



Vcolor 579/589

**Controllers for aging and/or meat dry-aging cabinets
and rooms with customised graphic skin**



ENGLISH

INSTALLER MANUAL ver. 2.0

CODE 144VC579E204

**Important**

Read this document carefully before installation and before using the device and take all the prescribed precautions. Keep this document with the device for future consultation.

Only use the device in the ways described in this document. Do not use the device as a safety device.

**Disposal**

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

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1 INTRODUCTION

1.1 Introduction

The Vcolor 579/589 controller can be programmed via parameter to manage the aging process only, meat dry-aging only or both. It has 3 analogue inputs for temperature, 1 analogue input for 4... 20 mA humidity transducers (which can also be used to read pH), 9 fully configurable digital outputs (which can be expanded to 13) and 1 modulating output which gives control of up to 10 evaporator fan speeds (the evaporator fan can alternatively be modulated using an EVCO inverter). In the Vcolor589 models, the modulating output can also be set to control variable speed compressors. The controller's firmware can control an ultrasonic humidifier from the Mistral series via the RS-485 serial port.

Intuitive user interfaces (with 5 pre-set + 4 freely configurable food categories) can be personalised to meet users' needs, making the controller both versatile and easy to use. Users can access a total of 30 meat dry-aging and aging programmes (each of the aging programmes has 30 sequential phases whose duration, temperature, humidity and ventilation can be fully configured). The controller also has manual preservation cycles, automatic air exchange and pause/work cycles and optional sanitation cycles (using UV lamps or ozone) and product smoking cycles which can be managed either automatically or manually.

The controller's innovative programmable platform gives manufacturers the freedom to personalise the graphic skin and programmes and add new languages. All they have to do is compile an ODS file and upload it using a flash drive to the USB port on the user interface. Users can save up to 30 programmes.

Users can interact remotely with their equipment and start up/stop working cycles using the EPoCA® cloud platform with Wi-Fi or Ethernet connectivity (which also enables alternative or parallel control through MODBUS TCP). For more details, compare all the connectivity options in the Technical Data table and consult the Management and Monitoring Products/Systems and the Connectivity Products/Devices sections of our website.

The controller has an open frame board and a remote user interface which consists of a 5-inch (M) or 7-inch (L) capacitive TFT touch-screen graphic display in glass which is installed horizontally. The user interface can be semi-recessed into the front or installed flush with the panel, fitting in perfectly with the design of the unit.

1.2 Models available and main features

The table below shows the main features of the models available.

MAIN FEATURES	KITS		OPTIONS			
	Vcolor 579 M & L with PWM output	Vcolor 589 M & L with 0-10 V output	I/O expansion module	Speed regulator	Inverter	Humidifier
			EVC20P52N9 XXX12*	EVDFAN1 (for 579 models only)	Compact, Slim and Slim Power	Mistral
Power supply						
Control module	115...230 Vac	115...230 Vac				
User interface	Powered by the control module (M version) or an external transformer 12 Vac/20 VA (L version)	Powered by the control module (M version) or an external transformer 12 Vac/20 VA (L version)				
Optional modules			115...230 Vac	230 Vac	230 Vac	100...230 Vac
Analogue inputs						
Cabinet probe (PTC/NTC)	•	•				
Evaporator probe (PTC/NTC)	•	•				
Condenser probe (PTC/NTC)	•	•				
4-20 mA humidity transducer (hereinafter referred to as "probe")	•	•				
Digital inputs (for NO/NC contact)						
Door switch	•	•				
Configurable multi-purpose 1 (default compressor thermal switch alarm)	•	•				
Configurable multi-purpose 2 (default high pressure alarm)	•	•				
Configurable multi-purpose 3 (default low pressure alarm)	•	•				
Modulating output						
Can be configured as 0-10 V to modulate the evaporator fan or as frequency for variable speed compressor		•				
Can be configured as PWM for EVDFAN1 speed regulator (evaporator fan)	•					

MAIN FEATURES	KITS		OPTIONS			
	Vcolor 579 M & L with PWM output	Vcolor 589 M & L with 0-10 V output	I/O expansion module	Speed regulator	Inverter	Humidifier
			EVC20P52N9 XXX12*	EVDFAN1 (for 579 models only)	Compact, Slim and Slim Power	Mistral
Digital outputs (sealed relays A res. @ 250 Vac)						
Configurable K1 (default compressor)	16 A	16 A				
Configurable K2 (default light)	8 A	8 A				
Configurable K3 (default humidity injection)	8 A	8 A				
Configurable K4 (default air exchange)	8 A	8 A				
Configurable K5 (default heater)	8 A	8 A				
Configurable K6 (default alarm)	16 A	16 A				
Configurable K7 (default condenser fans)	16 A	16 A				
Configurable K8 (default pump- down)	8 A	8 A				
Configurable K9 (default defrost)	8 A	8 A				
Configurable K10 (default sanitation)			30 A			
Configurable K11 (default smoking)			16 A			
Configurable K12 (default humidity production)			8 A			
Configurable K13 (default dehumidifier)			16 A			
Communications ports						
RS-485 MODBUS	•	•				
USB	•	•				
Connectivity						
RS-485 MODBUS RTU (built-in)	•	•				
Wi-Fi EPoCA/MODBUS TCP (optional through the EVlinking Wi-Fi module powered by controller)	•	•				
Ethernet EPoCA/MODBUS TCP (optional through EV3 Web or EVD Web gateway)	•	•				

MAIN FEATURES	KITS		OPTIONS			
	Vcolor 579 M & L with PWM output	Vcolor 589 M & L with 0-10 V output	I/O expansion module	Speed regulator	Inverter	Humidifier
			EVC20P52N9 XXX12*	EVDFAN1 (for 579 models only)	Compact, Slim and Slim Power	Mistral
Other features						
Clock	•	•				
Alarm buzzer	•	•				
Automatic cycle management	•	•				
Fan intensity management	•	•		•	•	
Integrated humidifier management						•
Saving HACCP files	•	•				
"Programmes" function	•	•				

* The code refers to the I/O expansion module with HC sealed relays

For more information see section 15 "TECHNICAL SPECIFICATIONS".

The table below lists the purchasing codes of the available models:

Purchasing codes	<u>Models with PWM output</u>
	Vcolor 579 M (control module + 5" user interface):
	EVCMC579N9EH (flush fit installation)
	EVCMC579N9EFH (semi-recessed installation)
	Vcolor 579 L (control module + 7" user interface):
	EVCLC579N9EH (flush fit installation)
	EVCLC579N9EFH (semi-recessed installation)
	<u>Models with 0-10 V output</u>
	Vcolor 589 M (control module + 5" user interface):
	EVCMC589N9EH (flush fit installation)
	EVCMC589N9EFH (semi-recessed installation)
	Vcolor 589 L (control module + 7" user interface):
	EVCLC589N9EH (flush fit installation)
	EVCLC589N9EFH (semi-recessed installation)

For more models, contact the EVCO sales network.

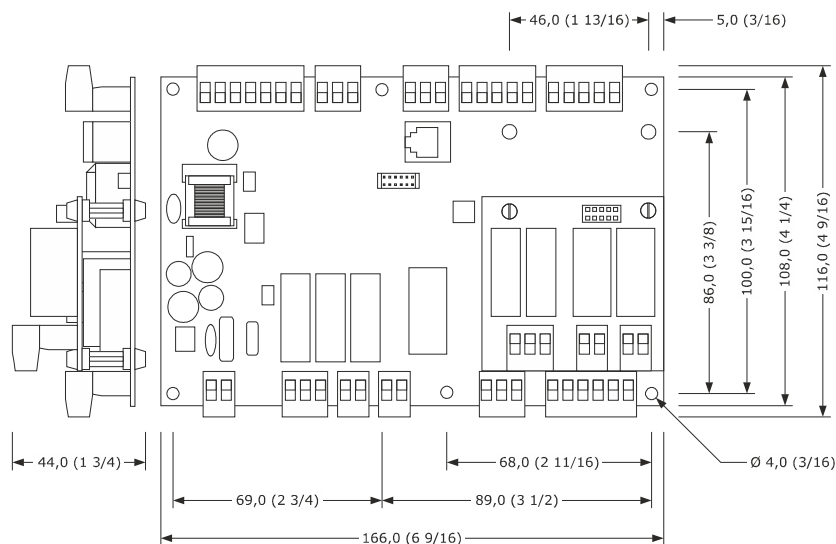
2 MEASUREMENTS AND INSTALLATION

2.1 Format features

The control module is available in a split version with an open frame board. User interfaces are available in 5- or 7-inch versions for horizontal operation and have capacitive colour TFT touch-screen graphic displays.

2.2 Control module measurements and installation

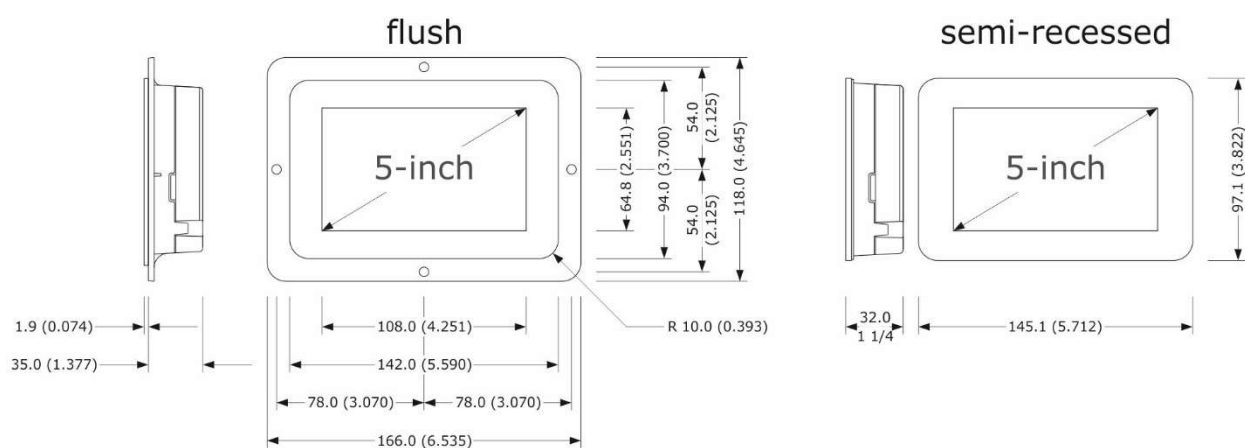
Installation of the control module is on a flat surface with spacers.



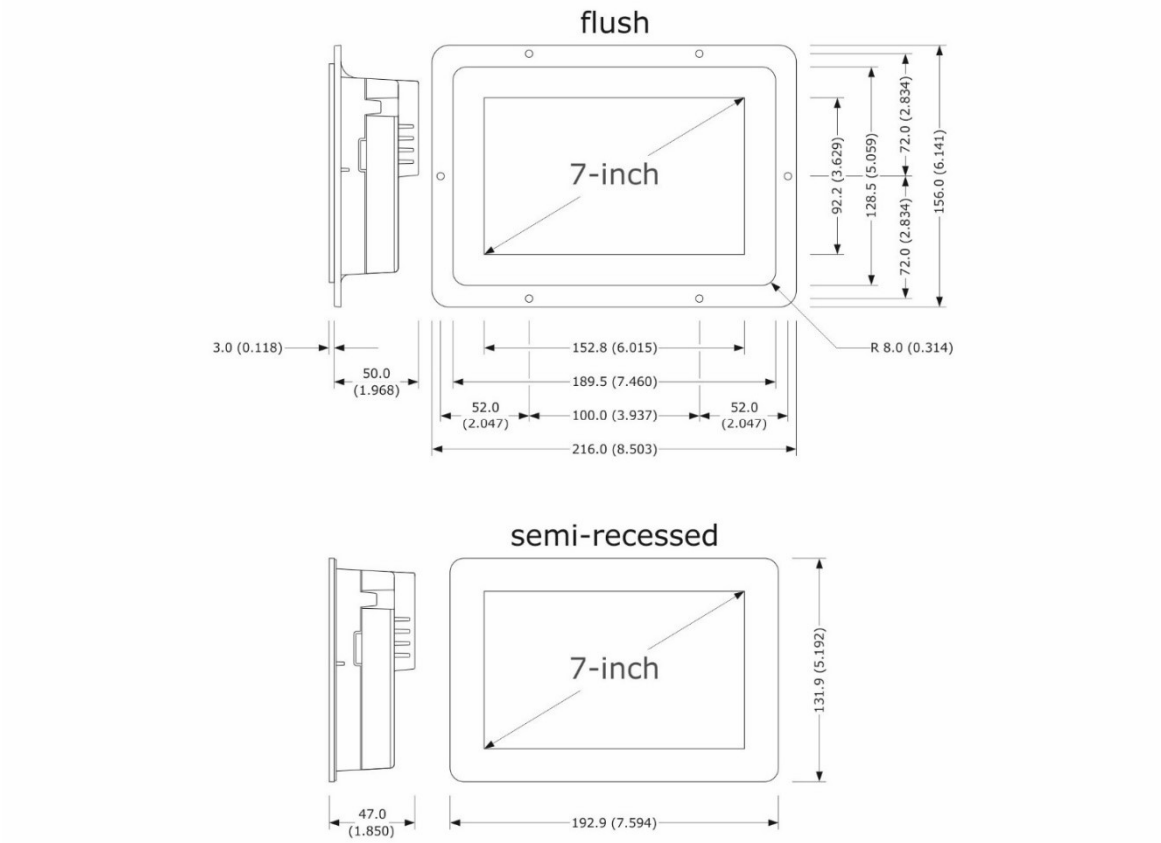
2.3 User interface measurements

The user interface is available in the model which is installed flush and the model which is semi-recessed into the front. The measurements vary according to the model, as illustrated below in mm (in).

Vcolor 579/589 M interface



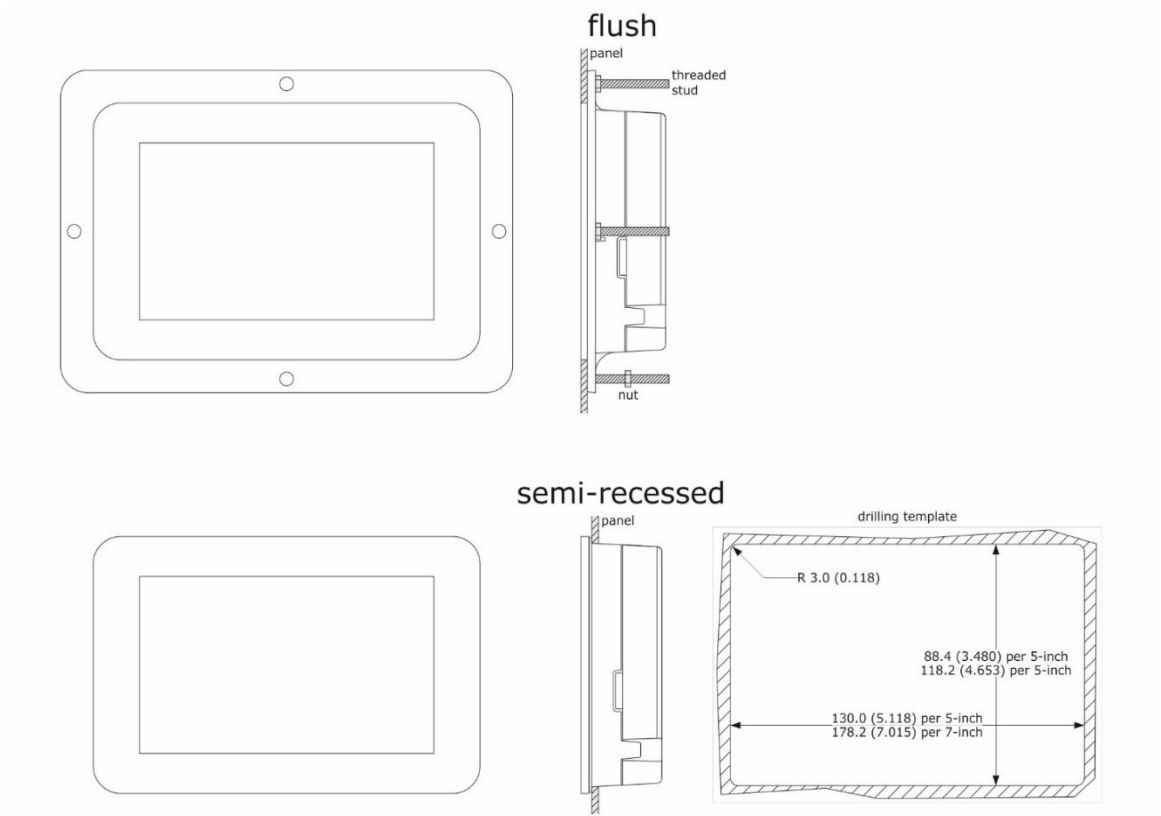
Vcolor 579/589 L interface



2.4 User interface installation

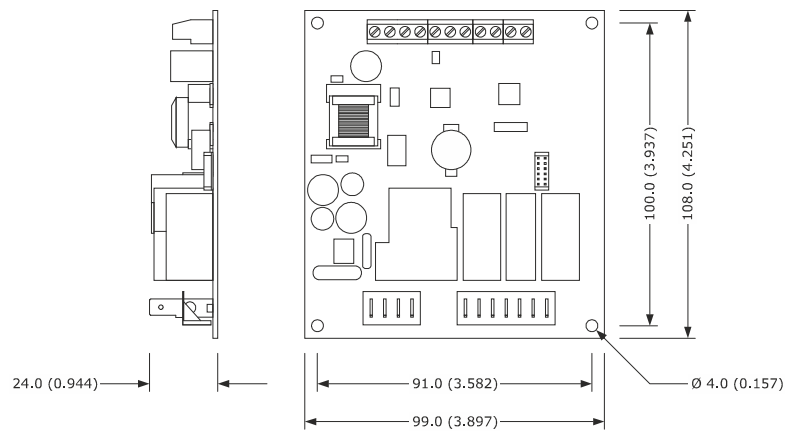
Depending on the model, installation can be:

- flush, from behind the panel with threaded studs (not provided) welded to hold it in place;
- semi-recessed, from the front of the panel with spring clips to hold it in place.



2.5 EVC20P52N9XXX10 – EVC20P52N9XXX12 expansion module measurements and installation

The diagram below shows the measurements of the 4 relay expansion. Installation is on a flat surface with spacers.



