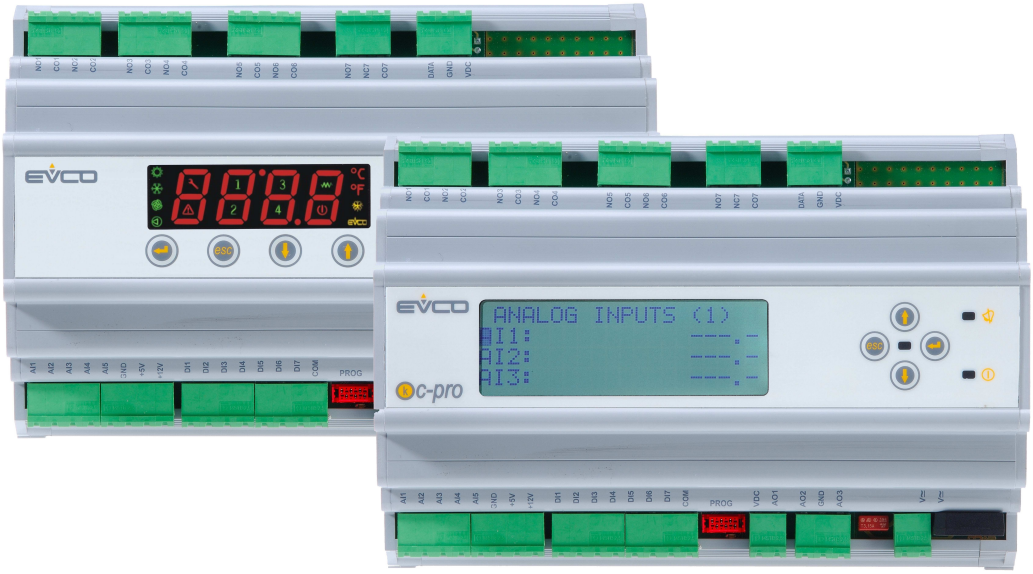
C-PRO KILO

PROGRAMMABLE CONTROLLERS



HARDWARE MANUAL

CODE 114CPRKHWE01

Important

Please read these instructions carefully prior to installation and use, and follow all the precautions for installation and electrical connections; keep these instructions with the device for future consultation.

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

Contents

1 Introduction

The **C-PRO KILO** family of programmable controllers is the ideal solution for low to medium complexity refrigeration, ventilation and air conditioning applications. The controller software is fully programmable, in a simple and intuitive manner, both in terms of control and the user interface, thanks to the use of the **UNI-PRO** development environment.

The C-PRO KILO is available in a version for installation on DIN rails (10 DIN modules); there is also an open case version available, again for installation on DIN rails.

Using the 7 relay outputs, it is possible to control various types of devices such as compressors, water circulation pumps, de-icer heaters, condensation or evaporation fans, cycle inversion valves, alarm indicators etc.

As an alternative to the 7 electromechanical relay outputs, there is also a version with 5 electromechanical relays and 2 solid state relays (SSR).

The C-PRO KILO is also available in an 11 DIN module case; in addition to the normal features, this version also has a 48 VDC stabilised output, useful in the climate control and mobile phone control unit (shelter) sectors for supplying the shutter servomotor.

The C-PRO KILO also has 3 analogue outputs: one for controlling the EVDFAN1 phase chopping module (this output is also provided with the standard version of the controller) and two 0-10 V or 4-20 mA type outputs (available on request).

The controller has 5 analogue inputs, 3 for NTC probes and 2 for NTC probes/0-5 V ratiometric transducers (on request)/0-20 mA transducers/4-20 mA transducers.

The C-PRO KILO also has 7 digital inputs for controlling the operation of the unit.

There are two alternative versions according to the kind of Bus used: CANBus version and IntraBus version. You can also connect until two I/O expansion units (IntraBus version) or the expansions of the C-PRO EXP-MICRO, C-PRO EXP-KILO, C-PRO EXP-MEGA, C-PRO EXP-GIGA families to increase the I/O (CAN version).

All parameters can be altered by means of the user interface; it is possible to download and upload configuration data using the programming key.

Finally, the controllers have a Real Time Clock.

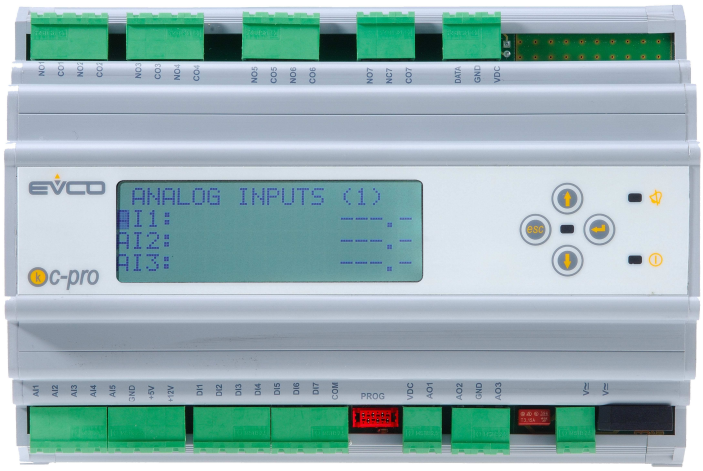
The C-PRO KILO is available as a built-in version (with 4 x 20 character alphanumeric display, LED display with refrigeration icons or LED display with air conditioning icons) and in closed case and open case versions; the closed and open case versions have neither display nor keypad and must be used in conjunction with a remote terminal unit.

The following table illustrates the main features of the C-PRO KILO:

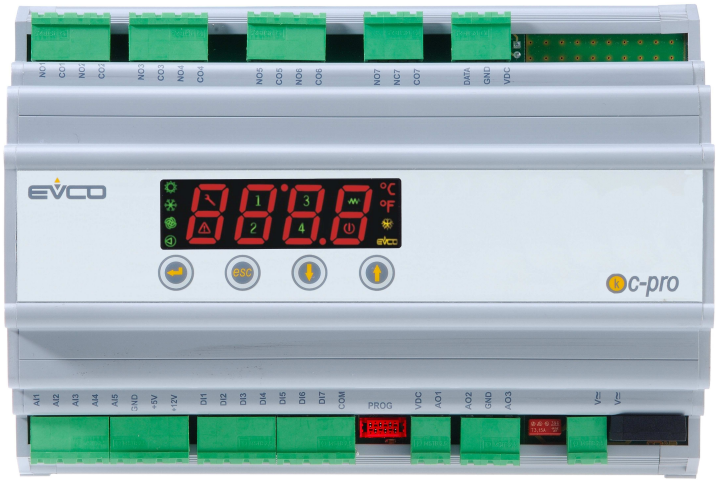
Dimensions	**Power supply**	**Analogue inputs** (1)	**Digital inputs**	**Analogue output 1** (2)	**Analogue outputs 2 and 3** (3)	**Digital outputs** (4)	**Output with 48 VDC stabilised power supply**
10 DIN modules	24 VAC/ 20 … 60 VDC	5	7	Yes	Available on request	7	No
11 DIN modules	48 VDC	5	7	Yes	Available on request	7	Yes

(1) 3 for NTC probes and 2 for NTC probes/0-5 V ratiometric transducers (on request)/0-20 mA transducers/ 4-20 mA transducers
(2) for controlling the EVDFAN1 phase chopping module (optoisolated output)
(3) 0-10 V or 4-20 mA (optoisolated outputs, not available in the open case models; all three combinations are permitted)
(4) 7 electromechanical relays; or alternatively, 5 electromechanical relays and 2 solid state relays (SSR).

The Real Time Clock and 48 VDC stabilised power output are not available in the open case version.

