EVCO
Advanced Controllers

EV3 Mix

Inverter and keypad for food mixers

144XXXME4.00 - 06/2020

User manual

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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.
The product must be installed outside hazardous ATEX areas.

Disposal

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

Consider the environment

With a view to respecting the environment, we strive to adhere to the environmental performance of the company, 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 suitably trained personnel, familiar with and capable of understanding the content of the manual and all relevant documentation, are authorised to work on and with this inverter. Furthermore, the personnel must have completed courses in safety and must be able to recognise and prevent the implied dangers. Installation, adjustment and maintenance must only be carried out by qualified personnel.
- Various product components, including the printed circuits, run at hazardous voltage levels.
- Only use electrically insulated and suitably calibrated measuring devices and equipment.
- Do not handle the equipment while the power supply is connected.
- Do not touch the unshielded components or the terminals while they are live.
- The motors may generate voltage if the shaft is rotated. Before carrying out any work on the inverter, lock the motor shaft to prevent it from rotating.
- Before working on the inverter:
  - Disconnect the power supply.
  - Use a suitably calibrated and electrically insulated Voltmeter to make sure the power supply is disconnected.
  - Wait for 5 minuted after disconnecting the power supply before installing/uninstalling accessories, hardware, cables or wires, to allow the condensers to discharge any residual voltage.
- Do not open, disassemble, repair or modify the product.
- Before handling the product, make sure you are wearing all the necessary personal protective equipment (PPE).
- Do not expose the equipment to liquids or chemicals.
- Before applying voltage to the inverter:
  - Make sure the running period has been completed and no parts of the system can become hazardous.
  - If the mains power supply terminals and the motor output terminals have been earthed and circuited, remove the earth and short circuits on these terminals.
  - Make sure all the equipment is properly earthed.
  - 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 between the power supply and the inverter.

⚠ ⚠ 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.

The **EV3 Mix** must be installed in a suitably ventilated environment to allow heat to dissipate.
The temperature of the device can exceed 80 °C (176 °F) during operation.

⚠ WARNING

HOT SURFACES

- Avoid all contact with hot surfaces.
- Do not leave flammable or heat-sensitive components on or near hot surfaces.
- Make sure the product has cooled sufficiently before handling it.
- Make sure sufficient heat dissipation takes place by performing a test under maximum load conditions.

⚠ WARNING

MALFUNCTIONING OF THE EQUIPMENT

- Perform the wiring carefully, in compliance with electromagnetic compatibility requirements.
- Do not operate the product with unknown or incorrect settings or data.
- Carry out a full start-up test.
- Make sure the wiring is correct for the settings.
- Use shielded cables for all I/O signal and communication cables.
- Use double-shielded cables for motor wiring.
- Minimise the length of the connections as much as possible, to avoid winding the cables around electrically connected parts.
- The signal (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.

CHAPTER 1. INTRODUCTION

EV3 Mix is a controller for industrial food mixers, consisting of an inverter for asynchronous motors and a user interface.

There are 2 types of interface:

- **Basic**: You can set 3 rotation speeds (high, medium and low) and mixing cycles with up to 2 stages.
  There are several functions, such as:
  - Play/Pause;
  - Reverse, to remove the dough/mixture from the spiral attachment;
  - Speed change during operation;
  - Motor alarm display.
- **Plus**: You can set 10 rotation speeds and mixing cycles with up to 10 stages. The time for each stage may vary between 1 and 99 minutes and can be customised. There are several functions, such as:
  - Play/Pause;
  - Reverse, to remove the dough/mixture from the spiral attachment;
  - Speed change during operation;
  - Motor alarm display.

1.1 COMPLIANCE

2014/35/UE: Low voltage directive applied in accordance with standard EN61800-5-1 for electrical safety.
2014/30/UE: Electromagnetic compatibility directive applied in accordance with standard EN61800-3 class C2.

CHAPTER 2. TECHNICAL DATA

2.1 TECHNICAL SPECIFICATIONS

Ambient operating conditions: -10...55 °C (14...131 °F) 10 ... 90 % RH non-condensing
Transportation and storage conditions: -20...60 °C (-4...140 °F) 10 ... 90 % RH non-condensing

Altitude:	Maximum 1000 m (3,280 ft)
Pollution category:	2
Protection degree:	IP00
Overvoltage category:	II
Power supply:	230 Vac ±10 % 50/60 Hz
Input current (RMS):	**0.75 kW**: 5 A **1.5 kW**: 10 A **2.2 kW**: 15 A
Output current (RMS):	**0.75 kW**: 3.3 A **1.5 kW**: 6.3 A **2.2 kW**: 8.8 A
Cooling method:	**0.75 kW models:** Natural ventilation **Other models**: Forced ventilation

2.1.1 Other technical information - Inverter

Input properties (SELV)

Digital Inputs:	3 digital inputs

Output properties

Digital outputs:	1 relay output 5 A at 250 Vac
Motor Output:	0...230 Vac, 3 ph at Vin = 230 Vac
Carrier frequency:	5...16 kHz
Nominal overload:	Maximum 150 % for 60 seconds
Output frequency:	0...100 Hz

Serial communication port properties (SELV)

RS-485 serial port:	1 opto-isolated RS-485 MODBUS RTU Slave serial port, reinforced for connection with Basic/Plus interface. Maximum baud rate: 38400 bps - Maximum cable length: 1.5 m (4.9 ft.)

Compliance

CE in accordance with directives EN61800-3 and EN61800-5-1 in C2 category

2.2 TECHNICAL SPECIFICATIONS - BASIC/PLUS INTERFACES

The product complies with the following harmonised standards: EN60730-1 and EN60730-2-9

Device construction:	Incorporated device
Device purpose:	Operating control device
Type of action:	1
Pollution category:	2
Overvoltage category:	I
Nominal pulse voltage:	330 V
Power supply:	12 Vdc ±10 %
Consumption:	0.7 W
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

2.2.1 Other technical information - Basic/Plus interfaces

Serial communication port properties (SELV)

RS-485 serial port:	1 RS-485 MODBUS RTU Master Serial port

CHAPTER 3. MECHANICAL ASSEMBLY

3.1 INSTALLATION - INVERTER

Inverter installation anticipates the use of a corner bracket (not supplied).
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.

⚠⚠ DANGER

RISK OF ELECTRIC SHOCK, EXPLOSION OR ELECTRIC ARC

- Before handling the product, make sure you are wearing all the necessary personal protective equipment (PPE).
- Do not expose the equipment to liquids or chemicals.
- Before applying voltage to the inverter:
  - Make sure the running period has been completed and no parts of the system can become hazardous.
  - If the mains power supply terminals and the motor output terminals have been earthed and circuited, remove the earth and short circuits on these terminals.
  - Make sure all the equipment is properly earthed.
  - 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.

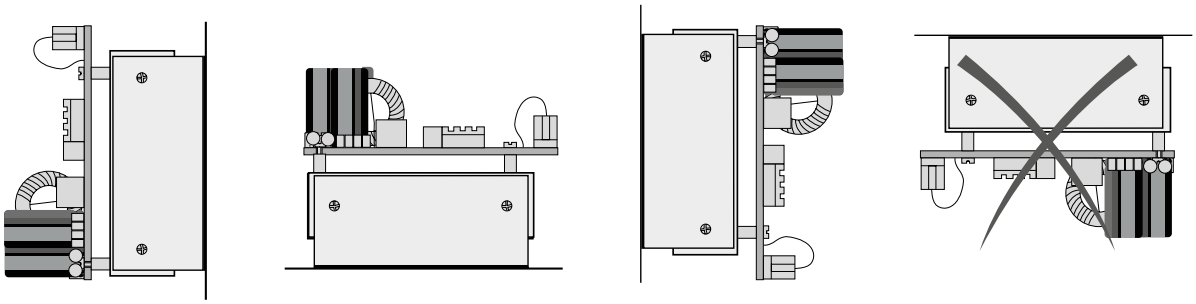
For **EV3 Mix 0.75 kW** models:

⚠ DANGER

RISK OF EXPLOSION

Only install the equipment in a vertical position (condensers towards the bottom).

