROOM LIGHT MANAGEMENT

This output is activated/deactivated on the basis of the door switch status and/or selection of the light key.

If the light is off, opening and closing the door will activate/deactivate the relevant output.

If the light has been switched on using a key, opening/closing the door will have no effect on the light (the light remains on until it is switched off using the key).

## 7.16 DOOR LOCK MANAGEMENT

This output, if configured, manages the activation and deactivation of the door lock.

---

## 7.17 WATER FILLING MANAGEMENT

Set the following to configure and enable the water filling output:

- One digital output **u1c...u13c** = 19;
- One digital input **i4, i7, i10** = 5.

The output remains active until the input is deactivated or the timeout **u12** elapses. In this case, the water filling alarm indication is given (see "**9.1 Vcolor 229/249 M/L alarm table**" on page 79).



## 8. 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;

### 8.1 TABLE OF CONFIGURATION PARAMETERS

Par.	Description	MU	Range	Default
<b>ANALOGUE INPUT group</b>				
SP1	Temperature Setpoint 1.	°C/°F	-99.9... 99.9	2.0
SP2	Humidity Setpoint 2. (* with manual recipe: 0...ru13 with pre-set recipe: data limits for individual recipes with F0 = 8: 40...90	% R.H.	Variable(*)	50
CA1	Probe Pb1 offset.	°C/°F	-25.0...25.0	0.0
CA2	Probe Pb2 offset.	°C/°F	-25.0...25.0	0.0
CA3	Probe Pb3 offset.	°C/°F	-25.0...25.0	0.0
CA4	Backup module probe offset.	°C/°F	-25.0...25.0	0.0
CA5	Probe Pb5 (humidity) offset.	% R.H.	-20...20	0.0
P0	Probe type. 0 = PTC; 1 = NTC; 2 = Pt1000.	---	0...2	1
P1	Enable decimal point in °C. 0 = No; 1 = Yes.	---	0/1	1
P2	Temperature unit of measure (changing value means that the temperature parameter limits will need to be reset manually). 0 = °C; 1 = °F.	---	0/1	0
P3	Power failure duration for PF (power failure) alarm logging. -1 = Alarm disabled.	min	-1...240	15
P6	Regulation probe selection. 0 = Cold room probe; 1 = Product probe.	---	0/1	0
P7	Humidity lower limit.	% R.H.	0...100	0
P8	Humidity upper limit.	% R.H.	0...100	100
P12	Humidity probe type. 0 = Disabled; 1 = Probe 4...20 mA; 2 = EVHTP500; 3 = EVHTP520.	---	0...3	0
P13	Temperature-humidity setpoint lock. 0 = No; 1 = Yes.	---	0/1	0
P14	Differential position. 0 = Asymmetrical; 1 = Symmetrical.	---	0/1	0
P15	Regulation type. 0 = Cold 1 = Hot; 2 = Hot/Cold with neutral zone.	---	0...2	0
Pr1	Probe Pb1 configuration. 0 = Cold room; 1 = Evaporator; 2 = Condenser; 3 = Product probe; 4 = Disabled.	---	0...4	0
Pr2	Probe Pb2 configuration. Same as Pr1.	---	0...4	1
Pr3	Probe Pb3 configuration. Same as Pr1.	---	0...4	4
Pr4	Backup module probe configuration. Same as Pr1.	---	0...4	4
<b>COLD MANAGEMENT group</b>				
rC0	Cold temperature regulation differential, to be added to setpoint 1 (setpoint 1 + r0).	°C/°F	0.1...15.0	2.0

Par.	Description	MU	Range	Default
rC1	Minimum value that can be assigned to setpoint 1.	°C/°F	-99.9...rC2	-2.0
rC2	Maximum value that can be assigned to setpoint 1.	°C/°F	rC1 = 99.0	8.0
rC3	Neutral zone for cold management.	°C/°F	0.0...10.0	0.0
rC4	Continuous timed cycle duration.	min	0...720	30
rC5	Cooling setpoint offset.	°C/°F	rC1 = 99.0	0.0
rC6	Proportional band.	min	0...240	60
<b>HOT MANAGEMENT group</b>				
rH0	Hot temperature regulation differential, to be added to setpoint 1 (setpoint 1 + rH0).	°C/°F	0.1...15.0	2.0
rH3	Hot management neutral zone value to be added to the differential.	°C/°F	0.0...10.0	0.0
rH6	Cycle time for heater switch-on in the event of a hot request.	s	1...600	60
rH7	Heaters ON time during cycle rH6.	s	1...600	30
<b>HUMIDITY group</b>				
rU0	Humidity management mode. <b>0</b> = No regulation (probe value is shown only if P12≠0). <b>1</b> = Regulation with evaporator fan (on the basis of parameter configuration F0=5 or F0=8). If F0=5 the display will show the value read by the humidity probe only if P12≠0, while if P12=0 nothing will be displayed. If F0=8 the display will show both the value read by the humidity probe only if P12≠0, and the humidity setpoint. If P12=0 the probe value will be the same value set in the setpoint. <b>2</b> = Regulation (with setpoint) with timed cyclical humidification (rU2, rU3) on the basis of the set percentage; in this case the humidity value and the setpoint coincide (in practice the humidity value corresponds to the setpoint). If P12≠0 the probe is not displayed in any case. <b>3</b> = Regulation (with setpoint) with humidification, dehumidification and heating; in this case there must be a humidity probe, and the probe value and setpoint are shown on the display.	---	0...3	0
rU1	Minimum temperature in the cold room for inhibiting humidification control.	°C/°F	-99.0...99.0	0.0
rU2	Cycle time for switching on the humidifier (rU0 = 2 only).	s	1...600	60
rU3	Humidifier on time within the cycle time rU2 to generate 100% humidity in the cold room (rU0 = 2 only)	s	1...600	30
rU5	Dehumidification regulation differential, to be added to setpoint 2 (setpoint 2 + rU5).	% R.H.	1...100	5
rU6	Neutral zone for dehumidification regulation.	% R.H.	1...100	2
rU8	Humidification regulation differential, to be added to setpoint 2 (setpoint 2 + rU8).	% R.H.	1...100	5
rU9	Neutral zone for humidification regulation.	% R.H.	1...100	2
rU10	Humidification proportional band value.	% R.H.	0...100	10
rU11	Cycle time for humidification proportional regulation.	s	0...255	30
rU12	Time base for humidification proportional regulation cycle time. <b>0</b> = Seconds; <b>1</b> = Minutes.	---	0/1	0
rU13	Maximum value that can be assigned to Setpoint 2.	% R.H.	0...100	80
rU14	Minimum temperature in the cold room for inhibiting dehumidification.	°C/°F	-99.0...99.0	0
rU15	Humidifier pause time.	s	0...300	60
rU16	Humidifier activation time.	s	0...60	3
rU17	Heater activation if running dehumidification with compressor. <b>0</b> = Deactivated; <b>1</b> = Activated.	---	0/1	1
<b>COMPRESSOR group</b>				
C0	Compressor ON delay from power-on.	min	0...240	0
C1	Delay between two consecutive compressor switch-ons.	min	0...240	3
C2	Minimum compressor OFF time.	min	0...240	3
C3	Minimum compressor ON time.	s	0...240	0
C4	Compressor ON time in dehumidification.	min	0...240	0
C6	Condensation temperature over which the condenser overheat alert is triggered.	°C/°F	0.0...164.0	70.0
C7	Condenser temperature over which the compressor lock alarm is triggered, once time period C8 has elapsed.	°C/°F	0.0...164.0	80.0