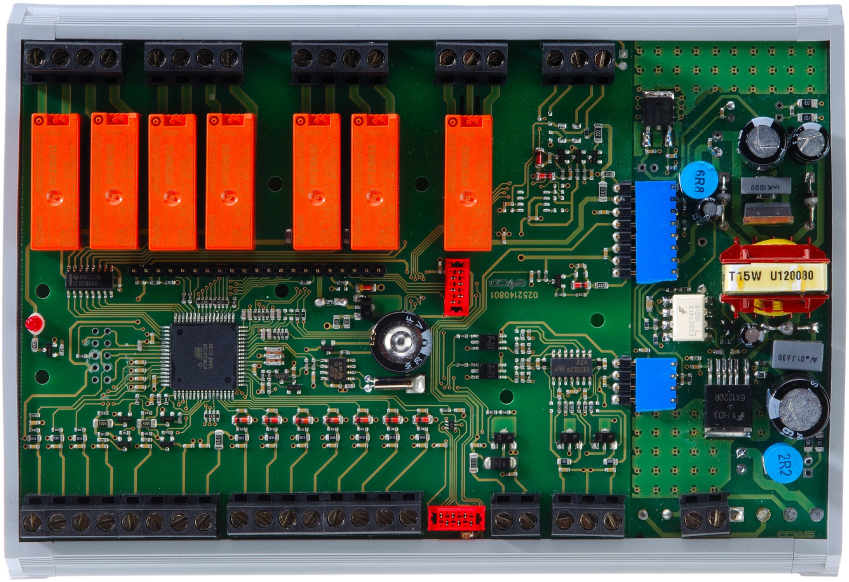


C-PRO KILO
Built-in version with 4 x 20 character alphanumeric display



C-PRO KILO
Built-in version with LED display and air conditioning icons

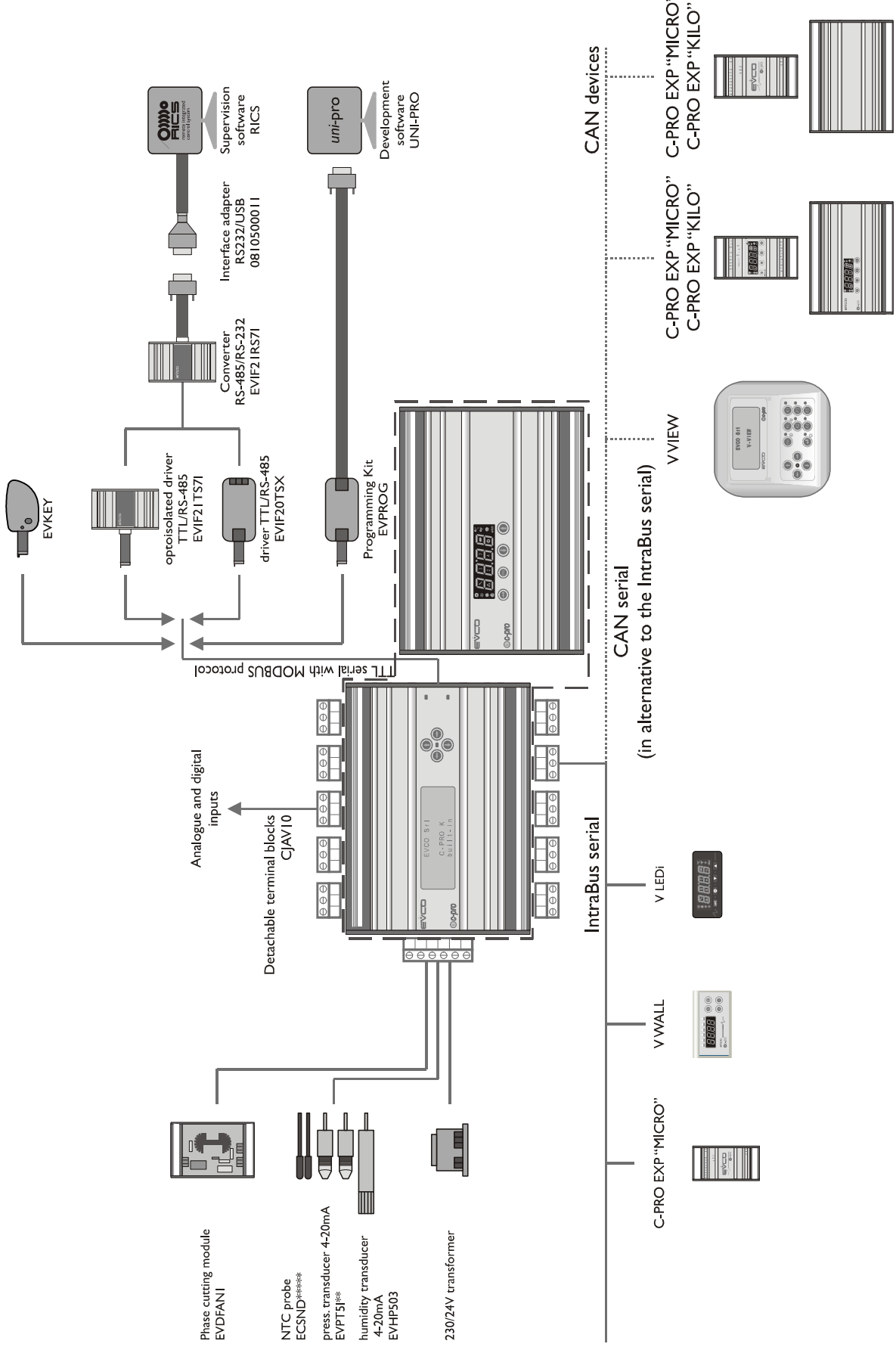
C-PRO KILO
Closed case version



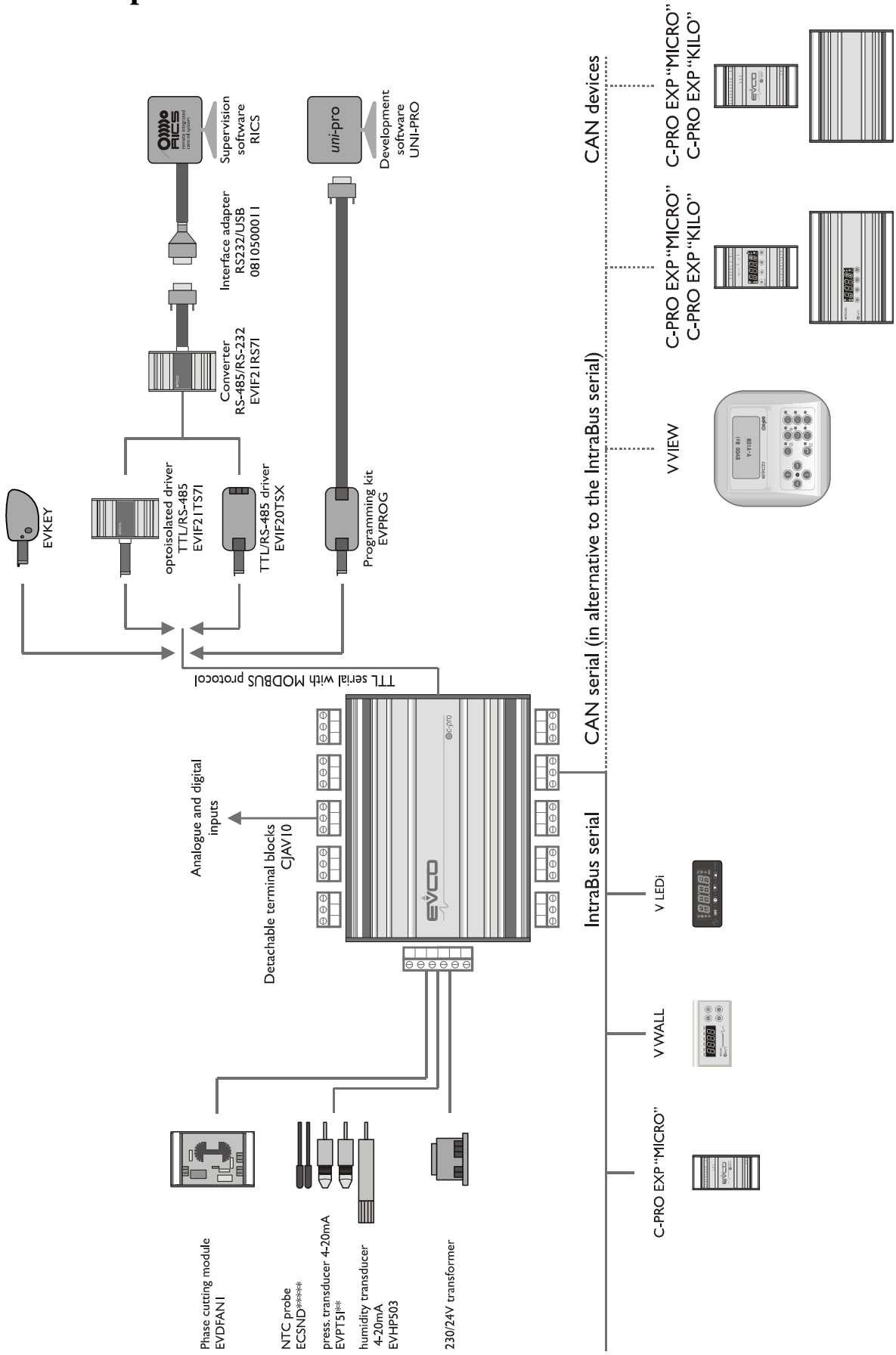
C-PRO KILO
Open version

2 Components and accessories

2.1 Example for built-in versions



2.2 Example for closed case versions



3 Technical characteristics

3.1 Connections

Power supply:
The C-PRO KILO is powered by 24 VAC. It can also be powered using DC supplies with outputs between 20 and 60 VDC; in this case, it is not possible to control the fan and phase chopping modules. The maximum length for the power supply connecting cables is 1 m.

Connecting the analogue inputs:
The C-PRO KILO has three analogue inputs for NTC sensors, and two for NTC sensors/0-20 mA transducers/4-20m A transducers/0-5 V ratiometric transducers (on request). Selection is implemented by the UNI-PRO development system. The 0-20 and 4-20 mA transducers may be powered from the +12 V terminal, the 0-5 V ratiometric transducers from the +5 V terminal (see the physical layout). The maximum length for the analogue input connecting cables is 3 m.

Connecting the digital inputs:
The C-PRO KILO has 7 non-optoisolated digital inputs (clean contact). The maximum length for the digital input connecting cables is 3 m.

Connecting the digital outputs:
The C-PRO KILO has a maximum of 7 digital outputs to electromechanical relays (two can be SSR). The maximum length for the digital output connecting cables is 3 m.

Connecting the analogue outputs:
The C-PRO KILO has 1 pulse analogue output for driving the phase chopping modules. The maximum length for the connecting cables for this type of analogue output is 1 m.
The C-PRO KILO also has 2 voltage or current analogue outputs (optional). The maximum connecting cable length for these analogue outputs is 3 m. Optional analogue outputs are not available for the open case models.

Connecting the remote terminals (IntraBus):
The connection between the C-PRO KILO and the user terminal is made using a 3 way cable. The maximum length for remote terminal connecting cables is 1 m if powered by DC current from the controller; 30 m in the case of a wall-mounted keypad powered by a separate transformer.

Connecting the remote expansion units (IntraBus):
The connection between the C-PRO KILO and the I/O expansion units is made using a 3 way cable. The maximum length for the remote I/O expansion units connecting cables is 1 m.

User interface connections (CAN):
The connection between C-PRO KILO and the remote user interface is made using 2 way cable (better if it is two weaves couples) plus possible ground.
The maximum length of the connection cables to the remote user interface depends of the CAN port baud rate.

- 1.000 m with 20.000 baud
- 500 m with 50.000 baud
- 250 m with 125.000 baud
- 50 m with 500.000 baud.

The CAN port baud rate is settable by parameter.

Connection with a remote expansion (or another CAN controller):
The connection between C-PRO KILO and the remote expansion (or other CAN controller) is made using a 2 way cable (better if weaved) plus possible ground.
The maximum length of the connection cables to the remote controllers or expansions depend on the CAN port baud rate (see above section “User interface connections”).

Notes on the electrical connections:

- do not use electric or pneumatic screw-wrenches on the terminal board
- if the device has been moved from a cold to a warm environment, condensation may have formed inside; please wait approx. one hour prior to switching on
- ensure that the voltage, frequency and operational power of the device are compatible with the local power supply
- disconnect the power prior to proceeding with any kind of maintenance operation
- do not use the device as a safety device
- for repairs and any information relating to the device, contact the Evco dealer network.

Caution
The indications regarding maximum connecting cable length infer that a series of precautions are complied with:

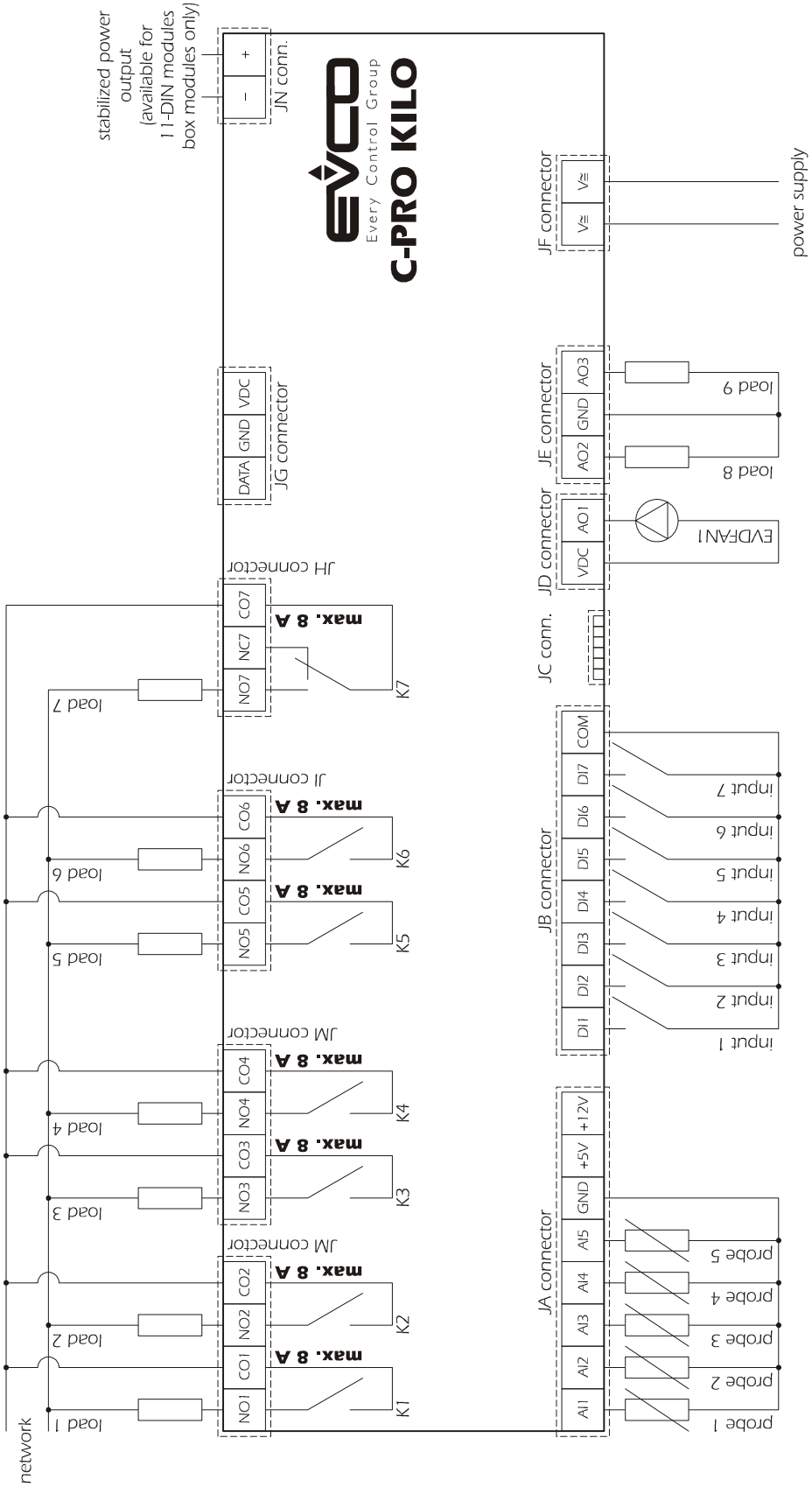
To avoid immunity problems, it is good practice to observe the following points:
- Avoid locations with antennae
- Avoid cabling probe inputs and relay outputs together; more generally, avoid mixing low and high voltage signals with one another
- Avoid wrapping cable around power components

To avoid any safety issues, it is good practice to observe the following points:
- Avoid premises with relative humidity >90%
- Avoid moisture
- Avoid corrosive environments
- Avoid explosive environments

Strategies
Finally, ensure that the operating conditions are within the operating limits indicated in the technical characteristics.

3.2 C-PRO KILO electrical connections (wiring)

The C-PRO KILO controller wiring layout is shown below, along with tables giving the meanings of the inputs and outputs.



C-PRO KILO wiring layout

JA Connector for analogue signals		
Conn.	**Abbrev.**	**Description**
JA-1	AI1	Analogue input No.1 (for NTC probes)
JA-2	AI2	Analogue input No.2 (for NTC probes)
JA-3	AI3	Analogue input No.3 (for NTC probes)
JA-4	AI4	Analogue input No.4 (for NTC probes/0-20 mA transducers/4-20 mA transducers); 0-5 V ratiometric transducers available on request
JA-5	AI5	Analogue input No.5 (for NTC probes/0-20 mA transducers/4-20 mA transducers); 0-5 V ratiometric transducers available on request
JA-6	GND	Analogue input common ground
JA-7	+5V	Ratiometric transducer power supply
JA-8	+12V	Current transducer power supply

JB Connector for digital signals		
Conn.	**Abbrev.**	**Description**
JB-1	ID1	No. 1 digital input
JB-2	ID2	No. 2 digital input
JB-3	ID3	No. 3 digital input
JB-4	ID4	No. 4 digital input
JB-5	ID5	No. 5 digital input
JB-6	ID6	No. 6 digital input
JB-7	ID7	No. 7 digital input
JB-8	GND	Digital input common connection

JC: Connection for parameter upload/download key and/or output for RS-485 and/or controller flash memory download module.

JD: Connector for EVDFAN1 phase chopping module output (analogue output 1)		
Conn.	**Abbrev.**	**Description**
JD-1	VDC	EVDFAN1 phase chopping module power supply
JD-2	AO1	EVDFAN1 phase chopping module output

To be able to use the EVDFAN1 phase chopping module, it is essential the controller be powered using AC current; the phase feeding the controller must be the same as that feeding the module.

