

Vcolor 739 M/L

Electronic controllers with 5" or 7" TFT graphic display for multifunctional ice cream and patisserie machines



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



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IMPORTANT INFORMATION

Liability and residual risks

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

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

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

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

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

Disclaimer

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

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

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

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

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

Terms and Conditions of use

Permitted use

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

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

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

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

Prohibited use

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

Disposal



The device must be disposed of in accordance with local regulations regarding the collection of electrical and electronic appliances.

Consider the environment



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

Please consider the environment before printing this document.

IMPORTANT SAFETY INFORMATION

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



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



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

DANGER

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

WARNING

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

CAUTION

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

NOTICE

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

NOTE: the maintenance, repair, installation and use of electrical equipment must only be entrusted to qualified personnel.

QUALIFIED PERSONNEL

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

SAFETY INFORMATION RELATING TO THE PRODUCT

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

DANGER

RISK OF ELECTRIC SHOCK, EXPLOSION OR ELECTRIC ARC

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

DANGER

RISK OF ELECTRIC SHOCK AND FIRE

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

DANGER

RISK OF ELECTRIC SHOCK OR MALFUNCTIONING OF THE EQUIPMENT

Do not use damaged products or accessories.

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

DANGER

RISK OF EXPLOSION

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

WARNING

MALFUNCTIONING OF THE EQUIPMENT

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

1. INTRODUCTION

Chapter content

This chapter contains the following information:

Subject	Page
<i>Description</i>	9
<i>Available models</i>	9
<i>Features</i>	9
<i>Accessories</i>	10

1.1 DESCRIPTION

Vcolor 739 M/L controllers are the EVCO solution for complete management of multifunctional ice cream and patisserie machines, and can be used to:

- Knead;
- Cook;
- Pasteurise;
- Whisk;
- Etc.

Vcolor 739 M/L controllers consist of:

- Built-in base power board;
- Remote user display interface.

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

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

Plus, the EVCO range of displays offers the user two different types of interface installation, for optimum flexibility:

- User interface **mounted with protruding front panel** (see "**3.5.1 Mounting with protruding front panel**" on page 19);
- User interface **mounted flush with the back of the panel** (see "**3.5.2 Flush mounting from the rear of the panel**" on page 20).

The innovative **Vcolor 739 M/L** programmable platform allows fully independent management of the following:

- Controller graphics customisation;
- Addition and management of up to 72 ready-to-use recipes (by adding high-quality photos);
- The addition of other languages other than those made available by EVCO.

1.2 AVAILABLE MODELS

The **Vcolor 739 M/L** series includes 2 controllers:

- **Vcolor 739 M** - Controller for multifunctional machines with a 5" display;
- **Vcolor 739 L** - Controller for multifunctional machines with a 7" display.

1.3 FEATURES


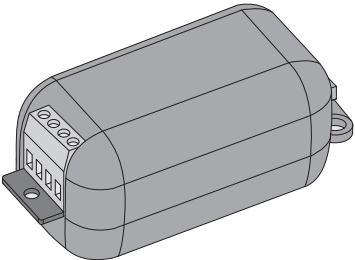
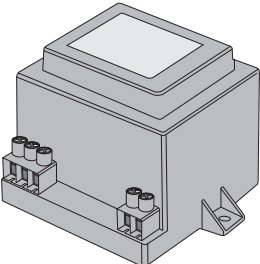
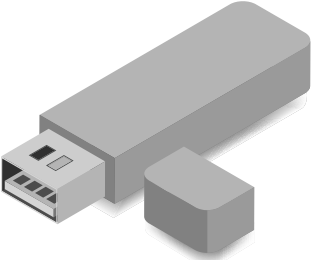
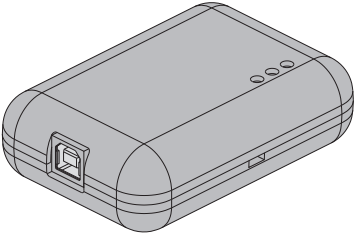
The main features of the **Vcolor 739 M/L** series are:

- 3 analogue inputs for temperature, for Pt1000 probes;
- 5 digital inputs, including:
 - 2 voltage-free digital inputs;
 - 3 hazardous voltage digital inputs;
- 10 non-sealed relay outputs;
- 2 12 Vdc 15 mA maximum outputs for external SSR relay control;
- 1 RS-485 MODBUS RTU serial port on the user interface;
- 2 USB-A ports:
 - 1 USB-A port on the base board (for programming);
 - 1 USB-A port on the user interface (for graphic customization);
- **EPoCA**-compatible.

NOTE: for further information regarding input and output specifications, please refer to paragraph "**2.2 Technical specifications**" on page 12.

1.4 ACCESSORIES

The Vcolor 739 M/L range is supplemented with the following accessories:

Type	P/n	Description
	--	Pt1000 temperature probes
	EVIF25SWX	EVlinking RS-485/Wi-Fi module
---	CJAV55	Kit for removable terminals on the power base
	ECTSFD004	Safety transformer 230 Vac/12 Vac, 20 VA
---	0812000002	USB plug type A IP65
	EVUSB4096M	USB flash drive 4096MB
---	0810500018	USB 2.0 cable, 2 m, M/M
---	0810500020	USB 2.0 cable, 0.5 m, M/M
	EVIF20SUXI	Non optoisolated RS-485/USB serial interface

2. TECHNICAL DATA

Chapter content

This chapter contains the following information:

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<i>Introduction</i>	12
<i>Technical specifications</i>	12
<i>I/O specifications</i>	13

2.1 INTRODUCTION

All the system components of **Vcolor 739 M/L** controllers satisfy European Community (EC) requirements for built-in equipment. They must be installed in casing or another location designated on the basis of specific environmental conditions and in order to minimise the risk of involuntary contact with hazardous voltage. Use metal casing to improve immunity to the electromagnetic fields of the **Vcolor 739 M/L** system. This equipment satisfies the EC requirements as indicated in the tables below.

WARNING

MALFUNCTIONING OF THE EQUIPMENT

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

2.2 TECHNICAL SPECIFICATIONS

2.2.1 Base board

Type	Description
The product complies with the following harmonised standards:	EN60730-1 and EN60730-2-9
Device construction:	Incorporated electronic device
Device purpose:	Operating control device
Type of action:	1
Pollution category:	2
Overvoltage category:	II
Nominal pulse voltage:	2500 V
Power supply:	12 Vac/dc, $\pm 10\%$, 50/60 Hz
Consumption:	10 VA maximum
Ambient operating conditions:	0 ... 55 °C (32 ... 131 °F) 10 ... 90 % RH non-condensing
Transportation and storage conditions:	-25 ... 70 °C (-13 ... 158 °F) 10 ... 90 % RH non-condensing
Software class:	A
Ambient front protection:	IP00

2.2.2 User interface

Type	Description
The product complies with the following harmonised standards:	EN60730-1 and EN60730-2-9
Device construction:	Incorporated electronic device
Device purpose:	Operating control device
Type of action:	1
Pollution category:	2
Overvoltage category:	I
Nominal pulse voltage:	330 V
Power supply:	12 Vac/dc $\pm 10\%$, 50/60 Hz (from power supply unit)
Consumption:	20 VA maximum
Ambient operating conditions:	0 ... 55 °C (32 ... 131 °F) 10 ... 90 % RH non-condensing
Transportation and storage conditions:	-25 ... 70 °C (-13 ... 158 °F) 10 ... 90 % RH non-condensing
Software class:	A
Ambient front protection:	IP65
RTC:	Built-in lithium battery
RTC drift:	≤ 60 s/month at 25 °C (77 °F)
Battery life:	> 6 months at 25 °C (77 °F)
Battery charging time:	24 h using instrument power supply

2.3 I/O SPECIFICATIONS

2.3.1 Base board

Type	Description
Voltage-free digital inputs:	2 voltage-free digital inputs
Hazardous voltage digital inputs:	3 hazardous voltage digital inputs
Analogue inputs for temperature:	3 analogue inputs for Pt1000 probes
Low voltage (SELV) digital outputs:	10 low voltage digital outputs 2 12 Vdc 15 mA maximum outputs for external SSR relay control
Serial ports:	1 x RS-485 fieldbus communication serial port for connection with user interface 1 x RS-485 fieldbus communication serial port for connection with inverter 1 x USB 2.0 type A serial port (operation guaranteed with EVUSB4096M)

Analogue input specifications

	Default	Pt1000 Class B
Pb3	Tank probe	•
Pb4	Heater probe	•
Pb5	Condenser probe	•
Range	---	-50...200 °C (-58...392 °F)
Solution	---	0.1 °C (1 °F)
Input impedance	---	>30 kΩ

Digital output specifications

Relay output	Default	Description	Load (at 250 Vac)	Load type
Out1 (SSR)	Heaters	12 Vdc, 15 mA maximum for external SSR	---	---
Out2 (SSR)	Heaters	12 Vdc, 15 mA maximum for external SSR	---	---
Out3	Heaters (ON/OFF)	SPDT	2 A	Resistive
Out4	Arm drive	SPST	2 A	Resistive
Out5	Arm gearmotor	SPST	2 A	Resistive
Out6	Compressor	SPST	2 A	Resistive
Out7	Defrost solenoid valve	SPST	2 A	Resistive
Out8	Half load solenoid valve	SPST	2 A	Resistive
Out12	Crankcase heaters	SPDT	2 A	Resistive
Out13	Condenser fan	SPST	2 A	Resistive
Out14	Technical room fans	SPST	2 A	Resistive
Out15	Cooling solenoid valve	SPST	2 A	Resistive

2.3.2 User interface

Type	Description
Serial ports:	1 x RS-485 fieldbus communication serial port for connection with base board 1 x RS-485 RTU SLAVE communication serial port for connection with EPoCA or third-party monitoring system 1 x USB 2.0 type A serial port (operation guaranteed with EVUSB4096M)

3. MECHANICAL ASSEMBLY

Chapter content

This chapter contains the following information:

Subject	Page
<i>Before you start</i>	15
<i>Information concerning installation and the surrounding environment</i>	15
<i>Dimensions for models mounted with protruding front panel</i>	16
<i>Flush mounting model dimensions</i>	18
<i>Vcolor 739 installation</i>	19
<i>Base power board installation</i>	22
<i>Minimum installation distances</i>	22

3.1 BEFORE YOU START

Read this manual carefully before installing the system.

