



# c-pro 3 micro and c-pro 3 kilo

## PROGRAMMABLE CONTROLLERS



ENGLISH

### HARDWARE MANUAL ver. 1.1

CODE 114CP3UKE114

# Important

## Important

Read this document carefully before the installation and before the use and follow all the additional information for the installation and for the electrical connection; keep this document close to the devices for future consultations.

The following symbols support the reading of the document:



it indicates a suggestion



it indicates an additional information to be followed.

The devices must be disposed according to the local legislation about the collection for electrical and electronic equipment.



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# 1. INTRODUCTION

## 1.1. Introduction

**c-pro 3 micro** and **c-pro 3 kilo** are two families of programmable controllers.

The family consists of:

- programmable controllers (**c-pro 3 micro**, **c-pro 3 micro+**, **c-pro 3 kilo** and **c-pro 3 kilo+**)
- I / O expansions (**c-pro 3 EXP micro**, **c-pro 3 EXP micro+**, **c-pro 3 EXP kilo** and **c-pro 3 EXP kilo+**).

**c-pro 3 micro** and **c-pro 3 micro+** are available in the following versions:

- with 4 + 4 digits custom LED display (with function icons) and with a 6 buttons (with preset functions) keyboard made of silicone rubber integrated in the controller, hereinafter also called "built-in LED versions"
- blind (they can be used for example with an user interface), hereinafter also called "blind versions".

**c-pro 3 kilo** and **c-pro 3 kilo+** are available in the following versions:

- with 128 x 64 pixel single colour LCD graphic display (black with rearlighting through white LEDs) and with a 6 buttons (with preset functions) keyboard made of silicone rubber integrated in the controller, hereinafter also called "built-in LCD versions"
- with 4 + 4 digits custom LED display (with function icons) and with a 6 buttons (with preset functions) keyboard made of silicone rubber integrated in the controller, hereinafter also called "built-in LED versions"
- blind (they can be used for example with an user interface), hereinafter also called "blind versions".

Some integrate an unipolar stepper electronic expansion valves driver.

Some more are available in IoT version and stand out for being very high-performance in terms of CPU as well as program memory.

Compared to standard versions, the wiring remains unchanged, as does the I/O configuration.

The I/O expansions are available in blind version.

Through the development environment UNI-PRO 3 (to order separately) it is possible to realize the application software and through a common USB cable it is possible to program the controllers.

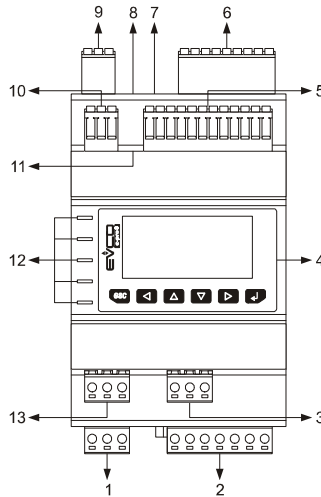
The devices look in case 4 DIN modules; installation is in electrical panel, on DIN rail.

Through a common USB peripheral it is possible to make the upload and the download of the configuration parameters.

## 2. DESCRIPTION

### 2.1. Description programmable controllers

The following drawing shows the aspect of the programmable controllers.



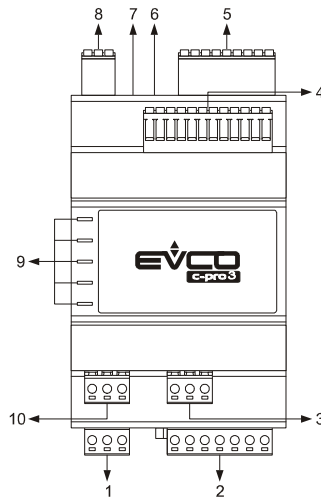
The following table shows the meaning of the parts of the controller.

Part	Meaning
1	digital outputs 6 and 7
2	digital outputs 1 and 5
3	according to the model: - digital outputs 9 (available in models <b>c-pro 3 micro+</b> and <b>c-pro 3 kilo+</b> only) - unipolar stepper electronic expansion valves driver (available in models <b>c-pro 3 micro+</b> and <b>c-pro 3 kilo+</b> only)
4	display and keyboard (not available in the blind versions)
5	analog inputs 7... 9, digital inputs 6... 9 and analog outputs 4... 6 (available in models <b>c-pro 3 micro+</b> and <b>c-pro 3 kilo+</b> only)
6	analog inputs 1... 6, digital inputs 1... 5 and analog outputs 1... 3
7	OTG USB port
8	micro-switch to: - plug in the termination of the RS-485 port with Modbus slave communication protocol - plug in the termination of the CAN port
9	power supply, RS-485 port with Modbus master communication protocol and CAN port

10	RS-485 port with Modbus master communication protocol (available in models <b>c-pro 3 micro+</b> and <b>c-pro 3 kilo+</b> only)
11	micro-switch to plug in the termination of the RS-485 port with Modbus master communication protocol (available in models <b>c-pro 3 micro+</b> and <b>c-pro 3 kilo+</b> only)
12	signalling LEDs
13	according to the model: <ul style="list-style-type: none"><li>- digital outputs 8 (available in models <b>c-pro 3 micro+</b> and <b>c-pro 3 kilo+</b> only)</li><li>- unipolar stepper electronic expansion valves driver (available in models <b>c-pro 3 micro+</b> and <b>c-pro 3 kilo+</b> only)</li></ul>

## 2.2. Description I/O expansions

The following drawing shows the aspect of the I/O expansions.



The following table shows the meaning of the parts of the expansion.

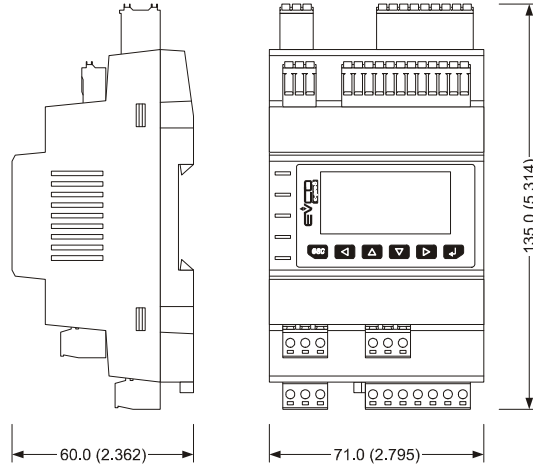
Part	Meaning
1	digital outputs 6 and 7
2	digital outputs 1 and 5
3	digital outputs 9 (available in models <b>c-pro 3 EXP micro+</b> and <b>c-pro 3 EXP kilo+</b> only)
4	analog inputs 7... 9, digital inputs 6... 9 and analog outputs 4... 6 (available in models <b>c-pro 3 EXP micro+</b> and <b>c-pro 3 EXP kilo+</b> only)
5	analog inputs 1... 6, digital inputs 1... 5 and analog outputs 1... 3
6	OTG USB port
7	micro-switch to plug in the termination of the CAN port
8	power supply and CAN port
9	signalling LEDs
10	digital outputs 8 (available in models <b>c-pro 3 EXP micro+</b> and <b>c-pro 3 EXP kilo+</b> only)



### 3. SIZE AND INSTALLATION

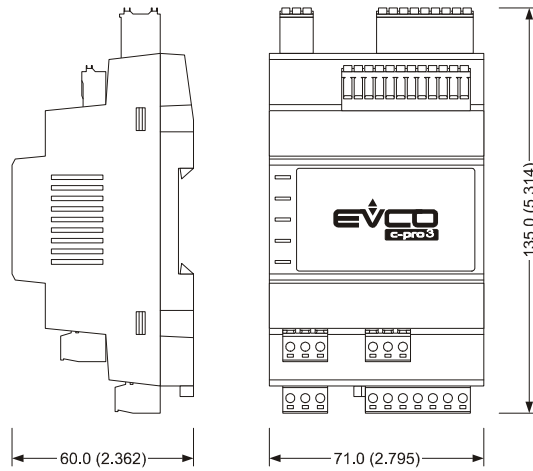
#### 3.1. Size programmable controllers

4 DIN modules; size in mm (in).



#### 3.2. Size I/O expansions

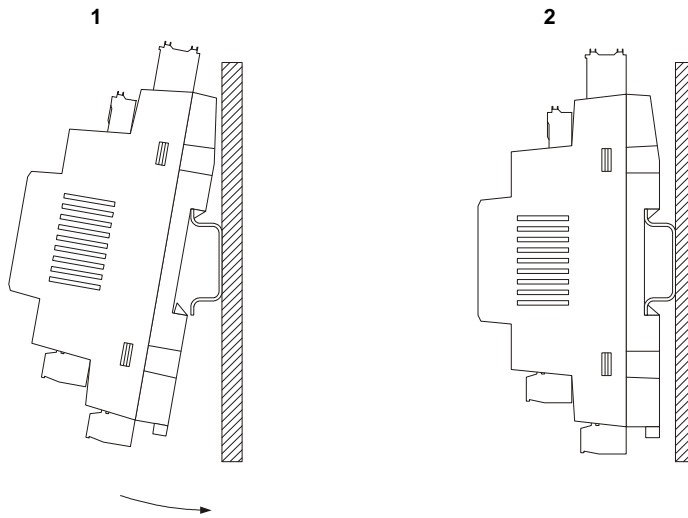
4 DIN modules; size in mm (in).



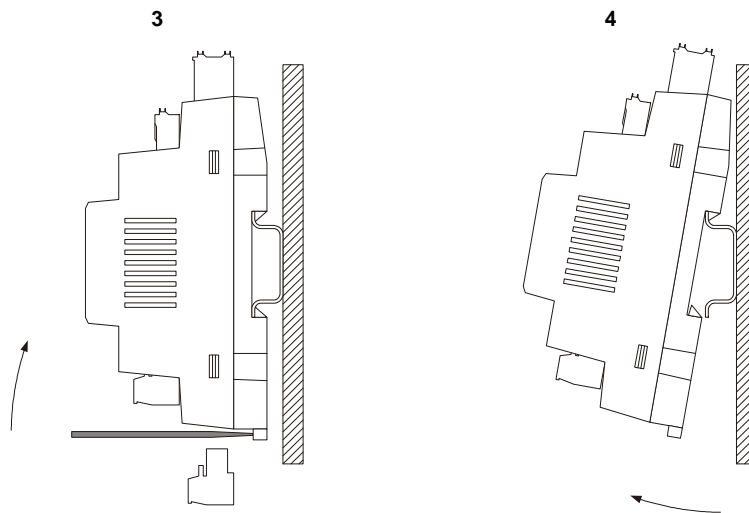
### 3.3. Installation

On DIN rail 35.0 x 7.5 mm (1.377 x 0.295 in) or 35.0 x 15.0 mm (1.377 x 0.590 in).

To install the devices operate as shown in the following drawing.



