c-pro 3 micro+ and *c-pro 3 kilo+* Programmable controllers

(GB) ENGLISH

1 GETTING STARTED

1.1 Important

Read these instructions carefully before installing and using the controller and follow all additional information for installation and electrical connection; keep these instructions close to the controller for future consultations.

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

2 INTRODUCTION

2.1 Introduction

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

The families are available in the version:

- with 128 x 64 pixel single colour LCD graphic display (black with rearlighting through white LED) and with a 6 buttons (with preset functions) keyboard made of silicone rubber integrated in the controller, hereinafter also called built-in LCD versions (not available in ***c-pro 3*** *micro+)*
- with 4 + 4 digit custom 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 (usable for example with an user interface such as ***Vgraph***, ***Vtouch***, ***Vroom*** or ***Vcolor***) hereinafter also called blind versions.

The controllers have got:

- real time clock
- 9 analog 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 probes
- 9 optoisolated digital inputs at 24 VAC / DC of which 7 at 50 / 60 Hz and 2 up to 2 KHz
- 6 non optoisolated analog outputs of which 2 configurable via configuration parameter for PWM / 0-10 V signal, 2 configurable via configuration parameter for 0-20 mA / 4-20 mA / 0-10 V signal and 2 for 0-10 V signal
- according to the model:
  - 9 digital outputs (electromechanical relays) of which seven 3 res. A @ 250 VAC SPST outputs and two 3 res. A @ 250 VAC SPDT outputs
  - 9 digital outputs of which seven 3 res. A @ 250 VAC SPST electromechanical relays and two solid stare relays (24 VAC/DC, 0.6 A max.)
  - seven 3 res. A @ 250 VAC SPST digital outputs (electromechanical relays) and an unipolar stepper electronic expansion valves driver
- 4 non optoisolated communication ports of which 1 USB OTG port (for programming and debugging), 1 CAN port with CANbus communication protocol, 1 RS-485 port with Modbus master communication protocol and 1 RS-485 port with Modbus slave communication protocol.

Through the I/O expansion ***c-pro 3*** *EXP micro+* or ***c-pro 3*** *EXP kilo+* it is possible to increase the number of inputs and outputs.

Through the development environment UNI-PRO 3 (to order separately) it is possible to realize the application software and through the connecting cable 0810500018 (2 m, 6,561 ft long) or 0810500020 (0.5 m, 1.640 ft long), to order separately, it is possible to program the controller.

The devices look in case 4 DIN modules.

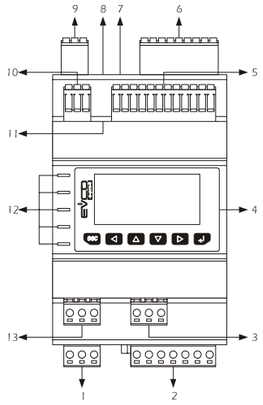
Installation is in electrical panel, on DIN rail.

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

For further information please consult the *Hardware manual of* ***c-pro 3***.

3 DESCRIPTION

3.1 Description



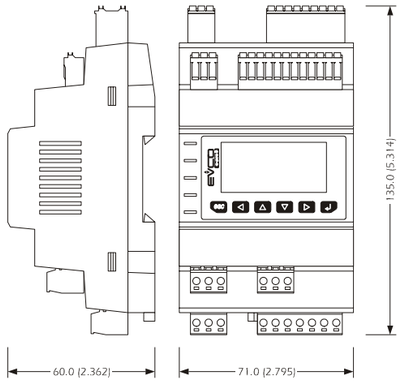
The following table shows the meaning of the parts of the controller.

PART	MEANING
1	digital outputs 6 and 7
2	digital outputs 1... 5
3	according to the model: - digital output 9 - unipolar stepper electronic expansion valves driver
4	display and keyboard (not available in the blind versions)
5	analog inputs 7... 9, digital inputs 6... 9 and analog outputs 4... 6
6	analog inputs 1... 6, digital inputs 1... 5 and analog outputs 1... 3
7	USB OTG 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 slave communication protocol and CAN port
10	RS-485 port with Modbus master communication protocol
11	micro-switch to plug in the termination of the RS-485 port with Modbus master communication protocol
12	signalling LEDs
13	according to the model: - digital output 8 - unipolar stepper electronic expansion valves driver

4 SIZE AND INSTALLATION

4.1 Size

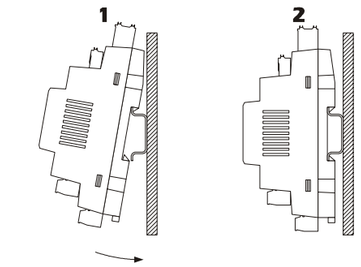
4 DIN modules; size in mm (in).