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

WARNING

REGULATORY INCOMPATIBILITY

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

3.2 INFORMATION CONCERNING INSTALLATION AND THE SURROUNDING ENVIRONMENT

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

DANGER

RISK OF ELECTRIC SHOCK, EXPLOSION OR ELECTRIC ARC

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

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

DANGER

RISK OF EXPLOSION

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

WARNING

MALFUNCTIONING OF THE EQUIPMENT

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

3.3 DIMENSIONS FOR MODELS MOUNTED WITH PROTRUDING FRONT PANEL

3.3.1 Vcolor 739 M user interface

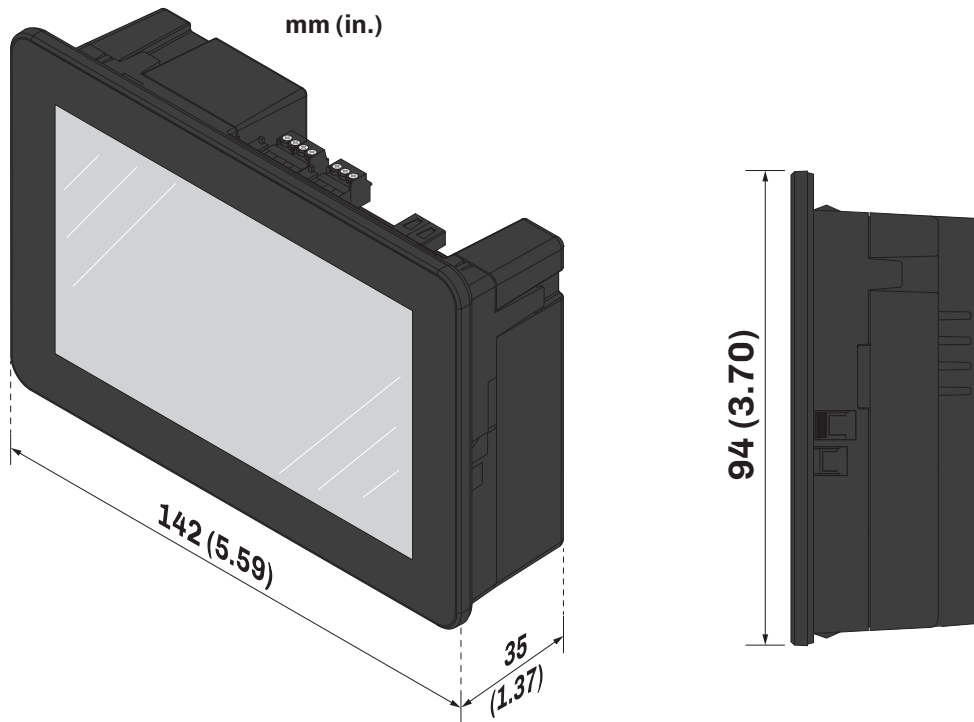


Fig. 1. Protruding front panel Vcolor 739 M user interface dimensions

3.3.2 Vcolor 739 L user interface

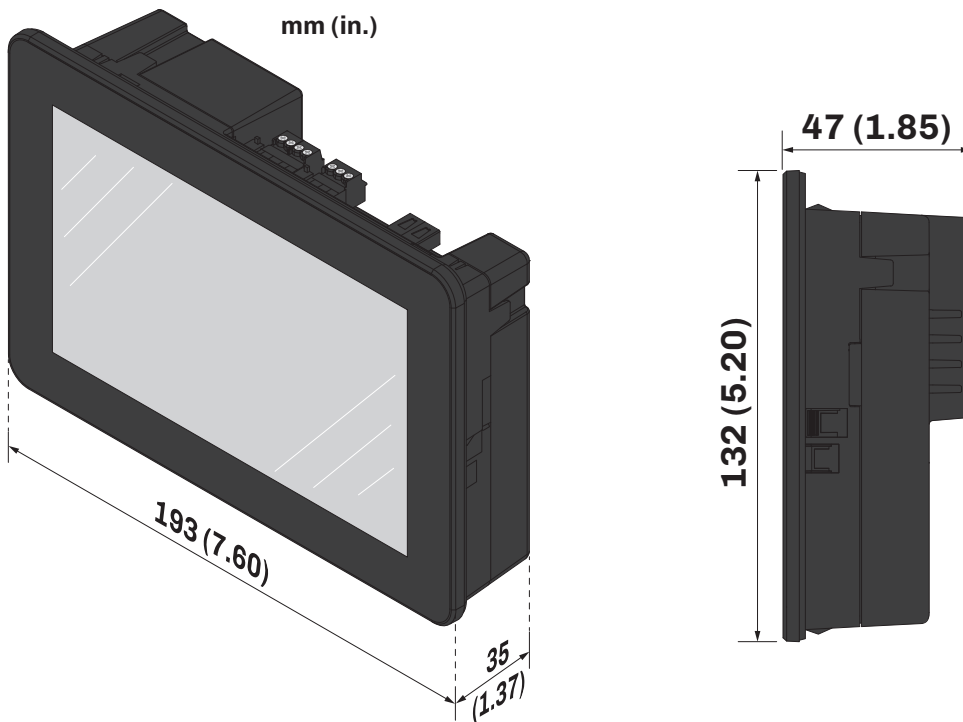


Fig. 2. Protruding front panel Vcolor 739 L user interface dimensions

3.3.3 Base board

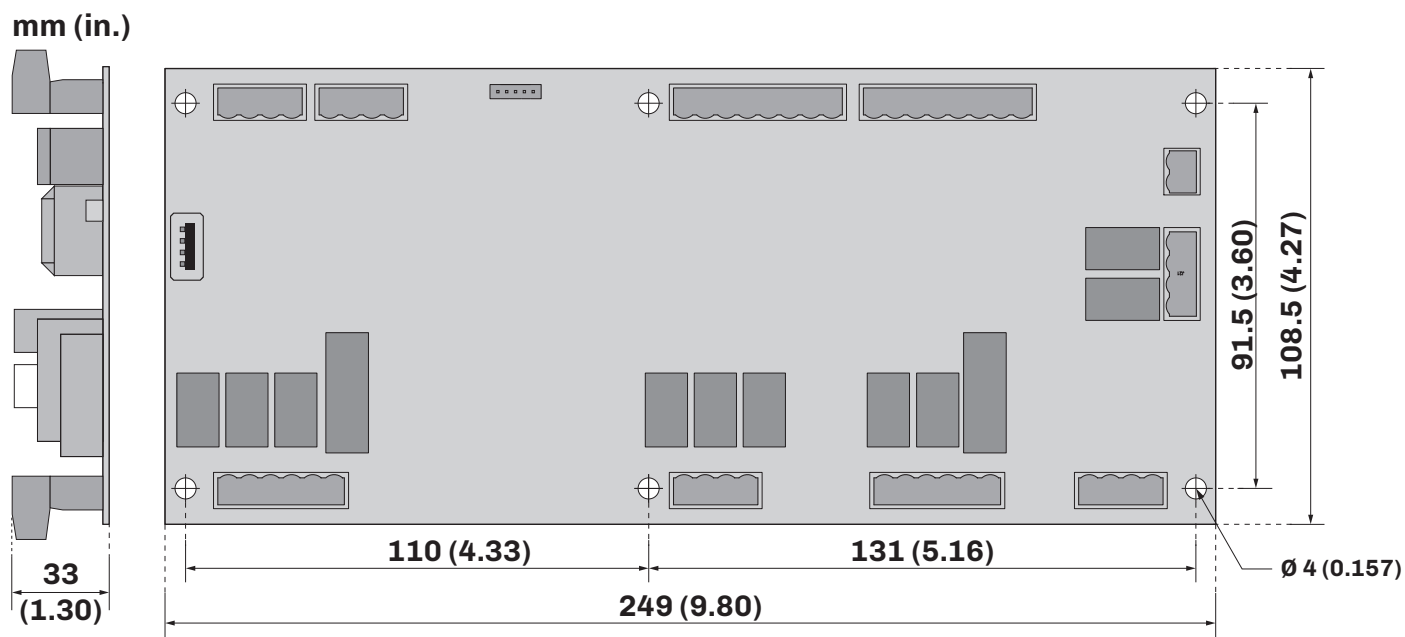


Fig. 3. Base board dimensions

3.4 FLUSH MOUNTING MODEL DIMENSIONS

3.4.1 Vcolor 739 M user interface

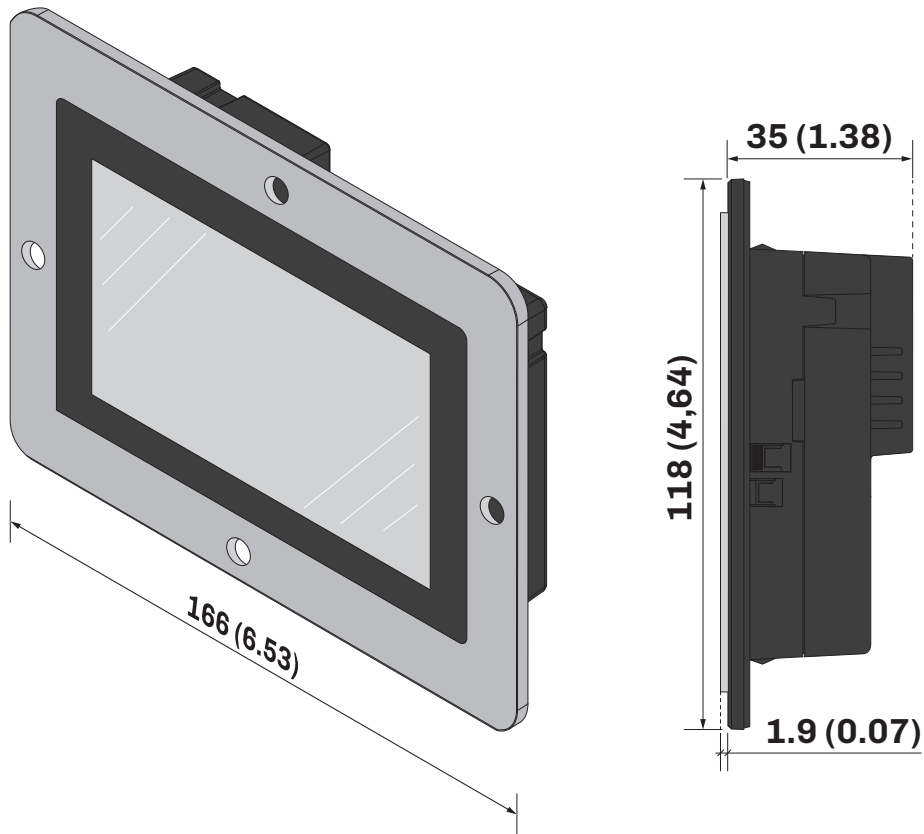


Fig. 4. Flush mounting Vcolor 739 M user interface dimensions

3.4.2 Vcolor 739 L user interface

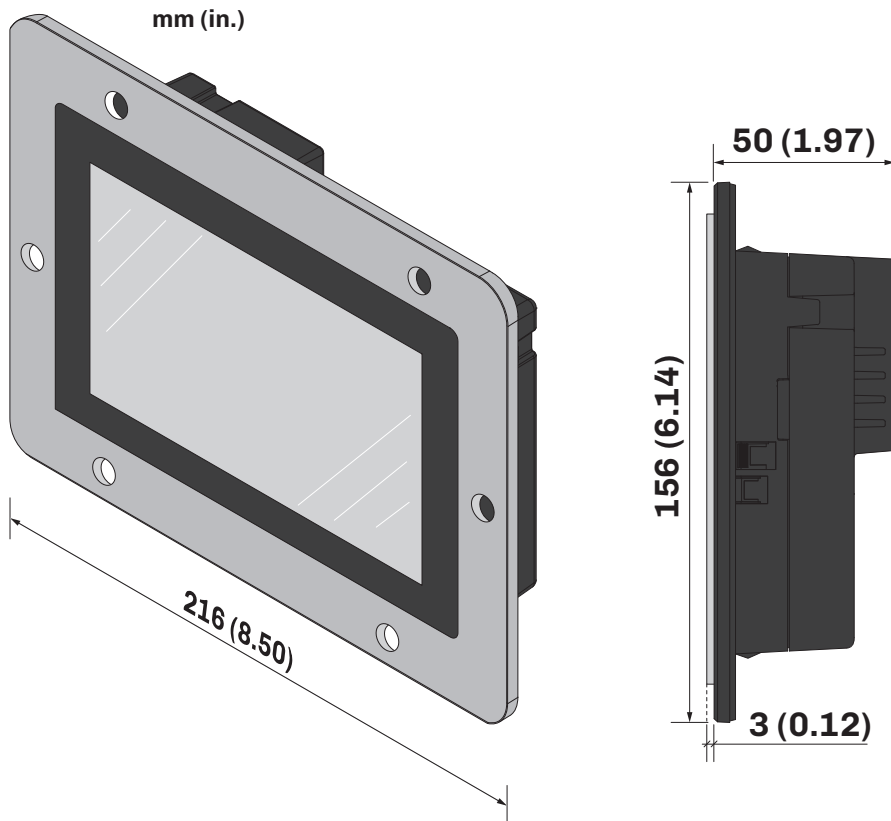


Fig. 5. Flush mounting Vcolor 739 L user interface dimensions

3.5 VCOLOR 739 INSTALLATION

3.5.1 Mounting with protruding front panel

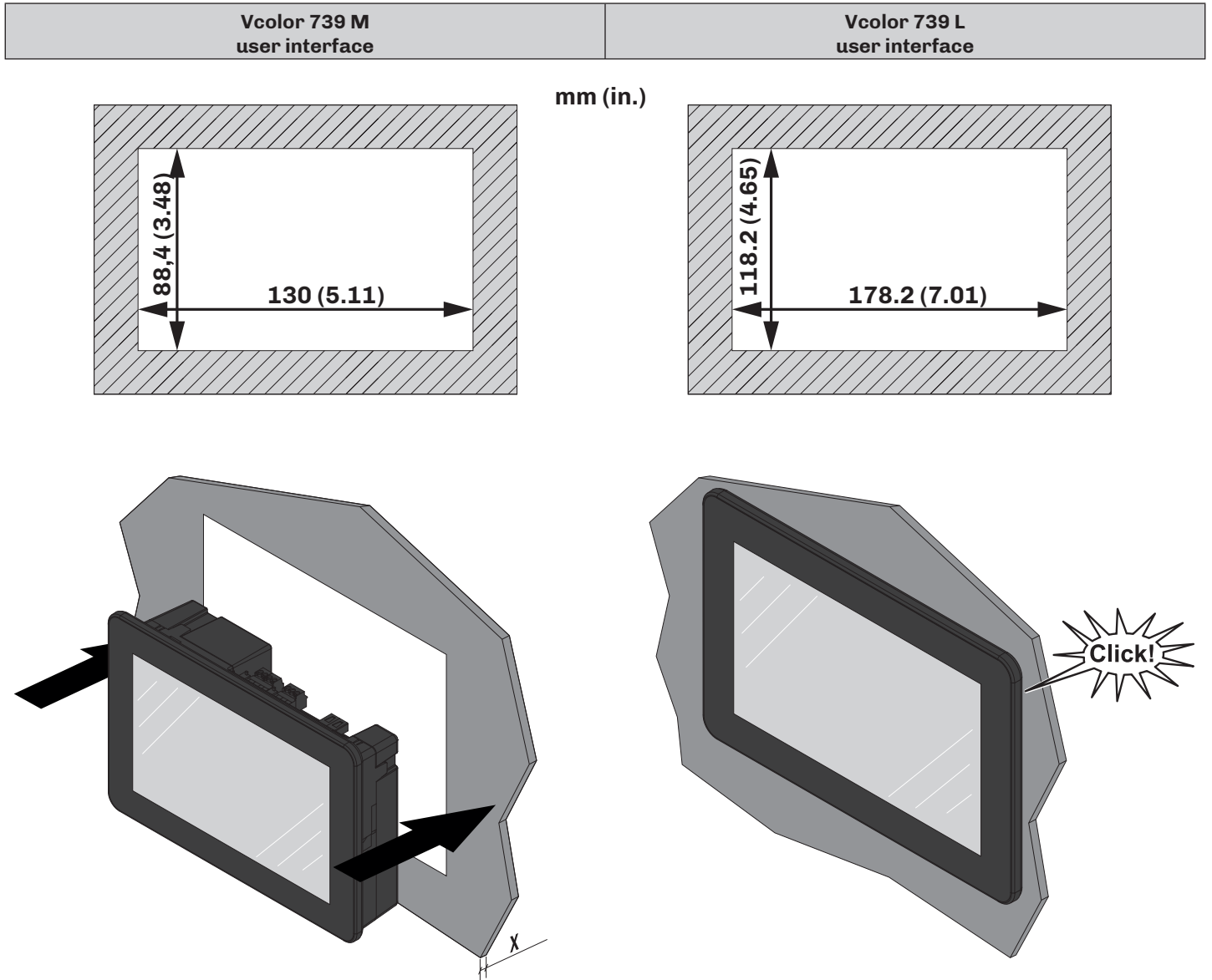


Fig. 6. Installing Vcolor 739 M user interface with protruding front panel

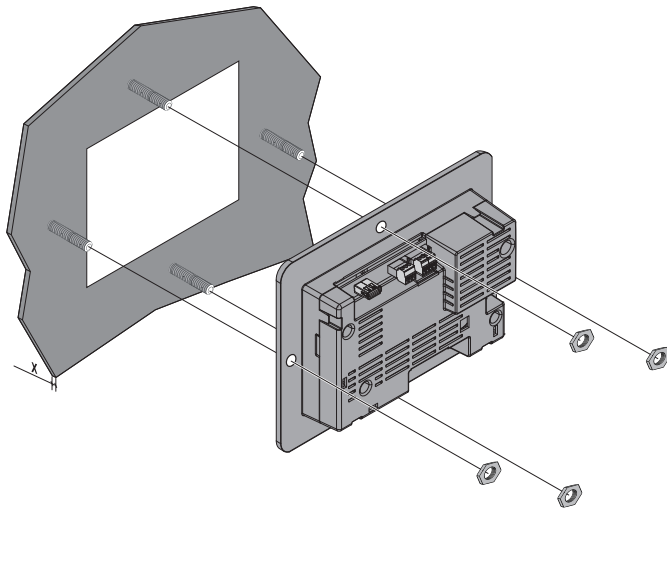
Panel thickness

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

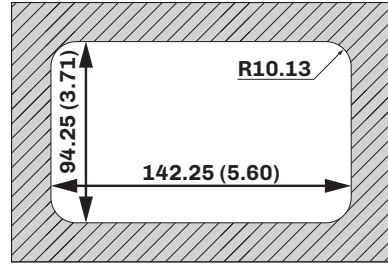
Material	Thickness (X) [mm (in.)]
Metal	0.8...1.5 (0.03...0.06)
Plastic	0.8...3.4 (0.03...0.13)

3.5.2 Flush mounting from the rear of the panel

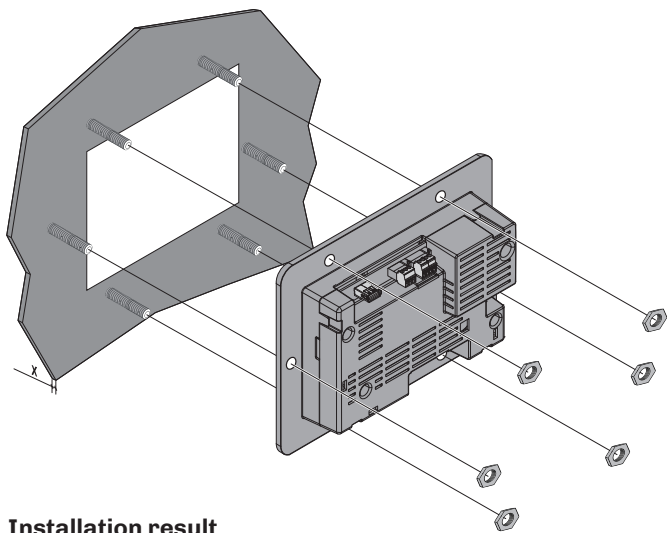
Vcolor 739 M



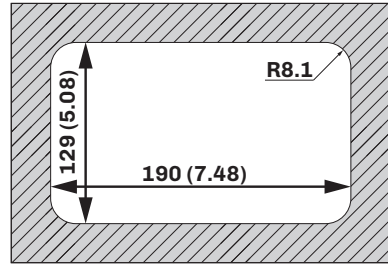
mm (in.)



Vcolor 739 L



mm (in.)



Installation result

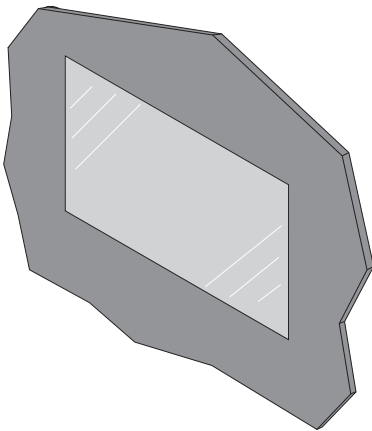


Fig. 7. Flush mounting Vcolor 739 M/L user interface from the rear of the panel

Panel thickness

The thickness of the panel used for flush installation from the back of a panel depending on the model:

Model	Thickness (X) [mm (in.)]
Vcolor 739 M	1.9 (0.07)
Vcolor 739 L	3.0 (0.12)