To remove the devices remove possible extractable screw terminal blocks plugged at the bottom first, then operate on the DIN rail clips with a screwdriver as shown in the following drawing.



To install the devices again press the DIN rail clips to the end first.

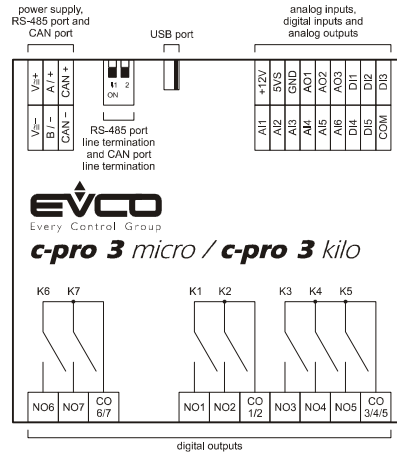
### 3.4. Additional information for installation

- working conditions (working temperature, humidity, etc.) must be between the limits indicated in the technical data
- do not install the devices close to heating sources (heaters, hot air ducts, etc.), equipments provided with big magnetos (big speakers, etc.), locations subject to direct sunlight, rain, humidity, dust, mechanical vibrations or bumps
- according to the safety legislation, the protection against electrical parts must be ensured by a correct installation of the devices; the parts that ensure the protection must be installed so that you can not remove them if not by using a tool.

## 4. ELECTRICAL CONNECTION

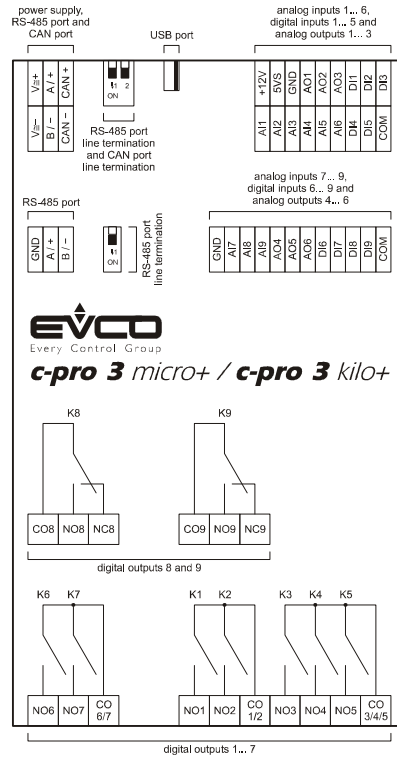
### 4.1. Connectors programmable controllers

The following drawing shows the connectors of *c-pro 3 micro* and of *c-pro 3 kilo*.

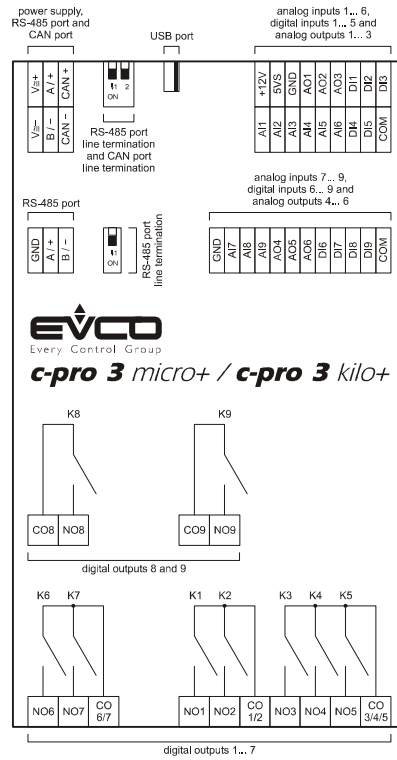


The following drawing shows the connectors of *c-pro 3 micro+* and of *c-pro 3 kilo+*.

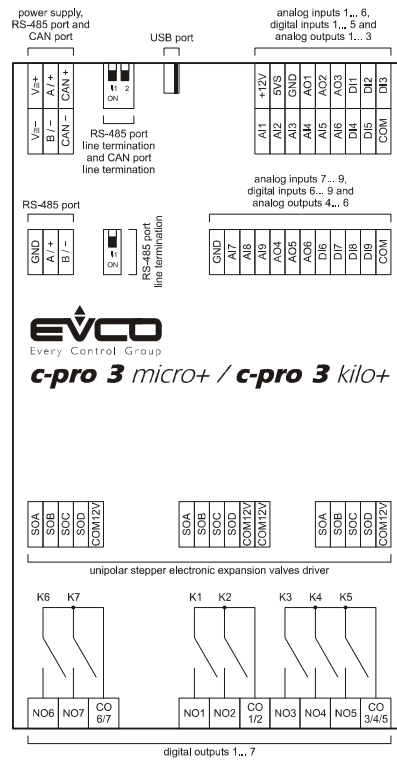
#### Models with 9 electromechanical relays



**Models with 7 electromechanical relays and 2 solid state relays**

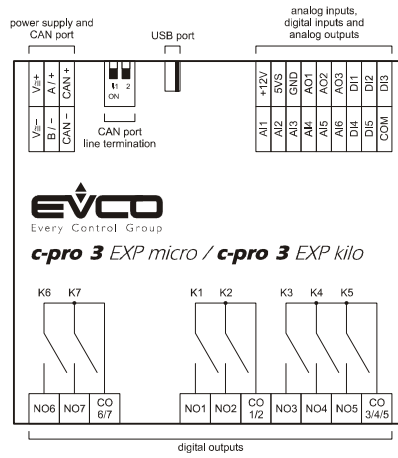


**Models with integrated unipolar stepper electronic expansion valves driver**



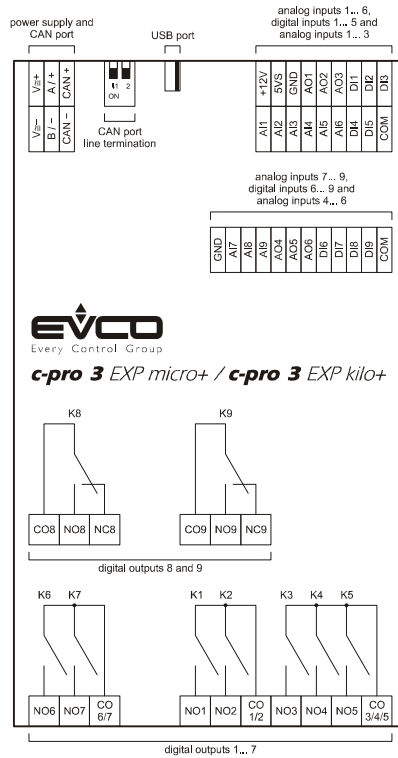
## 4.2. Connectors I/O expansions

The following drawing shows the connectors of **c-pro 3 EXP micro** and of **c-pro 3 EXP kilo**.

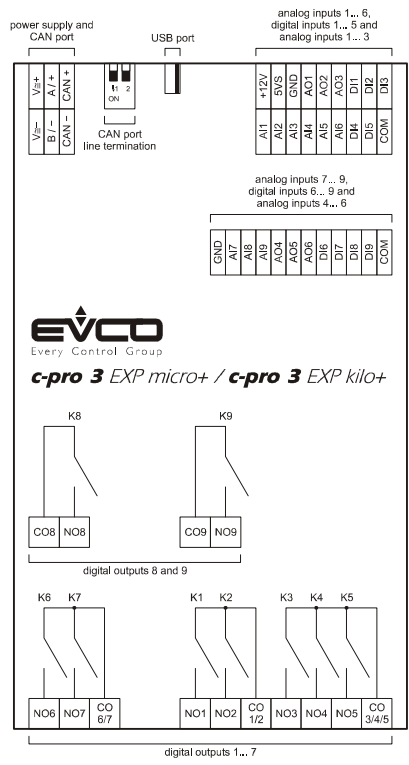


The following drawing shows the connectors of **c-pro 3 EXP micro+** and of **c-pro 3 EXP kilo+**.

### Models with 9 electromechanical relays



**Models with 7 electromechanical relays and 2 solid state relays**



## 4.3. Meaning of connectors

The following tables show the meaning of the connectors.

### Digital outputs 1... 7

Electromechanical relays.

Terminal	Meaning
NO6	normally open contact digital output 6 (3 res. A @ 250 VAC)
NO7	normally closed contact digital output 7 (3 res. A @ 250 VAC)
CO6/7	common digital outputs 6 and 7

Terminal	Meaning
NO1	normally open contact digital output 1 (3 res. A @ 250 VAC)
NO2	normally open contact digital output 2 (3 res. A @ 250 VAC)
CO1/2	common digital outputs 1 and 2
NO3	normally open contact digital output 3 (3 res. A @ 250 VAC)
NO4	normally open contact digital output 4 (3 res. A @ 250 VAC)
NO5	normally open contact digital output 5 (3 res. A @ 250 VAC)
CO3/4/5	common digital outputs 3, 4 and 5



The maximum length of the connecting cables of the digital outputs is 100 m (328 ft).

### Digital outputs 8 and 9

According to the model, electromechanical or solid state relays.

Terminal	Meaning
CO8	common digital output 8
NO8	normally open contact digital output 8 (3 res. A @ 250 VAC in case of electromechanical relay; 24 VAC/DC, 0,6 A max in case of solid state relay)
NC8	normally closed contact digital output 8

Terminal	Meaning
CO9	common digital output 9

NO9	normally open contact digital output 9 (3 res. A @ 250 VAC in case of electromechanical relay; 24 VAC/DC, 0,6 A max in case of solid state relay)
NC9	normally closed contact digital output 9

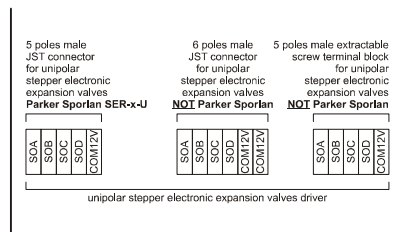


The maximum length of the connecting cables is:

- 100 m (328 ft) in case of electromechanical relay
- 100 m (328 ft) in case of solid state relay.

**Unipolar stepper electronic expansion valves driver**

The following drawing shows the connectors of the unipolar stepper electronic expansion valves driver.



The following table shows the meaning of the connectors.

Terminal	Meaning
SOA	unipolar stepper motor coli 1
SOB	unipolar stepper motor coli 2
SOC	unipolar stepper motor coli 3
SOD	unipolar stepper motor coli 4
COM12V	motor power supply (12 VDC, 260 mA max.)



The maximum length of the connecting cables is 3 m (9,842 ft).



**RS-485 port**

RS-485 port with Modbus master communication protocol (with network already polarized internally).

Terminal	Meaning
GND	ground
A / +	terminal 1 of the transceiver
B / -	terminal 0 of the transceiver



The maximum length of the connecting cables of the RS-485 port is 1,000 m (3,280 ft); also look at the *Modbus specifications and implementation guides manual* (the document is available on the internet site [www.modbus.org](http://www.modbus.org)).