JE: Connector for analogue outputs 2 and 3 (optoisolated); available on request, not available for the open case models		
Conn.	**Abbrev.**	**Description (Version V+I)**
JE-1	AO2	0-10 VDC
JE-2	GND	Analogue output common ground
JE-3	AO3	4-20mA
		Description (Version I+I)
JE-1	AO2	4-20 mA
JE-2	GND	Analogue output common ground
JE-3	AO3	4-20 mA
		Description (Version V+V)
JE-1	AO2	0-10 VDC
JE-2	GND	Analogue output common ground
JE-3	AO3	0-10 VDC

JF: Controller power supply connector		
Conn.	**Abbrev.**	**Description**
JF-1	V≅	Controller power supply (24 VAC / 20 … 60 VDC)
JF-2	V≅	Controller power supply (24 VAC / 20 … 60 VDC)

JG: Remote keypad and I/O expansion unit connector (IntraBus)		
Conn.	**Abbrev.**	**Description**
JG-1	VDC	Remote keypad power supply (12 VDC, max. 50 mA)
JG-2	GND	Common ground
JG-3	DATA	Live serial

JG: Connector for remote keypad and I/O expansion unit (CAN)		
Conn.	**Abbrev.**	**Description**
JG-1	+	Connector for the serial CAN+ connection
JG-2	GND	Ground reference connection
JG-3	-	Connector for the serial CAN- Connection

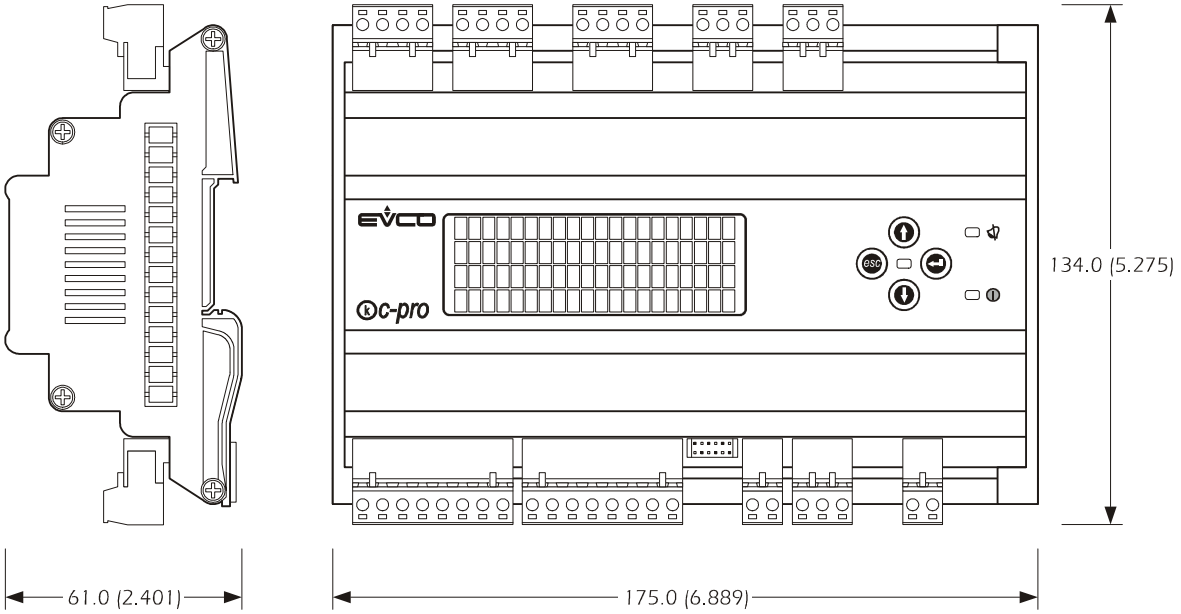
JM-JL-JI-JH: Digital output connection (electromechanical relays)		
Conn.	**Abbrev.**	**Description**
JM-4	NO1	Relay No. 1 contact normally open
JM-3	CO1	Relay No. 1 common ground
JM-2	NO2	Relay No. 2 contact normally open
JM-1	CO2	Relay No. 2 common ground
JL-4	NO3	Relay No. 3 contact normally open
JL-3	CO3	Relay No. 3 common ground
JL-2	NO4	Relay No. 4 contact normally open
JL-1	CO4	Relay No. 4 common ground
JI-4	NO5	Relay No. 5 contact normally open; alternatively, solid state relay (SSR) (max. 48 VDC, 80 mA)
JI-3	CO5	Relay No. 5 common ground (or SSR common ground)
JI-2	NO6	Relay No. 6 contact normally open; alternatively, solid state relay (SSR) (max. 48 VDC, 80 mA)
JI-1	CO6	Relay No. 6 common ground (or SSR common ground)
JH-3	NO7	Relay No. 7 contact normally open
JH-2	NC7	Relay No. 7 contact normally closed
JH-1	CO7	Relay No. 7 common ground

JN: Stabilised power supply output connector; available on 11 DIN module cases models, not available on open case models		
Conn.	**Abbrev.**	**Description**
JN-1	+	Stabilised power supply output (48 VDC, max. 80 mA; positive terminal)
JN-2	-	Stabilised power supply output (negative terminal)

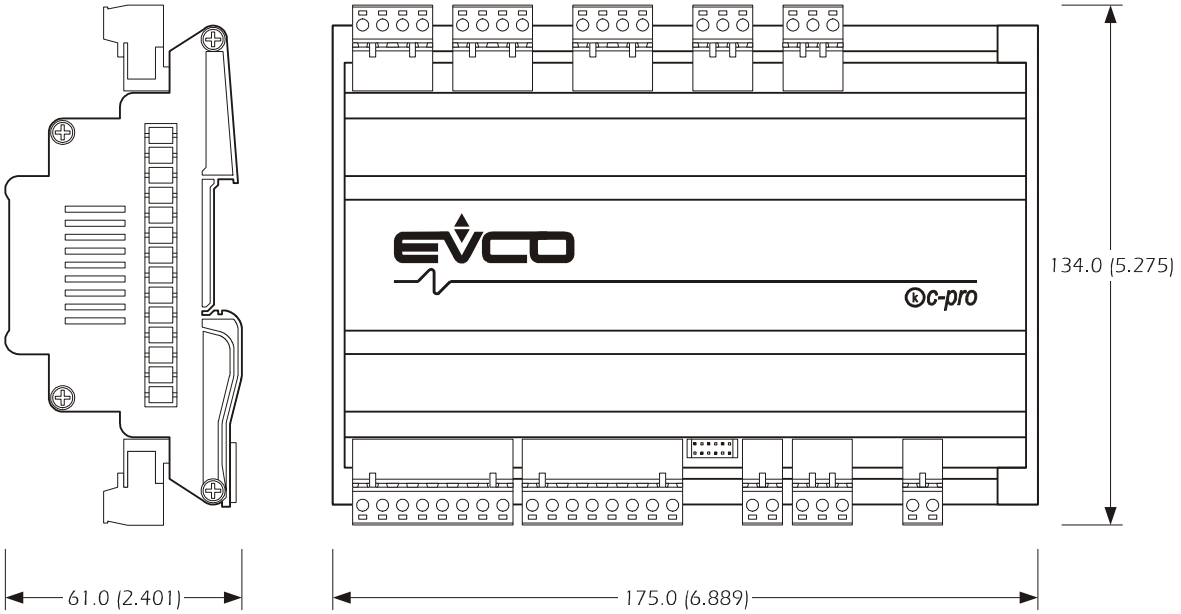
3.3 C-PRO KILO dimensions/installation

The mechanical dimensions of the C-PRO KILO are indicated below; the measurements are expressed in mm (in).

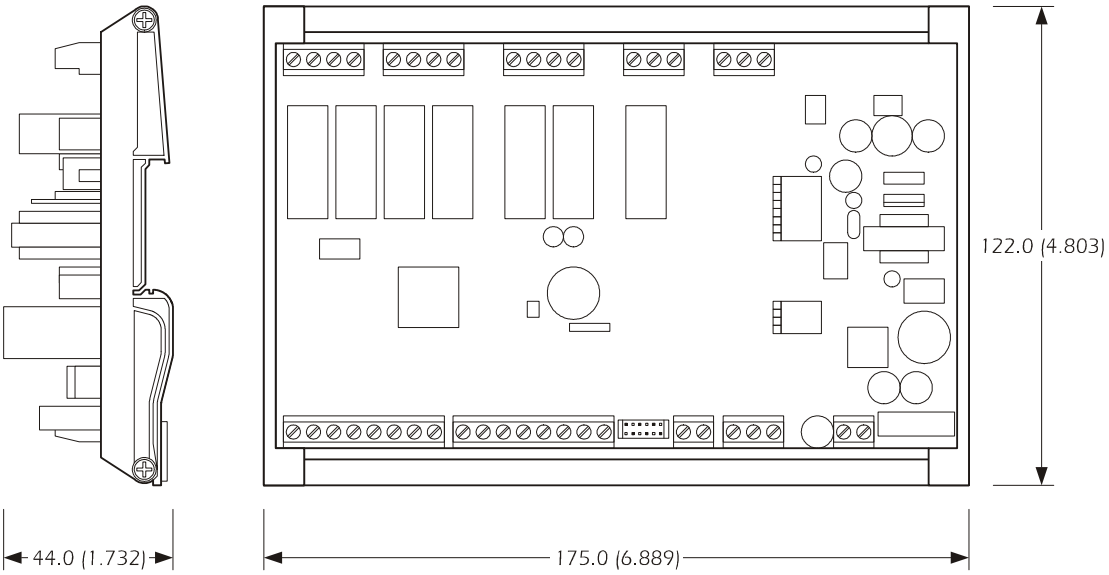
Built-in versions
10 DIN modules (11 DIN modules for versions with stabilised power supply output).



Closed case versions
10 DIN modules (11 DIN modules for versions with stabilised power supply output).



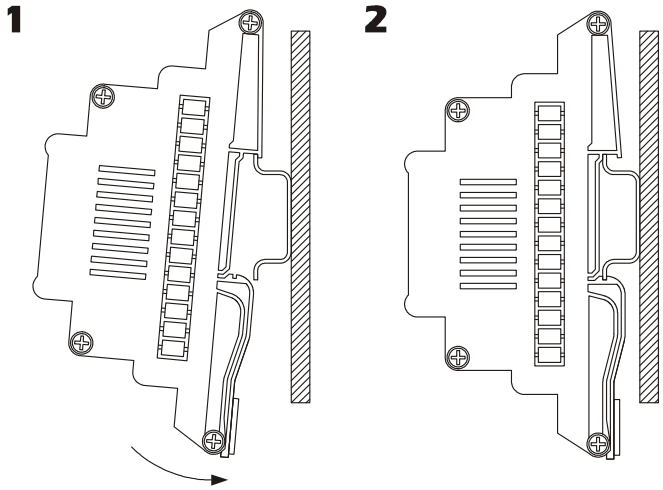
Open case versions
10 DIN modules.



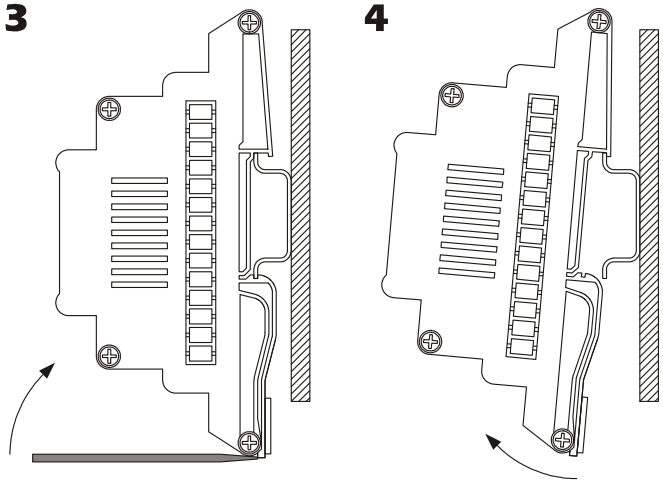
Recommendations for installation:

- ensure that the operating conditions (operating temperature, humidity, etc.) are within the limits indicated in the technical data sheets
- do not install the device near to any sources of heat (heating elements, hot air conduits, etc.), equipment containing powerful magnets (large diffusers, etc.), areas affected by direct sunlight, rain, humidity, excessive dust, mechanical vibration or shock
- in compliance with safety regulations, the device must be installed correctly, and in such a way as to protect against any contact with electrical parts; all safety devices must be fixed so that they cannot be removed without the use of tools.

To install the C-PRO KILO, proceed as indicated in the diagrams (points 1 and 2).



To remove the C-PRO KILO, use a screwdriver and proceed as indicated in the diagrams (points 3 and 4).



