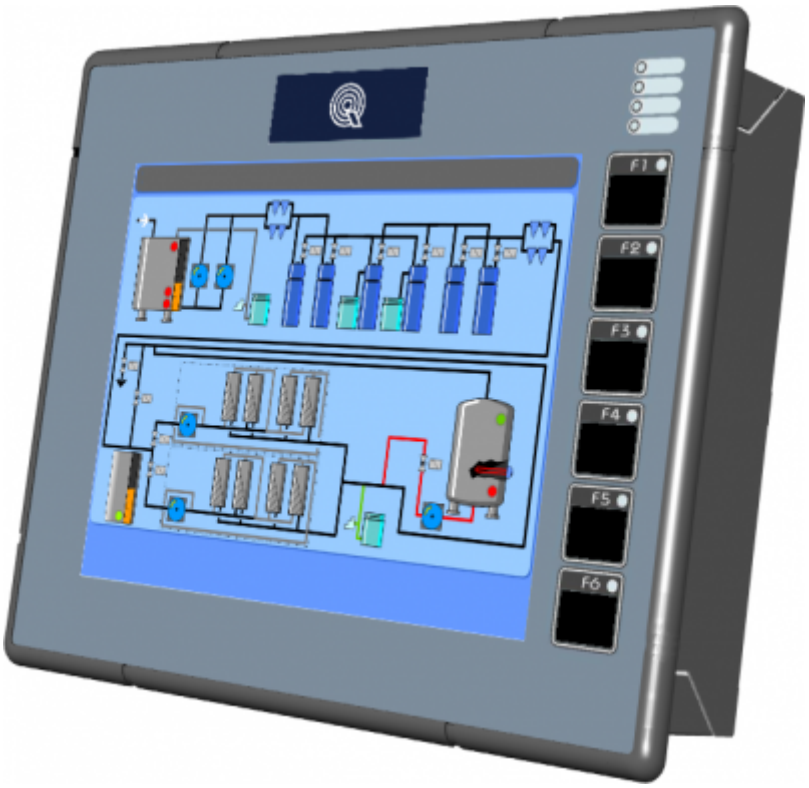
Índice

J1-P44-Fx BASE



Informations

Document	**MIMJ1P44FxBASE**
Description	Installation and maintenance manual
Drawn up	Riccardo Furlato
Approved	Gabriele Bazzi
Link	http://http://www.qem.eu/doku/doku.php/en/strumenti/qmoveplus/j1p44/mimj1p44fx_base
Language	English

Release	Release Hardware	Description	Notes	Date
01	01	New manual		22/09/2016

The controller has been designed for industral environments in conformity to EC directive 2004/108/CE.

- EN 61000-6-4: Electromagnetic compatibility - Generic standard on emission for industrial environments
  - EN55011 Class A: Limits and measurement methods
  - EN 61000-6-2: Electromagnetic compatibility - Generic standard on immunity for industrial environments
    - EN 61000-4-2: Electromagnetic compatibility - Electrostatic discharge immunity
    - EN 61000-4-3: Immunity to radiated, radio-frequency electromagnetic field
    - EN 61000-4-4: Electrical fast transients
    - EN 61000-4-5: Surge immunity
    - EN 61000-4-6: Conducted disturbance induced by radio-frequency
    - Moreover the product is conform to the following standards:
      - EN 60529: Housing protection rating IP64
      - EN 60068-2-1: Environmental testing: Cold
      - EN 60068-2-2: Environmental testing: Dry heat
      - EN 60068-2-14: Environmental testing: Change of temperature
      - EN 60068-2-30: Environmental testing: Cyclic damp heat
      - EN 60068-2-6: Environmental testing: Sinusoidal vibration
      - EN 60068-2-27: Environmental testing: Shock vibration
      - EN 60068-2-64: Environmental testing: Random vibration

1. Description

J1-P44-F is a combo HMI-PAC controller of the Qmove+ range.

1.1 Product Identification

	**The Ordering Code provides the exact product features.** **Make sure that the product features meet your requirements.**

1.1.1 Product Label

- **a - Ordering Code**
- **b - Week made**: indicates the week and year of manufacture
- **c - Part number**: unique code that identifies an ordering code
- **d - Serial number**: product serial number, different for individual product
- **e - Hardware release**: version of hardware release

1.1.2 Ordering Code

Model				Features				
J1	-	**P44**	-	**FA**	-	**10**	/	**TP01**
								TP00 = Keypad code (TP00 = panel with resistive, logo and custom function keys; **TP01** = panel with resistive touch-screen, logo and QEM standard function keys
						10 = Firmware version (00 = not installed)		
				F = Technology level **A** = Hardware version				
		P = Basic keypad (only function keys) **4** = 8” LCD graphic display, TFT-256 COLORI-800x600px; front panel dimensions (240x192mm); keypad 6 keys + 10 led; housing to DIN 43700; **4** = Firmware-hardware correspondence						
J1 = “HMI+PLC” Qmove family								

1.1.3 Hardware Versions

These are hardware versions currently available:

		Hardware versions							
		A	**B**	**C**	**E**	**F**	**H**	**I**	**Y**
Base card	**USER PORT (RS232-422-485)**	-	-	-	-	-	1	-	1
	AUX PORT (RS485)	1	1	1	1	1	1	1	1
	CAN1 PORT	1	1	1	1	1	1	1	1
	CAN2 PORT [1)]	-	-	-	-	-	-	-	-
	ETHERNET PORT	1	1	1	1	1	1	1	1
	USB PORT	1	1	1	1	1	1	1	1
	Standard digital inputs	16	16	16	16	16	16	16	16
	16bit selectable analog input(0-10V, 0-20mA, potentiometer, thermocouples, PT100)	2	2	2	2	2	2	2	2
	200kHz two-way count inputs, ABZs(24V-PP, 5V-LD)	-	2	4[2)]	2	4[3)]	4[4)]	4[5)]	4[6)]
	SSI counts	-	-	-	-	-	-	-	2
	Protected digital outputs	16	16	16	16	16	16	16	16
	Stepper outputs	-	-	-	-	-	-	-	2
	+/-10V, 16bit analog outputs	-	2	4	2	4	4	4	4
Card software code declared in Base card		1QM4F							
Specialist card	**Digital input**	-	-	-	16	16	-	16	-
	Selectable 16bit analog input(0-10V, 0-20mA, potent., thermoc., PT100)	-	-	-	-	2	-	2	-
	Protected digital outputs	-	-	-	16	16	-	16	-
	+/-10V, 16bit analog outputs	-	-	-	-	-	-	2	-
	200kHz two-way count inputs, ABZs(24V-PP, 5V-LD)	-	-	-	-	-	-	2	-
Card software code declared as specialist card		-	-	-	1MG2F	1MG2F	-	1MG2F	-

[1)] option not currently enabled
[2), 3), 4), 5), 6)] 2 of the "Z" inputs can be used as frequency meters in the "FREQ" device

1.1.4 Expansion Board Manuals

1MG2F rel.01

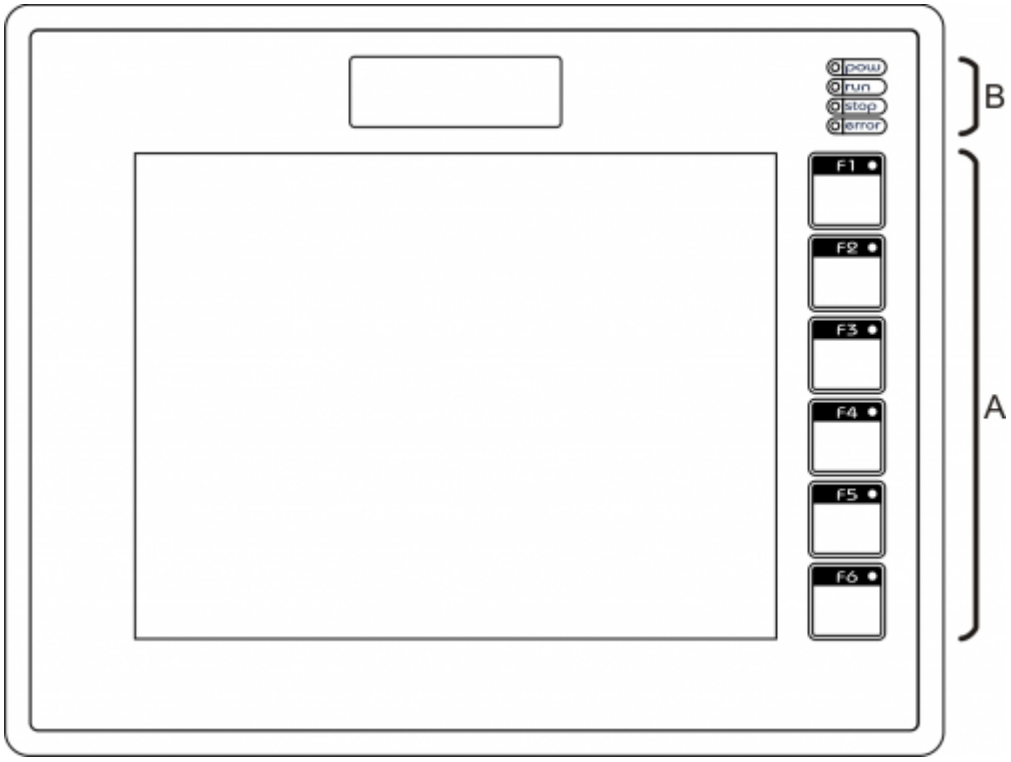
1.1.5 Firmware versions

Version	Description
10	Fully programmable with PLC functions
20	Fully programmable with PLC and Motion control functions
30	Fully programmable with PLC, Motion control, Camming and Interpolation functions

For more details about the firmware, consult Devices enabled in the controllers.

1.2 Product Configuration

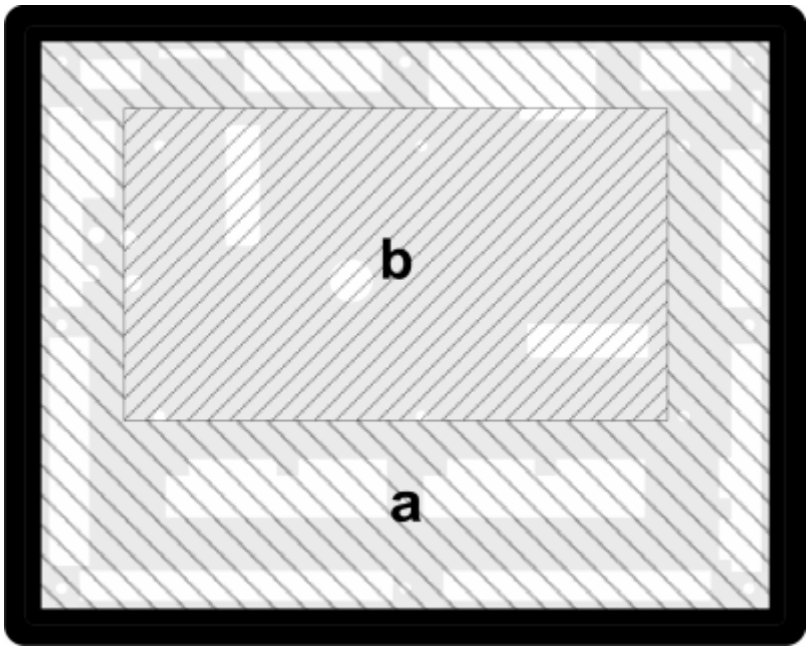
1.2.1 Front Panel



A) Function keys and led's
B) System led's

1.2.2 Back terminal blocks

J1-P44-F composed of a “base” card and an “expansion” card.



- **a** = Base card
- **b** = Expansion card

2. Technical features

2.1 General Features

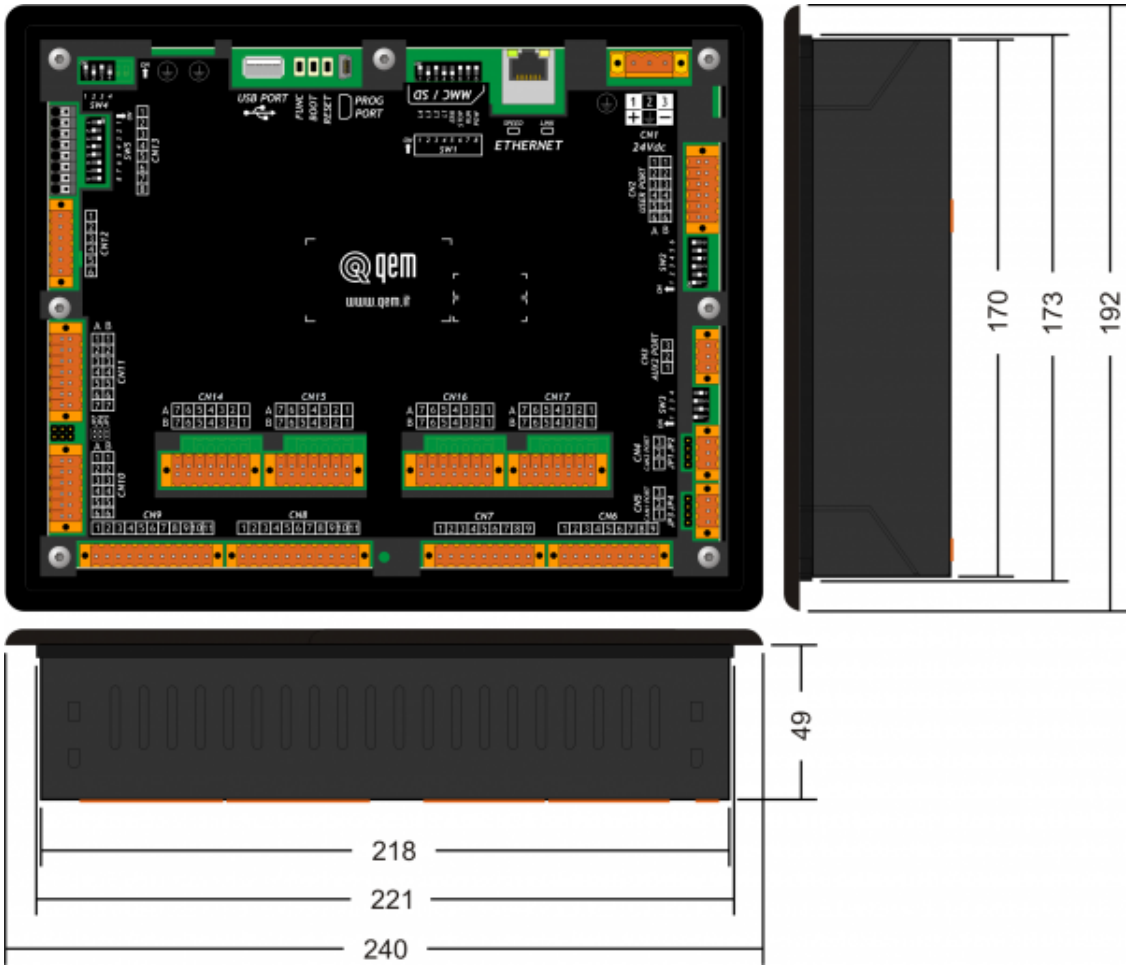
Weight (full hardware)	1.2Kg
Housing	Sheet metal
Front panel	Alluminium
Outer Frame	Self-extinguishing Noryl
Display	8'' LCD TFT 256 colours - 800*600px
Touch screen	4-wire Resistive
Display dimensions	162.0 x 121.5mm / 8“
User led's	6
System led's	4
Function keys	6
System keys	3
Operating temperature	0 ÷ 50°C
Transport and storage temperature	-25 ÷ +70 °C
Relative humidity	90% condensate free
Altitude	0 - 2000m a.s.l.
Front protection rating	IP64