Par.	Description	MU	Range	Default
<b>C8</b>	Compressor lock alarm activation delay from when threshold <b>C7</b> was exceeded.	min	0...15	1
<b>C9</b>	Consecutive cold room temperature time in proportional band for compressor at maximum capacity.	h	0...99	5
<b>C10</b>	Total compressor operation time for maintenance alert.	days	0...999	0
<b>C11</b>	Compressor 2 switch-on delay from compressor 1 switch-on.	s	0...999	3
<b>C12</b>	Compressor OFF time in cold room probe alarm mode.	min	0...240	10
<b>C13</b>	Compressor ON time in cold room probe alarm mode.	min	0...240	10
<b>VARIABLE SPEED COMPRESSOR group</b>				
<b>VC1</b>	Proportional band.	°C/°F	0.0...99.0	10.0
<b>VC2</b>	Full time action.	min	0...99	10
<b>VC3</b>	Compressor type. <b>1</b> = Embraco VEM – VES; <b>2</b> = Embraco VEG – VES; <b>3</b> = Embraco VNEK – VNEU – FMFT; <b>4</b> = Secop VNL 50...150 Hz (40 Hz in OFF); <b>5</b> = Secop 33...133 Hz; <b>6</b> = Tecumseh 85...150 Hz; <b>7</b> = Tecumseh 68...150 Hz.	---	0...7	3
<b>VC4</b>	Compressor time at 85 Hz from power-on.	s x 10	0...100	0
<b>VC5</b>	Percentage for increasing the minimum compressor frequency. If <b>VC5</b> =0 the minimum operating frequency is the value identified by the compressor manufacturer.	%	0...100	0
<b>VC6</b>	Percentage for decreasing the compressor frequency. If <b>VC6</b> =100 the maximum operating frequency is the value identified by the compressor manufacturer.	%	0...100	100
<b>DEFROST group</b>				
<b>d0</b>	Automatic defrost interval.	h	0...99	8
<b>d1</b>	Defrost type. <b>0</b> = Electric heaters; <b>1</b> = Cycle inversion (hot gas); <b>2</b> = On compressor stoppage.	---	0...2	0
<b>d2</b>	Evaporator temperature over which defrost ends with evaporator probe ( <b>Pr1...Pr3</b> = 1).	°C/°F	-99.0...99.0	8.0
<b>d3</b>	Defrost duration.	min	0...99	30
<b>d4</b>	Enable defrost at device switch-on. <b>0</b> = No; <b>1</b> = Yes, activate defrost at switch-on.	---	0/1	0
<b>d5</b>	Defrost delay after power failure (if <b>d4</b> = 1).	min	0...99	0
<b>d6</b>	Value shown on the display during a defrost. <b>0</b> = Regulation; <b>1</b> = Display locked; <b>2</b> = Defrosting in progress text.	---	0...2	2
<b>d7</b>	Evaporator drip time after a defrost.	min	0...15	2
<b>d8</b>	Automatic defrost interval count mode. <b>0</b> = Device ON hours; <b>1</b> = Compressor ON hours; <b>2</b> = Evaporator temperature < <b>d9</b> ; <b>3</b> = Adaptive; <b>4</b> = Manual defrost.	---	0...4	0
<b>d9</b>	Evaporator threshold for counting the automatic defrost interval <b>d8</b> = 2.	°C/°F	-99.0...99.0	0.0
<b>d11</b>	Enable alert for defrost end 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.	min	0...99	0
<b>d18</b>	Adaptive defrost interval.	min	0...999	40
<b>d19</b>	Temperature for starting adaptive defrost.	°C/°F	0.0...40.0	3.0
<b>d20</b>	Consecutive compressor ON time for defrost. <b>0</b> = Disabled.	min	0...999	0
<b>d21</b>	Consecutive compressor ON time for defrost from power-on and from cooling.	min	0...500	0

Par.	Description	MU	Range	Default
d22	Adaptive defrost interval count suspension temperature.	°C/°F	-10.0...10.0	-2.0
d23	Number of door openings for defrost.	num	0...240	0
d24	Consecutive time door open for defrost.	min	0...240	0
d00	Enable mode B defrost parameters on setpoint threshold. 0 = No; 1 = Yes.	---	0/1	0
d01	Setpoint threshold for mode B parameter activation.	°C/°F	-99.0...99.0	1.0
d0b	Mode B automatic defrost interval.	min	0...240	6
d1b	Mode B defrost type. 0 = Electric heaters; 1 = Cycle inversion (hot gas); 2 = On compressor stoppage.	---	0...2	2
d2b	Mode B defrost end threshold.	°C/°F	-99.0...99.0	4.0
d3b	Mode B defrost duration.	min	0...99	20
d7b	Mode B dripping time.	min	0...15	0
<b>ALARMS group</b>				
A1	High/low power-on temperature alarm delay.	min	0...240	120
A2	High/low defrost temperature alarm delay.	min	0...240	15
A3	High/low temperature alarm delay from door closure.	min	0...240	15
A5	Cold room alarm type. 0 = Corresponding SET; 1 = Absolute.	---	0/1	1
A6	Cold room alarm delay.	s	0...900	60
A7	Cold room alarm hysteresis.	°C/°F	0.0...20.0	2.0
A8	LOW cold room temperature alarm threshold.	°C/°F	-99.0...99.0	-50.0
A9	HIGH cold room temperature alarm threshold.	°C/°F	-99.0...99.0	50.0
A10	Alarm delta for LOW cold room temperature in relation to the setpoint.	°C/°F	-50.0...0.0	-3.0
A11	Alarm delta for HIGH cold room temperature in relation to the setpoint.	°C/°F	0.0...50.0	4.0
A12	LOW cold room temperature PRE-alarm threshold.	°C/°F	-99.0...99.0	-50.0
A13	HIGH cold room temperature PRE-alarm threshold.	°C/°F	-99.0...99.0	50.0
A14	PRE-alarm delta for LOW cold room temperature in relation to the setpoint.	°C/°F	-50.0...0.0	-3.0
A15	PRE-alarm delta for HIGH cabinet temperature in relation to the setpoint.	°C/°F	0.0...50.0	4.0
A5b	Product alarm type. 0 = Corresponding SET; 1 = Absolute.	---	0/1	1
A6b	Product alarm delay.	s	0...900	60
A7b	Product alarm hysteresis.	°C/°F	0.0...20.0	2.0
A8b	LOW product temperature alarm threshold.	°C/°F	-99.0...99.0	-50.0
A9b	HIGH product temperature alarm threshold.	°C/°F	-99.0...99.0	50.0
A10b	Alarm delta for LOW product temperature in relation to the setpoint.	°C/°F	-50.0...0.0	-3.0
A11b	Alarm delta for HIGH product temperature in relation to the setpoint.	°C/°F	0.0...50.0	4.0
A12b	LOW product temperature PRE-alarm threshold.	°C/°F	-99.0...99.0	-50.0
A13b	HIGH product temperature PRE-alarm threshold.	°C/°F	-99.0...99.0	50.0
A14b	PRE-alarm delta for LOW product temperature in relation to the setpoint.	°C/°F	-50.0...0.0	-3.0
A15b	PRE-alarm delta for HIGH product temperature in relation to the setpoint.	°C/°F	0.0...50.0	4.0
A16	Buzzer reactivation time in alarm.	s	0...900	300
A17	Alarm output activation 0 = with alarm active; 1 = with alarm inactive.	---	0/1	0

Par.	Description	MU	Range	Default
<b>A18</b>	Evaporator temperature threshold for high temperature alarm.	°C/°F	0.0...99.0	70.0
<b>A19</b>	Evaporator high temperature alarm delay. -1 = Disabled.	min	-1...240	-1
<b>EVAPORATOR/CONDENSER FAN group</b>				
<b>F0</b>	Evaporator fans in normal operating mode. <b>0</b> = Always OFF; <b>1</b> = Always ON; <b>2</b> = Active depending on loads; <b>3</b> = Temperature-controlled ( <b>F1</b> relating to temperature regulation); <b>4</b> = Active depending on loads and temperature-controlled ( <b>F1</b> relating to temperature regulation); <b>5</b> = With ON/OFF cycles, while the compressor is off, on the basis of parameters <b>F14</b> and <b>F15</b> ; <b>6</b> = Thermostat-controlled based on <b>F1</b> (as an absolute value); <b>7</b> = Thermostat-controlled based on <b>F1</b> with the compressor on (as an absolute value); <b>8</b> = With ON/OFF cycles; in this case the humidity probe performs a read-only function and does not take part in regulation.	---	0...8	1
<b>F1</b>	Evaporator fan regulation threshold with <b>F0</b> = 3, 4 (relative to the setpoint).	°C/°F	-99.0...99.0	-4.0
<b>F2</b>	Evaporator fan mode during defrosting. <b>0</b> = OFF; <b>1</b> = ON.	---	0/1	0
<b>F3</b>	Maximum evaporator fan post-dripping stoppage time.	min	0...15	2
<b>F4</b>	Fan OFF time in energy saving mode.	S x 10	0...240	30
<b>F5</b>	Fan ON time in energy saving mode.	S x 10	0...240	30
<b>F6</b>	Fan speed forcing during energy saving mode.	%	0...100	0
<b>F7</b>	Threshold relative to the setpoint for fan restart after a defrost.	°C/°F	-99.0...99.0	5.0
<b>F8</b>	Evaporator setpoint differential.	°C/°F	1.0...15.0	2.0
<b>F9</b>	Evaporator fan switch-off delay from compressor switch-off.	s	0...240	0
<b>F10</b>	Fan speed forcing during dehumidification.	%	0...100	0
<b>F11</b>	Condenser fan mode. <b>0</b> = Temperature-controlled; <b>1</b> = Temperature-controlled if compressor OFF; <b>2</b> = Temperature-controlled if compressor ON; <b>3</b> = Temperature-controlled if compressor and defrost OFF.	---	0...3	2
<b>F12</b>	Condenser fan setpoint.	°C/°F	-0.0...99.0	15.0
<b>F13</b>	Condenser fan switch-off delay from compressor switch-off.	s	0...240	0
<b>F14</b>	Fan OFF time in the absence of regulation with <b>F0</b> = 5. <b>F14</b> = 0 and <b>F15</b> > 0 fans are always on.	s x 10	0...240	60
<b>F15</b>	Fan ON time in the absence of regulation with <b>F0</b> = 5. <b>F15</b> = 0 fans remain stopped.	s x 10	0...240	10
<b>F16</b>	Evaporator fan switch-on delay from door closure.	s	0...240	0
<b>F19</b>	Evaporator minimum speed.	%	0...100	20
<b>F20</b>	Evaporator maximum speed.	%	0...100	100
<b>F21</b>	Evaporator fan boost speed.	%	0...100	75
<b>F22</b>	Boost time at evaporator fan switch-on.	s	0...240	5
<b>F23</b>	Evaporator fan minimum calibration speed value.	%	0...100	35
<b>F24</b>	Evaporator fan maximum calibration speed value.	%	0...100	65
<b>F25</b>	Speed value 1.	%	0...100	20
<b>F26</b>	Speed value 2.	%	0...100	40
<b>F27</b>	Speed value 3.	%	0...100	60
<b>F28</b>	Speed value 4.	%	0...100	80
<b>F29</b>	Speed value 5.	%	0...100	100
<b>F30</b>	Differential for activation of the second condenser fan.	°C/°F	-0.0...99.0	0.0
<b>F0b</b>	Evaporator fan mode in mode B normal operation. Same as <b>F0</b> .	---	0...8	1
<b>F2b</b>	Evaporator fan mode in mode B defrost. Same as <b>F2</b> .	---	0/1	0
<b>F3b</b>	Maximum evaporator fan post-dripping stoppage time, mode B.	min	0...15	2