3.4 General characteristics

Applicable safety regulations	EN60730-1
Purpose of the device	Programmable electronic controller for refrigeration, ventilation and air-conditioning applications
Storage conditions	-10~70°C Condensation free RH <80%
Operating conditions	-10~50°C Condensation free RH <80%
Electric shock protection class	Control device to be integrated; assumes the class of the integrated equipment
Disconnection type	Reduced interruption (relay contacts)
PTI of insulation materials	>=250V
Case	Mounted on omega rails
Action type	1C
Pollution	Normal
Software class	A
Isolated component electrical stress period	Long
Front panel protection classification	IP00 for open case versions; otherwise IP 40

3.5 Technical characteristics

Low voltage signal connection	Phoenix detachable terminal block; screw terminal blocks for open case versions
Power connector	Phoenix detachable terminal block; screw terminal blocks for open case versions
	Cable cross sectional thickness > $0.75mm^2$
Connection for EVCO live serial port to remote keypad and/or remote I/O expansion card	Phoenix detachable terminal block; screw terminal blocks for open case versions
Connection for parameter key, TTL serial output for RS-485 module, Flash programming interface	AMP micro-match 6 pin
D/A output connection	Phoenix detachable terminal block; screw terminal blocks for open case versions

3.6 Electrical characteristics

CPU	Microcontroller	8 bit
	Program flash	128kB
	Data memory RAM	4kB
	EEPROM	4kB
	A/D	8 channels at 10 bits
Power supply	Voltage	24 VAC / 20 … 60 VDC
	Range	-10% +15%
	Frequency	50/60 Hz / DC
	Maximum absorbed input power	10 VA
	Protection fuse	External
Digital outputs	**Number**	**7**
	Type	Electromechanical relays
	Maximum breaker current at 250 VAC	8 A
	Operation cycle number	100,000
	Minimum time between switching	20 s
	Type of micro-interruption action	1C
	Insulation between relays and low voltage	Reinforced
	Insulation between relays	Functional
	Insulation between the relays and DO7	Reinforced
Digital outputs	**Number**	**2**
	Type	SSR
	Maximum breaker current at 48 VDC	80 mA
	Please note: as an alternative to relay outputs 5 and 6	
Digital inputs	**Number**	**7**
	Type	Clean contact
	Current over contact closing to ground	2 mA
	Maximum closing resistance	100Ω
	OFF to ON detection time	100 ms
	ON to OFF detection time	100 ms
Analogue inputs for NTC probes	**Number**	**3**
	Type	NTC (10KΩ ±1% @25°C)
	NTC measurement range	-40°C - 100°C
	NTC measurement accuracy	±1°C
	NTC measurement sensitivity	0.1°C
Analogue inputs for NTC probes or pressure transducers	**Number**	**2**
	Type	NTC (10KΩ ±1% @25°C)
	NTC measurement range	-40°C – 100°C
	NTC measurement accuracy	±1°C
	NTC measurement sensitivity	0.1°C
	Type	Current
	Current measurement range	0/4 ÷ 20 mA
	Current measurement accuracy	±0.08 mA

	Current measurement sensitivity Type Voltage measurement range Voltage measurement accuracy Voltage measurement sensitivity	0.01 mA; Ri = 200 Ohm Ratiometric 0 ÷ 5V ±50mV 10mV
Fan output	**Number**	**1**
	Type	EVDFAN1 phase chop module pulses
UART1 TTL for RS-485 serial port (Modbus)	**Number**	**1**
	Type	UART
	Physical layer	TTL signal level
	Maximum baud rate	19200 bit/s
	Connector	AMP micro-match 6 pin
	Please note: The same serial connector is used for the parameter key and the interface used to program the microcontroller flash memory	
Serial output for remote I/O expansion card and remote keypad	**Number**	**1**
	Type	EVCO live serial port
	Physical layer	12 VDC, GND, DATA
	Baud rate	19200 bit/s
	Connector	Phoenix detachable
Analogue output Voltage + Voltage Voltage + Current or Current + Current only on request	**Number**	**1+1**
	Connector	Phoenix detachable
	Power supply	Internally optoisolated
	Type	Current
	Current range	4 - 20 mA
	Current output accuracy	±1 mA
	Current output sensitivity	0.05 mA
	Current output load	47 - 300 Ω
	Adjustment time	1 s
	Type	Voltage
	Voltage range	0 ÷ 10 V
	Voltage output accuracy	±200 mV (no load)
	Voltage output sensitivity	10 mV
	Output impedance	100 Ω
	Adjustment time	1 s
CAN communication Bus	Number	1
	type	CAN V2.0B no optoinsulated
	Physical layer	2 wires + common wire (ISO 11898)
	Baud rate (max. length = 1000 m)	20K
	Baud rate (max. length = 500 m)	50K
	Baud rate (max. length = 250 m)	125K
	Baud rate (max. length = 50 m)	500K
	Connector	Disconnectable screw terminals

	Note: *1) baud rate selectable by parameters* *2) The CAN connection consists of a cable with twisted pair (both shielded and not shielded). The first and the last elements of the system must have the bus terminating resistor connected (impedance is 120)*

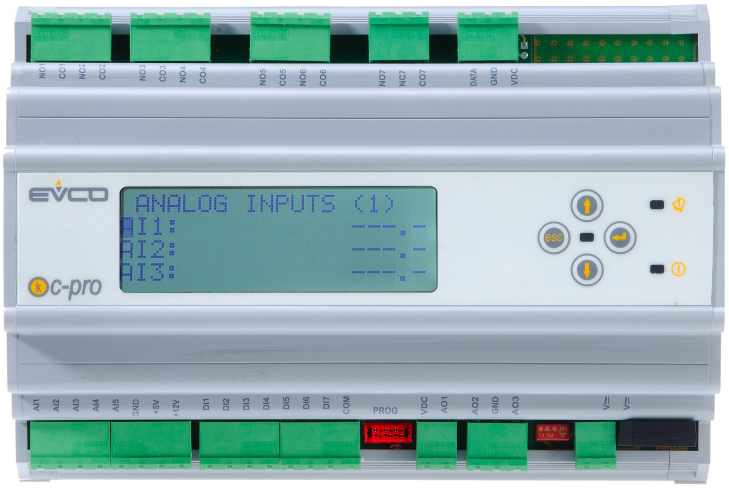
4 The C-PRO KILO user interface

There are 3 C-PRO KILO built-in versions:

- with 4 x 20 character alphanumeric display
- with LED display and refrigeration icons
- with LED display and air-conditioning icons

The closed case and open case versions have neither display nor keypad and must be used in conjunction with a remote terminal.

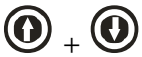
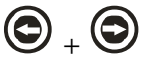
Version with 4 x 20 character alphanumeric display



The display consists of a 4 x 20 character alphanumeric display, 6 key keypad; and 3 LEDs complete the user interface.

The following table gives the meanings of the keys:

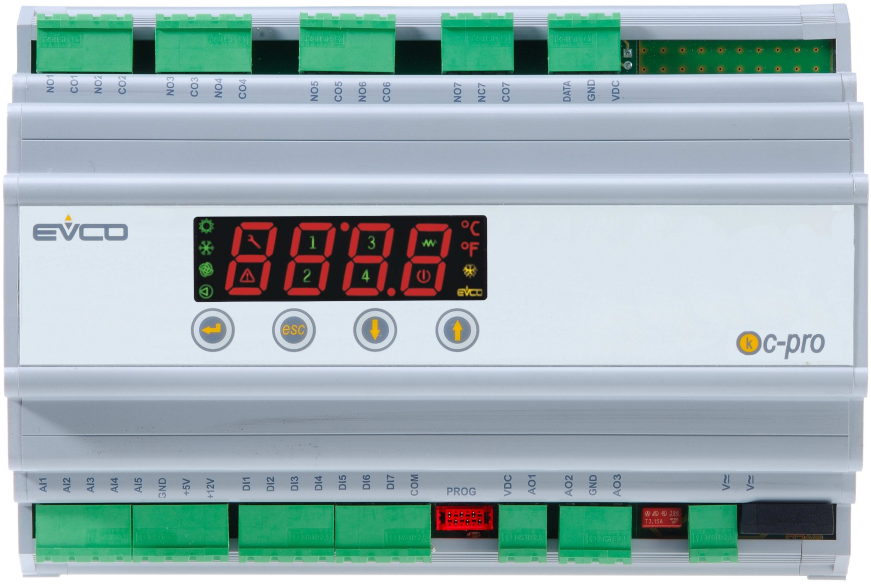
KEY	MAIN FUNCTION	OTHER
	Predefined as UP	Programmable secondary function
	Predefined as DOWN	Programmable secondary function
	Predefined as LEFT	
	Predefined as RIGHT	
	Predefined as ESC	• unit off switch (held for 3 s) • delete value/return to previous menu (pressed and released)

	Predefined as ENTER	• 1st level programming command (pressed for 3 s) • confirm value/send command (pressed and released)
		project information/versions/firmware revisions (pressed for 3 s)
		2nd level programming command (pressed for 3 s)
		3rd level programming command (pressed for 3 s)

The following table gives the meanings of the front panel LEDs:

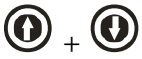
LED	FUNCTION
	Predefined (flashing during controller parameter configuration)
	Programmable
	Programmable

Version with LED display and refrigeration or air-conditioning icons



The display consists of four red digits (plus decimal points) and 16 variously coloured icons; the keypad has four keys.

The following table gives the meanings of the keys:

KEY	MAIN FUNCTION	OTHER
	Predefined as UP	Programmable secondary function
	Predefined as DOWN	Programmable secondary function
	Predefined as ESC	• unit off switch (held for 3 s) • delete value/return to previous menu (pressed and released)
	Predefined as ENTER	• 1st level programming command (pressed for 3 s) • confirm value/send command (pressed and released)
		project information/versions/firmware revisions (pressed for 3 s)
		2nd level programming command (pressed for 3 s)

The following table gives the meanings of the front panel icons:

ICON	COLOUR
Summer Icon (air-conditioning display) Circuit 1 icon (refrigeration display)	**Green**
Winter Icon (air-conditioning display) Circuit 2 icon (refrigeration display)	**Green**
Fan Icon (air-conditioning display) High pressure circuit icon (refrigeration display)	**Green**
Pump Icon (air-conditioning display) Low pressure circuit icon (refrigeration display)	**Green**
EVCO icon	**Amber**
Defrost Icon (air-conditioning display) Fan Icon (refrigeration display)	**Amber**
°F Icon (air-conditioning display) Bar Icon (refrigeration display)	**Red**
°C Icon	**Red**
Maintenance icon	**Red**
Alarm icon	**Red**
Icon 1	**Green**
Icon 2	**Green**
Icon 3	**Green**
Icon 4	**Green**
Heating element Icon (air-conditioning display) Compressor Icon (refrigeration display)	**Green**
On-Off Icon	**Red**

5 C-PRO EXP KILO I/O expansion units

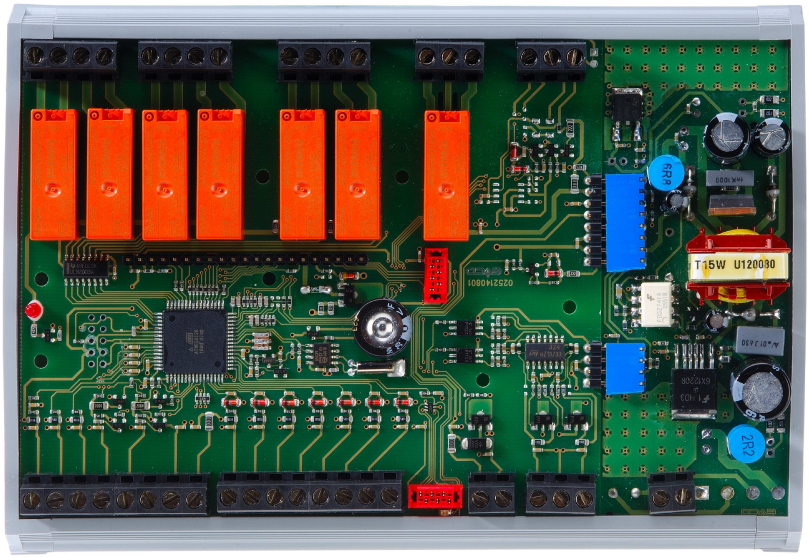
The C-PRO EXP KILO I/O expansion units allow expansion of the controller I/O capacity. There are two types of expansion units, closed case versions in 10 DIN module cases and open case versions mounted on 10 DIN module bases.
It is also possible to use C-PRO EXP MICRO range I/O expansion units.

The following table illustrates the main features of the C-PRO KILO:

Version	**Power supply**	**Analogue inputs** (1)	**Digital inputs**	**Analogue output 1** (2)	**Analogue outputs 2 and 3** (3)	**Digital outputs (electromechanical relays)**
Closed case	24 VAC/ 20 … 60 VDC	5	7	Yes	Available on request	7
Open case	24 VAC/ 20 … 60 VDC	5	7	Yes	No	7

(1) 3 for NTC probes and 2 for NTC probes/0-5 V ratiometric transducers (on request)/0-20 mA transducers/4-20 mA transducers
(2) for controlling the EVDFAN1 phase chopping module (optoisolated output)
(3) 0-10 V or 4-20 mA (optoisolated outputs; all three combinations are possible).