2.2 CPU (F level technology)

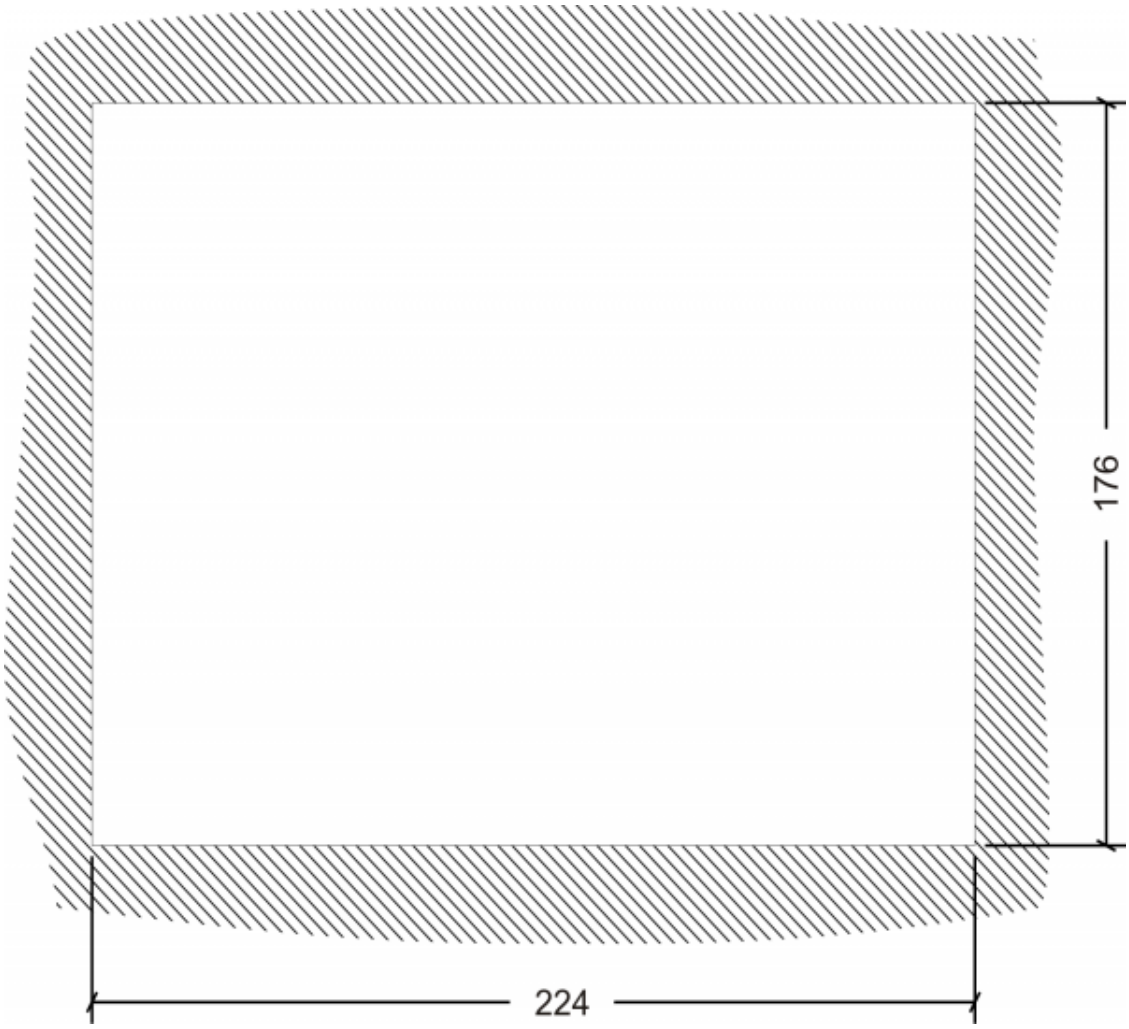
RISC microprocessor (32 bit)	
Work frequency	200MHz
RAM	32MB
Flash	16MB

2.3 Dimensions

	Lengths in mm

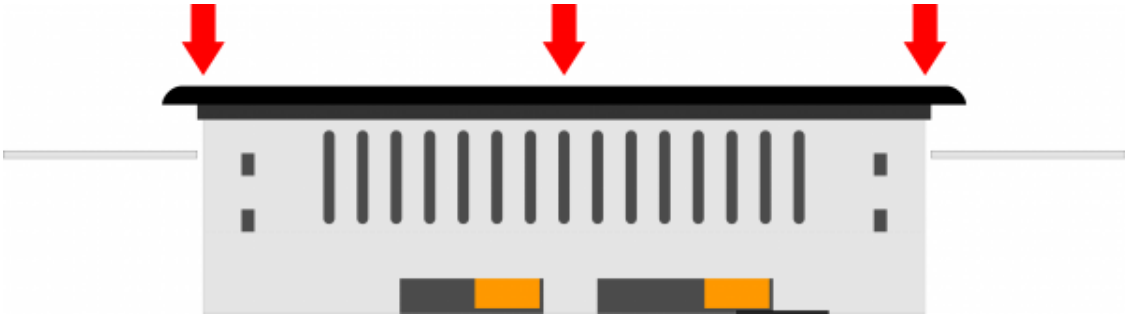


2.4 Hole template

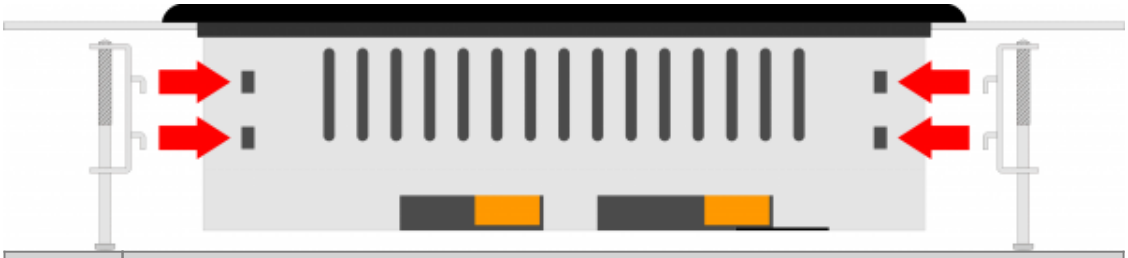


2.5 Installation

Fit the controller in the hole.

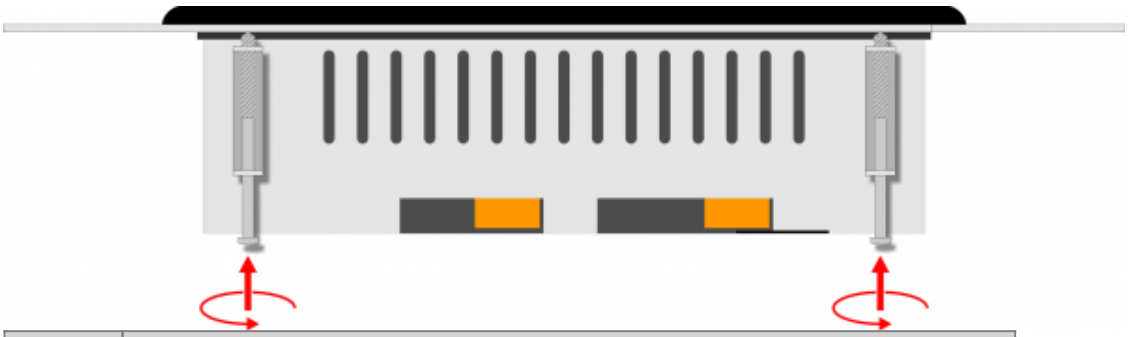


Apply the brackets.



Before fixing the controller, check it is mounted firmly in the hole and the gasket under the frame makes a good seal. No liquids must enter and the frame must not deform.

Screw the controller in place.



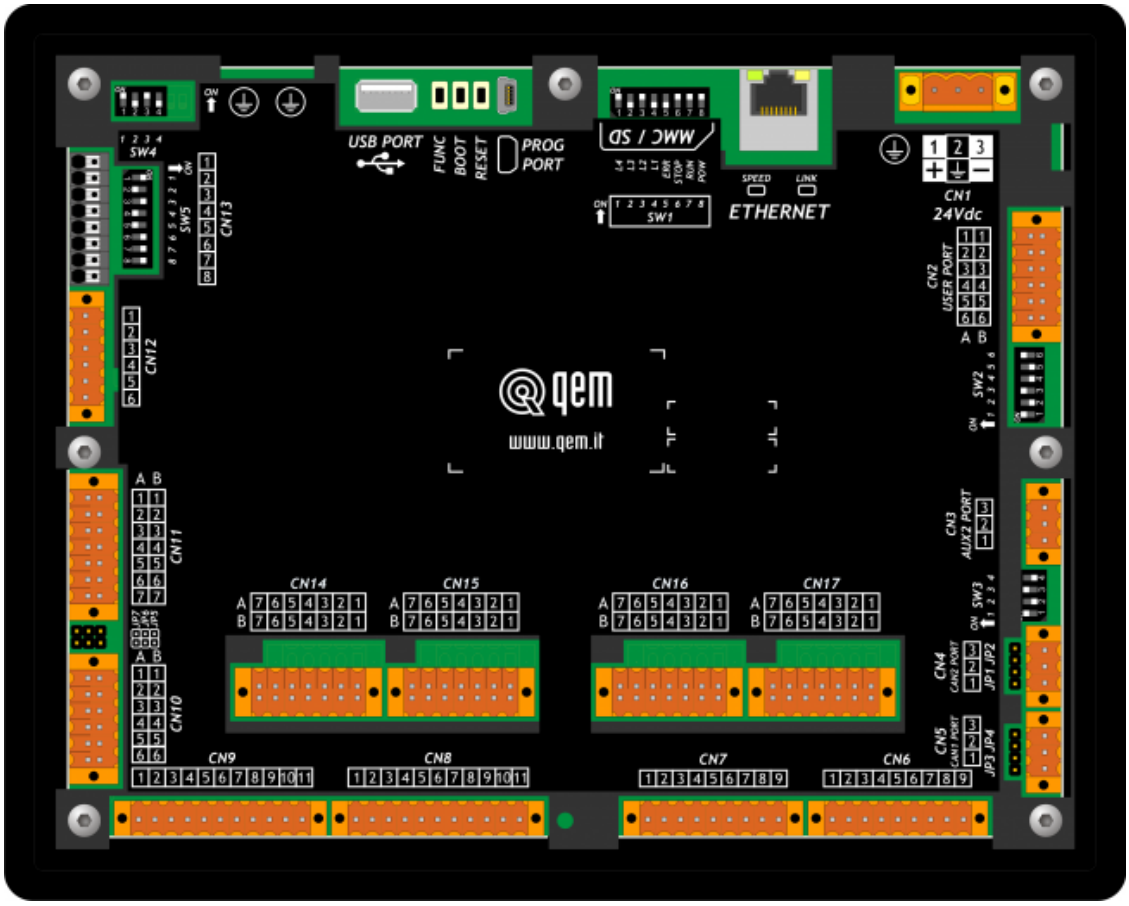
Warning: after putting the pin of fixing, do only half rotation to not tear the frame!

3. Base card wiring

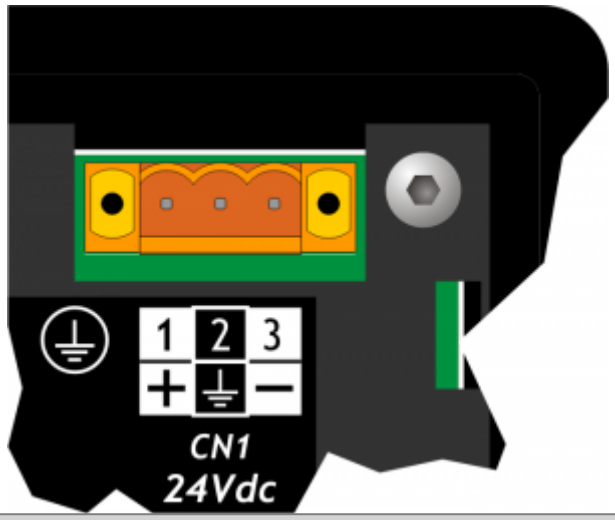
	For details about cable sections and connectors, see application note AN021

.

	The electrical features are given in paragraph Electrical features. **The connection examples are provided in paragraph Connection examples**



3.1 Power supply

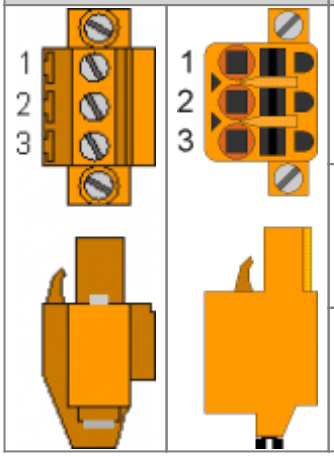


	The cabling must be carried out by specialist personnel and fitted with suitable anti-static precautions. **Before handling the controller, disconnect the power and all parts connected to it.** **To guarantee compliance with EC regulations, the power supply must have a galvanic isolation of at least 1500Vac.**

.

Power supply	**24 Vdc**
Voltage range	22 - 27 Vdc
Max. absorption	10W

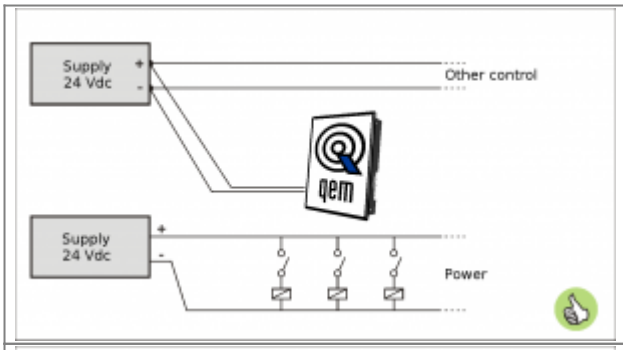
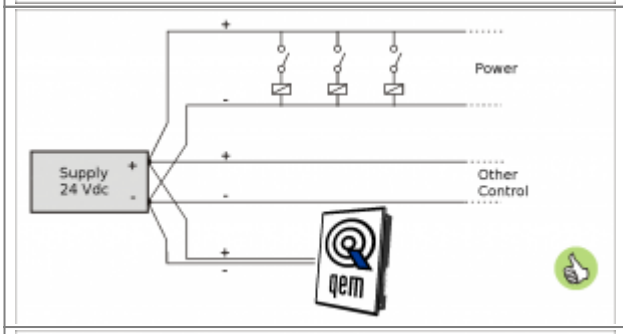
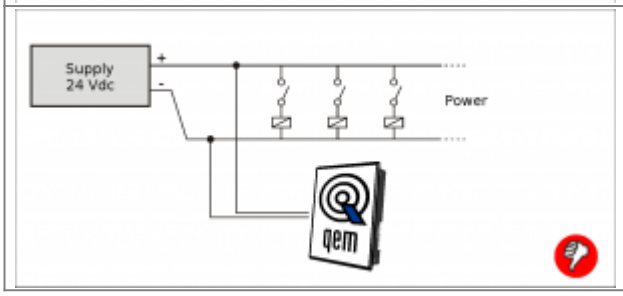
Connector

CN1	**Terminal**	**Symbol**	**Description**
	1	+	DC power positive
	2	**GROUND**	Gnd-PE (signals)
	3	−	DC power 0V

Connection examples

	Use an isolated power unit with 24Vdc +/-5% output conform to EN60950-1.

.

	Use two separate power units: one for the control circuit and one for the power circuit
	For a single power unit, use two separate lines: one for the control and one for the power
	DO NOT use the same lines for the power circuit and the controller

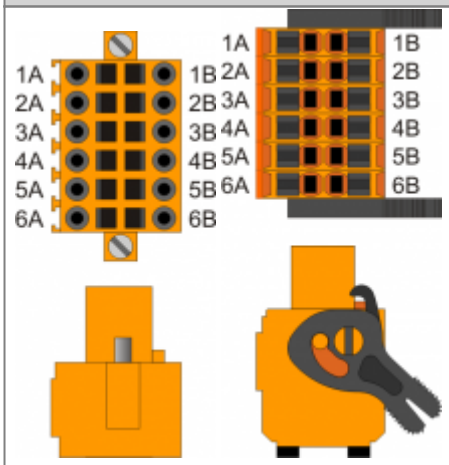
3.2 Serial Port Connections

3.2.1 PROG PORT (USB mini-B)

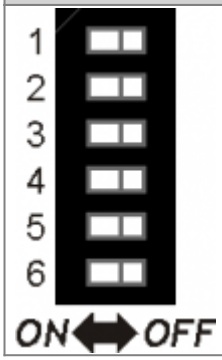
PROG PORT	Description
	Serial port used for the transfer and debugging of the application program in the CPU. Use only with IQ009 or IQ013.