Connect the RS-485 port using a twisted pair.

The following table shows the *function codes* supported by the controller.

Function code	Meaning
FC 01	read coils
FC 02	read discrete inputs
FC 03	read multiple registers
FC 04	read input registers
FC 05	write single coil
FC 06	write single register
FC 08	diagnostic
FC 15	write multiple coils
FC 16	write multiple registers
FC 23	read write multiple registers

For the settings about the RS-485 port look at chapter 6 "CONFIGURATION".

**Termination RS-485 port**

Micro-switch to plug in the termination of the RS-485 port with Modbus master communication protocol (120  $\Omega$ , 0.25 W); position micro-switch 1 on position ON to plug in the termination of the RS-485 port (plug in the termination of the first and of the last element of the network).



**Analog inputs 7... 9, digital inputs 6... 9 and analog outputs 4... 6**

Terminal	Meaning
GND	common analog inputs and analog outputs
AI7	analog input 7 (configurable via configuration parameter for PTC / NTC / Pt 1000 probes / 0-20 mA / 4-20 mA / 0-5 V ratiometric / 0-10 V transducers)
AI8	analog input 8 (configurable via configuration parameter for PTC / NTC / Pt 1000 probes / 0-20 mA / 4-20 mA / 0-5 V ratiometric / 0-10 V transducers)
AI9	analog input 9 (configurable via configuration parameter for PTC / NTC / Pt 1000 probes / 0-20 mA / 4-20 mA / 0-5 V ratiometric / 0-10 V transducers)
AO4	analog output 4 (configurable via configuration parameter for 0-20 mA / 4-20 mA / 0-10 V signal)
AO5	analog output 5 (for 0-10 V signal)
AO6	analog output 6 (for 0-10 V signal)
DI6	digital input 6 (optoisolated, 24 VAC / DC and 50 / 60 Hz)
DI7	digital input 7 (optoisolated, 24 VAC / DC and 50 / 60 Hz)
DI8	digital input 8 (optoisolated, 24 VAC / DC and 50 / 60 Hz)
DI9	digital input 9 (optoisolated, 24 VAC / DC and 50 / 60 Hz)
COM	common digital inputs



The maximum length of the connecting cables is:

- 100 m (328 ft) for the analog inputs
- 100 m (328 ft) for the digital inputs
- 100 m (328 ft) for the analog outputs.

For the settings about the analog inputs look at chapter 6 "CONFIGURATION".

**Power supply, RS-485 port with Modbus slave communication protocol and CAN port**

Terminal	Meaning
V $\equiv$ +	power supply controller (12 VAC in <b>c-pro 3 micro</b> and in <b>c-pro 3 micro+</b> , 24 VAC / 20... 30 VDC in <b>c-pro 3 kilo</b> and in <b>c-pro 3 kilo+</b> ); if the controller is powered in alternating current, connect the phase
V $\equiv$ -	power supply controller (12 VAC in <b>c-pro 3 micro</b> and in <b>c-pro 3 micro+</b> , 24 VAC / 20... 30 VDC in <b>c-pro 3 kilo</b> and in <b>c-pro 3 kilo+</b> ); if the controller is powered in alternating current, connect the neutral
A / +	terminal 1 of the transceiver RS-485 port
B / -	terminal 0 of the transceiver RS-485 port
CAN +	signal + CAN port
CAN -	signal - CAN port



The maximum length of the connecting cables is:

- 100 m (328 ft) for the power supply
- 1,000 m (3,280 ft) for the RS-485 port; also look at the *Modbus specifications and implementation guides manual* (the document is available on the internet site [www.modbus.org](http://www.modbus.org)).

The maximum length of the connecting cables of the CAN port depends on the baud rate of the CANbus communication, as follows:

- 1,000 m (3,280 ft) with baud rate 20,000 baud
- 500 m (1,640 ft) with baud rate 50,000 baud
- 250 m (820 ft) with baud rate 125,000 baud
- 50 m (164 ft) with baud rate 500,000 baud.

Protect the power supply with a fuse rated 2 A-T 250 V.

If the controller is powered in direct current, it will be necessary to respect the polarity of the power supply voltage.

In case of connection in a network:

- for the devices powered at 12 VAC, the power supply of the devices in the network must be galvanically isolated one another
- for the devices powered at 24 VAC, it is necessary the phase powering the device is the same powering the remaining devices in the network
- for the devices powered at 20... 30 VDC, it is necessary to respect the polarity of the power supply voltage of all the devices in the network.

Connect the RS-485 port using a twisted pair.

The following table shows the *function codes* supported by the controller.

Function code	Meaning
FC 01	read coils
FC 02	read discrete inputs
FC 03	read multiple registers
FC 04	read input registers
FC 05	write single coil
FC 06	write single register
FC 08	diagnostic
FC 15	write multiple coils
FC 16	write multiple registers
FC 23	read write multiple registers

For the settings about the RS-485 port look at chapter 6 “CONFIGURATION”.

The maximum number of devices that can make a CAN network (32) depends on the bus load; the bus load depends on the baud rate of the CANbus communication and on the kind of device in the network.



For example: a CAN network can be made of a programmable controller, of four I / O expansions and of four user interfaces with baud rate 500,000 baud.

Connect the CAN port using a twisted pair.

For the settings about the CAN port look at chapter 6 “CONFIGURATION”.

**Termination RS-485 port and termination CAN port**

Micro-switch to:

- plug in the termination of the CAN port (120 Ω, 0,5 W); position micro-switch 2 on position ON to plug in the termination of the CAN port (plug in the termination of the first and of the last element of the network).



- to plug in the termination of the RS-485 port with Modbus slave communication protocol (120 Ω, 0.25 W); position micro-switch 1 on position ON to plug in the termination of the RS-485 port (plug in the termination of the first and of the last element of the network).



**USB port**

OTG USB port.

**Analog inputs 1... 6, digital inputs 1... 5 and analog outputs 1... 3**

Terminal	Meaning
AI1	analog input 1 (configurable via configuration parameter for PTC / NTC / Pt 1000 probes / 0-20 mA / 4-20 mA / 0-5 V ratiometric / 0-10 V transducers)
AI2	analog input 2 (configurable via configuration parameter for PTC / NTC / Pt 1000 probes / 0-20 mA / 4-20 mA / 0-5 V ratiometric / 0-10 V transducers)
AI3	analog input 3 (configurable via configuration parameter for PTC / NTC / Pt 1000 probes / 0-20 mA / 4-20 mA / 0-5 V ratiometric / 0-10 V transducers)
AI4	analog input 4 (configurable via configuration parameter for PTC / NTC / Pt 1000 probes)
AI5	analog input 5 (configurable via configuration parameter for PTC / NTC / Pt 1000 probes)
AI6	analog input 6 (configurable via configuration parameter for PTC / NTC / Pt 1000 probes)
DI4	digital input 4 (optoisolated, 24 VAC / DC and up to 2 KHz)
DI5	digital input 5 (optoisolated, 24 VAC / DC and 50 / 60 Hz)
COM	common digital inputs
+12V	power supply 0-20 mA / 4-20 mA / 0-10 V transducers (12 VDC, 120 mA max.)
5VS	power supply 0-5 V ratiometric transducers (5 VDC, 60 mA max.)
GND	common analog inputs and analog outputs
AO1	analog output 1 (configurable via configuration parameter for PWM / 0-10 V signal)
AO2	analog output 2 (configurable via configuration parameter for PWM / 0-10 V signal)
AO3	analog output 3 (configurable via configuration parameter for 0-20 mA / 4-20 mA / 0-10 V signal)
DI1	digital input 1 (optoisolated, 24 VAC / DC and 50 / 60 Hz)
DI2	digital input 2 (optoisolated, 24 VAC / DC and 50 / 60 Hz)
DI3	digital input 3 (optoisolated, 24 VAC / DC and up to 2 KHz)



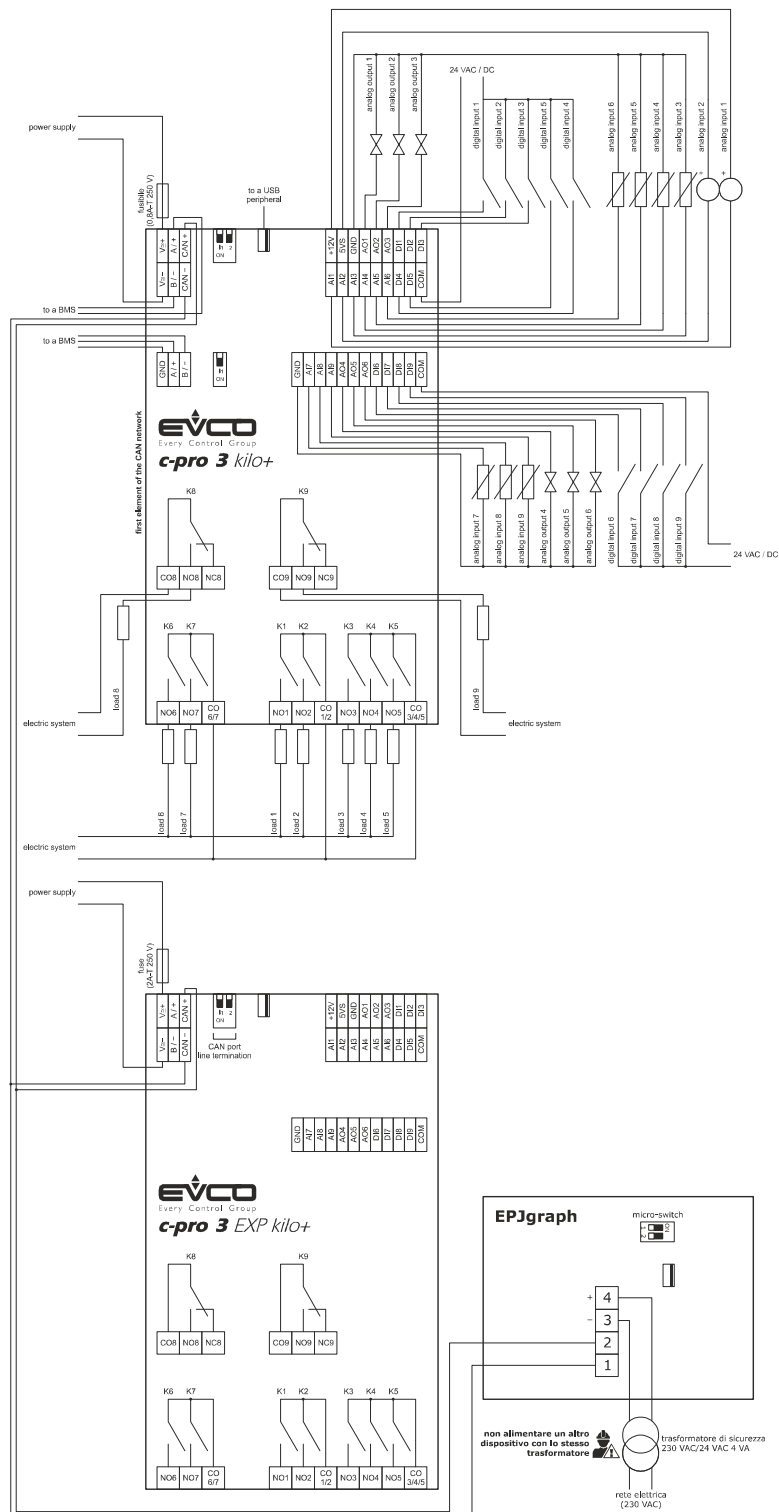
The maximum length of the connecting cables is:

- 100 m (328 ft) for the analog inputs
- 100 m (328 ft) for the power supply of the transducers
- 100 m (328 ft) for the digital inputs
- 1 m (3.280 ft) for the PWM analog outputs
- 100 m (328 ft) for the 0-20 mA / 4-20 ma / 0-10 V analog outputs.