Par.	Description	MU	Range	Default
<b>ENERGY SAVING group</b>				
<b>ES0</b>	Energy saving mode. <b>0</b> = 1 level (Disabled/High saving); <b>1</b> = 3 levels (Disabled/Low saving/Medium saving/High saving).	num	0/1	0
<b>ES1</b>	Maximum energy saving duration.	min	0...999	0
<b>ES2</b>	Consecutive time door closed for energy saving mode activation.	min	0...999	10
<b>ES3</b>	Energy saving mode activation scheduled time.	h	0...24	24
<b>ES4</b>	Energy saving duration.	h	0...24	0
<b>ES5</b>	Setpoint delta corresponding to <b>Low saving</b> .	°C/°F	0.0...10.0	0.5
<b>ES6</b>	Setpoint delta corresponding to <b>Medium saving</b> .	°C/°F	0.0...10.0	1.0
<b>ES7</b>	Setpoint delta corresponding to <b>High saving</b> .	°C/°F	0.0...10.0	1.5
<b>ES8</b>	<b>Low saving</b> differential.	°C/°F	0.0...10.0	0.4
<b>ES9</b>	<b>Medium saving</b> differential.	°C/°F	0.0...10.0	0.8
<b>ES10</b>	<b>High saving</b> differential.	°C/°F	0.0...10.0	1.2
<b>ES11</b>	<b>Low saving</b> door heater ON time.	min	0...100	8
<b>ES12</b>	<b>Medium saving</b> door heater ON time.	min	0...100	6
<b>ES13</b>	<b>High saving</b> door heater ON time.	min	0...100	4
<b>ES14</b>	OFF time after <b>ES11, ES12, ES13</b> .	min	0...60	2
<b>ES15</b>	Period of time for calculating/updating compressor work percentage.	min	0...240	0
<b>ES16</b>	<b>Reserved.</b>	---	---	0
<b>ES17</b>	Light status during Energy saving. <b>0</b> = The light remains in its current status; <b>1</b> = If lit, the light is switched off (in any case the light can always be switched on/off using the key).	---	0/1	0
<b>SANITISING group</b>				
<b>SA0</b>	Sanitising type. <b>0</b> = Disabled. <b>1</b> = UV lamp; <b>2</b> = Ozone generator.	---	0...2	0
<b>SA1</b>	Cold room temperature below which the sanitising cycle, if started, is paused.	°C/°F	99.0...99.0	0.0
<b>SA2</b>	Sanitising cycle duration.	min	0...240	10
<b>SA3</b>	Delay after Sanitising.	min	0...240	5
<b>THAWING group</b>				
<b>th01</b>	Initial cold room temperature setpoint for low-load thawing.	°C/°F	-50.0...99.0	25.0
<b>th02</b>	Initial cold room temperature setpoint for medium-load thawing.	°C/°F	-50.0...99.0	30.0
<b>th03</b>	Initial cold room temperature setpoint for high-load thawing.	°C/°F	-50.0...99.0	35.0
<b>th04</b>	Final cold room temperature setpoint for low-load thawing.	°C/°F	-50.0...99.0	10.0
<b>th05</b>	Final cold room temperature setpoint for medium-load thawing.	°C/°F	-50.0...99.0	12.0
<b>th06</b>	Final cold room temperature setpoint for high-load thawing.	°C/°F	-50.0...99.0	15.0
<b>th07</b>	Low-load thawing duration.	min	1...999	240
<b>th08</b>	Medium-load thawing duration.	min	1...999	480
<b>th09</b>	High-load thawing duration.	min	1...999	720
<b>th10</b>	Post-thawing cold room storage temperature setpoint (cold only).	°C/°F	-50.0...99.0	3.0
<b>th11</b>	Fan speed during first thawing phase.	---	1...5	1
<b>th12</b>	Fan speed during second thawing phase.	---	1...5	1
<b>th13</b>	Fan speed during third thawing phase.	---	1...5	1
<b>th14</b>	Fan speed during fourth thawing phase.	---	1...5	1
<b>th15</b>	Fan speed during fifth thawing phase.	---	1...5	1
<b>th16</b>	Fan speed for thawing storage.	---	1...5	1
<b>th17</b>	Thawing neutral zone corresponding threshold.	°C/°F	0.0...10.0	1.0
<b>th18</b>	Cold room setpoint differential during thawing, heater activation.	°C/°F	1.0...15.0	2.0
<b>th19</b>	Cold room setpoint differential in thawing, compressor activation.	°C/°F	1.0...15.0	2.0
<b>th20</b>	Thawing heater cycle time.	s	1...600	60



Par.	Description	MU	Range	Default
tH21	Heater ON time in thawing.	s	1...600	30
tH22	Neutral zone threshold in storage phase.	°C/°F	0.0...10.0	1.0
tH23	Enable thawing cycle. 0 = Disabled; 1 = Enabled. (If TH23=0, the key is not shown on the display).	---	0/1	0
<b>DIGITAL INPUT PROPERTIES group</b>				
i0	Door open effect. 0 = No effect; 1 = Compressor, evaporator fan OFF (no effect on the light); 2 = Evaporator fan OFF (no effect on the compressor or light); 3 = Light only ON; 4 = Compressor, evaporator fan OFF, cold room light ON; 5 = Evaporator fan OFF, cold room light ON; 6 = Evaporator fan OFF, cold room light OFF;	---	0...6	5
i1	Door input polarity. 0 = Closed contact (NC); 1 = Open contact (NO).	---	0/1	0
i2	Door alarm delay. -1 = The alarm is not indicated.	min	-1...120	5
i3	Inhibit compressor regulation and door opening fans. -1 = Disabled.	min	-1...120	15
i4	Digital input 1 effect. 0 = Disabled; 1 = Compressor 1 high pressure alarm; 2 = Compressor 2 high pressure alarm; 3 = Compressor 1 low pressure alarm; 4 = Compressor 2 low pressure alarm; 5 = Compressor 1 thermal switch alarm; 6 = Compressor 2 thermal switch alarm; 7 = System protection alarm (all loads are switched off); 8 = ECO/Energy saving activation (High saving); 9 = "iA" generic alarm (display only); 10 = Device switch-on/off; 11 = Fan thermal switch alarm.	---	0...11	0
i5	Digital input 1 polarity. 0 = Closed contact (NC); 1 = Open contact (NO).	---	0/1	0
i6	Digital input 1 alarm indication delay. -1 = The alarm is not indicated.	s	-1...120	5
i7	Digital input 2 effect. Same as i4.	---	0...11	0
i8	Digital input 2 polarity. 0 = Closed contact (NC); 1 = Open contact (NO).	---	0/1	0
i9	Digital input 2 alarm indication delay. -1 = The alarm is not indicated.	s	-1...120	5
i10	Digital input 3 effect. Same as i4.	---	0...11	0
i11	Digital input 3 polarity. 0 = Closed contact (NC); 1 = Open contact (NO).	---	0/1	0
i12	Digital input 3 alarm indication delay. -1 = The alarm is not indicated.	s	-1...120	5
i13	<b>RESERVED.</b>	---	---	---
i14	Light off timeout from door switch.	S x 10	0...240	30
<b>DIGITAL OUTPUT CONFIGURATION group</b>				
u0	Door lock present. 0 = No; 1 = Yes.	---	0/1	0
u1	<b>RESERVED.</b>	---	---	0