3.2.2 USER PORT

USER PORT connector

CN2	Terminal	RS232	RS422	RS485	Description
	1A	-	-	A	Terminal A - RS485
	2A	-	-	B	Terminal B - RS485
	3A	0V	0V	0V	USER PORT common
	4A	0V	0V	0V	USER PORT common
	5A	TX	-	-	Terminal TX - RS232
	6A	Ground			
	1B	-	RX	-	Terminal RX - RS422
	2B	-	RXN	-	Terminal RX N - RS422
	3B	-	TX	-	Terminal TX - RS422
	4B	-	TXN	-	Terminal TX N - RS422
	5B	RX	-	-	Terminal RX - RS232
	6B	Ground			

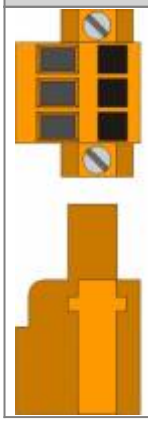
USER PORT electrical standard setting

SW2	Num. Dip	Name DIP	Setting dei DIP			Function
	1	JP2	ON	X[1)]	X[2)]	Termination RS485
	2	JP3	ON	X[3)]	X[4)]	Polarisation RS485
	3	JP1	ON	X[5)]	X[6)]	
	4		OFF	ON	OFF	USER PORT electrical standard selection
	5		ON	OFF	OFF	
	6		OFF	OFF	ON	
			RS485	**RS422**	**RS232**	

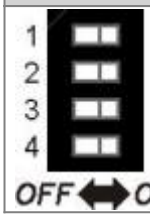
[1), 2), 3), 4), 5), 6)] X = not significant setting

3.2.3 AUX PORT

Connector

CN3	Terminal	Symbol	Description
	1	0V	RS485 serial common
	2	B	Terminal RS485 B
	3	A	Terminal RS485 A

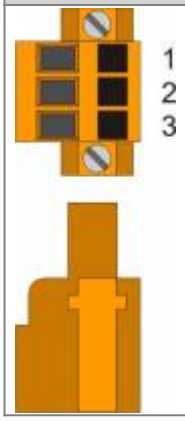
Setup of AUX2 PORT polarisation and termination resistances

SW3	Num. Dip	Name Dip	Setting of DIP	Function
	1	JP3	ON	Polarisation RS485
	2	JP2	ON	Termination RS485
	3	JP1	ON	Polarisation RS485
	4		X[1)]	None

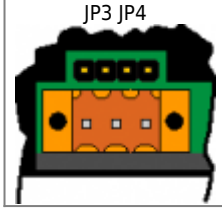
[1)] X = setting not significant

3.2.3.1 CANbus PORT

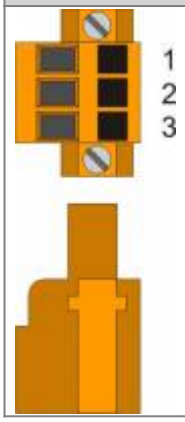
Connector

CN5 CAN1 PORT	Terminal	Symbol	Description
	1	0V	CAN common
	2	CAN L	Terminal CAN L
	3	CAN H	Terminal CAN H

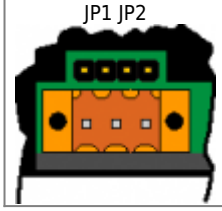
Termination resistor setting

	Name jumper	Setting of DIP	Function
JP3 JP4 	JP3	INSERTED	Termination CAN active
	JP4		

Connector

CN4 CAN2 PORT	Terminal	Symbol	Description
	1	0V	CAN common
	2	CAN L	Terminal CAN L
	3	CAN H	Terminal CAN H

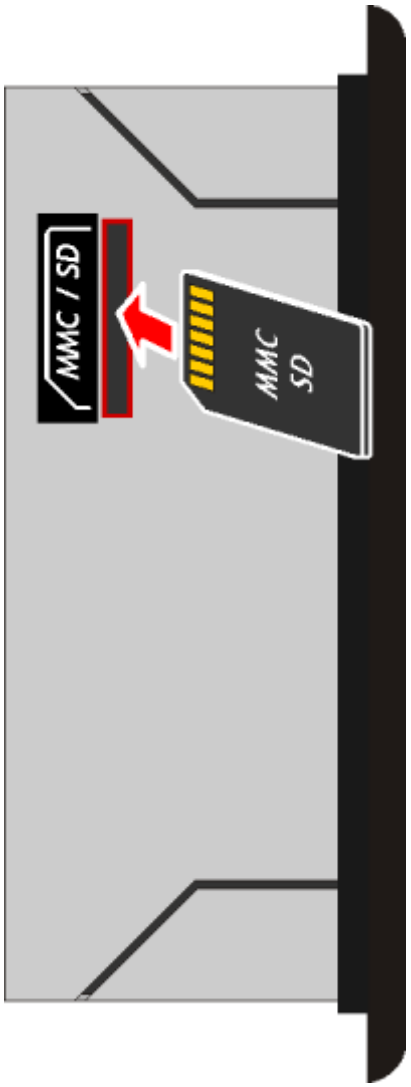
Termination resistor setting

	Name jumper	Setting of DIP	Function
JP1 JP2 	JP1	INSERTED	Termination CAN active
	JP2		

3.2.4 ETHERNET port

ETHERNET PORT	Description
	Connector RJ45. LED: * LINK: green led = cable connected (led on signals the cable is connected to both ends) * DATA: yellow led = data transmission (flashing led signals data transmission)

3.2.5 MMC/SD

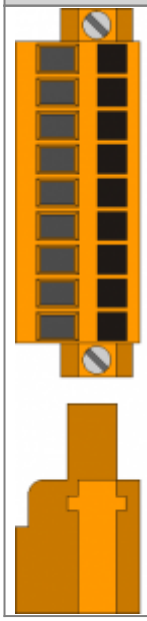


Memory card slot (marked by an arrow)

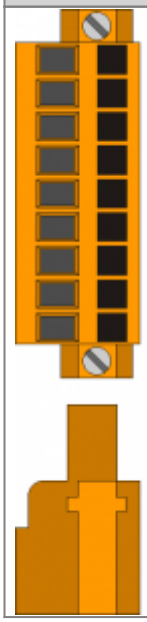
3.2.6 USB

3.3 Digital Inputs

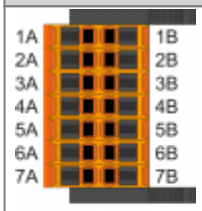
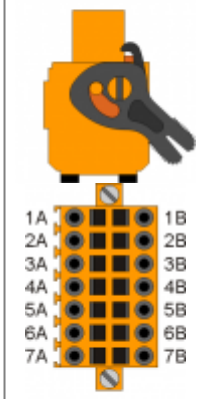
3.3.1 16 Digital inputs, PNP

CN7	Terminal	Symbol	Description	Addres
	1	0V	Common for digital inputs	
	2	I1	Input I1	2.INP01
	3	I2	Input I2	2.INP02
	4	I3	Input I3	2.INP03
	5	I4	Input I4	2.INP04
	6	I5	Input I5	2.INP05
	7	I6	Input I6	2.INP06
	8	I7	Input I7	2.INP07
	9	I8	Input I8	2.INP08

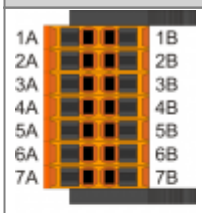
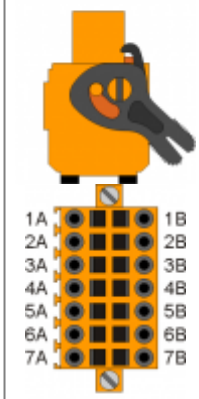
.

CN6	Terminal	Symbol	Description	Address
	1	0V	Common for digital inputs	
	2	I9	Input I9	2.INP09
	3	I10	Input I10	2.INP10
	4	I11	Input I11	2.INP11
	5	I12	Input I12	2.INP12
	6	I13	Input I13	2.INP13
	7	I14	Input I14	2.INP14
	8	I15	Input I15	2.INP15
	9	I16	Input I16	2.INP16

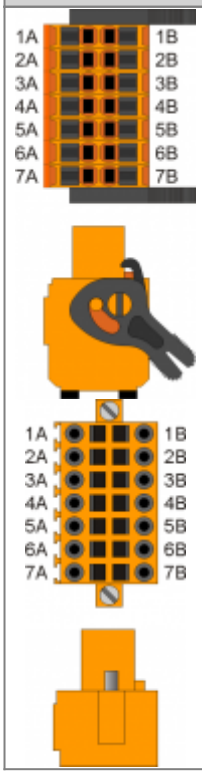
3.3.2 4 two-way count inputs, 200KHz

CN14	Terminal	Symbol	Description		Address	
	1A		Output + 24V dc[1]			
	2A	PHA1	Phase A	Count 1 PNP / Push-Pull[2]	2.INP17	2.CNT01
	3A	PHB1	Phase B		2.INP18	
	4A	Z1	Z		1.INT01	
	5A	0V	Common for count inputs			
	6A	0V				
	7A	0V				
	1B		Output + 24V dc[3]			
	2B	PHA1+	+ PHA	Count 1 Line Driver	2.INP17	2.CNT01
	3B	PHB1+	+ PHB		2.INP18	
	4B	Z1+	+ Z		1.INT01	
	5B	PHA1-	- PHA			
	6B	PHB1-	- PHB			
	7B	Z1-	- Z			

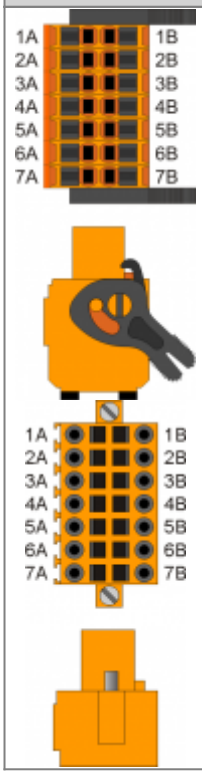
[1, 3] Used to power the encoder. See Connection examples.
[2] **PNP/Push-Pull type count input configuration**:
Terminal 5B: connect to terminal 5A
Terminal 6B: connect to terminal 6A
Terminal 7B: connect to terminal 7A

CN15	Terminal	Symbol	Description		Address	
	1A		Output + 24V dc[1]			
	2A	PHA2	Phase A	Count 2 PNP / Push-Pull[2]	2.INP19	2.CNT02
	3A	PHB2	Phase B		2.INP20	
	4A	Z2	Z		1.INT02	
	5A	0V	Common for count inputs			
	6A	0V				
	7A	0V				
	1B		Output + 24V dc[3]			
	2B	PHA2+	+ PHA	Count 2 Line Driver	2.INP19	2.CNT02
	3B	PHB2+	+ PHB		2.INP20	
	4B	Z2+	+ Z		1.INT02	
	5B	PHA2-	- PHA			
	6B	PHB2-	- PHB			
	7B	Z2-	- Z			

[1, 3] Used to power the encoder. See Connection examples.
[2] **PNP/Push-Pull type count input configuration**:
Terminal 5B: connect to terminal 5A
Terminal 6B: connect to terminal 6A
Terminal 7B: connect to terminal 7A

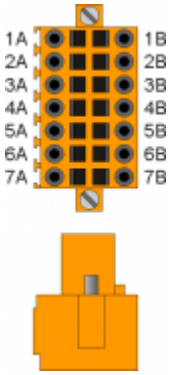
CN16	Terminal	Symbol	Description		Address	
	1A		Output + 24V dc[1)]			
	2A	PHA3	Phase A	Count 3 PNP / Push-Pull[2)]	2.INP21	2.CNT03
	3A	PHB3	Phase B		2.INP22	
	4A	Z3	Z		1.INT03	FREQ1[3)]
	5A	0V	Common for count inputs			
	6A	0V				
	7A	0V				
	1B		Output + 24V dc[4)]			
	2B	PHA3+	+ PHA	Count 3 Line Driver	2.INP21	2.CNT03
	3B	PHB3+	+ PHB		2.INP22	
	4B	Z3+	+ Z		1.INT03	FREQ1[5)]
	5B	PHA3-	- PHA			
	6B	PHB3-	- PHB			
	7B	Z3-	- Z			

[1), 4)] Used to power the encoder. See Connection examples.
[2)] **PNP/Push-Pull type count input configuration**:
Terminal 5B: connect to terminal 5A
Terminal 6B: connect to terminal 6A
Terminal 7B: connect to terminal 7A
[3), 5)] Can be used as frequency input for a FREQ device, indicating 1 in the device declaration

CN17	Terminal	Symbol	Description		Address	
	1A		Output + 24V dc[1)]			
	2A	PHA4	Phase A	Count 4 PNP / Push-Pull[2)]	2.INP23	2.CNT04
	3A	PHB4	Phase B		2.INP24	
	4A	Z4	Z		1.INT04	FREQ2[3)]
	5A	0V	Common for count inputs			
	6A	0V				
	7A	0V				
	1B		Output + 24V dc[4)]			
	2B	PHA4+	+ PHA	Count 4 Line Driver	2.INP23	2.CNT04
	3B	PHB4+	+ PHB		2.INP24	
	4B	Z4+	+ Z		1.INT04	FREQ2[5)]
	5B	PHA4-	- PHA			
	6B	PHB4-	- PHB			
	7B	Z4-	- Z			

[1), 4)] Used to power the encoder. See Connection examples.
[2)] **PNP/Push-Pull type count input configuration**:
Terminal 5B: connect to terminal 5A
Terminal 6B: connect to terminal 6A
Terminal 7B: connect to terminal 7A
[3), 5)] Can be used as frequency input for a FREQ device, indicating 2 in the device declaration

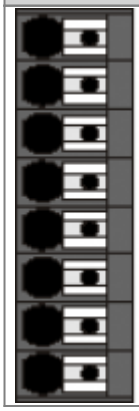
3.3.3 2 SSI absolute counters

CN11	Terminal	Symbol	Description	Address
	1A		Internal bridge 1A-2A-1B-2B	
	2A			
	3A	DATA1+	DATA in SSI1	1
	4A	DATA1-		
	5A	CLOCK1+	CLOCK out SSI1	
	6A	CLOCK1-		
	7A	0V	Common for count inputs	
	1B		Internal bridge 1A-2A-1B-2B	
	2B			
	3B	DATA2+	DATA in SSI2	2
	4B	DATA2-		
	5B	CLOCK2+	CLOCK out SSI1	
	6B	CLOCK2-		
	7B	0V	Common for count inputs	

3.4 Analog inputs

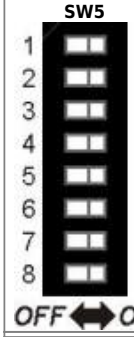
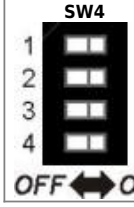
3.4.1 2 multistandard analog input

Connector

CN13	Terminal	Symbol	Description			Address
			Potenziometers / 0-10V / 0-20mA	Thermocouple	PT100	
 1	1	AI2_C	-	TC 2 +	C	2.AI02
2	2	AI2_B	-	TC 2 -	B	
3	3	AI2_A	Analog input 2	-	A [1)]	
4	4	AI1_C	-	TC 1 +	C	2.AI01
5	5	AI1_B	-	TC 1 -	B	
6	6	AI1_A	Analog input 1	-	A [2)]	
7	7	VREF	Reference voltage [3)]	-	-	
8	8	GAI	Common	-	-	

[1), 2)] A and B cables are connected to the same head of the PT100 wire and have the same colors.
In the case of 2-wire PT100 make a jumper between A and B.
[3)] For potentiometers

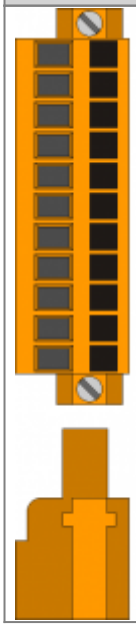
Analog inputs setting

	Num. Dip	Analog input 1					Analog input 2				
		PT100	Thermocouple	Pot.	0-10V	0-20mA	PT100	Thermocouple	Pot.	0-10V	0-20mA
SW5 	1	ON	X	OFF	OFF	OFF	X	X	X	X	X
	2	OFF	X	ON	ON	ON	X	X	X	X	X
	3	X	X	X	X	X	ON	X	OFF	OFF	OFF
	4	X	X	X	X	X	OFF	X	ON	ON	ON
	5	ON	ON	OFF	OFF	OFF	X	X	X	X	X
	6	OFF	OFF	ON	ON	ON	X	X	X	X	X
	7	OFF	ON	X	X	X	X	X	X	X	X
	8	X	X	X	X	X	OFF	ON	X	X	X
SW4 	1	X	X	X	X	X	X	X	OFF	OFF	ON
	2	X	X	X	X	X	X	X	OFF	ON	OFF
	3	X	X	OFF	OFF	ON	X	X	X	X	X
	4	X	X	OFF	ON	OFF	X	X	X	X	X

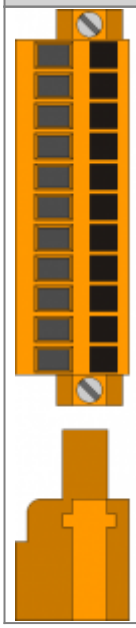
X = irrelevant setting
Pot. = potentiometric type input

3.5 Digital outputs

3.5.1 16 protected outputs

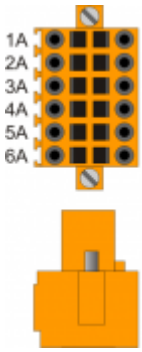
CN9	Terminal	Symbol	Description	Address
	1	V+	Outputs power input O1÷O4 (12÷28V dc)	
	2	O1	Digital output 1	2.OUT01
	3	O2	Digital output 2	2.OUT02
	4	O3	Digital output 3	2.OUT03
	5	O4	Digital output 4	2.OUT04
	6	V+	Outputs power input O5÷O8(12÷28V dc)	
	7	O5	Digital output 5	2.OUT05
	8	O6	Digital output 6	2.OUT06
	9	O7	Digital output 7	2.OUT07
	10	O8	Digital output 8	2.OUT08
	11	V-	Outputs power in (0V dc)	

.