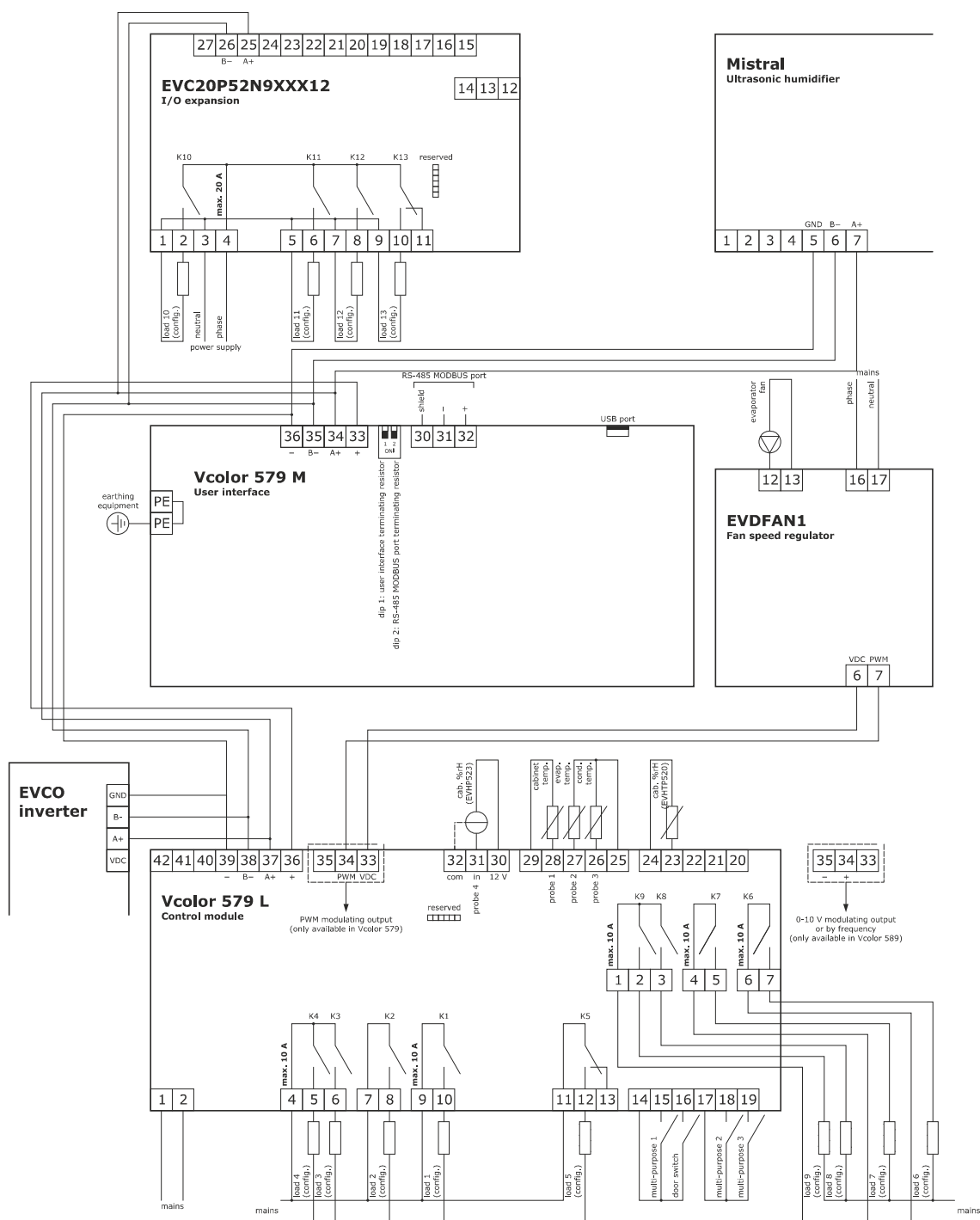
2.6 Installation precautions

- Ensure that the working conditions for the device (operating temperature, humidity, etc.) are within the set limits. See section 15 "TECHNICAL SPECIFICATIONS".
- Do not install the device close to heat sources (heaters, hot air ducts, etc.), equipment with a strong magnetic field (large diffusers, etc.), in places subject to direct sunlight, rain, damp, excessive dust, mechanical vibrations or shocks.
- Any metal parts close to the control module must be far enough away so as not to compromise the safety distance.
- In compliance with safety regulations, the device must be installed properly to ensure adequate protection from contact with electrical parts. All protective parts must be fixed in such a way as to need the aid of a tool to remove them.

3 ELECTRICAL CONNECTION

3.1 Vcolor 579/589 M electrical connection

The diagram below shows the Vcolor 579/589 M electrical connection.



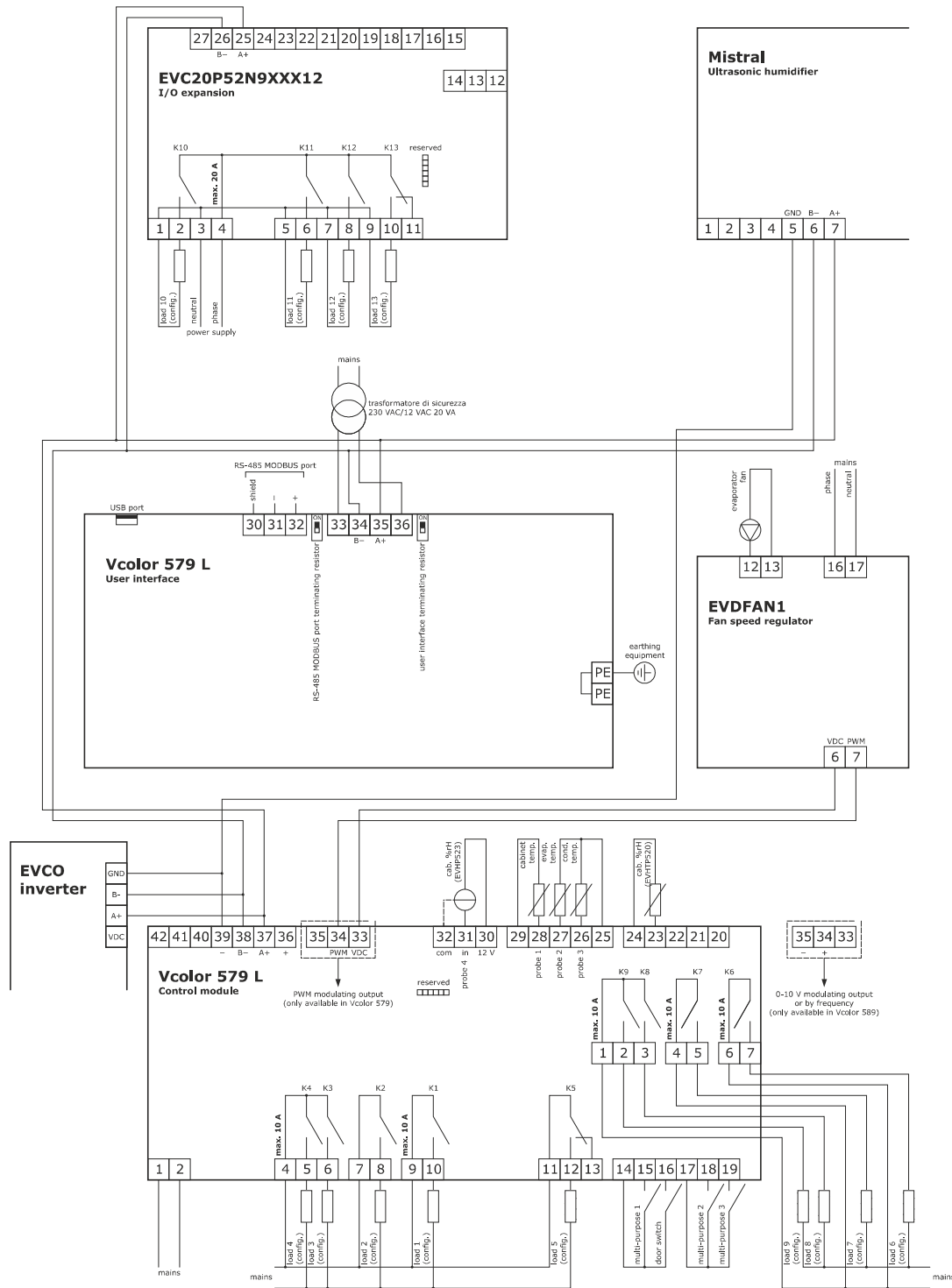
NB: the wiring diagram for the PWM output covers the connection to EVDFAN1 only; for other devices, please contact the EVCO sales network.

NB: the USB communications port makes it possible to upload and download the device settings and personalise the graphics, recipes and languages using an ordinary USB flash drive (see section “USB PORT MANAGEMENT”).

NB: the RS-485 MODBUS communications port enables connection to the Parameters Manager set-up software or to the modules for Wi-Fi (EVlinking Wi-Fi) or Ethernet (EV3 Web/EVD Web) connectivity to manage the unit using the EPoCA cloud platform or MODBUS TCP systems (see section "CONNECTIVITY").

3.2 Vcolor 579/589 L electrical connection

The diagram below shows the Vcolor 579/589 L electrical connection.



NB: the wiring diagram for the PWM output covers the connection to EVDFAN1 only; for other devices, please contact the EVCO sales network.

NB: the USB communications port makes it possible to upload and download the device settings and personalise the graphics, recipes and languages using an ordinary USB flash drive (see section "USB PORT MANAGEMENT").

NB: the RS-485 MODBUS communications port enables connection to the Parameters Manager set-up software or to the modules for Wi-Fi (EVlinking Wi-Fi) or Ethernet (EV3 Web/EVD Web) connectivity to manage the unit using the EPoCA cloud platform or MODBUS TCP systems (see section "CONNECTIVITY").

3.3 Precautions for electrical connection

- Do not use electric or pneumatic screwdrivers on the terminal blocks of the device
- If the device is moved from a cold to a warm place, the humidity may cause condensation to form inside. Wait about an hour before switching on the power.
- Make sure that the supply voltage, electrical frequency and power of the device correspond to the local power supply. See section 15 "TECHNICAL SPECIFICATIONS".
- Disconnect the device from the power supply before doing any type of maintenance.
- Locate the power cables as far away as possible from those for the signal.
- To reduce reflections on the signal transmitted along the cables connecting the user interface to the control module, it is necessary to fit a termination resistor.
- For repairs and for further information on the device, contact the EVCO sales network.

4 AGING AND/OR MEAT DRY-AGING OPERATION

4.1 Initial information

Vcolor 579/589 is a controller which, by simply setting a parameter, can be configured to manage aging cabinets and rooms (E17=0), meat dry-aging cabinets and rooms (E17=1) or aging and meat dry-aging cabinets and rooms (E17=2).

This manual gives instructions how to use the controller, pointing out when there are differences between the three configurations.

5 FIRST-TIME USE

5.1 Operating modes

The controller has the following operating modes:

- "OFF" (no power to the device);
- "STAND-BY" (the device is powered but switched off);
- "ON/HOME" (the device is powered, switched on and awaiting start-up of an aging cycle);
- "RUN" (the device is powered, switched on and running a cycle).

Terminology: "device switch-on" means going from "Stand-by" to "ON" and "device switch-off" from "ON" to "Stand-by".

If there is a power failure, when power is restored the device will return to the mode set before the failure.

5.2 Operating the device

Follow these instructions to operate the device:


1. Install the device as shown in section 2 "MEASUREMENTS AND INSTALLATION", taking all the precautions mentioned in paragraph 2.6 "Installation precautions".
2. Make the electrical connection as shown in section 3 "ELECTRICAL CONNECTION", taking all the precautions mentioned in paragraph 3.3 "Precautions for electrical connection".
3. Connect the power supply to the device: the splash screen will appear for 10 seconds.
Once loading is complete, the device will go back to the mode it was in before being powered down, namely:
 - the stand-by screen; press the central area to go to the home screen (for aging configuration) or the run screen (for meat dry-aging configuration);
 - the run screen if a cycle was running before the device was powered down.

Splash screen



Stand-by screen



To switch the device on from the stand-by screen in all configurations, press the central  key.

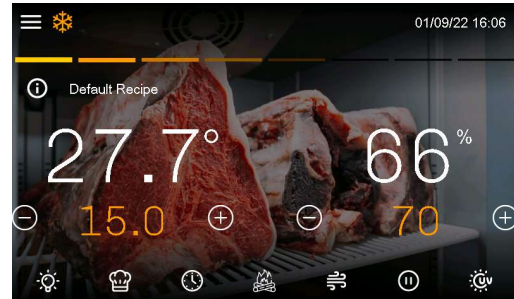
The screens show the functions enabled, the date and the time.

If E17=2, the screen displayed depends on the cycle which is running or has been selected: if it is an aging cycle, it is the home screen which is displayed with configuration E17=0; if it is a meat dry-aging cycle, it is the run screen displayed with configuration E17=1.

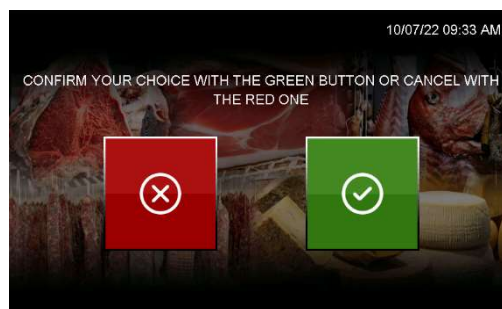
Aging home screen (E17=0)



Meat dry-aging run screen (E17=1)



To switch the device off, go to the Settings page and select Switch-off. Confirmation will be requested as shown below:











By pressing the green confirmation key, the controller will be placed in stand-by.

6 NAVIGATION

6.1 Initial information


Navigating the menus is intuitive, based on touch technology.

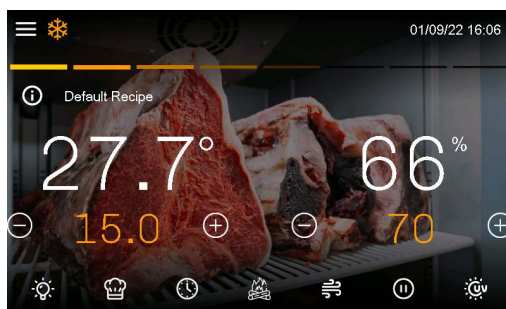
- To enter into a procedure, touch the menu or the corresponding icon.
- To exit a procedure and, in general, to return to the previous level, use the  keys.
- To scroll up and down a menu, use the  and  keys  and  to skip to the next page.
- To confirm the settings and/or changes, press the  key.
- To start up an aging cycle, press ; the meat dry-aging cycle starts up automatically when going from the stand-by page to the home page.
- To interrupt an aging cycle, press the  key; to interrupt a meat dry-aging cycle, go to the Settings page and select SWITCH-OFF; confirmation will be requested in both cases.
- To silence the buzzer, touch the alarm bar while it is sounding. If the buzzer sounds to indicate the end of the cycle, it will be automatically deactivated after the number of seconds set by parameter E1 (unless it is silenced manually first).

6.2 Stand-by screen


This screen is the departure point for navigating the user interface.

6.2.1 Meat dry-aging configuration

When meat dry-aging is configured and the  key is pressed, the screen comes on and the last meat dry-aging recipe carried out or the first meat dry-aging recipe in the recipe book starts up, passing directly to the run screen.



6.2.2 Aging configuration

When aging is configured and the  key is pressed, the screen comes on and selects the last cycle carried out or the first aging cycle in the recipe book without starting it up.



6.2.3 Combined configuration

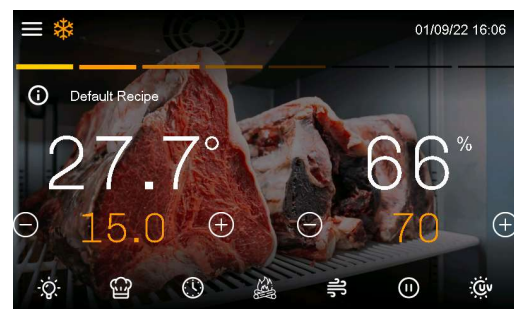
In combined configuration (meat dry-aging + aging), when the screen comes on from the stand-by page, the page to select either "meat dry-aging" or "aging" is displayed.



If "meat dry-aging" is selected when going from the stand-by to the home screen, the first meat dry-aging recipe in the recipe book will run; if "aging" is selected, the home page opens and selects the first aging recipe in the recipe book.

6.3 Cycle run screen

Once a cycle has been started up (or the device has been switched on in meat dry-aging configuration), the run screen appears.



The cycle run page gives information about the activated loads (top bar), the current date and time, the current temperature and humidity with the relative setpoints in the centre of the screen and the keys to select/manage the special functions at the bottom.

When in the aging configuration, the date of the end of the recipe, the phase in progress and the date of the end of the phase in progress are also given.

6.3.1 Regulator status icons

While a cycle is running, the status of the principal loads is displayed as icons on the upper part of the screen. Below are their meanings:



On: compressor active; flashing: compressor start-up delay in progress



On: fans working; flashing: during an ON-OFF cycle, time OFF



On: defrost in progress; flashing: dripping time in progress



On: heating active



On: humidification in progress



On: dehumidification in progress






On: remote connection connected; flashing: remote connection disconnected



On: alarm in progress

6.3.2 Function keys

Different keys are displayed when a cycle is being configured or is running. Below are their functions:

	enter the Settings screen
	switch light on/off
	activate a smoking phase according to settings
	activate an air exchange phase according to settings
	activate a rest phase (pause) according to settings
	activate sanitation according to settings
	block a cycle (not present in the meat dry-aging configuration)
	open the settings summary screen where it is possible to change the selected recipe (and save and/or copy the recipe if it is not running)
	quickly change the temperature or humidity setpoint
	quickly change the temperature or humidity setpoint

6.4 Screen saver


When a recipe is running, the screen saver will come on after a period of inactivity set by parameter E0 and will display the values detected by the probes in use. This function can be disabled by setting parameter E0=0.