Captive screw hole spacing for Vcolor 739 M user interface

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

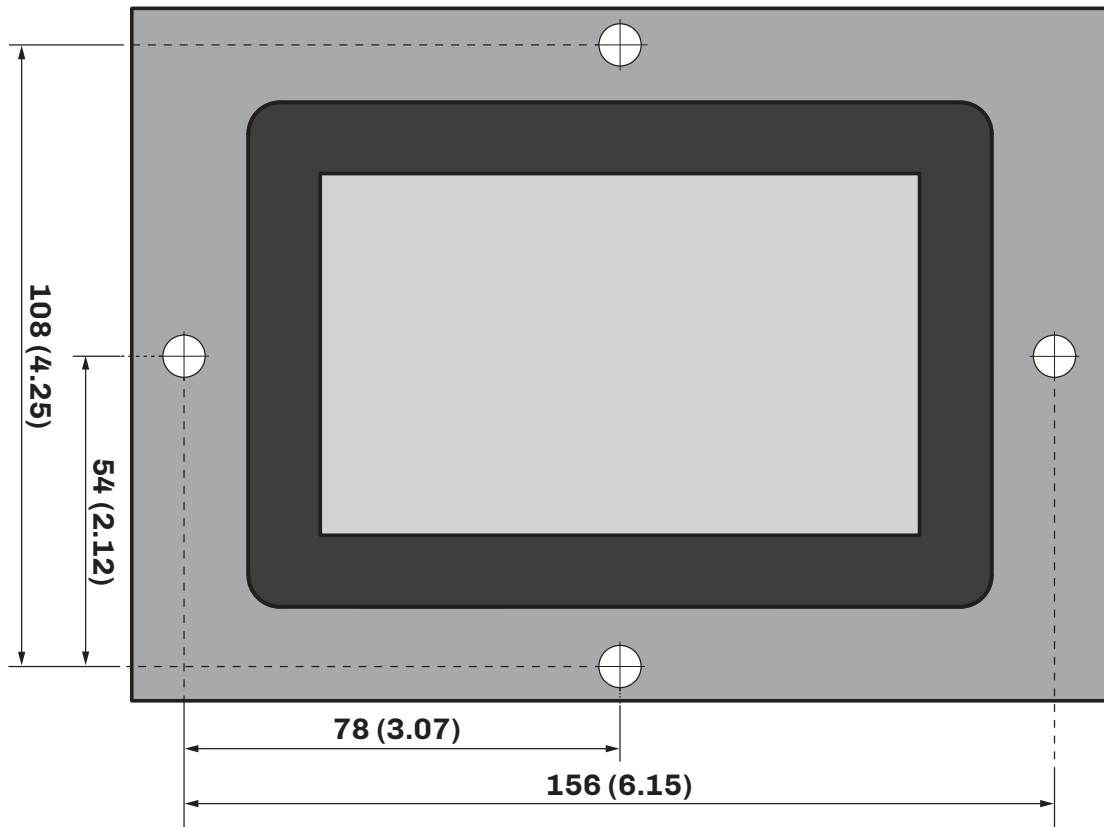


Fig. 8. Captive screw hole spacing measurements for Vcolor 739 M

Captive screw hole spacing for Vcolor 739 L user interface

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

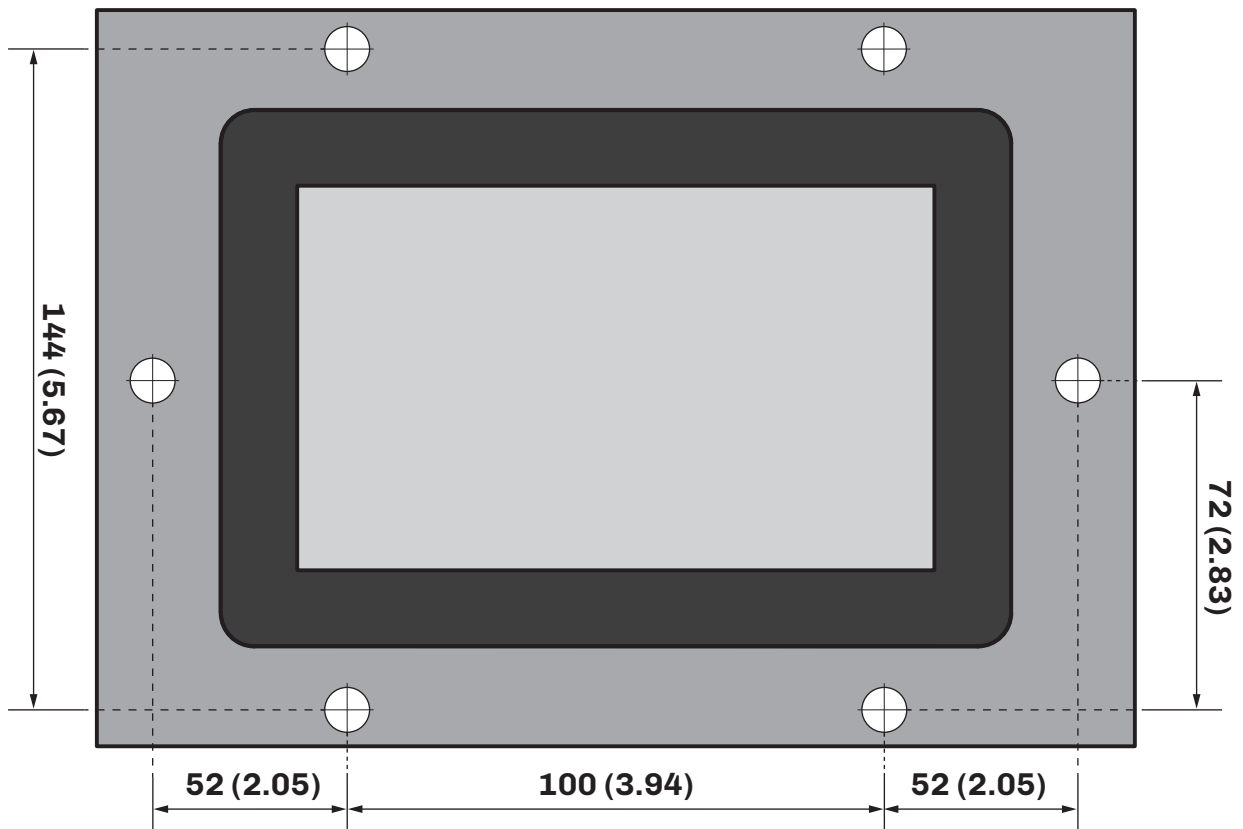


Fig. 9. Captive screw hole spacing measurements for Vcolor 739 L user interface

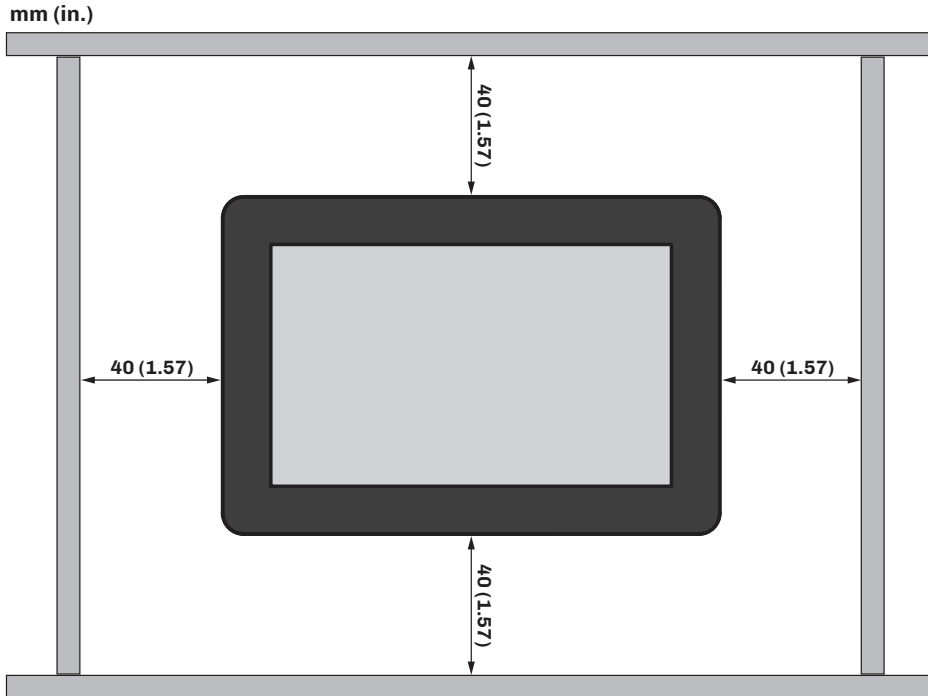
3.6 BASE POWER BOARD INSTALLATION

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

3.7 MINIMUM INSTALLATION DISTANCES

3.7.1 Vcolor 739 M/L user interface

Mounting with protruding front panel



Flush mounting from the rear of the panel

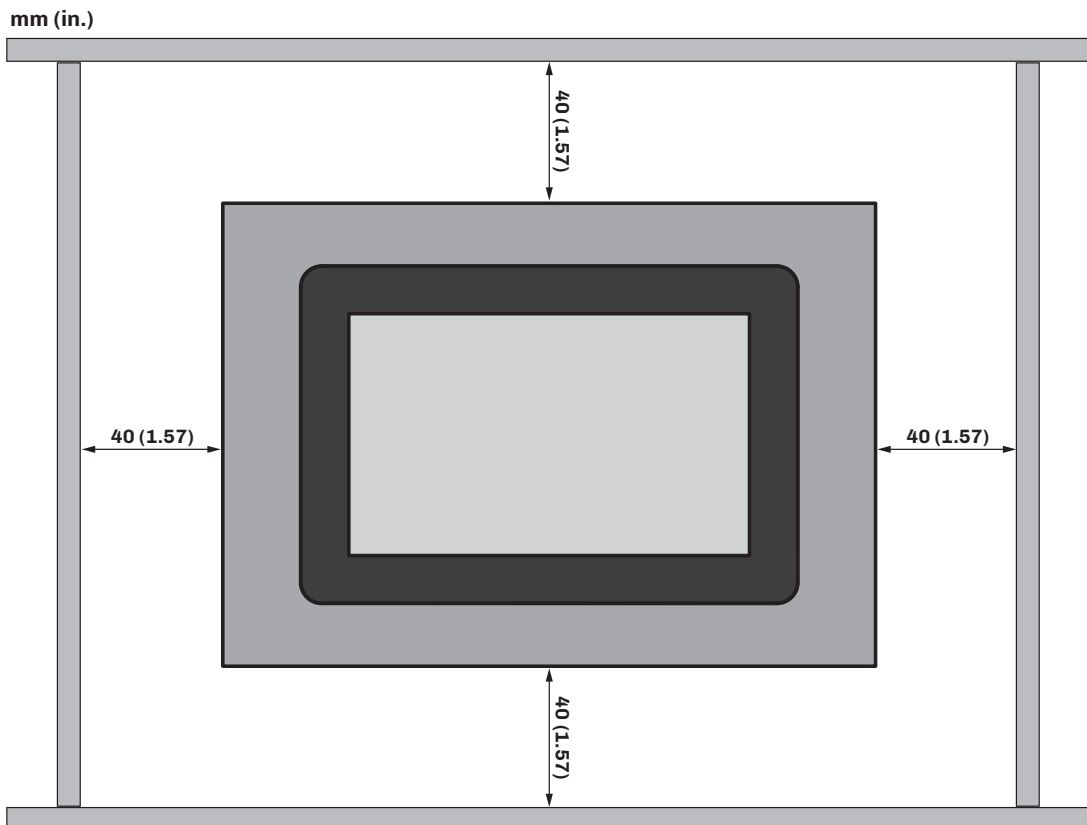


Fig. 10. Vcolor 739 M/L user interface minimum installation distances

3.7.2 Base board

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

4. ELECTRICAL CONNECTIONS

Chapter content

This chapter contains the following information:

Subject	Page
<i>Wiring best practices</i>	24
<i>Wiring diagrams</i>	25
<i>Connection example</i>	28

4.1 WIRING BEST PRACTICES

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

DANGER

RISK OF ELECTRIC SHOCK, EXPLOSION OR ELECTRIC ARC

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

4.1.1 Wiring guidelines

When wiring the controllers, observe the following standards:

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

Use correctly earthed shielded cables for all inputs or analogue outputs and for communication connections. If shielded cables are not used for these connections, electromagnetic interference may cause signal degradation. Degraded signals can result in unpredictable operation of the controller or the modules and connected equipment.

WARNING

MALFUNCTIONING OF THE EQUIPMENT

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

4.1.2 Guidelines for screw terminals

Suitable wiring for the power supply

Step 5.08 mm (0.199 in.)

mm in.											Nom lb-in	0.5...0.6 4.42...5.31
		mm ²	0.2...2.5	0.2...2.5	0.25...2.5	0.25...2.5	2 x 0.2...1	2 x 0.2...1.5				
		AWG	24...14	24...14	22...14	22...14	2 x 24...18	2 x 24...16	2 x 22...18	2 x 20...16		

Fig. 11. Suitable wiring for the power supply

Suitable wiring for I/O SELV

Step 3.5 mm (0.137 in.)

mm in.											Nom lb-in	0.22...0.25 1.94...2.21
		mm ²	0.14...1.5	0.14...1.5	0.25...1.5	0.25...0.5	2 x 0.08...0.5	2 x 0.08...0.5				
		AWG	28...16	28...16	22...16	22...20	2 x 28...20	2 x 28...20	2 x 22...21	2 x 20...20		

Fig. 12. Suitable wiring for I/O SELV

4.1.3 Permitted cable lengths

NOTICE

INOPERABLE EQUIPMENT

- When connecting the probes, the digital inputs and the power supply, use cables that are no longer than 10 m (32.80 ft.).
- When connecting the RS-485 serial port, use cables that are no longer than 1 m (3.28 ft.).
- When connecting the controller power supply and the relay outputs, use cables that are no longer than 10 m (32.80 ft.).

4.2 WIRING DIAGRAMS

4.2.1 Vcolor 739 M user interface

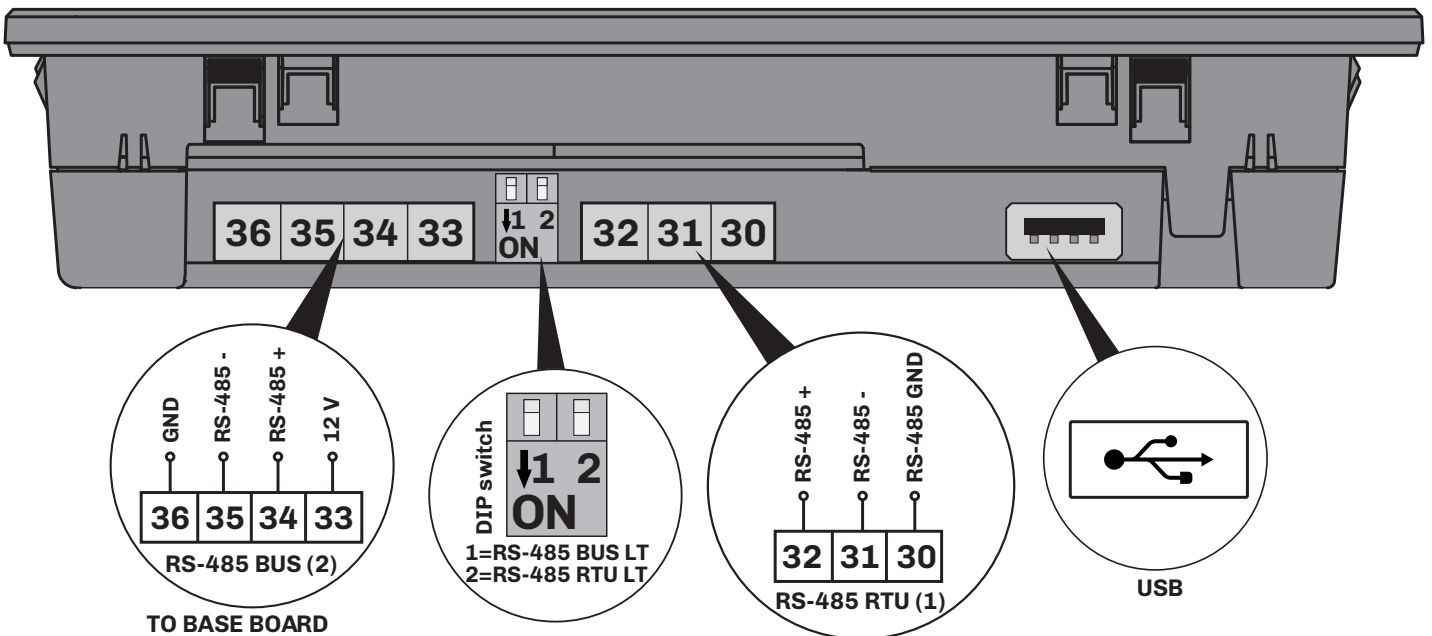


Fig. 13. Vcolor 739 M user interface wiring diagram

TERMINALS			
30...32	RS-485 RTU Slave serial port connection	USB	Service USB port (for graphic customization)
34...36	RS-485 fieldbus serial port connection	DIP switch	1 = Activation of RS-485 BUS serial port termination resistor
33-36	Power supply input (12 Vdc from base board)	switch	2 = Activation of RS-485 RTU serial port termination resistor

(1) = RS-485 communication serial port with EVlinking Wi-Fi;

(2) = RS-485 communication serial port with base board.

4.2.2 Vcolor 739 L user interface

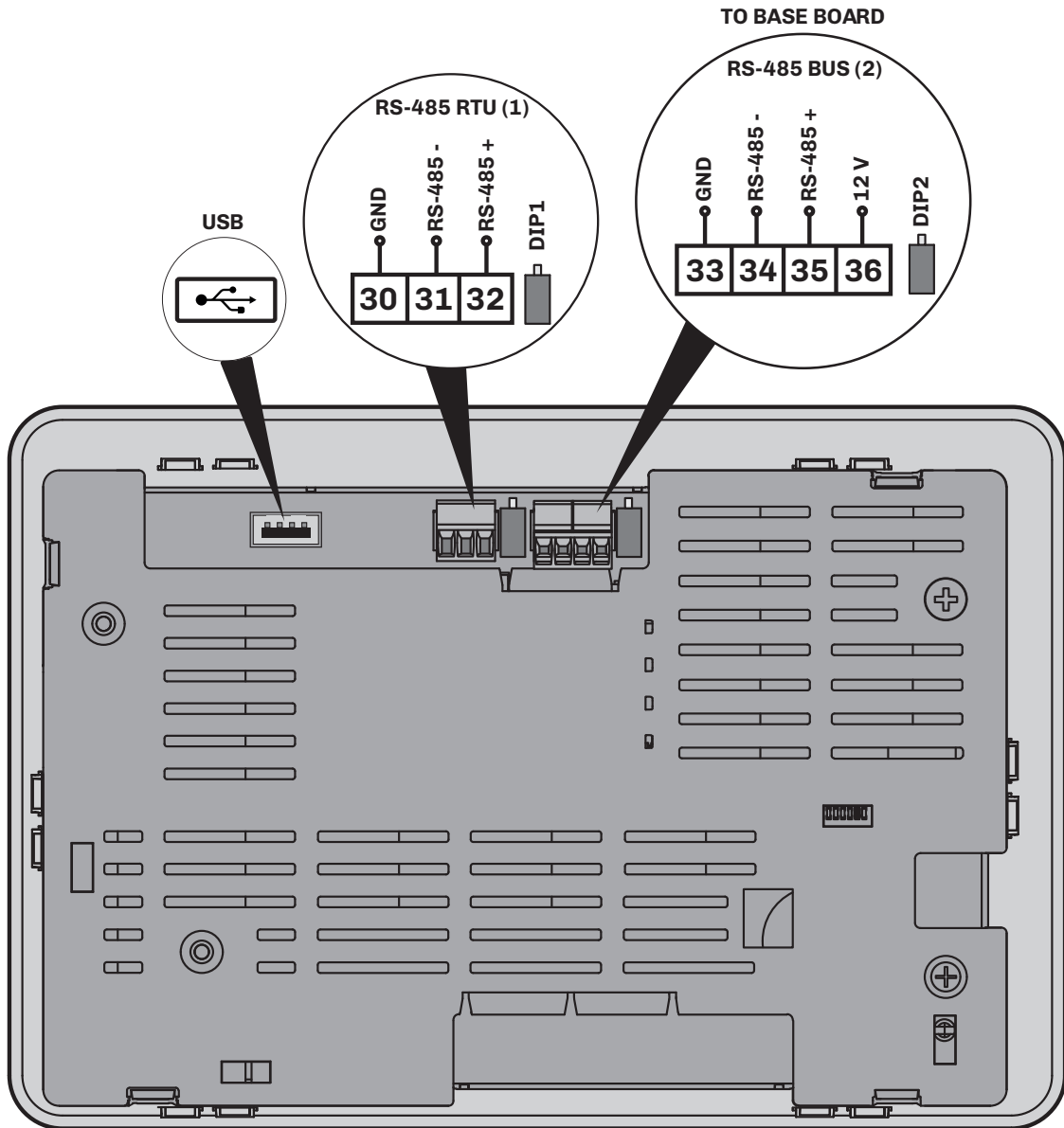


Fig. 14. Vcolor 739 L user interface wiring diagram

TERMINALS			
30...32	RS-485 RTU Slave serial port connection	DP1	RS-485 RTU serial port termination resistor ON/OFF
33-36	12 Vac/dc power supply input	DP2	RS-485 fieldbus serial port termination resistor ON/OFF
34...36	RS-485 fieldbus serial port connection	USB	Service USB port (for graphic customization)

(1) = RS-485 communication serial port with EVlinking Wi-Fi;

(2) = RS-485 communication serial port with base board.