CN8	Terminal	Symbol	Description	Address
	1	V+	Outputs power input O9÷O12(12÷28V dc)	
	2	O9	Digital output 9	2.OUT09
	3	O10	Digital output 10	2.OUT10
	4	O11	Digital output 11	2.OUT11
	5	O12	Digital output 12	2.OUT12
	6	V+	Outputs power input O13÷O16(12÷28V dc)	
	7	O13	Digital output 13	2.OUT13
	8	O14	Digital output 14	2.OUT14
	9	O15	Digital output 15	2.OUT15
	10	O16	Digital output 16	2.OUT16
	11	V-	Outputs power in (0V dc)	

3.5.2 2 STEP-DIRECTION outputs

Connector

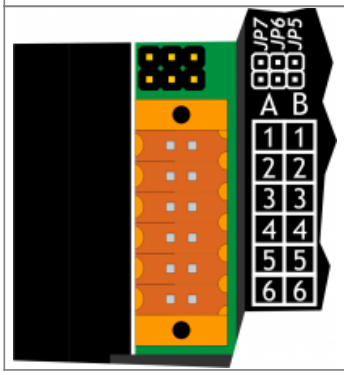
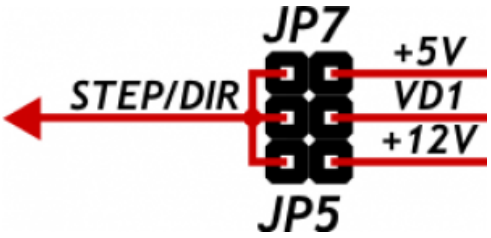
CN10	Terminal	Symbol	Description		Address
	1A	VD1	Internal bridge 1A -1B		
	2A	DIR1+	Output DIRECTION 1	**Push-Pull Line Driver**	2.PULSE01
	3A	STEP1+	Output STEP 1		
	4A	DIR2+	Output DIRECTION 2		2.PULSE02
	5A	STEP2+	Output STEP 2		
	6A	0V	Common for stepper outputs		
	1B	VD1	Internal bridge 1A -1B		
	2B	DIR1-	Complementary output DIRECTION 1	Complementary outputs for use in drives with **Line-Driver** inputs	
	3B	STEP1-	Complementary output STEP 1		
	4B	DIR2-	Complementary output DIRECTION 2		
	5B	STEP2-	Complementary output STEP 2		
	6B	0V	Common for stepper outputs		

Outputs STEP-DIRECTION voltage setting

By placing one of several jumpers JP5, JP6 and JP7, you can choose Nominal Operating Voltage of STEP and DIRECTION outputs.

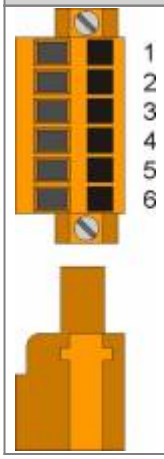
	**Must be inserted only one jumper at a time** **If you select one of the two voltage 5V (JP7) or 12V (JP5) terminals 1A and 1B must remain disconnected**

.

	jumper name	Setting	Nominal voltage	
	JP5	INSERTED	12V (Voltage supplied by the instrument)	
	JP6	INSERTED	VD1 (Voltage to be supplied to the terminals 1A or 1B)	
	JP7	INSERTED	5V (Voltage supplied by the instrument)	

3.6 Analog outputs

3.6.1 4 analog outputs +/-10V, 16bit

CN12	Terminal	Symbol	Description	Address
	1	GAO	Common for analog outputs	
	2	AO1	Analog output 1	2.AN01
	3	AO2	Analog output 2	2.AN02
	4	GAO	Common for analog outputs	
	5	AO3	Analog output 3	2.AN03
	6	AO4	Analog output 4	2.AN04

4. Electrical Features

The electrical features of the hardware are given below.
The maximum and minimum frequencies, and real acquisition times, may depend on eventual additional software filters.

4.1 PROG PORT (USB mini-B)

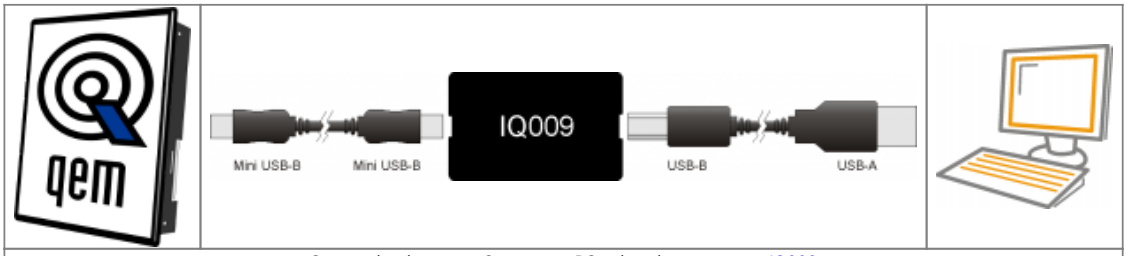
Connector for IQ009 or IQ013

The USB mini-B connector does not support USB electrical standards, it can only be used with an interface IQ009 or IQ013.

It is used for the transfer and debugging of the application program in the CPU.

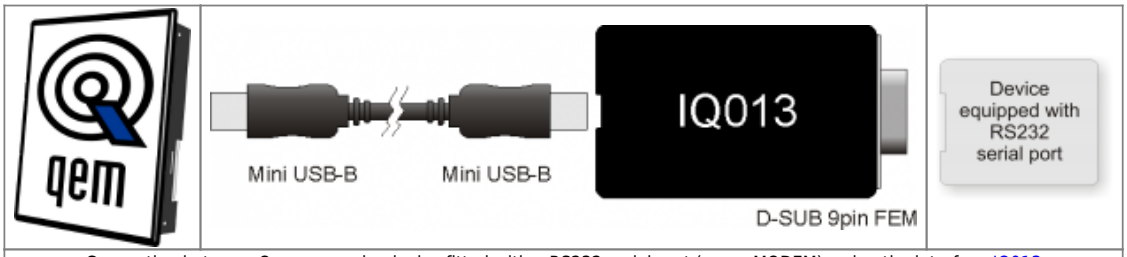
Electrical standard	TTL (Use serial interface IQ009 or IQ013)
Communication speed	Min. 9.6 Kbaud - max 115200 Kbaud settable by dip1 and 2 of the switch SW1
Insulation	None

.



Connection between Qmove+ e PC using the accessory IQ009

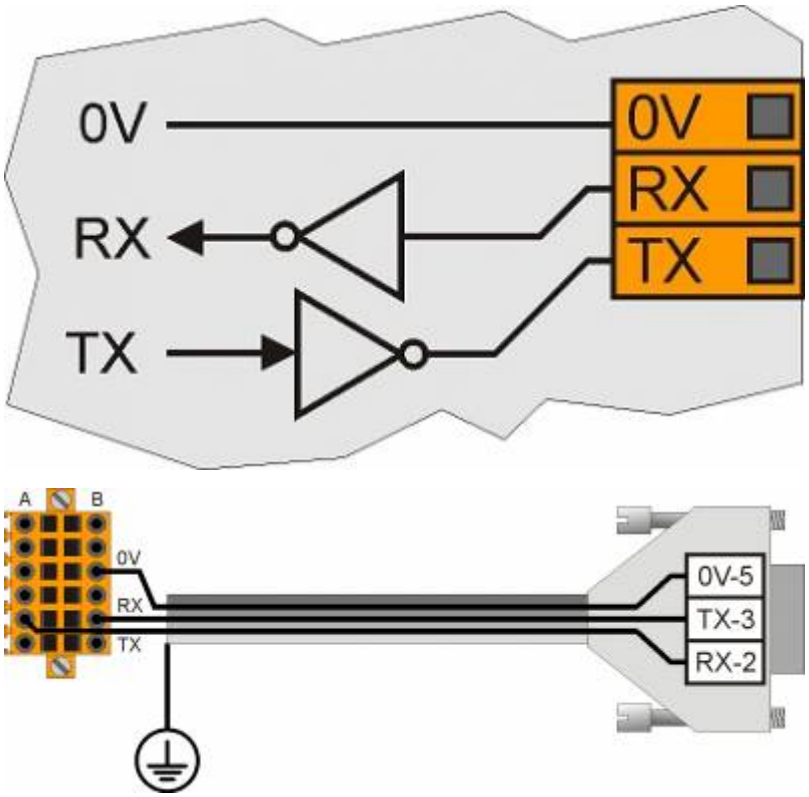
.



Connection between Qmove+ and a device fitted with a RS232 serial port (e.g. a MODEM), using the interface IQ013

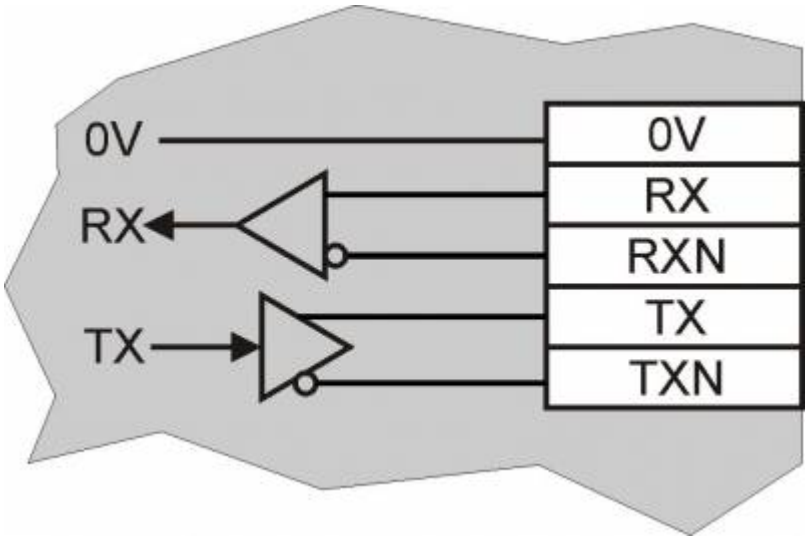
4.2 RS232

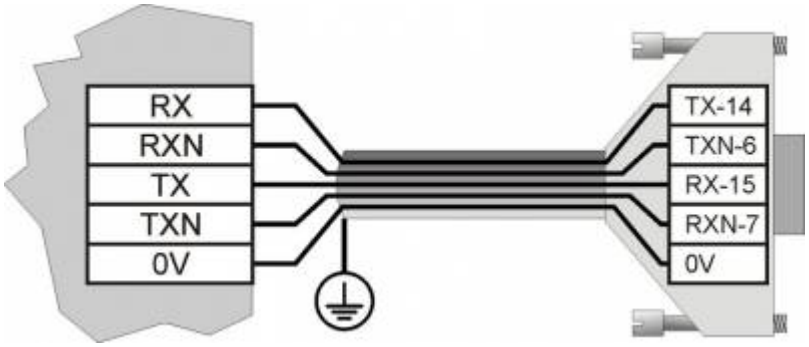
Communication speed	4800, 9600, 19200, 38400, 57600, 115200 baud
Communication mode	Full duplex
Operating mode	Referred to 0V
Max. number of devices connected on the line	1
Max. cable length	15 m
Input impedence	≥ 3 Kohm
Short-circuit current limit	7 mA



4.3 RS422

Communication speed	4800, 9600, 19200, 38400, 57600, 115200 baud
Communication mode	Full duplex
Operating mode	Differential
Max. number of devices connected on the line	1
Max. cable length	1200 m
Input impedence	≥ 12 Kohm
Short-circuit current limit	35 mA



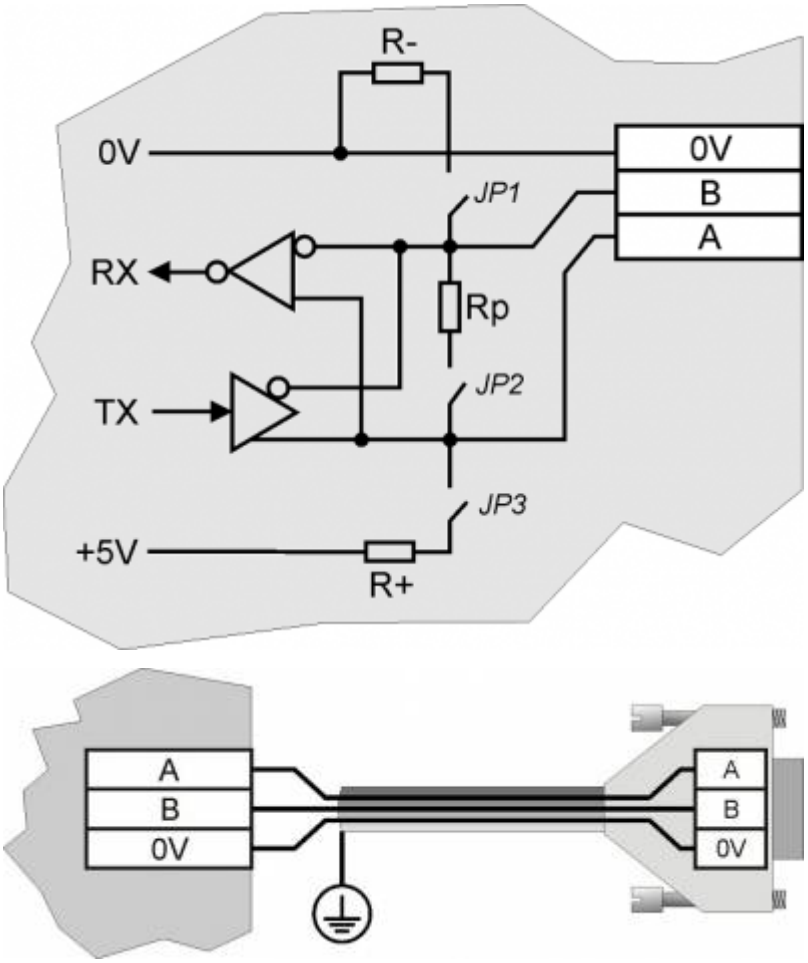


4.4 RS485

To activate the internal termination resistance see paragraph Setup of USER PORT electric standard, Setup of AUX1 PORT electric standard or Setup of AUX2 PORT polarization and termination resistances

.

Communication speed	4800 baud (only if used with SERCOM and/or MODBUS device), 9600 baud, 19200 baud, 38400 baud, 57600 baud
Communication mode	Half duplex
Operating mode	Differential
Max. number of devices connected on the line	32
Max. cable length	1200 m
Input impedence	≥ 12 Kohm
Short-circuit current limit	35 mA

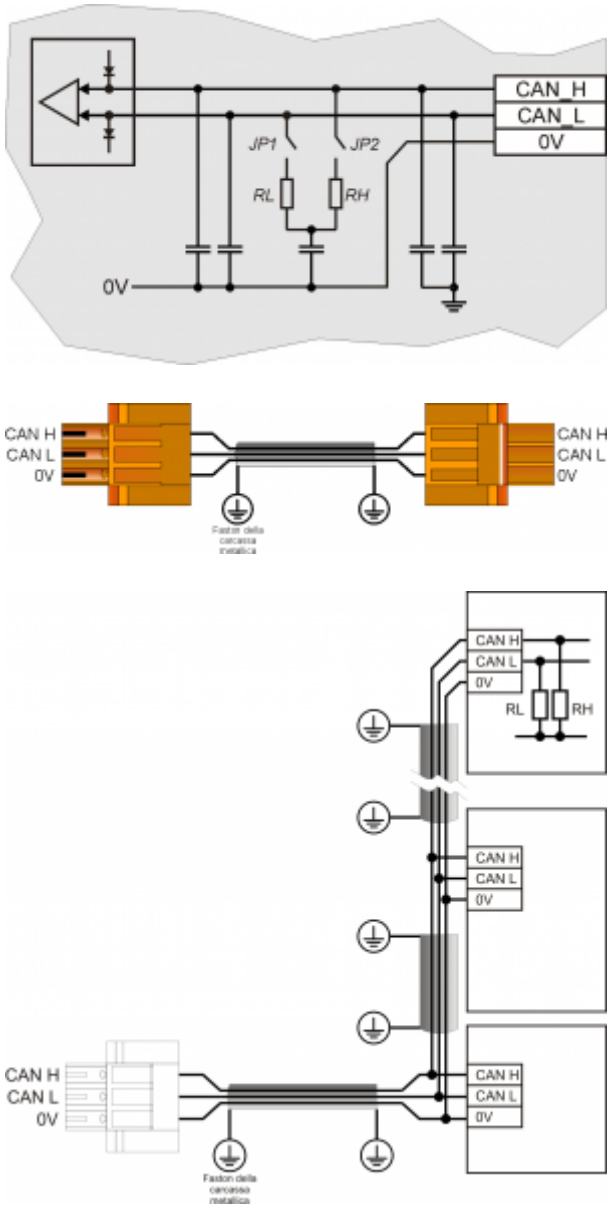


4.5 CAN BUS

To activate the internal termination resistance see paragraph Setup Termination resistances

.

Communication speed	125, 250, 500, 1000 Kbit/s
Max. number of Drivers/Receivers on the line	100
Max. cable lengths	500m @ 125Kbit/s, 250m @ 250Kbit/s, 100m @ 500Kbit/s, 25m @ 1000Kbit/s
Input impedence	>15Kohm
Short-circuit current limit	45mA



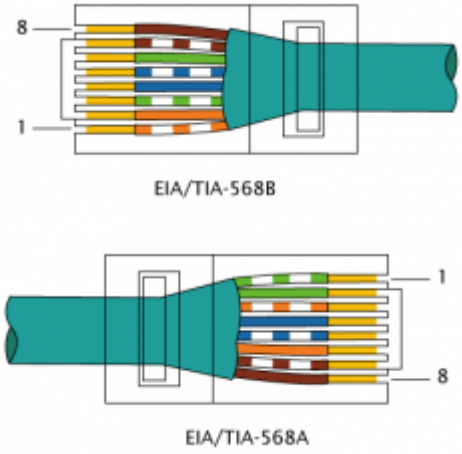
CAN BUS connection examples.

