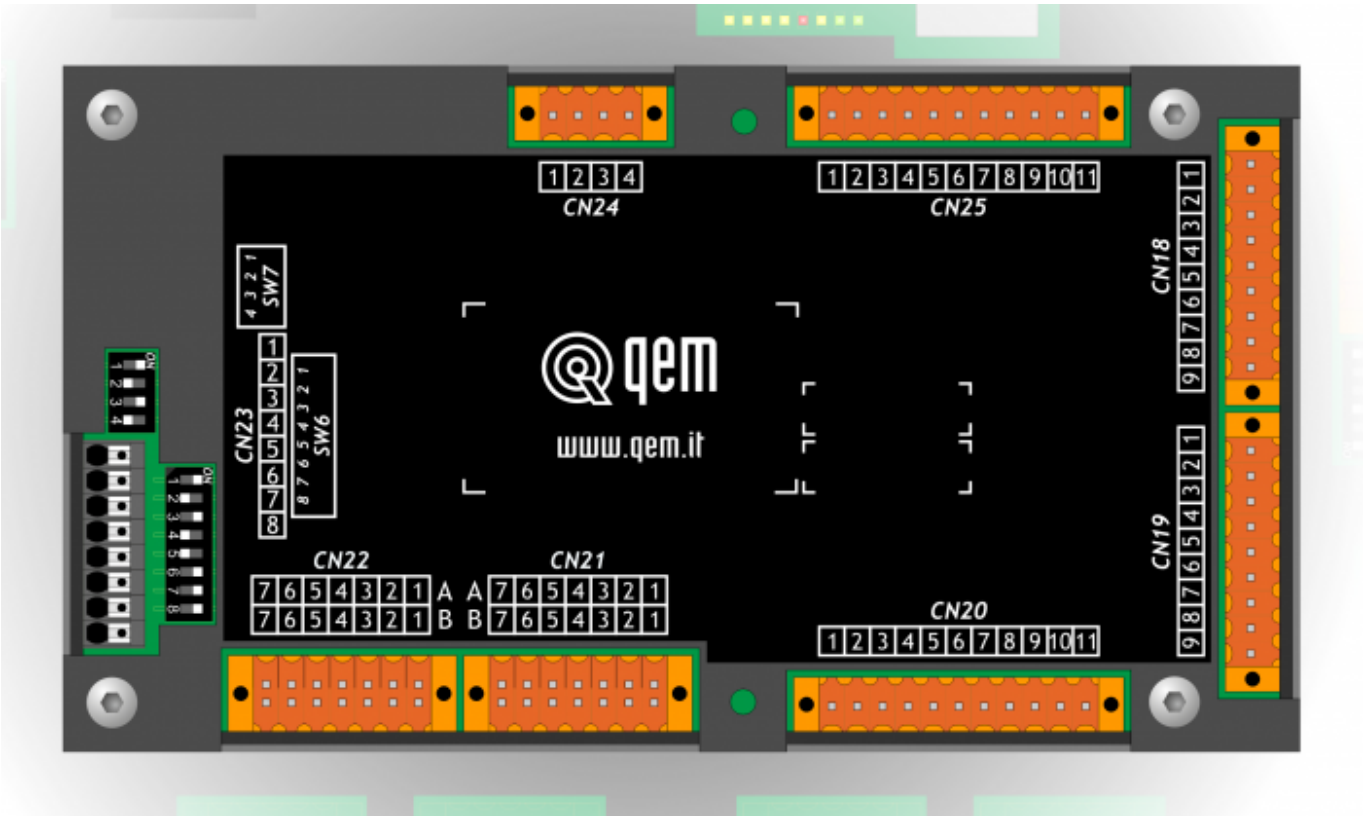
目录

Specialization card 1MG2F rel.01



Informations

Quality in Electronic Manufacturing

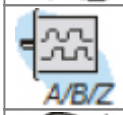
Document:	**MIM1MG2F01**
Description:	Installation and maintenance manual
Editor:	Riccardo Furlato
Approver	Giuliano Tognon
Link:	http://www.qem.eu/doku/doku.php/en/strumenti/qmoveplus/mim1mg2f01
Language:	English

Release documento	Hardware Release	Description	Note	Date
00	01	New document		26/04/2016

1. Description

The **1MG2F** is a specialization card for the Qmove+ instrument.