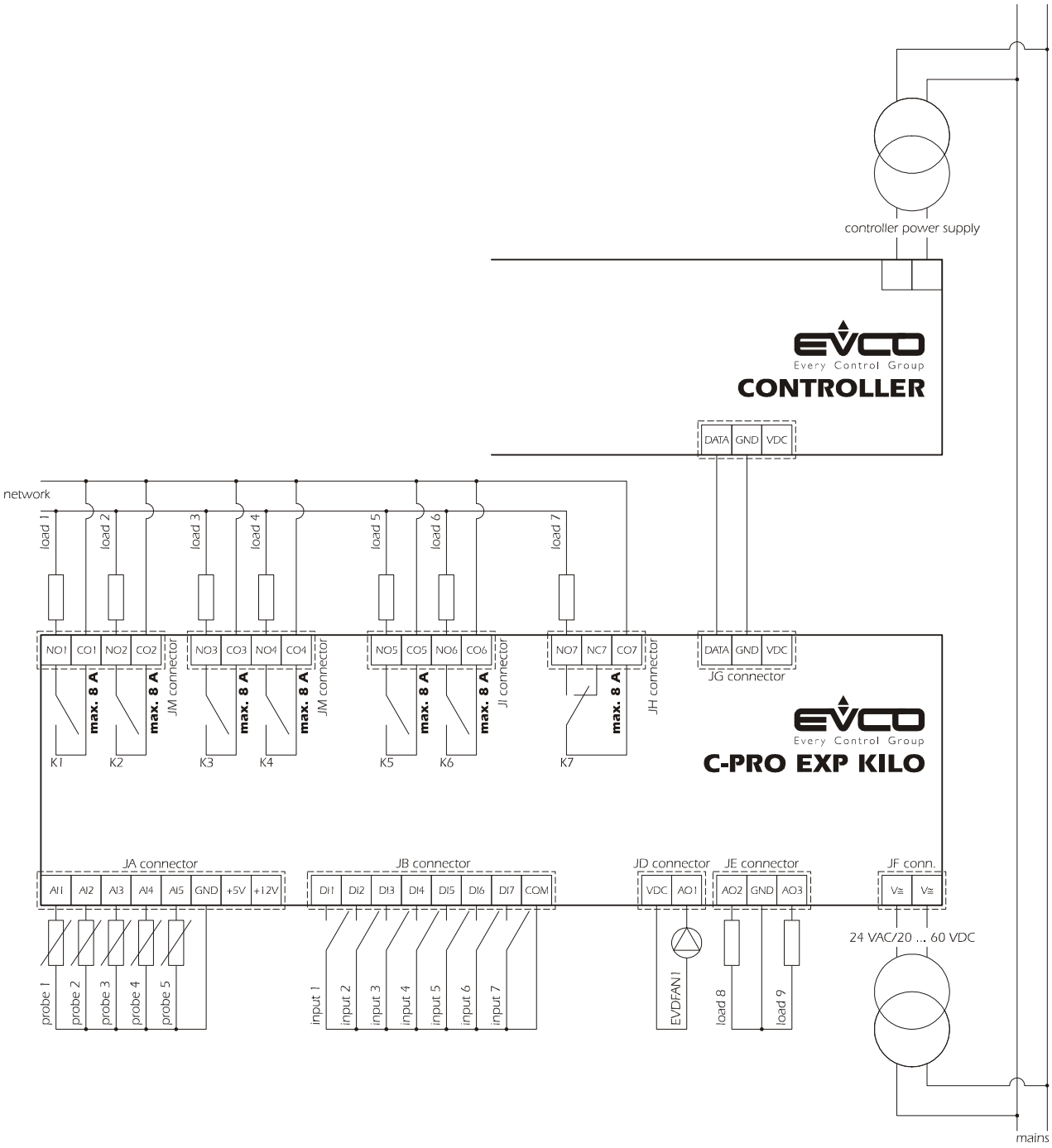
C-PRO EXP KILO
Closed case version



C-PRO EXP KILO
Open version

5.1 C-PRO EXP KILO electrical connections (wiring)

The C-PRO EXP KILO controller wiring layout is shown below, along with tables giving the meanings of the inputs and outputs.
References to connection cable lengths and the general, technical and electrical characteristics reported in chapter 3 are also valid for the I/O expansion units.



C-PRO EXP KILO wiring layout

JA Connector for analogue signals		
Conn.	**Abbrev.**	**Description**
JA-1	AI1	Analogue input No.1 (for NTC probes)
JA-2	AI2	Analogue input No.2 (for NTC probes)
JA-3	AI3	Analogue input No.3 (for NTC probes)
JA-4	AI4	Analogue input No.4 (for NTC probes/0-20 mA transducers/4-20 mA transducers); 0-5 V ratiometric transducers available on request
JA-5	AI5	Analogue input No.5 (for NTC probes/0-20 mA transducers/4-20 mA transducers); 0-5 V ratiometric transducers available on request
JA-6	GND	Analogue input common ground
JA-7	+5V	Ratiometric transducer power supply
JA-8	+12V	Current transducer power supply

JB Connector for digital signals		
Conn.	**Abbrev.**	**Description**
JB-1	ID1	No. 1 digital input
JB-2	ID2	No. 2 digital input
JB-3	ID3	No. 3 digital input
JB-4	ID4	No. 4 digital input
JB-5	ID5	No. 5 digital input
JB-6	ID6	No. 6 digital input
JB-7	ID7	No. 7 digital input
JB-8	GND	Digital input common connection

JD: EVDFAN1 phase chop output connector (analogue output 1)		
Conn.	**Abbrev.**	**Description**
JD-1	VDC	EVDFAN1 phase chopping module power supply
JD-2	AO1	EVDFAN1 phase chopping module output

To be able to use the EVDFAN1 phase chopping module, it is essential the controller and expansion unit be powered using AC current; the phase feeding the controller must be the same as that feeding the expansion unit and the module.

JE: Connector for analogue outputs 2 and 3 (optoisolated); available on request, not available for the open case models		
Conn.	**Abbrev.**	**Description (Version V+I)**
JE-1	AO2	0-10 VDC
JE-2	GND	Analogue output common ground
JE-3	AO3	4-20mA
		Description (Version I+I)
JE-1	AO2	4-20 mA
JE-2	GND	Analogue output common ground
JE-3	AO3	4-20 mA
		Description (Version V+V)
JE-1	AO2	0-10 VDC
JE-2	GND	Analogue output common ground
JE-3	AO3	0-10 VDC

JF: Expansion unit power supply connector		
Conn.	**Abbrev.**	**Description**
JF-1	V≅	Expansion unit power supply (24 VAC/20 … 60 VDC)
JF-2	V≅	Expansion unit power supply (24 VAC/20 … 60 VDC)

JG: Control unit connection connector (IntraBus)		
Conn.	**Abbrev.**	**Description**
JG-1	VDC	Power supply (not used)
JG-2	GND	Common ground
JG-3	DATE	Live serial port

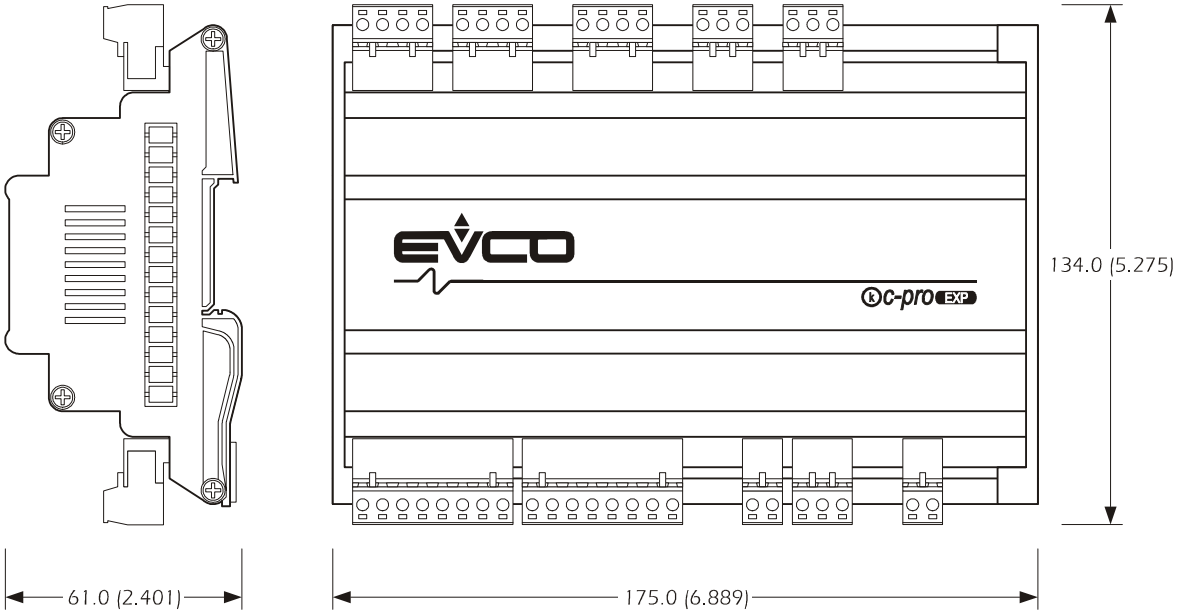
JG: Connector for remote keypad and I/O expansion unit (CAN)		
Conn.	**Abbrev.**	**Description**
JG-1	CAN+	Connector for the serial CAN+ connection
JG-2	GND	Ground reference connection
JG-3	CAN-	Connector for the serial CAN- Connection

JM-JL-JI-JH: Digital output connection (electromechanical relays)		
Conn.	**Abbrev.**	**Description**
JM-4	NO1	Relay No. 1 contact normally open
JM-3	CO1	Relay No. 1 common ground
JM-2	NO2	Relay No. 2 contact normally open
JM-1	CO2	Relay No. 2 common ground
JL-4	NO3	Relay No. 3 contact normally open
JL-3	CO3	Relay No. 3 common ground
JL-2	NO4	Relay No. 4 contact normally open
JL-1	CO4	Relay No. 4 common ground
JI-4	NO5	Relay No. 5 contact normally open
JI-3	CO5	Relay No. 5 common ground
JI-2	NO6	Relay No. 6 contact normally open
JI-1	CO6	Relay No. 6 common ground
JH-3	NO7	Relay No. 7 contact normally open
JH-2	NC7	Relay No. 7 contact normally closed
JH-1	CO7	Relay No. 7 common ground

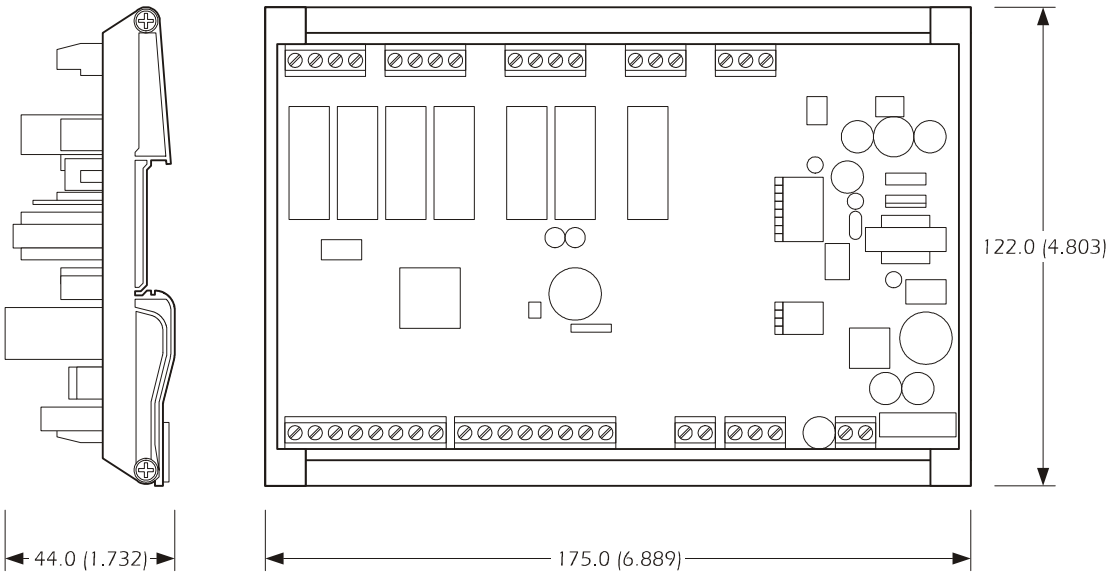
5.2 C-PRO EXP KILO dimensions/installation

The mechanical dimensions of the C-PRO EXP KILO are indicated below; the measurements are expressed in mm (in).

Closed case versions
10 DIN modules.



Open case versions
10 DIN modules.