Caution:
Close DIP's JP1 and JP2 and insert the termination resistances (RL, RH) on the last device of the chain.

4.6 ETHERNET

Ethernet Interface 10/100 Base T (IEEE 802.3) on RJ45 connector.

Connection between Qmove + and PC:

		
Qmove+	Cross-over cable EIA/TIA-568A/B	PC

4.7 MMC/SD

Type of Memory Card to use	MMC, SD and SDHC up to 8GB For proper operation it is necessary that the device conforms to the standards set by “SD Association” (www.sdcard.org) or “Multi Media Card Association” (www.mmca.org).

.

To use the Memory Cards they must first be formatted with FAT16 or FAT32 file system.

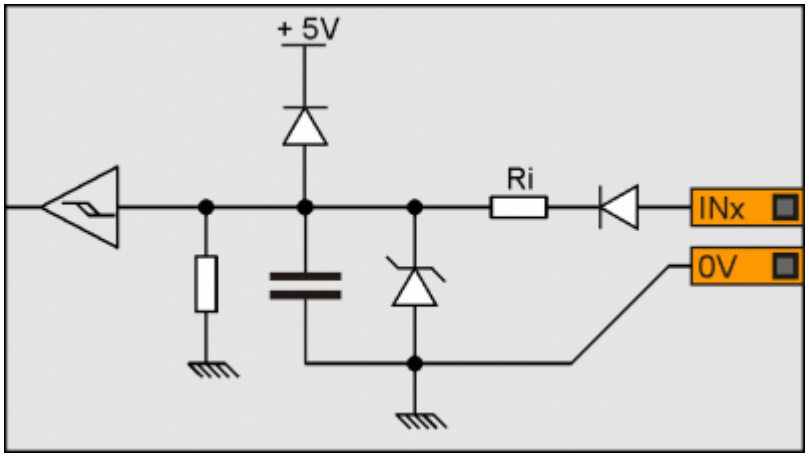
4.8 USB

Max output current	500mA

4.9 Standard digital inputs

Type of polarisation	PNP
Min. acquisition time (hardware)	3ms
Isolation	1000Vrms
Rated operating voltage	24Vdc
Voltage of logic state 0	0-2 V
Voltage of logic state 1	10.5 - 26.5 V
Internal voltage drop	5V
Input resistance (Ri)	2700Ω
Sink current	2mA ÷ 8mA[1)]

[1)] **CAUTION: If the device connected to the inputs needs a higher minimum current, inputs may not work properly.**



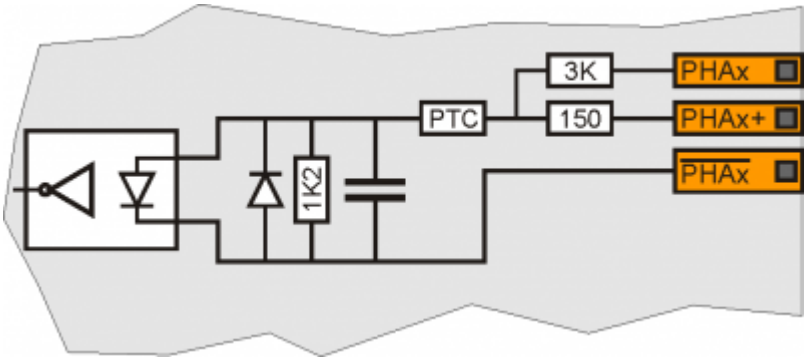
4.10 Two-way count inputs, 200KHz

The values given in the table refer to input signals A, B and Z.
The max. frequency given in the table refers to A and B phase signals with a DutyCycle = 50%
With count frequencies over 50KHz the use of Line-Driver type encoders is recommended.

Type of polarisation	PNP/PP
Max frequency	200KHz
Min. acquisition time	5µs
Insulation	1000Vrms
Rated operating voltage	24Vdc
Voltage of logic status 0	0 - 2 V
Voltage of logic status 1	10.5 - 26.5 V
Internal voltage drop	1.2V
Input resistance	3100Ω

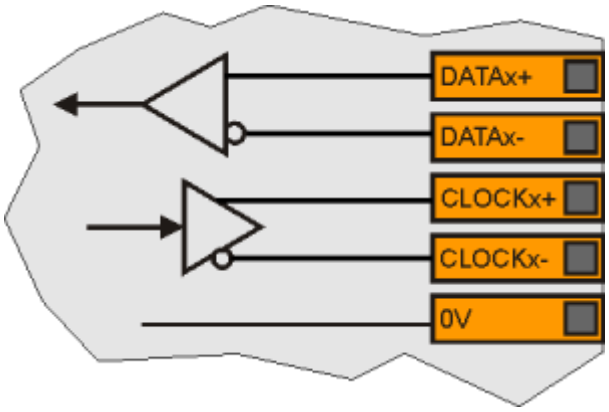
Line-Driver

Type of polarisation	Line-Driver
Max. frequency	200KHz
Min. acquisition time	5µs
Insulation	1000Vrms
Rated operating voltage (PHx+ ? PHx-)	5Vdc
Voltage of logic status 0 (PHx+ ? PHx-)	0-1.5 V
Voltage of logic status 1 (PHx+ ? PHx-)	2-5 V
Internal voltage drop	1.2V
Input restistance	150Ω



4.11 SSI absolute counts

Frequency	320KHz
Operation mode	Differential
Input impedance	>= 12KO
Short circuit current limit	>= 35mA



4.12 Analog inputs

4.12.1 Conversion time

The electrical features depend on the type of input, configurable via DIP switch.

The conversion times from analog to digital depend on the configuration according to the table:

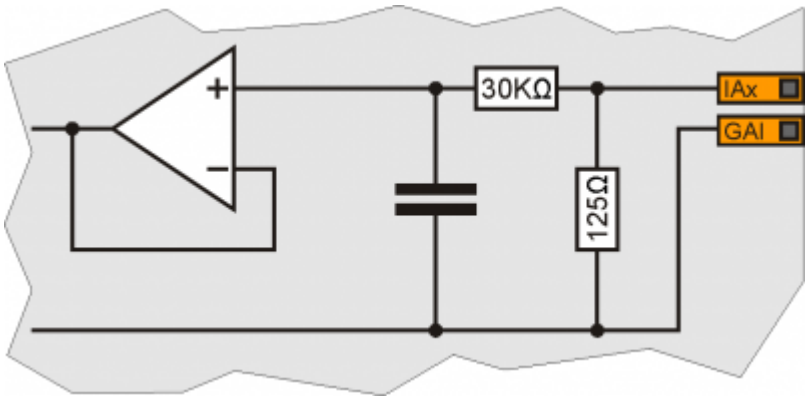
Analog Input Configuration		Conversion time per channel
Input 1	**Input 2**	
DC[1)]	-	4.6 ms
-	DC[2)]	4.6 ms
DC[3)]	DC[4)]	9.3 ms
DC[5)]	TC	9.3 ms
DC[6)]	PT100	79.1 ms
TC	-	9.3 ms
-	TC	9.3 ms
TC	DC[7)]	9.3 ms
TC	TC	9.3 ms
TC	PT100	83.8 ms
PT100	-	74.5 ms
-	PT100	74.5 ms
PT100	DC[8)]	79.1 ms
PT100	TC	79.1 ms
PT100	PT100	79.1 ms

[1), 2), 3), 4), 5), 6), 7), 8)] Amperometric, voltmetric or potentiometric type

4.12.2 Amperometric analog inputs, 0-20mA

Connection type	Amperometric (0-20 mA)
Resolution	12bit/16bit[1)]
Input resistance	125Ω
Value of damage	25 mA
Max. Linearity error	± 0,1% Vfs
Max. Offset error	± 0,1% Vfs
S.n.	71 dB
Conversion time	It depends on the configuration of the analog input. See section Conversion times if present [2)]
Isolation	1000 Vrms

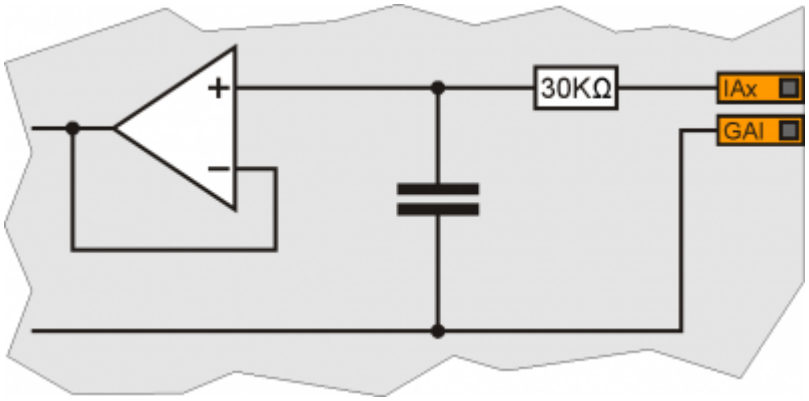
[1)] It depends on the Hardware versions
[2)] The sampling time of the device must be equal or higher than the conversion time



4.12.3 Potentiometric analog inputs

Connection type	Potentiometric 1KΩ÷20KΩ
Resolution	12bit/16bit[1)]
Reference voltage output	2,5Vdc
Max output current from reference	10mA
Input resistance	10MΩ
Max. Linearity error	± 0,1% Vfs
Max. Offset error	± 0,1% Vfs
S.n.	71 dB
Conversion time	It depends on the configuration of the analog input. See section Conversion times if present [2)]
Isolation	1000 Vrms

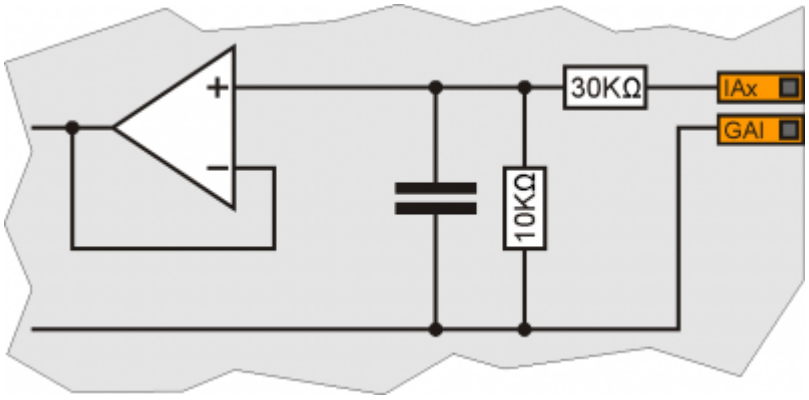
[1)] It depend on the Hardware versions
[2)] The sampling time of the device must be equal or higher than the conversion time



4.12.4 Voltmetric analog inputs

Connection type	Voltmetrico 0÷10V
Resolution	12bit/16bit[1)]
Input resistance (Rin)	40KΩ
Value of damage	20V
Max. Linearity error	± 0,1% Vfs
Max. Offset error	± 0,1% Vfs
S.n.	71 dB
Conversion time	It depends on the configuration of the analog input. See section Conversion times if present [2)]
Isolation	1000 Vrms

[1)] It depends on the Hardware versions
[2)] The sampling time of the device must be equal or higher than the conversion time



4.12.5 PT100 analog inputs

Sensor type collegabile	PT100 3 wire [1)]
Measure type	Resistance [2)]
Resolution	15 bit (32767 corresponds to 250.00 O)
Input resistance (Rin)	15 MO
Measuring current	1 mA
Value of damage	10V
Accuracy of resistance measurement	± 0,04%
Conversion time	It depends on the configuration of the analog input. See section Conversion times if present [3)]
Isolation	1000 Vrms

[1)] Also connected to 2-wire terminals with jumper
[2)] Temperature calculated by software
[3)] The sampling time of the device must be equal or higher than the conversion time

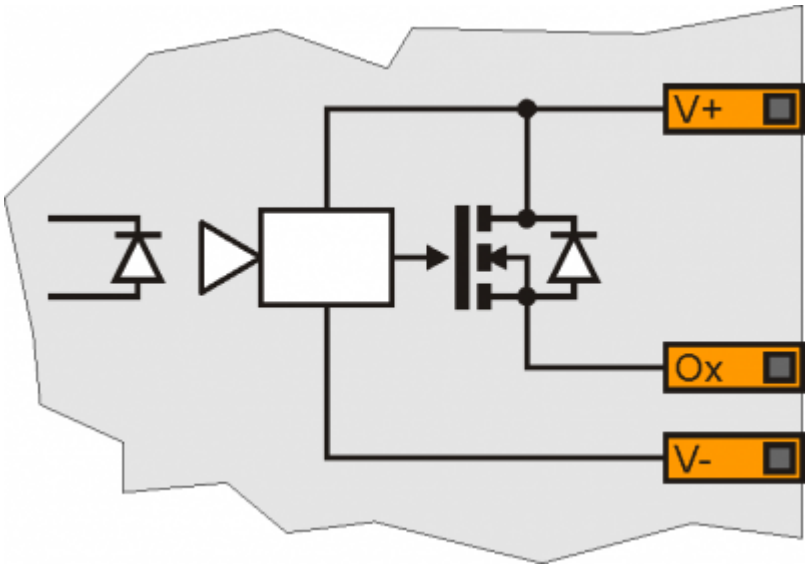
4.12.6 Termocouples analog inputs

Sensor type	Thermocouple type J,K,R,S,B,N,T,E [1)]
Type of measure	Differential voltage
Resolution	16 bit
Measuring range	±156.25 mV
Measure for cold junction compensation	Integrated
Input resistance (Rin)	15 MO
Value of damage	30V
Measurement accuracy	± 0,2% (excluding cold junction compensation)
Conversion time	It depends on the configuration of the analog input. See section Conversion times if present [2)]
Isolation	1000 Vrms

[1)] J and K only supported by SW. Contact QEM for the support of the other sensor types.
[2)] The sampling time of the device must be equal or higher than the conversion time

4.13 Protected Digital Outputs

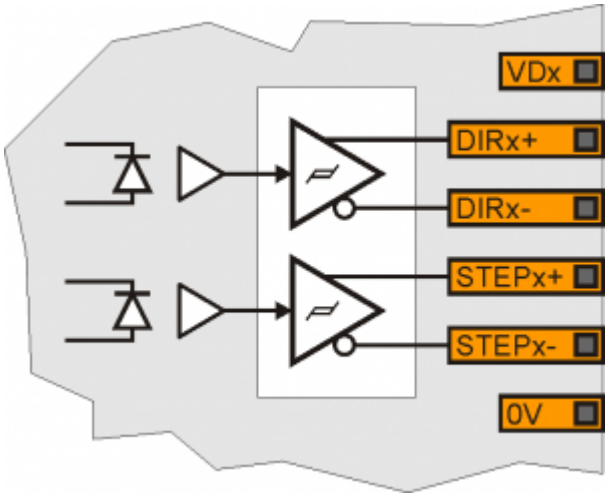
Switchable load	Dc (PNP)
Max. operating voltage	28V
Insulation	1000Vpp
Max. internal voltage drop	600mV
Max internal resistance @ON	90mΩ
Max. protection current	12A
Max. operating current	2A
Max. current @OFF	5µA
Max switching time from ON to OFF	270µs
Max switching time from OFF to ON	250µs



4.14 STEP-DIRECTION outputs

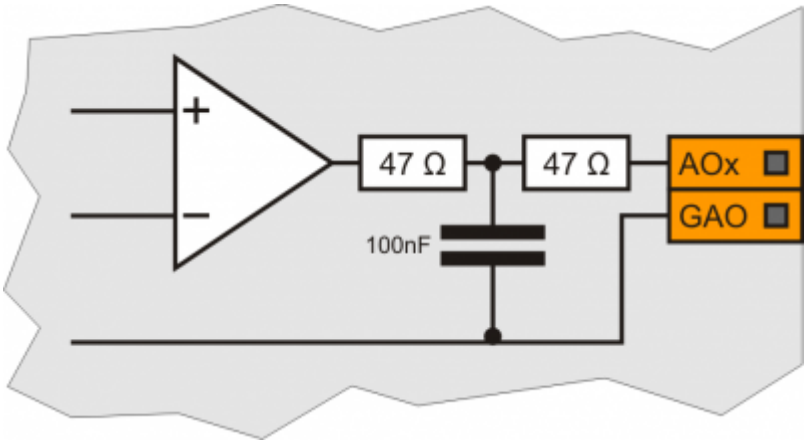
Type of polarisation	Push-Pull / Line-Driver
Max output frequency	200KHz
Insulation	1000Vpp
Max. operating current	20mA
Max. voltage	24Vdc[1)]

[1)] Selectable via jumpers: 5V e 12V supplied by the instrument, 24V supply from outside to the terminal VDx