4.2.3 Vcolor 739 M/L base board

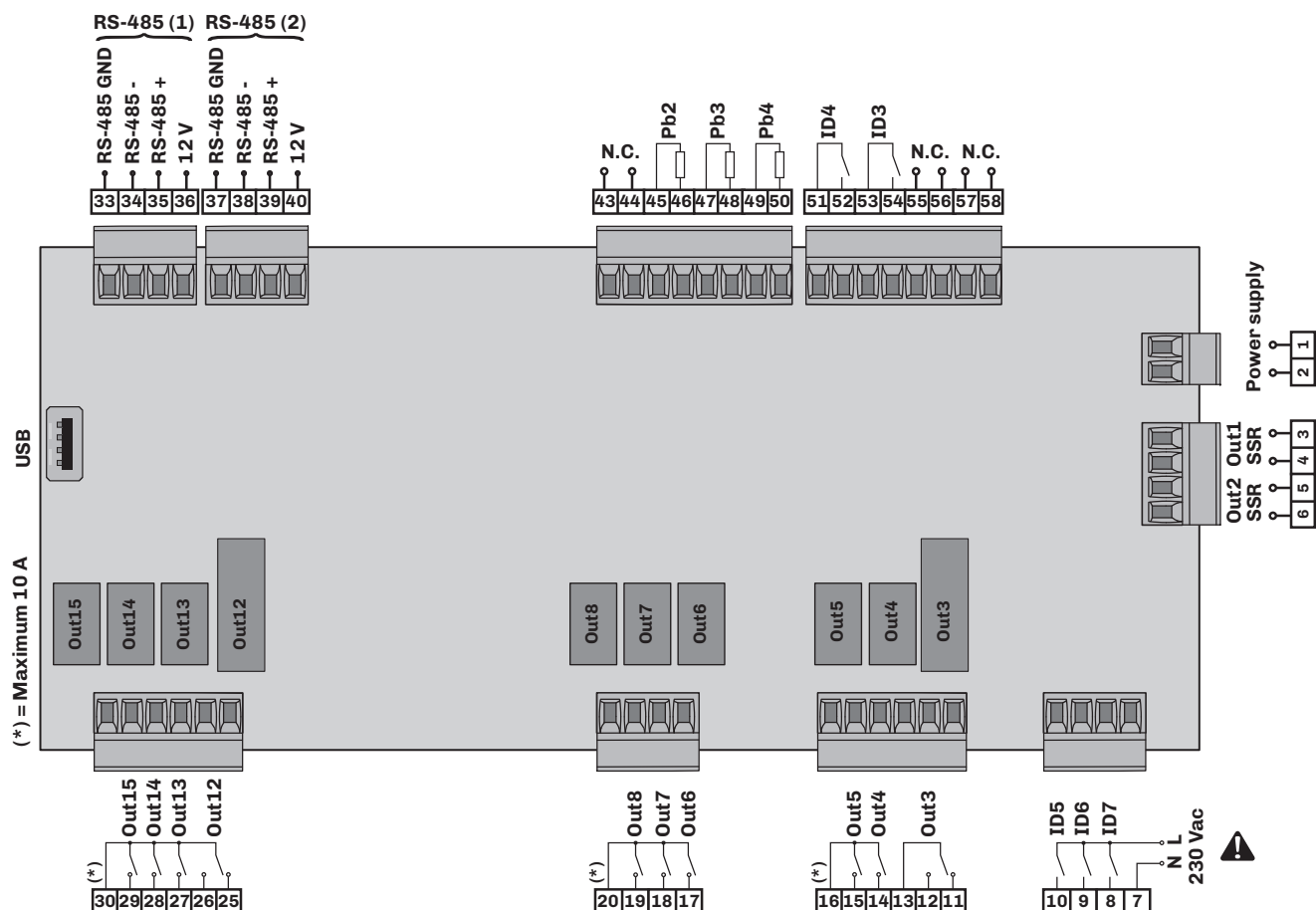


Fig. 15. Vcolor 739 M/L base board wiring diagram

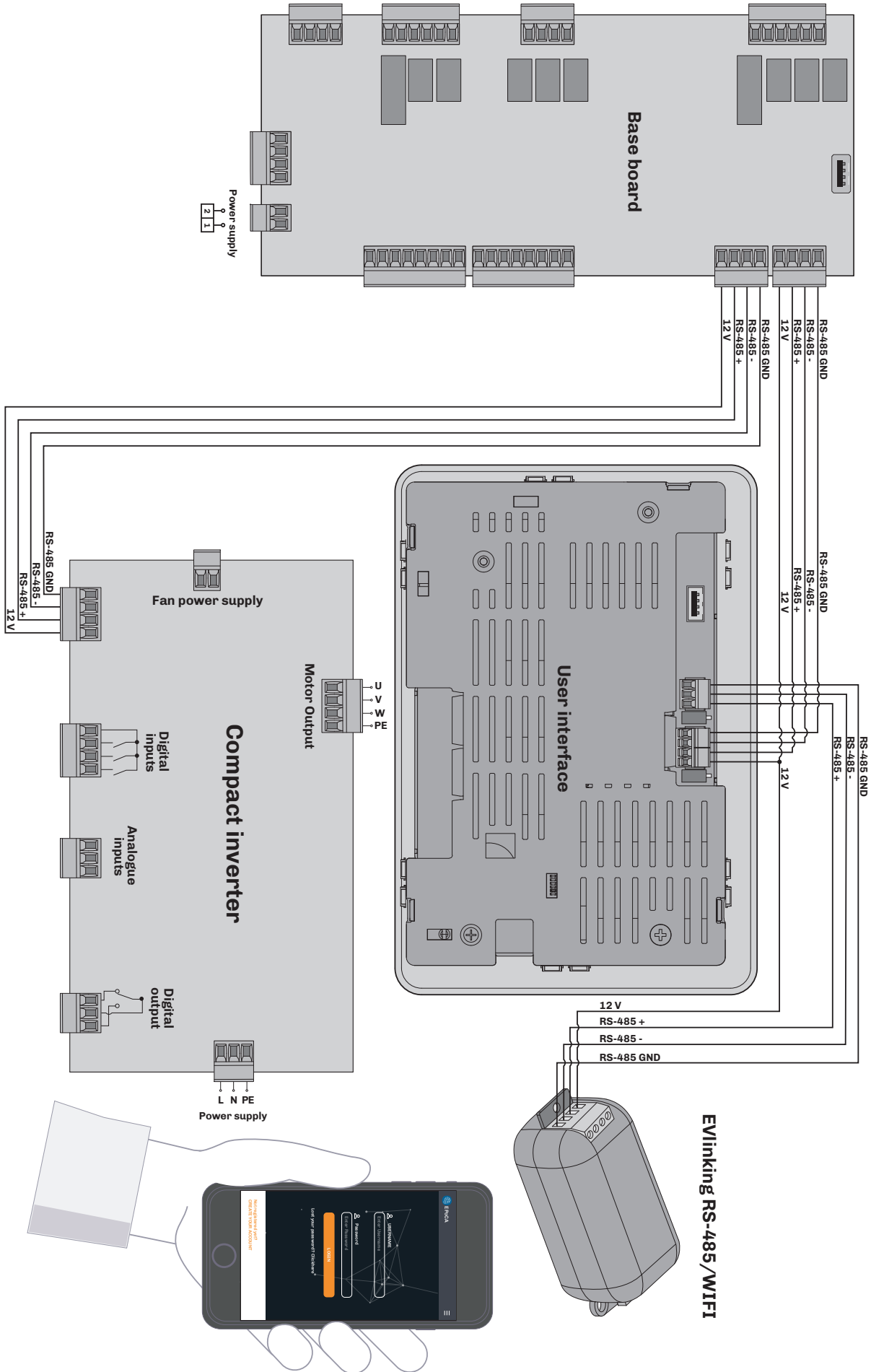
TERMINALS	
1-2	Power supply input
3-4	OUT1 12 Vdc output for external SSR relay (heating resistors)
5-6	OUT2 12 Vdc output for external SSR relay (heating resistors)
7-8	Hazardous voltage digital input ID7 (Compressor thermal switch)
7-9	Hazardous voltage digital input ID6 (Heater thermal switch)
7-10	Hazardous voltage digital input ID5 (Arm/gearmotor thermal switch)
13...11	Digital output Out3 (Heaters (3))
16-14	Digital output Out4 (Arm drive)
16-15	Digital output Out5 (Arm gearmotor)
20-17	Digital output Out6 (Compressor)
20-18	Digital output Out7 (Defrost solenoid valve)
20-19	Digital output Out8 (Half load solenoid valve)
30-26-25	Digital output Out12 (Crankcase heater)
30-27	Digital output Out13 (Condenser fans)
30-28	Digital output Out14 (Technical room fans)
30-29	Digital output Out15 (Cooling solenoid valve)
33...36	Serial communication connection RS-485 (1)
37...40	Serial communication connection RS-485 (2)
43-44	No connection N.C.
45-46	Analogue input Pb2 (Heater probe)
47-48	Analogue input Pb3 (Condenser probe)
49-50	Analogue input Pb4 (Tank probe)
51-52	Digital input ID4 (High pressure switch)
53-54	Digital input ID3 (Cover status)
55-56	No connection N.C.
57-58	No connection N.C.
USB	USB drive connection (for programming)

(1) = RS-485 communication serial port with user interface;

(2) = RS-485 communication serial port with EVCO inverter;

(3) = For heater ON/OFF regulation.

4.3 CONNECTION EXAMPLE



5. USER INTERFACE

Chapter content

This chapter contains the following information:

Subject	Page
<i>Interface</i>	30
<i>Icons</i>	30
<i>Touch keys</i>	30
<i>Function keys/icons</i>	30
<i>Using the controller</i>	31
<i>Settings menu</i>	33
<i>Data log</i>	35
<i>View alarm list</i>	36
<i>Change Date and Time</i>	36
<i>Machine info</i>	36
<i>Change language</i>	37
<i>In/out status</i>	37
<i>Output test (EXPERT/OEM ONLY)</i>	38
<i>Internal data reset (EXPERT/OEM ONLY)</i>	38
<i>Parameter management (EXPERT/OEM ONLY)</i>	39
<i>PID setup (OEM ONLY)</i>	39

5.1 INTERFACE

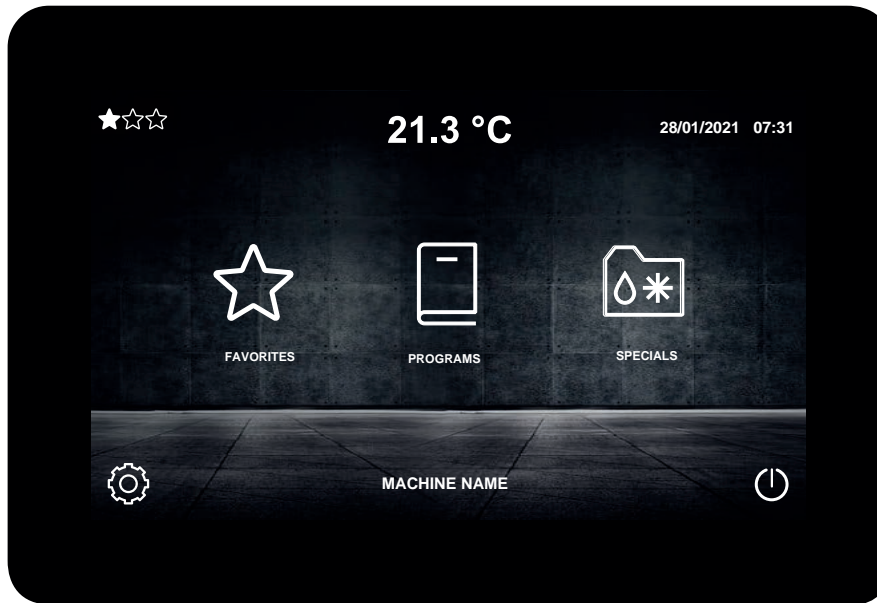










Fig. 16. User interface

5.2 ICONS





Icon	Lit steadily	Flashing	OFF
	Compressor ON	---	Compressor OFF
	Heaters ON	---	Heaters OFF

5.3 TOUCH KEYS

The touch key functions are described below:

Keys...	Tap and release to...
	Switch the controller on/off
	Access controller settings
	At the top of the display Used to navigate through screens within the settings menu
	At the top of the display Used to navigate through screens within the settings menu
	At the bottom of the display Used to navigate through screens within the menus
	At the bottom of the display Used to navigate through screens within the menus

5.4 FUNCTION KEYS/ICONS

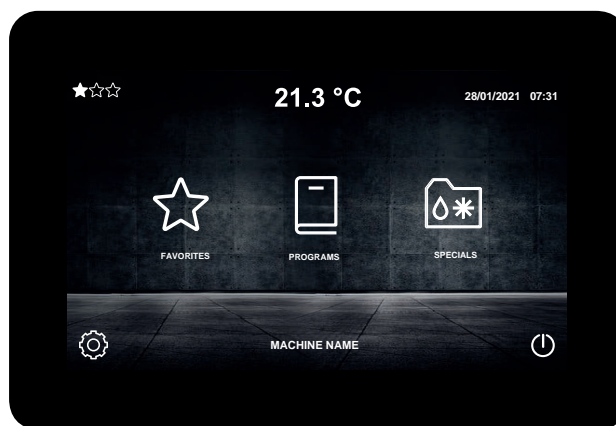
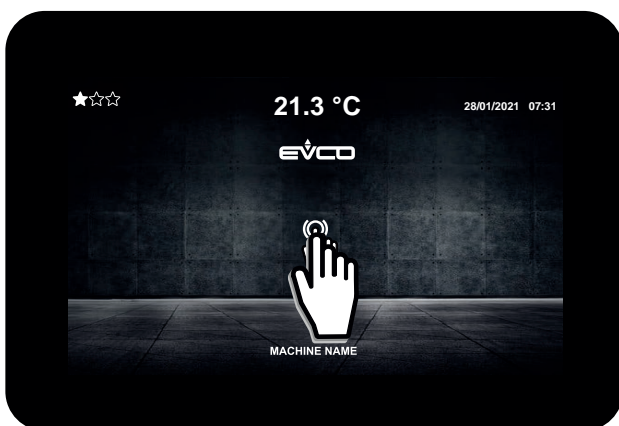
Key/Icon...			
			
Defrost OFF	Defrost ON	Half load solenoid valve OFF (Full load)	Half load solenoid valve ON (Half load)

5.5 USING THE CONTROLLER

5.5.1 Controller ON/OFF

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

Switching on



Switching off



Fig. 17. Controller ON/OFF

NOTE: by switching ON/OFF we mean switching from STANDBY to ON and vice-versa.

5.5.2 Backlighting

After a period of inactivity that can be set via parameter **P70** ≠0, the backlighting automatically dims in order to save energy.

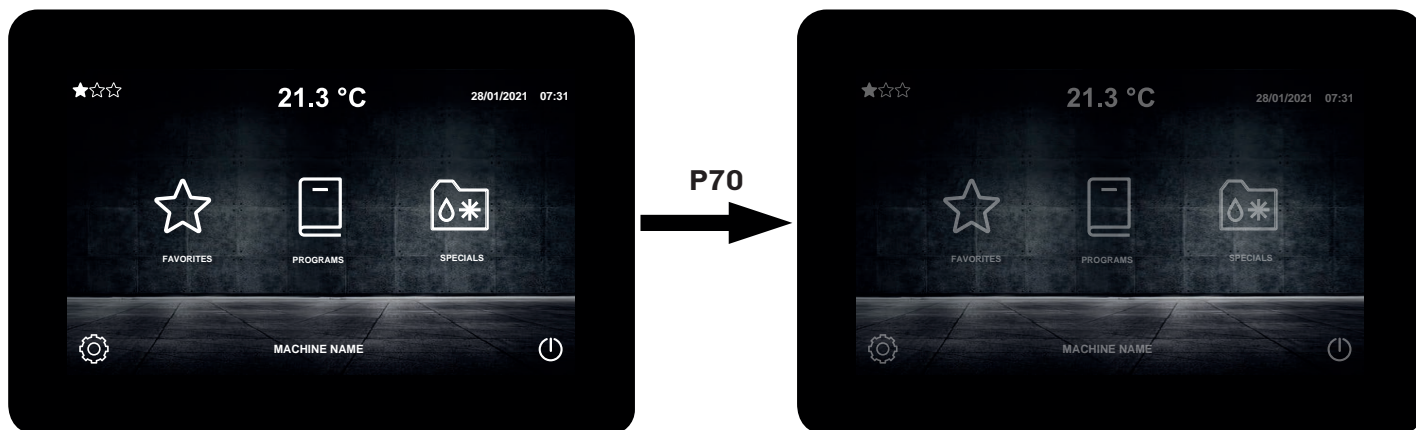
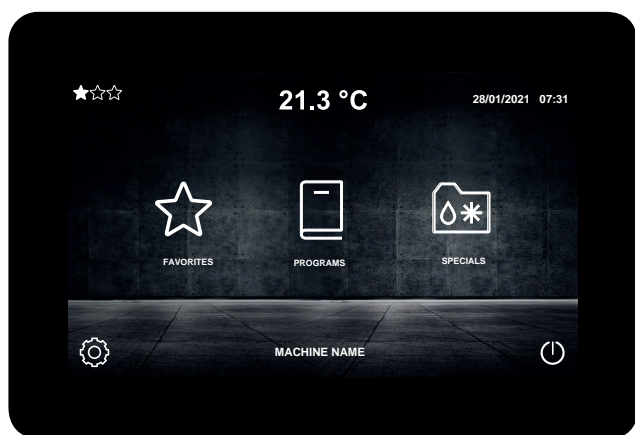


Fig. 18. Backlighting dimming

5.5.3 Homepage

The **Home** screen is as follows:



From here you can:

- Switch off the device;
- Access the list of favourite cycles;
- Access the settings menu;
- Access the recipe book;
- Access special cycles;
- Login to EXPERT or OEM levels.