Par.	Description	MU	Range	Default
<b>u2</b>	Enable light key. <b>0</b> = Disabled; <b>1</b> = Enabled. <b>NOTE:</b> if <b>u2=0</b> and the light relay is configured, this is managed by the door switch.	---	0/1	1
<b>u3</b>	Dehumidification management. <b>0</b> = By means of external dehumidifier/extractor fan (in this case parameters <b>rU5</b> and <b>rU6</b> will become meaningful); <b>1</b> = Through activation of the refrigeration system.	---	0/1	1
<b>u4</b>	Alarm output deactivation on buzzer silencing. <b>0</b> = Disabled; <b>1</b> = Enabled.	---	0/1	1
<b>u5</b>	Door heater activation temperature.	°C/°F	-99.0...99.0	-5.0
<b>u6</b>	Door lock polarity. <b>0</b> = Closed contact (NC); <b>1</b> = Open contact (NO).	---	0/1	0
<b>u7</b>	Enable alarm buzzer. <b>0</b> = Disabled; <b>1</b> = Enabled.	---	0/1	1
<b>u8</b>	CO2 backup alarm delay.	min	0...1440	300
<b>u9</b>	CO2 backup activation threshold.	°C/°F	-99.0...99.0	10.0
<b>u10</b>	CO2 backup differential.	°C/°F	1.0...15.0	2.0
<b>u11</b>	Dripping heater.	min	0...240	0
<b>u12</b>	Water fill timeout.	sec	0...999	60
<b>u1c</b>	Configure <b>out1</b> relay output. <b>0</b> = Disabled; <b>1</b> = Compressor 1; <b>2</b> = Compressor 2; <b>3</b> = Evaporator fans (maximum speed); <b>4</b> = Condenser 1 fan; <b>5</b> = Defrost; <b>6</b> = Light; <b>7</b> = Door heater; <b>8</b> = Alarm; <b>9</b> = Door closure; <b>10</b> = ON/OFF; <b>11</b> = Evaporator fans (minimum speed); <b>12</b> = Condenser 2 fan; <b>13</b> = Sanitising; <b>14</b> = Heaters; <b>15</b> = Steam generator (boiler); <b>16</b> = Steam injection; <b>17</b> = Dehumidifier; <b>18</b> = Dripping heater; <b>19</b> = Water filling.	---	0...19	1
<b>u2c</b>	Configure <b>out2</b> relay output. Same as <b>uc1</b> .	---	0...18	6
<b>u3c</b>	Configure <b>out3</b> relay output. Same as <b>uc1</b> .	---	0...18	4
<b>u4c</b>	Configure <b>out4</b> relay output. Same as <b>uc1</b> .	---	0...18	3
<b>u5c</b>	Configure <b>out5</b> relay output. Same as <b>uc1</b> .	---	0...18	8
<b>u6c</b>	Configure <b>out6</b> relay output. Same as <b>uc1</b> .	---	0...18	5
<b>u7c</b>	Configure <b>out7</b> relay output. Same as <b>uc1</b> .	---	0...18	14
<b>u8c</b>	Configure <b>out8</b> relay output. Same as <b>uc1</b> .	---	0...18	7
<b>u9c</b>	Configure <b>out9</b> relay output. Same as <b>uc1</b> .	---	0...18	13
<b>u10c</b>	Configure <b>out10</b> relay output. Same as <b>uc1</b> . (Only with expansion device).	---	0...18	15
<b>u11c</b>	Configure <b>out11</b> relay output. Same as <b>uc1</b> . (Only with expansion device).	---	0...18	16
<b>u12c</b>	Configure <b>out12</b> relay output. Same as <b>uc1</b> . (Only with expansion device).	---	0...18	0
<b>u13c</b>	Configure <b>out13</b> relay output. Same as <b>uc1</b> . (Only with expansion device).	---	0...18	17



Par.	Description	MU	Range	Default
<b>u14c</b>	Configure <b>out14</b> relay output. Same as <b>uc1</b> . (Backup module). <b>0</b> = Disabled; <b>1</b> = Power failure alarm; <b>2</b> = CO2 backup alarm; <b>3</b> = Safety thermostat alarm; <b>4</b> = Frost protection alarm.	---	0...4	0
<b>AUTOMATIC TEST group</b>				
<b>T1</b>	Cold room temperature threshold for Test Cycle - Cooling Phase.	°C/°F	-99.0...99.0	20.0
<b>T2</b>	Cooling phase end setpoint.	°C/°F	-99.0...99.0	2.0
<b>T3</b>	Thermostat control phase setpoint.	°C/°F	-99.0...99.0	3.0
<b>T4</b>	Thermostat control phase differential.	°C/°F	1.0...15.0	3.0
<b>T5</b>	Number of compressor cycles, Thermostat control phase - Recovery phase.	num	1...20	2
<b>T6</b>	Recovery phase setpoint - Cycle Stop.	°C/°F	-99.0...99.0	2.0
<b>T7</b>	Maximum time for Cooling phase execution.	min	1...240	15
<b>SERIAL COMMUNICATION group</b>				
<b>L1</b>	Internal data sampling time.	min	1...60	15
<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
<b>LP</b>	Modbus parity bit. <b>0</b> = None; <b>1</b> = Odd; <b>2</b> = Even.	---	0...2	2
<b>PA1</b>	EVlink/EVconnect user password (not via instrument).	---	-99... 999	426
<b>PA2</b>	EVlink/EVconnect password service.	---	-99... 999	824
<b>BLE</b>	Communication type. <b>0</b> = Free; <b>1</b> = Forced for EPOCA (do not change parameters <b>LA</b> , <b>Lb</b> and <b>LP</b> ); <b>2...99</b> = Address for EPOCA local network.	---	0...99	0
<b>GENERAL CONFIGURATION group</b>				
<b>E8</b>	Inactivity time for screensaver.	min	0...240	0
<b>E10</b>	Humidifier type. <b>0</b> = Isothermal humidifier (steam generators); <b>1</b> = Direct generation adiabatic humidifier.	---	0/1	0
<b>E13</b>	Evaporator fan configuration. <b>0</b> = Fans at speed 1 (with an output <b>u1c...u13c</b> = 3); <b>1</b> = Fans at speed 2 (with an output <b>u1c...u13c</b> = 3 and <b>u1c...u13c</b> = 11); <b>2</b> = Fans at speed 5 via output 0...10 Vdc; <b>3</b> = Fans at speed 5 via PWM output; <b>4</b> = Fans at speed 2 with 2 relays (with an output <b>u1c...u13c</b> = 3 and <b>u1c...u13c</b> = 11).	---	0...4	0
<b>E14</b>	Configuration of output 0...10 V. <b>0</b> = Disabled; <b>1</b> = Evaporator fan ( <b>E13</b> =2); <b>2</b> = Variable speed compressor (parameter <b>VC3</b> ).	---	0...2	0
<b>E18</b>	Enable users. <b>0</b> = Disabled; <b>1</b> = Enabled.	---	0/1	0
<b>E19</b>	Enable additional modules. <b>0</b> = None; <b>1</b> = Expansion module only; <b>2</b> = Backup module only; <b>3</b> = Expansion + backup module.	---	0...3	0
<b>E20</b>	Minimum battery voltage.	V	8.0...12.0	9.5
<b>E21</b>	Display brightness percentage.	%	10...100	60
<b>E22</b>	Display brightness timeout.	sec	1...300	60
<b>E23</b>	Inverter enable. <b>0</b> = Disabled; <b>1</b> = Enabled	---	0/1	0