For the settings about the analog inputs look at chapter 6 "CONFIGURATION".

### 4.3.1. Example of electrical connection

The following drawing shows an example of electrical connection of **c-pro 3 kilo+** with **c-pro 3 EXP kilo+** and with an user interface **EPJgraph**.



For the devices powered at 12 VAC, the power supply of the devices in the network must be galvanically isolated one another.  
 For the devices powered at 24 VAC, it is necessary the phase powering the device is the same powering the remaining devices in the network.  
 For the devices powered at 20... 30 VDC, it is necessary to respect the polarity of the power supply voltage of all the devices in the network.



To reduce the reflections on the signal transmitted through the cables connecting the devices each other, plug in the termination of the CAN port of the first and of the last element of the network.

#### 4.4. Additional information for electrical connection







- do not operate on the terminal blocks with electrical or pneumatic screwdrivers
- if the device has been moved from a cold location to a warm one, the humidity could condense on the inside; wait about an hour before powering it
- test the working power supply voltage, working electrical frequency and working electrical power of the controller; they must correspond with the local power supply
- connect the device to the other devices using a twisted pair
- disconnect the local power supply before servicing the device
- do not use the device as safety device
- for repairs and information on the device please contact the EVCO's sales network.



## 5. USER INTERFACE

### 5.1. Keyboard

The following table shows the meaning of the keyboard.


Button	Preset function
	cancel, hereinafter also called "button ESC"
	move to left, hereinafter also called "button LEFT"
	increase, hereinafter also called "button UP"
	decrease, hereinafter also called "button DOWN"
	move to right, hereinafter also called "button RIGHT"
	confirmation, hereinafter also called "button ENTER"

The keyboard is not available in the blind versions.

### 5.2. Signalling LEDs

#### 5.2.1. LEDs at the front of the device

The following table shows the meaning of the LEDs at the front of the device.

LED	Meaning
ON	LED power supply if it is lit, the device will be powered if it is out, the device will not be powered
RUN	LED run if it is lit, the application software will be compiled and running in <i>release</i> modality if it flashes slowly, the application software will be compiled and running in <i>debug</i> modality (condition not allowed in <b>c-pro 3 EXP micro / micro+</b> and in in <b>c-pro 3 EXP kilo / kilo+</b> ) if it flashes quickly, the application software will be compiled, running in <i>debug</i> modality and stopped in a <i>breakpoint</i> (condition not allowed in <b>c-pro 3 EXP micro / micro+</b> and in in <b>c-pro 3 EXP kilo / kilo+</b> ) if it is out (condition not allowed in <b>c-pro 3 EXP micro / micro+</b> and in in <b>c-pro 3 EXP kilo / kilo+</b> ): - the controller will not be compatible with the application software - the controller will not be enabled to work with the <i>Special ABL (Application Block Libraries)</i>
	LED system alarm if it flashes slowly, a system alarm with automatic reset will be running if it is lit, an alarm system not restorable via software will be running if it flashes very slowly, an access to the external flash memory will be running if it flashes quickly, a system alarm with manual reset will be running if it is out, no alarm system will be running

<b>CAN</b>	LED CANbus communication if it is lit, the device will be configured to communicate via CANbus with another device but the CAN communication will not have been set up if it flashes slowly, the CANbus communication will have been set up but it will not be completely correct if it flashes quickly, the CANbus communication will have been set up and will be correct if it is out, no CANbus communication will be running
<b>L1</b>	LED auxiliary (not used in <b>c-pro 3 EXP micro / micro+</b> and in in <b>c-pro 3 EXP kilo / kilo+</b> ) The operation of this LED can be programmed through the development environment UNI-PRO 3

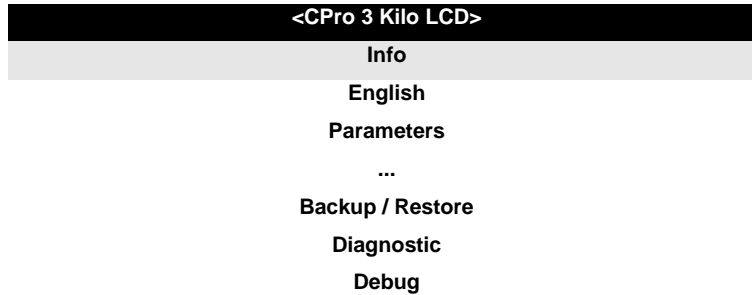
## 6. CONFIGURATION

### 6.1. Configuring a programmable controller

#### 6.1.1. Configuring a built-in programmable controller

To gain access to the procedure operate as follows:

1. Make sure the power supply is switched on.
2. Keep pressed 2 s buttons UP and DOWN: the display will show the following menu (hereinafter called *Main menu*).



It is also possible to configure the controller using an user interface; look at paragraph 6.3 “Configuring a device through an user interface”.

To gain access to a submenu operate as follows:

3. Press and release button UP or button DOWN to select the submenu.
4. Press and release button ENTER.



The access to the *Parameters* submenu, to the *Networks* submenu, to the *Password* submenu and to the *Backup / Restore* submenu is protected by password.

To gain access to the *Parameters* submenu, to the *Networks* submenu, to the *Password* submenu and to the *Backup / Restore* submenu operate as follows:

5. From step 2, press and release button UP or button DOWN to select the submenu.
6. Press and release button ENTER.
7. Press and release button ENTER again to set the password value.
8. Press and release button DOWN over and over again to set “-19”.
9. Press and release button ENTER again.

To modify a parameter operate as follows:

10. From step 9, press and release button UP or button DOWN to select the parameter (some parameters belong to a possible submenu; press and release button ENTER to gain access to them).
11. Press and release button ENTER.
12. Press and release button UP or button DOWN to modify the value.
13. Press and release button ENTER to confirm the value.
14. Press and release button ESC over and over again to go back to the *Main menu*.

To modify the language of the application software pages operate as follows:

15. From step 2, press and release button UP or button DOWN to select the voice *Language* (according to the factory setting it has value “**English**”).
16. Press and release button ENTER.
17. Press and release button UP or button DOWN to modify the language.
18. Press and release button ENTER to confirm the value.

To modify the real date and time operate as follows:

19. From step 2, press and release button UP or button DOWN to select the voice *Data e ora reale*.
20. Press and release button ENTER.
21. Press and release button UP or button DOWN to modify the value.
22. Press and release button ENTER or button RIGHT to confirm the value and modify the following field (press and release button LEFT or button RIGHT to move among the fields).
23. Repeat steps 21 and 22.

To copy the parameters from the controller to an USB peripheral operate as follows:

24. Make sure the power supply is switched on.
25. Connect the peripheral to the controller.
26. Gain access to the submenu *Backup / Restore*, then choose *Parameter key* (choose *Backup memory* for the backup memory).
27. Press and release button UP or button DOWN to select "**Application par**" to copy the application software parameters or "**Hardware config**" to copy the configuration parameters.
28. Press and release button UP or button DOWN to select "**Save on the key**".
29. Press and release button ENTER: the parameters will be copied from the controller to the peripheral (this operation usually takes a few seconds; if an error had to arise the *LED system alarm* (look at paragraph 5.2.1 "LEDs at the front of the device") will light up and parameter *Key Par* (it belongs to the *Diagnostic* submenu) will assume value *Err*.
30. Disconnect the programming key.

To copy the parameters from an USB peripheral to the controller operate as follows:

31. Make sure the power supply is switched on.
32. Connect the peripheral to the controller.
33. Gain access to the submenu *Backup / Restore*, then choose *Parameter key* (choose *Backup memory* for the backup memory).
34. Press and release button UP or button DOWN to select "**Restore from the key**".
35. Press and release button ENTER: the parameters will be copied from the peripheral to the controller (this operation usually takes a few seconds; if an error had to arise the *LED system alarm* (look at paragraph 5.2.1 "LEDs at the front of the device") will light up and parameter *Key Par* (it belongs to the *Diagnostic* submenu) will assume value *Err*.
36. Disconnect the peripheral.



**The copy of the parameters from the programming key EVKEY10 to the controller is allowed on condition that the firmware of the controllers coincides.**

To quit the procedure operate as follows:

37. Press and release button ESC over and over again: possible modifications will not be saved.



**Switch off the power supply after the modification of the configuration.**

## 6.1.2. Configuring a blind programmable controller

The following procedures show an example of configuration of a blind programmable controller through a built-in programmable controller (in the example it is **c-pro 3 kilo**) and through its user interface.



It is also possible to configure the controller using an user interface; look at paragraph 6.3 “Configuring a device through an user interface”.

### Operate as follows:

1. Switch off the power supply of the controllers.
2. Connect the blind controller to the built-in controller through the CAN port; look at chapter 4 “ELECTRICAL CONNECTION”.
3. Switch on the power supply of the controllers.
4. Keep pressed 2 s buttons UP and DOWN: the display will show the following menu.

```

<CPro 3 Kilo LCD>
Info
English
Parameters
...
Backup / Restore
Diagnostic
Debug
  
```

5. Press and release button UP or button DOWN to select “**Networks**”.
6. Press and release button ENTER.
7. Press and release button ENTER again to set the password value.
8. Press and release button DOWN over and over again to set “**-19**”.
9. Press and release button ENTER again.
10. Press and release button UP or button DOWN to select “**CAN Bus**”.
11. Press and release button ENTER again.
12. Set parameter *NetworkNode* using button UP or button DOWN to select the parameter and using button ENTER to modify and to confirm the value.



According to the factory setting the address of the CAN node of a programmable controller has value 1 (therefore operate on the controller to set parameter *NetworkNode* to [ 1 ] 1).

13. Press and release button UP or button DOWN to select “>”.
14. Press and release button ENTER again: the display will show the *Main menu* of the blind controller.
15. Operate as shown in paragraph 6.1.1 “Configuring a built-in programmable controller”.