Fig. 19. Home screen

5.6 SETTINGS MENU

USER level:

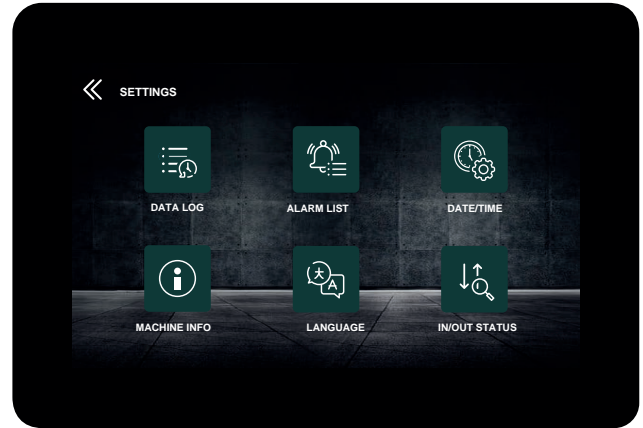


Fig. 20. Settings menu, **USER** level

EXPERT level:

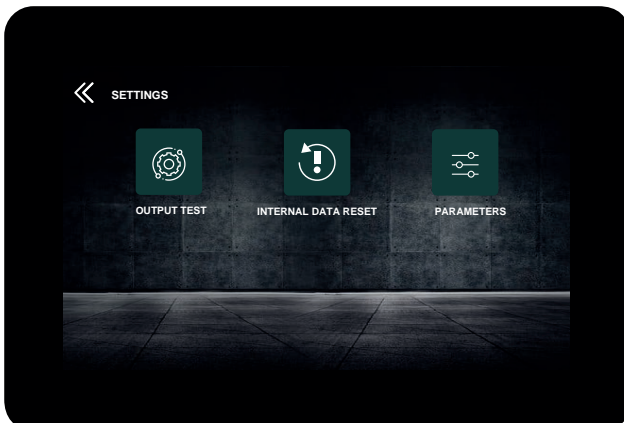
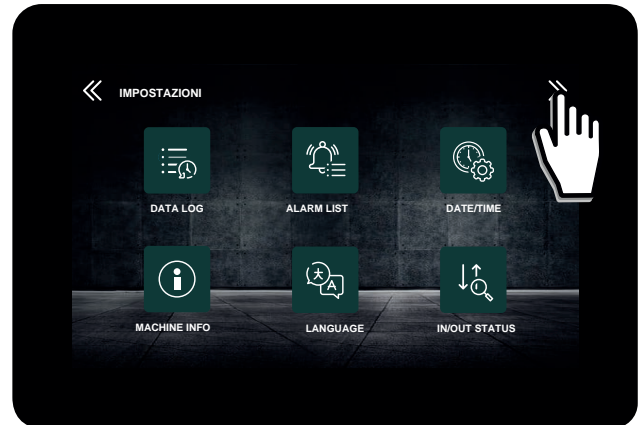
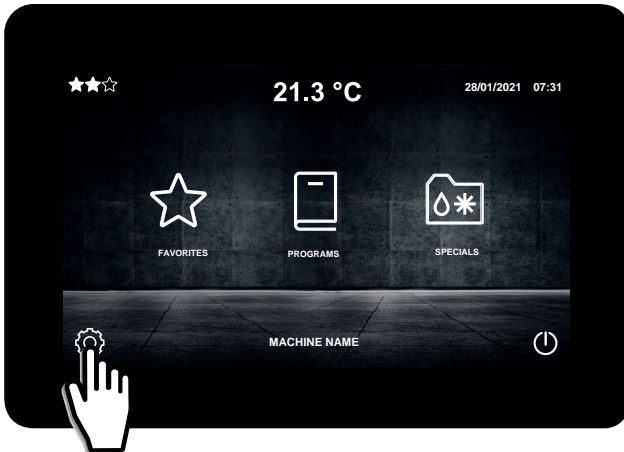


Fig. 21. Settings menu, **EXPERT** level

OEM level:



Fig. 22. Settings menu, OEM level

The table below shows the authorisation settings according to access level:

Action	USER	EXPERT	OEM
View data log	√	√	√
View alarm list	√	√	√
Change date/time	√	√	√
Machine info	√	√	√
Change language	√	√	√
I/O status	√	√	√
Output test	---	√	√
Internal data reset	---	√	√
View/change parameters	---	√	√
PID setup	---	---	√

5.7 DATA LOG

The data log can be used to view:

- Alarm log;
- Completed recipe log;
- Counter log.



Fig. 23. Data log

5.7.1 Alarm log

This screen shows the last 10 alarms which have occurred. The following information is provided:

- Alarm type;
- Date and time at which the alarm first occurred;
- Date and time at which the alarm ended;
- Name of the recipe in progress when the alarm occurred.

5.7.2 Completed recipe log

This screen shows the last 10 recipes which have been completed. The following information is provided:

- Recipe name;
- Date and time at which the recipe was carried out.

5.7.3 Counter log

The following information is shown on this screen:

- Total machine running time;
- Compressor running time;
- Heater running time;
- Any condenser cleaning alerts.

5.8 VIEW ALARM LIST

The **Alarm List** screen shows all the alarms managed by the controller.

When an alarm is in progress, during the alarm the text **ACTIVE** appears in the top right-hand part of the display; otherwise the text **INACTIVE** is shown.



Fig. 24. Alarm list

5.9 CHANGE DATE AND TIME

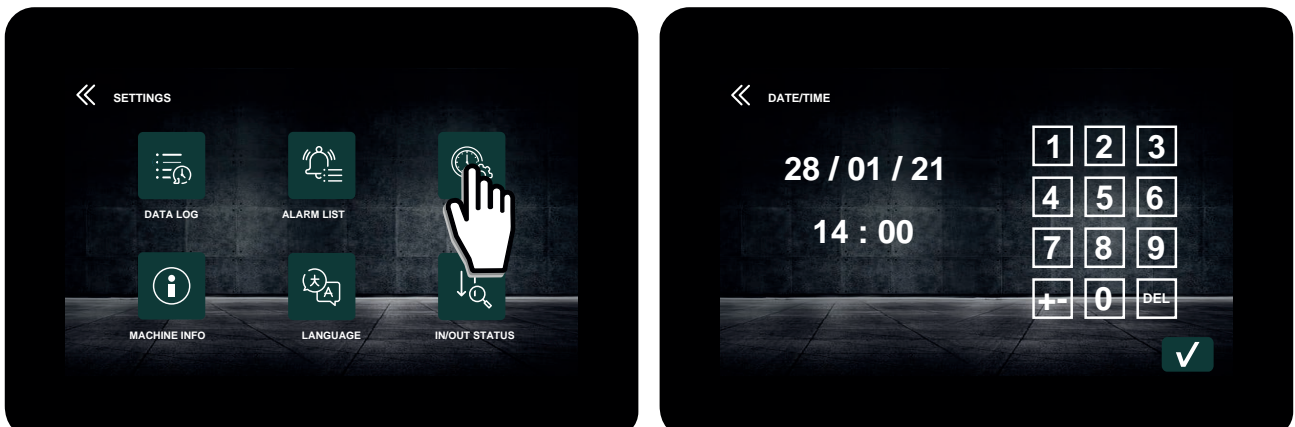


Fig. 25. Change Date and Time

NOTE: only the EU date/time format can be used.

5.10 MACHINE INFO

The **Machine info** screen shows information relating to:

- Machine firmware;
- Machine name;
- Manufacturer data.

5.11 CHANGE LANGUAGE

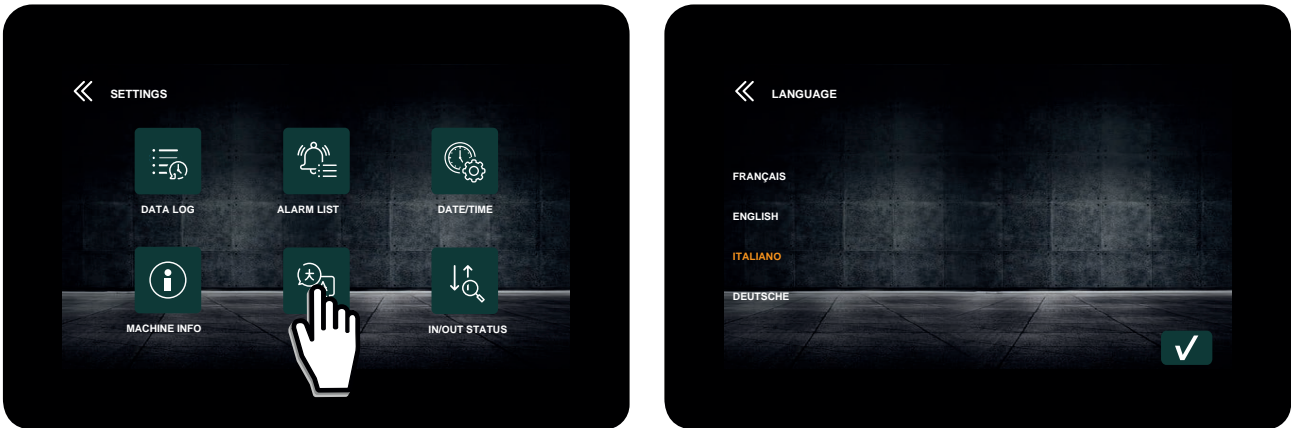


Fig. 26. Change language

The default languages are:

- Français (French);
- English;
- Italiano (Italian);
- Deutsche (German).

5.12 IN/OUT STATUS

This screen can be used to view the status of:

- Analogue inputs;
- Digital inputs;
- Digital outputs.



Fig. 27. IN/OUT status

5.13 OUTPUT TEST (EXPERT/OEM ONLY)

The **Output test** section is only available on accessing the **Expert** or **OEM** level, as described in the subsection “**5.6 Settings menu**” on page 33.

This section can be used to carry out a functional test for each output on the machine.

When the output selector is touched, the output becomes active for a period of up to 2 minutes.

To deactivate the output, touch an area near the selector or wait for the maximum activation period of 2 minutes to elapse.

Activating the **Gearmotor** output simultaneously activates the arm at minimum speed (the cover safety feature is active).

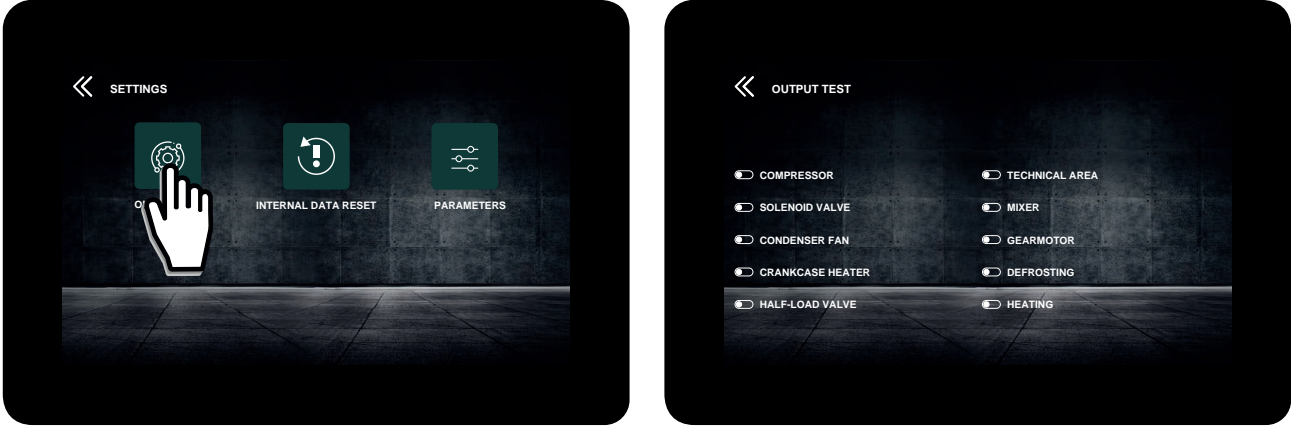


Fig. 28. Output test

5.14 INTERNAL DATA RESET (EXPERT/OEM ONLY)

The **Internal data reset** section is only available on accessing the **Expert** or **OEM** level, as described in the subsection “**5.6 Settings menu**” on page 33.

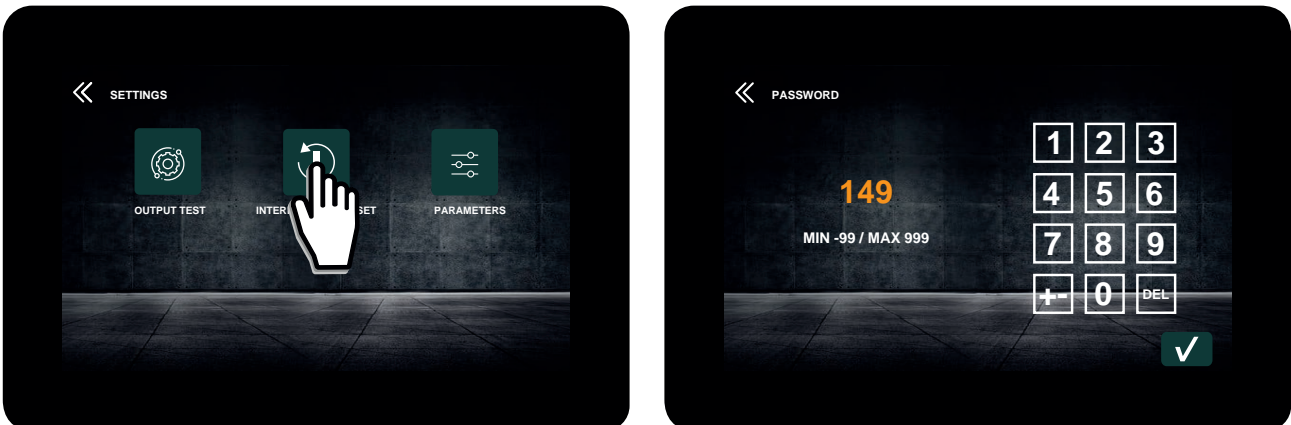


Fig. 29. Internal data reset

The **Internal data reset** function can be used to:

- Restore the parameters to the factory-set default values;
- Delete the data log;
- Delete machine operating time counter data;
- Delete the alarm log;
- Delete **OEM** recipes.

5.15 PARAMETER MANAGEMENT (EXPERT/OEM ONLY)



Fig. 30. Parameter management

NOTE: if the password value is negative, enter the absolute numeric value first, followed by the sign.

This section can be used to change the parameter values by pressing the relevant line. A number keypad appears, along with the range of permitted values (see "Chapter 9. Parameters" on page 57).

5.16 PID SETUP (OEM ONLY)

The **PID setup** section is only available on accessing the **OEM** level, as described in the subsection "5.6 Settings menu" on page 33.



Fig. 31. PID setup

This function can be used to change the parameters used for PID regulation on heater startup.

6. RECIPE BOOK

Chapter content

This chapter contains the following information:

Subject	Page
<i>Introduction</i>	41
<i>Creating recipes from an .ODS file</i>	41
<i>Creating a recipe with mixture density control via .ods file</i>	43
<i>Filling in the recipe info screen</i>	43
<i>Assigning a product name and photo to the recipe</i>	44
<i>Changing recipe values before the cycle starts or while it is in progress</i>	44
<i>Saving recipe changes</i>	46

6.1 INTRODUCTION

Vcolor 739 has 72 OEM recipes, arranged in 8 categories.

Up to 12 recipes can be added to each category, for a maximum of 72 recipes in total.

Vcolor 739 offers several recipe slots labelled as **FREE**, which can be edited by the user in order to add custom recipes.

Alternatively, an .ODS file can be used to add custom recipes to the Vcolor 739.

6.2 CREATING RECIPES FROM AN .ODS FILE

Various general settings are available for each recipe:

RECIPE	Phase/Category	Mode
REC01	CAT	1
	MIXER TYPE	TYPE 1
	SAVE	ENABLE
	DEFROST	DISABLE
	DELAYED START	ENABLE
	HALF LOAD	ENABLE
	ENABLE EDIT	ENABLE
	CONS MIXER MODE	MODE 1

Fig. 32. Creating recipes from an .ods file

Description of options

Option	Description
CAT	(Category) Select the category to which the recipe belongs (from recipe 1...8).
MIXER TYPE	Type of mixer to connect to the arm. You can choose from 4 types of mixer and assign a name and icon to it.
SAVE	Used to save the changes to recipe settings.
DEFROST	Used to enable defrosting in the recipe.
DELAYED START	Used to enable the delay period at recipe startup.
HALF LOAD	Used to enable the half load function.
ENABLE EDIT	Used to change the recipe settings.
CONS. MIXER MODE	Sets conservation mode for the recipe. Options include: <ul style="list-style-type: none"> • Mode 1; • Mode 2; • Mode 3; • Mode 4.

RECIPE	Phase/Category	Mode	Tank Temp.	Heater Temp.	Pause Temp.	Density	Mixer Speed	Mixer On Time	Mixer OFF Time	Mixer Rotation
REC01	CAT	1								
	MIXER TYPE	TYPE 1								
	SAVE	ENABLE								
	DEFROST	DISABLE								
	DELAYED START	ENABLE								
	HALF LOAD	ENABLE								
	ENABLE EDIT	ENABLE								
	CONS MIXER MODE	MODE 1								
	HEATING MODE		880	1350		0				
	PAUSE				0		60	1	0	CLOCKWISE
	COOLING MODE		250				60	1	0	CLOCKWISE

Fig. 33. Creating recipes from an .ods file - phases

The temperature values should be entered in tenths of a degree (example: to set -20.0 °C, enter -200; to set 4 °C, enter 40).

The time values should be expressed in seconds (example: to set 1 minute, enter 60; to set 5 minutes, enter 300).

6.2.1 Cooking phases

For the cooking phase of the recipe, set:

- Tank setpoint;
- Heater setpoint;
- Arm rotation settings for:
 - Mixer speed;
 - ON time;
 - OFF time;
 - Rotation direction (in steps of 10 °C) (only if **E13** = 1).
- Minimum and maximum setpoint that can be set for the tank;
- Minimum and maximum setpoint that can be set for the heaters;
- Minimum and maximum rotation speed that can be set for the mixer arm;
- Maximum ON time that can be set for the mixer arm;
- Maximum OFF time that can be set for the mixer arm.

6.2.2 Pause phase

For the pause phase of the recipe, set:

- Pause duration;
- Heater setpoint;
- Arm rotation settings for:
 - Mixer speed;
 - ON time;
 - OFF time;
 - Rotation direction (in steps of 10 °C) (only if **E13** = 1).
- Maximum duration that can be set for the pause phase;
- Minimum and maximum speed that can be set for the mixer arm;
- Maximum ON time that can be set for the mixer arm;
- Maximum OFF time that can be set for the mixer arm.

6.2.3 Cooling and maintenance phase

For the cooling and maintenance phase of the recipe, set:

- Tank setpoint;
- Arm rotation settings for:
 - Mixer speed;
 - ON time;
 - OFF time;
 - Rotation direction (in steps of 10 °C) (only if **E13** = 1).
- Arm rotation settings during maintenance for:
 - Mixer speed;
 - ON time;
 - OFF time;
 - Rotation direction (not in steps, but single value as the temperature of the tank is maintained) (only if **E13** = 1).
- Minimum and maximum setpoint that can be set for the tank;
- Safety temperature, below which **Safety temperature** mode is triggered;
- Minimum and maximum speed that can be set for the mixer arm;
- Maximum ON time that can be set for the mixer arm;
- Maximum OFF time that can be set for the mixer arm.