Par.	Description	MU	Range	Default
<b>HUMIDIFIER group</b>				
<b>HS1</b>	Minimum humidity setpoint value. With <b>CFG</b> = 2, 3, 4, 7, 8, 9.	%	0...100	0
<b>HS2</b>	Maximum humidity setpoint value. With <b>CFG</b> = 2, 3, 4, 7, 8, 9.	%	0...100	95
<b>HS3</b>	Minimum delay time between two consecutive humidity production activations. With <b>CFG</b> ≠ 10.	s	1...240	20
<b>HS4</b>	Fan speed. <b>0</b> = Fan off; <b>1</b> = 30%; <b>2</b> = 60%; <b>3</b> = 80%.	---	0...3	2
<b>HS5</b>	Water conductivity.	μS*cm	70...1250	500
<b>HS6</b>	Number of continuous idle hours causing the water reservoir to empty. <b>0</b> = Function disabled.	h	0...250	12
<b>HS7</b>	Number of operating hours causing the water reservoir to empty. <b>0</b> = Function disabled.	h	0...250	24
<b>INVERTER Group</b>				
<b>S202</b>	Acceleration ramp. Time required to reach the nominal speed from 0 rpm/s.	rmp/s	1 ... 1000	30
<b>S203</b>	Deceleration ramp. Time required to reach 0 rpm/s from the nominal speed.	rmp/s	1 ... 1000	50
<b>S204</b>	Maximum motor speed <sup>(1)</sup> .	rpm	<b>S205</b> ... 8000	1500
<b>S205</b>	Minimum motor speed <sup>(1)</sup> .	rpm	150 ... <b>S204</b>	300
<b>S206</b>	Select the motor rotation direction <sup>(2)</sup> . <b>0</b> = Clockwise; <b>1</b> = Anticlockwise.	-	0 / 1	0
<b>S403</b>	Time limit beyond which, if communication is not working, the device enters timeout alarm mode. <b>0</b> = Disabled.	s	0.0 ... 60.0	50.0
<b>S501</b>	Nominal motor current.	A	0.1 ... <b>S601</b>	29.0
<b>S502</b>	Nominal motor voltage.	V	50 ... 400	230
<b>S503</b>	Nominal motor frequency.	Hz	10 ... 400	50
<b>S504</b>	Number of motor pole pairs.	-	1 ... 8	2
<b>S506</b>	Nominal motor revolutions <sup>(3)</sup> .	rpm	1 ... 8000	1690
<b>S508</b>	Cos(phi). Nominal motor power factor <sup>(3)</sup> .	-	0.01 ... 1.00	1.00
<b>S509</b>	Motor boost. Overvoltage percentage applied at motor start-up.	%	0 ... 25	5
<b>S511</b>	Motor overload. Motor overload percentage permitted by the inverter for a time set using parameter <b>S512</b> .	%	0 ... 50	50
<b>S512</b>	Maximum motor overload time.	s	0 ... 60	30
<b>S529</b>	Selection of PWM carrier frequency.	kHz	4 ... 8	5

**NOTE:** Changing the parameters causes the controller to restart.

## 9. DIAGNOSTICS

The table below lists alarms with corresponding solutions. Indication occurs through the buzzer sounding and the alarm appearing on the display. Each alarm is recorded in the Alarms menu.

### 9.1 VCOLOR 229/249 M/L ALARM TABLE

Description	Cause	Effects	Solution
Cold room probe alarm	<ul style="list-style-type: none"> <li>Probe not working</li> <li>Probe not connected properly</li> <li>Incorrect probe type</li> </ul>	<ul style="list-style-type: none"> <li>Alarm shown on display</li> <li>If regulation is set to cold room probe, regulation switches to product probe, if configured and they affect the regulators; otherwise: <ul style="list-style-type: none"> <li>The compressor performs ON/OFF cycles</li> <li>Door heater OFF</li> <li>Heaters OFF</li> <li>Thawing OFF</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Check the probe type (<b>P0</b>)</li> <li>Check the probe wiring</li> <li>Change the probe type</li> </ul>
Evaporator probe alarm		<ul style="list-style-type: none"> <li>Alarm shown on display</li> <li>Checks on evaporator fan activation are not taken into account</li> <li>Defrost cycle on a time-only basis</li> </ul>	
Condenser probe alarm		<ul style="list-style-type: none"> <li>Alarm shown on display</li> <li>The condenser fan runs in parallel with the compressor</li> <li>Condenser alarm always OFF</li> </ul>	
Product probe alarm		<ul style="list-style-type: none"> <li>If regulation is set to product probe, regulation switches to cold room probe, if configured and they affect the regulators; otherwise: <ul style="list-style-type: none"> <li>The compressor performs ON/OFF cycles</li> <li>Door heater OFF</li> <li>Heaters OFF</li> <li>Thawing OFF</li> </ul> </li> </ul>	
Humidity probe alarm		<ul style="list-style-type: none"> <li>Alarm shown on display</li> <li>Dehumidification/humidification OFF</li> </ul>	
High cold room temperature indication	<p>If <b>A5</b> = 0:</p> <ul style="list-style-type: none"> <li>Temperature Pb1 &gt; <b>A15</b> for time period = <b>A1</b> from power-on</li> <li>Temperature Pb1 &gt; <b>A15</b> for time period = <b>A2</b> from defrost end</li> <li>Temperature Pb1 &gt; <b>A15</b> for time period = <b>A3</b> from door closure</li> <li>Temperature Pb1 &gt; <b>A15</b> for time period = <b>A6</b></li> </ul> <p>If <b>A5</b> = 1:</p> <ul style="list-style-type: none"> <li>Temperature Pb1 &gt; <b>A13</b> for time period = <b>A1</b> from power-on</li> <li>Temperature Pb1 &gt; <b>A13</b> for time period = <b>A2</b> from defrost end</li> <li>Temperature Pb1 &gt; <b>A13</b> for time period = <b>A3</b> from door closure</li> <li>Temperature Pb1 &gt; <b>A13</b> for time period = <b>A6</b></li> </ul>	<ul style="list-style-type: none"> <li>Indication shown on display</li> <li>Heaters, humidification and dehumidification OFF</li> </ul>	<ul style="list-style-type: none"> <li>If <b>A5</b>=0, wait for the temperature read by Pb1 &lt; <b>A15</b></li> <li>If <b>A5</b>=1, wait for the temperature read by Pb1 &lt; <b>A13</b></li> </ul>

Description	Cause	Effects	Solution
High cold room temperature alarm	<p>If <b>A5</b> = 0:</p> <ul style="list-style-type: none"> <li>• Temperature Pb1 &gt; <b>A11</b> for time period = <b>A1</b> from power-on</li> <li>• Temperature Pb1 &gt; <b>A11</b> for time period = <b>A2</b> from defrost end</li> <li>• Temperature Pb1 &gt; <b>A11</b> for time period = <b>A3</b> from door closure</li> <li>• Temperature Pb1 &gt; <b>A11</b> for time period = <b>A6</b></li> </ul> <p>If <b>A5</b> = 1:</p> <ul style="list-style-type: none"> <li>• Temperature Pb1 &gt; <b>A9</b> for time period = <b>A1</b> from power-on</li> <li>• Temperature Pb1 &gt; <b>A9</b> for time period = <b>A2</b> from defrost end</li> <li>• Temperature Pb1 &gt; <b>A9</b> for time period = <b>A3</b> from door closure</li> <li>• Temperature Pb1 &gt; <b>A9</b> for time period = <b>A6</b></li> </ul>	<ul style="list-style-type: none"> <li>• Alarm shown on display</li> <li>• Heaters, humidification and dehumidification OFF</li> </ul>	<ul style="list-style-type: none"> <li>• If <b>A5</b>=0, wait for the temperature read by Pb1 &lt; <b>A11</b></li> <li>• If <b>A5</b>=1, wait for the temperature read by Pb1 &lt; <b>A9</b></li> </ul>
Low cold room temperature indication	<p>If <b>A5</b> = 0:</p> <ul style="list-style-type: none"> <li>• Temperature Pb1 &gt; <b>A14</b> for time period = <b>A1</b> from power-on</li> <li>• Temperature Pb1 &gt; <b>A14</b> for time period = <b>A2</b> from defrost end</li> <li>• Temperature Pb1 &gt; <b>A14</b> for time period = <b>A3</b> from door closure</li> <li>• Temperature Pb1 &gt; <b>A14</b> for time period = <b>A6</b></li> </ul> <p>If <b>A5</b> = 1:</p> <ul style="list-style-type: none"> <li>• Temperature Pb1 &gt; <b>A12</b> for time period = <b>A1</b> from power-on</li> <li>• Temperature Pb1 &gt; <b>A12</b> for time period = <b>A2</b> from defrost end</li> <li>• Temperature Pb1 &gt; <b>A12</b> for time period = <b>A3</b> from door closure</li> <li>• Temperature Pb1 &gt; <b>A12</b> for time period = <b>A6</b></li> </ul>	<ul style="list-style-type: none"> <li>• Indication shown on display</li> <li>• No effect on regulation</li> </ul>	<ul style="list-style-type: none"> <li>• If <b>A5</b>=0, wait for the temperature read by Pb1 &lt; <b>A14</b></li> <li>• If <b>A5</b>=1, wait for the temperature read by Pb1 &lt; <b>A12</b></li> </ul>
Low cold room temperature alarm	<p>If <b>A5</b> = 0:</p> <ul style="list-style-type: none"> <li>• Temperature Pb1 &gt; <b>A10</b> for time period = <b>A1</b> from power-on</li> <li>• Temperature Pb1 &gt; <b>A10</b> for time period = <b>A2</b> from defrost end</li> <li>• Temperature Pb1 &gt; <b>A10</b> for time period = <b>A3</b> from door closure</li> <li>• Temperature Pb1 &gt; <b>A10</b> for time period = <b>A6</b></li> </ul> <p>If <b>A5</b> = 1:</p> <ul style="list-style-type: none"> <li>• Temperature Pb1 &gt; <b>A8</b> for time period = <b>A1</b> from power-on</li> <li>• Temperature Pb1 &gt; <b>A8</b> for time period = <b>A2</b> from defrost end</li> <li>• Temperature Pb1 &gt; <b>A8</b> for time period = <b>A3</b> from door closure</li> <li>• Temperature Pb1 &gt; <b>A8</b> for time period = <b>A6</b></li> </ul>	<ul style="list-style-type: none"> <li>• Indication shown on display</li> <li>• Compressor OFF</li> </ul>	<ul style="list-style-type: none"> <li>• If <b>A5</b>=0, wait for the temperature read by Pb1 &lt; <b>A10</b></li> <li>• If <b>A5</b>=1, wait for the temperature read by Pb1 &lt; <b>A8</b></li> </ul>