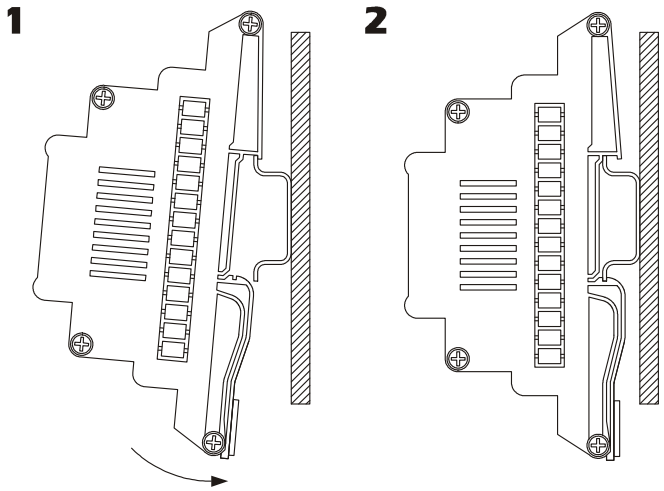


Recommendations for installation:

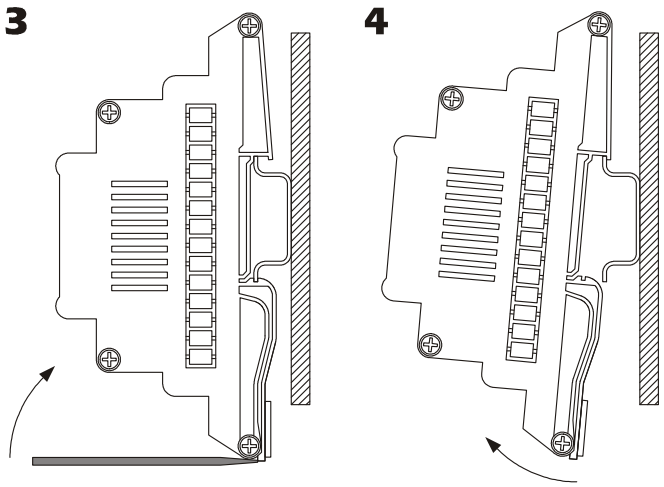
- ensure that the operating conditions (operating temperature, humidity, etc.) are within the limits indicated in the technical data sheets
- do not install the device near to any sources of heat (heating elements, hot air conduits, etc.), equipment containing powerful magnets (large diffusers, etc.), areas affected by direct sunlight, rain, humidity, excessive dust, mechanical vibration or shock

- in compliance with safety regulations, the device must be installed correctly, and in such a way as to protect against any contact with electrical parts; all safety devices must be fixed so that they cannot be removed without the use of tools.

To install the C-PRO EXP KILO, proceed as indicated in the diagrams (points 1 and 2).



To remove the C-PRO EXP KILO, use a screwdriver and proceed as indicated in the diagrams (points 3 and 4).



6 Accessories

6.1 User terminals (IntraBus)

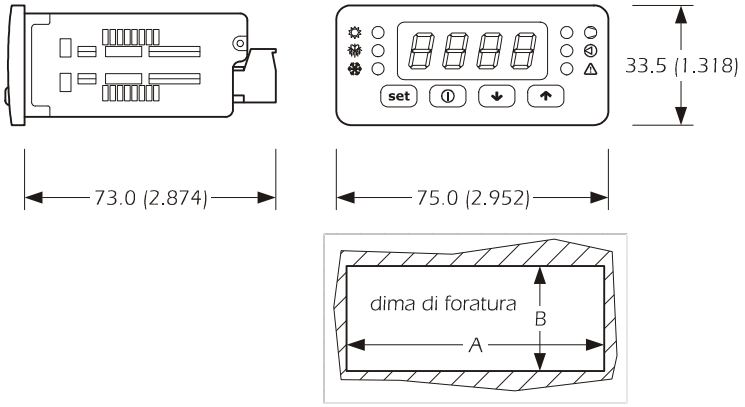
User terminals allow remote management of the controller (display and controls). There two types of interface, panel mounted and wall mounted. The interface is connected to the specific serial port (live) connector of the C-PRO KILO controllers.

V LEDi
Panel mounted version

V WALL
Wall mounted version

6.1.1 V LEDi dimensions/installation

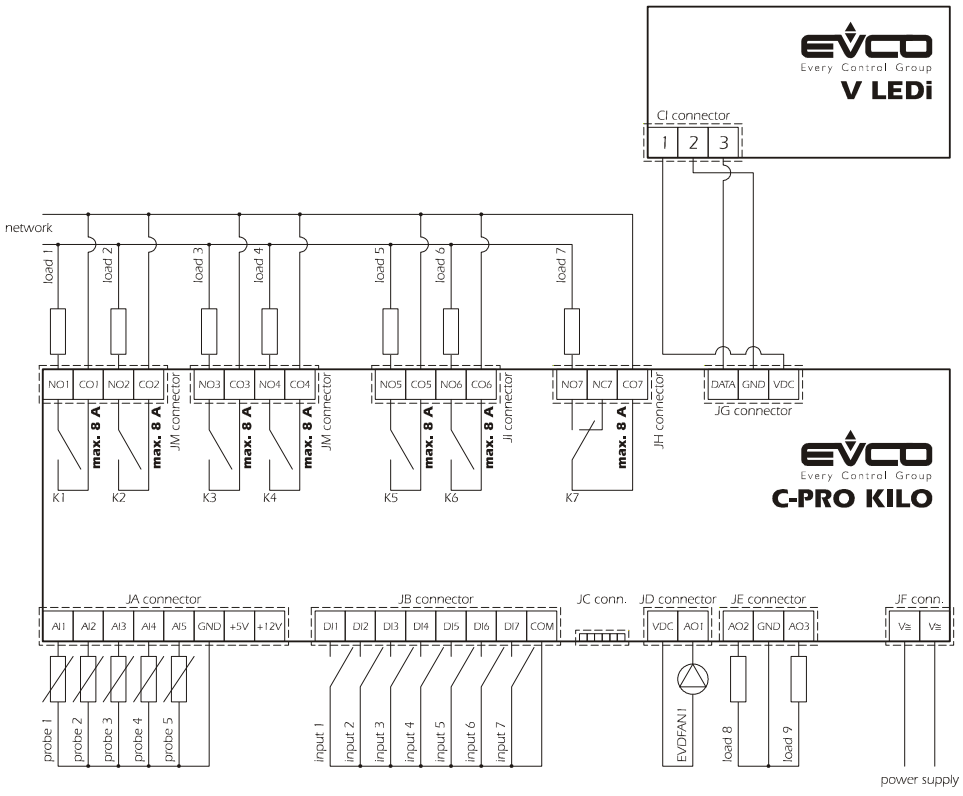
The V LEDi mechanical dimensions are given below; the measurements are expressed in mm (in); for fixing, use the snap-on brackets supplied.



DIMENSION	MINIMUM	TYPICAL	MAXIMUM
A	71.0 (2.795)	71.0 (2.795)	71.8 (2.826)
B	29.0 (1.141)	29.0 (1.141)	29.8 (1.173)

6.1.2 V LEDi electrical connections (wiring)

The V LEDi user terminal wiring layout is shown below, with a table giving the meanings of the connections.



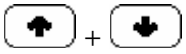
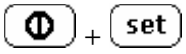
Connecting the C-PRO KILO to a V LEDi

CI connector: Control unit connection connector		
Conn.	**Abbrev.**	**Description**
CI-1	1	V LEDi power supply (12 VDC); the keypad is powered from the controller
CI-2	2	Common ground
CI-3	3	EVCO live serial port

6.1.3 V LEDi user interface

The display consists of four red digits (plus decimal points) and 6 icons; the keypad has four keys.

The following table gives the meanings of the keys:

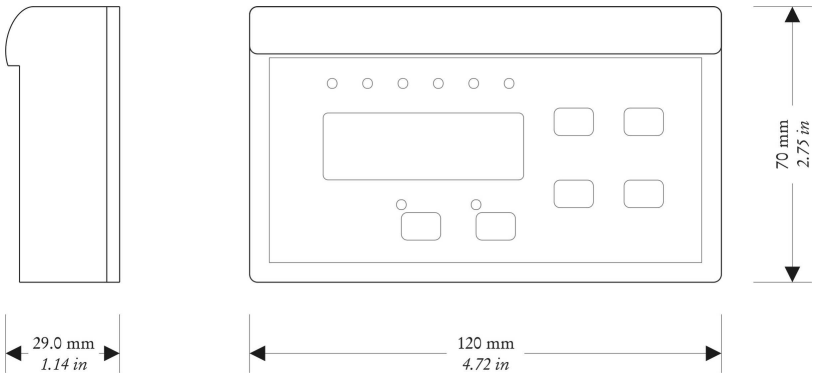
KEY	MAIN FUNCTION	OTHER
	Predefined as UP	Programmable secondary function
	Predefined as DOWN	Programmable secondary function
	Predefined as ESC	• unit off switch (held for 3 s) • delete value/return to previous menu (pressed and released)
	Predefined as ENTER	• 1st level programming command (pressed for 3 s) • confirm value/send command (pressed and released)
		project information/versions/firmware revisions (pressed for 3 s)
		2nd level programming command (pressed for 3 s)

The following table gives the meanings of the front panel LEDs:

ICON	COLOUR
Summer Icon	**Red**
Winter Icon	**Red**
Compressor Icon	**Red**
Pump Icon	**Red**
Defrost Icon	**Red**
Alarm Icon	**Red**

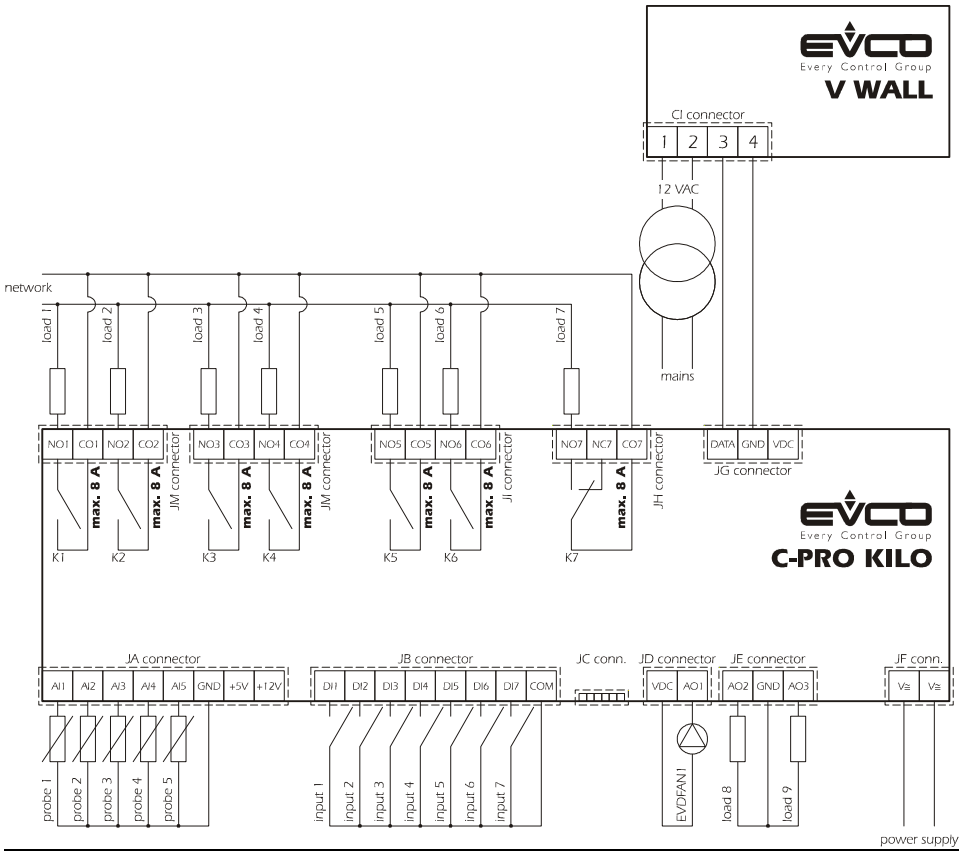
6.1.4 V WALL dimensions and installation

The V LEDi mechanical dimensions are given below; the measurements are expressed in mm (in); for fixing, use rawplugs and screws.



6.1.5 V WALL electrical connections, when the user terminal has an independent power supply

The V WALL user terminal wiring layout is shown below, with a table giving the meanings of the connections.
The maximum length for the user terminal power supply cables is 1 m; the maximum length for the C-PRO KILO to V WALL connecting cables is 30 m.
Make the connection between the C-PRO KILO module and the V WALL module using a twisted pair cable; ensuring that the cabling does not run adjacent to any high voltage components.

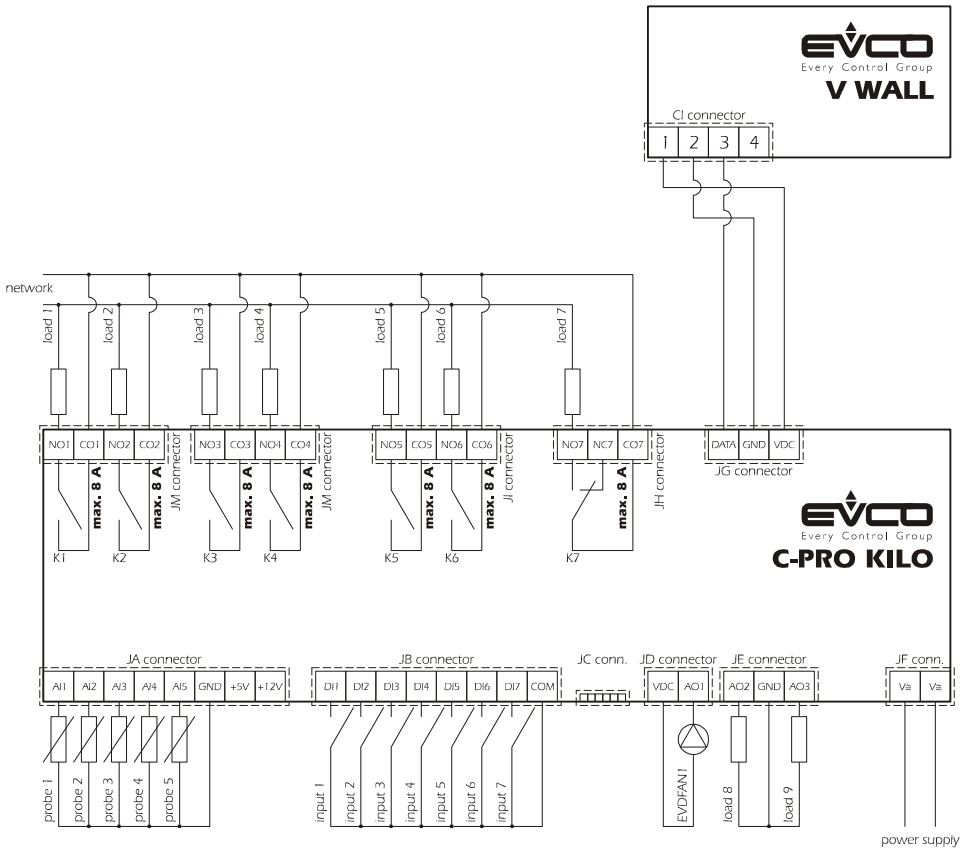


Connecting the C-PRO KILO module to the V WALL module when the user terminal has an independent power supply

CI connector: Control unit connection connector		
Conn.	**Abbrev.**	**Description**
CI-1	1	User terminal power supply (12 VAC)
CI-2	2	User terminal power supply (12 VAC)
CI-3	3	EVCO live serial port
CI-4	4	Common ground

6.1.6 V WALL electrical connections, when the user terminal is powered from the controller

The V WALL user terminal wiring layout is shown below, with a table giving the meanings of the connections.
The maximum length of the C-PRO KILO to V WALL connecting cable is 1 m.
Make the connection between the C-PRO KILO module and the V WALL module using a twisted pair cable; ensuring that the cabling does not run adjacent to any high voltage components.