NOTE: a maintenance phase can be set with cooling regulation (instead of neutral zone) by setting the density setpoint for the recipe to value **101**.

6.3 CREATING A RECIPE WITH MIXTURE DENSITY CONTROL VIA .ODS FILE

To create a recipe with mixture density control, simply set the setpoint value **DENSITY > 0** in the **.ODS file**.

RECIPE	Phase/Category	Mode	Tank Temp.	Heater Temp.	Pause Temp.	Density	Mixer Speed	Mixer On Time	Mixer OFF Time	Mixer Rotation
REC01	CAT	6								
	MIXER TYPE	TYPE 1								
	SAVE	DISABLE								
	DEFROST	ENABLE								
	DELAYED START	DISABLE								
	HALF LOAD	ENABLE								
	ENABLE EDIT	ENABLE								
	CONS MIXER MODE	MODE 1								
	HEATING MODE		850	1200		65				
	PAUSE				0		60	1	0	CLOCKWISE
	COOLING MODE		250				60	1	0	CLOCKWISE

Fig. 34. Creating a recipe with mixture density control

The below values can be set for a cycle "with mixture density control":

- All values for the **COOKING** and **PAUSE** are not taken into account;
- Tank setpoint;
- Density setpoint;
- Arm rotation speed;
- Minimum and maximum rotation speed that can be set for the mixer arm.

NOTE: density control is only available if the inverter is installed and working.

6.4 FILLING IN THE RECIPE INFO SCREEN

After filling in the **PROGRAMS TAB** for the .ODS file to enter the machine programs for the recipes, complementary recipe information can be added, for access via the INFO key when selecting the recipe.

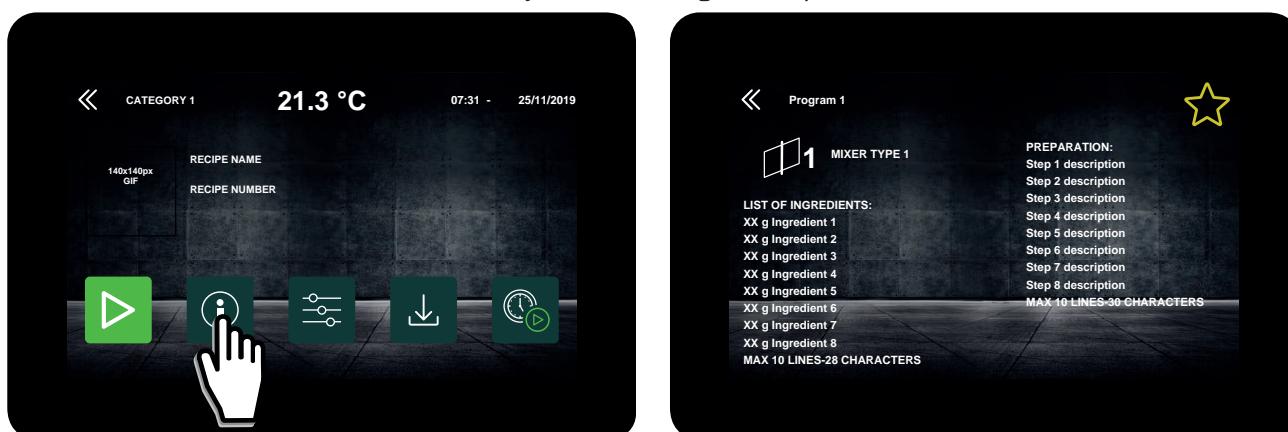


Fig. 35. Recipe info

The arm type and its corresponding BMP, on the other hand, have already been specified during the creation of the machine program.

In the **LANGUAGE TAB** for the .ODS file there are, for each of the 72 OEM recipes, two fields that can be translated into different languages for the entry of the ingredients list and the preparation instructions:

STR_INGREDIENTS_REC_1	INGREDIENTS for 1l of milk: Milk 1000 g Sucrose 200 g Egg yolks 80 g Cream powder 90 g	INGREDIENTI per 1 litro di latte Latte 1000 gr Saccarosio 200 gr Tuorli d'uovo 80 gr Crema in polvere 90 gr
STR_INFO_REC_1	Mix and mix the sucrose; powder cream the yolks and milk. Pour into the bowl and start custard program 1. When the program is finished extract	Mescolare e mescolare il saccarosio; crema in polvere i yolks e latte. Versare nella ciotola e avviare il programma crema pasticceria 1. Al termine del programma estrarre

Fig. 36. Entering recipe languages from the .ODS file

Ingredients list

The maximum size of the ingredients list is 10 lines of 28 characters each.

Description/Preparation

The maximum size of the description string is 13 lines of 20 characters each.

NOTE: do not use the "Comma" character (,).

6.5 ASSIGNING A PRODUCT NAME AND PHOTO TO THE RECIPE

The **LANGUAGE TAB** can be used to assign a custom name in different languages to all 8 categories, and to each of the 72 recipes. The image to be assigned must have the following specifications and syntax:

Image for category	Image for recipe
Category 1 image: File name: CAT_01.gif Dimensions: 140x140px Image depth: 8 bit	Recipe 1 image: File name: REC_01.gif Dimensions: 140x140px Image depth: 8 bit

6.6 CHANGING RECIPE VALUES BEFORE THE CYCLE STARTS OR WHILE IT IS IN PROGRESS

To be able to change the recipe from the instrument, consent must be given via the .ODS file. With consent, the recipe settings can be changed according to the access level.



Fig. 37. Changing recipe values before the cycle starts or while it is in progress

Changing the recipe values only affects the cycle in progress. Once the cycle is complete, the changes made are restored to the factory values. If the value entered is outside the permitted range (shown on the display), the following message appears:

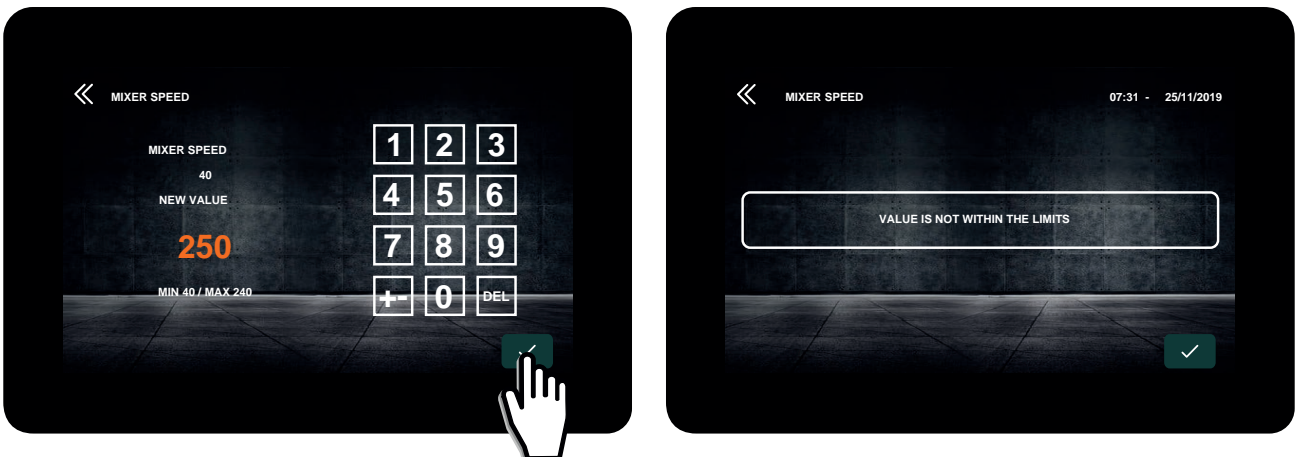




Fig. 38. Value outside the range entered

Plus, if changes are made to the recipe and then the cycle is not carried out, the recipe is not overwritten, but the screen will be exited and the changes will be restored to the factory values.

To make the changes to the recipe permanent, you need to overwrite the recipe, by tapping  and confirming that you want to overwrite the recipe by tapping .

To go back, tap .

The settings permitted according to access level are as follows:

USER level			
Cooking phases	Pause phase	Cooling phase	Maintenance phase
Tank setpoint	Phase duration	Tank setpoint	Mixer speed
Heater setpoint	Mixer speed	Mixer speed	Mixer ON time
Mixer speed			Mixer OFF time

EXPERT level			
Cooking phases	Pause phase	Cooling phase	Maintenance phase
Tank setpoint	Phase duration	Tank setpoint	Mixer speed
Heater setpoint	Mixer speed	Mixer speed	Mixer ON time
Mixer speed	Mixer ON time	Mixer ON time based on thermal gradient	Mixer OFF time
All automatic speeds	Mixer OFF time	Mixer OFF time based on thermal gradient	
Mixer ON time based on thermal gradient		All automatic speeds	
Mixer OFF time based on thermal gradient			

OEM level			
Cooking phases	Pause phase	Cooling phase	Maintenance phase
Tank setpoint	Phase duration	Tank setpoint	Mixer speed
Heater setpoint	Mixer speed	Mixer speed	Mixer ON time
Mixer speed	Mixer ON time	Mixer ON time based on thermal gradient	Mixer OFF time
All automatic speeds	Mixer OFF time	Mixer OFF time based on thermal gradient	
Mixer ON time based on thermal gradient		All automatic speeds	
Mixer OFF time based on thermal gradient			

6.6.1 Advanced configurations

You can access the **Advanced configurations** menu by logging in at **Expert** and/or **OEM** level.

The **Advanced configurations** menu can be used to implement advanced recipe configurations, and the available commands are as follows:

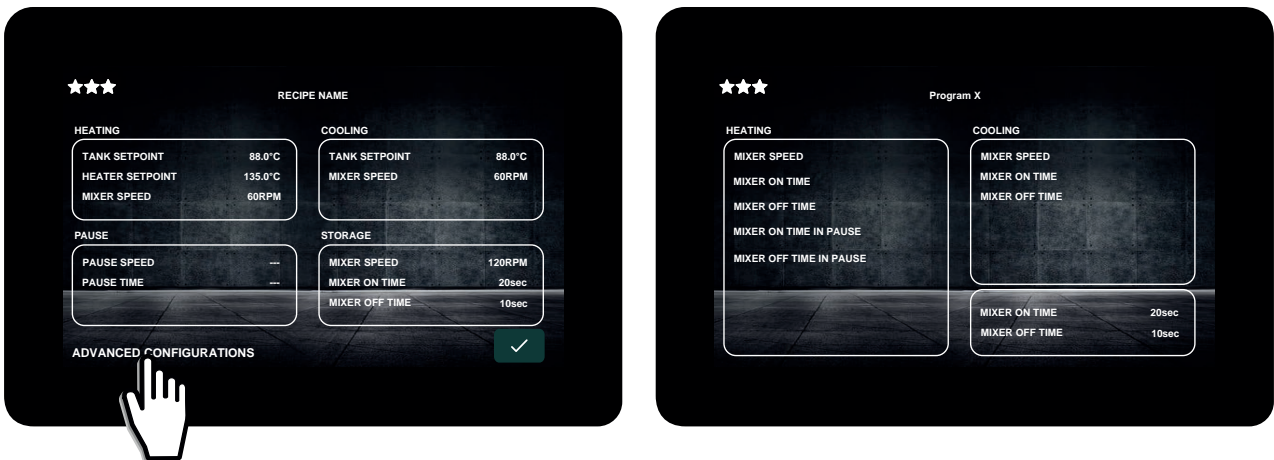




Fig. 39. Recipe program advanced configurations

6.7 SAVING RECIPE CHANGES

Any changes made to the recipes is temporary and are only valid while the cycle is in progress.

To make the changes to the recipe permanent, you need to overwrite the recipe, by tapping  and confirming that you want to overwrite the recipe by tapping .

Parameter **P59** enables/disables the password request for saving; if the password entered is correct, a pop-up will appear asking you to confirm the save procedure, otherwise the save procedure will be rejected.

The value of the save password is **99**. When saving, you can also change the name of the recipe. The original recipe is overwritten with the new name.

6.8 RUNNING A RECIPE PROGRAM

6.8.1 Machine statuses

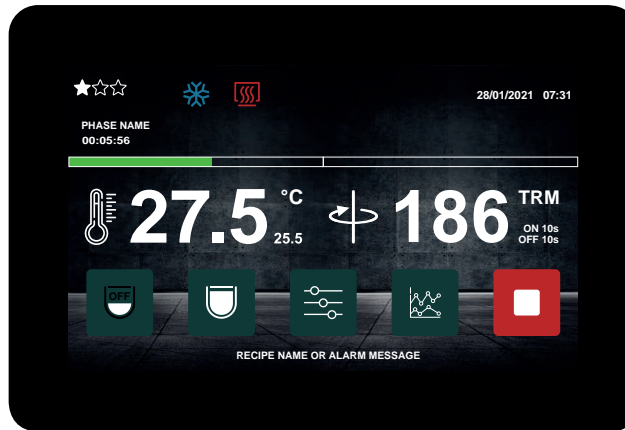


Fig. 40. Viewing the machine status

The above screen shows information relating to the cycle in progress and the machine status, including:

- Name of phase currently in progress;
- Time elapsed since the start of the cycle;
- During the final maintenance phase: cycle complete indication;
- Time elapsed since the start of the final maintenance phase;
- Temperature of the technical area (ambient);
- Date and time;
- Compressor output ON or Heating output ON;
- Phase/cycle progress bar.

6.8.2 Quick edit in real time screen

The main information regarding the cycle in progress is shown in the middle of the screen:

- Tank temperature and tank setpoint;
- Arm status;
- Mixer speed;
- Mixer ON time (only when active);
- Mixer OFF time (only when active).

While the recipe cycle is in progress, tap  on the display to change the values in real time:

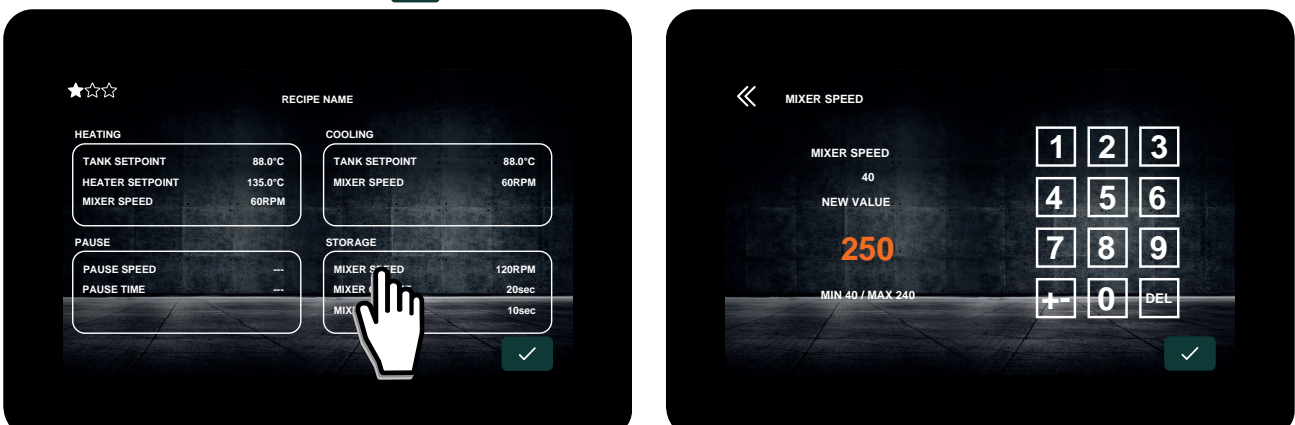









Fig. 41. Editing in real time

6.8.3 Key functions

Function	Key	Description
Defrost		Key present if the function is enabled for the recipe currently in progress and if the recipe is in its delayed start, cooling or maintenance phase. When you tap the key the defrost cycle begins; when you tap it again the cycle stops.
Half load/ Full load		Key present if the function is enabled for the recipe in progress. The key is present in all recipe phases and can be used to select the amount of product in the machine with the aim of limiting the area of the tank to cool if there is only a small amount of mixture in the tank. Selection can take place during the heating and cooling phases, but it only takes effect during the cooling phase.
Change		Key present if the function is enabled for the recipe in progress. Used to access the screens for changing the recipe setpoints.
Graph		While a recipe cycle is being carried out, tap the key to view the progress graph for the reference values. The graph generation data is collected from the start of the cycle until it ends. At the end of the cycle the graph is no longer available.
Stop		While a cycle is in progress, this is used to stop the cycle in progress after confirmation is given via a pop-up.
Extraction		Stops the maintenance phase and moves on to the product extraction phase.
Cleaning		Stops the extraction phase and moves on to the special machine cleaning program.

6.8.4 Progress graph

The available graph can be used to view the progress of the:

- Tank probe;
- Heater probe;
- Condenser probe;
- Board probe (ambient);
- Density of the mixture if an ice cream recipe cycle is running.

These values can all be displayed together, or the user can choose what to view for any direct analysis of particular values.

The name of the recipe in progress and the start date and time appears at the top of the screen. The start of the time interval appears in the top left-hand corner, while the end of the time interval taken into account for generation of the graph is shown in the top right-hand corner.

The keys used to select the values to be displayed on the graph appear at the bottom, along with a key used to move forward by 12 samples. If there are no samples, the key has no effect.

The sorting scale is recalculated every time the screen changes, so that the maximum and minimum value of all measurements visible at that moment can be shown.

The keys corresponding to the selection/deselection of values function as a legend which can be used to interpret the graph. The keys for the values that are not shown have a grey background. The labels used for the keys have been entered using the file **language.csv**.

The values that are made available in order to generate the graph are the tank probe, heater probe, condenser probe, board probe and density (for ice cream recipes) and cannot be edited by the user.

The user can select the values they want to view from the available options. The selection is also retained for subsequent views.

While the graph is displayed you can tap it to view a table with the sample values for all measurements used to construct the graph, including those that are currently deselected.

Tapping inside the area on the left shows the 6 data samples on the left-hand side; tapping inside the area on the right shows the second group of six data samples.

The graph is based on samples that are taken while a cycle is being carried out, therefore the graph can only be created if at least two samples are available.