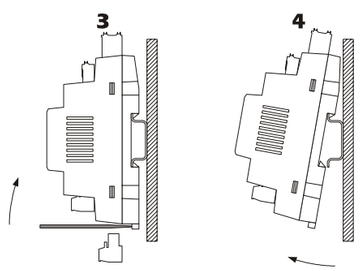
4.2 Installation

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 ***c-pro 3*** *micro+* and ***c-pro 3*** *kilo+* operate as shown in the following drawing.



To remove ***c-pro 3*** *micro+* and ***c-pro 3*** *kilo+* 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.



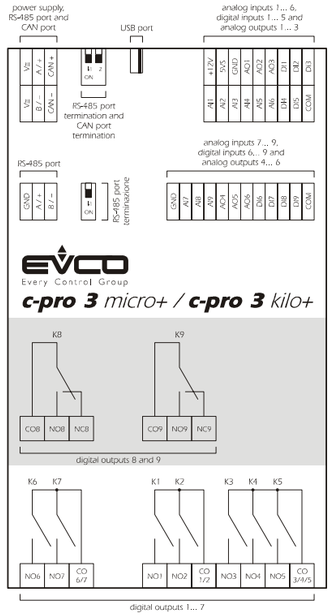
To install ***c-pro 3*** *micro+* and ***c-pro 3*** *kilo+* again press the DIN rail clips to the end first.

4.3 Additional information for installation

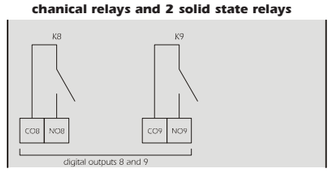
- working conditions (working temperature, humidity, etc.) must be between the limits indicated in the technical data
- do not install the controller close to heating sources (heaters, hot air ducts, etc.), devices provided with big magnetos (big speakers, etc.), locations subject to direct sunlight, 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 controller; the parts that ensure the protection must be installed so that you can not remove them if not by using a tool.

5 ELECTRICAL CONNECTION

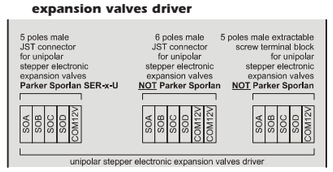
5.1 Electrical connection models with 9 electromechanical relays



5.2 Electrical connection models with 7 electromechanical relays and 2 solid state relays



5.3 Electrical connection models with 7 electromechanical relays and unipolar stepper electronic expansion valves driver



5.4 Meaning of connectors

The following tables show the meaning of the connectors.

DIGITAL OUTPUTS

Digital outputs 6 and 7 (electromechanical relays).

TERM.	MEANING
NO6	normally open contact digital output 6
NO7	normally open contact digital output 7
CO6/7	common digital outputs 6 and 7

Digital outputs 1... 5 (electromechanical relays).

TERM.	MEANING
NO1	normally open contact digital output 1
NO2	normally open contact digital output 2
CO1/2	common digital outputs 1 and 2
NO3	normally open contact digital output 3
NO4	normally open contact digital output 4
NO5	normally open contact digital output 5
CO3/4/5	common digital outputs 3, 4 and 5

DIGITAL OUTPUTS

Digital output 8 (if present, according to the model, electromechanical relay or solid state relay).

TERM.	MEANING
CO8	common digital output 8
NO8	normally open contact digital output 8
NC8	normally open contact digital output 8

DIGITAL OUTPUTS

Digital output 9 (if present, according to the model, electromechanical relay or solid state relay).

TERM.	MEANING
CO9	common digital output 9
NO9	normally open contact digital output 9
NC9	normally open contact digital output 9

UNIPOLAR EEV VALVE

Unipolar stepper electronic expansion valves driver (if present).

TERM.	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.)

RS485

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

TERM.	MEANING
GND	ground
A / +	terminal 1 of the transceiver
B / -	terminal 0 of the transceiver

RS485 LT

Micro-switch to plug in the termination of the RS-485 port with Modbus master communication protocol.

Position micro-switch 1 on position ON to plug in the termination of the RS-485 port.