## 6.2. Configuring an I / O expansion

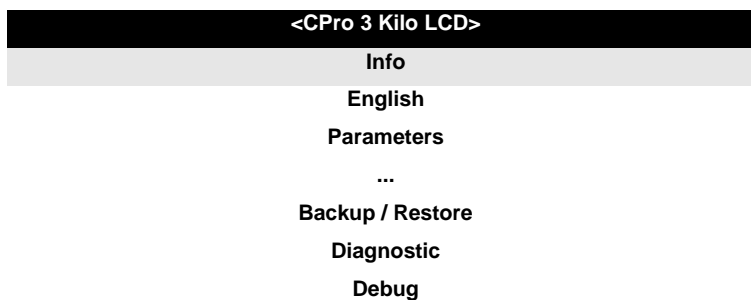
The following procedures show an example of configuration of an I / O expansion through a built-in programmable controller (in the example it is **c-pro 3 kilo**) and through its user interface.



It is also possible to configure the expansion using an user interface; look at paragraph 6.3 "Configuring a device through an user interface".

Operate as follows:

1. Switch off the power supply of the controller and of the expansion.
2. Connect the controller to the expansion through the CAN port; look at chapter 4 "ELECTRICAL CONNECTION".
3. Switch on the power supply of the controller and of the expansion.
4. Keep pressed 2 s buttons UP and DOWN: the display will show the following menu.



5. Press and release button UP or button DOWN to select "**Networks**".
6. Press and release button ENTER.
7. Press and release button ENTER again to set the password value.
8. Press and release button DOWN over and over again to set "**-19**".
9. Press and release button ENTER again.
10. Press and release button UP or button DOWN to select "**CAN Bus**".
11. Press and release button ENTER again.
12. Set parameter *NetworkNode* using button UP or button DOWN to select the parameter and using button ENTER to modify and to confirm the value.



According to the factory setting the address of the CAN node of an I / O expansion has value 2 (therefore operate on the controller to set parameter *NetworkNode* to [ 2 ] 2).

13. Press and release button UP or button DOWN to select ">".
14. Press and release button ENTER again: the display will show the *Main menu* of the expansion.
15. Operate as shown in paragraph 6.1.1 "Configuring a built-in programmable controller".

### 6.3. Configuring a device through an user interface

The following procedures show an example of configuration of a device through an user interface (in the example EPJgraph) and through its user interface.

For further information please consult the hardware manual of the user interface.

Operate as follows:

1. Switch off the power supply of the device and of the interface.
2. Connect the device to the interface through the CAN port; look at chapter 4 "ELECTRICAL CONNECTION".
3. Keep pressed 2 s buttons ESC and RIGHT.
4. Switch on the power supply of the device and of the interface.
5. When the display of the interface will show the following menu release buttons ESC and RIGHT.

<b>EPJgraph</b>
<b>Parameters</b>
<b>Contrast</b>
<b>CAN Network</b>
<b>Modbus</b>
<b>Info</b>
<b><i>Real date and time</i></b>

6. Press and release button UP or button DOWN to select "CAN Network".
7. Press and release button ENTER.
8. Press and release button ENTER again to set the password value.
9. Press and release button DOWN over and over again to set "-19".
10. Press and release button ENTER again.
11. Set parameter *NW Node* using button UP or button DOWN to select the parameter and using button ENTER to modify and to confirm the value.



According to the factory setting the address of the CAN node of a programmable controller has value 1 (therefore operate on the interface to set parameter *NW Node* to [ 1 ] 1) and the address of the CAN node of an I / O expansion has value 2 (therefore operate on the interface to set parameter *NW Node* to [ 2 ] 2).

12. Switch off the power supply of the interface.
13. Switch on the power supply of the interface.
14. Keep pressed 2 s buttons LEFT and ENTER: the display will show the following menu.

<b>Network Status</b>			
<b>Loc</b>	<b>99</b>	<b>OK</b>	<b>&gt;&gt;</b>
1	1	OK	>>
2	2	OK	>>
3	0	-	>>
4	0	-	>>
5	0	-	>>

15. Press and release button UP or button DOWN to select the device.
16. Press and release button ENTER: the display will show the *Main menu* of the device.
17. Operate as shown in paragraph 6.1.1 "Configuring a built-in programmable controller".

### 6.4. List of configuration parameters

Submenu	Parameter	Min.	Max.	Unit	Preset	Description
Info	PROJ	parameter available in read only modality				information about the application project (project, version and revision)
Info	FW	parameter available in read only modality				information about the firmware (project, version, revision and subrevision)
Info	HW	parameter available in read only modality				information about the hardware (version, revision, generic (G) or special (S))
Info	SW	parameter available in read only modality				information about UNI-PRO 3 (version and revision)
Info	SN	parameter available in read only modality				information about the serial number and the result of the productive test
Info	MASK	parameter available in read only modality				information about the mask (it depends on the builder's coding system)
Info	date and time	parameter available in read only modality				date and time of the last compilation of the application project
Parameters (1)	AI1	---	---	---	NTC	kind of probe analog input 1 PTC = PTC probe NTC = NTC probe 0-20mA = 0-20 mA transducer 4-20mA = 4-20 mA transducer 0-5V = 0-5 V ratiometric transducer 0-10V = 0-10 V ratiometric transducer PT1000 = Pt 1000 probe NTCK2 = NTC probe type 2 NTCK3 = NTC probe type 3 RESIST = reading of the electric resistance



Parameters (1)	AI2	---	---	---	NTC	<p>kind of probe analog input 2</p> <p>PTC = PTC probe</p> <p>NTC = NTC probe</p> <p>0-20mA = 0-20 mA transducer</p> <p>4-20mA = 4-20 mA transducer</p> <p>0-5V = 0-5 V ratiometric transducer</p> <p>0-10V = 0-10 V ratiometric transducer</p> <p>PT1000 = Pt 1000 probe</p> <p>NTCK2 = NTC probe type 2</p> <p>NTCK3 = NTC probe type 3</p> <p>RESIST = reading of the electric resistance</p>
Parameters (1)	AI3	---	---	---	NTC	<p>kind of probe analog input 3</p> <p>PTC = PTC probe</p> <p>NTC = NTC probe</p> <p>0-20mA = 0-20 mA transducer</p> <p>4-20mA = 4-20 mA transducer</p> <p>0-5V = 0-5 V ratiometric transducer</p> <p>0-10V = 0-10 V ratiometric transducer</p> <p>PT1000 = Pt 1000 probe</p> <p>NTCK2 = NTC probe type 2</p> <p>NTCK3 = NTC probe type 3</p> <p>RESIST = reading of the electric resistance</p>
Parameters (1)	AI4	---	---	---	NTC	<p>kind of probe analog input 4</p> <p>PTC = PTC probe</p> <p>NTC = NTC probe</p> <p>PT1000 = Pt 1000 probe</p> <p>NTCK2 = NTC probe type 2</p> <p>NTCK3 = NTC probe type 3</p> <p>RESIST = reading of the electric resistance</p>
Parameters (1)	AI5	---	---	---	NTC	<p>kind of probe analog input 5</p> <p>PTC = PTC probe</p> <p>NTC = NTC probe</p> <p>PT1000 = Pt 1000 probe</p> <p>NTCK2 = NTC probe type 2</p> <p>NTCK3 = NTC probe type 3</p> <p>RESIST = reading of the electric resistance</p>

Parameters (1)	AI6	---	---	---	NTC	<p>kind of probe analog input 6</p> <p>PTC = PTC probe</p> <p>NTC = NTC probe</p> <p>PT1000 = Pt 1000 probe</p> <p>NTCK2 = NTC probe type 2</p> <p>NTCK3 = NTC probe type 3</p> <p>RESIST = reading of the electric resistance</p>
Parameters (1)	AI7	---	---	---	NTC	<p>kind of probe analog input 7</p> <p>PTC = PTC probe</p> <p>NTC = NTC probe</p> <p>0-20mA = 0-20 mA transducer</p> <p>4-20mA = 4-20 mA transducer</p> <p>0-5V = 0-5 V ratiometric transducer</p> <p>0-10V = 0-10 V ratiometric transducer</p> <p>PT1000 = Pt 1000 probe</p> <p>NTCK2 = NTC probe type 2</p> <p>NTCK3 = NTC probe type 3</p> <p>RESIST = reading of the electric resistance</p>
Parameters (1)	AI8	---	---	---	NTC	<p>kind of probe analog input 8</p> <p>PTC = PTC probe</p> <p>NTC = NTC probe</p> <p>0-20mA = 0-20 mA transducer</p> <p>4-20mA = 4-20 mA transducer</p> <p>0-5V = 0-5 V ratiometric transducer</p> <p>0-10V = 0-10 V ratiometric transducer</p> <p>PT1000 = Pt 1000 probe</p> <p>NTCK2 = NTC probe type 2</p> <p>NTCK3 = NTC probe type 3</p> <p>RESIST = reading of the electric resistance</p>
Parameters (1)	AI9	---	---	---	NTC	<p>kind of probe analog input 9</p> <p>PTC = PTC probe</p> <p>NTC = NTC probe</p> <p>0-20mA = 0-20 mA transducer</p> <p>4-20mA = 4-20 mA transducer</p> <p>0-5V = 0-5 V ratiometric transducer</p> <p>0-10V = 0-10 V ratiometric transducer</p> <p>PT1000 = Pt 1000 probe</p> <p>NTCK2 = NTC probe type 2</p> <p>NTCK3 = NTC probe type 3</p> <p>RESIST = reading of the electric resistance</p>

Parameters (1)	AI Err Time	0	240	s	2	analog inputs time-out (after this time without communication with an analog input, the controller signals the analog input error)
Parameters (1)	AO impulse	1	50	ms/10	20	cut phase pulse duration
Parameters (1)	AO1	---	---	---	0-10V	kind of signal analog input 1 FAN = FAN (for cut phase module) 0-10V = 0-10 V PWM = PWM (Pulse With Modulation)
Parameters (1)	freq	10	2000	Hz	1000	frequency of the PWM signal of the analog output 1
Parameters (1)	Delay ph.	0	50	ms/10	0	displacement of the cut phase pulse of the analog output 1
Parameters (1)	AO2	---	---	---	0-10V	kind of signal analog input 2 FAN = FAN (for cut phase module) 0-10V = 0-10 V PWM = PWM (Pulse With Modulation)
Parameters (1)	freq	10	2000	Hz	1000	frequency of the PWM signal of the analog output 2
Parameters (1)	Delay ph.	0	50	ms/10	0	displacement of the cut phase pulse of the analog output 2
Parameters (1)	AO3	---	---	---	0-10V	kind of signal analog input 3 0-20mA = 0-20 mA 4-20mA = 4-20 mA 0-10V = 0-10 V
Parameters (1)	AO4	---	---	---	0-10V	kind of signal analog input 4 0-20mA = 0-20 mA 4-20mA = 4-20 mA 0-10V = 0-10 V
Parameters (1)	AO5	---	---	---	0-10V	kind of signal analog input 5 0-10V = 0-10 V
Parameters (1)	AO6	---	---	---	0-10V	kind of signal analog input 6 0-10V = 0-10 V
Parameters (1)	EEV_StepRate	25	1000	step/s	100	movement speed of the valve