For this reason, you can only press the key that enables the graph after at least three samples are available. Then the graph is updated with a delay of 1 minute 30 seconds in relation to the real-time value.

If the key is pressed before the samples are available, a pop-up appears to inform you that there is insufficient data to draw a graph.

The sampling time is governed by parameter **rE0**.

The colours of the graph, backgrounds, lines, etc., are default settings and cannot be changed.

To return to the previous screen, wait for a few seconds.

Legend of colours

Colour	Description
Black	Background
Dark grey	Grid
Light grey	Setpoint
Orange	Tank probe temperature
Red	Heater probe temperature
Blue	Condenser probe temperature
Yellow	Density

7. FUNCTIONS

Chapter content

This chapter contains the following information:

Subject	Page
<i>Standard operation</i>	50
<i>Operation with special maintenance</i>	52
<i>Operation with mixture density control</i>	52
<i>Special cycles</i>	53
<i>Independent safety temperature for each recipe</i>	53
<i>Power failure management</i>	53

7.1 STANDARD OPERATION

Every standard program is based on the following series of phases:

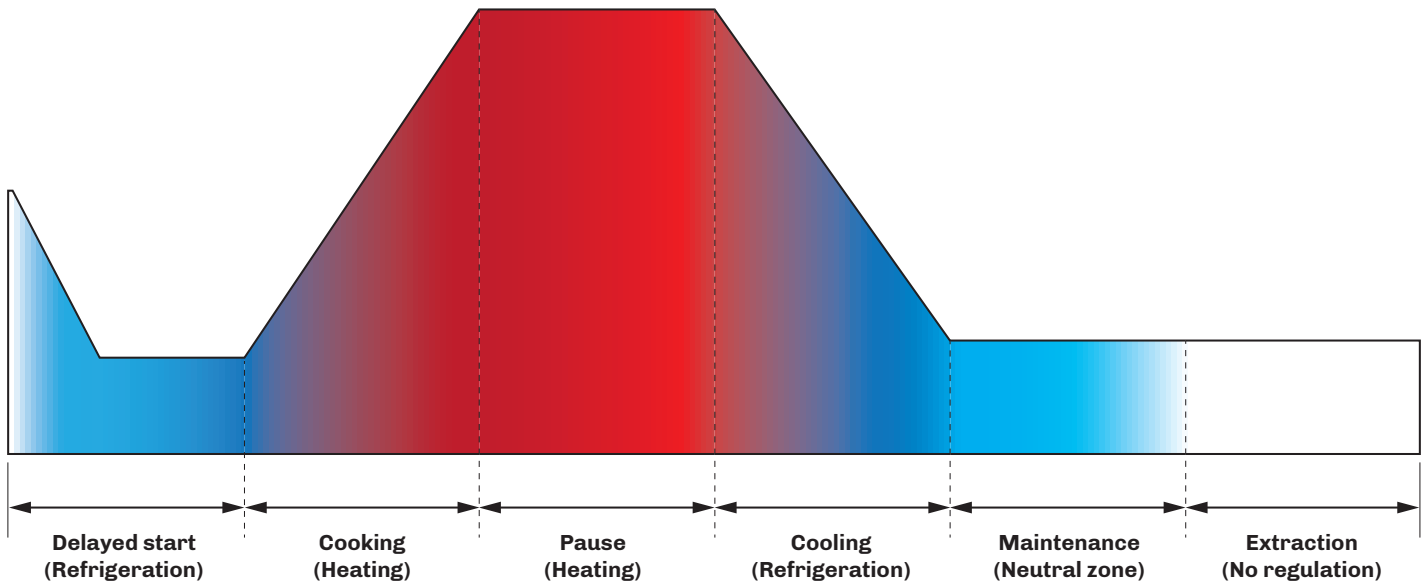


Fig. 42. Standard operation

Phases:

- Delayed start;
- Cooking;
- Pause;
- Cooling

may be included or not, depending on how the recipe program has been set up. Arm rotation for mixing the product inside the tank is always included in each phase.

7.1.1 Delayed start

Delayed start is intended to keep the ingredients in the machine cool (in observance of HACCP standards governing ingredient quality) while mixing them as it waits for the selected program to begin at the specified time.

The delayed start period can be between 1 minute and 72 hours long; it can only be selected for programs in the OEM recipe book and for programs in which the **Delayed start** function has been enabled via the .ODS file.

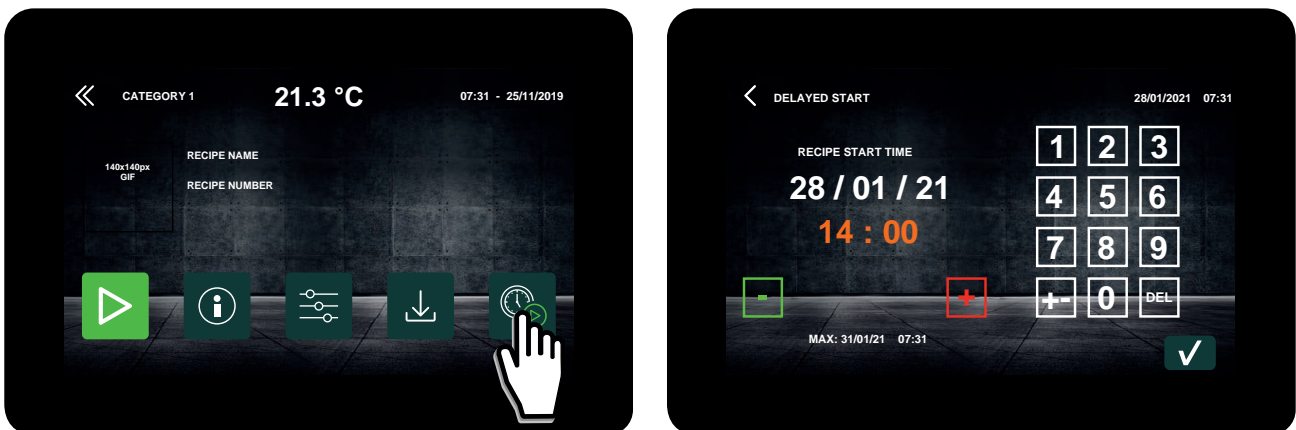



Fig. 43. Delayed start

The tank temperature is shown on the display during the delayed start phase.

The machine brings the temperature to the set value and continues to maintain the temperature at the specified setpoint. During the cooling phase, before the setpoint is reached, the arm rotates at speed **t06**. Once the setpoint temperature has been reached, the arm rotates in accordance with the ON time period (**t05**) and the OFF time period (**t04**), at speed **t06**. When the compressor is reactivated, the arm resumes its rotation continuously for the entire activation time. The phase ends when the program start date and time selected at the **Start** is reached. The program can always be ended at any time by pressing .

If specified, the amount of product in the machine can be selected by tapping Full load/Half load. During the conservation due to delayed start phase, the HACCP data is stored in the HACCP log and can be downloaded via the USB port on the back of the user interface.

7.1.2 Cooking, Pause and Cooling phase

The 3 main phases in the preparation of recipe, consecutive and in order, are:

- Cooking phase (temperature-controlled);
- Pause phase (timed);
- Cooling phase (temperature-controlled).

Cooking phases

The cooking phase lasts until the temperature of the tank reaches the setpoint selected at the start.

When the tank temperature value **E21** is exceeded, the buzzer sounds once to indicate that machine heating is complete and the food that needs to be added once the machine has heated up can be introduced.

Heater activation/deactivation is determined by:

- Heater probe;
- Heater setpoint;
- Tank probe;
- Tank setpoint.

Which can be used to limit overtemperature at the sides of the tank (which could cause the product to burn as it comes into contact with the walls). The cooking phase continues until the tank temperature setpoint specified for the recipe has been reached.

To disable the cooking phase, set the heating setpoint to 0.0 °C/°F.

Pause phase

During the pause phase, the tank temperature is maintained, with heat regulation, at the selected setpoint, taking account of the temperature of the heaters (to avoid burning the product).



Once the timed pause phase has ended, the product cooling phase begins.

To disable the pause phase, set the pause duration to 0 h and 0 min.

Cooling phase

During the cooling phase, the temperature of the tank is decreased with cooling regulation until the selected cooling setpoint is reached. While the temperature is being decreased, once value **E20** is reached, the buzzer sounds once to indicate that the ingredients to be added when the machine is cold can be introduced.

When the cooling setpoint is reached, the program is considered finished and the user is notified by means of the buzzer

sounding continuously for a time period **E11** and the  key on the display is replaced with . If the buzzer is not silenced by tapping the display, the sound alert will repeat every 2 minutes (**A16**).

To disable the cooling phase, set the cooling setpoint to 0.0 °C/°F.


7.1.3 Maintenance phase

At the end of the cooling phase the product is ready to be taken out, but the cycle continues with a final maintenance phase while it waits for the user to do so. During the maintenance phase the machine runs with neutral zone regulation set via **P25**.

It is possible to set a maintenance phase with cooling regulation by filling in the .ODS file as necessary (by setting the density setpoint for the recipe to the value 101).

The arm maintains the speed set for the previous phase and rotation may be continuous or alternate, depending on the settings specified in the selected recipe.


7.1.4 Extraction phase

Tap  to start the extraction phase, moving on to the final phase of the cycle. This phase consists of actual product extraction, in which:

- Temperature regulation ends;
- The arm works continuously at the maintenance speed (this facilitates extraction of the product from the specific door).

If the temperature of the tank is < **d2**, a defrost cycle begins automatically in order to heat the tank walls and make product extraction easier.

During the extraction phase, you can:

- Change the speed of the arm;
- Start a manual defrost cycle;
- Start a cleaning cycle;
- Permanently end the cycle (by tapping ).


7.2 OPERATION WITH SPECIAL MAINTENANCE

Some products require special machine functions during the final maintenance phase.


7.2.1 Mode 1

If **Mode 1** cycle end is selected, neutral zone temperature regulation takes place normally during the maintenance phase. In relation to the standard maintenance phase, the arm rotates continuously at the start of the phase for 2 minutes (cannot be changed from the controller), and then moves on to alternate arm rotation based on the data selected for the recipe.

7.2.2 Mode 2

If **Mode 2** cycle end is selected, at the end of the cooling phase the cycle is not considered complete; instead the controller launches a further **Continuous arm drive** phase for a time period **t01** (duration 1...50 minutes) with temperature regulation inactive. When time period **t01** has elapsed, the cycle is considered complete (buzzer sounds and extraction button appears), even though its **continuous arm drive** time continues until the user taps , whereby the cycle resumes standard operation.

7.2.3 Mode 3

If **Mode 3** cycle end is selected, at the end of the cooling phase the cycle is not considered complete; instead the controller launches a further **Continuous arm drive** phase for a time period **t02** (duration 1...50 minutes) with temperature regulation inactive. When time period **t02** has elapsed, the cycle is considered complete (buzzer sounds and extraction button appears), even though its **continuous arm drive** time continues until the user taps , whereby the cycle resumes standard operation.

7.3 OPERATION WITH MIXTURE DENSITY CONTROL


This type of operation can only be used with EVCO inverters connected to the **Vcolor 739** via serial port.

NOTE: for further information concerning the EVCO series of inverters, contact the sales office.


Preparing cold mixtures such as ice cream, sorbet and other similar products on the basis of cooling while stirring the mixture requires a type of program dedicated to density control.

To allow the machine to keep track of the process status, a **mixture density** value, expressed in %, is calculated and shown on the display, on the basis of the value of the current absorbed by the inverter arm.

The logic relation between current absorption and product density level is as follows: once the user has decided on the mixer rotation speed for a specific recipe according to the desired level of smoothness (greater arm speed = more air incorporated into the mixture = greater smoothness), the arm's current draw increases to maintain the same number of rotations as the mixture is cooled by the machine (cooling is active for the entire duration of the process) and as the ice cream begins to come together.

Once the density setpoint selected for the recipe has been reached, the cycle is considered complete; the buzzer sounds and the key  appears (buzzer sounds and extraction button appears), the compressor is switched off and the machine moves on to the conservation phase, continuing its continuous mixer rotation.

During the conservation phase the compressor starts up again as soon as the density value < **P32** and is deactivated again as soon as the density > density setpoint.

Conservation lasts until the user presses the  key, at which point the cycle resumes standard operation.

The density calculation depends on the current absorbed by the arm and takes place according to the following equation:

$$\text{Density} = (\text{E10} \times \text{AbsorbedCurrent}^2 + \text{E11} \times \text{AbsorbedCurrent} + \text{E12})$$

The values to enter for the 3 coefficients vary depending on the power cut of the connected EVCO inverter and based on the size of the machine tank.

7.4 SPECIAL CYCLES

Vcolor 739 offers 3 special cycles:

- Cooling cycle;
- Cleaning cycle;
- Continuous mixing cycle (only with EVCO inverter connected).

7.4.1 Cooling cycle

Once the cooling cycle has been selected, **Vcolor 739** will ask you to select the cooling setpoint (default **t13** shown).

Tap  to launch the cycle with the selected setpoint.

While it is running, the following can be changed:

- The temperature setpoint;
- The arm rotation ON time (**t15**);
- The arm rotation OFF time (**t14**);
- The arm rotation speed (**t16**);
- The arm direction (**t49** if enabled via **E13** and if logged in at EXPERT level).

Pressing  stops the cooling cycle, moving straight on to the product extraction phase.

7.4.2 Cleaning cycle

Once the cooling cycle has been selected, **Vcolor 739** will ask you to select the setpoint (default **t08** shown).

Tap  to launch the cycle with the selected setpoint.

While it is running, the following can be changed:


- The temperature setpoint;
- The arm rotation ON time (**t10**);
- The arm rotation OFF time (**t09**);
- The arm rotation speed (**t11**);
- The arm direction (**t12** if enabled via **E13** and if logged in at EXPERT level).

Pressing  stops the cooling cycle, moving straight on to the product extraction phase.

7.4.3 Continuous mixing cycle

Selecting this cycle allows continuous arm action to be started with no temperature control.

Once the continuous mixing cycle has been selected, **Vcolor 739** will ask you to set the arm speed (default 40 RPM).

Tap  to launch the cycle with the selected setpoint.

While it is running, the following can be changed:

- Tank temperature;
- Arm rotation speed.

Pressing  stops and ends the continuous mixing cycle, bringing the user back to the **Special cycles** menu.

7.5 INDEPENDENT SAFETY TEMPERATURE FOR EACH RECIPE

Vcolor 739 has a **Safety temperature** function which can be used to define a tank temperature value below which the arm runs continuously.

During the cooling and product extraction phases, if the tank probe temperature is lower than the **safety temperature** set for the individual recipe, the arm is made to rotate continuously at the speed set for the final conservation phase.

During the cooling phase carried out while waiting for a delayed start, if the tank probe temperature is lower than the **safety temperature** set for the recipe, the arm is made to rotate continuously at the speed set for the wait phase.

7.6 POWER FAILURE MANAGEMENT

Duration	Effect on cycle in progress		Indication on display	Recording in log	Graph
< 5 minutes	Resumes after any cycle/ phase except the cleaning cycle, which is interrupted		No	No	From start of cycle
5...15 m	Resumes after log recording of any cycle/phase		Yes	Yes	
> 15 m	Cooking phase	The phase resumes when the power is restored	Yes	Yes	
	Cooling phase	The phase stops	Yes + prompt (*)		
	Cleaning cycle	The cycle stops	Yes		
	Delayed start	The phase stops	Yes		

(*): Prompt to empty the tank.

8. REGULATORS

Chapter content

This chapter contains the following information:

Subject	Page
<i>Heaters</i>	55
<i>Compressor</i>	55
<i>Condenser fans</i>	55
<i>Crankcase heater</i>	55
<i>Half/full load solenoid valve</i>	55
<i>Technical room fans</i>	55
<i>Defrost solenoid valve</i>	55
<i>Gearmotor</i>	56
<i>Single speed arm rotation</i>	56

8.1 HEATERS

Heater management is carried out according to the progress of the tank probe temperature, in reference to the tank probe setpoint value, and according to the heater probe, in reference to the heater setpoint value.

Regulation may be of the ON/OFF type, utilising the heater output Out3, or PID type, utilising the SSR outputs **Out1** and **Out2**. Regulation is managed using a PID type controller (proportional, integral and derivative), calculated based on the variation of the tank probe in relation to the tank setpoint, and using P type regulation (proportional), calculated based on the variation of the heater probe in relation to the heater setpoint.

When both probes are some distance from the regulation setpoint, continuous activation of the heaters is required. The activation module comes into play when the temperatures fall within the corresponding proportional band.

If the temperature of the heater probe is between the **heater probe setpoint - r13**, activation of the heaters is timed, with cycle time **r17**, based on the offset between the temperature and setpoint values.

When the temperature of the tank probe is between the **product setpoint - r14**, regulation is activated in the three PID components for the tank probe.

If the heater probe reaches the heater setpoint, the heaters are switched off, even if the tank probe has not yet reached its setpoint.

If the tank probe reaches the tank setpoint, the heaters are switched off, regardless of the heater probe value in relation to its setpoint.

8.2 COMPRESSOR

This is activated to lower the temperature of the tank until it reaches the desired setpoint.

Compressor activation is subject to safety times **C0**, **C2**, **C3** being observed. When the compressor is activated the crankcase heater is deactivated.

Times **C0**, **C2** and **C3** are not observed if the compressor and solenoid valve are activated/deactivated due to a defrost.

8.3 CONDENSER FANS

These are activated in parallel with the compressor.

If the temperature of the condenser is higher than the value **C6**, a condenser dirty pre-alarm appears; if the condenser probe is higher than the value **C7** for the time period **C8**, the compressor is inhibited, the condenser fans remain activated and a compressor inhibit alarm is generated.

8.4 CRANKCASE HEATER

This output is activated when the board is switched on (switching from standby to Home) and remains on until the moment the compressor is activated. If the machine is set to OFF it remains deactivated.

8.5 HALF/FULL LOAD SOLENOID VALVE

This is activated/deactivated on the basis of the load amount set for the cycle in progress.

The relay output is activated when the cycle has a full load.

The relay output is switched off when a half load is requested.

When the status changes, the key on the cycle execution screen changes image to indicate the new status.