0.75 kW models



1.5 kW / 2.2 kW models

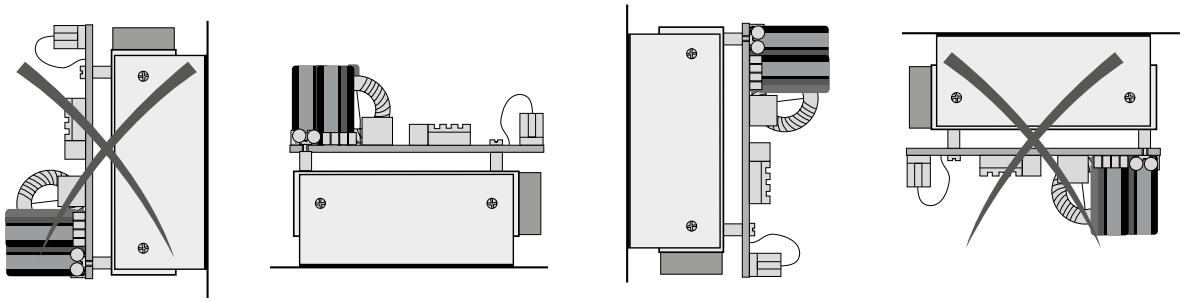


Fig. 1. ***EV3 Mix*** *installation position*

3.1.1 Dimensions - Inverter

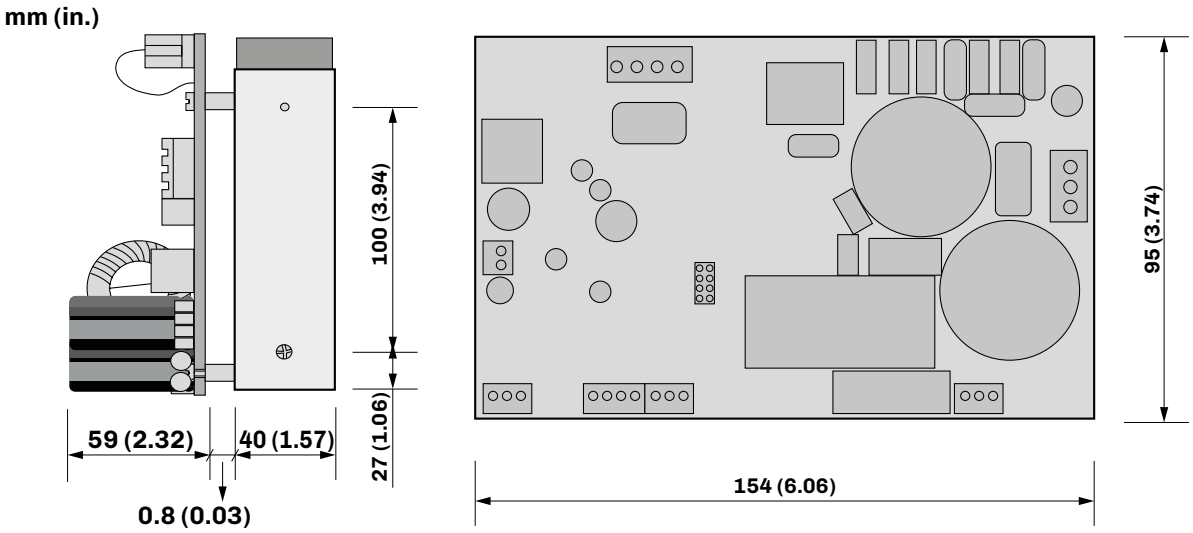


Fig. 2. *Inverter dimensions*

3.1.2 Minimum installation distances

Install the **EV3 Mix** inverter observing the minimum distance of 40 mm (1.57 in.) at the sides, so as to guarantee adequate ventilation and aeration of the system. Make sure there is a distance of at least 10 mm (0.39 in.) between the support base and the cooler.

⚠ WARNING

HOT SURFACES

- Avoid all contact with hot surfaces.
- Do not leave flammable or heat-sensitive components on or near hot surfaces.
- Make sure the product has cooled sufficiently before handling it.
- Make sure sufficient heat dissipation takes place by performing a test under maximum load conditions.

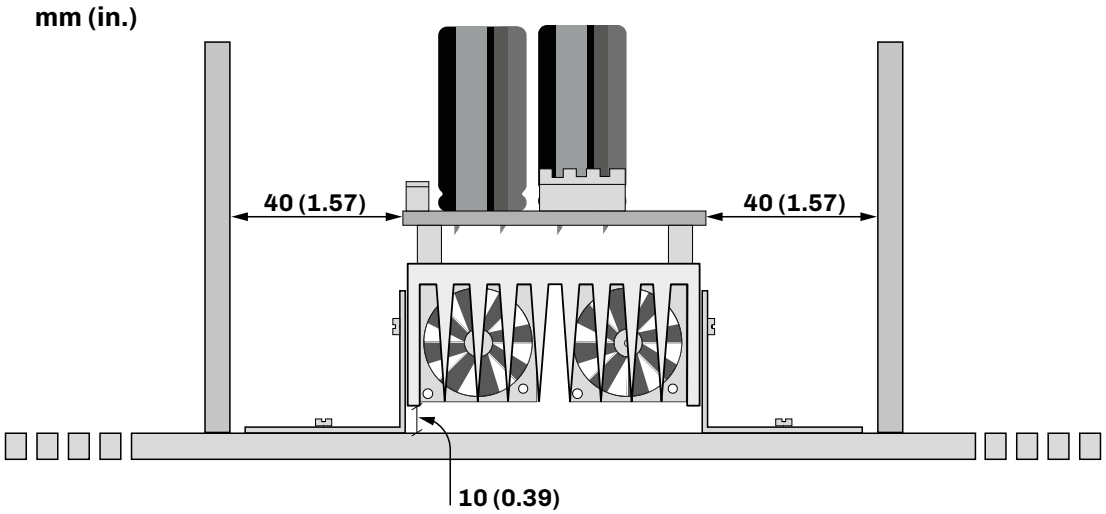


Fig. 3. *Minimum inverter installation distances - view from below*

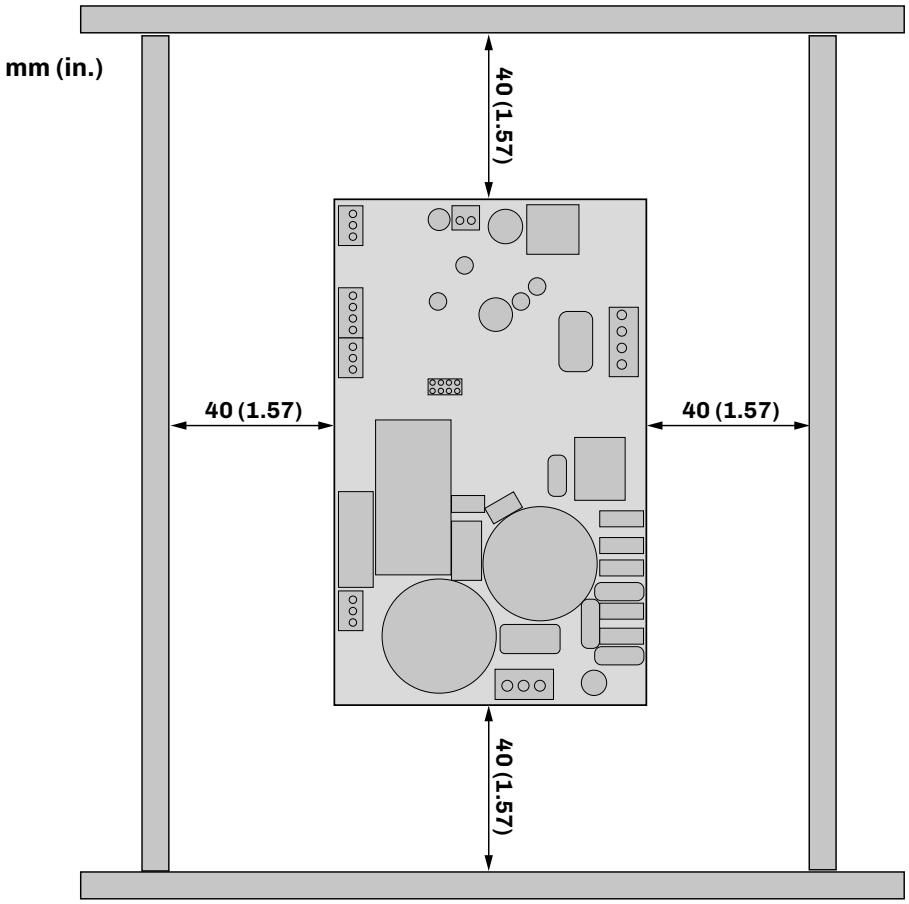


Fig. 4. *Minimum inverter installation distances - front view*

3.2 INSTALLATION - BASIC/PLUS INTERFACES

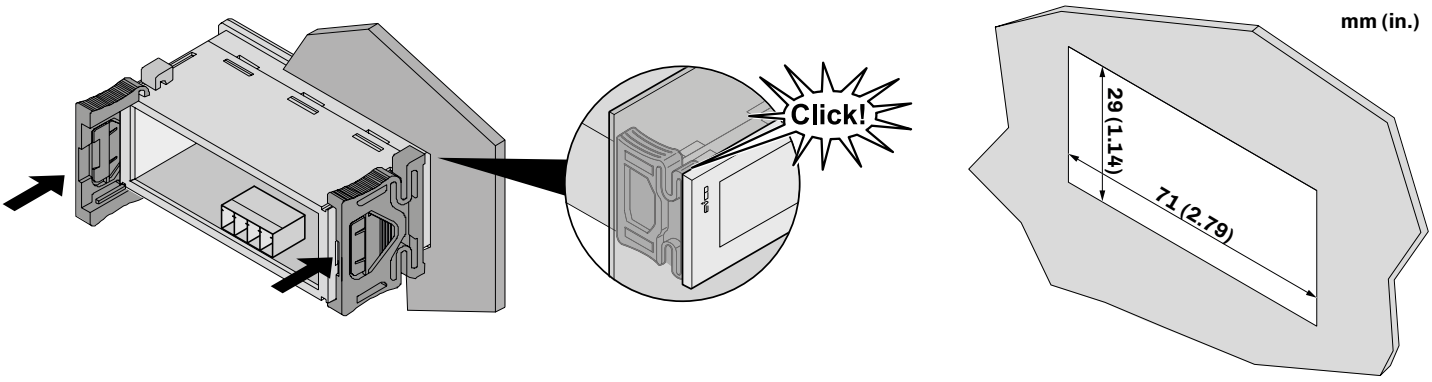


Fig. 5. *Installing* **Basic/Plus** *interfaces*

3.2.1 Dimensions - Basic/Plus Interfaces

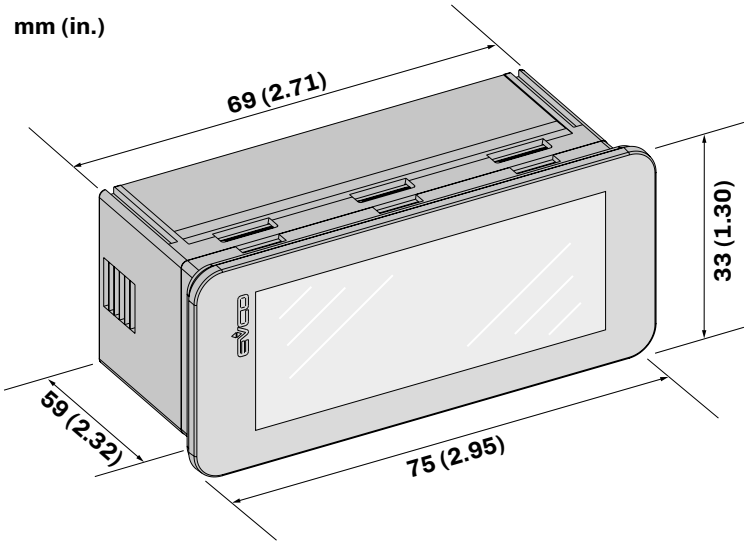


Fig. 6. ***Basic/Plus*** *interface dimensions*

CHAPTER 4. ELECTRICAL CONNECTIONS

4.1 CONNECTION BEST PRACTICE

The following information describes the wiring guidelines and best practices which should be observed when using the inverter.