Description	Cause	Effects	Solution
High product temperature indication	<p>If <b>A5b</b> = 0:</p> <ul style="list-style-type: none"> <li>Product temperature &gt; <b>A15b</b> for time period = <b>A1</b> from power-on</li> <li>Product temperature &gt; <b>A15b</b> for time period = <b>A2</b> from defrost end</li> <li>Product temperature &gt; <b>A15b</b> for time period = <b>A3</b> from door closure</li> <li>Product temperature &gt; <b>A15b</b> for time period = <b>A6b</b></li> </ul> <p>If <b>A5b</b> = 1:</p> <ul style="list-style-type: none"> <li>Product temperature &gt; <b>A13b</b> for time period = <b>A1</b> from power-on</li> <li>Product temperature &gt; <b>A13b</b> for time period = <b>A2</b> from defrost end</li> <li>Product temperature &gt; <b>A13b</b> for time period = <b>A3</b> from door closure</li> <li>Product temperature &gt; <b>A13b</b> for time period = <b>A6b</b></li> </ul>	<ul style="list-style-type: none"> <li>Indication shown on display</li> <li>Heaters, humidification and dehumidification OFF</li> </ul>	<ul style="list-style-type: none"> <li>If <b>A5b</b>=0, wait for the temperature read by the product probe &lt; <b>A15b</b></li> <li>If <b>A5b</b>=1, wait for the temperature read by the product probe &lt; <b>A13b</b></li> </ul>
High product temperature alarm	<p>If <b>A5b</b> = 0:</p> <ul style="list-style-type: none"> <li>Product temperature &gt; <b>A11b</b> for time period = <b>A1</b> from power-on</li> <li>Product temperature &gt; <b>A11b</b> for time period = <b>A2</b> from defrost end</li> <li>Product temperature &gt; <b>A11b</b> for time period = <b>A3</b> from door closure</li> <li>Product temperature &gt; <b>A11b</b> for time period = <b>A6b</b></li> </ul> <p>If <b>A5b</b> = 1:</p> <ul style="list-style-type: none"> <li>Product temperature &gt; <b>A9b</b> for time period = <b>A1</b> from power-on</li> <li>Product temperature &gt; <b>A9b</b> for time period = <b>A2</b> from defrost end</li> <li>Product temperature &gt; <b>A9b</b> for time period = <b>A3</b> from door closure</li> <li>Product temperature &gt; <b>A9b</b> for time period = <b>A6b</b></li> </ul>	<ul style="list-style-type: none"> <li>Alarm shown on display</li> <li>Heaters, humidification and dehumidification OFF</li> </ul>	<ul style="list-style-type: none"> <li>If <b>A5b</b>=0, wait for the temperature read by the product probe &lt; <b>A11b</b></li> <li>If <b>A5b</b>=1, wait for the temperature read by the product probe &lt; <b>A9b</b></li> </ul>
Low product temperature indication	<p>If <b>A5b</b> = 0:</p> <ul style="list-style-type: none"> <li>Product temperature &gt; <b>A14b</b> for time period = <b>A1</b> from power-on</li> <li>Product temperature &gt; <b>A14b</b> for time period = <b>A2</b> from defrost end</li> <li>Product temperature &gt; <b>A14b</b> for time period = <b>A3</b> from door closure</li> <li>Product temperature &gt; <b>A14b</b> for time period = <b>A6b</b></li> </ul> <p>If <b>A5b</b> = 1:</p> <ul style="list-style-type: none"> <li>Product temperature &gt; <b>A12b</b> for time period = <b>A1</b> from power-on</li> <li>Product temperature &gt; <b>A12b</b> for time period = <b>A2</b> from defrost end</li> <li>Product temperature &gt; <b>A12b</b> for time period = <b>A3</b> from door closure</li> <li>Product temperature &gt; <b>A12b</b> for time period = <b>A6b</b></li> </ul>	<ul style="list-style-type: none"> <li>Alarm shown on display</li> <li>No effect on regulation</li> </ul>	<ul style="list-style-type: none"> <li>If <b>A5b</b>=0, wait for the temperature read by the product probe &lt; <b>A14b</b></li> <li>If <b>A5b</b>=1, wait for the temperature read by the product probe &lt; <b>A12b</b></li> </ul>

Description	Cause	Effects	Solution
Low product temperature alarm	<p>If <b>A5b</b> = 0:</p> <ul style="list-style-type: none"> <li>Product temperature &gt; <b>A10b</b> for time period = <b>A1</b> from power-on</li> <li>Product temperature &gt; <b>A10b</b> for time period = <b>A2</b> from defrost end</li> <li>Product temperature &gt; <b>A10b</b> for time period = <b>A3</b> from door closure</li> <li>Product temperature &gt; <b>A10b</b> for time period = <b>A6b</b></li> </ul> <p>If <b>A5b</b> = 1:</p> <ul style="list-style-type: none"> <li>Product temperature &gt; <b>A8b</b> for time period = <b>A1</b> from power-on</li> <li>Product temperature &gt; <b>A8b</b> for time period = <b>A2</b> from defrost end</li> <li>Product temperature &gt; <b>A8b</b> for time period = <b>A3</b> from door closure</li> <li>Product temperature &gt; <b>A8b</b> for time period = <b>A6b</b></li> </ul>	<ul style="list-style-type: none"> <li>Alarm shown on display</li> <li>Compressor OFF</li> </ul>	<ul style="list-style-type: none"> <li>If <b>A5b</b>=0, wait for the temperature read by the product probe &lt; <b>A10b</b></li> <li>If <b>A5b</b>=1, wait for the temperature read by the product probe &lt; <b>A8b</b></li> </ul>
High evaporator temperature alarm	Temperature Pb2 > <b>A18</b> for time period = <b>A19</b>	<ul style="list-style-type: none"> <li>Alarm shown on display</li> <li>Heaters, humidification and dehumidification OFF</li> </ul>	Wait for the temperature read by Pb2 < <b>A18</b>
Door open alarm	Digital input activated for a time period > <b>i2</b>	<ul style="list-style-type: none"> <li>Alarm shown on display</li> <li>Regulators inhibited on the basis of <b>i0</b></li> </ul>	<ul style="list-style-type: none"> <li>If <b>i2</b> = -1 the alarm is disabled</li> <li>Check <b>i0</b>, <b>i1</b>, <b>i2</b> and <b>i3</b></li> <li>Check the digital input connection</li> <li>Close the door</li> </ul>
Condenser overheat indication	Condenser temperature > <b>C6</b>	<ul style="list-style-type: none"> <li>Code <b>COH</b> shown</li> <li>No effect on regulation</li> </ul>	Check <b>C6</b>
Compressor 1 high pressure alarm	<p>Digital input activated:</p> <ul style="list-style-type: none"> <li><b>i4</b> = 1 for time period = <b>i6</b></li> <li><b>i7</b> = 1 for time period = <b>i9</b></li> <li><b>i10</b> = 1 for time period = <b>i12</b></li> </ul>	<ul style="list-style-type: none"> <li>Alarm shown on display</li> <li>Compressor OFF</li> <li>Condenser fan ON until switch-off conditions satisfied</li> </ul>	Check for and remove the cause of the alarm on the digital input (automatic reset)
Compressor 1 low pressure alarm	<p>Digital input activated:</p> <ul style="list-style-type: none"> <li><b>i4</b> = 3 for time period = <b>i6</b></li> <li><b>i7</b> = 3 for time period = <b>i9</b></li> <li><b>i10</b> = 3 for time period = <b>i12</b></li> </ul>	<ul style="list-style-type: none"> <li>Alarm shown on display</li> <li>Compressor and defrost OFF</li> </ul>	
Compressor 2 high pressure alarm	<p>Digital input activated:</p> <ul style="list-style-type: none"> <li><b>i4</b> = 2 for time period = <b>i6</b></li> <li><b>i7</b> = 2 for time period = <b>i9</b></li> <li><b>i10</b> = 2 for time period = <b>i12</b></li> </ul>	<ul style="list-style-type: none"> <li>Alarm shown on display</li> <li>Compressor OFF</li> <li>Condenser fan ON until switch-off conditions satisfied</li> </ul>	
Compressor 2 low pressure alarm	<p>Digital input activated:</p> <ul style="list-style-type: none"> <li><b>i4</b> = 4 for time period = <b>i6</b></li> <li><b>i7</b> = 4 for time period = <b>i9</b></li> <li><b>i10</b> = 4 for time period = <b>i12</b></li> </ul>	<ul style="list-style-type: none"> <li>Alarm shown on display</li> <li>Compressor and defrost OFF</li> </ul>	
Compressor 1 thermal switch alarm	<p>Digital input activated:</p> <ul style="list-style-type: none"> <li><b>i4</b> = 5 for time period = <b>i6</b></li> <li><b>i7</b> = 5 for time period = <b>i9</b></li> <li><b>i10</b> = 5 for time period = <b>i12</b></li> </ul>	<ul style="list-style-type: none"> <li>Alarm shown on display</li> <li>Compressor OFF</li> </ul>	
Compressor 2 thermal switch alarm	<p>Digital input activated:</p> <ul style="list-style-type: none"> <li><b>i4</b> = 6 for time period = <b>i6</b></li> <li><b>i7</b> = 6 for time period = <b>i9</b></li> <li><b>i10</b> = 6 for time period = <b>i12</b></li> </ul>	<ul style="list-style-type: none"> <li>Alarm shown on display</li> <li>Compressor OFF</li> </ul>	Check for and remove the cause of the alarm on the digital input (automatic reset)
Fan thermal switch alarm	<p>Digital input activated:</p> <ul style="list-style-type: none"> <li><b>i4</b> = 11 for time period = <b>i6</b></li> <li><b>i7</b> = 11 for time period = <b>i9</b></li> <li><b>i10</b> = 11 for time period = <b>i12</b></li> </ul>	<ul style="list-style-type: none"> <li>Alarm shown on display</li> <li>Evaporator fan OFF</li> </ul>	
System protection alarm	<p>Digital input activated:</p> <ul style="list-style-type: none"> <li><b>i4</b> = 7 for time period = <b>i6</b></li> <li><b>i7</b> = 7 for time period = <b>i9</b></li> <li><b>i10</b> = 7 for time period = <b>i12</b></li> </ul>	<ul style="list-style-type: none"> <li>Alarm shown on display</li> <li>All regulators are switched off</li> </ul>	