Parameters (1)	EEV_DrvMode	0	2	---	1	driving mode of the stepper motor 0 = full step 2 phases on 1 = full step 1 phase on 2 = half step
Parameters (1)	EEV_DutyForce	50	100	%	1	duty cycle to avoid the overheating 100% = always forced movement
Parameters (1)	EEV_OvrSteps	0	4900	step	2000	number of steps required to totally close the valve
Parameters (2) [ press button RIGHT to show it ]	I/O Timeout	1	240	s	60	time-out of the CANbus communication for the test of the remote values of the I / O (after this time without CANbus communication, the I / O of the controller is disabled)
Parameters (2) [ press button RIGHT to show it ]	En. Prg Level	---	---	---	NO	enabling the access to the first level page pressing a combination of buttons YES = yes, operating as follows: - keep pressed 3 s button ENTER to gain access to the first page of level 1 - keep pressed 3 s buttons ENTER and ESC to gain access to the first page of level 2 - keep pressed 3 s buttons LEFT and RIGHT to gain access to the first page of level 3
Parameters (2) [ press button RIGHT to show it ]	Password Indi	---	---	---	NO	connection among the passwords to gain access to the levels NO = one has not to set any password to gain access to levels lower than the one one has already gained access YES = one has to set a password to gain access to each level
Parameters (2) [ press button RIGHT to show it ]	Ena BkMem RTC	---	---	---	YES	enabling the real time clock and the backup memory

<p>Parameters (2) [ press button RIGHT to show it; not available in the built-in LED versions and in the blind versions ]</p>	<p>Backlight</p>	<p>---</p>	<p>---</p>	<p>---</p>	<p>TIME</p>	<p>kind of backlight OFF = the backlight is never lit ON = the backlight is always lit TIME = the backlight is lit the time one has set with parameter <i>B. Time</i> since the last operation with the buttons</p>
<p>Parameters (2) [press button RIGHT to show it; not available in the built-in LED versions and in the blind versions ]</p>	<p>B. Time</p>	<p>0</p>	<p>60</p>	<p>s</p>	<p>240</p>	<p>backlight duration (only if parameter <i>Backlight</i> has value <i>TIME</i>)</p>
<p>Parameters (2) [press button RIGHT to show it; not available in the built-in LED versions and in the blind versions ]</p>	<p>Contrast</p>	<p>0</p>	<p>100</p>	<p>---</p>	<p>50</p>	<p>display contrast</p>
<p>Parameters (2) [press button RIGHT to show it; not available in the built-in LED versions and in the blind versions ]</p>	<p>Date Char Sep</p>	<p>---</p>	<p>---</p>	<p>---</p>	<p>/</p>	<p>date separator (ASCII character)</p>
<p>Parameters (2) [press button RIGHT to show it; not available in the built-in LED versions and in the blind versions ]</p>	<p>Year format</p>	<p>---</p>	<p>---</p>	<p>---</p>	<p>YY</p>	<p>year format YY = two numbers (for example 10) YYYY = four numbers (for example 2010)</p>

Parameters (2) [press button RIGHT to show it; not available in the built-in LED versions and in the blind versions ]	Date format	---	---	---	D-M-Y	date format D-M-Y = day, month and year M-D-Y = month, day and year Y-M-D = year, month and day
Parameters (2) [press button RIGHT to show it; not available in the built-in LED versions and in the blind versions ]	Time Char Sep	---	---	---	:	time separator (ASCII character)
Parameters (2) [press button RIGHT to show it; not available in the built-in LED versions and in the blind versions ]	Time With Sec	---	---	---	YES	showing the seconds in the real time YES = yes
Parameters (2) [press button RIGHT to show it; not available in the built-in LED versions and in the blind versions ]	Time AM/PM	---	---	---	NO	time format NO = 24 h (for example 15:20) YES = 12 h (for example 3:20 PM)
Networks / CAN Bus	MyNode	1	127	---	1	local (or of the controller) CAN node address
Networks / CAN Bus	Master	---	---	---	YES	enabling the operation as master in a CAN network YES = yes

Networks / CAN Bus	Baud	---	---	---	20K	CANbus communication baud rate 20K = 20,000 baud 50K = 50,000 baud 125K = 125,000 baud 500K = 500,000 baud	
Networks / CAN Bus	Timeout	1	60	s	5	remote (or with a device in the network) CANbus communication time-out (after this time without CANbus communication with a device, it is excluded by the network)	
Networks / CAN Bus	NetworkNode	[ 1 ] 0	[ 32 ] 127	---	[ 1 ] 99	address of a remote (or of a device in the network) CAN node; example for [ 1 ] 2: [ 1 ] = node 2 = node's address	
Networks / CAN Bus [ press button RIGHT to show it ]	TSEG1	0	15	---	10	reserved	
Networks / CAN Bus [ press button RIGHT to show it ]	TSEG2	1	7	---	2	reserved	
Networks / CAN Bus [ press button RIGHT to show it ]	SJW	0	3	---	0	reserved	
Networks / CAN Bus [ press button RIGHT to show it ]	BTR(1)	1	255	---	100	reserved	
Networks / CAN Bus [ press button RIGHT to show it ]	Status	parameter available in read only modality					CAN machine status INIT = initialization STOPPED = CAN stop OPERAT = operative PRE-OP = in pre-operative

<p>Networks / CAN Bus [ press button RIGHT to show it ]</p>	<p>Bus Status</p>	<p>parameter available in read only modality</p>				<p>CAN bus status OK = status OK WARNING = warning PASSIVE = bus working in rx only BUS OFF = bus stopped</p>
<p>Networks / CAN Bus [ press button RIGHT to show it ]</p>	<p>Cnt Rx</p>	<p>parameter available in read only modality</p>				<p>number of packages received</p>
<p>Networks / CAN Bus [ press button RIGHT to show it ]</p>	<p>Cnt Tx</p>	<p>parameter available in read only modality</p>				<p>number of packages transmitted</p>
<p>Networks / CAN Bus [ press button RIGHT to show it ]</p>	<p>Cnt Ovf</p>	<p>parameter available in read only modality</p>				<p>number of packages in overflow</p>
<p>Networks / CAN Bus [ press button RIGHT to show it ]</p>	<p>Cnt Passive</p>	<p>parameter available in read only modality</p>				<p>number of transactions in passive status</p>
<p>Networks / CAN Bus [ press button RIGHT to show it ]</p>	<p>Cnt Bus Off</p>	<p>parameter available in read only modality</p>				<p>number of transactions in Bus off status</p>
<p>Networks / UART1 (1)</p>	<p>Address</p>	<p>1</p>	<p>247</p>	<p>---</p>	<p>1</p>	<p>local (or of the controller) Modbus node address in a RS-485 network wired on the RS-485 port with Modbus slave communication protocol</p>



Networks / UART1 (1)	Baud Rate	---	---	---	9600	<p>Modbus communication baud rate in a RS-485 network wired on the RS-485 port with Modbus slave communication protocol</p> <p>1200 = 1,200 baud                  2400 = 2,400 baud                  4800 = 4,800 baud                  9600 = 9,600 baud                  19200 = 19,200 baud                  28800 = 28,000 baud                  38400 = 38,400 baud                  57600 = 57,600 baud</p>
Networks / UART1 (1)	Parity	---	---	---	EVEN	<p>Modbus communication parity in a RS-485 network wired on the RS-485 port with Modbus slave communication protocol</p> <p>NONE = no parity                  ODD = odd                  EVEN = even</p>
Networks / UART1 (1)	Stop	---	---	---	1 BIT	<p>Modbus communication stop bit number in a RS-485 network wired on the RS-485 port with Modbus slave communication protocol</p> <p>1 BIT = 1 bit                  2 BIT = 2 bit</p>
Networks / UART1 (1)	Timeout	2	240	s	10	<p>Modbus communication time-out in a RS-485 network wired on the RS-485 port with Modbus slave communication protocol for the test of the remote values of the I / O (after this time without Modbus communication, the request is considered not sent and the controller moves to the following request) (1)</p>
Networks / UART1 (1)	Address	1	247	---	1	<p>local (or of the controller) Modbus node address in a RS-485 network wired on the RS-485 port with Modbus slave communication protocol</p>

Networks / UART2 (2)	Baud Rate	---	---	---	9600	<p>Modbus communication baud rate in a RS-485 network wired on the RS-485 port with Modbus master communication protocol</p> <p>1200 = 1,200 baud                  2400 = 2,400 baud                  4800 = 4,800 baud                  9600 = 9,600 baud                  19200 = 19,200 baud                  28800 = 28,000 baud                  38400 = 38,400 baud                  57600 = 57,600 baud</p>
Networks / UART2 (2)	Parity	---	---	---	EVEN	<p>Modbus communication parity in a RS-485 network wired on the RS-485 port with Modbus master communication protocol</p> <p>NONE = no parity                  ODD = odd                  EVEN = even</p>
Networks / UART2 (2)	Stop	---	---	---	1 BIT	<p>Modbus communication stop bit number in a RS-485 network wired on the RS-485 port with Modbus master communication protocol</p> <p>1 BIT = 1 bit                  2 BIT = 2 bit</p>
Networks / UART2 (2)	Timeout	2	240	s	10	<p>Modbus communication time-out in a RS-485 network wired on the RS-485 port with Modbus master communication protocol for the test of the remote values of the I / O (after this time without Modbus communication, the request is considered not sent and the controller moves to the following request) (3)</p>
Password	Level 1:	-32768	32767	---	0	value of the password to gain access to level 1
		---	---	---	ON	<p>enabling the password to gain access to level 1</p> <p>OFF = to gain access to level 1 one has not to set any password                  ON = to gain access to level 1 one has to set a password</p>
Password	Level 2:	-32768	32767	---	0	value of the password to gain access to level 2

		---	---	---	ON	enabling the password to gain access to level 2 OFF = to gain access to level 2 one has not to set any password ON = to gain access to level 2 one has to set a password	
Password	Level 3:	-32768	32767	---	0	value of the password to gain access to level 3	
		---	---	---	ON	enabling the password to gain access to level 3 OFF = to gain access to level 3 one has not to set any password ON = to gain access to level 3 one has to set a password	
Password	Level 4:	-32768	32767	---	0	value of the password to gain access to level 4	
		---	---	---	ON	enabling the password to gain access to level 4 OFF = to gain access to level 4 one has not to set any password ON = to gain access to level 4 one has to set a password	
Password	Level 5:	-32768	32767	---	0	value of the password to gain access to level 5	
		---	---	---	ON	enabling the password to gain access to level 5 OFF = to gain access to level 5 one has not to set any password ON = to gain access to level 5 one has to set a password	
Password	Timeout	0	240	s	240	time-out of the passwords to gain access to the levels (after this time since the last operation with the buttons, to gain access to the level one has to set a password again, if foreseen)	
Diagnostic	Memory	parameter available in read only modality					non volatile memory status ok = not in error err = in error