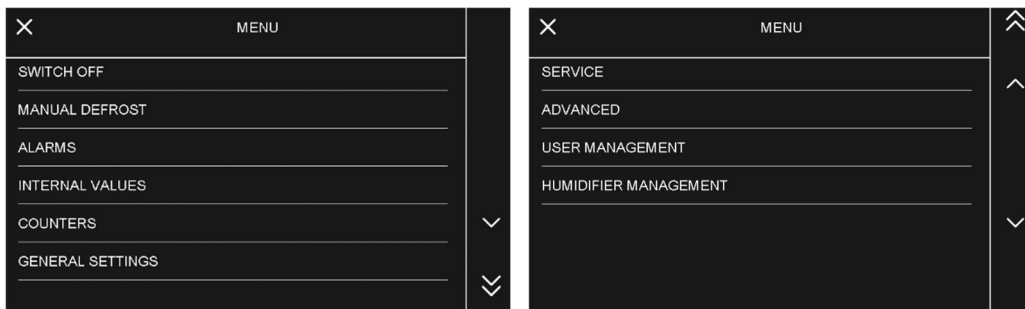
To exit the screen saver, touch the display twice: the first time shows the status screen of the controller and the second reactivates the functions of the keys.

The controller status screen also automatically appears during an alarm in progress or at the end of a recipe in progress.



6.5 Settings screen

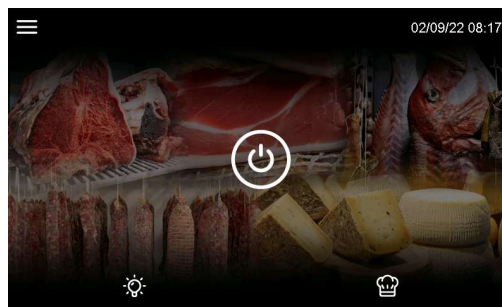
The  key gives access to a screen where sub-menus can be selected to configure the controller or check machine status and alarms; some sub-menus are not available when a cycle is in progress. The following screen is displayed and can be seen in full by scrolling down with the arrows on the right side of the display:



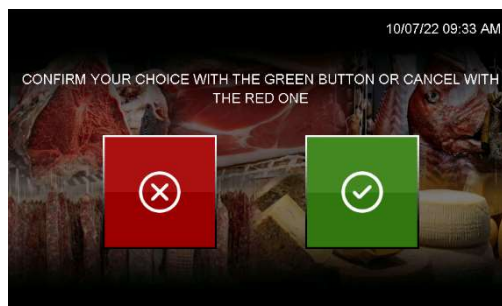
Press on a description to access the sub-menu.

6.5.1 Switch-off

By pressing this key, the machine goes back into stand-by.

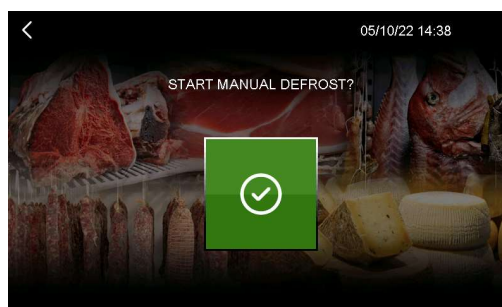


To switch the device on from the stand-by screen, press the central  key; to switch the device off, go to the Settings page and select Switch-off. The following page will be displayed:



6.5.2 Manual defrost

When this key is pressed, manual defrost is selected and starts up if the conditions are met.



6.5.3 Alarms

When this key is pressed, the alarms in progress (with automatic and manual reset) are displayed.

When alarms with automatic reset are resolved, they are deleted from the list, while manual alarms, once resolved, must be reset by the user before they are removed from the list.

6.5.4 Internal values


A screen is displayed with the status or value of the controller's inputs and outputs. Only the status of the configured inputs and outputs are displayed.

INTERNAL VALUES	
PROBE 1	31.8°C
PROBE 2	13.9°C
HUMIDITY	67%
DOOR INPUT	OFF
MF1 INPUT	OFF
MF2 INPUT	OFF

6.5.5 Counters

Reports of machine operation times are displayed (total hours of machine operation, total hours of compressor operation, average time the compressor was switched on, average time the compressor was switched off).

COUNTERS	
COMPRESSOR OPERATING TIME	00h00m
AVERAGE COMPRESSOR-ON TIME	00h00m
AVERAGE COMPRESSOR-OFF TIME	00h00m
% DAILY COMPRESSOR OPERATION	0%
% HOURLY COMPRESSOR OPERATION	0%
TOTAL OPERATING TIME	21h00m

Compressor operation time and, therefore, compressor maintenance time can be reset using the  key.



6.5.6 General settings

This option gives access to the following sub-menu:

GENERAL SETTINGS	
DATE TIME	
LANGUAGE	
HACCP.CSV FILE SETUP	
WELCOME PAGE	
UNIT NAME	

and the following pages:

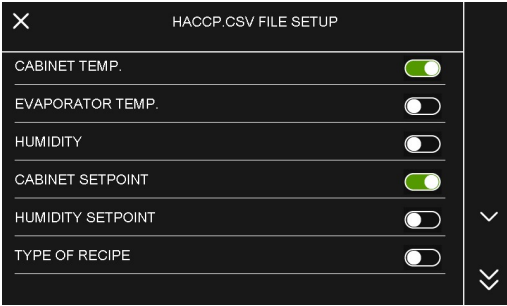
DATE/TIME: to set the date and time

< DATE TIME	
05 / 10 / 22	
15 : 30	
	<div>AM PM</div> <div>0</div> <div></div>

LANGUAGE: to choose the language



HACCP FILE SETUP: to select the variables to create the HACCP historical data file



WELCOME PAGE: to enable the machine configuration wizard. When the user switches the device on for the first time (going from stand-by to ON), some pages of settings are displayed in sequence to quickly configure the controller:

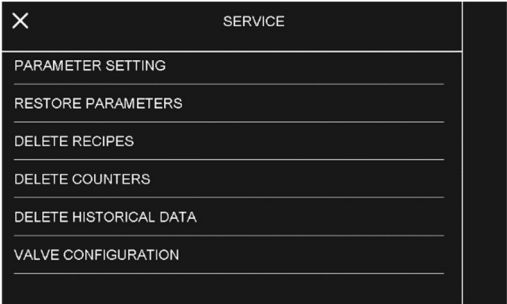
- LANGUAGE
- NAME OF DEVICE/UNIT
- DATE AND TIME
- UNIT OF MEASUREMENT

UNIT NAME: editor to set the machine name.



6.5.7 Service

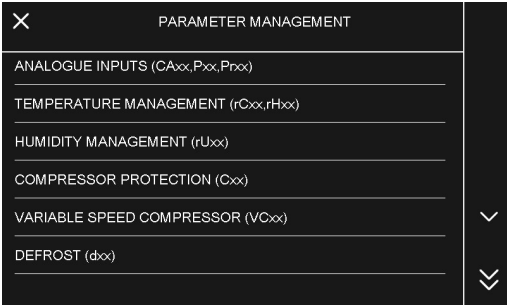
This option gives access to the sub-menu below



and the following pages:

PARAMETER SETTING

The parameter configuration page is accessed by the password -19. See also section 13 “PARAMETERS”.



RESTORE DEFAULT PARAMETERS

The function to restore the default parameters is accessed by the password 149.

DELETE RECIPES

The function to restore the default recipe book is accessed by the password 99.

DELETE COUNTERS

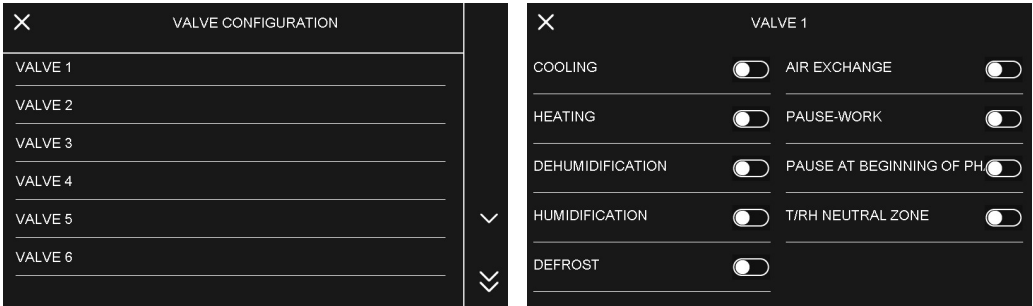
The function to delete machine operation times is accessed by the password 99.

DELETE HISTORICAL DATA

The function to delete historical data is accessed by the password 99.

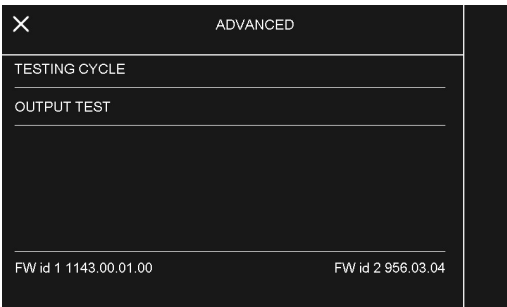
VALVE CONFIGURATION

The function to configure the valves is accessed by the password -19. The status of each of the 7 valves in the heating, cooling, humidification, dehumidification, defrost, pause at the beginning of the phase and in the neutral zone phases can be configured here.



6.5.8 Advanced

This option gives access to the following sub-menu:



and the following pages:

OUTPUT TEST to access the page to test the machine’s physical outputs (see para. 9.14).

TESTING CYCLE to activate the machine’s testing cycle (see para. 9.15).

The password -19 must be entered to access both these functions.

6.5.9 User management

The controller can manage the three access levels listed below if parameter E9=1; the user levels can only be managed when logged in as ADMIN.



USER



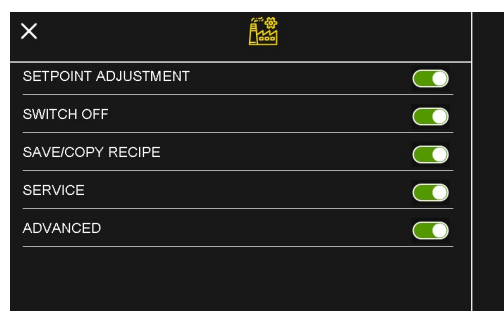
SERVICE



ADMIN

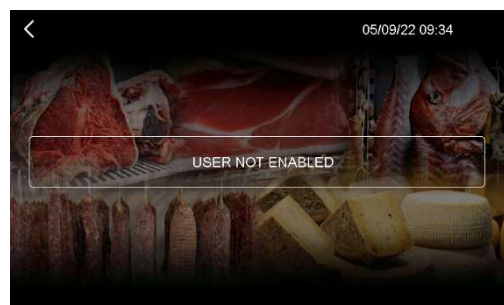
The default passwords to access the SERVICE or ADMIN levels are 125 and 250 respectively; the USER level has no password.

ADMIN is the only level granted full access to the machine functions and the possibility of changing the passwords and enable/disable the functions each user can access.



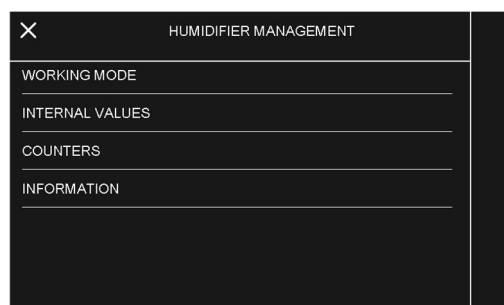
Once the user configurations have been completed, it is possible to log out manually from the home or stand-by pages by pressing the icon of the user who is currently active, otherwise the controller will exit after 5 minutes.


The following page is displayed if users attempt to perform a function they are not enabled to perform.




6.5.10 Humidifier management (only if operation with Mistral is enabled)

This option gives access to a list of menus for humidifier management: working mode, internal values, counters and information.



WORKING MODE: this page gives the internal working values of the humidifier and can also be viewed while a cycle is running by pressing the function key .

WORKING MODE	
STATUS	DRAINAGE
WORKING PERCENTAGE	0%
MODE	OFF
r5 VALUE	0%
r6 VALUE	100%
WATER CONDUCTIVITY	487uS*cm

INTERNAL VALUES: this page gives the status of humidifier operational variables (currents, inputs and outputs) and can also be viewed while a cycle is running by pressing the function key .

INTERNAL VALUES	
CURRENT OF THE MIST MAKER	212.0mA
CURRENT OF THE LOAD VALVE	0.0mA
CURRENT OF THE DRAIN VALVE	0.0mA
CURRENT OF THE FAN	89.0mA
POWER	0.0W
ENABLING STEAM GENERATION	ACTIVE

COUNTERS: this page gives the worked hours of the mist maker and the fans.

COUNTERS	
MIST MAKER WORKED HOURS	00h00m
FAN WORKED HOURS	00h00m

INFORMATION: this page gives general humidifier information.


INFORMATION	
Operating hours can be canceled by pressing the T1 button for a minimum of 4 seconds.	
Manual drain is activated by pressing the FNC button for at least 4 seconds. Manual drain can be required in any operating condition. During drain the LEDs turn on sequentially changing the status every second.	
FW id 1062.AA.06	

7 MAIN FUNCTIONS

The controller provides complete control for aging and meat dry-aging cabinets or rooms for different types of products such as meat, charcuterie, cheese and other types of product.

The 30 available recipes are grouped into 9 product categories. In the combined configuration (aging+meat dry-aging), the categories and, as a result, the recipes are divided into the two operating modes.

7.1 Meat dry-aging cycle

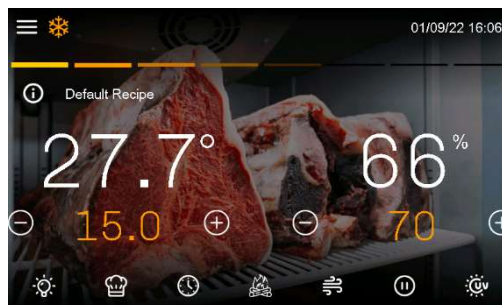
When the controller goes from stand-by to ON in this configuration, the last meat dry-aging recipe carried out before switch-off or the first meat dry-aging recipe in the recipe book begins to run. To change the recipe, press the  key to select the new category and recipe. The recipe will start to run as soon as the selection page is exited.


The temperature and humidity setpoints and fan speed can be set in the meat dry-aging cycle (see parameter E7). The modes of the special functions, such as air exchange, rest, smoking and sanitation, can also be set.

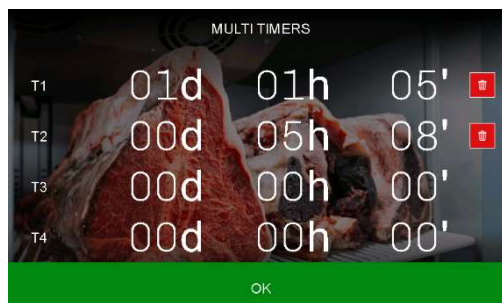



Up to 4 timers may be set during a meat dry-aging cycle; when the time has elapsed, a buzzer will sound but does not affect the progress of the cycle.

The settings window opens from the meat dry-aging run screen.



The following screen opens when the  key is pressed.




When the OK key is pressed, the timers start up and the  icon on the meat dry-aging run page flashes.



To set a timer, press the area relating to it and a page with a numerical keypad will open.



The maximum timer duration that can be set is 30 days, 23 hours and 59 minutes.

A timer can be disabled by pressing the  key on the relative line.

7.2 Aging cycle

When the controller goes from stand-by to ON in this configuration, the last aging recipe carried out before switch-off or the first aging recipe in the recipe book is selected. To change the recipe, press the  key to select the new category and recipe. The recipe will be selected as soon as the selection page is exited. Press the  key to run it.

The temperature and humidity setpoints, fan speed and the duration of each individual phase can be set in the aging cycle. The modes of the special functions, such as air exchange, rest, smoking and sanitation, can also be set.

N.B.: the duration of each individual phase can only be set if the recipe is not running.

7.2.1 Selecting, changing and starting up a recipe

Every recipe is selected, changed and started up from the default recipe or a pre-existing recipe.
Upon selecting the desired recipe, a table with a summary of the settings for every phase is displayed.

Default Recipe				
1	2	3	4	5
Phase 1	Phase 2	Phase 3	Phase 4	Phase 5
-4.0°	1.0°	12.0°	28.0°	13.0°
0%	0%	80%	85%	85%
00d00h03'	00d00h01'	00d00h01'	00d00h02'	00d00h05'
1	1	1	1	1

The name of the recipe can be set or changed here. When the area with the current name is pressed, the page below will open to enter the new name.



Pressing on the table, instead, will give access to the single screens where changes can be made to each phase.





If the name of the phase at the top of the display is pressed, a list of names which can be selected to rename the phase appears; to go back to the table, press the arrow at the top of the display. Select the different fields to change their values using the numerical keypad. **N.B.:** the maximum duration that can be set for each phase is 30 days, 23 hours and 59 minutes.

Changing fan speed depends on parameter E7:


- if E7=0, the speed is single and cannot be changed;
- if E7=1 or 4, the speed is single or double and can be changed by pressing on the fan area;
- if E7=2 or 3, there are 10 steps for the speed: to change them, press on the fan area and the following screen will be displayed.



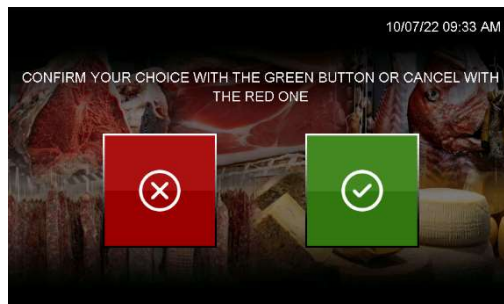
Once the settings have been made, go back to the table where changes can be saved, recipes can be copied with the  key or existing recipes overwritten with the  key.

Exit this page and go back to the home page where the selected recipe can be started up.


Once the recipe has finished, the buzzer will sound and the message Cycle Completed will appear on the screen. This message will remain on the screen for the time set by parameter E2.

If the final phase is set with unlimited time, the buzzer will sound at the end of the penultimate phase and the recipe will continue to run until the  key is pressed. Confirmation of the choice will be requested on the screen.


The cycle can be interrupted manually at any time by holding the  key down. Once again, confirmation of the choice will be requested on the screen.



7.2.2 Adding/Removing a phase

A phase can be added to a recipe by pressing the  key on the recipe summary screen; the additional phase is automatically assigned the values of the previous phase.




When the data of the final phase is displayed, the  key appears, allowing it to be deleted.



N.B.: Phases can only be added or removed starting with the final existing phase. Intermediary phases cannot be modified.

7.3 Special functions

A number of special functions, such as air exchange, rest, smoking and sanitation, can be programmed to take place during a recipe to enhance the aging and meat dry-aging process. These functions can be set either before or while the recipe is running.

Go into the summary screen of the phase and press the  key.



The special functions summary page will open.




Press on an area to open its settings page. Press the  key to return to the previous page.