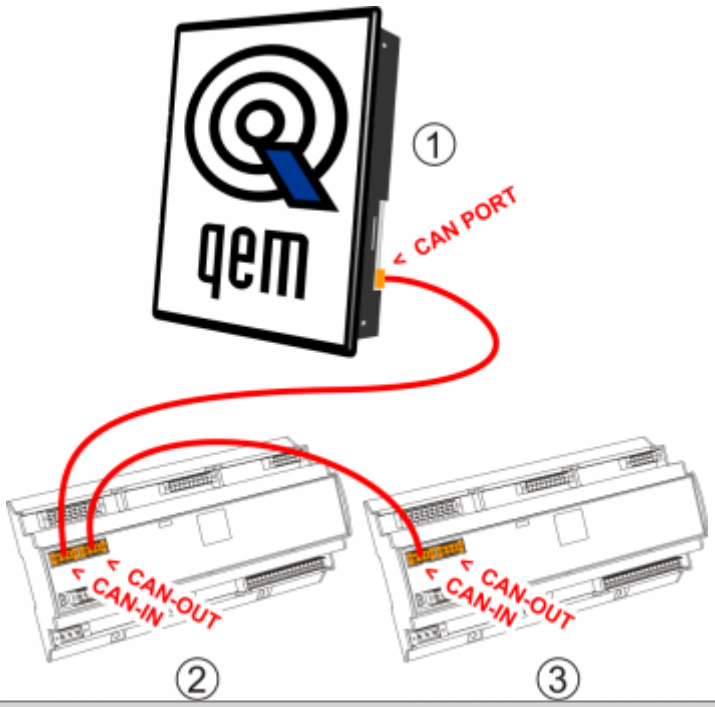
4.15 Analog outputs

Type of connection	Common mode
Insulation	1000Vrms
Voltage range (minimum no load)	-9.8V - +9.8V
Max. offset variation depending on temperature*	+/- 5mV
Resolution	16bit
Max. current	1mA
Output variation depending on load	100 µV/mA
Output resistence	249Ω



5. Connection examples

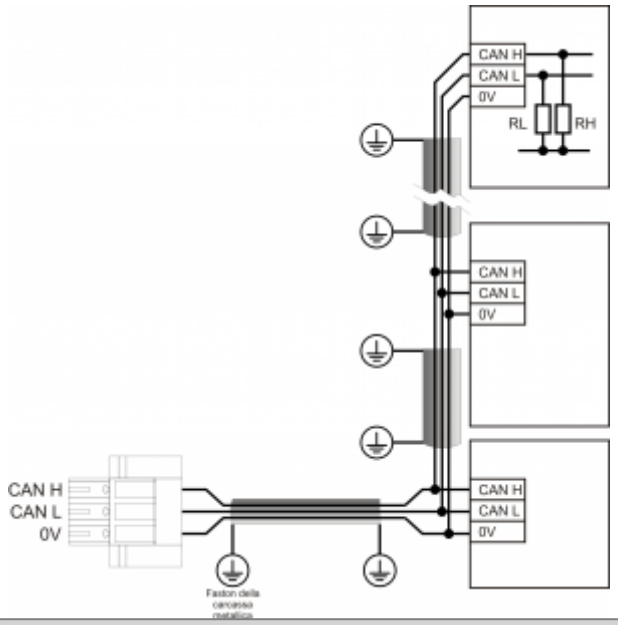
5.1 CANbus



	On the first (1) and on the last (3) device of the chain, the termination resistances must be inserted. **The cable shoes must be connected to ground by the fastons provided on the metal body.**

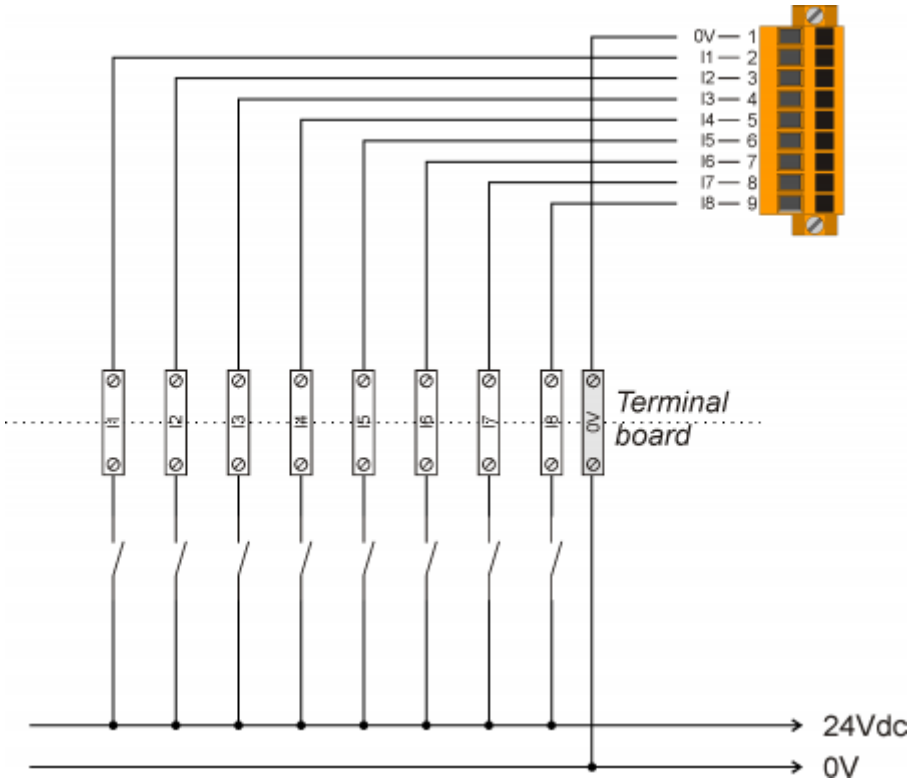
.

	To activate the internal termination resistance see paragraph Setup of CAN1 and CAN2 PORT Termination resistances

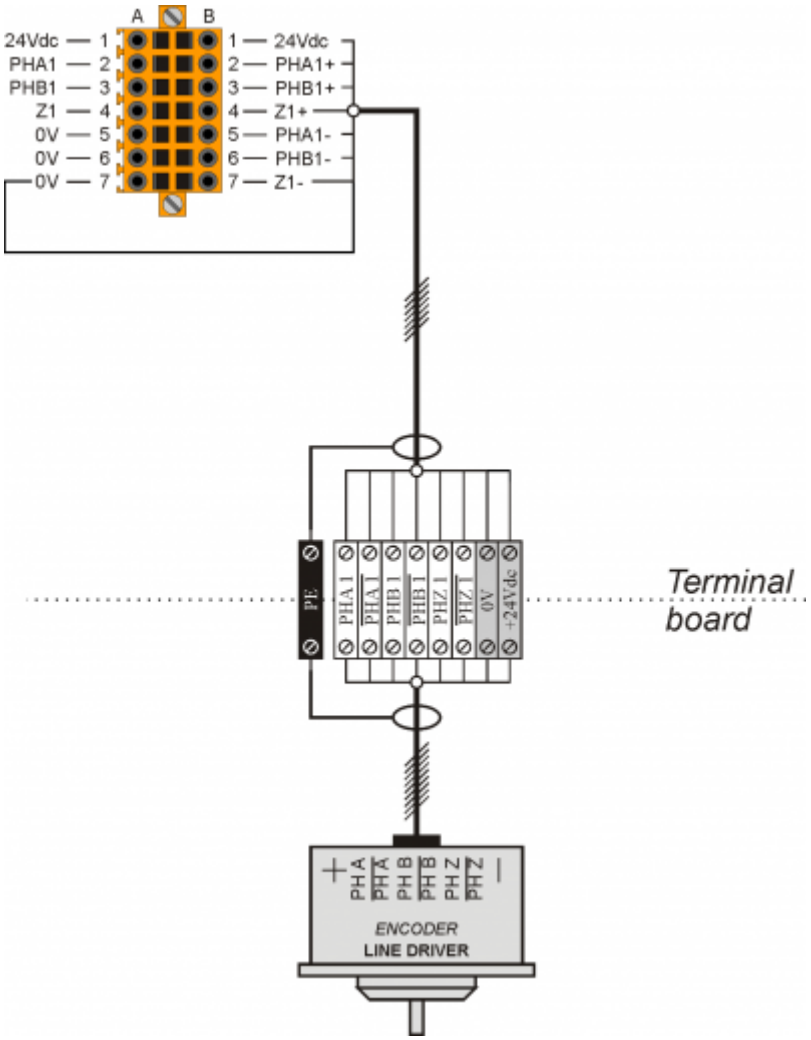


	Caution: close the DIP JP1 and JP2 and insert the terminating resistors (RL, RH) on the last device in the chain.