⚠ DANGER

RISK OF ELECTRIC SHOCK, EXPLOSION OR ELECTRIC ARC

- Only suitably trained personnel, familiar with and capable of understanding the content of the manual and all relevant documentation, are authorised to work on and with this inverter. Furthermore, the personnel must have completed courses in safety and must be able to recognise and prevent the implied dangers. Installation, adjustment and maintenance must only be carried out by qualified personnel.
- Various product components, including the printed circuits, run at hazardous voltage levels.
- Only use electrically insulated and suitably calibrated measuring devices and equipment.
- Do not touch the unshielded components or the terminals while they are live.
- The motors may generate voltage if the shaft is rotated. Before carrying out any work on the inverter, lock the motor shaft to prevent it from rotating.
- Before working on the inverter:
  - Disconnect the power supply.
  - Use a suitably calibrated and electrically insulated Voltmeter to make sure the power supply is disconnected.
  - Wait for 5 minutes after disconnecting the power supply before installing/uninstalling accessories, hardware, cables or wires, to allow the condensers to discharge.
- Do not open, disassemble, repair or modify the product.
- Before handling the product, make sure you are wearing all the necessary personal protective equipment (PPE).
- Do not expose the equipment to liquids or chemicals.
- Before applying voltage to the inverter:
  - Make sure the running period has been completed and no parts of the system can become hazardous.
  - If the mains power supply terminals and the motor output terminals have been earthed and circuited, remove the earth and short circuits on these terminals.
  - Make sure all the equipment is properly earthed.
  - 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.

When the **EV3 Mix** is in standby and the motor is not running, the latter remains live.

⚠ DANGER

RISK OF ELECTRIC SHOCK

Do not handle the motor when the **EV3 Mix** is in standby.

⚠ WARNING

MALFUNCTIONING OF THE EQUIPMENT

- Perform the wiring carefully, in compliance with electromagnetic compatibility requirements.
- Do not operate the product with unknown or incorrect settings or data.
- Carry out a full start-up test.
- Make sure the wiring is correct for the settings.
- Use shielded cables for all I/O signal and communication cables.
- Use shielded cables for motor wiring.
- Minimise the length of the connections as much as possible, to avoid winding the cables around electrically connected parts.
- The signal (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.

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 shielded twisted pair cables for network and RS-485 serial connections.

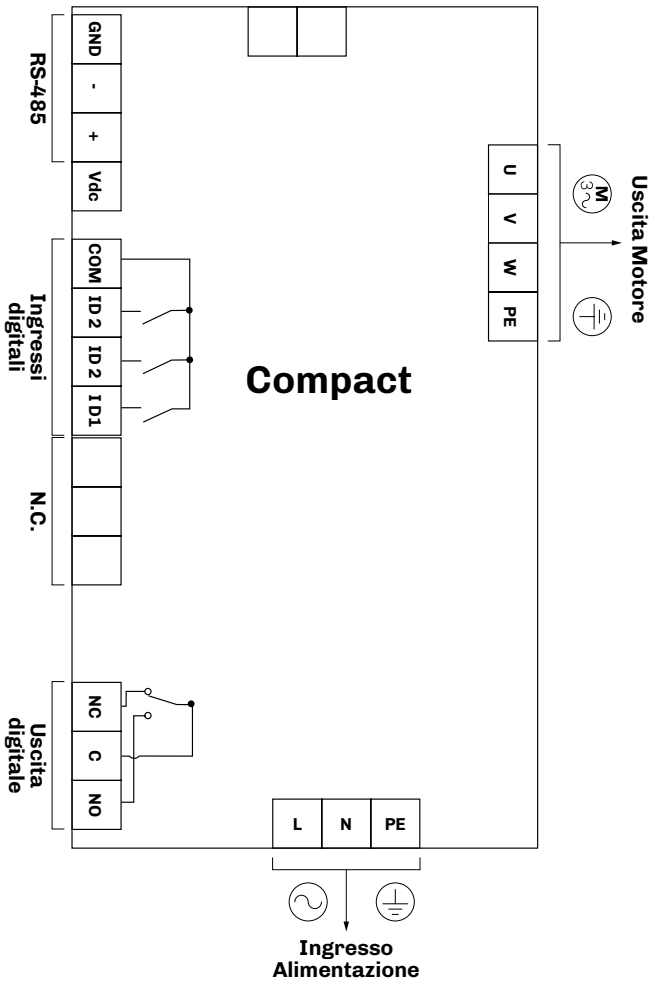
Use correctly earthed shielded cables for all inputs or analogue outputs and for communication connections.

⚠ WARNING

MALFUNCTIONING OF THE EQUIPMENT

- Perform the wiring carefully, in compliance with electromagnetic compatibility requirements.
- Do not operate the product with unknown or incorrect settings or data.
- Carry out a full start-up test.
- Make sure the wiring is correct for the settings.
- Use shielded cables for all I/O and communication signals.
- Use shielded cables for motor wiring.
- Minimise the length of the connections as much as possible, to avoid winding the cables around electrically connected parts.
- The signal (digital 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.

4.2 WIRING DIAGRAM - INVERTER



TERMINALS	
L	PHASE - Power supply input
N	NEUTRAL - Power supply input
PE	EARTH - Power supply input ***(*)***
RS-485	RS-485 serial port for remote connection
U	Motor control output
V	Motor control output
W	Motor control output
PE	Motor earth connection ***(*)***
COM	Digital input common
NC	Alarm relay output normally closed
C	Relay output common
NO	Alarm relay output normally open
ID1	Digital input 1 - Stop/Run
ID2	Digital input 2 - Motor thermal switch
ID3	Digital input 3 - Reset alarms

***(*) NOTE**: For board and motor output earthing, see paragraph **"4.2.1 EARTHING" ON PAGE 17**.*

4.2.1 Earthing

⚠ ⚠ DANGER

RISK OF ELECTRIC SHOCK, EXPLOSION OR ELECTRIC ARC

Make sure all the equipment is properly earthed.

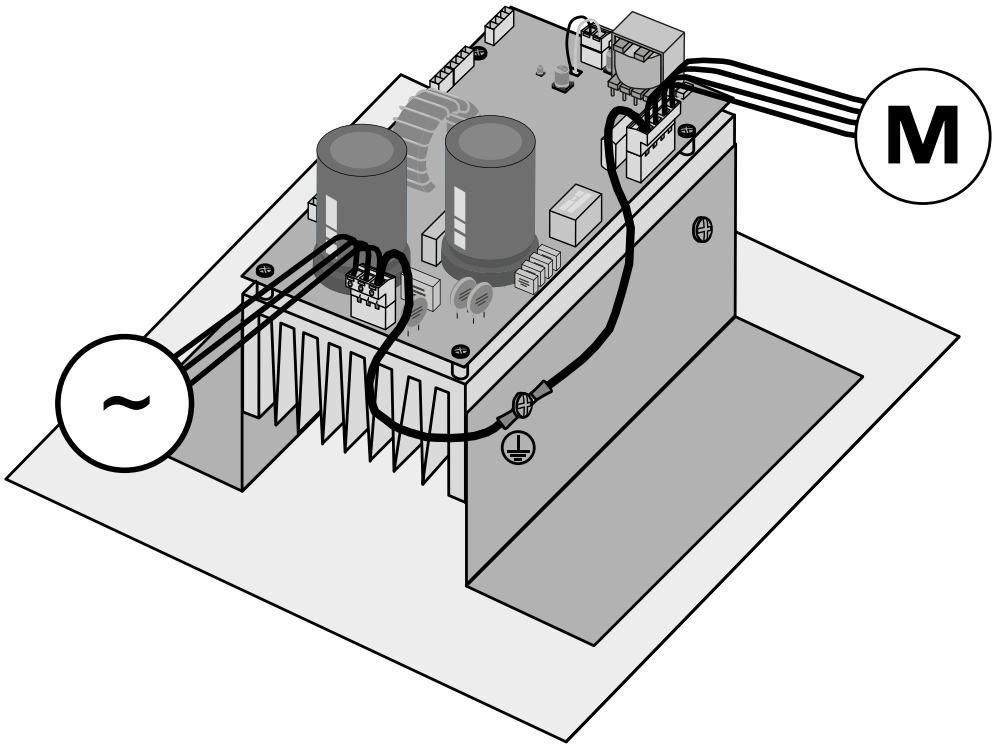
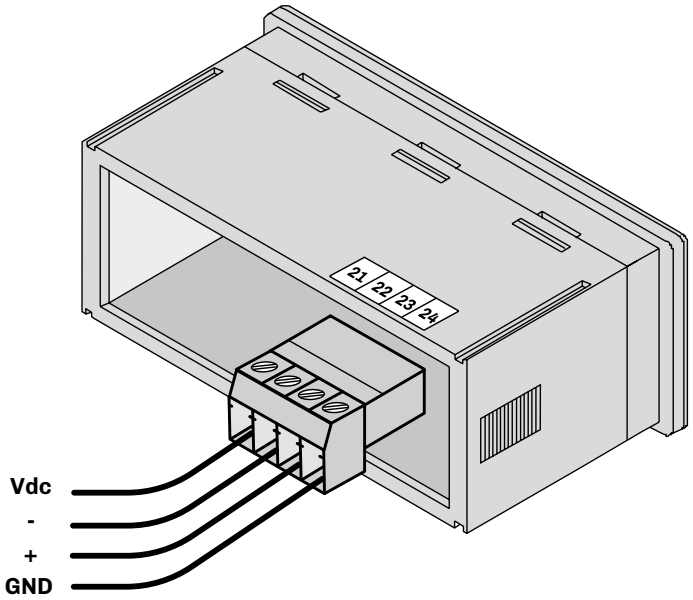