7.3.1 Air exchange management

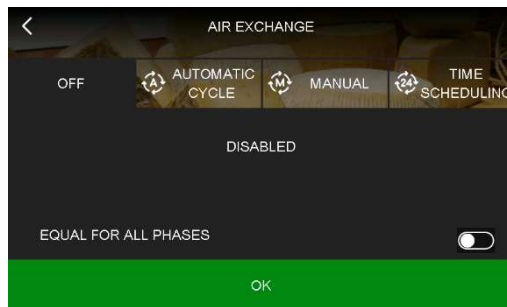
During the aging and meat dry-aging processes, the air in the cabinet needs changing periodically to ensure it is always rich in oxygen in order to prevent smells or impurities which could ruin the end product.

This function is enabled by configuring an output as the air exchange fan.

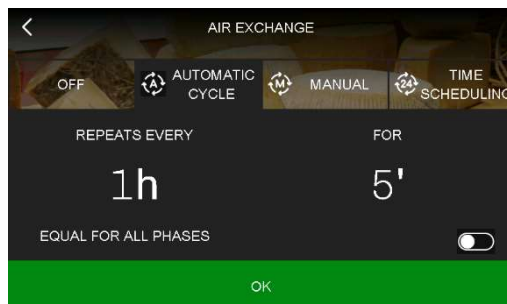
The air exchange fan can be set to OFF, automatic, manual or time scheduling.

Settings can be different for every phase or the same for all the phases. The setting for one phase can be applied to all the phases by pressing the  key.

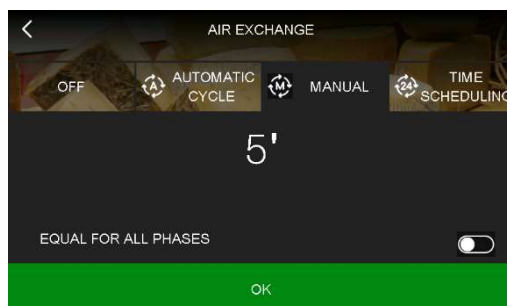
OFF: air exchange is disabled.



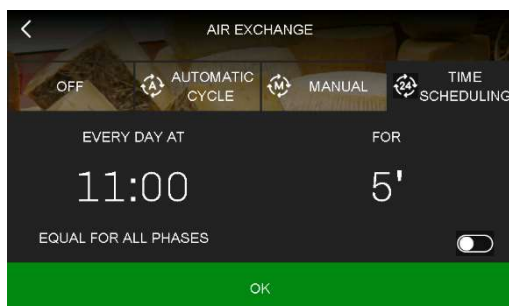
AUTOMATIC CYCLE: the fixed interval between air exchange cycles and the duration of the cycle are set. In the example below, the cycle is programmed to run for 5 minutes every hour.



MANUAL: the duration of the air exchange cycle is set but is only activated when the dedicated key is pressed. In the example below, the cycle is programmed to run for 5 minutes.



TIME SCHEDULING: the time of day and the duration of the cycle are set. In the example below, the cycle is programmed to run every day at 11.00 for 5 minutes.



If the air exchange function is active when a recipe is running, the icon flashes. At any time when a recipe is running, the air exchange key can be pressed and a manual air exchange cycle run, irrespective of the setting.

7.3.2 Management of product rest intervals

During aging and meat dry-aging, products need periods of complete rest (of variable frequency and duration) when the equipment does not regulate either the temperature, humidity or ventilation inside the cabinet. These intervals are configured in the same way as the air exchange function.

7.3.3 Management of smoking cycles

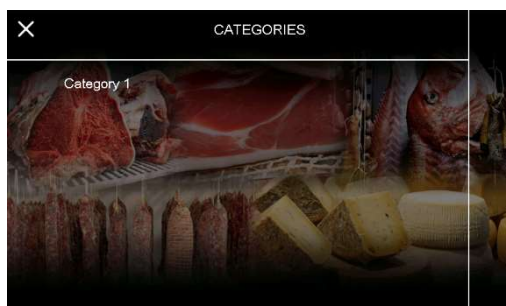
Smoking cycles can be enabled/activated during aging and meat dry-aging. These intervals are configured in the same way as the air exchange function. This function is enabled by configuring an output as the smoker.

7.3.4 Management of sanitation cycles

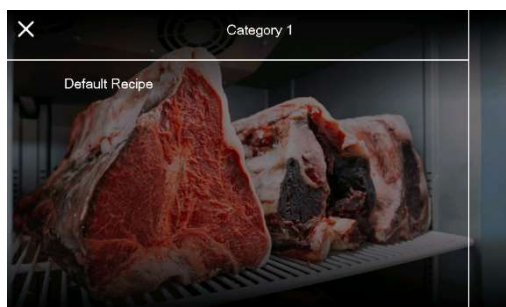
Sanitation cycles can be enabled/activated during aging and meat dry-aging. These intervals are configured in the same way as the air exchange function. This function is enabled by configuring an output as sanitation.

7.4 Recipe book

Machines which are configured for aging only or meat dry-aging only have a single recipe book which is divided into categories. Only the categories which contain at least one recipe are displayed.




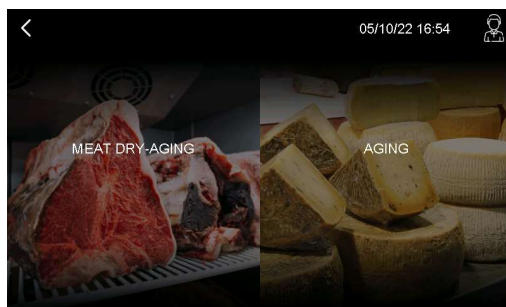
After choosing the category, a list of the recipes in the category are given on the next page.



The maximum number of categories available is 9, for an overall total of 30 recipes. There is no limit to the number of recipes in each category; the total number of recipes (i.e. the sum of all the recipes in all the categories) however must not exceed 30.

Machines which are configured for aging+meat dry-aging can have a maximum of 9 categories altogether and the total number of recipes is always 30.

In this configuration, when the  key is pressed, the page appears to choose the type of recipe book.



When the name of the desired recipe is pressed, the table is displayed and the cycle/recipe can be started up.

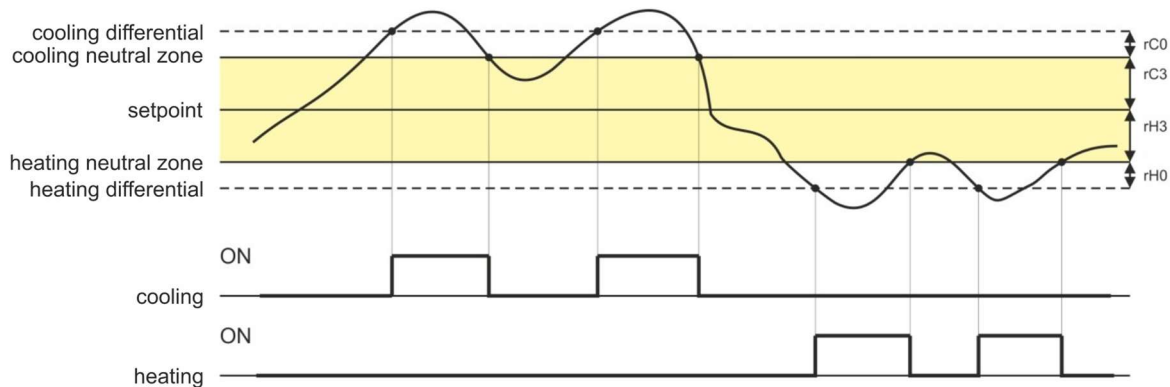
8 REGULATIONS

8.1 Temperature regulation

Temperature regulation for all phases of the equipment is in the neutral zone, in which two relative values are set one above and one below the temperature setpoint, thus creating a zone inside which the loads for heating and cooling are not activated.

When the temperature rises above the neutral zone value beyond the threshold set by rC0 (cooling differential), the cooling loads are activated until the temperature returns to the neutral zone value.

Similarly, when the temperature falls below the neutral zone value beyond the threshold set by rH0 (heating differential), the heating loads are activated until the temperature returns to the neutral zone value.



8.1.1 Generating cooling

Cooling is generated by the refrigeration circuit installed in the equipment.

When cooling is required, the compressor output and the pump-down solenoid valve output (if enabled) are activated.

The evaporator fan operates continuously or in parallel with the compressor, depending how the parameters are configured.

8.1.2 Generating heat

Heat is generated by a heater.

When heating is required, the heater output is activated, with the possibility of running a duty switch on/off cycle (set by parameters rH6 and rH7), so as to limit the heating power if a very powerful heater is being used and thus avoid the cabinet overheating.

The evaporator fan operates continuously or in parallel with the heaters, depending how the parameters are configured.

8.2 Humidity regulation

In all phases where this is required, the humidity is regulated with a 4÷20 mA humidity probe (rU0=0 and P12≠0). It is enabled in the neutral zone where two values are set, one above and one below the humidity setpoint, thus creating a zone inside which the loads for humidification and dehumidification are not activated.

When the humidity rises above the neutral zone value beyond the threshold set by rU5 (dehumidification differential), the dehumidification loads are activated and they remain active until the humidity returns to the neutral zone value.

Similarly, when the humidity falls below the neutral zone value beyond the threshold set by rU8 (humidification differential), the humidification loads are activated proportionally and they remain active until the humidity returns to the neutral zone value.

N.B.: to manage humidity without a probe, see paragraph 9.7.1.

8.2.1 Humidification management

Humidification is managed by two different loads: a humidity production (generator) output and a humidity injection (humidification) output. The operating modes are configurable through parameters E3, E4 and E6.

Parameter E3

If set to 1, this parameter enables the use of an external humidifier which is controlled by the RS485 serial connection.

Parameter E4

This parameter manages the humidity production output.

0 -> output always active when a recipe is running.

1 -> output active if humidity is requested and the cabinet temperature is lower than the setpoint of the phase in progress; the output is deactivated if humidity is not requested or if the cabinet temperature is higher or equal to the setpoint of the phase in progress.

2 -> output active if humidity is requested, deactivated if not requested in the phase in progress.

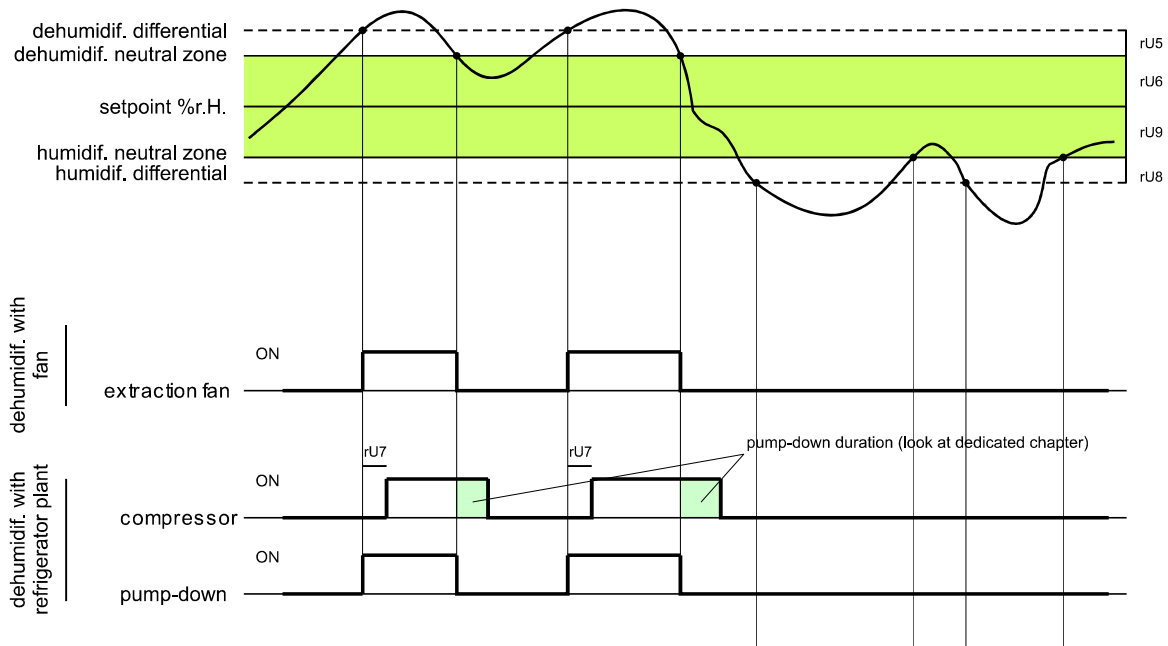
3 -> output active if humidity is requested and the humidity value is lower than the humidity - neutral zone - hysteresis setpoint; it is deactivated if humidity is not requested or if the humidity value is higher than the humidity - neutral zone setpoint.

Parameter E6

On/Off or proportional humidity regulation.

0 -> proportional regulation. The humidity injection output is activated when the humidity value inside the cabinet falls below the neutral zone value (set by parameter rU9) beyond the threshold set by parameter rU8 (humidification differential). The humidity injection output activation time percentage is proportional to the humidity value compared to the proportional humidification band value set by parameter rU10. The activation/deactivation cycle time of the humidity injection output is set by parameter rU11, while the duration of activation is calculated on the basis of the time set by rU12.

1 -> on/off regulation. The humidity injection output, on the other hand, is activated in on/off cycles when required, set by parameters rU15 and rU16, always starting at the off time to allow the humidity generator to be ready to produce humidity.

**8.2.2 Dehumidification management**

Dehumidification is managed by parameter u3:

if u3=0, it is managed by an extractor fan/dehumidifier; if u3=1, it is managed by activating the refrigeration plant.

When managed by an extractor fan/dehumidifier, the output will be activated when the humidity rises above the dehumidification neutral zone value (parameter rU6) beyond the threshold set by parameter rU5 (dehumidification differential) and will be deactivated when the humidity returns to within the dehumidification neutral zone value.

When managed by the refrigeration plant, if the pump-down solenoid valve is enabled (parameter uxc=8), there will be a first attempt at dehumidification by activating the solenoid valve for a time equal to parameter rU7 (to make use of the high pressure generated when the compressor is switched off). After this time has elapsed, the compressor output will also be activated if dehumidification is still requested; once the humidity returns to within the dehumidification neutral zone value, the pump-down solenoid valve will be deactivated, after which the compressor will be deactivated by the pump-down algorithm.

If the solenoid valve is not enabled, the compressor output will be activated and deactivated in the same way as the fan output.

9 LOAD MANAGEMENT

Loads are managed according to the configuration of parameters u1c - u13c. See the list of parameters for more details of permitted configurations.

9.1 ON-OFF / variable speed compressor management

Activation of the compressor depends on the length of the delay between two switch-ons (parameter C1), on the minimum duration of the compressor-off time (parameter C2), on the delayed switch-on of the compressor from the device power-on (parameter C0) and on the minimum duration of the compressor-on time (parameter C3).

The compressor can also be active during a hot gas defrost (parameter d1=1). In this case, in order for the defrost to start, the compressor must be active for at least the time set by parameter d15.

The compressor can also be used for dehumidification; for more details see paragraph 9.9.

Compressor switch-off is managed differently if management of the pump-down solenoid valve is required (for more details see paragraph 9.2).

A variable speed compressor can be managed instead of the on/off compressor. The models that may be used are specified by parameter VC3.

Regulation of the variable speed compressor is PI and is set by parameters VC1 and VC2; using parameter VC4, it is possible to set how long the compressor remains at a speed of 85Hz before considering PI regulation at first power-on.

If necessary, parameter C9 can be set to force compressor speed to the maximum, if the compressor is still within the proportional band after the time set by this parameter has elapsed.

If cabinet temperature is lower than "Setpoint-rC0", the compressor is immediately switched off, even if integral time still has not elapsed.

Use parameters VC5 and VC6 if it becomes necessary to limit the minimal and maximum frequency of operation; always remain within the range set by the compressor manufacturer.

N.B.: Managing a variable speed compressor in the Vcolor 589 models is only possible when there is a modulating frequency output.

9.2 Pump-down management

If a relay is configured as a pump-down solenoid valve, the controller manages the interaction between the compressor output and the solenoid valve output as follows:

When compressor activation is requested, the pump-down valve is also activated.

When compressor deactivation is requested, first the valve is deactivated and then the compressor. The compressor is deactivated as follows and depends on the configuration of u2 and the configuration parameters of the multi-purpose digital inputs:

- if u2 is set to 0, deactivation of the compressor and the valve happen at the same time;
- if u2 is set to anything other than zero and no multi-purpose input is configured for low pressure or pump-down, when there is a deactivation request, first the valve is deactivated and after time u2, the compressor is deactivated;
- if u2 is set to anything other than zero and an input is configured for low pressure, first the valve is deactivated and then the compressor is deactivated when the input closes or time u2 elapses;
- if u2 is set to anything other than zero and an input is configured for pump-down, first the valve is deactivated and then the compressor is deactivated when the input closes or time u2 elapses; if time u2 expires, the pump-down alarm is also triggered.

9.3 Evaporator fan management

N.B.: the evaporator fan can be managed by the PWM output (Vcolor 579) or the 0-10 Vdc output (Vcolor 589) depending on the model.

The evaporator fan is managed according to the configuration of parameter E7. It can be configured to work continuously or in parallel with the regulation output, ie. in parallel with the compressor, heater, humidification and dehumidification. The way it behaves is set by parameter F1.

It is also possible to set a regulation output delay at fan deactivation using parameter F13 and a duty-cycle with a cycle time and On time set by parameters F14 and F15 during deactivation of the main load. If parameters F14 and F15 are set to zero, there will be no activation.

During the phases, the fan is only activated when the evaporator temperature is below the value set by parameter F25.

If the evaporator fan is managed by analogue output PWM or 0-10 Vdc, it will also be possible to set the fan speed for each phase, considering ten speeds set by parameters F27 - F36.

When the fan is switched on, the controller manages its speed (F21) and start-up time (F22). When the start-up phase ends, the fan speed will keep to the speed set for the phase in progress, compensated between parameters F23 and F24 that set the minimum and maximum fan speed respectively.

During a defrost cycle, fan operation is set by parameter F26. At the end of the defrost cycle, the evaporator fan will remain off for the drip time set by parameter d7 and the subsequent evaporator fan stop time set by parameter F12.

9.3.1 EVDFAN1 module management (only for the Vcolor 579 version with PWM):

To adapt the phase-cutting regulation to all types of 230 Vac single-phase motors, a manual evaporator fan calibration procedure is recommended.