Connecting the C-PRO KILO module to the V WALL module when the user terminal is powered from the controller

CI connector: Control unit connection connector		
Conn.	**Abbrev.**	**Description**
CI-1	1	User terminal power supply (12 VDC)
CI-2	2	Common ground
CI-3	3	EVCO live serial port
CI-4	4	Common ground

6.1.7 V WALL user interface

The display consists of four red digits (plus decimal points) and 6 icons; the keypad has four keys.

The following table gives the meanings of the keys:

KEY	MAIN FUNCTION	OTHER
	Predefined as UP	Programmable secondary function
	Predefined as DOWN	Programmable secondary function
	Predefined as ESC	• unit off switch (held for 3 s) • delete value/return to previous menu (pressed and released)
	Predefined as ENTER	• 1st level programming command (pressed for 3 s) • confirm value/send command (pressed and released)
		project information/versions/firmware revisions (pressed for 3 s)
		2nd level programming command (pressed for 3 s)

The following table gives the meanings of the front panel LEDs:

LED	COLOUR
L0	**Red**
L1	**Red**
L2	**Red**
L3	**Red**
L4	**Red**
L5	**Red**

6.2 Remote User interface (CAN)

The user interfaces allow to install a display and keyboard remotely far from the controller .
“V-VIEW” user interface (with a alfanumeric 4 x 20 characters LCD display) can be connected to the CAN port of the C-PRO KILO controller. On request a graphic 240 x 128 pixel LCD display (V-GRAPH) user interface is also available .

6.2.1 V-VIEW

The visualized text on the LCD display, the LEDs and key functions of the user interface are realized with UNI-PRO software development system and use a “browser” technology to load the C-PRO KILO pages and to refresh the visualized variable value. The user interface is directly interfaced with the controller without downloading any software.
The typical implemental functionality are :

- intuitive navigation with “ browser style”
- text and icon combination
- tables utilization with “scroll” possibilities.

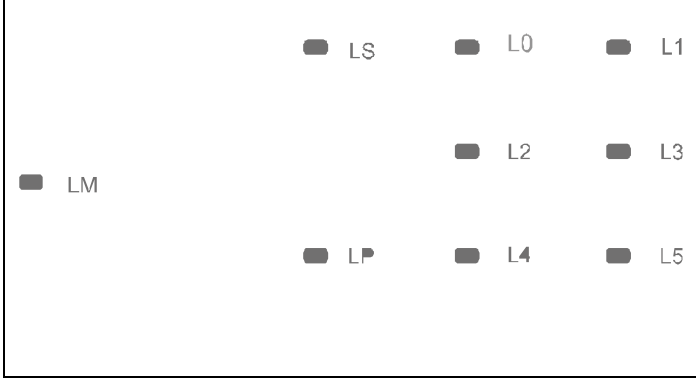
6.2.1.1 V-VIEW User Interface

V-VIEW

The following table summarizes the keyboard button meaning:

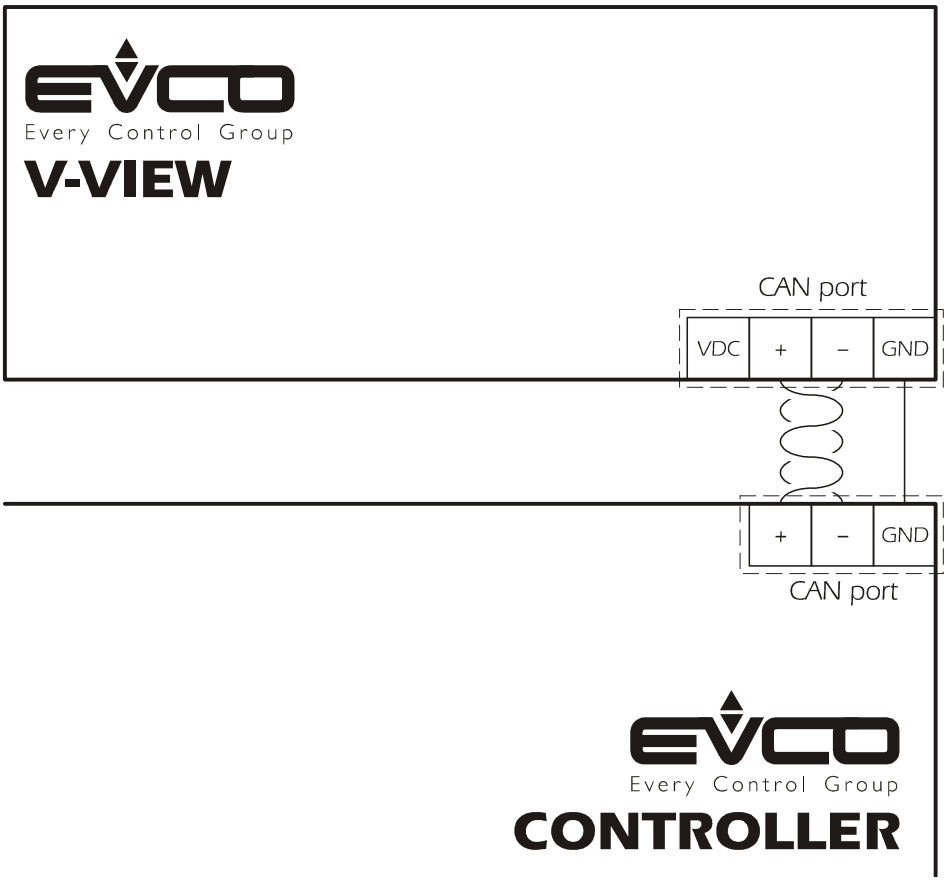
BUTTONS	MAIN FUNCTION	SECONDARY FUNCTION
↑	Predefined as UP	
↓	Predefined as DOWN	
←	Predefined as LEFT	
→	Predefined as RIGHT	
esc	Predefined as ESC	Stand-By command
↵	Predefined as ENTER	1° programming level command
K0	Programmable	Alarm reset / identification
K1	Programmable	
K2	Programmable	
K3	Programmable	
K4	Programmable	
K5	Programmable	
↑ + ↓		Controller configuration parameters command
esc + ↵		2° programming level command
← + →		3° programming level command

The following table summarizes the meaning of the LEDs on front panel :



LED	FUNCTION
LM	Predefined (blinking during the parameters configuration of the controller)
LS	Programmable
LP	Programmable
L0	Programmable
L1	Programmable
L2	Programmable
L3	Programmable
L4	Programmable
L5	Programmable

6.2.1.2 V-VIEW wiring layout



6.2.1.3 V-VIEW specifications

General specifications

Safety standards references	**EN 60730-1**
Purpose of the device	To be integrated in equipment
Electronic control device connections	Plug-in terminal block 5mm pitch for conductors up to 2.5 mm^2
Storage temperature limits	-20T70 °C (@RH<90% non-condensing)
Ambuent temperature limits	-10T60 °C 0T50 °C for version with integrated LCD (@RH<90% non-condensing)
Electrical shock protection classification	An integrated control device takes up the classification of the equipment which it is integrated with
PTI of insulation materials used	>250

Housing

Installation	Pannel mounting
Housing	160 x 160 mm

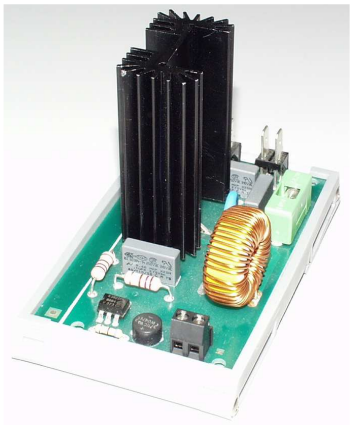
Electrical specifications

Power supply	Main (input)	12Vdc, 0.2A
CPU	Microprocessor	16 bit
	Oscillator frequency	16 MHz
EEPROM	Memory for parameters	256 byte
	Number	**1**

Serial CAN Communication	Type	CAN V2.0B not optoisolated
	Physical Layer	2 wires + common, ISO 11898 standard
	Baud rate (L max. = 10 m)	20K
	Baud rate (L max. = 5 m)	50K
	Baud rate (L max. = 2 m)	125K
	Baud rate (L max. = 1 m)	500K
	Connector	Sconnectable terminals
	Note: baud rate can be selected by parameter *Note: The physical level of the CAN consists of a cable with twisted pair (both shielded and not shielded). The terminator's impedance is 120Ω. A second cable with twisted pairis used for feeding and common (ground)*	
Buzzer	Number	**1**
LCD Dispay	4 x 20 alfanumeric backlight	1
Keyboard	Buttons	12
	Led	9

6.3 EVDFAN1 phase chopping speed regulator

The EVDFAN1 is a phase chopping speed regulator for controlling single phase fans (fans with a maximum nominal current consumption of 5 A).
It is ideal for controlling refrigeration control unit condensation/evaporation fans.
To be able to use the EVDFAN1 phase chopping module, it is essential the controller be powered using AC current; the phase feeding the controller must be the same as that feeding the module.

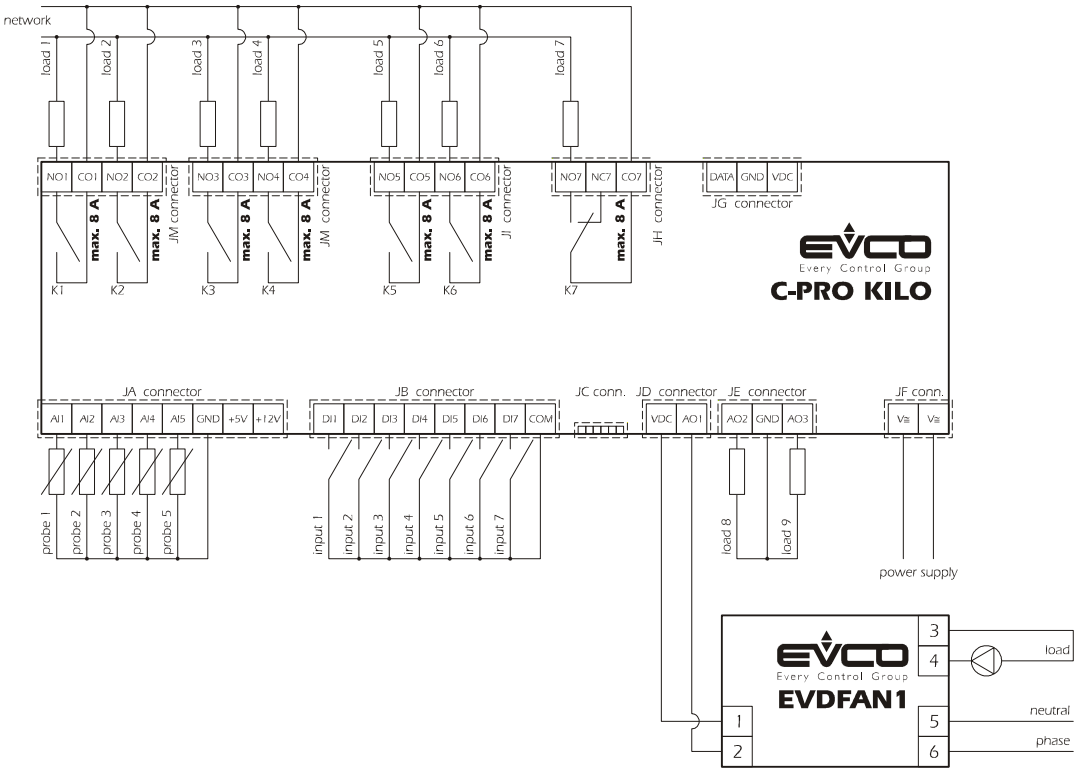


EVDFAN1
Phase chopping speed regulator

The fan module is available as an open case model and is mounted onto a plastic base adapted for fixing onto a DIN rail.