Description	Cause	Effects	Solution
Power failure alarm	Power failure for time period > <b>P3</b>	<ul style="list-style-type: none"> <li>Alarm shown on display</li> <li>No effect on regulation</li> </ul>	<ul style="list-style-type: none"> <li>If <b>P3</b> = -1 the alarm is disabled</li> <li>Check the power supply wiring</li> </ul>
High condensation temperature indication	With <b>Pr1...Pr3</b> = 2: Condenser temperature > <b>C6</b>	<ul style="list-style-type: none"> <li>Alarm shown on display</li> <li>Compressor OFF</li> <li>Evaporator fan OFF</li> <li>Condenser fan ON</li> </ul>	Check <b>C6</b>
High condensation temperature alarm	With <b>Pr1...Pr3</b> = 2: Condenser temperature > <b>C7</b> for time period = <b>C8</b>	<ul style="list-style-type: none"> <li>Alarm shown on display</li> <li>Compressor OFF</li> <li>Evaporator fan OFF</li> <li>Condenser fan ON</li> <li>Thawing OFF</li> </ul>	<ul style="list-style-type: none"> <li>Switch the instrument off and on again;</li> <li>Check <b>C7</b> and <b>C8</b></li> </ul>
Generic alarm <b>iA</b>	Digital input activated: <ul style="list-style-type: none"> <li><b>i1</b> = 9 for time period = <b>i6</b></li> <li><b>i7</b> = 9 for time period = <b>i9</b></li> <li><b>i10</b> = 9 for time period = <b>i12</b></li> </ul>	<ul style="list-style-type: none"> <li>Generic alarm <b>iA</b> shown</li> <li>No effect on regulation</li> </ul>	Check for and remove the cause of the alarm on the digital input (automatic reset)
Compressor maintenance alarm	Compressor hours > <b>C10</b>	<ul style="list-style-type: none"> <li>Alarm shown on display</li> <li>The compressor performs ON/OFF cycles on the basis of <b>C11</b> and <b>C12</b></li> </ul>	<ul style="list-style-type: none"> <li>Carry out compressor maintenance</li> <li>Reset maintenance counter hours</li> </ul>
Defrost timeout alarm	With <b>d11</b> =1, defrost ends due to timeout <b>d3</b> instead of temperature <b>d2</b> being reached	<ul style="list-style-type: none"> <li>Alarm shown on display</li> <li>No effect on regulation</li> </ul>	<ul style="list-style-type: none"> <li>Tap any key</li> <li>Check <b>d2</b>, <b>d3</b> and <b>d11</b></li> </ul>
RTC alarm	RTC not working alarm	<ul style="list-style-type: none"> <li>Functions connected to the RTC not present or not synchronised with the actual time</li> <li>The data-logger saves the information with an incorrect date and time</li> </ul>	Set the correct time. If the error persists, replace the instrument (RTC battery exhausted)
Base communication alarm	No communication between base board and user interface	<ul style="list-style-type: none"> <li>Alarm shown on display</li> <li>All regulators are switched off</li> </ul>	<ul style="list-style-type: none"> <li>Restore communication between base board and user interface</li> <li>Automatic reset</li> </ul>
Expansion device communication alarm	If present, <b>E19</b> = 1, 3: No communication between base board and expansion device	<ul style="list-style-type: none"> <li>Alarm shown on display</li> <li>All expansion device outputs deactivated</li> </ul>	<ul style="list-style-type: none"> <li>Restore communication with the expansion device</li> <li>Automatic reset</li> </ul>
Backup module communication alarm	If present, <b>E19</b> = 2, 3: No communication between base board and backup module	<ul style="list-style-type: none"> <li>Alarm shown on display</li> <li>The alarms corresponding to the backup module are deactivated</li> </ul>	<ul style="list-style-type: none"> <li>Restore communication with the backup module</li> <li>Automatic reset</li> </ul>
Battery fault alarm	Battery low or the controller is not detecting the battery	<ul style="list-style-type: none"> <li>Alarm shown on display</li> <li>No effect on regulation</li> </ul>	Replace the battery
Emergency power supply alarm	The controller is not powered by the mains (the backup battery has cut in)	<ul style="list-style-type: none"> <li>The display comes on for 5 s and is switched off for 10s</li> </ul>	Restore the mains power supply connection
CO <sub>2</sub> backup alarm	If <b>E19</b> = 2, 3 or <b>u14c</b> = 2: Backup module probe temperature ( <b>Pr4</b> ≠0) > <b>u9+u10</b> for time period = <b>u8</b>	<ul style="list-style-type: none"> <li>Alarm shown on display</li> <li>No effect on regulation</li> </ul>	Wait for the temperature read by the module probe < <b>u9+u10</b>
Anti-thawing alarm	If <b>E19</b> = 2, 3 or <b>u14c</b> = 4: Backup module probe temperature ( <b>Pr4</b> ≠0) < <b>u9</b>	<ul style="list-style-type: none"> <li>Alarm shown on display</li> <li>No effect on regulation</li> </ul>	Wait for the temperature read by the module probe > <b>u9</b>
Thermostat alarm	If <b>E19</b> = 2, 3 or <b>u14c</b> = 4: Backup module probe temperature ( <b>Pr4</b> ≠0) > <b>u9+u10</b>	<ul style="list-style-type: none"> <li>Alarm shown on display</li> <li>No effect on regulation</li> </ul>	Wait for the temperature read by the module probe < <b>u9+u10</b>
Water filling alarm	Water filling time > <b>u12</b>	<ul style="list-style-type: none"> <li>Alarm shown on display</li> <li>Water filling output deactivated</li> </ul>	<ul style="list-style-type: none"> <li>Check the connection to the water filling system</li> <li>Automatic reset</li> </ul>