1. Set F23 at 0% and F24 at 100%.
2. Carry out a manual cycle and vary the fan speed, check the minimum percentage below which the fan switches off and the maximum percentage above which the fan runs at maximum.
3. Set these values for F23 and F24 respectively.

9.3.2 Management by EVCO inverter

The evaporator fans are managed in modulating mode by the EVCO inverter which can be integrated via the RS-485 serial port. The connected inverter can be replaced by a different model or version at any time.


The controller can automatically detect the presence of an EVCO inverter. By setting parameter E10=2 (or E10=3 if there is also a relay expansion) and E7=2, the system starts up again on the home page.

The parameters relating to the inverter can be set from the page SERVICE – PARAMETERS – INVERTER CONFIGURATION.

Similarly to what happens in the phase cutting management mode (E7=3), up to 10 speeds can be selected for the evaporator fans when managed by the inverter. In this case, the 10 steps are set by parameters F27 - F36 (from speed 1 to speed 10 respectively) at the discretion of the user and the speeds are expressed as a percentage of the interval between the maximum speed of the motor in RPM (S204) and the minimum speed of the motor in RPM (S205).

Below is the formula for determining speed 1, for example: $S205 + [(S204-S205) \cdot (\text{value of parameter F27})] / 100$

9.4 Defrost management

Defrost can be automatic (at time intervals) or manual. Manual defrost is activated by accessing the  menu from the On/stand-by screen or during a cycle in progress.

Depending on the value of parameter d1, the machine will perform either electric or hot gas defrost cycles or when the compressor stops. If an evaporator probe is enabled (parameters Pr1, Pr2 or Pr3 = 2), defrost will end when it reaches the end-of-defrost temperature (parameter d2) within a maximum time interval set by parameter d3. If an evaporator probe is not enabled (Pr1, Pr2 or Pr3 ≠ 2) or if it is faulty, defrost will end at the time set by parameter d3.

At the end of a defrost cycle, the controller will allocate a drip time (d7) during which all the regulation outputs will be switched off. When the dripping time finishes, the refrigeration plant will begin working again but activation of the evaporator fan will be further delayed by the time set by parameter F12.

If a hot gas defrost is being carried out, in order for defrost to start, the compressor must be activated for at least the time set by parameter d15.

If type "B" defrost is enabled (parameter d00), traditional defrost is carried out alongside another defrost mode which is activated according to the cabinet setpoint (see parameter d01).

9.5 Heater management

When heat is required, the heater output will be activated, also making it possible to manage a switch-on and off duty cycle controlled by parameters rH6 and rH7.

9.6 Humidity production output management (only if E3 = 0)

Management of the humidity production output depends on the setting of parameter E4.

More precisely:

E4=0

- Output always active when a cycle is running.

E4=1

- In phases which require humidity control, the output is active if the cabinet temperature is lower than the setpoint of the phase in progress and is deactivated if the cabinet temperature is higher.
In phases where there is no humidity control, the output is deactivated.

E4=2

- The output is active if the phase requires humidity control, it is deactivated if there is no control.

E4=3

- In phases which require humidity control, the output is active if the humidity in the cabinet is lower than the setpoint - hysteresis for the phase in progress and is deactivated if humidity in the cabinet is higher.
In phases where there is no humidity control, the output is deactivated.

9.7 Humidity injection output management (only if E3 = 0)

The humidity injection output management is possible only if E3=0, with or without the use of a humidity probe (parameter rU0).

If E3=1, the humidifier is managed by the Mistral humidifier (see section 9.8).

9.7.1 Output management without a probe in a generic humidifier

This kind of management is obtained with the following setting: rU0 = 1.

The humidity injection output will remain active for a duty cycle that varies according to the humidity setpoint for the phase in progress. The output activation and deactivation duration is set by parameter rU2 (humidification cycle time) and the maximum humidification time needed to obtain 100% humidity within the cabinet (rU3).

The humidification switch-on/off times will be proportional on the basis of the humidity setpoint percentage according to parameter rU3, and they will be repeated for every cycle time set by rU2.

9.7.2 Output management with a probe in a generic humidifier with proportional regulation

This kind of management is obtained with the following setting: rU0 = 0, E6=0.

The humidity injection output is activated when the humidity value inside the cabinet falls below the neutral zone value (rU9) beyond the threshold set by the humidification differential (rU8).

The duration of the humidity injection output activation is proportional to the humidity value compared to the proportional humidification band value set by parameter rU10.

Parameter rU11 sets the cycle time, while parameter rU12 represents the time base used to calculate the output activation duration.

9.7.3 Output management with a probe in a generic humidifier with on-off cycle regulation

This kind of management is obtained with the following setting: rU0 = 0, E6=1.

The humidity injection output is activated when the humidity value inside the cabinet falls below the neutral zone value (rU9) beyond the threshold set by the humidification differential (rU8) performing off/on cycles, the duration being set by parameters rU15 and rU16. The count always starts from the off time.

9.8 Mistral humidifier management via the serial port (only if E3 = 1)

This kind of management is obtained with the following settings: rU0 = 0, E6=0.

Make sure the right connections have been made to allow serial communication via the RS-485 port and check the settings of parameters HS1 to HS7.

9.9 Dehumidification management

Dehumidification management is only active when humidity is managed by a humidity probe (rU0 = 0).

Dehumidification can be managed in one of the following ways.

- through the dehumidification output, configuring one of the outputs as dehumidifier/extraction fan. In this case, parameter "u3" will not be considered, irrespective of the assigned value;
- by activating the refrigeration plant (compressor and pump-down solenoid valve if fitted) with "u3=1" and no output configured as dehumidifier.

9.9.1 Extractor fan/dehumidifier management

When managed by an extractor fan/dehumidifier, the output will be activated when the humidity rises above the dehumidification neutral zone value (rU6) plus the differential value (rU5) and will be deactivated when the humidity returns to within the dehumidification neutral zone value.

9.9.2 Management by activating the refrigeration plant

When pump-down solenoid valve management is not enabled, the output will be activated when the humidity rises above the dehumidification neutral zone value (rU6) plus the differential value (rU5) and will be deactivated when the humidity returns to within the dehumidification neutral zone value.

If, however, pump-down solenoid valve management is enabled, there will be a first attempt at dehumidification by activating the pump-down solenoid valve (to make use of the high pressure generated when the compressor is switched off), for a time period set by rU7. After this time has elapsed, the compressor output will be activated.

Once the humidity returns to within the dehumidification neutral zone value, the pump-down solenoid valve will be deactivated, after which the compressor will be deactivated by the pump-down algorithm.

9.10 Condenser fan management

If a condenser probe is enabled (see parameters Pr1, Pr2, Pr3), the condenser fan activation modes depend on F18.

If F18=0, the condenser fan will be activated when the condenser temperature rises above the value of parameter F16 plus the differential value ($F16 + 2.0\text{ °C} / 3.6\text{ °F}$) and will be deactivated if the condenser temperature goes below the value of F16.

If F18=1, the condenser fan will be activated if the compressor is active; if the compressor is deactivated, after the delay in deactivation following compressor switch-off (set by parameter F17), the fan will be activated/deactivated on the basis of the threshold temperature value of the condenser probe (F16).

If F18 = 2, the condenser fan will be activated on the basis of the threshold temperature value of the condenser probe (F16) if the compressor is on and will be deactivated after the delay set by parameter F17 when the compressor goes off.

During a CONDENSER OVERHEAT or COMPRESSOR LOCKED alarm, the condenser fan will stay on.

The fans are switched off during defrost.

9.11 Cabinet light management

The cabinet light can be switched on by the  key if the function is enabled by parameter u1.

It can also be switched on when the door is opened if the value set by i0 is greater than 2; switching on with the key has priority over the door switch.

If the light has been switched on with the key, opening or closing the door will have no effect on the light (the light will stay on until it is switched off from the key).

If the light is switched on when the door is opened, it stays on for the time set by parameter i14.

9.12 On/Stand-by output management

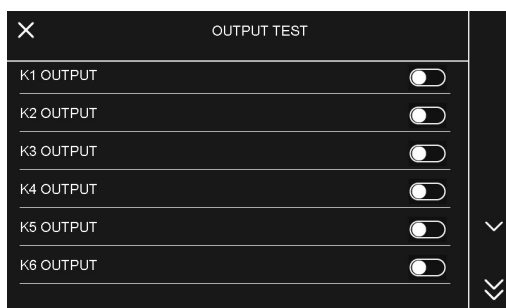
This output does not depend on any regulation; it is activated when the controller is ON and deactivated when the controller is in stand-by.

9.13 Water load management

The water load output (if configured setting to 26 one of the parameters from u1c to u13c) is activated when the water load level input (if configured setting to 9 one among the parameters i4, i7 and i10) is activated and remains active until the input is deactivated or the timeout set by parameter u7 has elapsed. In this case, the water loading alarm is set off.

9.14 Output testing

In this mode, all the outputs (digital and analogue) in the controller can be manually activated/deactivated independently of the regulation in progress. Every output can be activated/deactivated individually.



9.15 Testing cycle


The password to enter this mode is -19.

A completely automatic testing cycle can be performed in this mode.

The testing cycle consists of the following phases:

- heating phase

- cooling phase
- defrost
- recovery

Press the  key to start up the testing cycle:

1. Heating adjustment phase

The heating phase begins by checking the temperature and humidity. When setpoint T1 is reached, the heater switch-on cycles are run to complete the phase. 'Cycles' are the time of the ON phase plus the OFF phase. If the setpoint is not reached in the time set by parameter T3, the controller exits the testing cycle and the error "MAX TIME" is displayed.

If everything works correctly, the cooling phase starts up. First the T5 pull-down setpoint is reached and then compressor ON and OFF cycles are performed on the cooling phase setpoint.

2. Cooling adjustment phase

During this phase, probe connection is checked; the temperature of the evaporator probe must be lower than that of the cabinet, while the temperature of the condenser must always be higher than that of the cabinet. If these conditions are not met, the test ends.

This phase must not take longer than the maximum time set by parameter T7; if it does, the label "MAX TIME" will be displayed and the test ends.


3. Defrost phase

At the end of the temperature adjustment phase, a defrost cycle is forced (considering the standard defrost parameters, so d00=0). A label is displayed to indicate if this phase has been terminated due to temperature or time.

4. Recovery phase

At the end of defrost, the controller must reach the cabinet setpoint set by parameter T9.

While the cycle is running, the temperatures of the cabinet-evaporator-condenser probes are displayed on the screen (if configured), as well as the values of the humidity probe and, for each completed phase, the time and duration of the cycle.

The test can be terminated manually at any time by pressing the  key.

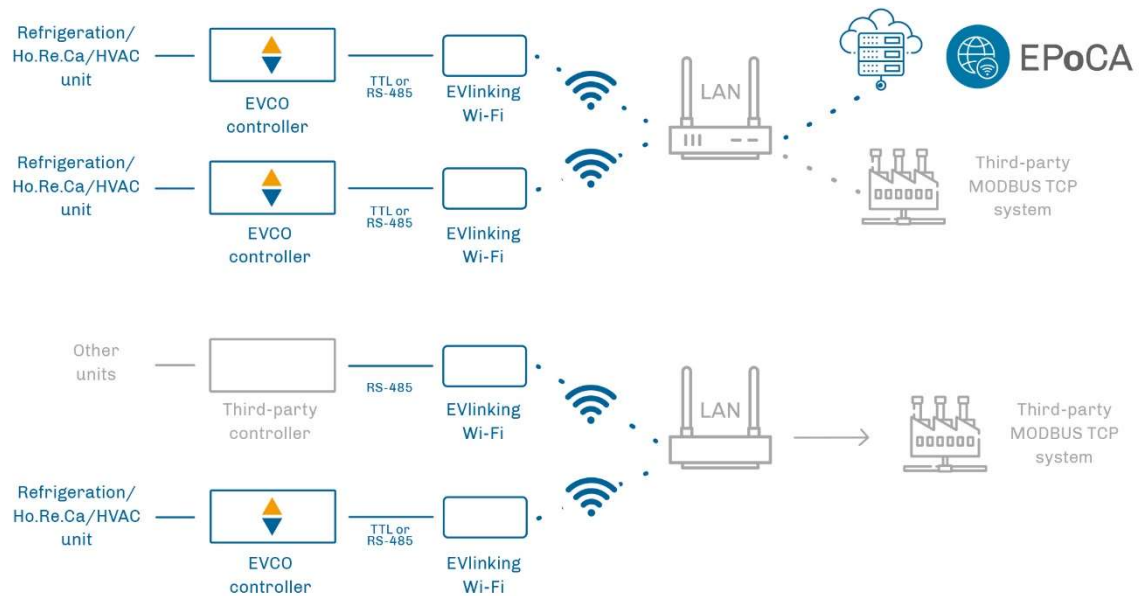
If there is a power failure during the cycle, the cycle is interrupted when power is restored.

10 CONNECTIVITY

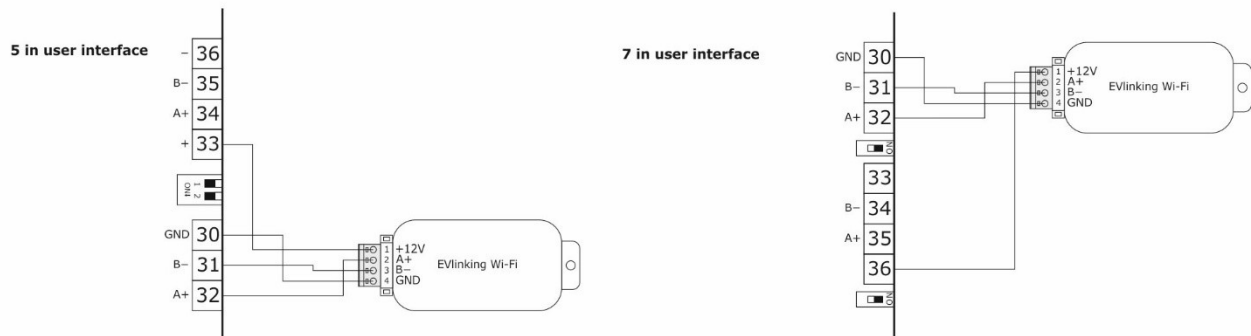
10.1 Initial information

Users can interact remotely with their equipment and start up/stop working cycles using the EPoCA cloud platform with Wi-Fi or Ethernet connectivity (which also enable alternative or parallel control through MODBUS TCP). For more details, compare the connectivity options in the "Models available and technical features" table and consult the Management and Monitoring Products/Systems and the Connectivity/Devices sections of our website www.evco.it.

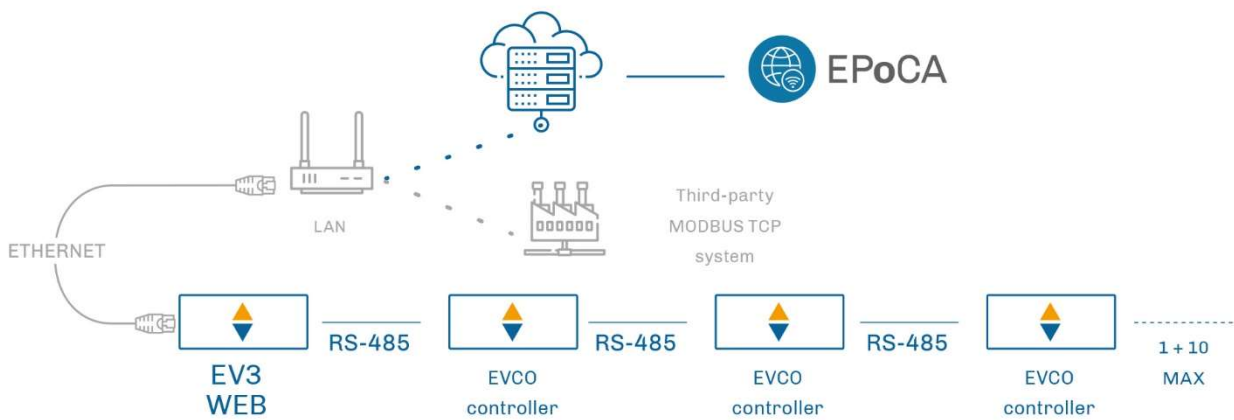
Schematic diagram for operation with EVlinking Wi-Fi (Wi-Fi connectivity)



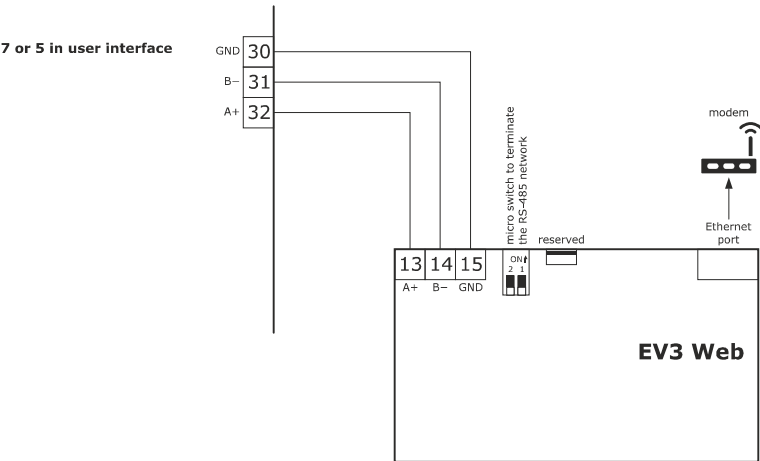
Detail of electrical connection of EVlinking Wi-Fi to Vcolor 579/589