6.3.1 EVDFAN1 electrical connections (wiring)

The EVDFAN1 module wiring layout is shown below, with a table giving the meanings of the connections.



Connecting the C-PRO KILO to an EVDFAN1 module

Terminals 1 and 2: Control input (Phoenix detachable terminal block)		
Terminal	**Abbrev. on the controller**	**Description**
1	VDC	Phase chopping module power supply (12 VDC)
2	AO1	Phase chopping control input

Terminals 3, 4, 5 and 6: Power connectors (FAST-ON)		
Conn.	**Abbrev.**	**Description**
3	-	Load
4	-	Load (Neutral)
5	-	230 VAC neutral
6	-	230 VAC live

Example:
VAC = 230 VAV
I max. = 5 A
VA (max.) = 230 x 5 = 1150 VA
W (max.) = 230 x 5 x cosφ = 1150 W if cosφ = 1

6.4 Control and monitoring accessories

These modules allow the conversion of signals from TTL to RS-485 (with or without optoisolation) for control by means of the MODBUS protocol.
The modules are connected to the specific AMP Micro-match 6 pin connector located on the controller; this connector is shared with the parameter programming key and the tools for programming the controller flash memory.

6.4.1 Non-optoisolated TTL/RS-485 interface

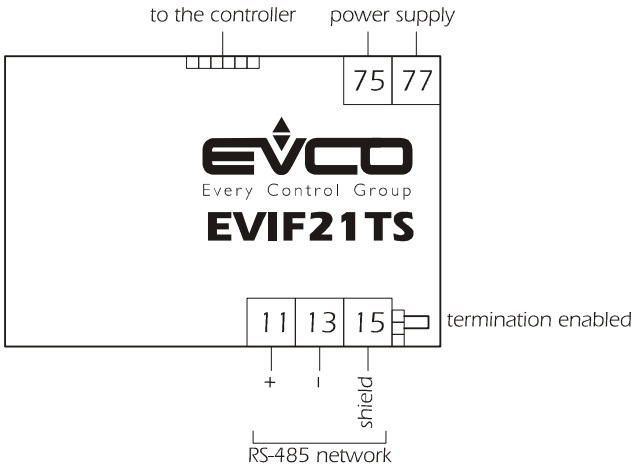
EVIF20TSX
Non-optoisolated TTL/RS-485 interface

6.4.2 Optoisolated TTL/RS-485 interface

EVIF21TS7I
Optoisolated TTL/RS-485 interface

6.4.3 EVIF21TS7I electrical connections

The EVIF21TS7I interface wiring layout is shown below, with a table giving the meanings of the connections.



Connector		
Conn.	**Abbrev.**	**Description**
11	+	RS-485 (+)
13	-	RS-485 (-)
15	shield	screen
75	power supply	230 VAC
77	power supply	230 VAC

6.5 Programming accessories

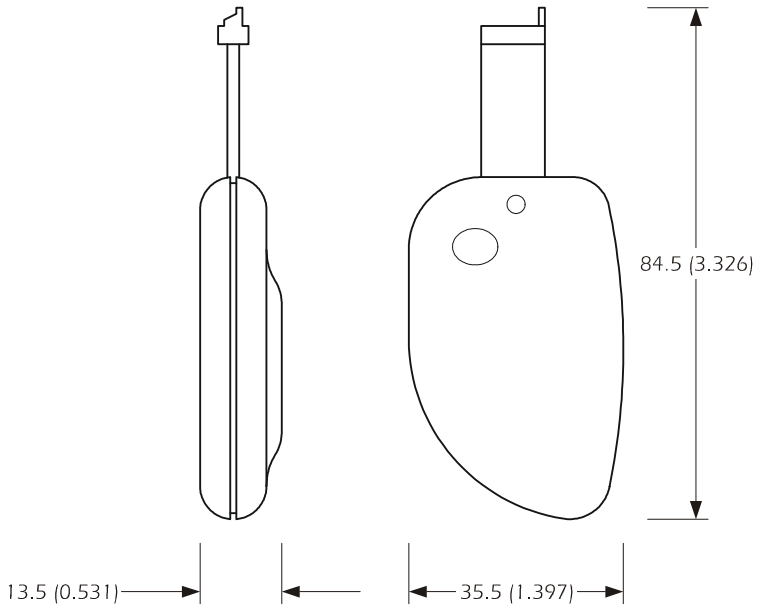
6.5.1 EVKEY programming key

The EVKEY programming key allows configuration parameters to be downloaded/uploaded (even with the controller not powered up; in this case it is necessary to use the EVPS power supply).
The key is connected to the specific AMP micro-match 6 pin connector, also used for monitoring and programming.

EVKEY
Programming key

6.5.2 EVKEY dimensions

The mechanical dimensions of the EVKEY are indicated below; the measurements are expressed in mm (in).



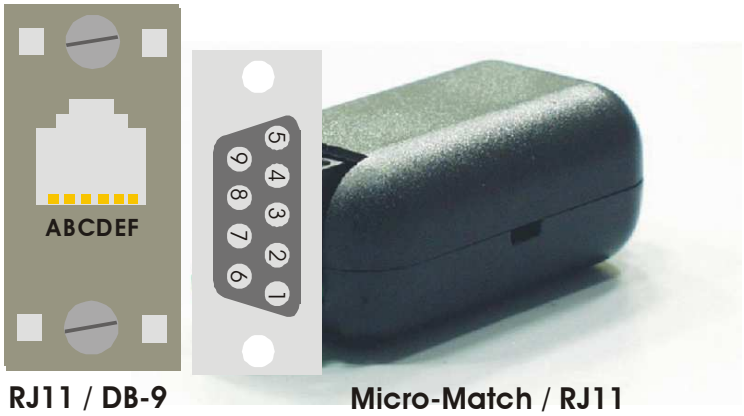
6.5.3 EVPROG programming kit

The EVPROG programming kit allows programs to be downloaded to the C-PRO KILO controller flash memory (even with the controller not powered up; in this case, it is necessary to use the EVPS power supply).
The EVPROG is connected to the specific AMP micro-match 6 pin connector, also used for the parameter programming key and/or supervision.
The kit consists of the following components:

1. EVIF20TRX interface.
2. PONY PROG tray adapter (9 pin – RJ 11).
3. ECCC506 telephony cable.

Configuring the EVPROG kit hardware:

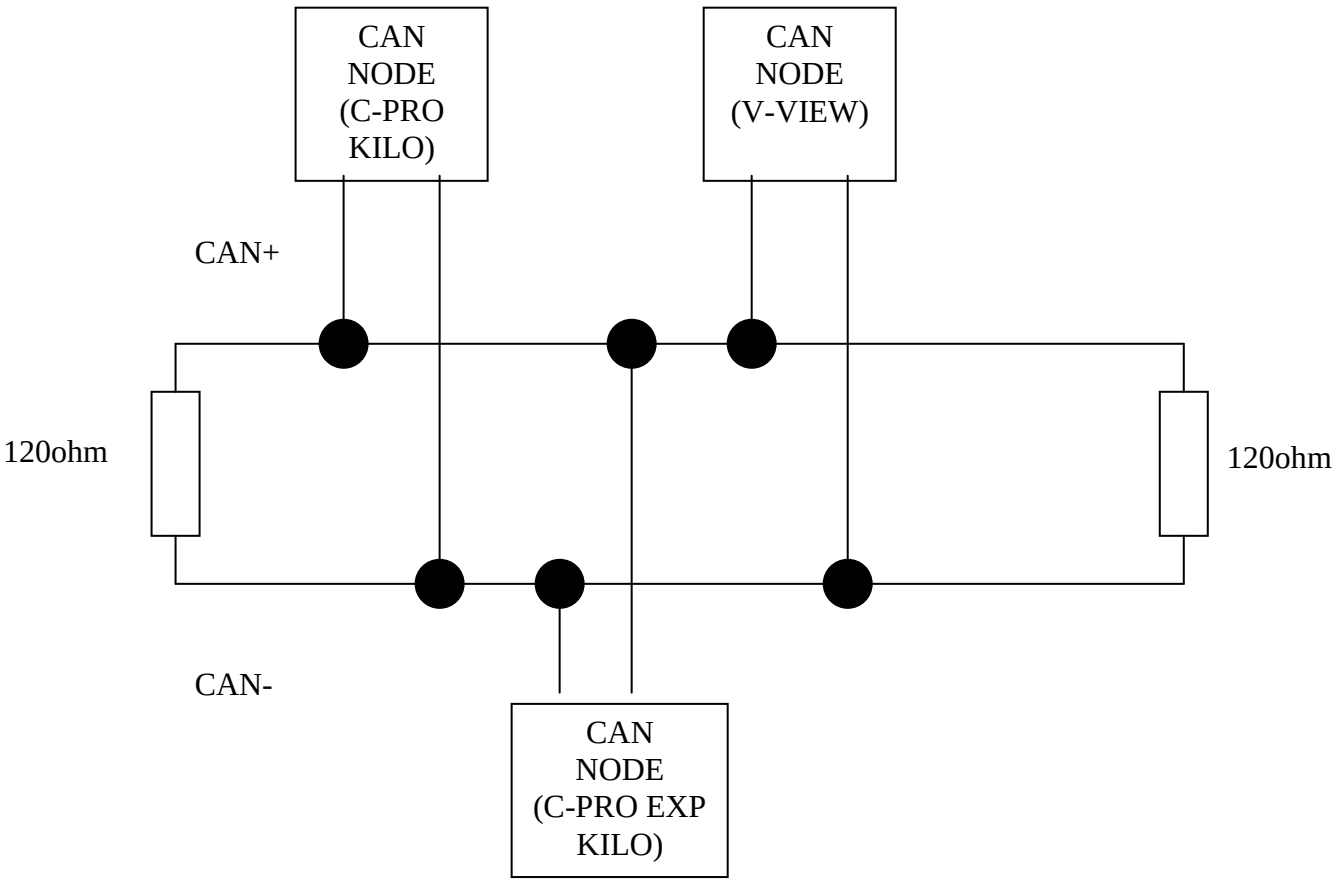
1. Connect the PONY PROG tray adapter to the computer serial port.
2. Connect the EVIF20TRX interface to the controller AMP micro-match connector.
3. Connect one end of the ECCC506 telephony cable to the Pony Prog tray adapter, and the other end to the EVIF20TRX interface.



EVPROG
Programming kit

7 CAN Connection

C-PRO KILO can be connected to other controllers, to expansion modules and to one or more user interfaces using either local or wide CAN serial port. The CAN bus uses the ISO 11898 standard, a balanced two-wire communication very similar to the RS 485 standard.
Resistors with a recommended rating of 120-124 ohm have to be fitted at each end of the bus.



If connection is established through the Local CAN bus, it is possible to power a user interface using the 4-terminal connector, according to the following table:

C-PRO KILO	V-VIEW User Interface
	PA 1 (VCD) needs independent power supply
C3-1 (CAN+)	PA 2 (CAN+)
C3-3 (CAN-)	PA 3 (CAN-)
C3-2 (GND)	PA 4 (GND)

The maximum number of expansions and user terminals is 32.

The maximum number of controllers for the user terminal V-VIEW is 2.

7.1 Notes on the parameter of the controller relative to the CAN net configuration

To log on the controller parameters configuration procedure relative to the analogic output act in the following way :

Both for the remote or built-in user interface :

1. Ensure that the controller and the user interface are both switched on and no utilization is connected with the analogic output
2. Keep pressed at the same time and buttons for two seconds : the first available voice will be visualized (the voices are relative to the controller; for the voices relative to the user interface repeat the selection from “reset”).

To select the controller parameters relative to the CAN network configuration:

1. Press and release button to select “CAN” voice.
2. Press and release button: if the controller is visualizing the net parameters, the voice “Input Password” will be visualized: in this case see the following 3. and 4. (in opposite case see directly point 5.).
3. Press and release button: the cursor blinking.
4. Press and release button to set “ -19”.
5. Press and release button: the first voice available will be visualized.

To select a parameter:

1. Press and release button

To modify a parameter:

1. Press and release button: the cursor blinking.
2. Press and release or buttons to select the value
3. Press and release button to confirm the selection done.
4. Switch – off the controller.

For a quick closing procedure :

1. Press and release repeatedly button

The main parameters of the CAN net are the following :

- "My Node" (represents the data sender ID)
- "Network Node" (represents the receiver ID)
- Baud rate (represent the data transmissions speed; initially it can be useful to let this value set at "Auto"; in this way the device will try to connect a few time with different speed)
- Master (represents network operation) when instrument is set as master it checks device network to find Devices presence. A controller with I/O expansions needs to have MASTER = TRUE.

Predefined value :

- the parameter My Node for a controller is set at 1
- the parameter My Node for an expansion is set at 2
- the parameter My Node for a user interface is set at 99.

Every device in the network represents a knot (the maximum knot numbers are 32); each knot has an ID (the Id range is from 1 to 127).

Every device in the network has to be set as regards the network components through "Network Node" parameters.

Example:
If a controller, an expansion and a user interface are installed, set the following value on the controller in the following way :

1. Assign at "Network Node 1" the address "2" (expansion).
2. Assign at "Network Node 2" the address "99" (user interface).

Repeat the same operations for the expansion and the user interface.

ATTENTION: the parameters as regards the net could be overwritten by the application software.

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