Fig. 7. *Inverter earthing*

4.3 WIRING DIAGRAM - BASIC/PLUS INTERFACE



TERMINALS	
21	12 Vdc power supply connection from Inverter
22	RS-485- serial port connection with Inverter
23	RS-485+ serial port connection with Inverter
24	RS-485 GND serial port connection with Inverter

4.4 INVERTER / INTERFACE CONNECTION

The wiring diagram below illustrates how to connect the inverter to one of the interfaces (Basic or Plus):

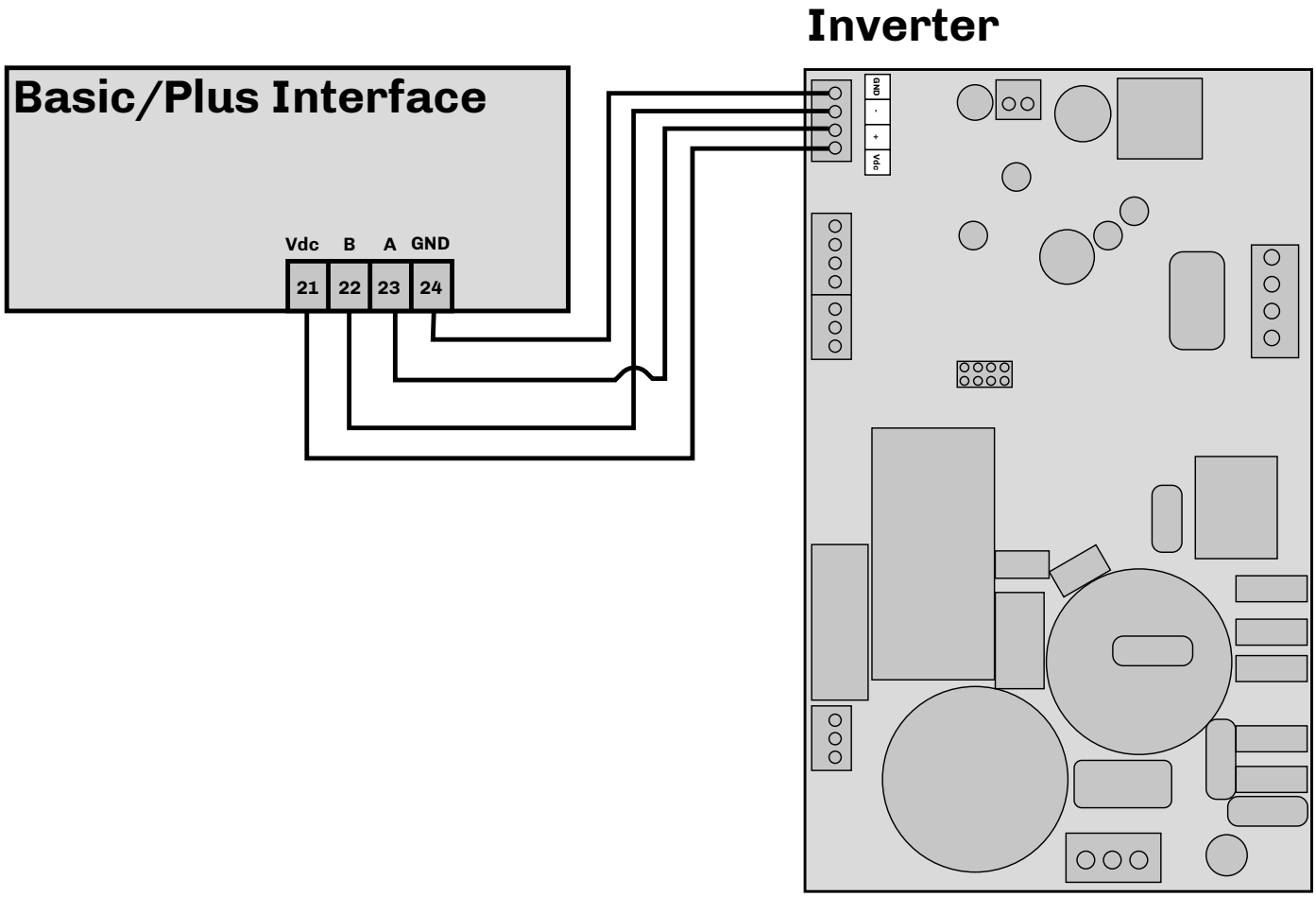


Fig. 8. *Inverter - Interface connection*

CHAPTER 5. USER INTERFACE

5.1 TOUCH KEYS

The touch key functions are described below.

Key description	
AUTO	• Touch to enter automatic rotation cycle mode configuration
▶ ⏸	• Touch to start or pause a rotation cycle • Touch to confirm values • Touch for 2 seconds: Stop rotation cycle
MAN	• Touch to enter manual rotation cycle mode configuration • Scroll down through values • During cycle: decrease speed
REV	• Scroll up through values • During cycle: increase speed

***NOTE**: The keys and their functions are identical in Basic and Plus interfaces.*

5.2 ICONS

The Basic and Plus interfaces have different displays:

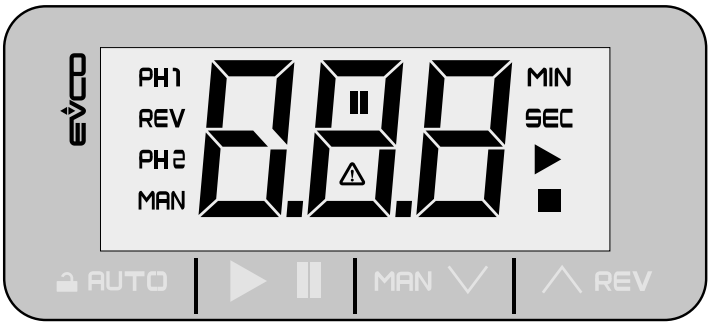
- Basic Interface: 1-line display;
- Plus Interface: 2-line display.

Lamp Test:
When it is first switched on, the display will flash for 8 seconds to make sure the icons are shown correctly. Once the Lamp Test is complete, the device will revert to the status it was in before it was switched off.

The icons used by each model are described below.

5.2.1 Basic Interface

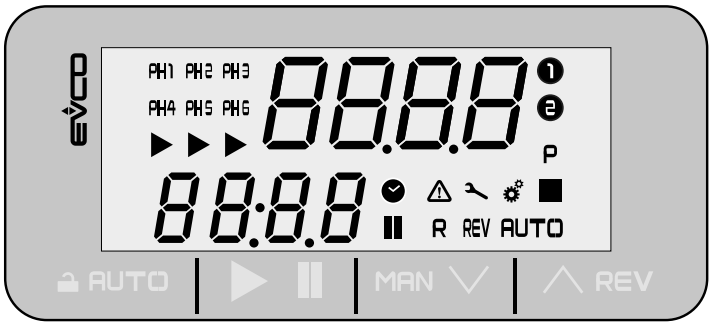
The icons used by the **Basic** interface are described below:



Icon description		
PH1	Lit steadily:	Configuration or Stage 1 of the cycle active
PH2	Lit steadily:	Configuration or Stage 2 of the cycle active
REV	Flashing:	Reverse motor operation
MAN	Lit steadily:	Manual rotation cycle mode enabled
MIN	Lit steadily:	Time value displayed in minutes
SEC	Lit steadily:	Time value displayed in seconds
▶	Lit steadily: Flashing: Off:	Rotation cycle active Rotation cycle paused Rotation cycle not active
■	Lit steadily:	Motor not in motion
⚠	Flashing:	Alarm active (alarm code displayed)

5.2.2 Plus Interface

The icons used by the **Plus** interface are described below:



Icon description		
▶▶▶	Lit in sequence:	Rotation cycle active
	Flashing:	Rotation cycle paused
	Off:	Rotation cycle not active
■	Lit steadily:	Motor not in motion
REV	Flashing:	Reverse motor operation
⚠	Flashing:	Alarm active (alarm code displayed)
AUTO	Lit steadily:	Automatic mode active
🕒	Lit steadily:	Time value displayed
⏸	Flashing:	Rotation cycle paused

Icon description		
PH1	Lit steadily:	- Stage 1 configuration - Stage 1 of the cycle active
PH2	Lit steadily:	- Stage 2 configuration - Stage 2 of the cycle active
PH3	Lit steadily:	- Stage 3 configuration - Stage 3 of the cycle active
PH4	Lit steadily:	- Stage 4 configuration - Stage 4 of the cycle active
PH5	Lit steadily:	- Stage 5 configuration - Stage 5 of the cycle active
PH6	Lit steadily:	- Stage 6 configuration - Stage 6 of the cycle active
🔧	Not used	
R		
✱		
P		
❶		
❷		

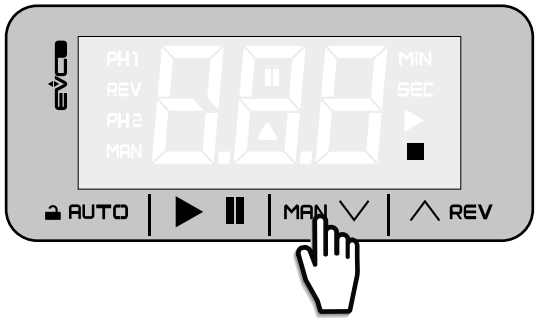
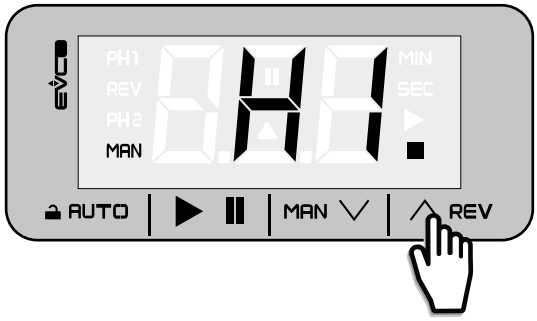
5.3 FUNCTIONS MENU

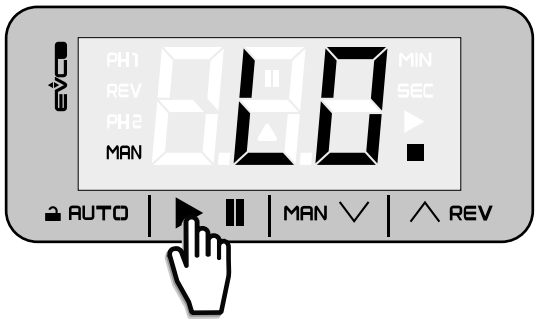
The following section explains which menus are available in the **EV3 Mix** and how to navigate them.