1.1 standard equipment

	16 standard digital inputs (+4 inputs alternatively to 2 counters)
	2 16bit multistandard analog inputs
	2 bidirectional counters
	16 digital outputs
	2 analog outputs

2. Techniques features

Fix Me! Bisogna inserire un disegno con gli ingombri meccanici dell'espansione con la copertura

Fix Me!

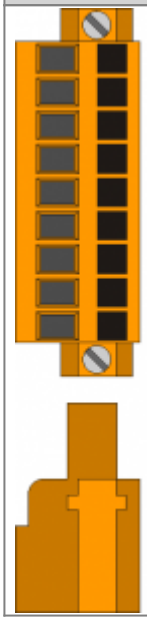
2.1 Mechanical dimensions

	Measurements in mm

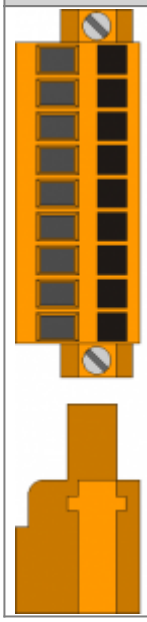
3. Connectors

3.1 Digital inputs

3.1.1 16 PNP digital inputs

CN18	Terminal	Simbol	Description	Address
	1	0V	Digital inputs common	
	2	I1	Input I1	3.INP01
	3	I2	Input I2	3.INP02
	4	I3	Input I3	3.INP03
	5	I4	Input I4	3.INP04
	6	I5	Input I5	3.INP05
	7	I6	Input I6	3.INP06
	8	I7	Input I7	3.INP07
	9	I8	Input I8	3.INP08

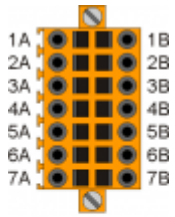
.

CN19	Terminal	Simbol	Description	Address
	1	0V	Digital inputs common	
	2	I9	Input I9	3.INP09
	3	I10	Input I10	3.INP10
	4	I11	Input I11	3.INP11
	5	I12	Input I12	3.INP12
	6	I13	Input I13	3.INP13
	7	I14	Input I14	3.INP14
	8	I15	Input I15	3.INP15
	9	I16	Input I16	3.INP16

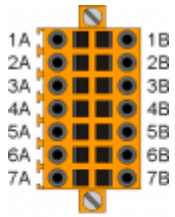
3.1.2 2 bidirectional input counters 200KHz

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

.

CN22	>Terminal	Simbol	Description		Address	
	1A		+24V dc output [1]			
	2A	PHA1	Phase A	Counter 1 PNP / Push-Pull[2]	3.INP17	3.CNT01
	3A	PHB1	Phase B		3.INP18	
	4A	Z1	Z		1.INT05	
	5A	0V	Counter inputs common			
	6A	0V				
	7A	0V				
	1B		+24V dc output[3]			
	2B	PHA1+	+ PHA	Counter 1 Line Driver	3.INP17	3.CNT01
	3B	PHB1+	+ PHB		3.INP18	
	4B	Z1+	+ Z		1.INT05	
	5B	PHA1-	- PHA			
	6B	PHB1-	- PHB			
	7B	Z1-	- Z			

[1), 3)] Can be used to power the encoder. See the Connection examples.
[2)] **Configuration type counter PNP/Push-Pull**:
5B terminal : to connect at 5A terminal
6B terminal: to connect at 6A terminal
7B terminal: to connect at 7A terminal