Diagnostic	RTC	parameter available in read only modality	clock status ok = not in error err = in error low = loss of data disab = disabled
Diagnostic	STACK	parameter available in read only modality	stack status ok = not in error err = in error (because of overflow)
Diagnostic	5V Ratio	parameter available in read only modality	status of the power supply voltage of the ratiometric transducers ok = not in error err = in error (because of out of range voltage)
Diagnostic	12V Sensor	parameter available in read only modality	status of the power supply voltage of the 0-20 mA / 4-20 mA / 0-10 V transducers ok = not in error err = in error (because of out of range voltage)
Diagnostic	Math	parameter available in read only modality	Math status ok = not in error err = in error (because of overflow, underflow, division by zero or NaN)
Diagnostic	Key Par	parameter available in read only modality	result of the copy of the parameters from the controller to the USB peripheral ok = operation successful completed err = operazione failed
Debug [ Algo ]	Main time	parameter available in read only modality	main cycle time of the application software (in milliseconds)
	Max. time	parameter available in read only modality	maximum main cycle time of the application software (in milliseconds)
	Free stack	parameter available in read only modality	time of execution of the application software temporized at 100 ms
Debug [ CAN bus ]	100 ms time	parameter available in read only modality	maximum time of execution of the application software temporized at 100 ms
	Max. time	parameter available in read only modality	free stack of the interrupt cycle at 100 ms of the application software (in byte)

	Free stack	parameter available in read only modality	number of packages in reception
Debug	5V probe	parameter available in read only modality	reading the power supply voltage of the ratiometric transducers
Debug	12V probe	parameter available in read only modality	reading the power supply voltage of the 0-20 mA / 4-20 mA / 0-10 V transducers
Debug	12V exp	parameter available in read only modality	reading the power supply voltage coming from the upper board

**Notes:**

- (1) the submenu is visible on condition that the application software expects the RS-485 port with Modbus slave communication protocol is configured to support the Modbus communication protocol
- (2) the submenu is visible on condition that the application software expects the RS-485 port with Modbus master communication protocol is configured to support the Modbus communication protocol
- (3) the parameter is meaningful on condition that the RS-485 port is configured to support the Modbus master communication protocol.

## 7. TECHNICAL DATA

### 7.1. Technical data

<b>Purpose of control:</b>	programmable controller for applications in refrigeration, ventilation and air conditioning.
<b>Construction of control:</b>	electronic control device to be incorporated.
<b>Box:</b>	self-extinguishing grey UL94 V0.
	Heat and fire resistance category: D.
<b>Size:</b>	71.0 x 135.0 x 60.0 mm (2.795 x 5.315 x 2.362 in); 4 DIN modules. Size refers to the device with all the connectors properly plugged.
<b>Installation:</b>	on DIN rail 35.0 x 7.5 mm (1.377 x 0.295 in) or 35.0 x 15.0 mm (1.377 x 0.590 in) according to EN 50022.
<b>Index of protection:</b>	IP20; IP40 the front.

<p><b>Connections:</b></p>	<p>According to the model:</p> <ul style="list-style-type: none"> <li>• male Micro-Fit connectors (power supply, inputs, analog outputs, CAN port and RS-485 ports) in <b>c-pro 3 micro</b>, <b>c-pro 3 micro+</b>, <b>c-pro 3 EXP micro</b> and <b>c-pro 3 EXP micro+</b></li> <li>• male extractable clamp terminal blocks with pitch 3.5 mm (0.137 in; power supply, inputs, analog outputs, CAN port and RS-485 ports) for conductors up to 1.5 mm<sup>2</sup> (0.0028 in<sup>2</sup>) in <b>c-pro 3 kilo</b>, <b>c-pro 3 kilo+</b>, <b>c-pro 3 EXP kilo</b> and <b>c-pro 3 EXP kilo+</b></li> <li>• male JST connectors (unipolar stepper electronic expansion valves driver)</li> <li>• male extractable screw terminal blocks with pitch 3.5 mm (0.137 in; unipolar stepper electronic expansion valves driver) for conductors up to 1.5 mm<sup>2</sup> (0.0028 in<sup>2</sup>)</li> <li>• male extractable screw terminal blocks with pitch 5 mm (0.196 in; digital outputs) for conductors up to 2.5 mm<sup>2</sup> (0.0038 in<sup>2</sup>)</li> <li>• “A” type USB connector (USB port).</li> </ul> <p>The maximum lengths of the connecting cables are the followings:</p> <ul style="list-style-type: none"> <li>• power supply controller: 100 m (328 ft)</li> <li>• analog inputs: 100 m (328 ft); <u>use a shielded cable only in case of lengths over or equal to 10 m (32.8 ft) for:</u> <ul style="list-style-type: none"> <li>- <u>analog inputs 7, 8 and 9</u></li> <li>- <u>the remaining inputs if configured for PTC or Pt 1000 probes</u></li> </ul> </li> </ul> <p><b><u>The shield must be connected to ground in only one point.</u></b></p> <ul style="list-style-type: none"> <li>• power supply transducers: 100 m (328 ft)</li> <li>• digital inputs: 100 m (328 ft)</li> <li>• PWM analog output: 1 m (3.280 ft)</li> <li>• 0-20 mA / 4-20 mA / 0-10 V analog outputs: 100 m (328 ft)</li> <li>• digital outputs (electromechanical relays): 100 m (328 ft)</li> <li>• digital outputs (solid state relays): 100 m (328 ft)</li> <li>• unipolar stepper electronic expansion valves driver: 3 m (9.842 ft)</li> <li>• RS-485 ports: 1,000 m (3,280 ft); also look at the <i>Manuale Modbus specifications and implementation guides</i></li> <li>• CAN port: <ul style="list-style-type: none"> <li>- 1,000 m (3,280 ft) with baud rate 20,000 baud</li> <li>- 500 m (1,640 ft) with baud rate 50,000 baud</li> <li>- 250 m (820 ft) with baud rate 125,000 baud</li> <li>- 50 m (164 ft) with baud rate 500,000 baud.</li> </ul> </li> </ul> <p>One suggests using the connecting kit CJAV18 (female extractable screw terminal blocks with pitch 5 mm, 0.196 in; to order separately), the connecting kit CJAV19 (wired female Micro-Fit connectors; to order separately) and the connecting kit CJAV20 (female extractable clamp terminal blocks with pitch 3.5 mm, 0.137 in; to order separately).</p> <p>To program the controller one suggests to use the connecting cable 0810500018 (2 m, 6.561 ft long) or 0810500020 (0.5 m, 1.640 ft long), to order separately.</p>
<p><b>Working temperature:</b></p>	<p>from -10 to 60 °C (14 to 140 °F) for the built-in versions, from -20 to 60 °C (-4 to 140 °F) for the blind versions.</p>
<p><b>Storage temperature:</b></p>	<p>from -25 to 70 °C (-13 to 158 °F).</p>
<p><b>Working humidity:</b></p>	<p>from 5 to 95% of relative humidity without condensate.</p>

<b>Pollution situation:</b>	2.	
<b>Working altitude:</b>	from 0 to 2,000 m (0 to 6591 ft).	
<b>Transport altitude:</b>	from 0 to 3,048 m (0 to 10,000 ft).	
<b>Ambient conformity:</b>	ROHS 2002 / 95, WEEE 2002 / 96 / EC, REACH CE 1907 / 2006.	
<b>EMC conformity:</b>	EN / IEC 60730-1.	
<b>Power supply:</b>	<p>12 VAC (+10%, -15%), 50 / 60 Hz, 8 VA max. supplied by a class 2 circuit in <b>c-pro 3 micro</b>, <b>c-pro 3 micro+</b>, <b>c-pro 3 EXP micro</b> and <b>c-pro 3 EXP micro+</b>; 24 VAC (+10%, -15%), 50 / 60 Hz, 10 VA max. or 20... 30 VDC, 5 W max. supplied by a class 2 circuit in <b>c-pro 3 kilo</b>, <b>c-pro 3 kilo+</b>, <b>c-pro 3 EXP kilo</b> and <b>c-pro 3 EXP kilo+</b>.</p> <p><u>If the device is powered in direct current, it will be necessary to respect the polarity of the power supply voltage.</u></p> <p>Protect the power supply with a fuse rated 2 A-T 250 V.</p>	
<b>Overvoltage category:</b>	III.	
<b>Real time clock:</b>	Programmable controllers	I/O expansions
	incorporated (with SuperCap battery); not available in <b>c-pro 3 micro BASIC</b> (article code EPU2B and EPU2L)	not available.
	Drift: ≤ to 30 s / month at 25 °C (77 °F).	
<b>Analog inputs:</b>	<p>According to the model:</p> <ul style="list-style-type: none"> <li>6 inputs of which 3 configurable via configuration parameter for PTC / NTC / Pt 1000 probes / 0-20 mA / 4-20 mA / 0-5 V ratiometric / 0-10 V transducers and 3 configurable via configuration parameter for PTC / NTC / Pt 1000 in <b>c-pro 3 micro</b>, <b>c-pro 3 kilo</b>, <b>c-pro 3 EXP micro</b> and <b>c-pro 3 EXP kilo</b></li> <li>9 inputs of which 6 configurable via configuration parameter for PTC / NTC / Pt 1000 probes / 0-20 mA / 4-20 mA / 0-5 V ratiometric / 0-10 V transducers and 3 configurable via configuration parameter for PTC / NTC / Pt 1000 in <b>c-pro 3 micro+</b>, <b>c-pro 3 kilo+</b>, <b>c-pro 3 EXP micro+</b> and <b>c-pro 3 EXP kilo+</b></li> </ul>	
	<p>Power supply 0-5 V ratiometric transducers: 5 VDC (+0% -12%), 60 mA max.  Power supply 0-20 mA / 4-20 mA / 0-10 V transducers: 12 VDC (+50% -25%), 120 mA max.  The sum of the maximum current powerable by the two power supply circuits is 120 mA.</p>	
	<p><u>PTC analog inputs (990 Ω @ 25 °C, 77 °F)</u></p>	
	<p>Kind of sensor: KTY 81-121.  Working range: from -50 to 150 °C (-58 to 302 °F).  Accuracy: ±0.5%.  Resolution: 0.1 °C.  Conversion time: 100 ms.  Protection: no protection.</p>	



NTC analog inputs (10K  $\Omega$  @ 25  $^{\circ}$ C, 77  $^{\circ}$ F)

Kind of sensor:	$\beta$ 3435.
Working range:	from -50 to 120 $^{\circ}$ C (-58 to 248 $^{\circ}$ F).
Accuracy:	$\pm$ 0.5% of the full scale between -40 and 100 $^{\circ}$ C, $\pm$ 1 $^{\circ}$ C between -50 to -40 $^{\circ}$ C and between 100 and 120 $^{\circ}$ C .
Resolution:	0.1 $^{\circ}$ C.
Conversion time:	100 ms.
Protection:	no protection.