5.3.1 Select/start manual cycle

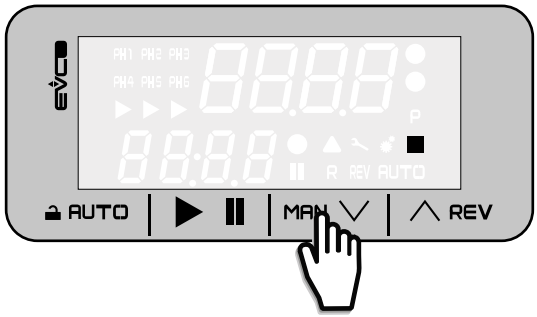
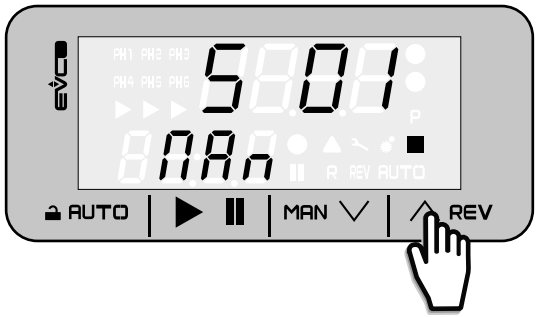
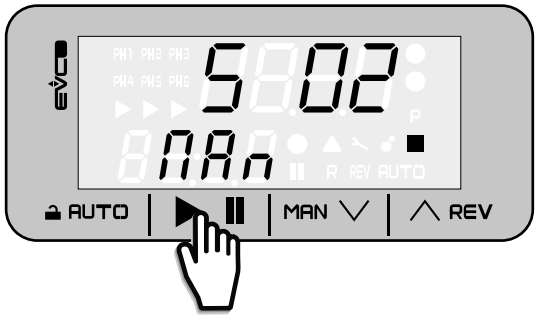
Basic Interface

The sequence of actions to complete in order to start the food mixer rotation cycle manually and change its speed is described below:

Sequence	Description
	Touch MAN ⋁ to enter the Select/start manual cycle menu.
	Touch ⋀ REV to scroll through the available speeds and select the desired level: **HI** = High speed; **Md** = Medium speed; **LO** = Low speed. See ***"6.1 SETTING THE SPEED" ON PAGE 26.***

Sequence	Description
	Touch ▶ ⏸ to confirm the selection and start the rotation cycle. The food mixer rotation speed will be displayed, as well as the minutes elapsed since the start of the cycle; the values will alternate every 10 seconds. **Play/Pause** When the cycle has begun, the food mixer can be paused by pressing ▶ ⏸; to resume the cycle simply press ▶ ⏸ again.

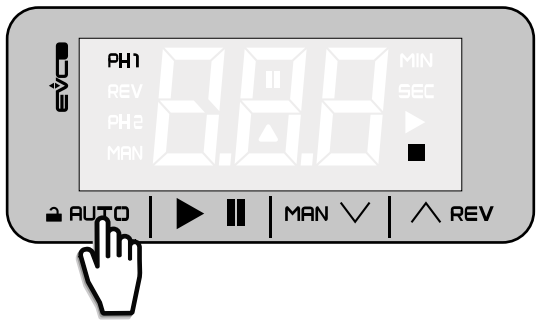
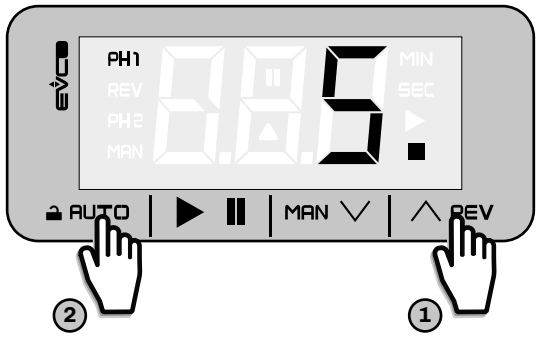
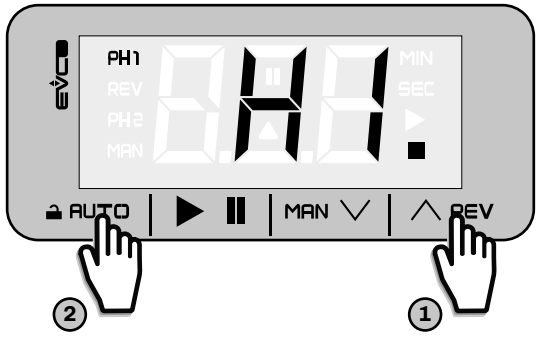
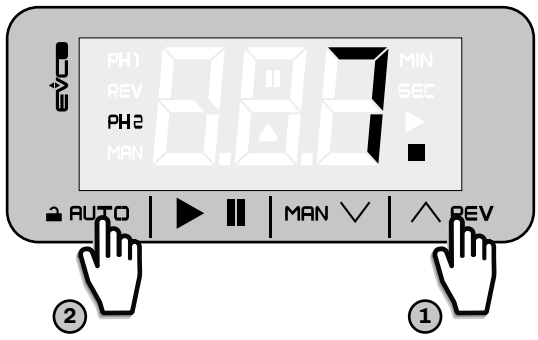
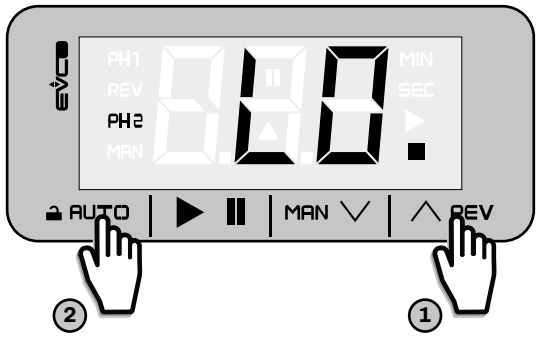
Plus Interface
The sequence of actions to complete in order to start the food mixer rotation cycle manually and change its speed is described below:

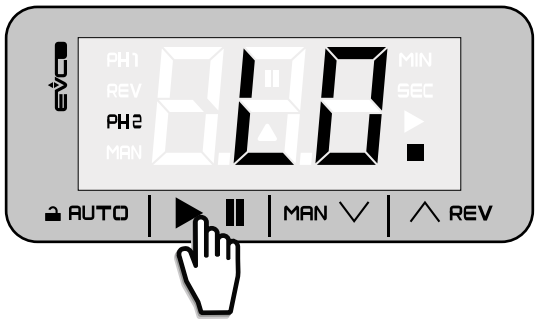
Sequence	Description
	Touch **MAN** ⋁ to enter the Select/start manual cycle menu.
	Touch ⋀ **REV** to scroll through the available speeds and select the desired level: See ***"6.1 SETTING THE SPEED" ON PAGE 26.***
	Touch ▶ ⏸ to confirm the selection and start the rotation cycle. The bottom display will show the text **MAN** and the time elapsed since the start of the cycle; the values will alternate every 10 seconds. **Play/Pause** When the cycle has begun, the food mixer can be paused by pressing ▶ ⏸; to resume the cycle simply press ▶ ⏸ again.

5.3.2 Automatic select/start cycle with several stages

Basic Interface

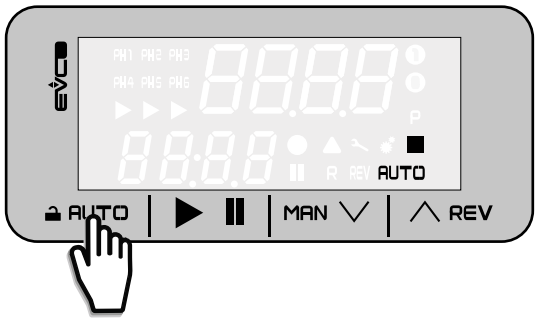
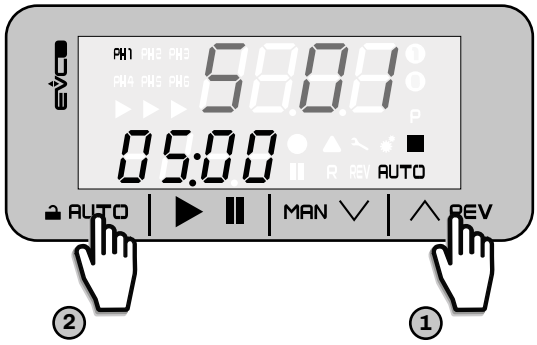
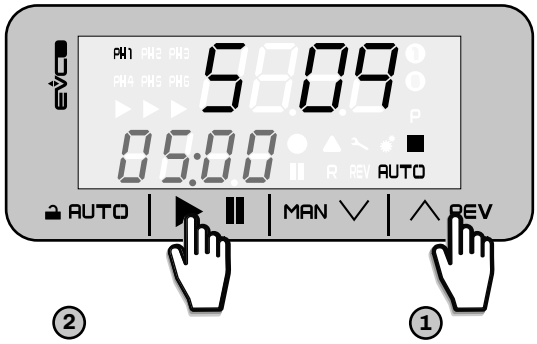
The sequence of actions to complete in order to start the food mixer automatic rotation cycle with 1-2 stages manually is described below:

Sequence	Description
	Touch AUTO to enter the Select/start automatic cycle with 1-2 stages menu.
	Touch REV to select the duration of stage 1 and press AUTO to confirm.
	Touch REV to scroll through the available speeds and press AUTO to confirm: **HI** = Maximum speed; **Md** = Medium speed; **LO** = Minimum speed. See ***"6.1 SETTING THE SPEED" ON PAGE 26.***
	Touch REV to select the duration of stage 2 and press AUTO to confirm. **0** = Stage not applied
	Touch REV to scroll through the available speeds and press AUTO to confirm: **HI** = High speed; **Md** = Medium speed; **LO** = Low speed. See ***"6.1 SETTING THE SPEED" ON PAGE 26.***

Sequence	Description
	Touch ▶ ⏸ to confirm the selection and start the food mixer cycle. ***NOTE**: The **EV3 Mix** always suggests the last configuration set to make starting the rotation cycle quicker and easier.* The food mixer rotation speed is displayed, along with the cycle minutes; the values will alternate every 10 seconds. The last 3 minutes are displayed in seconds. When the cycle is complete, the text **END** appears, while the buzzer sounds for 10 seconds. **Play/Pause** When the cycle has begun, the food mixer can be paused by pressing ▶ ⏸; to resume the cycle simply press ▶ ⏸ again.