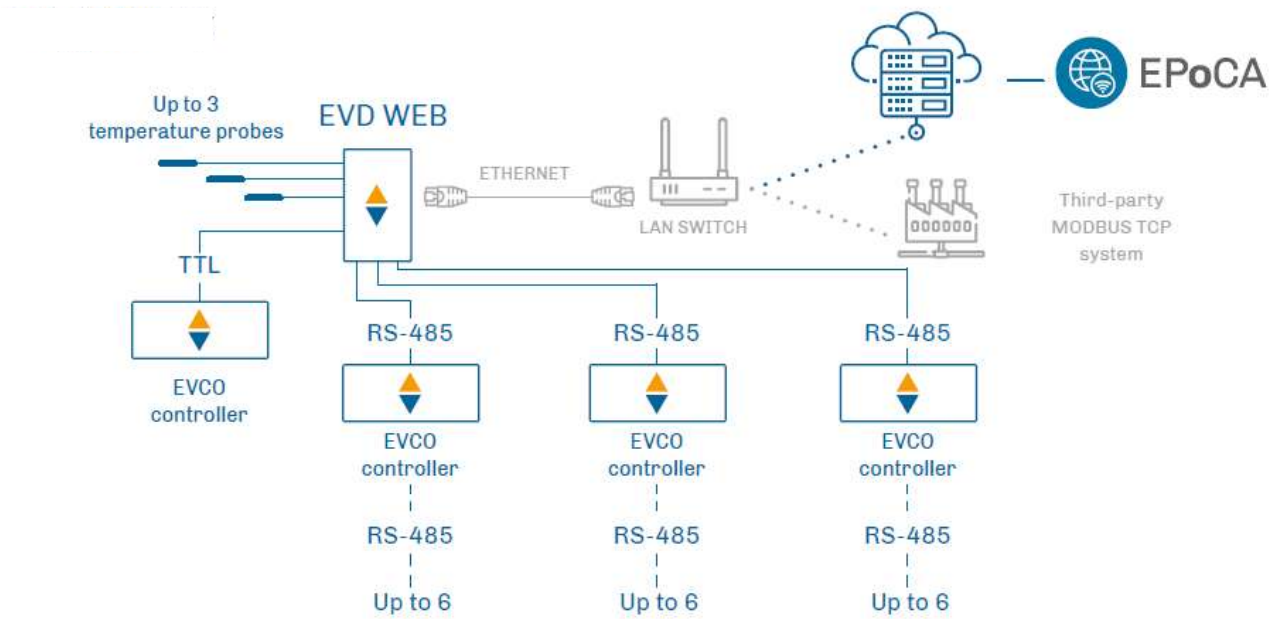
Schematic diagram for operation with EV3 Web (Ethernet connectivity)



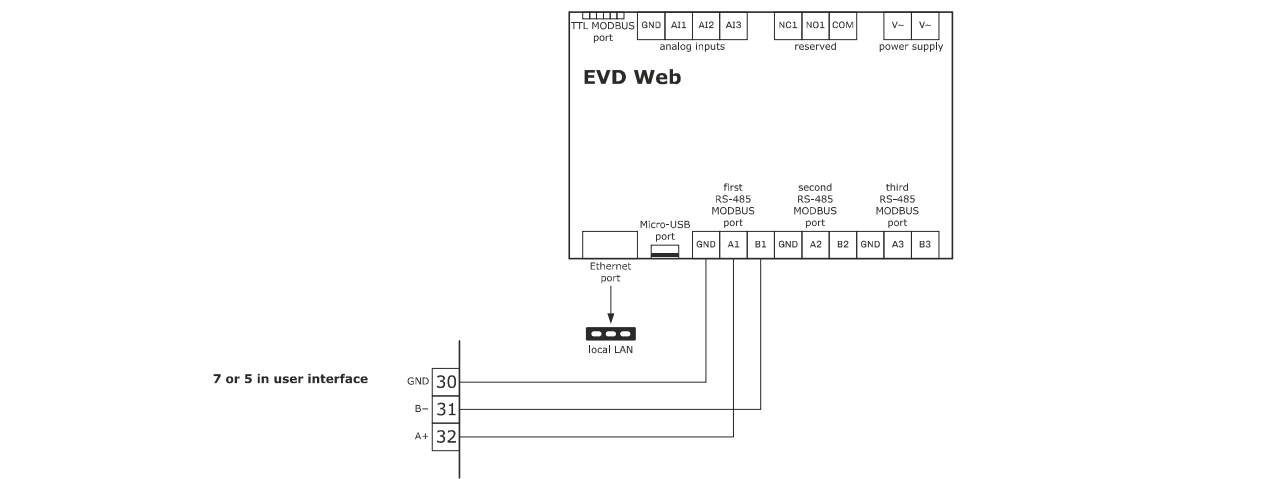
Detail of electrical connection of EV3 Web to Vcolor 579/589



Schematic diagram for operation with EVD Web (Ethernet connectivity)



Detail of electrical connection of EVD Web to Vcolor 579/589



10.2 EPoCA cloud platform

EPoCA® is a remote management and monitoring system based on a cloud platform. Originally developed to meet the management needs of the food preservation and cooking sector, it has been expanded to HVAC units in response to market demand.

To connect to the cloud system and remotely control machinery from a PC, tablet or smartphone, all users need is an EVCO controller with native EPoCA® technology and connectivity which is either built-in or provided by external hardware modules. All devices are configured using the dedicated “EPoCA Start” mobile app.

The responsive design and the graphic interface conceived to provide a pleasant user experience make EPoCA® a “ready-to-use” solution for easily accessible management and monitoring operations, even for entry-level users, while offering all the typical functions of professional platforms.

With the appropriate protection measures for access and data, the system makes it possible for one or more enabled users to operate remotely on the unit to configure its parameters, activate cycles, receive automatic alerts, view data (also as a graph) and download records in the most popular formats, such as XLSX, CSV and PDF.

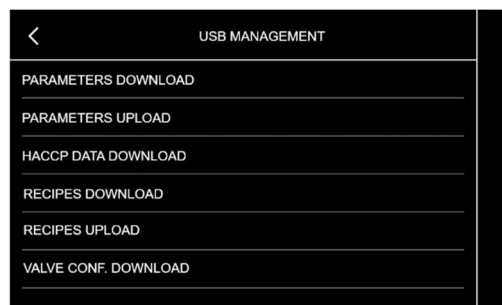
11 USB PORT MANAGEMENT

11.1 Available functions

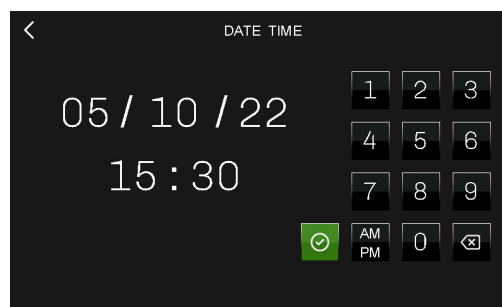
The USB port allows the following functions:

- download the data relating to the cycles performed (HACCP history) to a USB flash drive
- download the recipes saved in the controller to a USB flash drive
- download the parameters saved in the controller to a USB flash drive
- download valve configuration to a USB flash drive
- upload the recipes in the USB flash drive to the controller
- upload the parameters in the USB flash drive to the controller
- upload valve configuration to the controller
- upload CSV files to personalise the graphics, recipes and languages to the controller.

Before inserting the flash drive in the on-board USB port, go to the stand-by screen (controller is powered but regulation is not activated) then insert the USB flash drive and the menu below will appear.



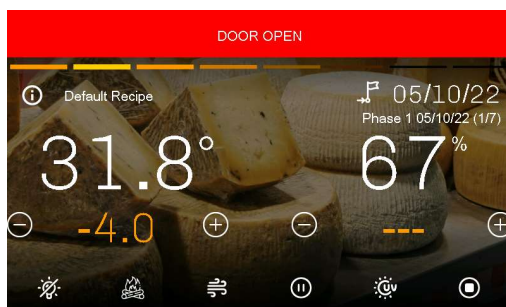
To download historical data, select the date from which to begin downloading HACCP data.



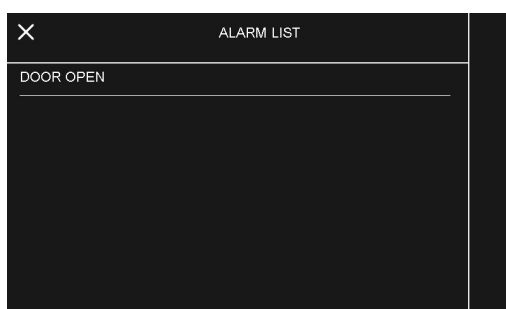
For the procedure to compile the ODS file, convert it to CSV, transfer to a USB flash drive and the instructions to upload it to the controller, please refer to "Personalisation of the Vcolor platform".

12 ALARMS

When an alarm occurs, a red bar will appear at the top of the screen indicating the alarm in progress, and the buzzer, if enabled, will begin to sound; if several alarms are in progress at the same time, they will alternate on the bar every 3 seconds.

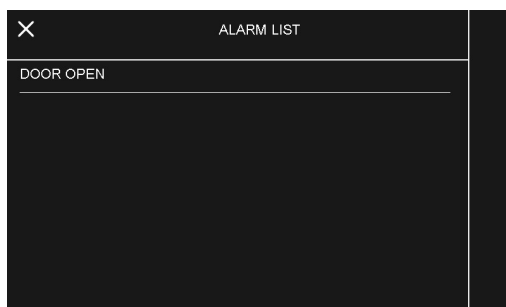


When the alarm bar is pressed, the buzzer will be silenced and the controller will automatically go to the ALARM LIST screen, where only the active alarms will be displayed.



12.1 Active alarms

To see the list of active alarms, press the MENU key and then ALARMS.



12.2 Humidifier alarms

When a humidifier alarm occurs, the controller displays the message "Generic Humidifier Alarm".

Press the relative line on the ALARM LIST screen and the page showing the current active humidifier alarms will open.

12.3 List of alarms

The table below lists all the possible alarms.

Dry aging/aging alarms

HIGH EVAPORATOR TEMPERATURE	<p>To correct:</p> <ul style="list-style-type: none"> - check the evaporator temperature - check the value of parameters A1 and A2 <p>Main results:</p> <ul style="list-style-type: none"> - all loads are deactivated
HIGH CABINET TEMPERATURE	<p>To correct:</p> <ul style="list-style-type: none"> - check the cabinet temperature - check the value of parameters A3 and A4 <p>Main results:</p> <ul style="list-style-type: none"> - all loads are deactivated
DOOR OPEN	<p>To correct:</p> <ul style="list-style-type: none"> - check the condition of the door - check the value of parameters i0, i1 and i2 <p>Main results:</p> <ul style="list-style-type: none"> - the effect set by parameter i0
HIGH PRESSURE	<p>To correct:</p> <ul style="list-style-type: none"> - check the state of the high pressure input - check the value of the parameters relating to the multi-purpose input configured as high pressure <p>Main results:</p> <ul style="list-style-type: none"> - deactivates all loads except the condenser fan
LOW PRESSURE	<p>To correct:</p> <ul style="list-style-type: none"> - check the state of the low pressure input - check the value of the parameters relating to the multi-purpose input configured as low pressure <p>Main results:</p> <ul style="list-style-type: none"> - deactivates all loads
COMPRESSOR THERMAL SWITCH	<p>To correct:</p> <ul style="list-style-type: none"> - check the state of the compressor thermal switch input - check the value of the parameters relating to the multi-purpose input configured as compressor thermal switch <p>Main results:</p> <ul style="list-style-type: none"> - the compressor is switched off
COMPRESSOR MAINTENANCE	<p>To correct:</p> <ul style="list-style-type: none"> - reset the counter of the compressor operation days <p>Main results:</p> <ul style="list-style-type: none"> - none; this is only a visual alarm and has no effect on regulation
THERMAL SWITCH	<p>To correct:</p> <ul style="list-style-type: none"> - check the state of the thermal switch input - check the value of the parameters relating to the multi-purpose input configured as thermal switch <p>Main results:</p> <ul style="list-style-type: none"> - all loads are deactivated
EVAPORATOR FAN THERMAL SWITCH ALARM	<p>To correct:</p> <ul style="list-style-type: none"> - check the state of the multi-purpose input configured as the evaporator fan thermal switch alarm <p>Main results:</p> <ul style="list-style-type: none"> - the evaporator fan is switched off
POWER FAILURE	<p>To correct:</p>

	<ul style="list-style-type: none"> - check the device-power supply connection
CONDENSER PRE-ALARM	<p>To correct:</p> <ul style="list-style-type: none"> - check the condenser temperature - check the value of parameter C6 <p>Main results:</p> <ul style="list-style-type: none"> - the condenser fan will be switched on
CONDENSER OVERHEAT ALARM	<p>To correct:</p> <ul style="list-style-type: none"> - check the condenser temperature - check the value of parameters C7 and C8 - disconnect the device from the power supply and clean the condenser <p>Main results:</p> <ul style="list-style-type: none"> - if the error occurs during an operating cycle, the cycle will be interrupted
PUMP-DOWN	<p>To correct:</p> <ul style="list-style-type: none"> - check the maximum pump-down time set by parameter u2 - the alarm will be reset when the compressor is next activated or by pressing the buzzer silencing key <p>Main results:</p> <ul style="list-style-type: none"> - the compressor will be switched off
CABINET PROBE	<p>To correct:</p> <ul style="list-style-type: none"> - check the value of parameter P0 - check the integrity of the probe - check the device-probe connection - check the cabinet temperature <p>Main results:</p> <ul style="list-style-type: none"> - if the error occurs during "stand-by", it will not be possible to start up an operating cycle - if the error occurs during a cycle, the compressor is activated with on/off cycles set by parameters C9 and C10
EVAPORATOR PROBE	<p>To correct:</p> <ul style="list-style-type: none"> - the same as for the cabinet probe error but with reference to the evaporator probe <p>Main results:</p> <ul style="list-style-type: none"> - defrost will last for the time set by parameter d3
CONDENSER PROBE	<p>To correct:</p> <ul style="list-style-type: none"> - the same as for the cabinet probe error but with reference to the condenser probe <p>Main results:</p> <ul style="list-style-type: none"> - the condenser fan will operate in parallel with the compressor - the condenser overheat alarm will never be activated - the compressor locked alarm will never be activated
HUMIDITY PROBE	<p>To correct:</p> <ul style="list-style-type: none"> - check the integrity of the probe - check the device-probe connection - check cabinet relative humidity <p>Main consequences if parameter rU0 is set to 0:</p> <ul style="list-style-type: none"> - if the error occurs during "stand-by", it will not be possible to start up humidity management cycles - if the error occurs during a humidity control cycle, the humidification/dehumidification function will be disabled
GENERIC ALARM	<p>To correct:</p> <ul style="list-style-type: none"> - check the condition of the multi-purpose input configured as the generic alarm <p>Main results:</p> <ul style="list-style-type: none"> - none; this is only a visual alarm and has no effect on regulation
RTC	<p>To correct:</p> <ul style="list-style-type: none"> - re-set the date and time

	<p>Main results:</p> <ul style="list-style-type: none"> - it is not possible to start up an aging recipe - any aging recipes in progress will be blocked - no effect if a meat dry-aging recipe is in progress or started up
NO BOARD COMMUNICATION	<p>To correct:</p> <ul style="list-style-type: none"> - check the user interface-control module connection <p>Main results:</p> <ul style="list-style-type: none"> - it is not possible to start up a recipe - any recipes in progress will be blocked
WATER LOADING	<p>To correct:</p> <ul style="list-style-type: none"> - check the connection with the water loading system <p>Main results:</p> <ul style="list-style-type: none"> - the water loading will be interrupted
EXPANSION COMMUNICATION	<p>To correct:</p> <ul style="list-style-type: none"> - check the connection between the expansion and the control module <p>Main results:</p> <ul style="list-style-type: none"> - it is not possible to start up a recipe - any recipes in progress will be blocked
HUMIDIFIER COMMUNICATION	<p>This occurs if there is no communication between Vcolor and the Mistral humidifier</p> <p>To correct:</p> <ul style="list-style-type: none"> - check the connections between Vcolor and the Mistral humidifier
GENERIC HUMIDIFIER ALARM	<p>This occurs when the Mistral humidifier is not functioning properly</p> <p>To correct:</p> <p>check what kind of humidifier alarm is currently active by accessing the ALARM LIST screen (see section 12.2) and refer to what indicated for that specific alarm</p>
Inverter alarms ⁽¹⁾	
INVERTER COMMUNICATION	<p>To correct:</p> <ul style="list-style-type: none"> - make sure the wiring is correct and intact - check the inverter is powered correctly
INVERTER SYNCHRONISATION	<p>To correct:</p> <ul style="list-style-type: none"> - check there is communication between Vcolor and the inverter - if the problem persists when there is communication between Vcolor and the inverter, contact EVCO's technical support
INVERTER UNDERVOLTAGE	<p>To correct:</p> <ul style="list-style-type: none"> - check the characteristics of the motor - check the inverter is powered correctly
INVERTER OVERVOLTAGE	<p>To correct:</p> <ul style="list-style-type: none"> - check the characteristics of the motor - check the inverter is powered correctly
INVERTER OVERLOAD	<p>To correct:</p> <ul style="list-style-type: none"> - check the characteristics of the motor - check the wiring
INVERTER OVERCURRENT	<p>To correct:</p> <ul style="list-style-type: none"> - check the characteristics of the motor - check the wiring
INVERTER HEAT SINK OVERHEAT	<p>To correct:</p> <ul style="list-style-type: none"> - check the inverter is powered correctly - check the inverter is aired correctly

Mistral humidifier pre-alarms ⁽²⁾

MINIMUM CURRENT LOAD VALVE PRE-AL	To correct: - schedule maintenance/replace the part Main results: - no effect on regulation
MAXIMUM CURRENT LOAD VALVE PRE-AL	To correct: - schedule maintenance/replace the part Main results: - no effect on regulation
MINIMUM CURRENT DISCHARGE VALVE PRE-AL	To correct: - schedule maintenance/replace the part Main results: - no effect on regulation
MAXIMUM CURRENT DISCHARGE VALVE PRE-AL	To correct: - schedule maintenance/replace the part Main results: - no effect on regulation
MINIMUM CURRENT MIST MAKER PRE-AL	To correct: - schedule maintenance/replace the part Main results: - no effect on regulation
MAXIMUM CURRENT MIST MAKER PRE-AL	To correct: - schedule maintenance/replace the part Main results: - no effect on regulation
MINIMUM CURRENT FAN PRE-AL	To correct: - schedule maintenance/replace the part Main results: - no effect on regulation
MAXIMUM CURRENT FAN PRE-AL	To correct: - schedule maintenance/replace the part Main results: - no effect on regulation

Mistral humidifier alarms ⁽³⁾

MIST MAKER HOURS OF OPERATION	To correct: - carry out maintenance (see Mistral manual) Main results: - no effect on regulation
FAN HOURS OF OPERATION	To correct: - carry out maintenance (see Mistral manual) Main results: - no effect on regulation
LOW HUMIDITY	To correct: - automatic re-arm when the humidity values are within the permitted range Main results: - no effect on regulation
HIGH HUMIDITY	To correct: - automatic re-arm when the humidity values are within the permitted range Main results: - no effect on regulation

HIGH WATER LEVEL BOARD TEMP/TEMP PROBE FAULT	<p>To correct:</p> <ul style="list-style-type: none"> - check the characteristics of water - clean the tank - check the NTC probe on the water level board and, if faulty, replace the water level board - switch the humidifier off then on again <p>Main results:</p> <ul style="list-style-type: none"> - OFF regulation
WATER LEVEL BOARD PROBLEM/SELF TEST	<p>To correct:</p> <ul style="list-style-type: none"> - clean the tank - replace the water level board (if the problem is not due to a water load and discharge malfunction) <p>Main results:</p> <ul style="list-style-type: none"> - OFF regulation
MINIMUM CURRENT LOAD VALVE	<p>To correct:</p> <ul style="list-style-type: none"> - replace the solenoid valve to load water <p>Main results:</p> <ul style="list-style-type: none"> - OFF regulation
MAXIMUM CURRENT LOAD VALVE	<p>To correct:</p> <ul style="list-style-type: none"> - replace the solenoid valve to load water <p>Main results:</p> <ul style="list-style-type: none"> - OFF regulation
MINIMUM CURRENT DISCHARGE VALVE	<p>To correct:</p> <ul style="list-style-type: none"> - replace the solenoid valve to discharge water <p>Main results:</p> <ul style="list-style-type: none"> - OFF regulation
MAXIMUM CURRENT DISCHARGE VALVE	<p>To correct:</p> <ul style="list-style-type: none"> - replace the solenoid valve to load water <p>Main results:</p> <ul style="list-style-type: none"> - OFF regulation
MINIMUM CURRENT MIST MAKER	<p>To correct:</p> <ul style="list-style-type: none"> - replace the mist maker <p>Main results:</p> <ul style="list-style-type: none"> - OFF regulation
MAXIMUM CURRENT MIST MAKER	<p>To correct:</p> <ul style="list-style-type: none"> - replace the mist maker <p>Main results:</p> <ul style="list-style-type: none"> - OFF regulation
MINIMUM CURRENT FAN	<p>To correct:</p> <ul style="list-style-type: none"> - replace the fan <p>Main results:</p> <ul style="list-style-type: none"> - OFF regulation
MAXIMUM CURRENT FAN	<p>To correct:</p> <ul style="list-style-type: none"> - replace the fan <p>Main results:</p> <ul style="list-style-type: none"> - OFF regulation

- (1) For inverter alarms, consult the dedicated section in the manual of the inverter used
- (2) For humidifier pre-alarms, consult the dedicated section in the Mistral manual
- (3) For humidifier alarms, consult the dedicated section in the Mistral manual

13 PARAMETERS

The table below describes the configuration parameters of the device.