## 9.2 MISTRAL HUMIDIFIER ALARM TABLE

Description	Cause	Effects	Solution
Inlet solenoid valve minimum current indication	Absorption thresholds exceeded in normal operation	<ul style="list-style-type: none"> <li>Inlet solenoid valve OFF</li> <li>If <b>CFG</b> = 0...4 then <b>Out1</b> (Mistral) is activated</li> <li>LED blinks 0.5 s ON / 5 s OFF</li> </ul>	<ul style="list-style-type: none"> <li>Schedule maintenance and/or component replacement</li> </ul>
Inlet solenoid valve maximum current indication	Absorption thresholds exceeded in normal operation	<ul style="list-style-type: none"> <li>No effect on regulation</li> <li>If <b>CFG</b> = 0...4 then <b>Out1</b> (Mistral) is activated</li> <li>LED blinks 0.5 s ON / 5 s OFF</li> </ul>	<ul style="list-style-type: none"> <li>Contact ELSTEAM technical support</li> </ul>
Outlet solenoid valve minimum current indication	Absorption thresholds exceeded in normal operation	<ul style="list-style-type: none"> <li>Outlet solenoid valve OFF</li> <li>If <b>CFG</b> = 0...4 then <b>Out1</b> (Mistral) is activated</li> <li>LED blinks 0.5 s ON / 5 s OFF</li> </ul>	<ul style="list-style-type: none"> <li>Schedule maintenance and/or component replacement</li> </ul>
Outlet solenoid valve maximum current indication	Absorption thresholds exceeded in normal operation	<ul style="list-style-type: none"> <li>No effect on regulation</li> <li>If <b>CFG</b> = 0...4 then <b>Out1</b> (Mistral) is activated</li> <li>LED blinks 0.5 s ON / 5 s OFF</li> </ul>	<ul style="list-style-type: none"> <li>Contact ELSTEAM technical support</li> </ul>
Mist-maker minimum current indication	Absorption thresholds exceeded in normal operation	<ul style="list-style-type: none"> <li>No effect on regulation</li> <li>If <b>CFG</b> = 0...4 then <b>Out1</b> (Mistral) is activated</li> <li>LED blinks 0.5 s ON / 5 s OFF</li> </ul>	<ul style="list-style-type: none"> <li>Schedule maintenance and/or component replacement</li> </ul>
Mist-maker maximum current indication	Absorption thresholds exceeded in normal operation	<ul style="list-style-type: none"> <li>Mist-maker OFF</li> <li>If <b>CFG</b> = 0...4 then <b>Out1</b> (Mistral) is activated</li> <li>LED blinks 0.5 s ON / 5 s OFF</li> </ul>	<ul style="list-style-type: none"> <li>Contact ELSTEAM technical support</li> </ul>
Fan minimum current indication	Absorption thresholds exceeded in normal operation	<ul style="list-style-type: none"> <li>No effect on regulation</li> <li>If <b>CFG</b> = 0...4 then <b>Out1</b> (Mistral) is activated</li> <li>LED blinks 0.5 s ON / 5 s OFF</li> </ul>	<ul style="list-style-type: none"> <li>Schedule maintenance and/or component replacement</li> </ul>
Fan maximum current indication	Absorption thresholds exceeded in normal operation	<ul style="list-style-type: none"> <li>Fan OFF</li> <li>If <b>CFG</b> = 0...4 then <b>Out1</b> (Mistral) is activated</li> <li>LED blinks 0.5 s ON / 5 s OFF</li> </ul>	<ul style="list-style-type: none"> <li>Contact ELSTEAM technical support</li> </ul>
Inlet solenoid valve minimum current alert	Absorption thresholds exceeded in normal operation	<ul style="list-style-type: none"> <li>Inlet solenoid valve OFF</li> <li>If <b>CFG</b> = 0...4 then <b>Out1</b> (Mistral) is activated</li> <li>LED blinks 0.5 s ON / 5 s OFF</li> </ul>	<ul style="list-style-type: none"> <li>Replace the inlet solenoid valve</li> </ul>
Inlet solenoid valve maximum current alert	Absorption thresholds exceeded in normal operation	<ul style="list-style-type: none"> <li>No effect on regulation</li> <li>If <b>CFG</b> = 0...4 then <b>Out1</b> (Mistral) is activated</li> <li>LED blinks 0.5 s ON / 5 s OFF</li> </ul>	<ul style="list-style-type: none"> <li>Contact ELSTEAM technical support</li> </ul>
Outlet solenoid valve minimum current alert	Absorption thresholds exceeded in normal operation	<ul style="list-style-type: none"> <li>Outlet solenoid valve OFF</li> <li>If <b>CFG</b> = 0...4 then <b>Out1</b> (Mistral) is activated</li> <li>LED blinks 0.5 s ON / 5 s OFF</li> </ul>	<ul style="list-style-type: none"> <li>Replace the outlet solenoid valve</li> </ul>
Outlet solenoid valve maximum current alert	Absorption thresholds exceeded in normal operation	<ul style="list-style-type: none"> <li>No effect on regulation</li> <li>If <b>CFG</b> = 0...4 then <b>Out1</b> (Mistral) is activated</li> <li>LED blinks 0.5 s ON / 5 s OFF</li> </ul>	<ul style="list-style-type: none"> <li>Contact ELSTEAM technical support</li> </ul>
Mist-maker minimum current alert	Absorption thresholds exceeded in normal operation	<ul style="list-style-type: none"> <li>No effect on regulation</li> <li>If <b>CFG</b> = 0...4 then <b>Out1</b> (Mistral) is activated</li> <li>LED blinks 0.5 s ON / 5 s OFF</li> </ul>	<ul style="list-style-type: none"> <li>Replace the mist-maker</li> </ul>
Mist-maker maximum current alert	Absorption thresholds exceeded in normal operation	<ul style="list-style-type: none"> <li>Mist-maker OFF</li> <li>If <b>CFG</b> = 0...4 then <b>Out1</b> (Mistral) is activated</li> <li>LED blinks 0.5 s ON / 5 s OFF</li> </ul>	<ul style="list-style-type: none"> <li>Contact ELSTEAM technical support</li> </ul>
Fan minimum current alert	Absorption thresholds exceeded in normal operation	<ul style="list-style-type: none"> <li>No effect on regulation</li> <li>If <b>CFG</b> = 0...4 then <b>Out1</b> (Mistral) is activated</li> <li>LED blinks 0.5 s ON / 5 s OFF</li> </ul>	<ul style="list-style-type: none"> <li>Automatic reactivation</li> </ul>
Fan maximum current alert	Absorption thresholds exceeded in normal operation	<ul style="list-style-type: none"> <li>Fan OFF</li> <li>If <b>CFG</b> = 0...4 then <b>Out1</b> (Mistral) is activated</li> <li>LED blinks 0.5 s ON / 5 s OFF</li> </ul>	<ul style="list-style-type: none"> <li>Contact ELSTEAM technical support</li> </ul>
Mist-maker operating hours alert	<ul style="list-style-type: none"> <li>If <b>P1</b> = 70...449 <math>\mu\text{S}\cdot\text{cm}</math>, operating hours &gt; <b>A10</b></li> <li>If <b>P1</b> = 450...849 <math>\mu\text{S}\cdot\text{cm}</math>, operating hours &gt; <b>A11</b></li> <li>If <b>P1</b> = 850...1250 <math>\mu\text{S}\cdot\text{cm}</math>, operating hours &gt; <b>A12</b></li> </ul>	<ul style="list-style-type: none"> <li>No effect on regulation</li> <li>If <b>CFG</b> = 0...4 then <b>Out1</b> (Mistral) is activated</li> <li>LED blinks 0.5 s ON / 5 s OFF</li> </ul>	Carry out maintenance
Fan operating hours alert	Fan operating hours > <b>A13</b>	<ul style="list-style-type: none"> <li>No effect on regulation</li> <li>If <b>CFG</b> = 0...4 then <b>Out1</b> (Mistral) is activated</li> <li>LED blinks 0.5 s ON / 5 s OFF</li> </ul>	Carry out maintenance
Low humidity alarm	RH sensor < <b>A5</b> for a time <b>A7</b>	<ul style="list-style-type: none"> <li>No effect on regulation</li> <li>LED blinks 1 s ON / 1 s OFF</li> </ul>	Reactivation is automatic if RH sensor > <b>A5</b> + 2 %
High humidity alarm	RH sensor > <b>A6</b> for a time <b>A7</b>	<ul style="list-style-type: none"> <li>No effect on regulation</li> <li>LED blinks 0.5 s ON / 0.5 s OFF</li> </ul>	Reactivation is automatic if RH sensor < <b>A6</b> - 2 %



Description	Cause	Effects	Solution
Level board high temperature alert	Impurities in the water in the reservoir	<ul style="list-style-type: none"> <li>No effect on regulation</li> <li>If <b>CFG</b> = 0...4 then <b>Out1</b> (Mistral) is activated</li> <li>LED blinks 0.5 s ON / 5 s OFF</li> </ul>	<ul style="list-style-type: none"> <li>Check the characteristics of the water</li> <li>Clean the reservoir</li> <li>Switch the humidifier off and on again</li> </ul>

**NOTE:** Refer to the operating and maintenance manual for the Mistral humidifier at the website [www.elsteam.it](http://www.elsteam.it)

### 9.3 INVERTER ALARM TABLE

Description	Effects	Solution
Communication timeout alarm	Modbus communication interrupted	Check and restore the modbus connection
Inverter synchronisation alarm	No communication between Vcolor and inverter	Check and restore the connection between the Vcolor and inverter
Undervoltage alarm	The voltage value of the device has dropped below the minimum value set via parameter <b>S602</b>	Reset alarm via suggested input
Overvoltage alarm	The voltage value of the device has exceeded the maximum value set via parameter <b>S603</b>	
Overcurrent alarm	The device has exceeded the maximum current value set via parameter <b>S601</b>	
Overload alarm	When the amount of energy according to logic <b>I x t</b> exceeds the value set via parameters <b>S511</b> and <b>S512</b>	
Cooler overtemperature alarm	The motor has reached and exceeded maximum temperature <b>S606</b>	The alarm resets automatically when the temperature of the device < <b>S606</b> - 10 °C (50 °F)



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