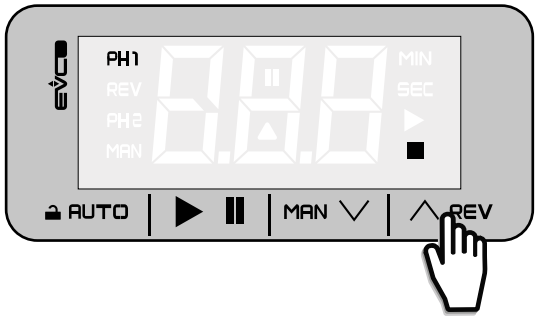
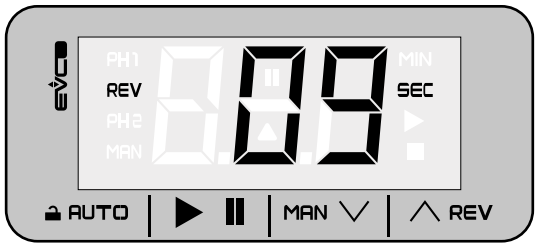
Plus Interface

The sequence of actions to complete in order to start the food mixer automatic rotation cycle with 1 to 10 stages manually is described below:

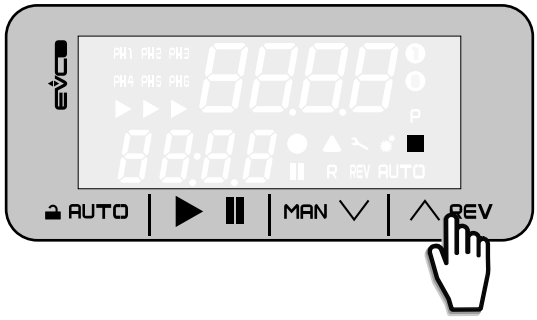
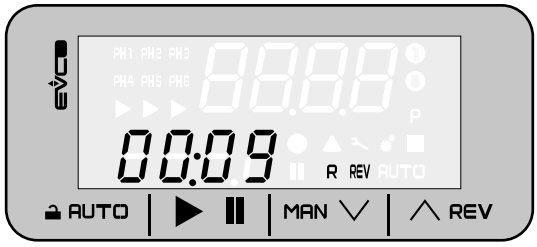
Sequence	Description
	Touch AUTO to enter the Select/start automatic cycle with 10 stages menu.
	Touch REV to select the duration of stage 1 and touch AUTO to confirm.
	Touch REV to scroll through the available speeds and press ▶ ⏸ to confirm and start the rotation cycle: **Play/Pause** When the cycle has begun, the food mixer can be paused by pressing ▶ ⏸; to resume the cycle simply press ▶ ⏸ again.
Repeat the same procedure for stages 2... 10. ***NOTE**: For stages 1 to 6, the corresponding icon indicating the active stage (**PH1...PH6**) will come on; for stages 7...10 the first line of the display will show the number of the active stage (**PH7...PH9**) and the implemented speed level alternately.*	

5.3.3 Reverse function

Basic Interface

Sequence	Description
	When the device is in STOP: Touch ∧ REV for 2 seconds to start a short manual reverse rotation cycle (10 seconds of rotation).
	The device will show the 10-second cycle countdown (timer). Once this has elapsed, the display will revert to how it was when the device was in stop mode.

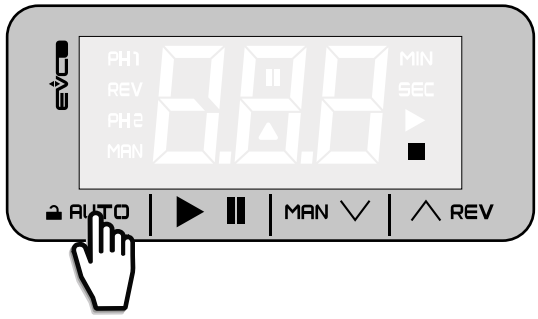
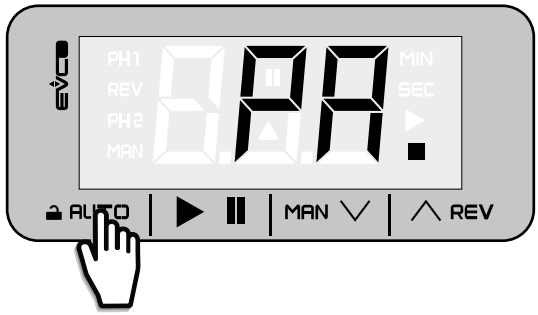
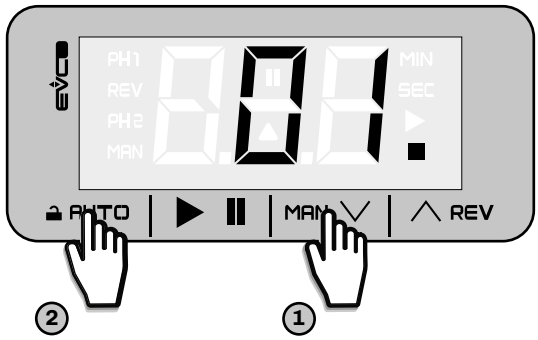
Plus Interface

Sequence	Description
	When the device is in STOP: Touch ∧ REV for 2 seconds to start a short manual reverse rotation cycle (10 seconds of rotation).
	The device will show the 10-second cycle countdown (timer) on the bottom display. Once this has elapsed, the display will revert to how it was when the device was in stop mode.

5.3.4 Edit Parameters

The sequence of actions to carry out in order to edit the parameters is as follows:

***NOTE**: the procedure is the same for both interfaces*

Sequence	Description
	When the device is in stop mode, touch AUTO for 3 seconds.
	The text **PA** will appear; touch and release AUTO.
	Set the password value for the level you want to enter by touching REV or MAN and touch AUTO to confirm. **Passwords:** **-19**: Password value to enter OEM parameters (**O**) **19**: Password value to enter Expert parameters (**E**)

CHAPTER 6. OPERATION

6.1 SETTING THE SPEED

6.1.1 Basic Interface

The speed is set by setting the minimum and maximum speed values using parameters:

Par.	Description	MU	Range	Setting
B04	Maximum motor speed.	rpm	**B05** ... 6000	1500
B05	Minimum motor speed.	rpm	150 ... **B04**	300

The speeds that can be set via the basic interface are:

- Maximum speed (**Hi**)
- Medium speed (**Md**)
- Minimum speed (**Lo**)

The device calculates the medium speed between the two values **B04** and **B05**, as shown in the graph below:

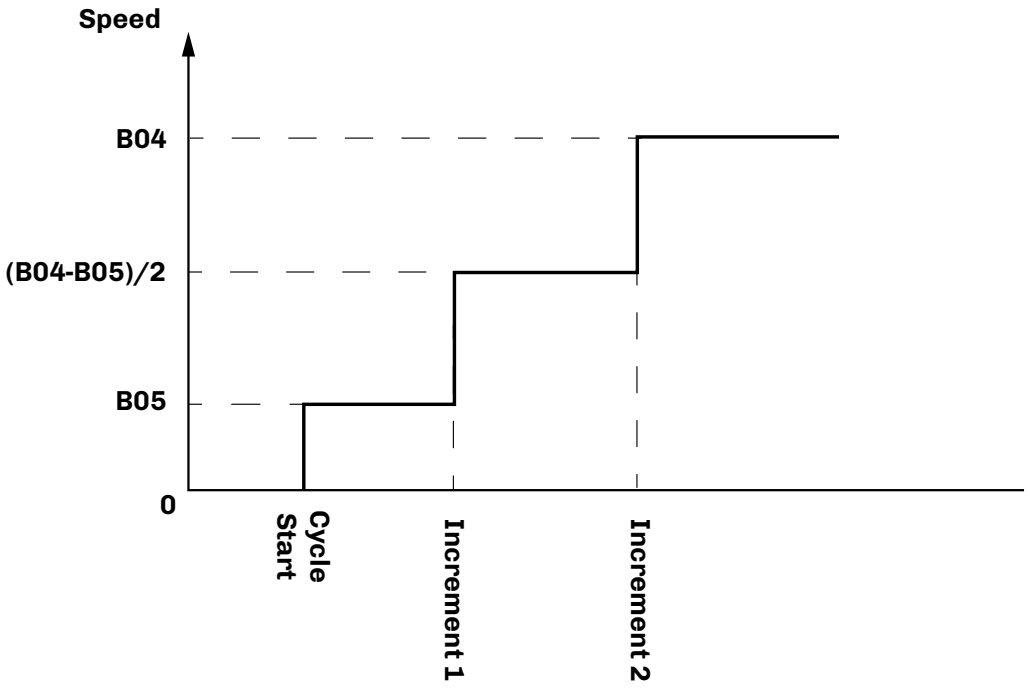


Fig. 9. *Setting the speed - Basic interface*

6.1.2 Plus Interface

The speed is set by setting the minimum and maximum speed values using parameters:

Par.	Description	MU	Range	Setting
B04	Maximum motor speed.	rpm	**B05** ... 6000	1500
B05	Minimum motor speed.	rpm	150 ... **B04**	300

10 speeds can be set via the plus interface.