The desired load status is saved at each moment of the cycle in progress, but the relay output will only be activated during the phases in which the refrigeration system may be active, i.e. **cooling**, **maintenance**, **maintenance for delayed start**.

If the "half load / full load" key is not available, the output will behave as if the setting were "full load".

8.6 TECHNICAL ROOM FANS

These can only be activated if the board is on and they are being controlled by the board temperature. They are on if the temperature is higher than **P6** and off otherwise. In OFF mode they are always off.

8.7 DEFROST SOLENOID VALVE

This can only be activated if enabled for the recipe in progress, during the cooling phase.

The first key tap activates the output, the second deactivates it. If it is not deactivated via key, when the time given in **d3** elapses, it is nevertheless deactivated.

If the cover is opened, it is still activated for the time period **d3** or until the cover is closed. During defrost solenoid valve activation the compressor and the cooling solenoid valve are switched on.

At the end of the solenoid valve activation time, the compressor and the cooling solenoid valve revert to normal regulation.

At the start of an extraction phase, if the temperature of the tank is lower than **d2**, a defrost begins automatically.

8.8 GEARMOTOR

This output is activated when the mixer needs to be activated, regardless of its speed.

8.9 SINGLE SPEED ARM ROTATION

This output is used when the machine is in single speed configuration **without using the Inverter**. It is activated when the mixer needs to be activated.

9. PARAMETERS

Chapter content

This chapter contains the following information:

Subject	Page
<i>Description of columns in the Table of Parameters</i>	58
<i>Table of configuration parameters for Vcolor 739</i>	58
<i>Table of Inverter configuration parameters</i>	61

9.1 DESCRIPTION OF COLUMNS IN THE TABLE OF PARAMETERS

- **Par.:** list of configurable device parameters;
- **Description:** indicates parameter operation and any possible selections;
- **MU:** measurement unit relating to the parameter;
- **Range:** describes the interval of values that the parameter can assume. This can be correlated with other instrument parameters (indicated with the parameter code);
NOTE: if the actual value is outside the permitted limits for that parameter (for example, because other parameters defining the aforementioned limits have been altered), the value of the violated limit is displayed instead of the actual value.
- **Default:** indicates the pre-set factory configuration.

9.2 TABLE OF CONFIGURATION PARAMETERS FOR VCOLOR 739

Par.	Description	MU	Range	Default
ANALOGUE INPUT group				
P0	Temperature unit of measure (changing value means that the temperature parameter limits will need to be reset manually). 0 = °C; 1 = °F.	---	0/1	0
P4	Enable condenser probe. 0 = Disabled; 1 = Enabled.	---	0/1	1
CA1	Probe Pb1 (tank) offset.	°C/°F	-25.0...25.0	0.0
CA2	Probe Pb2 (heaters) offset.	°C/°F	-25.0...25.0	0.0
CA3	Probe Pb3 (condenser) offset.	°C/°F	-25.0...25.0	0.0
C0	Compressor ON delay from power-on.	min	0...240	0
C2	Minimum compressor OFF time.	min	0...240	5
C3	Minimum compressor ON time.	s	0...240	3
E11	Buzzer activation duration.	s	0...240	20
A16	Buzzer activation time at the end of the cycle.	min	0...10	2
u30	Compressor ON delay from solenoid valve power-on.	s	0...999	10
u31	Compressor OFF delay from solenoid valve power-off.	s	0...999	15
P6	Technical area temperature threshold for fan power-on.	°C/°F	0.0...130.0	40.0
C6	Temperature threshold for high condensation pre-alarm.	°C/°F	0.0...160.0	60.0
C7	Temperature threshold for high condensation alarm.	°C/°F	0.0...160.0	70.0
C9	Delay time for high condensation alarm.	min	0...15	5
A20	Maximum temperature increase in A23 .	s	30...1800	300
A21	Heater temperature check interval in heating mode for heating alarm.	min	1...15	1
A22	Tank temperature variation required to avoid generating a cooling alarm. 0 = Function disabled.	°C/°F	0.1...30.0	5.0
A23	Tank temperature variation required to avoid generating a heating pre-alarm. 0 = Function disabled.	°C/°F	0.1...20.0	5.0
A24	Heater temperature variation required to avoid generating a heating alarm. 0 = Function disabled.	°C/°F	0.1...20.0	10.0
i3	Maximum cover opening time for inhibiting heaters in heating mode.	min	0...240	1
d2	Defrost end threshold.	°C/°F	-40.0...65.0	2.0
d3	Defrost duration.	s	1...60	10
r0	Differential to be added to the setpoint.	°C/°F	0.0...10.0	0.5
E20	Reference setpoint for single activation of the buzzer in cooling.	°C/°F	-35.0...99.9	65.0
E21	Reference setpoint for single activation of the buzzer in heating.	°C/°F	15.0...135.0	50.0
P25	Neutral Zone value in Conservation at the end of the cycle.	°C/°F	0.0...10.0	1.0
r13	Proportional band for heater probe regulation management.	°C/°F	1.0...50.0	20.0
r14	Proportional band for tank probe regulation management.	°C/°F	1.0...50.0	10.0
r15	Integral action time.	s	0...999	100
r16	Derivative action time.	s	0...250	0
r17	Cycle time for PID regulation.	s	5...60s	
r18	RESERVED.	---	---	---
P35	Density hysteresis ⁽¹⁾ .	%	1...40	5

Par.	Description	MU	Range	Default
t01	Continuous arm rotation after recipe with conservation, Marshmallow (MODE 3).	min	1...50	5
t02	Continuous arm rotation after recipe with conservation, Cream Puffs (MODE 4).	min	1...20	5
t03	Tank setpoint in delayed start.	°C/°F	2.0...8.0	4.0
t04	Mixer OFF time in delayed start.	s	0...600	5
t05	Mixer ON time in delayed start.	s	0...600	5
t06	Mixer speed in delayed start ⁽¹⁾ .	RPM	40...240	100
t07	Mixer direction in delayed start ⁽²⁾ . 0 = Clockwise; 1 = Anti-clockwise.	---	0/1	0
t08	Tank setpoint in cleaning.	°C/°F	20.0...100.0	50.0
t09	Heater setpoint in cleaning.	°C/°F	0.0...160.0	130.0
t10	Mixer OFF time in cleaning.	s	0...600	5
t11	Mixer On time in cleaning.	s	0...600	5
t12	Mixer speed in cleaning ⁽¹⁾ .	RPM	40...240	100
t13	Mixer direction in cleaning ⁽²⁾ . 0 = Clockwise; 1 = Anti-clockwise.	---	0/1	0
t14	Tank setpoint in cooling.	°C/°F	2.0...50.0	20.0
t15	Mixer OFF time in cleaning.	s	0...600	5
t16	Mixer On time in cleaning.	s	0...600	5
t17	Mixer speed in cleaning ⁽¹⁾ .	RPM	40...240	100
t18	Mixer direction in cleaning ⁽²⁾ . 0 = Clockwise; 1 = Anti-clockwise.	---	0/1	0
i1	Digital input ID3 (Cover) polarity. 0 = Open contact (NO); 1 = Closed contact (NC).	---	0/1	1
i19	Digital input ID5 (Gearmotor thermal switch) polarity. 0 = Open contact (NO); 1 = Closed contact (NC).	---	0/1	1
i20	Digital input ID7 (Compressor thermal switch) polarity. 0 = Open contact (NO); 1 = Closed contact (NC).	---	0/1	1
i21	Digital input ID4 (High pressure switch) polarity. 0 = Open contact (NO); 1 = Closed contact (NC).	---	0/1	1
i22	Digital input ID6 (Heater thermal switch) polarity. 0 = Open contact (NO); 1 = Closed contact (NC).	---	0/1	1
P56	LogIn timeout.	s	0...900	60
P57	Expert level password.	---	-99...999	49
P58	OEM level password.	---	-99...999	149
P59	Recipe save password.	---	0...1	0
PA1	First level connection password.	---	-99...999	426
PA2	Second level connection password.	---	-99...999	824
BLE	Communication type. 0 = Free; 1 = Forced for EPOCA (do not change parameters LA , Lb and LP); 2...99 = Address for EPOCA local network.	---	0...99	1
rE0	Internal data sampling time.	min	1...60	1
LA	Modbus protocol controller address.	---	0...247	247
Lb	Modbus transmission speed (baud rate). 0 = 2400; 1 = 4800; 2 = 9600; 3 = 19200.	baud	0...3	3

Par.	Description	MU	Range	Default
LP	Modbus parity bit. 0 = None (No parity); 1 = Odd; 2 = Even.	---	0...2	2
P68	Inverter type. 0 = Disabled; 1 = EVCO COMPACT; 2 = EVCO SLIM POWER; 3 = EVCO SLIM.	---	0...3	1
P69	Gearmotor ratio.	---	1...20	20
P70	Backlight duration.	s	10...240	60
E9	Initial splash. 0 = Disabled; 1 = Enabled.	---	0/1	0
E10	Power ² Coefficient A for density calculation equation.	num	0.000...1	0.015
E11	Power Coefficient B for density calculation equation.	num	0.00...2	1.25
E12	Constant Coefficient C for density calculation equation.	num	0...100	50
E13	Enable mixer direction control ⁽¹⁾ . 0 = Disabled; 1 = Enabled.	---	0/1	0
E14	Maintenance interval.	h	200...800	200

⁽¹⁾ Only applies if **P68** ≠ 0

⁽²⁾ Only applies if **P68** ≠ 0 and **E13** = 1.

NOTE: changing the parameters causes the controller to restart.

9.3 TABLE OF INVERTER CONFIGURATION PARAMETERS

Parameters only available if **P68** ≠ 0.

Par.	Description	MU	Range	Default
INVERTER Group				
S202	Acceleration ramp. Time required to reach the nominal speed from 0 rpm.	s	0.2 ... 200.0	3.0
S203	Deceleration ramp. Time required to reach 0 rpm from the nominal speed.	s	0.2 ... 200.0	5.0
S204	Maximum motor speed ⁽¹⁾ .	rpm	S205 ... 6000	1500
S205	Minimum motor speed ⁽¹⁾ .	rpm	150 ... S204	300
S206	Select the motor rotation direction ⁽²⁾ . 0 = Clockwise; 1 = Anticlockwise.	-	0 ... 1	0
S401	Modbus communication protocol device address.	-	1 ... 247	1
S501	Nominal motor current ⁽⁴⁾ .	A	0.1 ... 9.4	2.9
S502	Nominal motor voltage ⁽⁴⁾ .	V	50 ... 400	230
S503	Nominal motor frequency ⁽⁴⁾ .	Hz	0 ... 100	50
S504	Number of pole pairs ⁽⁴⁾ .	-	1 ... 8	2
S506	Nominal motor revolutions ⁽⁴⁾ .	rpm	1 ... 3000	1390
S511	Motor overload. Motor overload percentage permitted by the inverter for a time set using parameter S512 .	%	0 ... 50	50
S512	Maximum overload time.	s	0 ... 60	30
S513	Stop type. 1 = Stop with ramp; 2 = Stop with DC voltage injection; 3 = Stop with ramp + DC voltage injection. The latter creates a ramp until the braking speed is reached, and then DC voltage is injected in the percentage set via parameter S516 (0 %) for a duration equal to S515 (0.0 s), finally cutting off the motor power supply ⁽⁵⁾ . NOTE: in alarm or emergency conditions, stoppage is always the free type.	-	1 ... 3	1
S529	Selection of PWM carrier frequency.	kHz	5 ... 16	5
S602	Undervoltage level. Voltage value under which the Undervoltage alarm is generated.	V	120 ... S603	200
S603	Overvoltage level. Voltage value over which the Overvoltage alarm is generated.	V	S602 ... 450	420

⁽¹⁾ The minimum and maximum limits are calculated on the basis of the number of pole pairs for the motor, i.e. between 5 and 100 Hz;

⁽²⁾ Looking at the motor with the shaft positioned to the front;

⁽⁴⁾ Parameter depends on the motor rating label;

⁽⁵⁾ In alarm or emergency conditions, stoppage is always the free type.

10. DIAGNOSTICS

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10.1 INTRODUCTION

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

10.2 TABLE OF VCOLOR 739 ALARMS

Description	Cause	Effects	Solution
RTC alarm	Clock (RTC) not working alarm	Functions connected to the RTC not present or not synchronised with the actual time	Set the correct time. If the error persists, replace the instrument (RTC battery exhausted)
Tank probe alarm	<ul style="list-style-type: none"> Probe not working Probe not connected properly Incorrect probe type 	<ul style="list-style-type: none"> Alarm shown on display Cycle in progress inhibited (in any phase) Recording in alarm log 	<ul style="list-style-type: none"> Check the probe type (Pt1000) Check the probe wiring Change the probe type
Heater probe alarm		<ul style="list-style-type: none"> Alarm shown on display Heating phase: cycle inhibited Pause phase: cycle inhibited Recording in alarm log 	
Condenser probe alarm		<ul style="list-style-type: none"> Alarm shown on display Recording in alarm log No effect on regulation 	
High condensation pre-alarm	Condenser temperature > C6	<ul style="list-style-type: none"> Alarm shown on display Recording in alarm log No effect on regulation 	Check C6
High condensation	Condenser temperature > C7 for time period > C9	<ul style="list-style-type: none"> Alarm shown on display Recording in alarm log Compressor OFF Condenser fans ON The cycle in progress is inhibited 	<ul style="list-style-type: none"> Switch the instrument off and on again Check C7
Heating pre-alarm	Tank temperature < A23 after time period A20	<ul style="list-style-type: none"> Alarm shown on display Recording in alarm log Cycle continues 	Set A23 = 0 to disable the function
Heating alarm	Tank temperature < A24 after time period A21	If the check is not passed: <ul style="list-style-type: none"> Alarm shown on display Recording in alarm log Cycle inhibited If the check is passed: <ul style="list-style-type: none"> Condenser heaters considered OK 	<ul style="list-style-type: none"> Switch off the machine and check the heating circuit Set A24 = 0 to disable the function
Cooling alarm	Tank temperature during cooling < A22 after time period A20	If the check is not passed: <ul style="list-style-type: none"> Alarm shown on display Recording in alarm log Cycle inhibited if in cooling phase 	<ul style="list-style-type: none"> Switch off the machine and check the cooling circuit Set A22 = 0 to disable the function
No base communication alarm	No communication between base board and user interface > 60 seconds	The cycle in progress is inhibited	<ul style="list-style-type: none"> Restore communication between base board and user interface Automatic reset
Cover open alarm	The cover is open while the cycle is in progress (i1)	<ul style="list-style-type: none"> Alarm shown on display Recording in alarm log Mixer arm rotation inhibited If in the cooling phase, production of cold temperatures inhibited Heaters OFF if cover open for a time period > i3 (if in heating phase) During a recipe with defrost, cover opened during the cooling phase: <ul style="list-style-type: none"> Defrost ON with duration d3 or due to the cover being closed 	Cover open < 10 seconds: <ul style="list-style-type: none"> Close the cover and reset will take place automatically Cover open > 10 seconds: <ul style="list-style-type: none"> Close the cover and reset will be manual, via alarm reset
Gearmotor alarm	Gearmotor thermal switch digital input open (i19)	<ul style="list-style-type: none"> Alarm shown on display Recording in alarm log Cycle in progress inhibited 	Check for and remove the cause of the alarm on the digital input (automatic reset)
Thermal compressor alarm	Compressor thermal switch digital input open (i20)	<ul style="list-style-type: none"> Alarm shown on display Recording in alarm log Cycle in progress inhibited if in cooling 	Check for and remove the cause of the alarm on the digital input (automatic reset)
High pressure compressor alarm	Compressor high pressure digital input open (i21)	<ul style="list-style-type: none"> Alarm shown on display Recording in alarm log Cycle inhibited if in cooling 	Check for and remove the cause of the alarm on the digital input (automatic reset)

Description	Cause	Effects	Solution
Heater thermal alarm	Heater thermal switch digital input open (i22)	<ul style="list-style-type: none"> • Alarm shown on display • Recording in alarm log • Cycle inhibited if in heating 	Check for and remove the cause of the alarm on the digital input (automatic reset)
Power failure alarm	Occurs after a power failure	<ul style="list-style-type: none"> • Alarm shown on display • Recording in alarm log • No effect on regulation 	Check the power supply wiring
Scheduled maintenance alert	Machine cycle run hours > E14	<ul style="list-style-type: none"> • From standby to ON: alert shown on the display for 10 seconds • Recording in alarm log 	<ul style="list-style-type: none"> • Perform maintenance on the machine • Check E14 • Perform a data log reset

10.3 TABLE OF INVERTER ALARMS

Description	Cause	Effects	Solution
Overcurrent alarm	The device has exceeded the maximum current value S601	<ul style="list-style-type: none"> • Alarm shown on display • Recording in alarm log • Load regulation inhibited 	<ul style="list-style-type: none"> • Reset AUTORESET function alarm when enabled • Alarm reset from digital input (inverter)
Overload alarm	Amount of energy $I^2t > \mathbf{S511}$ for time period S512	<ul style="list-style-type: none"> • Alarm shown on display • Recording in alarm log • Load regulation inhibited 	
Overvoltage alarm	Inverter voltage > S603	<ul style="list-style-type: none"> • Alarm shown on display • Recording in alarm log • Load regulation inhibited 	
Minimum voltage alarm	Inverter voltage < S602	<ul style="list-style-type: none"> • Alarm shown on display • Recording in alarm log • Load regulation inhibited 	
Overheating alarm	Inverter temperature > 90 °C	<ul style="list-style-type: none"> • Alarm shown on display • Recording in alarm log • Load regulation inhibited 	<ul style="list-style-type: none"> • Automatic reset if inverter temperature < 90 °C - 10 °C • Alarm reset from digital input (inverter)
Inverter communication alarm	No communication between base board and inverter	<ul style="list-style-type: none"> • Alarm shown on display • Recording in alarm log • MODBUS communication interrupted • Load regulation inhibited 	<ul style="list-style-type: none"> • Restore communication between base board and inverter • Automatic reset

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MADE IN ITALY

EVCO S.p.A.

Via Feltre 81, 32036 Sedico (BL) ITALY

Telephone: +39 0437 8422

Fax: +39 0437 83648

email: info@evco.it

Web: www.evco.it