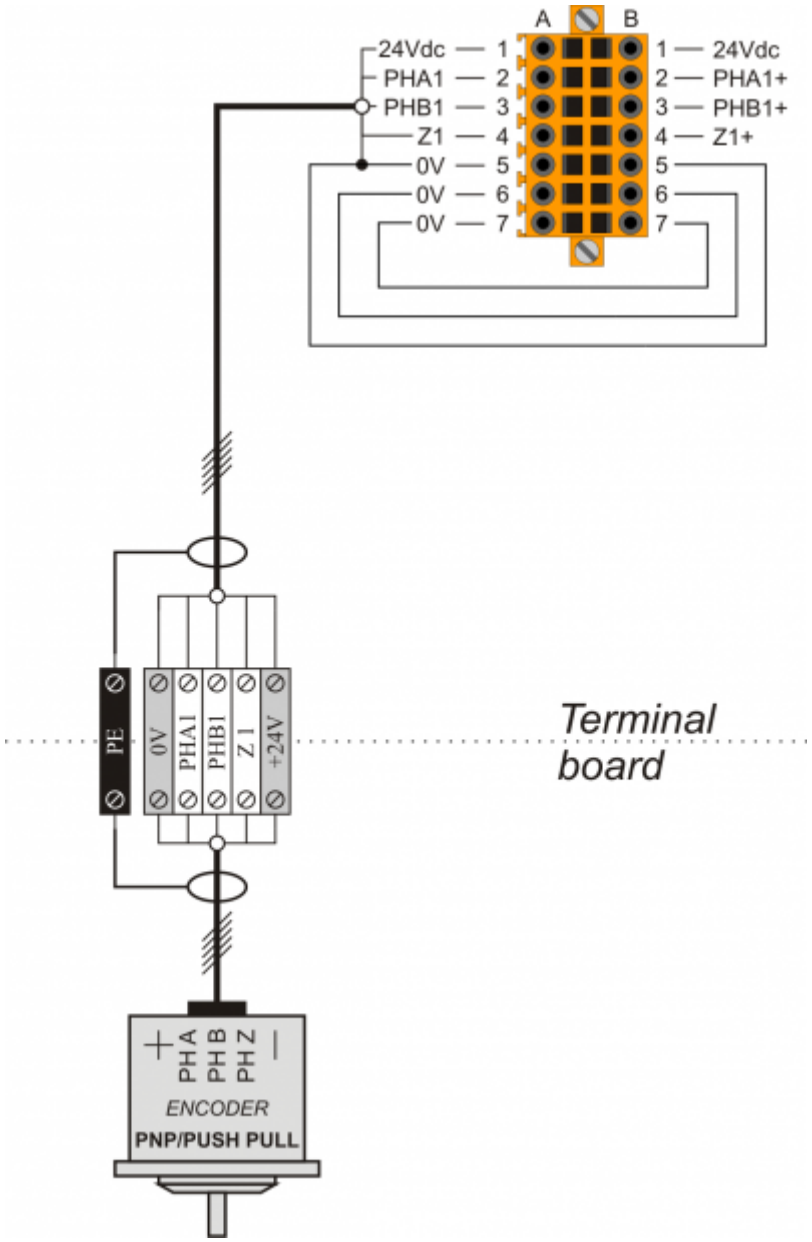
5.2 Digital inputs



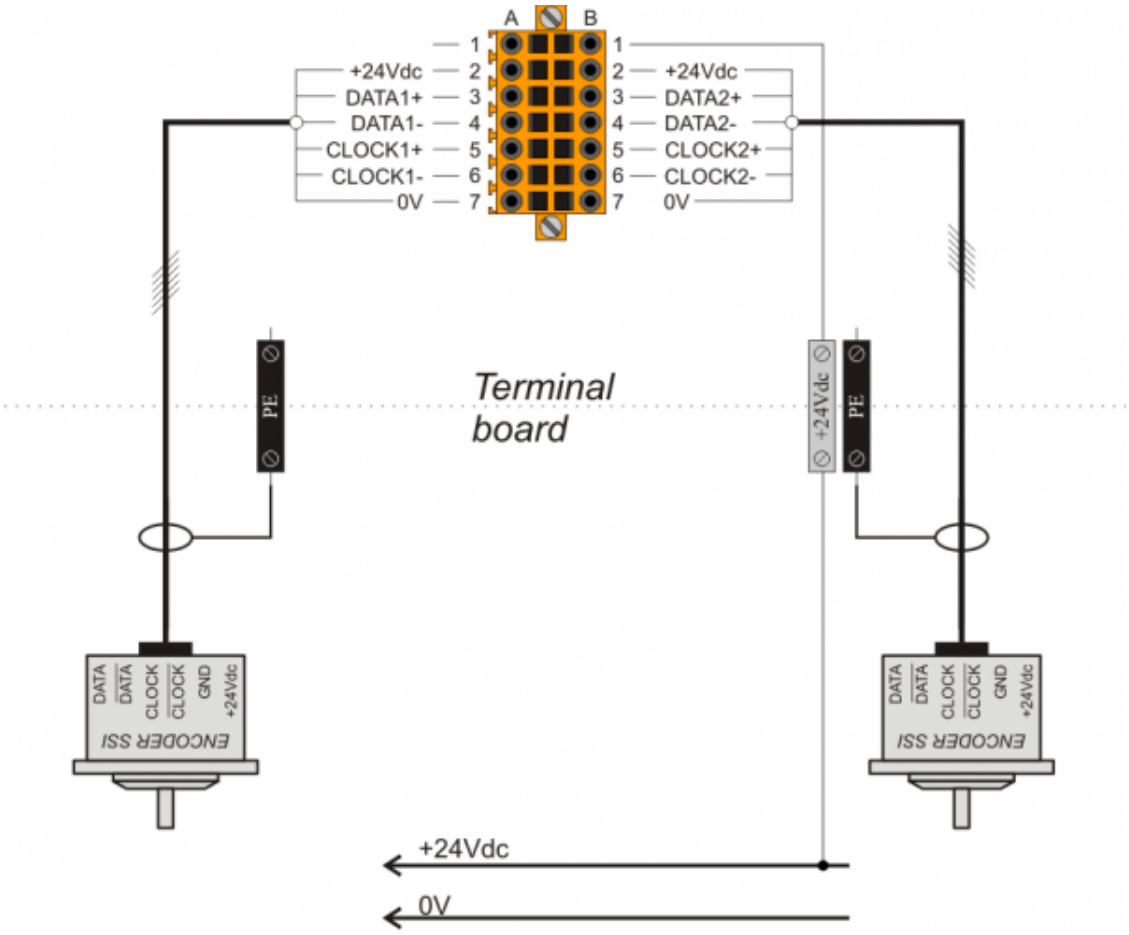
5.3 Line Driver counts



5.4 PNP / Push Pull counts

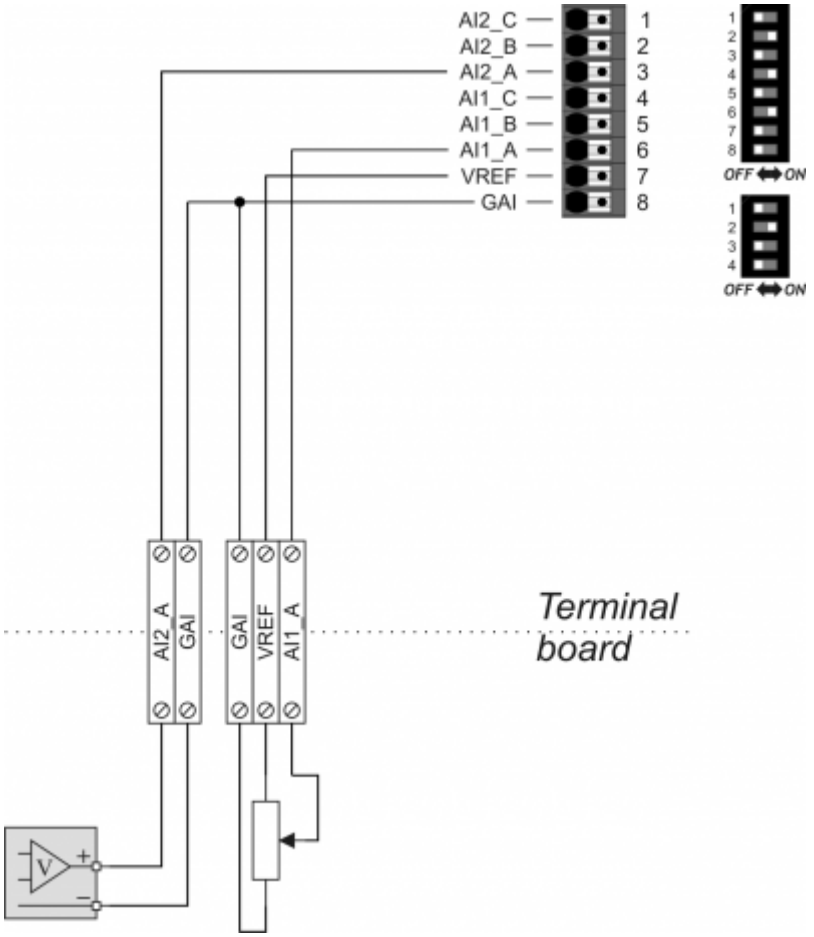


5.5 SSI absolute counts

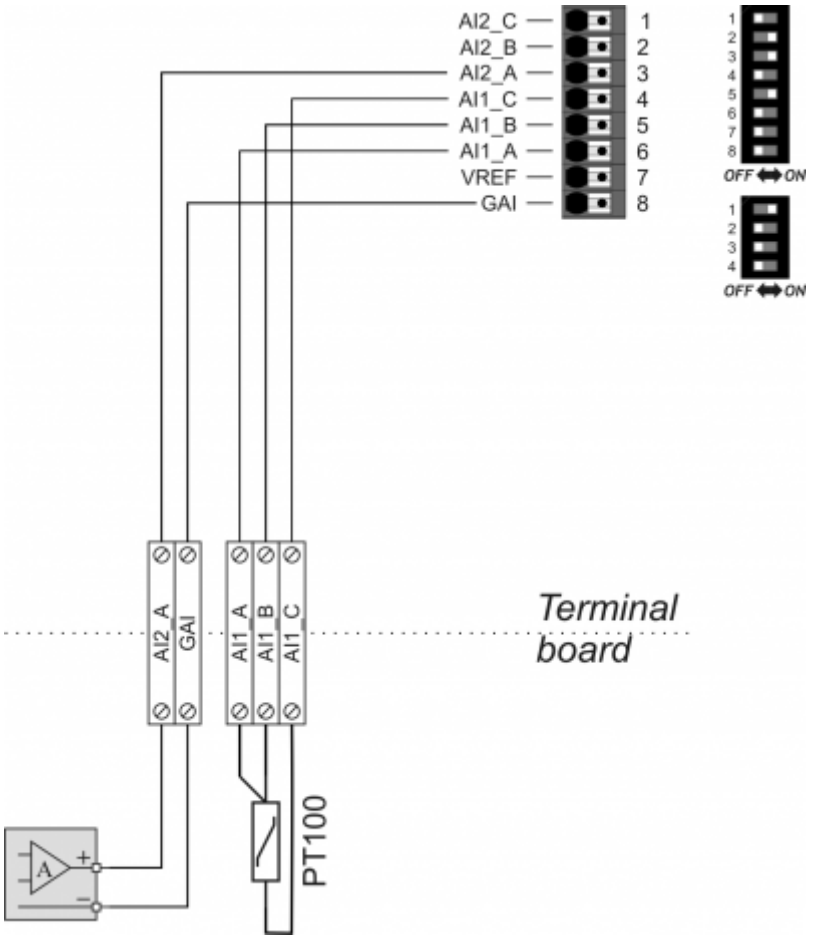


5.6 Analog inputs

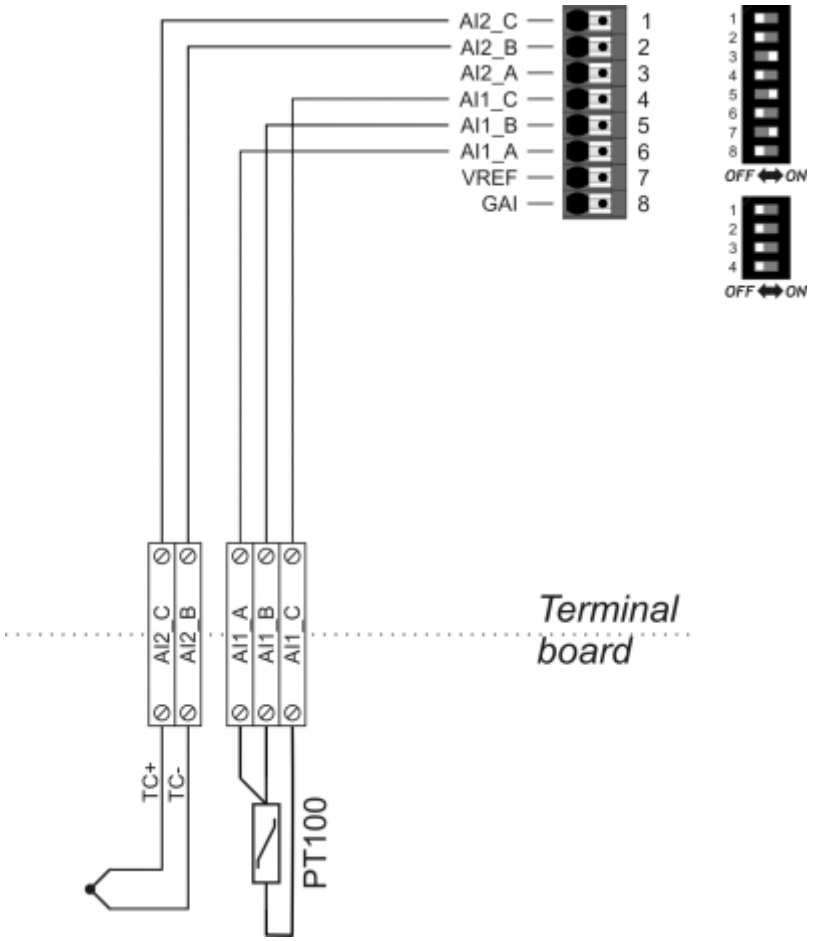
5.6.1 1 potentiometric e 2 voltmetric



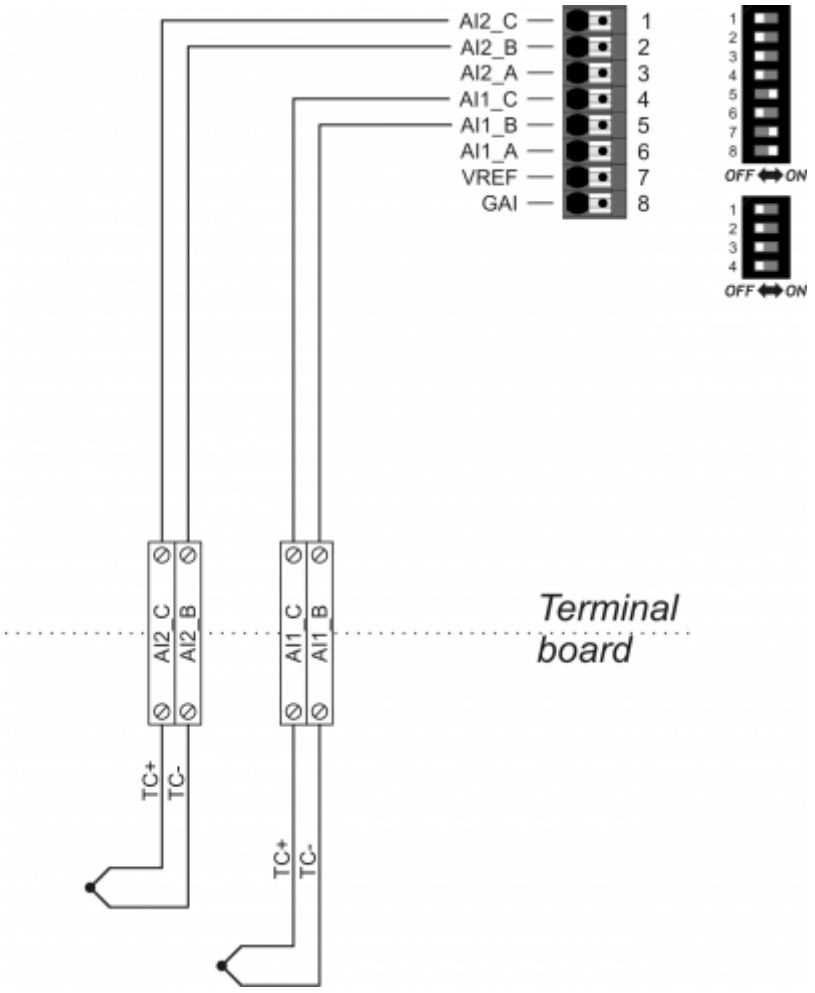
5.6.2 1 PT100 e 2 amperometric



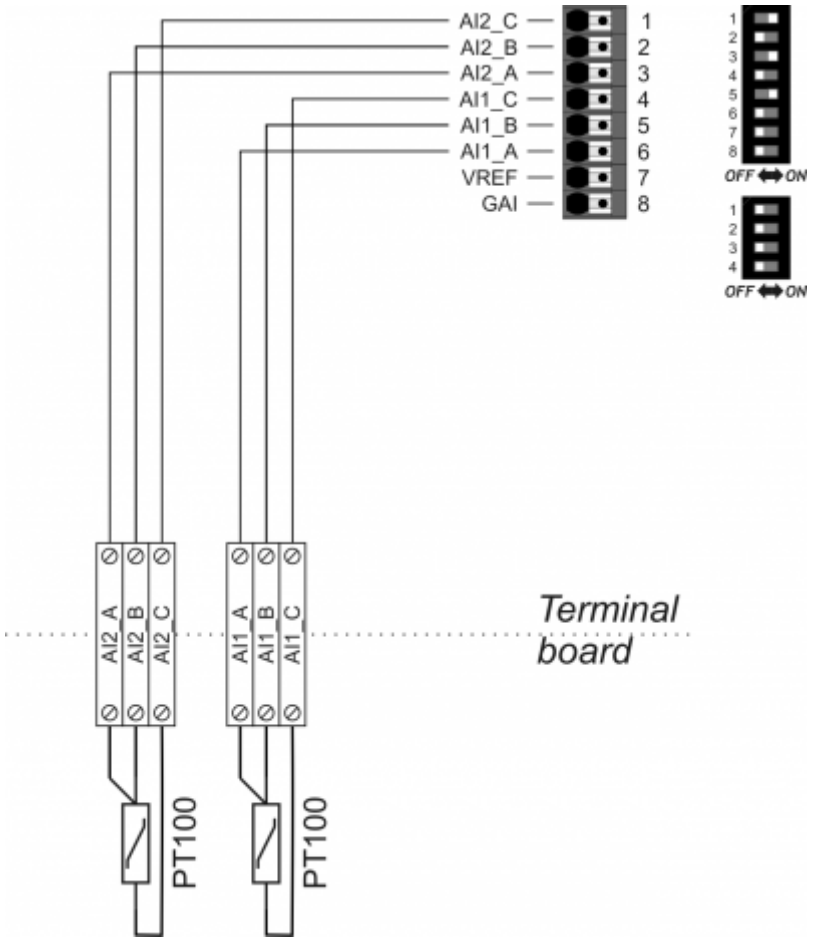
5.6.3 1 PT100 and 2 termocouples



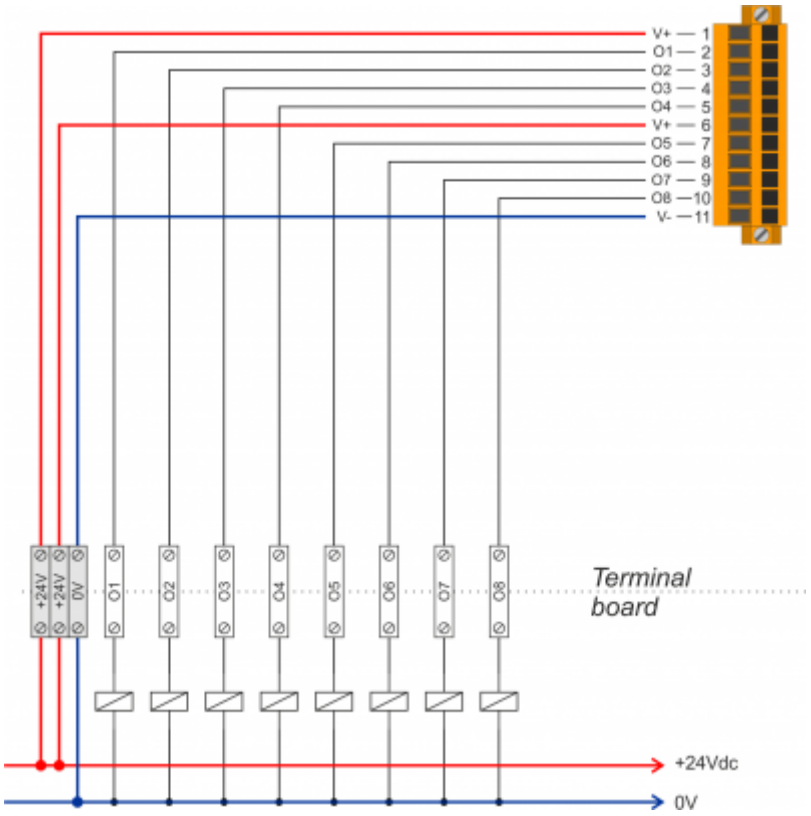
5.6.4 1 e 2 for termocouples



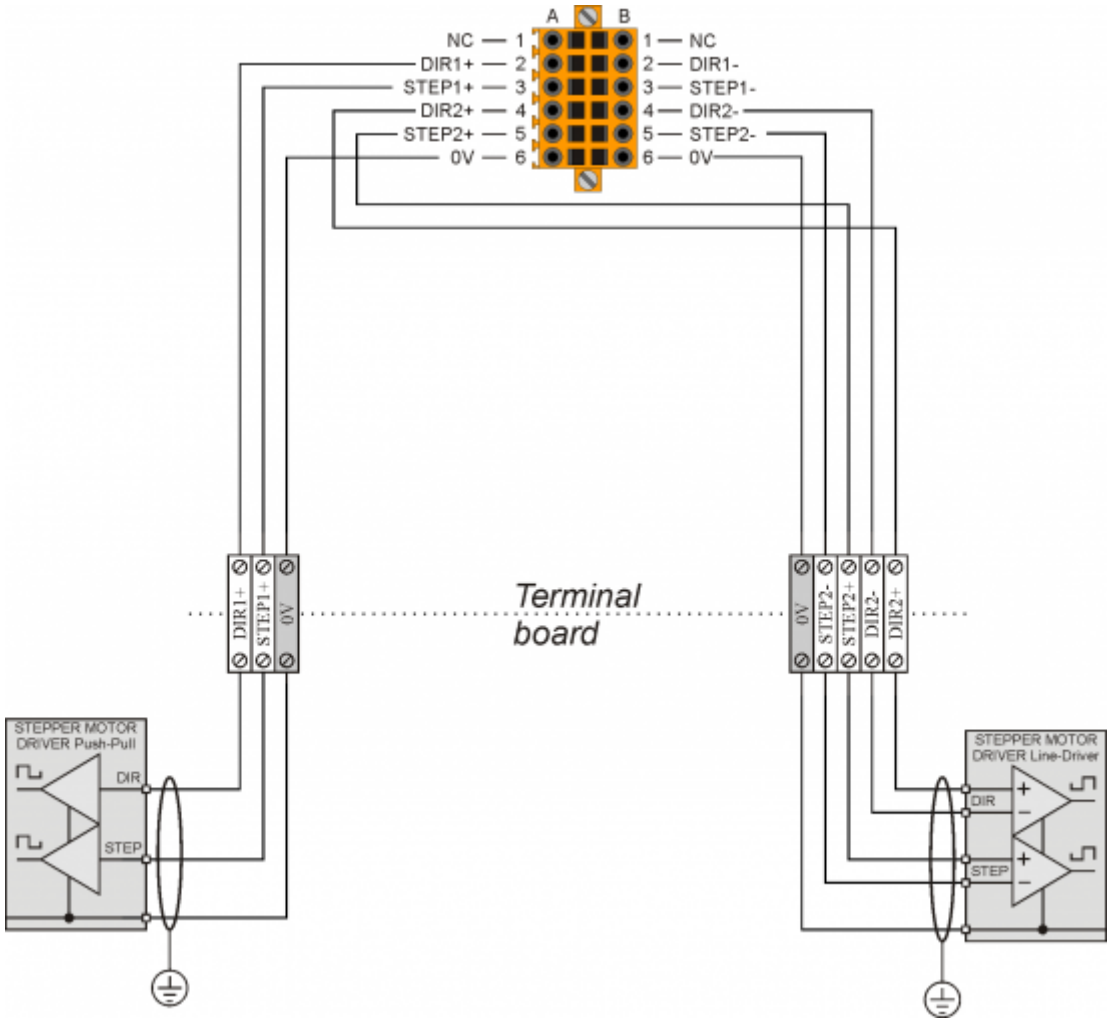
5.6.5 1 and 2 PT100



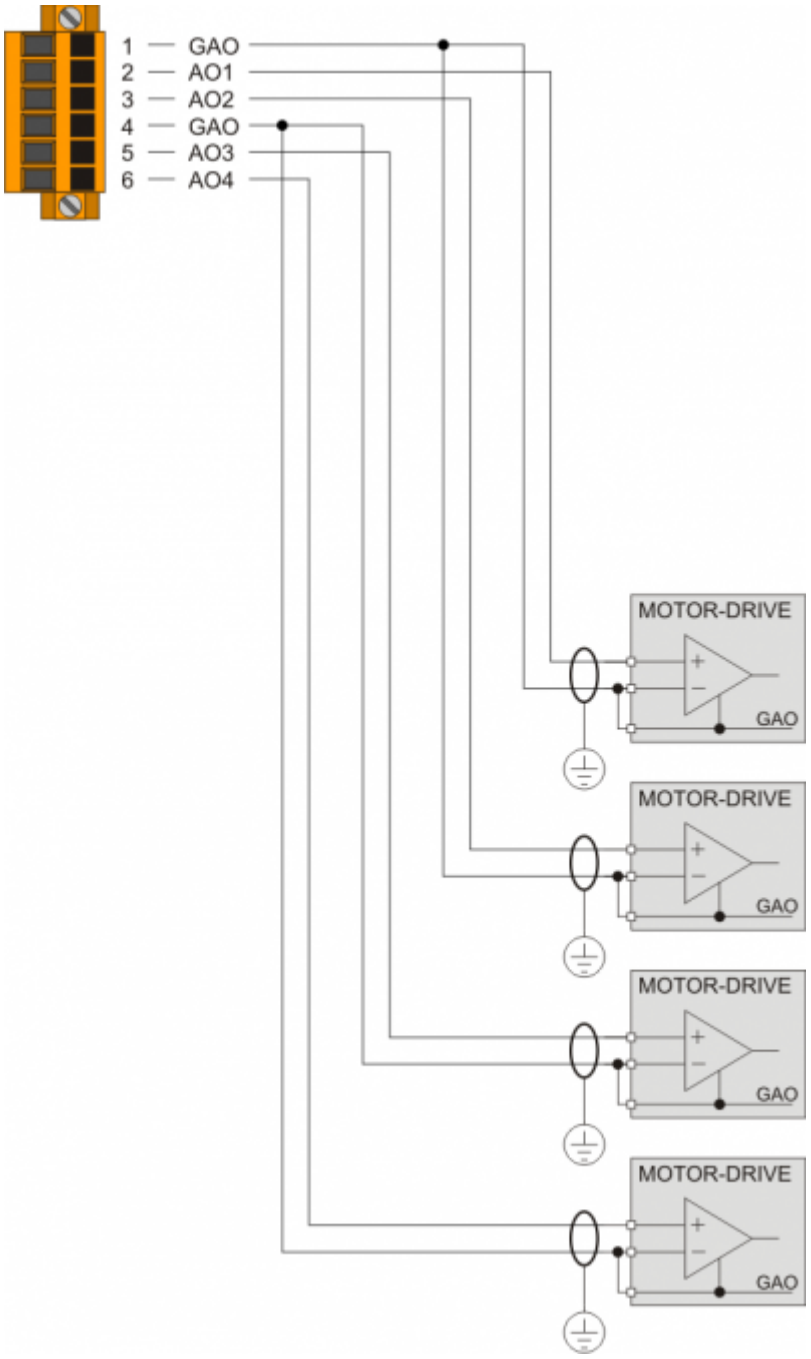
5.7 Protected digital outputs



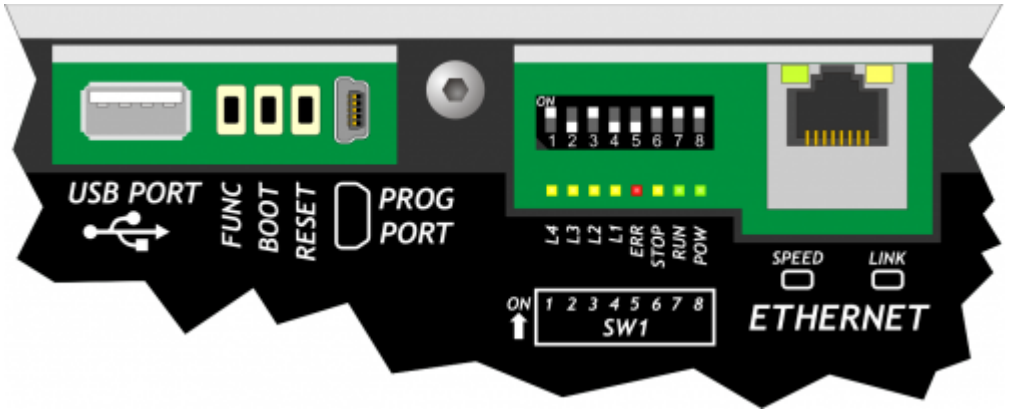
5.8 STEP-DIRECTION outputs



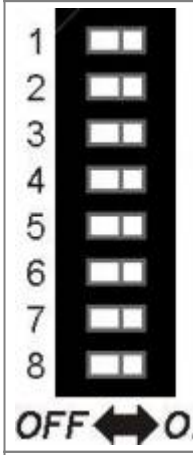
5.9 Analog outputs



6. Settings, procedures and signals



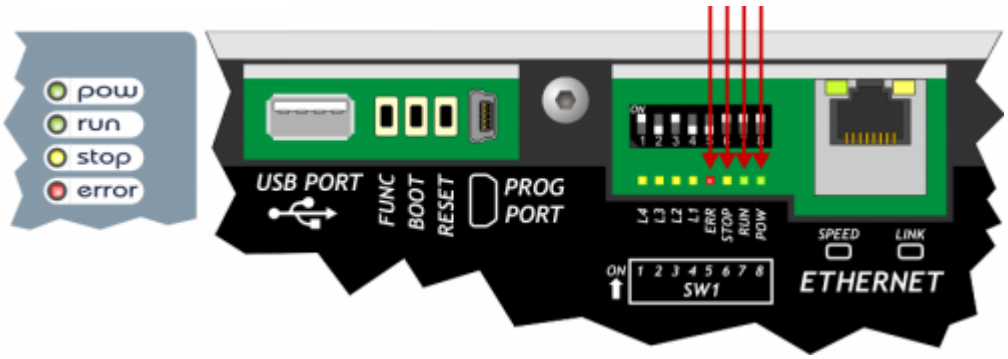
6.1 PROG PORT, USER PORT and CAN PORT baud-rate selector

SW1	Dip	DIP settings				Function
	1	OFF	Baud-rate 57600			Select PROG PORT transmission speed
		ON	Baud-rate 115200			
	2	OFF	Baud-rate 57600			Select USER PORT transmission speed
		ON	Baud-rate 115200			
	3	OFF	Can also be used by SERCOM and MODBUS devices			Select PROG PORT functioning mode
		ON	Cannot be used by SERCOM and MODBUS devices			
	4	OFF	ON	OFF	ON	CANbus baud-rate selector (CanOpen)[1]
	5	OFF	OFF	ON	ON	
		Baud-rate 125KB/S	Baud-rate 250KB/S	Baud-rate 500KB/S	Baud-rate 1MB/S	
	6	OFF	IQ009 connection			Mini USB 5Vdc supply[2]
		ON	IQ021 connection			
	7	Not used				
	8	OFF	PROG PORT normal			Select the USER PORT as PROG PORT[3]
		ON	PROG PORT on USER PORT connector			

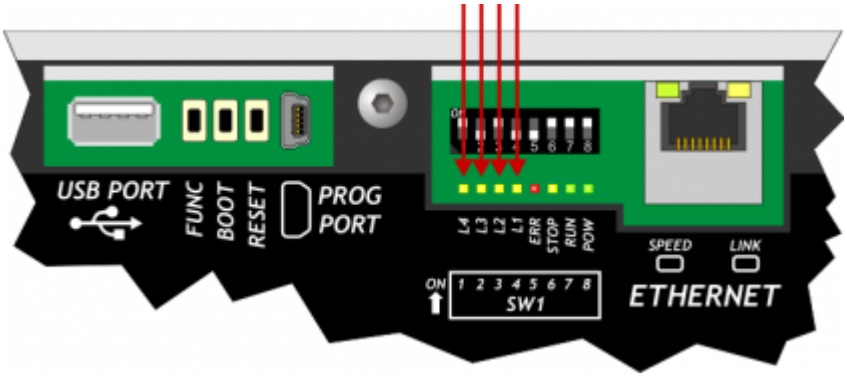
[1] Valid if the declaration of the CANopen device is set the speed to 0
[2] If enabled, on the mini USB connector of the PROG POR, 5Vdc are available for the IQ021 Bluetooth Interface power supply.
[3] It is possible to use the USER PORT connector as PROG PORT with RS232 electric standard, doing this the mini-USB connector of the PROG PORT is disconnected (Setting USER PORT electric standard). **For this function mode also set dip 6 of SW2 to OFF.**

6.2 Led

The system leds **“pow, run, stop, err”** are found on the front panel and on the rear of controllers with display and only on the top of controllers without display.



The user leds **“L1, L2, L3** e **L4”** are found on the rear:



“System Leds” Signals

Leggend:

Led ON

Led OFF

Led Blinking

Led	Colour	Status	Description
pow	Green		Power on
			Only this led on, signals the CPU reset status
run	Green		CPU in RUN status
			CPU in READY status
stop	Yellow		With **pow** on, signals the STOP status of the CPU With **pow** off, signals the BOOT status of the CPU
err	Red		With **pow** off, signals a hardware error. See paragraph Hardware Error codes With **pow** blinking, the flash rate gives the type of error. See paragraph **err** led signals

Err led signals

N. flashes	Error	Description	Recommended action
1	**Bus error**	Bus configuration different to application software.	Check the correspondence between the QMOVE application (BUS section of configuration unit) and the product configurations (cards mounted in BUS).
2	**CheckSum Error**	Negative outcome on the integrity control of retentive variables . (see Reset Error Checksum)	Restore the machine data from a backup (.DAT file) or cancel the error with in system functions and enter the values manually.
3	**Index Out of Bound**	An array index is pointing on an inexistent element	Open a unit editor in Qview development environment and use the “Edit→Go to PC” command to find the program line that is cause of the error. In general the index value has a value <1 or >array dimension.
4	**Program Over Range**	The program selection index in the DATAGROUP has attempted to access an inexistent program.	With the Qview development environment open the editor of a unit and user the “Edit→Go to PC” command to highlight the program line that has caused the error. In general the value used as index is lower than 1 or over the array dimension.
5	**Step Over Range**	The step selection index in the DATAGROUP has attempted to access an inexistent step.	With the Qview development environment open the editor of a unit and user the “Edit→Go to PC” command to highlight the program line that has caused the error. In general the value used as index is lower than 1 or over the array dimension.