The device calculates the 10 speed values based on the **B04** and **B05** settings, as shown in the graph below:

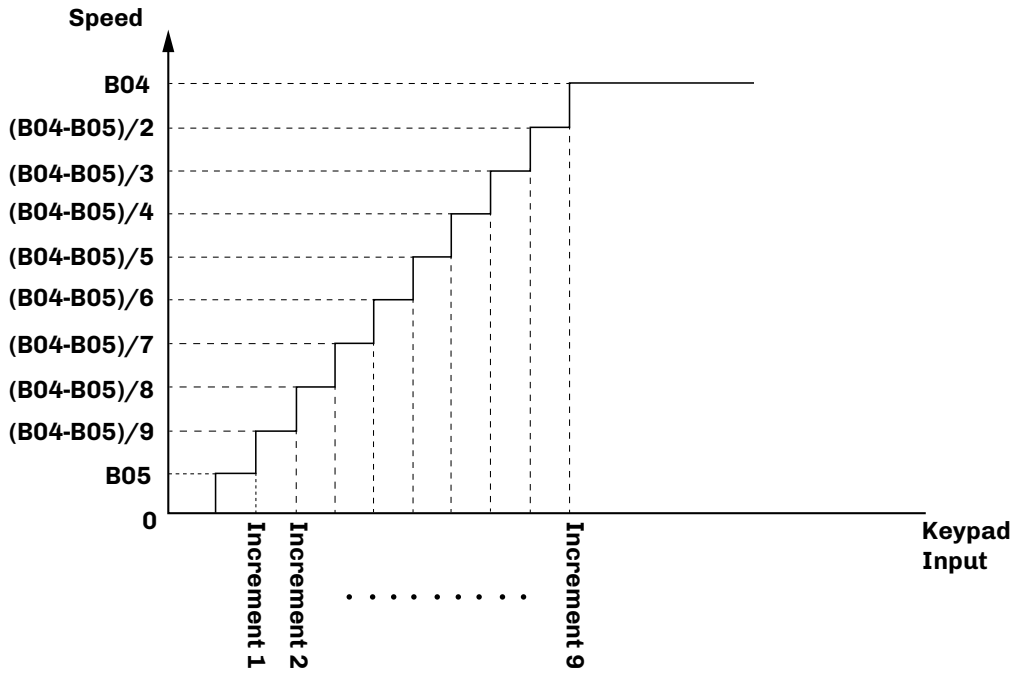


Fig. 10. *Setting the speed - Plus interface*

6.2 LED

The LED on the board:

- If lit in Green: Inverter in RUN status;
- If lit in RED: Inverter in STOP status;
- If flashing in Red: Inverter in Alarm (see Alarms chapter).

6.3 DIGITAL INPUTS

6.3.1 Digital input 1

Digital input 1 is dedicated to opening and closing the cover of the food mixer:

- With **ID1** closed: food mixer cover closed; the food mixer manual or automatic cycle can be started.
- With **ID1** open: food mixer cover open; if a cycle is in progress, it will be paused and the code **US** will appear on the display, alternating with the current display (for the Plus interface it will be shown on the top display) and the buzzer will sound until it is silenced.

Parameter **G40** configures the cycle restart after the cover is closed:

- **G40** = 0 (safe restart):the cycle remains paused and code **US** remains on the display. Press ▶ ⏸ once to reset the alarm and make code **US** disappear from the display; press ▶ ⏸ again to start the food mixer cycle.
- **G40** = 1 (quick restart): when the cover is closed, the cycle starts automatically and alarm code **US** disappears.

In any case, the paused cycle can be restarted by closing the cover and keeping digital input 3 closed for 1 second.

6.3.2 Digital input 2

Digital input 2 is dedicated to managing the motor thermal switch alarm.

- With **ID2** closed: when a cycle is in progress, the latter is set to STOP status. The motor thermal switch alarm is reset manually; to reset the alarm, close and reopen digital input 3 or disconnect and reconnect the device power supply.

6.3.3 Digital input 3

Digital input 3 is dedicated to alarm resetting as described in the previous paragraphs.

CHAPTER 7. PARAMETERS

EV3 Mix parameters can be configured using **Parameters Manager**, by connecting the inverter to the PC via RS-485 serial port. This means the **EV3 Mix** is fully configurable according to your own requirements/applications.

***NOTE**: For PC - **EV3 Mix** connection, use an RS-485/USB converter (for example, p/n: **EVIF20SUXI**); for all necessary information on the subject, please refer to instruction sheet code **104SUXIA104**).*

The parameters are divided into groups.

Description of columns in the Table of Parameters

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

7.1 TABLE OF CONFIGURATION PARAMETERS

Par.	Description	MU	Range	Model default [kW]			PW
				0.75	1.5	2.2	
	CONTROL GROUP A··						
A03	Selection of control type applied to the motor. **1** = Scalar; **2** = Vector. ***NOTE:** Contact EVCO technical support for setting **A03** = 2.*	-	1/2	1	1	1	E
	SPEED GROUP B··						
B02	Acceleration ramp. Time required to reach the nominal speed from 0 rpm.	s	0.2 ... 200.0	3.0	3.0	3.0	O
B03	Deceleration ramp. Time required to reach 0 rpm from the nominal speed.	s	0.2 ... 200.0	5.0	5.0	5.0	O
B04	Maximum motor speed (1).	rpm	0 ... 12000	1500	1500	1500	O
B05	Minimum motor speed (1).	rpm	0 ... 12000	300	300	300	O
	INPUTS/OUTPUTS GROUP C··						
C10	Output 1 function. **0** = Reserved; **1** = Inverter ready; **2** = Inverter in run; **3** = Inverter in alarm; **4** = Controlled by RS-485 serial port; **11...20** = Reserved.	-	0 ... 20	3	3	3	O
	Motor GROUP E··						
E01	Nominal motor current (2).	A	0.1 ... S601	2.9	5.5	7.9	O
E02	Nominal motor voltage (2).	V	50 ... 400	230	230	230	O
E03	Nominal motor frequency (2).	Hz	0 ... 100	50	50	50	O
E04	Number of pole pairs (2).	-	1 ... 8	2	2	2	O
E09	Motor boost. Overvoltage percentage applied at motor start-up.	%	0 ... 25	5	5	5	O
E10	Motor voltage. Maximum voltage percentage applied to the motor in relation to the nominal value.	%	10 ... 112	100	100	100	E
E11	Motor overload. Motor overload percentage permitted by the inverter for a time set using parameter **S512**.	%	0 ... 50	50	50	50	E
E12	Maximum overload time.	s	0 ... 60	30	30	30	E
E29	Selection of PWM carrier frequency.	kHz	5 ... 16	5	5	5	O
E34	Motor phase loss alarm sensitivity. Indicates the motor phase loss alarm sensitivity percentage. **0** = disabled; **100** = maximum sensitivity.	%	0 ... 100	0	0	0	O
	Motor GROUP G··						
G40	Cycle restart management. **0** = Safe restart; **1** = Quick restart.	-	0/1	1	1	1	E/O

(1) The minimum and maximum limits are calculated on the basis of the number of pole pairs for the motor, between 5 and 100 Hz;
(2) Parameter depends on the motor rating label data;

CHAPTER 8. ALARMS

The table below lists alarms with corresponding solutions. The main consequence of each alarm is that the cycle in progress stops.

8.1 TABLE OF ALARMS

<table>
<tr><th>Code</th><th>Description</th><th>No. of red LED flashes</th><th>Cause</th><th>Alarm solution</th></tr>
<tr><td>UV</td><td>Undervoltage alarm</td><td>1</td><td>The voltage value of the device has dropped below 200 V</td><td rowspan="4">– Reset AUTORESET function alarm when enabled;
– Reset alarm via input ID3</td></tr>
<tr><td>OV</td><td>Overvoltage alarm</td><td>2</td><td>The voltage value of the device has exceeded 420 V</td></tr>
<tr><td>OC</td><td>Overcurrent alarm</td><td>3</td><td>The device has exceeded the maximum current value:<table><tr><th>0.75 kW</th><th>1.5 kW</th><th>2.2 kW</th></tr><tr><td>5.0 A</td><td>9.4 A</td><td>13.2 A</td></tr></table></td></tr>
<tr><td>OL</td><td>Overload alarm</td><td>4</td><td>When the amount of energy according to logic I²t exceeds the value of parameter E10 for a time period E11</td></tr>
<tr><td>BT</td><td>Circuit board overtemperature alarm</td><td>5</td><td>The device has reached and exceeded the maximum temperature of 90 °C</td><td>– The alarm resets automatically when the device temperature drops to 10 °C (50 °F) below the set temperature threshold of 90 °C;
– Reset alarm via input ID3</td></tr>
<tr><td>OT</td><td>Cooler overtemperature alarm</td><td>6</td><td>The motor has reached and exceeded the maximum temperature of 90 °C</td><td>– The alarm resets automatically when the motor temperature drops to 10 °C (50 °F) below the set temperature threshold of 90 °C;
– Reset alarm via input ID3</td></tr>
<tr><td>EP</td><td>Eeprom data alarm</td><td>8</td><td>The data structure is not intact</td><td>– The default values are restored automatically. The parameters changed previously need to be re-entered manually;
– Reset alarm via input ID3</td></tr>
<tr><td>TO</td><td>Communication timeout alarm</td><td>9</td><td>MODBUS communication interrupted</td><td>– Check the connection;
– Reset alarm via input ID3</td></tr>
<tr><td>US</td><td>User alarm</td><td>10</td><td>Alarm associated with an input</td><td>– Remove the cause of the alarm;
– Reset alarm via input ID3</td></tr>
<tr><td>PS</td><td>Phase Lose alarm</td><td>12</td><td>– Motor not connected correctly
– Incorrect E34 sensitivity</td><td>– Check the power supply wiring;
– Change parameter E34;
– Reset alarm via input ID3</td></tr>
<tr><td>MT</td><td>Motor thermal switch alarm</td><td>13</td><td>Alarm associated with an input (ID2 = motor thermal switch)</td><td>– Remove the cause of the alarm;
– Reset alarm via input ID3</td></tr>
<tr><td>MS</td><td>Motor stall alarm</td><td>14</td><td>Motor does not rotate properly with vector algorithm</td><td>– Make sure parameters E01...E19 are correct;
– Reset alarm via input ID3;
– Contact EVCO technical support</td></tr>
</table>

CHAPTER 9. PARAMETERS MANAGER

The **EV3 Mix** can be configured using **Parameters Manager**, available to download from the website www.evco.it .
To connect the **EV3 Mix** to a PC, an RS-485/USB converter must be used (p/n: **EVIF20SUXI**).