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

TERM.	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, at 24 VAC / DC and at 50 / 60 Hz)
DI7	digital input 7 (optoisolated, at 24 VAC / DC and at 50 / 60 Hz)
DI8	digital input 8 (optoisolated, at 24 VAC / DC and at 50 / 60 Hz)
DI9	digital input 9 (optoisolated, at 24 VAC / DC and at 50 / 60 Hz)
COM	common digital inputs

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

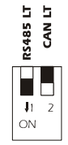
TERM.	MEANING
V≅+	power supply controller (12 VAC in ***c-pro 3*** *micro+*, 24 VAC / 20... 30 VDC in ***c-pro 3*** *kilo+*); connect the phase
V≅-	power supply controller (12 VAC in ***c-pro 3*** *micro+*, 24 VAC / 20... 30 VDC in ***c-pro 3*** *kilo+*); connect the neutral
A / +	terminal 1 of the transceiver RS-485 port
B / -	terminal 0 of the transceiver RS-485 port
CAN +	signal + CAN port
CAN -	signal - CAN port

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

CAN LT

Micro-switch to plug in the termination of the CAN port.

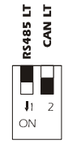
Position micro-switch 2 on position ON to plug in the termination of the CAN port.



RS485 LT

Micro-switch to plug in the termination of the RS-485 port with Modbus slave communication protocol.

Position micro-switch 1 on position ON to plug in the termination of the RS-485 port.



USB

USB OTG port.

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

TERM.	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, at 24 VAC / DC and up to 2 KHz)
DI5	digital input 5 (optoisolated, at 24 VAC / DC and at 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, at 24 VAC / DC and at 50 / 60 Hz)
DI2	digital input 2 (optoisolated, at 24 VAC / DC and at 50 / 60 Hz)
DI3	digital input 3 (optoisolated, at 24 VAC / DC and up to 2 KHz)

5.5 Additional information for electrical connection

- do not operate on the terminal blocks with electrical or pneumatic screwers
- if the controller has been moved from a cold location to a warm one, the humidity could condense on the inside; wait about an hour before supplying 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 controller to the other devices using a twisted pair
- disconnect the local power supply before servicing the controller
- do not use the controller as safety device
- for repairs and information on the controller please contact EVCO sales network.

6 SIGNALS

6.1 LEDs at the front of the controller

LED	MEANING
ON	LED power supply if it is lit, the controller will be supplied if it is out, the controller will not be supplied
RUN	LED run if it is lit, the application software will be compiled and running in release modality if it flashes slowly, the application software will be compiled and running in debug modality if it flashes quickly, the application software will be compiled, running in debug modality and stopped in a breakpoint if it is out: - the controller will not be compatible with the application software - the controller will not be enabled to work with the special ABL (Application Block Libraries)
⚠	LED system alarm if it is lit, an alarm system not resettable via software will be running if it flashes slowly, a system alarm with automatic reset 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
CAN	LED CANbus communication if it is lit, the controller 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
L1	LED auxiliary The operation of this LED can be programmed through the development environment UNI-PRO 3

7 TECHNICAL DATA

7.1 Technical data

Purpose of control: programmable controller for applications in refrigeration, ventilation and air conditioning.

Construction of control: electronic control device to be incorporated.

Box: self-extinguishing grey.

Size: 71.0 x 135.0 x 60.0 mm (2.795 x 5.314 x 2.362 in); 4 DIN modules.

Size refers to the controller with all the connectors properly plugged.

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).

Index of protection: IP20; IP40 the front.

Connections: male Micro-Fit connectors (power supply, inputs, analog outputs, CAN port and RS-485 ports) in ***c-pro 3*** *micro+*, male extractable spring terminal blocks pitch 3.5 mm (0.137 in; power supply, inputs, analog outputs, CAN port and RS-485 ports) for conductors up to 1.5 mm² (0.0028 in²) in ***c-pro 3*** *kilo+*, male JST connectors (unipolar stepper electronic expansion valves driver), male extractable screw terminal blocks pitch 5.0 mm (0.196 in; digital outputs) for conductors up to 2.5 mm² (0.0038 in²) and pitch 3.5 mm (0.137 in; unipolar stepper electronic expansion valves driver), "A" type USB connector (USB port).

The maximum lengths of the connecting cables are the followings:

- power supply controller: 100 m (328 ft)
- analog inputs: 100 m (328 ft); use a shielded cable only in case of lengths over or equal to 10 m (32.8 ft) for:
  - analog inputs 7, 8 and 9
  - the remaining inputs if configured for PTC or Pt 1000 probes

The shield must be connected to ground in only one point.