6	**Division By Zero**	The denominator of a division operation of the application program has a zero value.	With the Qview development environment open the editor of a unit and user the “Edit→Go to PC” command to highlight the program line that has caused the error.
7	**Syntax Error**	The application program has an invalid instruction	This error may appear because the program counter has met the QCL END instruction.
8	**Watch Dog Error**	A CAN module does not function correctly, or a specialist card has a hardware problem	With the Qview development environment open the “Monitor→Bus” panel and the righthand column called “Watchdog Bus” indicates the card that caused the problem.
9	**Stack Error**	The applciation program has used all permitted levels of calls to subroutines	With the Qview software environment open the editor of a unit and use the “Edit→Go to PC” command to highlight the program line that caused the error. Analyse the unit execution flow, the call to subroutines nestings have a limit, over which this error is generated.

Hardware error codes

During the startup sequence, if a malfunction of any peripheral is detected, the system blocks and the error is signaled by the flashing led  err while the other system led's remain off.

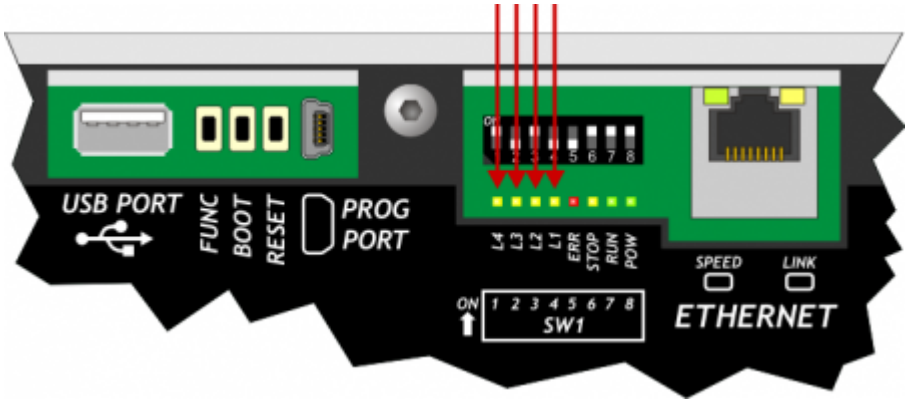
The number of flashes indicates the type of error according to the following table :

Number of flashes	Error
1	Display
2	FPGA
3	Media
4	Bootloader
5	FW
6	Bus
7	*Signal not active*
8	*Signal not active*
9	Exception

.

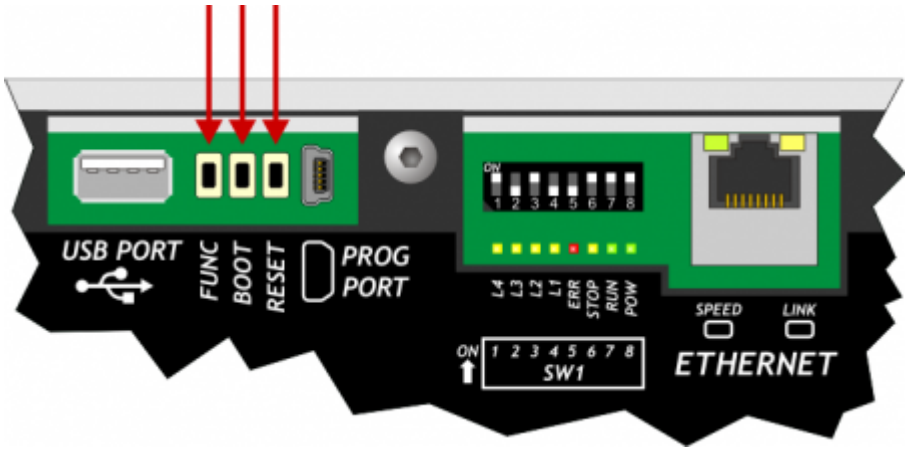
Each of these signals indicates a serious error situation. The product must be sent to the QEM aftersales service.

“User Led” signal



Led	Colour	Description
L1 L2 L3 L4	Yellow	Programmable in the application program by the QMOVE system variable:sys003 and used by the system functions

6.3 Keys



Name	Description
 FUNC	Press on startup of the controller to access the System functions
 BOOT	Press on startup of the controller to set the CPU in Boot status and then access the firmware update functions
 RESET	Reset CPU. the system is restarted restoring the initial conditions (after a startup)

7. System functions

IMPORTANT: The use of these procedures could represent a risk (e.g. see deletion of application), therefore it is highly recommended that they are performed by qualified experts.

The system functions are specific procedures that allow the user to perform various operations, e.g. the configuration/calibration of peripherals, data and application save/restore on/from removable mass memory, deletion of the application and management of the mass storage. Controllers with display have some system functions that are only accessible by password and if access attempts are made the **“Function is locked”** message is given.

7.1 System functions

All the system functions are listed below.
If the “**PWD**” column shows '**Y**', this means that the function requires a system password *(default: “123”)*.

Funzioni di sistema

n.	Led ON	System Function	PWD	Description
1	L1	01 - Reset Error Checksum	**-**	Reset error checksum. N.B.: if the checksum error is present, the led L1 flashes
2	L2	02 - Copy all files DEVICE → NAND	**-**	Copy all files from selected DEVICE to NAND Flash memory
3	L1 L2	03 - Copy all files NAND → DEVICE	**-**	Copy all files from NAND Flash to selected DEVICE
4	L3	04 - Application delete	**Y**	Delete the application
5	L1 L3	05 - Application upload from DEVICE	**Y**	Upload the application from selected DEVICE
6	L2 L3	06 - System Settings	**-**	Adjust the system clock and select the DEVICE in use
7	L1 L2 L3	07 - Downl. retentive data to DEVICE	**-**	Save the retentive data on selected DEVICE
8	L4	08 - Set NEW Password	**Y**	Set a new password to access the “locked” system functions
9	L1 L4	09 - Remove all files from NAND Flash	**Y**	Cancel all files stored on the NAND Flash memory
10	L2 L4	10 - Show NAND Flash files	**-**	List the files stored on the NAND Flash memory
11	L1 L2 L4	11 - Touch Calibration	**-**	Run the calibration procedure of the Touch Screen, if present
12	L3 L4	12 - Set Ethernet communic. parameter	**-**	Run the setup procedure for the Ethernet communication parameters (IP address,..., etc.)
13	L1 L3 L4	13 - Backup to NAND	**-**	Run the backup of the QCL application, data and HMI application on NAND memory
14	L2 L3 L4	14 - Restore from NAND	**Y**	Run the restore of the QCL application, data and HMI application from NAND memory

*NB: To exit system functions press the keep the **F1** key or **FUNC** button for at least two seconds.*

8. Available accessories

- IQ009
- IQ013
- IQ011
- IQ016
- Connectors polarization Kit
- Front panel customization kit