Par.	Min	Max	Unit	Default	Analogue inputs
CA1	-25.0	25.0	°C	0.0	probe 1 offset
CA2	-25.0	25.0	°C	0.0	probe 2 offset
CA3	-25.0	25.0	°C	0.0	probe 3 offset
CA4	-25	25	% r.H.	0	humidity probe offset (see parameter P12)
CA5	-5.00	5.00	- - - -	0	pH probe offset (see parameter P9)
P0	0	1	- - - -	1	type of temperature probe 0 = PTC 1 = NTC
P1	0	1	- - - -	1	decimal point when displaying temperature and setting the setpoint 0 = disabled 1 = enabled
P2	0	1	- - - -	0	temperature measurement unit 0 = °C 1 = °F
P3	-1	240	min	10	duration of power failure during a cycle due to start of recording of power failure alarm P3 = -1 alarm disabled
P5	0	1	- - - -	1	operation after a power failure 0 = the cycle keeps running 1 = the cycle is interrupted
P7	0	P8	% r.H.	0	lower calibration limit of the humidity probe (corresponding to 4 mA) only if P12=1
P8	P7	100	% r.H.	100	upper calibration limit of the humidity probe (corresponding to 20 mA) only if P12=1
P9	0	1	- - - -	0	enable pH probe only if P12= 0, 2 or 3 0 = disabled 1 = enabled
P10	-5.00	P11	- - - -	0	lower calibration limit of the pH transducer (corresponding to 4 mA)
P11	P10	14.00	- - - -	14.00	upper calibration limit of the pH transducer (corresponding to 20 mA)
P12	0	3	- - - -	1	type of humidity probe 0 = no probe 1 = 4-20 mA probe 2 = EVHTP500 probe (with NTC temperature sensor) 3 = EVHTP520 probe (with NTC temperature sensor)
P13	0	1	- - - -	0	temperature and humidity setpoint lock 0 = no 1 = yes
Pr1	0	3	- - - -	1	probe 1 configuration 0 = disabled 1 = cabinet 2 = evaporator 3 = condenser

Pr2	0	3	- - - -	2	probe 2 configuration see Pr1
Pr3	0	3	- - - -	0	probe 3 configuration see Pr1
Par.	Min	Max	Unit	Default	Temperature regulator
rC0	1.0	15.0	°C	2.0	cooling differential
rC1	-50.0	rC2	°C	-20.0	minimum setpoint that can be set
rC2	rC1	99.0	°C	20.0	maximum setpoint that can be set
rC3	0.0	10.0	°C	1.0	cooling neutral zone value
rH0	1.0	15.0	°C	2.0	heating differential
rH3	0.0	10.0	°C	1.0	heating neutral zone value
rH6	1	600	s	60	cycle time for heater switch-on if heating is required (see also rH7)
rH7	1	600	s	45	heater switch-on time within the rH6 cycle time
rH8	0	600	min	5	duration of pause for regulation at the beginning of a phase
Par.	Min	Max	Unit	Default	Humidity regulator
rU0	0	1	- - - -	0	humidity management mode: 0 = with humidity probe (only if P12≠0) 1 = without humidity probe, time intervals based on the percentage set
rU1	-50.0	99.0	°C	0.0	minimum cabinet temperature for inhibiting humidification control
rU2	1	600	s	60	cycle time for humidifier switch-on (only for rU0 = 1, see also rU3)
rU3	1	600	s	30	humidifier switch-on within rU2 cycle time to generate 100% humidity in cabinet (only for rU0 = 1, see also rU2)
rU4	0	1	- - - -	0	temperature priority for regulation 0 = no 1 = yes
rU5	1	100	% r.H.	5	dehumidification differential
rU6	0	100	% r.H.	2	dehumidification neutral zone value
rU7	0	255	s	10	duration of dehumidification attempt with pump-down solenoid valve (if configured)
rU8	1	100	% r.H.	5	humidification differential
rU9	0	100	% r.H.	2	humidification neutral zone value
rU10	0	50	% r.H.	10	humidification proportional band value (only for E6=0)
rU11	0	255	s	30	cycle time for humidification proportional regulation (only for E6=0)
rU12	0	1	- - - -	0	time base for humidification proportional regulation cycle time (only for E6=0): 0 = seconds 1 = minutes
rU13	0	100	%	80	maximum humidity setpoint that can be set
rU14	-50.0	99.0	°C	0.0	minimum cabinet temperature for inhibiting dehumidification control
rU15	0	300	s	60	humidifier pause time (only if E6=1)
rU16	0	60	s	3	humidifier activation time (only if E6=1)
rU17	0	1	- - - -	0	enable heater activation during dehumidification

rU18	0	100	%	0	minimum humidity setpoint that can be set
rU19	0	1	- - - -	0	Value displayed 0 = current humidity 1 = humidity setpoint
Par.	Min	Max	Unit	Default	Compressor protection
C0	0	240	min	0	compressor switch-on delay from device switch-on
C1	0	240	min	2	delay between two compressor switch-ons
C2	0	240	min	0	minimum compressor-off duration
C3	0	240	s	0	minimum compressor-on duration
C6	0.0	164.0	°C	70.0	condensation temperature above which the high condensation temperature pre-alarm message is displayed
C7	0.0	164.0	°C	80.0	condensation temperature above which the high condensation temperature alarm is triggered
C8	0	15	min	1	delay condensation high temperature alarm
C9	0	999	min	10	compressor ON time if a cabinet probe alarm occurs when a recipe is running
C10	0	999	min	10	compressor OFF time if a cabinet probe alarm occurs when a recipe is running
C11	0	99	hours	5	cabinet temperature consecutive time within proportional band (parameter VC1 for VSC compressors) to operate compressor at max. power; disabled if set to 0
C12	0	999	days	0	operating time of compressor due to maintenance warning; disabled if set to 0
Par.	Min	Max	Unit	Default	Variable speed compressor protection
VC1	0.0	99.0	°C	10.0	proportional band (relative to setpoint)
VC2	0	99	min	10	integral action time
VC3	1	7	- - - -	3	type of compressor 1 = Embraco VEM – VES 2 = Embraco VEG 3 = Embraco VNEK – VNEU – FMFT 4 = Secop VNL 50...150 Hz (40 Hz in OFF) 5 = Secop 33...133 Hz 6 = Tecumseh 85...150 Hz 7 = Tecumseh 68...150 Hz
VC4	0	100	sec x 10	0	85 Hz compressor time from power-on
VC5	0	100	%	0	% to increase minimum compressor frequency; if VC5=0, the minimum operating frequency is that set by the compressor manufacturer.
VC6	0	100	%	100	% to decrease maximum compressor frequency; if VC6=100, the maximum operating frequency is that set by the compressor manufacturer.
Par.	Min	Max	Unit	Default	Defrost
d0	0	99	h	6	automatic defrost interval 0 = defrost at intervals is never activated
d1	0	3	- - - -	0	type of defrost 0 = electrical (during defrosting the compressor is switched off, the defrost output is activated and the evaporator fan checks parameter F26) 1 = hot gas (during defrosting the compressor is switched on, the defrost output is activated and the evaporator fan checks parameter F26)

					2 = air (during defrosting the compressor is switched off and the evaporator fan checks parameter F26); in this case, the defrost output is not used, even if it is configured 3 = when cycle is reversed (remember to enable an output as the 4-way valve and operation as heat pump).
d2	-50.0	99.0	°C	8.0	evaporator temperature threshold to end defrosting; see also parameter d3
d3	0	99	min	30	defrost duration if no evaporator probe is configured maximum defrost duration if the evaporator probe does not reach the threshold indicated by d2 0 = defrost is never activated
d7	0	15	min	2	dripping time (during dripping the compressor and evaporator fan will remain off and the defrost output will be deactivated)
d15	0	99	min	0	minimum consecutive compressor-on duration for starting hot gas defrost when defrost interval elapses, only if d1=1 (or d1b=1 if type "b" defrost is enabled).
d00	0	1	- - - -	0	enable type "b" defrost parameters on setpoint threshold d01 0 = no 1 = yes
d01	-50.0	99.0	°C	1.0	setpoint threshold to activate type "b" parameters (activated if setpoint>d01)
d0b	0	99	hours	6	automatic defrost interval for type "b" same values as parameter d0
d1b	0	3	- - - -	2	defrost types for type "b" defrost same values as parameter d1
d2b	-50.0	99.0	°C	4.0	threshold of type "b" defrost; see also parameter d3b same values as parameter d2
d3b	0	99	min	20	type "b" defrost duration same values as parameter d3
d7b	0	15	min	0	type "b" dripping time same values as parameter d7
Par.	Min	Max	Unit	Default	Temperature alarms
A1	0.0	99.0	°C	70.0	evaporator temperature above which the evaporator high temperature alarm is activated; see also parameter A2
A2	-1	240	min	1	delay evaporator high temperature alarm -1 = alarm not enabled
A3	0.0	99.0	°C	70.0	cabinet temperature above which the cabinet high temperature alarm is activated; see also parameter A4
A4	-1	240	min	1	delay high cabinet temperature alarm -1 = alarm not enabled
A16	0	900	sec	300	buzzer reactivation time if alarm(s) still active 0 = not enabled
A17	0	1	- - - -	0	alarm output activation 0 = with alarm active 1 = with alarm not active
Par.	Min	Max	Unit	Default	Evaporator and condenser fan
F1	0	1	- - - -	0	evaporator fan activity during a recipe 0 = parallel function with the main loads 1 = continuous function
F2	0	1	- - - -	0	management of temperature and humidity regulation during special air exchange cycles 0 = T + RH regulation disabled 1 = T + RH regulation enabled

F12	0	15	min	2	fan stop after the dripping phase
F13	0	250	s	0	evaporator fan switch-off delay from main load switch-off
F14	1	600	s	0	evaporator fan cycle time if=0, cyclical fan switch-on will be deactivated
F15	1	600	s	0	evaporator fan switch-on time within the F14 cycle time
F16	0.0	99.0	°C	20.0	condenser temperature threshold to activate condenser fan (if condenser probe is configured)
F17	0	240	s	5	condenser fan switch-off delay from compressor switch-off (if condenser probe is disabled)
F18	0	2	- - - -	2	condenser fan activation mode (if condenser probe is configured) 0 = temperature adjusted (independent of compressor status) 1 = temperature adjusted only if compressor is OFF (on if compressor is ON) 2 = temperature adjusted only if compressor is ON (off if compressor is OFF)
F19	0	240	s	15	evaporator fan switch-on delay from when the door is closed, or the door switch input is deactivated
F21	1	10	- - - -	8	evaporator fan start-up speed
F22	1	240	s	5	start-up time when the evaporator fan is switched on
F23	0	100	%	35	evaporator fan min. speed calibration value
F24	0	100	%	65	evaporator fan max. speed calibration value
F25	-50.0	99.0	°C	1.0	evaporator temperature below which the evaporator fan is activated
F26	0	1	- - - -	0	evaporator fan mode during defrost 0 = off 1 = on
F27	0	100	%	10	speed 1 evaporator fan, if E7=2 or 3
F28	0	100	%	20	speed 2 evaporator fan, if E7=2 or 3
F29	0	100	%	30	speed 3 evaporator fan, if E7=2 or 3
F30	0	100	%	40	speed 4 evaporator fan, if E7=2 or 3
F31	0	100	%	50	speed 5 evaporator fan, if E7=2 or 3
F32	0	100	%	60	speed 6 evaporator fan, if E7=2 or 3
F33	0	100	%	70	speed 7 evaporator fan, if E7=2 or 3
F34	0	100	%	80	speed 8 evaporator fan, if E7=2 or 3
F35	0	100	%	90	speed 9 evaporator fan, if E7=2 or 3
F36	0	100	%	100	speed 10 evaporator fan, if E7=2 or 3
Par.	Min	Max	Unit	Default	Digital inputs
i0	0	6	- - - -	2	effect of the door opening, or when the door switch input is activated 0 = no effect 1 = the compressor and evaporator fan are switched off (no effect on light status) 2 = the evaporator fan is switched off (no effect on the compressor or light status) 3 = only light switched on 4 = the compressor and evaporator fan are switched off, the cabinet light is switched on 5 = the evaporator fan is switched off, the cabinet light is switched on

					<p>6 = the evaporator fan is switched off, the cabinet light (if on) is switched off; when the door is closed, the light goes back to its status before the door was opened</p> <p>N.B.:</p> <ul style="list-style-type: none"> - if the door is opened, the humidifier, dehumidifier, heater, sanitation and smoking are switched off. - the light key has priority over the door switch; if the light has been switched on with the key, the door opening or closing will have no effect on light status.
i1	0	1	- - - -	0	<p>door switch input contact type</p> <p>0 = normally open (input active with contact closed)</p> <p>1 = normally closed (input active with contact open)</p>
i2	-1	120	min	5	<p>door open alarm signal delay</p> <p>-1 = alarm not signalled</p>
i3	-1	120	min	15	<p>compressor and evaporator fan inhibition time from door open</p> <p>-1 = not considered</p>
i4	0	9	- - - -	4	<p>multi-purpose input 1 configuration:</p> <p>0 = <u>DISABLED</u></p> <p>1 = <u>HIGH PRESSURE ALARM</u> (the compressor and evaporator fan are switched off, the condenser fan stays on)</p> <p>2 = <u>LOW PRESSURE ALARM</u> (the compressor and evaporator fan are switched off)</p> <p>3 = <u>PUMP-DOWN AND ALARM MANAGEMENT</u> (while the compressor is being switched off, the digital input will switch off the compressor output to end the pump-down phase; during the activation phases of the refrigeration plant, the digital input will switch off the compressor and evaporator fan)</p> <p>4 = <u>COMPRESSOR THERMAL SWITCH ALARM</u> (the compressor is switched off)</p> <p>5 = <u>GENERIC ALARM</u> (displayed only)</p> <p>6 = <u>THERMAL SWITCH ALARM</u> (all loads are switched off)</p> <p>7 = <u>DEVICE SWITCH ON/OFF</u></p> <p>8 = <u>EVAPORATOR FAN THERMAL SWITCH ALARM</u> (humidifier, steriliser/oxygenator, heaters are switched off)</p> <p>9 = <u>WATER LOAD LEVEL</u> (activation water load output)</p>
i5	0	1	- - - -	0	<p>multi-purpose input 1 contact type</p> <p>0 = normally open (input active with contact closed)</p> <p>1 = normally closed (input active with contact open)</p>
i6	-1	240	s	5	<p>multi-purpose input 1 alarm delay</p> <p>-1 = alarm not signalled</p>
i7	0	9	- - - -	1	<p>multi-purpose input 2 configuration</p> <p>see configurations of parameter i4</p>
i8	0	1	- - - -	0	<p>multi-purpose input 2 contact type</p> <p>0 = normally open (input active with contact closed)</p> <p>1 = normally closed (input active with contact open)</p>
i9	-1	240	s	10	<p>multi-purpose input 2 alarm delay</p> <p>-1 = alarm not signalled</p>
i10	0	9	- - - -	2	<p>multi-purpose input 3 configuration</p> <p>see configurations of parameter i4</p>
i11	0	1	- - - -	0	<p>multi-purpose input 3 contact type</p> <p>0 = normally open (input active with contact closed)</p> <p>1 = normally closed (input active with contact open)</p>
i12	-1	240	s	5	<p>multi-purpose input 3 alarm delay</p>