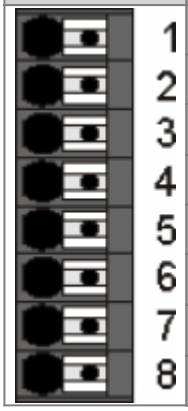
CN21	Terminal	Simbol	Description		Address	
	1A		+24V dc output[1]			
	2A	PHA2	Phase A	Conteggio 2 PNP / Push-Pull[2]	3.INP19	3.CNT02
	3A	PHB2	Phase B		3.INP20	
	4A	Z2	Z		1.INT06	
	5A	0V	Counter inputs common			
	6A	0V				
	7A	0V				
	1B		+24V dc output[3]			
	2B	PHA2+	+ PHA	Counter 2 Line Driver	3.INP19	3.CNT02
	3B	PHB2+	+ PHB		3.INP20	
	4B	Z2+	+ Z		1.INT06	
	5B	PHA2-	- PHA			
	6B	PHB2-	- PHB			
	7B	Z2-	- Z			

[1), 3)] Can be used to power the encoder. See the Connection examples.
[2)] **Configuration type counter PNP/Push-Pull**:
5B terminal : to connect at 5A terminal
6B terminal: to connect at 6A terminal
7B terminal: to connect at 7A terminal

3.2 Analog inputs

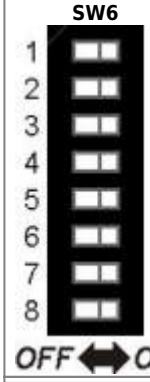
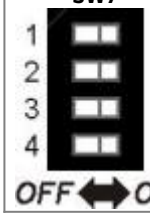
3.2.1 2 multistandard analog inputs

Connector

CN23	Terminal	Symbol	Description			Address
			Potenziometers / 0-10V / 0-20mA	Thermocouple	PT100	
	1	AI2_C	-	TC 2 +	C	3.AI02
	2	AI2_B	-	TC 2 -	B	
	3	AI2_A	Analog input 2	-	A [1)]	
	4	AI1_C	-	TC 1 +	C	3.AI01
	5	AI1_B	-	TC 1 -	B	
	6	AI1_A	Analog input 1	-	A [2)]	
	7	VREF	Reference voltage [3)]	-	-	
	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

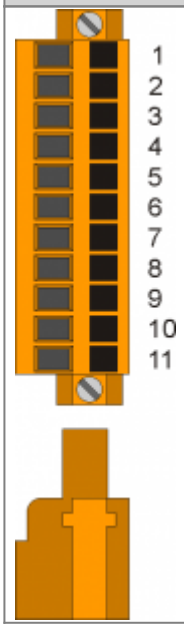
Analog inputs setting

	Num. Dip	Analog input 1					Analog input 2				
		PT100	Thermocouple	Pot.	0-10V	0-20mA	PT100	Thermocouple	Pot.	0-10V	0-20mA
SW6 	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
SW7 	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

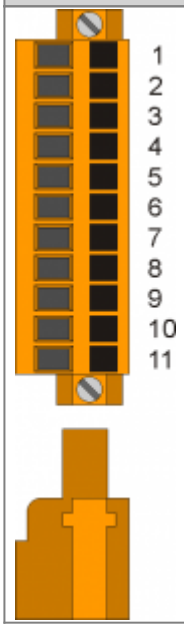
X = irrelevant setting
Pot. = potentiometric type input

3.3 Digital outputs

3.3.1 16 protected digital outputs

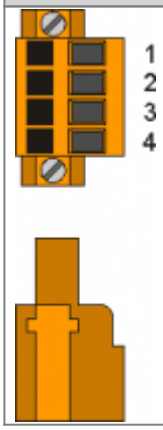
CN25	Terminal	Simbol	Description	Address
	1	V+	Outputs power O1÷O4 (12÷28V dc)	
	2	O1	Digital output 1	3.OUT01
	3	O2	Digital output 2	3.OUT02
	4	O3	Digital output 3	3.OUT03
	5	O4	Digital output 4	3.OUT04
	6	V+	Outputs power input O5÷O8(12÷28V dc)	
	7	O5	Digital output 5	3.OUT05
	8	O6	Digital output 6	3.OUT06
	9	O7	Digital output 7	3.OUT07
	10	O8	Digital output 8	3.OUT08
	11	V-	Outputs power input (0V dc)	

.