NTC analog inputs (10K  $\Omega$  @ 25  $^{\circ}$ C, 77  $^{\circ}$ F)

Kind of sensor:	NTC 2.
Working range:	from -40 to 86 $^{\circ}$ C (-40 to 186 $^{\circ}$ F).
Accuracy:	$\pm$ 1 $^{\circ}$ C.
Resolution:	0.1 $^{\circ}$ C.
Conversion time:	100 ms.
Protection:	no protection.

NTC analog inputs (10K  $\Omega$  @ 25  $^{\circ}$ C, 77  $^{\circ}$ F)

Kind of sensor:	NTC 3.
Working range:	from -40 to 86 $^{\circ}$ C (-40 to 186 $^{\circ}$ F).
Accuracy:	$\pm$ 1 $^{\circ}$ C.
Resolution:	0.1 $^{\circ}$ C.
Conversion time:	100 ms.
Protection:	no protection.

Pt 1000 analog inputs (1K  $\Omega$  @ 0  $^{\circ}$ C, 32  $^{\circ}$ F)

Working range:	from -100 to 400 $^{\circ}$ C (-148 to 752 $^{\circ}$ F ).
Accuracy:	$\pm$ 0.5% of the full scale between -100 and 200 $^{\circ}$ C, $\pm$ 2 $^{\circ}$ C between 200 to 400 $^{\circ}$ C.
Resolution:	0.1 $^{\circ}$ C.
Conversion time:	100 ms.
Protection:	no protection.

0-20 mA / 4-20 mA analog inputs

Input resistance:	$\leq$ to 200 $\Omega$ .
Accuracy:	$\pm$ 0.5% of the full scale.
Resolution:	0.01 mA.
Conversion time:	100 ms.
Protection:	no protection; the maximum current allowed on each input is 25 mA.

0-5 V ratiometric / 0-10 V analog inputs

Input resistance:	$\geq$ to 10K $\Omega$ .
Accuracy:	$\pm$ 0.5% of the full scale.
Resolution:	0.01 V.
Conversion time:	100 ms.
Protection:	against the reversal of the polarity.

<p><b>Digital inputs:</b></p>	<p>According to the model:</p> <ul style="list-style-type: none"> <li>5 optoisolated inputs at 24 VAC / DC of which 2 up to 2 KHz and 3 at 50 / 60 Hz in <b>c-pro 3 micro</b>, <b>c-pro 3 kilo</b>, <b>c-pro 3 EXP micro</b> and <b>c-pro 3 EXP kilo</b></li> <li>9 optoisolated inputs at 24 VAC / DC of which 2 up to 2 KHz and 7 at 50 / 60 Hz in <b>c-pro 3 micro+</b>, <b>c-pro 3 kilo+</b>, <b>c-pro 3 EXP micro+</b> and <b>c-pro 3 EXP kilo+</b></li> </ul> <hr/> <p><u>Optoisolated digital inputs at 24 VAC / DC</u></p> <p>Power supply: 24 VAC (±15%), 50 / 60 Hz (±3 Hz) or 24 VDC (+66% -16%).</p> <p>Input resistance: ≥ to 10K Ω.</p> <p>Protection: no protection.</p>		
<p><b>Displays:</b></p>	<p><b>c-pro 3 micro</b> and <b>c-pro 3 micro+</b></p>	<p><b>c-pro 3 kilo</b> and <b>c-pro 3 kilo+</b></p>	<p>I/O expansions</p>
	<p>According to the model:</p> <ul style="list-style-type: none"> <li>4 + 4 digits custom display (with function icons)</li> <li>nothing (blind version).</li> </ul>	<p>According to the model:</p> <ul style="list-style-type: none"> <li>128 x 64 pixel single colour LCD graphic display (black with rearlighting through white LEDs)</li> <li>4 + 4 digits custom display (with function icons)</li> <li>nothing (blind version).</li> </ul>	<p>Nothing (blind version).</p>
<p><b>Analog outputs:</b></p>	<p>3 non optoisolated outputs in <b>c-pro 3 micro</b>, <b>c-pro 3 kilo</b>, <b>c-pro 3 EXP micro</b> and <b>c-pro 3 EXP kilo</b>:</p> <ul style="list-style-type: none"> <li>2 outputs configurable via configuration parameter for PWM / 0-10 V signal</li> <li>1 output configurable via configuration parameter for 0-20 mA / 4-20 mA / 0-10 V signal.</li> </ul> <p>6 non optoisolated outputs in <b>c-pro 3 micro+</b>, <b>c-pro 3 kilo+</b>, <b>c-pro 3 EXP micro+</b> and <b>c-pro 3 EXP kilo+</b>:</p> <ul style="list-style-type: none"> <li>2 outputs configurable via configuration parameter for PWM / 0-10 V signal</li> <li>2 outputs configurable via configuration parameter for 0-20 mA / 4-20 mA / 0-10 V signal</li> <li>2 outputs for 0-10 V signal.</li> </ul>		
	<p><u>PWM analog outputs</u></p> <p>Driving power supply: 10 VDC (+16% -25%), 10 mA max.</p> <p>Frequency: 0... 2 KHz.</p> <p>Duty: 0... 100%.</p> <p>Protection: no protection.</p>		

	<p><u>0-20 mA / 4-20 mA analog outputs</u></p> <p>Input resistance: 40... 300 Ω.</p> <p>Accuracy: ±3% of the full scale.</p> <p>Resolution: 0.05 mA.</p> <p>Conversion time: 1 s.</p> <p>Protection: no protection.</p> <hr/> <p><u>0-10 V analog outputs</u></p> <p>Input resistance: 1K Ω.</p> <p>Accuracy: +2% -5% of the full scale for users having impedance between 1 and 5K Ω, ±2% of the full scale for users having impedance &gt; of 5K Ω.</p> <p>Resolution: 0.01 V.</p> <p>Conversion time: 1 s.</p> <p>Protection: no protection.</p>
<p><b>Digital outputs:</b></p>	<p>In <b>c-pro 3 micro BASIC</b> (article code EPU2B and EPU2L) and <b>c-pro 3 EXP micro</b>:</p> <ul style="list-style-type: none"> <li>• 6 SPST outputs (electromechanical relays) rated 3 res. A @ 250 VAC.</li> </ul> <p>In <b>c-pro 3 micro</b>, <b>c-pro 3 kilo</b> and <b>c-pro 3 EXP kilo</b>:</p> <ul style="list-style-type: none"> <li>• 7 SPST outputs (electromechanical relays) rated 3 res. A @ 250 VAC.</li> </ul> <p>According to the model in <b>c-pro 3 micro+</b> and <b>c-pro 3 kilo+</b>:</p> <ul style="list-style-type: none"> <li>• 9 outputs (electromechanical relays) of which 7 SPST outputs rated 3 res. A @ 250 VAC (K1... K7) and 2 SPDT outputs rated 3 res. A @ 250 VAC (K8 and K9)</li> <li>• 9 outputs of which 7 SPST electromechanical relays rated 3 res. A @ 250 VAC (K1... K7) and 2 solid state relays rated 24 VAC / DC, 0.6 A max. (K8 and K9)</li> <li>• 7 SPST outputs (electromechanical relays) rated 3 res. A @ 250 VAC and an unipolar stepper electronic expansion valves driver.</li> </ul> <p>According to the model in <b>c-pro 3 EXP micro+</b> and <b>c-pro 3 EXP kilo+</b>:</p> <ul style="list-style-type: none"> <li>• 9 outputs (electromechanical relays) of which 7 SPST outputs rated 3 res. A @ 250 VAC (K1... K7) and 2 SPDT outputs rated 3 res. A @ 250 VAC (K8 and K9)</li> <li>• 9 outputs of which 7 SPST electromechanical relays rated 3 res. A @ 250 VAC (K1... K7) and 2 solid state relays rated 24 VAC / DC, 0.6 A max. (K8 and K9).</li> </ul> <hr/> <p>The devices ensure a double isolation among each terminal of the digital outputs and the remaining parts of the device.</p>
<p><b>Unipolar stepper electronic expansion valves driver:</b></p>	<p>12 VDC, 260 mA max.</p>
<p><b>Type of actions and additional features:</b></p>	<p>1B.</p>

<p><b>Communication ports:</b></p>	<p>In <b>c-pro 3 micro</b> and <b>c-pro 3 kilo</b>:</p> <ul style="list-style-type: none"> <li>• 1 non optoisolated OTG USB port (for programming and debug)</li> <li>• 1 non optoisolated CAN port with CANbus communication protocol</li> <li>• 1 non optoisolated RS-485 port with Modbus slave communication protocol, not available in <b>c-pro 3 micro BASIC</b> (artiche code EPU2B ed EPU2L)</li> </ul> <p>In <b>c-pro 3 micro+</b> and <b>c-pro 3 kilo+</b>:</p> <ul style="list-style-type: none"> <li>• 1 non optoisolated OTG USB port (for programming and debug)</li> <li>• 1 non optoisolated CAN port with CANbus communication protocol</li> <li>• 2 non optoisolated RS-485 ports of which 1 with Modbus master communication protocol and 1 with Modbus slave communication protocol.</li> </ul> <p>In <b>c-pro 3 EXP micro</b>, <b>c-pro 3 EXP kilo</b>, <b>c-pro 3 EXP micro+</b> and <b>c-pro 3 EXP kilo+</b>:</p> <ul style="list-style-type: none"> <li>• 1 non optoisolated OTG USB port (for programming and debug)</li> <li>• 1 non optoisolated CAN port with CANbus communication protocol.</li> </ul>
<p><b>Prestazioni:</b></p>	<p>CPU 120 MHz /168 MHz in the IoT version)                  RAM 196 kB /256 kB in the IoT version)                  Program memory 512 kB /1 MB in the IoT version)                  External FLASH 2 MB /2 MB in the IoT version)</p>

**c-pro 3 micro** and **c-pro 3 kilo**

PROGRAMMABLE CONTROLLERS

Hardware manual ver. 1.1

PT - November 2022

Code 114CP3UKE114

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**EVCO S.p.A.**

Via Feltre 81, 32036 Sedico Belluno ITALY

Phone +39 / 0437 / 8422

Fax +39 / 0437 / 83.648

[info@evco.it](mailto:info@evco.it)

[www.evco.it](http://www.evco.it)