- power supply transducers: 100 m (328 ft)
- digital inputs: 100 m (328 ft)
- PWM analog output: 1 m (3.280 ft)
- 0-20 mA / 4-20 mA / 0-10 V analog outputs: 100 m (328 ft)
- digital outputs (electromechanical relays): 100 m (328 ft)
- digital outputs (solid state relays): 100 m (328 ft)
- unipolar stepper electronic expansion valves driver: 3 m (9.842 ft)
- RS-485 port: 1,000 m (3,280 ft); also look at the *Modbus specifications and implementation guides manual*
- CAN port:
  - 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.

One suggests using the connecting kit CJAV18 (female extractable screw terminal blocks pitch 5.0 mm, 0.196 in; to order separately), the connecting kit CJAV19 (wired female Micro-Fit connectors for ***c-pro 3*** *micro+*, to order separately) and the connecting kit CJAV20 (female extractable spring terminal blocks pitch 3.5 mm (0.137 in) for ***c-pro 3*** *kilo+*, to order separately).

To program the controller one suggests to use the connecting cable 0810500018 (2 m, 6 ft long) or 0810500020 (0.5 m, 1.640 ft long), to order separately.

Working temperature: 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.
Working humidity: from 5 to 95% of relative humidity without condensate.
Pollution situation: 2.
Power supply: 12 VAC, 50 / 60 Hz, 20 VA max., supplied from a class 2 circuit in ***c-pro 3*** *micro+;* 24 VAC, 50 / 60 Hz, 35 VA max. or 20... 30 VDC, 12 W max, supplied from a class 2 circuit in ***c-pro 3*** *kilo+.*
Protect the power supply with a fuse rated 2A-T 250 V.
Overvoltage category: III.
Real time clock: incorporated (with SuperCap battery).
Real time clock data maintenance in absence of power supply: 3 days will battery fully charged.
Analog inputs: 9 analog 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 probes.
Power supply 0-5 V ratiometric transducers: 5 VDC, 60 mA max.
Power supply 0-20 mA / 4-20 mA / 0-10 V transducers: 12 VDC, 120 mA max.
The sum of the maximum current powerable by the two power supply circuits is 120 mA.
Working range: from -50 to 150 °C (-58 to 302 °F) for PTC probe, from -50 to 120 °C (-58 to 248 °F) for NTC probe, from -100 to 400 °C (-148 to 752 °F) for Pt 1000 probe.
Digital inputs: 9 optoisolated digital inputs at 24 VAC / DC of which 7 at 50 / 60 Hz and 2 up to 2 KHz.
Resolution: 0.1 °C for PTC / NTC probes, 0.1 °C for Pt 1000 probes, 0.01 mA for 0-20 mA / 4-20 mA transducers, 0.01 V for 0-10 V transducers.
Analog outputs: 6 non optoisolated outputs:
- 2 outputs configurable via configuration parameter for PWM / 0-10 V signal
- 2 outputs configurable via configuration parameter for 0-20 mA / 4-20 mA / 0-10 V signal
- 2 outputs for 0-10 V signal.

Digital outputs: according to the model:
- 9 outputs (electromechanical relays) of which seven 3 res. A @ 250 VAC SPST outputs (K1... K7) and two 3 res. A @ 250 VAC SPDT outputs (K8 and K9)
- 9 outputs of which seven 3 res. A @ 250 VAC SPST electromechanical relays (K1... K7) and two 24 VAC/DC, 0.6 A max. solid state relays (K8 and K9)
- seven 3 res. A @ 250 VAC SPST outputs (electromechanical relays, K1... K7) and an unipolar stepper electronic expansion valves driver.

Unipolar stepper electronic expansion valves driver: 12 VDC, 260 mA max.
Type of actions and additional features: 1B.
Communication ports: 4 non optoisolated ports:
- 1 USB OTG port (for programming and debugging)
- 1 CAN port with CANbus communication protocol
- 2 RS-485 ports of which 1 with Modbus master communication protocol and 1 with Modbus slave communication protocol.

Program memory: 256 KB (FLASH memory).
Data memory: 4 KB (RAM memory).

PT ▪ 02/14

EVCO S.p.A.
Via Mezzaterra 6, 32036 Sedico Belluno ITALY
Phone +39-0437-8422 ▪ Fax +39-0437-83648
info@evco.it ▪ www.evco.it