NOTE: For *all necessary information on the subject, please refer to instruction sheet code* **104SUXIA104**)

NOTE*: Make sure you have downloaded the latest version of the drivers available for* ***Parameters Manager****.*

Once you have started **Parameters Manager**, you will need to configure the settings correctly to connect to the **EV3 Mix**, as shown in the image below:

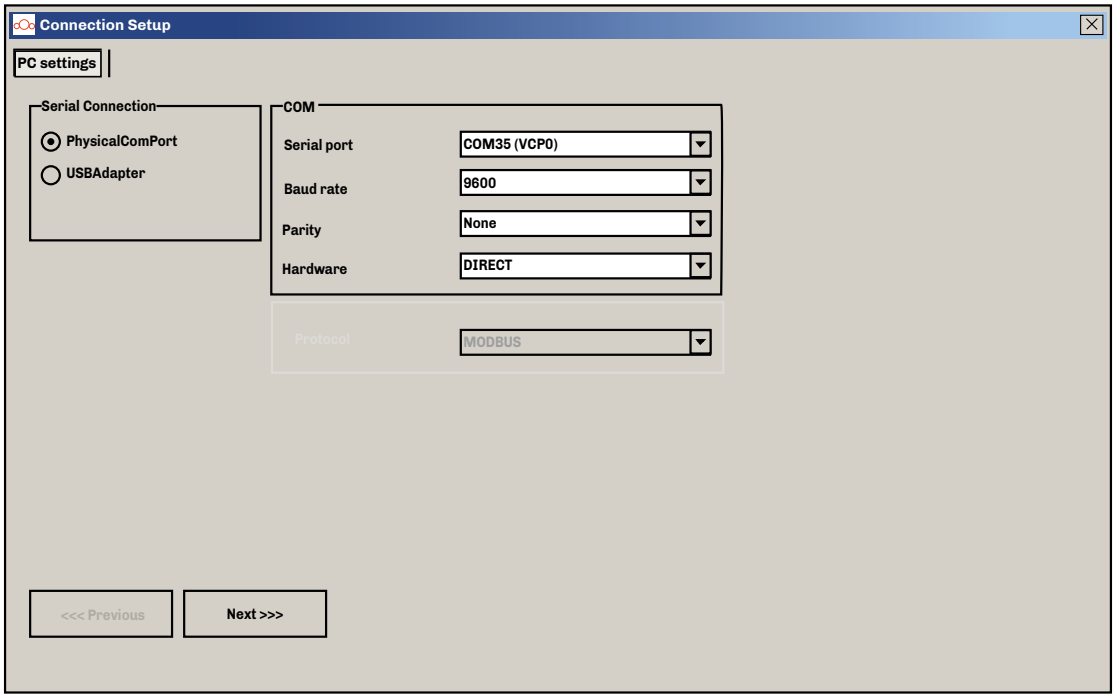


Fig. 11. *Communication port setting*

Press **NEXT** to continue and configure the network scan settings:

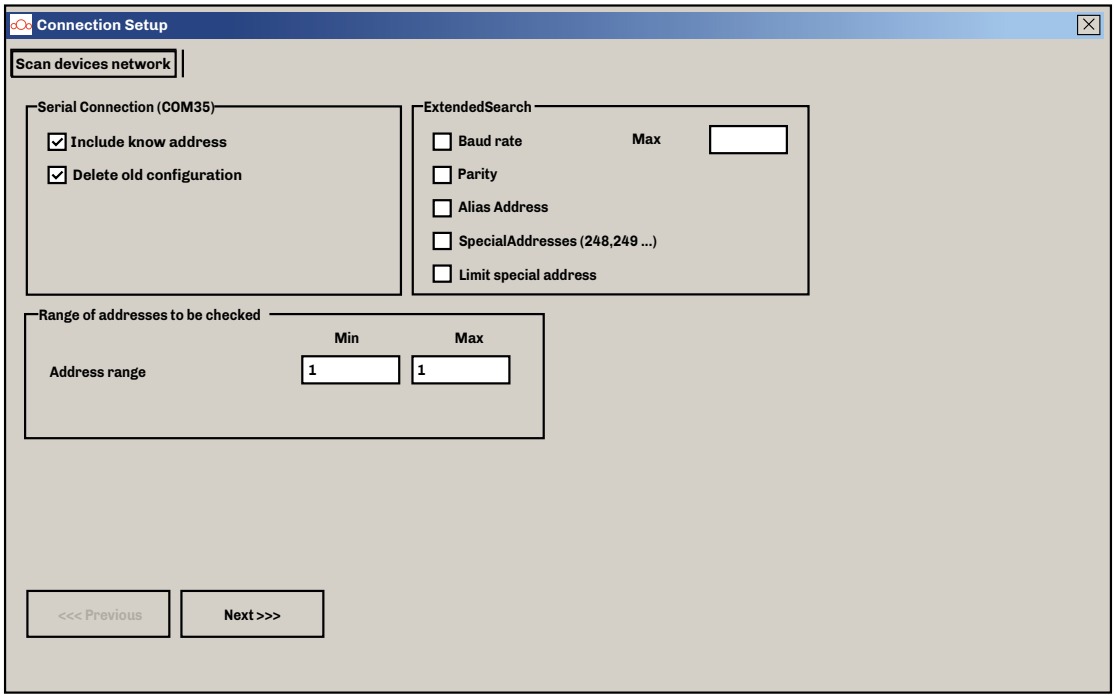


Fig. 12. *Communication Modbus address setting*

If **Parameters Manager** detects **EV3 Mix**, the following screen will appear, otherwise you will need to reconfigure the settings properly:

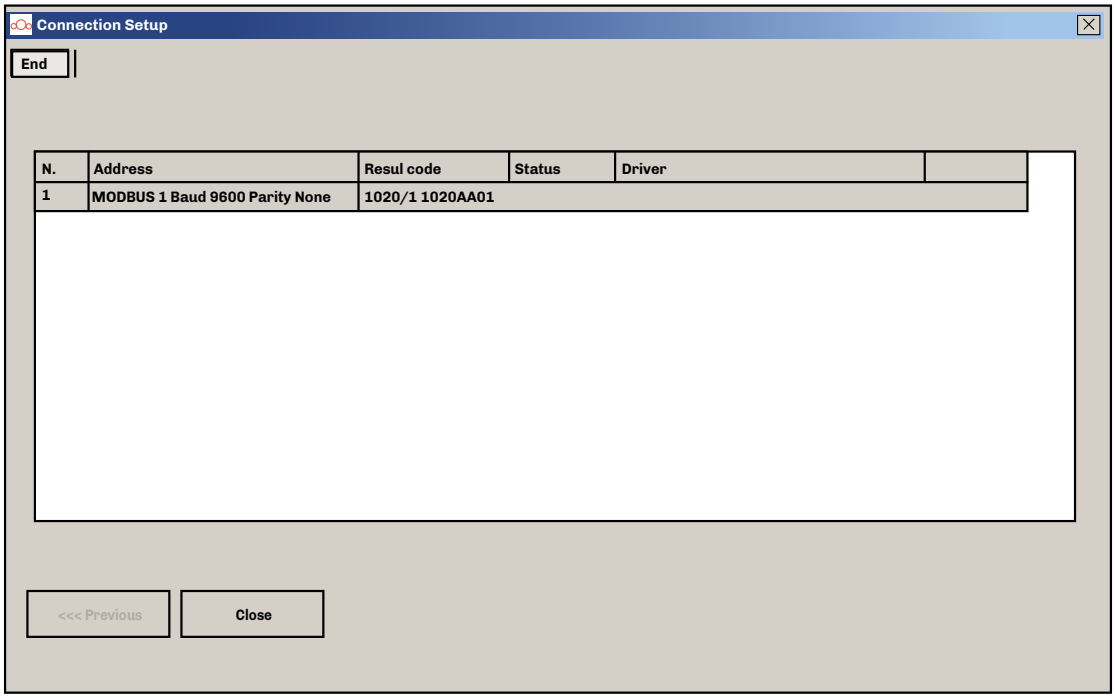


Fig. 13. ***EV3 Mix*** *detection*

Press **Close** to proceed with the **EV3 Mix** parameter configuration screen.

CHAPTER 10. WARRANTY

We recommend you read this document carefully; if you have any questions please contact EVCO directly.

EVCO guarantees its own products against material defects and/or manufacturing faults for a period of 24 months from the date of manufacture, or for a different period if specified by contractual norms.
The warranty is limited to product repair or, depending on the sole opinion of the manufacturer, replacement.
The warranty does not cover damage, malfunctioning, leaks or requests for compensation, due to:

- Operator error during use and/or installation;
- Modifications carried out by the purchaser;
- Unauthorised repairs;
- Dropping and/or damaging the device;
- Natural disasters (fires, lightning, floods, ...);
- Incorrect storage and/or maintenance.

It is the purchaser's responsibility to provide proof of the defect (and to request on-site assistance).

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