					-1 = alarm not signalled
i13	0	240	s	40	reset time for the low pressure switch when the compressor is switched on (only if the digital input is configured = 3)
i14	0	240	sec x 10	30	time-out light off by door switch (no effect if lit by key). If i14=0, the light stays on until the door is closed.
Par.	Min	Max	Unit	Default	Configurable digital outputs
u1	0	1	- - - -	1	enable light key 0 = no 1 = yes N.B.: if u1=0 and a relay is configured as the light, it will be controlled by the door switch.
u2	0	240	s	0	<ul style="list-style-type: none"> - <u>maximum pump-down duration in compressor switch-off mode without activating the low pressure input</u> if at least one multi-purpose digital input is configured as LOW PRESSURE - <u>maximum pump-down duration in compressor switch-off mode without activating the pump-down input and consequent pump-down alarm signal (with u2=0, the alarm is not signalled)</u> if at least one multi-purpose digital input is configured as PUMP-DOWN - <u>compressor deactivation delay from pump-down valve switch-off</u> for all the other configuration values of the multi-purpose inputs
u3	0	600	s	15	compressor activation/deactivation delay in relation to the 4-way valve when heat pump is in operation
u4	0	1	- - - -	1	dehumidification management type 0 = external dehumidifier/extractor fan (with this setting parameters rU5 and rU6 are relevant) 1 = management by activating the refrigeration plant
u5	0	1	- - - -	1	deactivation alarm output if buzzer silenced on keypad 0 = no 1 = yes
u6	0	1	- - - -	1	enable alarm buzzer 0 = no 1 = yes
u7	0	999	s	60	water load timeout

u1c	0	26	----	1	load associated with output K1 0 = not used 1 = compressor 2 = evaporator fan (if configured to 1 speed); maximum evaporator fan speed (if configured to 2 speeds) 3 = condenser fan 4 = defrost 5 = cabinet light 6 = alarm 7 = pump-down 8 = on/stand-by 9 = minimum evaporator fan speed (only if configured to 2 speeds) 10 = sanitation 11 = heater 12 = humidity generator (boiler/mist-maker) 13 = humidification/humidity injection 14 = dehumidification/extractor fan 15 = repeat buzzer events (alarms + machine status) 16 = smoker 17 = air exchange 18 = 4-way valve 19 = valve 1 20 = valve 2 21 = valve 3 22 = valve 4 23 = valve 5 24 = valve 6 25 = valve 7 26 = water load
u2c	0	26	----	5	load associated with output K2 (see u1c)
u3c	0	26	----	13	load associated with output K3 (see u1c)
u4c	0	26	----	17	load associated with output K4 (see u1c)
u5c	0	26	----	11	load associated with output K5 (see u1c)
u6c	0	26	----	2	load associated with output K6 (see u1c)
u7c	0	26	----	3	load associated with output K7 (see u1c)
u8c	0	26	----	7	load associated with output K8 (see u1c)
u9c	0	26	----	4	load associated with output K9 (see u1c)
u10c	0	26	----	10	load associated with output K10 (see u1c) parameter available if expansion used
u11c	0	26	----	16	load associated with output K11 (see u1c) parameter available if expansion used
u12c	0	26	----	12	load associated with output K12 (see u1c) parameter available if expansion used
u13c	0	26	----	14	load associated with output K13 (see u1c) parameter available if expansion used
Par.	Min	Max	Unit	Default	Automatic testing
T1	-50.0	99.0	°C	35.0	cabinet temperature setpoint heating phase of testing cycle
T2	0	100	%	90	humidity setpoint heating phase of testing cycle
T3	0	999	min	60	maximum duration heating phase of testing cycle
T4	1	20	---	2	number of heater cycles (‘cycle’ means ON time + OFF time)
T5	-50.0	99.0	°C	-20.0	pulldown setpoint cooling phase
T6	-50.0	99.0	°C	-3.0	cabinet setpoint temperature cooling phase of testing cycle

T7	0	999	°C	60	maximum duration cooling phase of testing cycle
T8	1	20	- - - -	2	number of compressor cycles (‘cycle’ means ON time + OFF time)
T9	-50.0	99.0	°C	2.0	recovery phase setpoint
Par.	Min	Max	Unit	Default	Serial communication (serial port type RS-485 with MODBUS communication protocol)
L1	1	240	min	15	internal data sampling time
LA	1	247	- - - -	247	device address
Lb	0	3	- - - -	3	baud rate (the parameter is relevant only if bLE = 0) 0 = 2,400 baud 1 = 4,800 baud 2 = 9,600 baud 3 = 19,200 baud
LP	0	2	- - - -	2	parity 0 = none 1 = odd 2 = even
PA1	-99	999	- - - -	426	EPoCA level 1 password
PA2	-99	999	- - - -	824	EPoCA level 2 password
bLE	0	99	- - - -	0	serial port configuration for connectivity 0 = free for MODBUS RTU 1÷99 = EPoCA local network address (in this case the baud rate is automatically configured to 19,200 baud irrespective of the Lb value) N.B.: if connectivity comes from EVlinking Wi-Fi, the only value that can be set is 1
Par.	Min	Max	Unit	Default	Special configurations
E0	0	240	min	1	inactivity period for enabling screen saver 0 = not enabled
E1	0	120	s	10	duration of buzzer at end of recipe
E2	0	240	min	0	duration of “cycle completed” display 0 = not enabled
E3	0	1	- - - -	0	humidifier type 0 = generic isothermal or adiabatic humidifier 1 = humidifier Mistral (set E6 and rU0=0, P12=1)
E4	0	2	- - - -	2	humidity generator relay management 0 = always ON 1 = ON only if the phase requires humidity and if the cabinet temperature value is < of the setpoint (of the phase in progress) 2 = ON only if the phase requires humidity 3 = ON only if the phase requires humidity and if the cabinet humidity value is < of the setpoint (of the phase in progress; with P12≠0)
E6	0	1	- - - -	0	type of humidification regulation 0 = proportional (rU11, rU12) 1 = ON-OFF cycles (rU15, rU16)
E7 ⁽¹⁾	0	4	- - - -	0	type of evaporator fan regulation 0 = 1 speed (with relay configured as “2”) 1 = 2 speeds (with relays configured as “2” and “9”) 2 = 10 steps for models with 0-10 V output or EVCO inverter on 485 serial port 3 = 10 steps for models with PWM output with EVDFAN1 module or EVCO inverter on RS-485 serial port

					4 = as configuration E7=1 but with 2 relays active at the same time for maximum speed
E8	0	2	----	0	configuration 0÷10 V output in Vcolor 589 models 0 = not used 1 = evaporator fan (if E7=2) 2 = variable speed compressor (see parameter VC3)
E9	0	1	----	0	enable user management/login 0 = no 1 = yes
E10	0	1	----	0	enable additional modules 0 = none 1 = expansion module 2 = inverter 3 = expansion module + inverter
E16	0	1	----	0	enable heat pump operation 0 = no 1 = yes the only type of defrost possible is with the 4-way valve
E17	0	2	----	0	machine configuration 0 = aging 1 = meat dry-aging 2 = aging+meat dry-aging
E18	0	1	----	0	regulation priority for valve management 0 = temperature regulation has priority for valve management 1 = humidity regulation has priority for valve management
E19	10	100	%	10	display brightness
E20	1	300	s	60	display brightness timeout
Par.	Min	Max	Unità	Default	MISTRAL HUMIDIFIER ⁽⁶⁾
HS1	0	100	%	0	minimum humidity setpoint value (see r1 in Mistral manual)
HS2	0	100	%	95	maximum humidity setpoint value (see r2 in Mistral manual)
HS3	1	240	s	20	cycle time (see r3 in Mistral manual)
HS4	0	3	---	2	fan speed (see F0 in Mistral manual) 0 = fan off 1 = 30% 2 = 60% 3 = 80%
HS5	70	1250	µS*cm	500	water conductivity (see P1 in Mistral manual)
HS6	0	250	h	12	no production of RH consecutive time due to tank emptying for health and hygiene management (see c0 in Mistral manual) 0 = function disabled
HS7	0	250	h	24	production of RH consecutive time due to tank emptying for health and hygiene management (see c1 in Mistral manual) 0 = function disabled
Par.	Min	Max	Unit	Default	EVCO INVERTER⁽¹⁾
S202	2	2000	ds (s/10)	30	duration acceleration ramp
S203	2	2000	ds (s/10)	50	duration deceleration ramp
S204	S205 ⁽³⁾	3000	RPM	1500	maximum motor speed
S205	150	S204 ⁽³⁾	RPM	300	minimum motor speed
S206	0	1	---	0	motor rotation direction 0 = clockwise 1 = anti-clockwise

S403	0	600	ds (s/10)	50	time-out inverter communication alarm 0 = disabled
S501 ⁽⁴⁾	1	50 ⁽⁵⁾	dA (A/10)	29 ⁽⁵⁾	nominal current
S502 ⁽⁴⁾	50	400	V	230	nominal voltage
S503 ⁽⁴⁾	0	100	Hz	50	nominal frequency
S504 ⁽⁴⁾	1	8	---	2	number of pole pairs
S506 ⁽⁴⁾	1	3000	RPM	1390 ⁽⁵⁾	nominal inverter revolutions
S508	1	100	---	81	nominal power factor
S509	0	25	%	5	overvoltage percentage applied at motor start-up (motor boost)
S511	0	100	%	50	motor overload
S512	0	60	s	30 ⁽⁵⁾	maximum time motor overload
S529	5	16	kHz	5	PWM carrier frequency

- (1) The value set for parameter E7 only applies to Vcolor 579 models with PWM output; make sure the parameter is set correctly in Vcolor 589 models with 0-10V output.
- (2) For a complete list of inverter parameters, see the dedicated documentation supplied with the inverter used. Except for S403, all parameters with their relative interval and default values are acquired when the inverter is switched on.
- (3) The upper limit of the minimum motor speed depends on the value set for S204; similarly, the lower limit of the maximum motor speed depends on the value set for S205: it is not possible, for instance, to set the minimum motor speed (parameter S205) at a value which is higher than the value of the maximum motor speed (parameter S204).
- (4) The parameter depends on the motor rating label data.
- (5) Values may differ depending on the inverter installed: the values indicated refer to the Compact inverter with power 0.75 KW and are given purely for reference purposes.
- (6) For a complete list of Mistral humidifier parameters, see the dedicated documentation supplied with the Mistral model used. Always switch the Mistral off and then on again after changing humidifier parameters.

14 ACCESSORIES

14.1 4 relay expansion

EVC20P52N9XXX10: 4 electro-mechanical relays

EVC20P52N9XXX12: 4 HC sealed relays



14.2 Phase cutting speed regulator

EVDFAN1

Makes it possible to regulate single-phase fan speed with a PWM command signal. The maximum operating current is 5 A.



14.3 EVCO Inverter

Enables modulating management of asynchronous motors.

Compact series: EI750M2C0400VXX/EI1K5M2C0400VXX/EI2K2M2C0400VXX/EI2K3M2C0400VXX

Single-phase inverter 0.75/1.5/2.2/2.3 KW @ 230 VAC.



Slim Power series: EI550M2L02TXVXX/ EI550M2L12TXVXX/ EI550M2L22TXVXX

Single-phase inverter with power up to 550 W @ 230 VAC.



Slim series: EI250M2S0200

Single-phase inverter with power up to 250 W @ 230 VAC.



14.4 Mistral humidifier

Ultrasonic humidifier with production capacity of up to 1 kg/h.



14.5 Safety transformer

ECTSFD004

The transformer can power the user interface.



14.6 Non-optoisolated RS-485/USB serial interface

EVIF20SUXI

The interface enables the device to be connected to the Parameters Manager set-up software system.



14.7 USB plug for panel installation

0812000002

The plug makes the USB communications port of the device more accessible.

To connect the device to the plug, connecting cable 0810500018 or 0810500020 must be used (to be ordered separately).



14.8 Connecting cables

0810500018/0810500020

These cables are used to connect the USB plug for panel installation 0812000002 to the device.

Cable 0810500018 is 2 m long; cable 0810500020 is 0.5 m long.



14.9 4GB USB flash drive

EVUSB4096M

The flash drive makes it possible to upload and download the settings and the data recorded by the device.



14.10 EVlinking Wi-Fi RS-485 module

EVIF25SWX

Through the RS-485 communications port, the module provides the controller with Wi-Fi connectivity which enables remote management and monitoring from the Internet using the EPoCA® cloud system.



14.11 IoT EV3 Web gateway

EV3W01

IoT gateway with Ethernet connectivity and data logging functions to remotely monitor and control an RS-485 MODBUS RTU network with up to 10 EVCO controllers with EPoCA® technology using the EPoCA® cloud platform.



14.12 EVD Web IoT gateway

EVDW01Z9

IoT gateway with Ethernet connectivity, data logging and date/time synchronization functions which allows users to remotely monitor and control up to 19 EVCO devices with EPoCA® technology using the EPoCA® cloud platform.



14.13 Humidity transducer 4÷20 mA

EVHP523

High-precision humidity transducer. Range: 5... 95 % RH



15 TECHNICAL SPECIFICATIONS

15.1 Technical data

Purpose of the control device:	function controller		
Construction of the control device:	built-in electronic device		
Housing:	user interface		control module
	black, self-extinguishing plastic		open frame board.
Category of heat and fire resistance:	D		
Measurements:	user interface M (horizontal)	user interface L (horizontal)	control module
	Flush installation: fit 166.0 x 118.0 x 35.0 mm (6.535 x 4.645 x 1.377 in; L x H x D). Semi-recessed installation: 145.1 x 97.1 x 32.0 mm (5,712 x 3,822 x 1,259 in; L x H x D).	Flush installation: fit 216.0 x 156.0 x 50.0 mm (8.503 x 6.141 x 1.968 in; L x H x D) Semi-recessed installation: 192.9 x 131.9 x 47.0 mm (7,594 x 5,192 x 1,850 in; L x H x D).	166.0 x 116.0 x 44.0 mm (6.535 x 4.566 x 1.732 in; L x H x D)
Mounting methods for the control device:	user interface		control module
	flush with the panel from behind with threaded studs (not provided) to hold it in place or semi-recessed from the front of the panel using the spring clips		on a flat surface with spacers
Degree of protection:	user interface		control module
	IP65 (front)		IP00.
Connection method:	user interface		control module
	plug-in screw terminal blocks for wires up to 1.5 mm², type A female USB connector (USB port)		plug-in screw terminal blocks for wires up to 2.5 mm²
	Maximum permitted length for connection cables: <ul style="list-style-type: none">- user interface-control module connection: 10 m (32.8 ft)- power supply: 10 m (32.8 ft)- analogue inputs: 10 m (32.8 ft)- digital inputs: 10 m (32.8 ft)- analogue outputs: 10 m (32.8 ft)- digital outputs: 100 m (328 ft)- RS-485 MODBUS port: 1,000 m (3,280 ft)- USB port: 1 m (3.28 ft)		
Operating temperature:	from 0 to 55 °C (from 32 to 131 °F)		
Storage temperature:	from -10 to 70 °C (from 14 to 158 °F)		
Operating humidity:	relative humidity without condensate from 10 to 90%		

Pollution status of the control device:	2.	
Environmental standards:	<ul style="list-style-type: none"> - RoHS 2011/65/EC - WEEE 2012/19/EU - REACH (EC) Regulation no. 1907/2006 	
EMC standards:	<ul style="list-style-type: none"> - EN 60730-1 - IEC 60730-1. 	
Power supply:	user interface	control module
	Vcolor 579 M: powered by the control module Vcolor 579 L: 12 Vac 20 VA.	115... 230 VAC (±15%), 50 / 60 Hz (±3 Hz), 10 VA max.
Rated impulse withstand voltage:	4 KV	
Overvoltage category:	III	
Software class and structure:	A	
Clock:	built-in (with secondary lithium battery)	
	Clock drift: ≤ 60 s/month at 25 °C (77 °F)	
	Clock battery autonomy in the absence of a power supply: > 6 months at 25 °C (77 °F)	
	Clock battery charging time: 24 h (the battery is charged by the power supply of the device)	
Analogue inputs:	4 inputs of which 3 for PTC/NTC (terminals 25 - 29), 1 for 4-20mA (humidity probe, terminals 30 - 32)	
	<i>PTC type analogue inputs</i>	
	Type of sensor: KTY 81-121 (990 @ 25°C, 77°F).	
	Measurement field: from -50 to 150 °C (from -58 to 302 °F)	
	Resolution: 0.1 °C (1 °F)	
	Protection: none	
	<i>NTC type analogue inputs</i>	
	Sensor type: B3435 (10 KΩ @ 25°C, 77°F).	
	Measurement field: from -40 to 105 °C (from -40 to 221 °F).	
	Resolution: 0.1 °C (1 °F)	
	Protection: none	
	<i>4-20 mA type analogue inputs</i>	
	Measurement field: can be configured.	
	Protection: none	
Digital inputs:	4 voltage-free.	

	<p><i>Voltage-free</i></p> <p>Type of contact: 5 Vdc, 2 mA.</p> <p>Power supply: none</p>
Modulating outputs:	<p>Vcolor 579 models:</p> <p>1 for PWM signal (for phase cutting speed regulator for single-phase EVDFAN1 fans) (terminals 33-34).</p> <p>Vcolor 589 models:</p> <p>1 configurable for 0÷10 Vdc signal to modulate evaporator fan speed or to control frequency on variable speed compressors (terminals 34-35)</p>
Digital outputs:	<p>9 outputs on the control module:</p> <ul style="list-style-type: none"> - 1 16 A res. @ 250 VAC type SPST (K1) configurable output - 1 8 A res. @ 250 VAC type SPDT (K2) configurable output - 1 8 A res. @ 250 VAC type SPST (K3) configurable output - 1 8 A res. @ 250 VAC type SPST (K4) configurable output - 1 8 A res. @ 250 VAC type SPDT (K5) configurable output - 1 16 A res. @ 250 VAC type SPST (K6) configurable output - 1 16 A res. @ 250 VAC type SPST (K7) configurable output - 1 8 A res. @ 250 VAC type SPST (K8) configurable output - 1 8 A res. @ 250 VAC type SPST (K9) configurable output <p>4 outputs on expansion (electro-mechanical relays)</p> <ul style="list-style-type: none"> - 1 30 A res. @ 250 VAC type SPST (K10) configurable output - 1 16 A res. @ 250 VAC type SPST (K11) configurable output - 1 8 A res. @ 250 VAC type SPST (K12) configurable output - 1 16 A res. @ 250 VAC type SPDT (K13) configurable output <p>* The relays do not control LED or fluorescent lights</p>
Displays:	<p>5- or 7-inch TFT touch-screen graphic display, 16K colours, 800 x 480 pixel resolution. The presence of imperfection points on the display is within the tolerance limits as established by the reference standards.</p>
Type 1 or Type 2 actions:	Type 1
Additional features of Type 1 or Type 2 actions:	C
Communications ports:	<p>2 ports:</p> <ul style="list-style-type: none"> - 1 RS-485 MODBUS port - 1 USB port
Warning and alarm buzzer:	built-in

Vcolor 579/589

Controller for aging or meat dry-aging cabinets and rooms with customised graphic skin

Installer manual ver. 2.0

PB - 19/23

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