CN20	Terminal	Simbol	Description	Address
	1	V+	Outputs power O9÷O12(12÷28V dc)	
	2	O9	Digital output 9	3.OUT09
	3	O10	Digital output 10	3.OUT10
	4	O11	Digital output 11	3.OUT11
	5	O12	Digital output 12	3.OUT12
	6	V+	Outputs power input O13÷O16(12÷28V dc)	
	7	O13	Digital output 13	3.OUT13
	8	O14	Digital output 14	3.OUT14
	9	O15	Digital output 15	3.OUT15
	10	O16	Digital output 16	3.OUT16
	11	V-	Outputs power input (0V dc)	

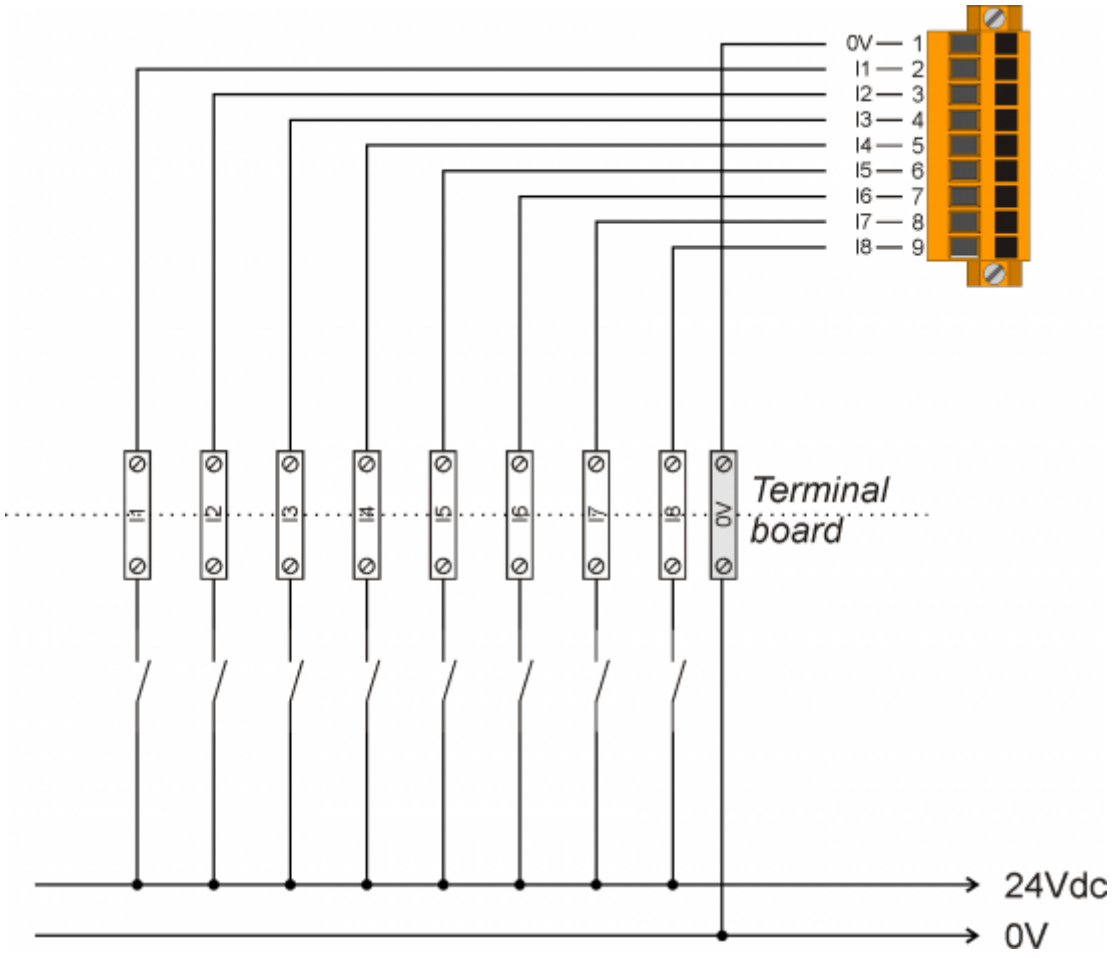
3.4 Analog outputs

3.4.1 2 +/-10V, 16bit analog outputs

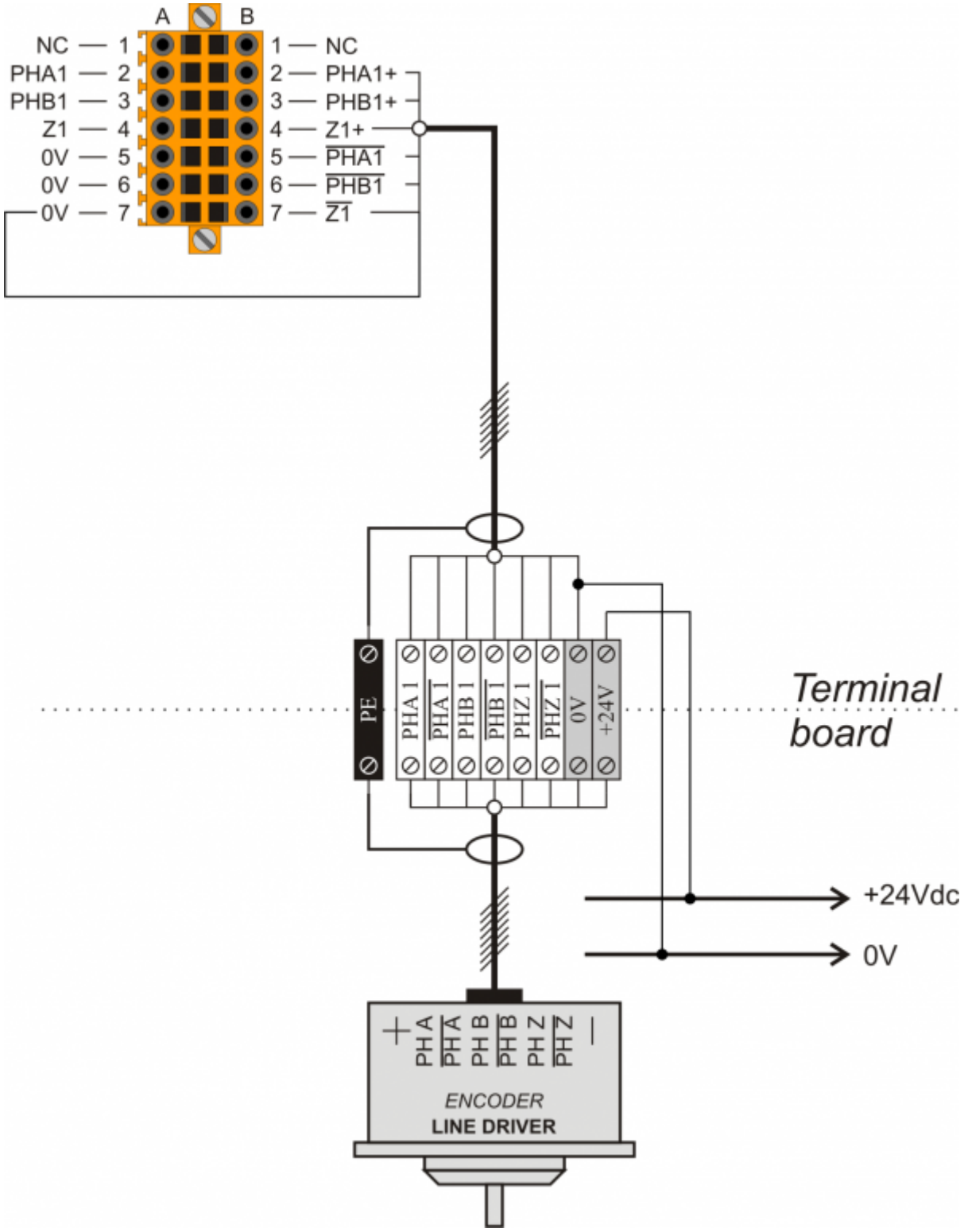
CN24	Terminal	Simbol	Description	Address
	1	GAO	Analog outputs common	
	2	AO1	Analog output 1	3.AN01
	3	AO2	Analog output 2	3.AN02
	4	GAO	Analog outputs common	

4. Connection examples

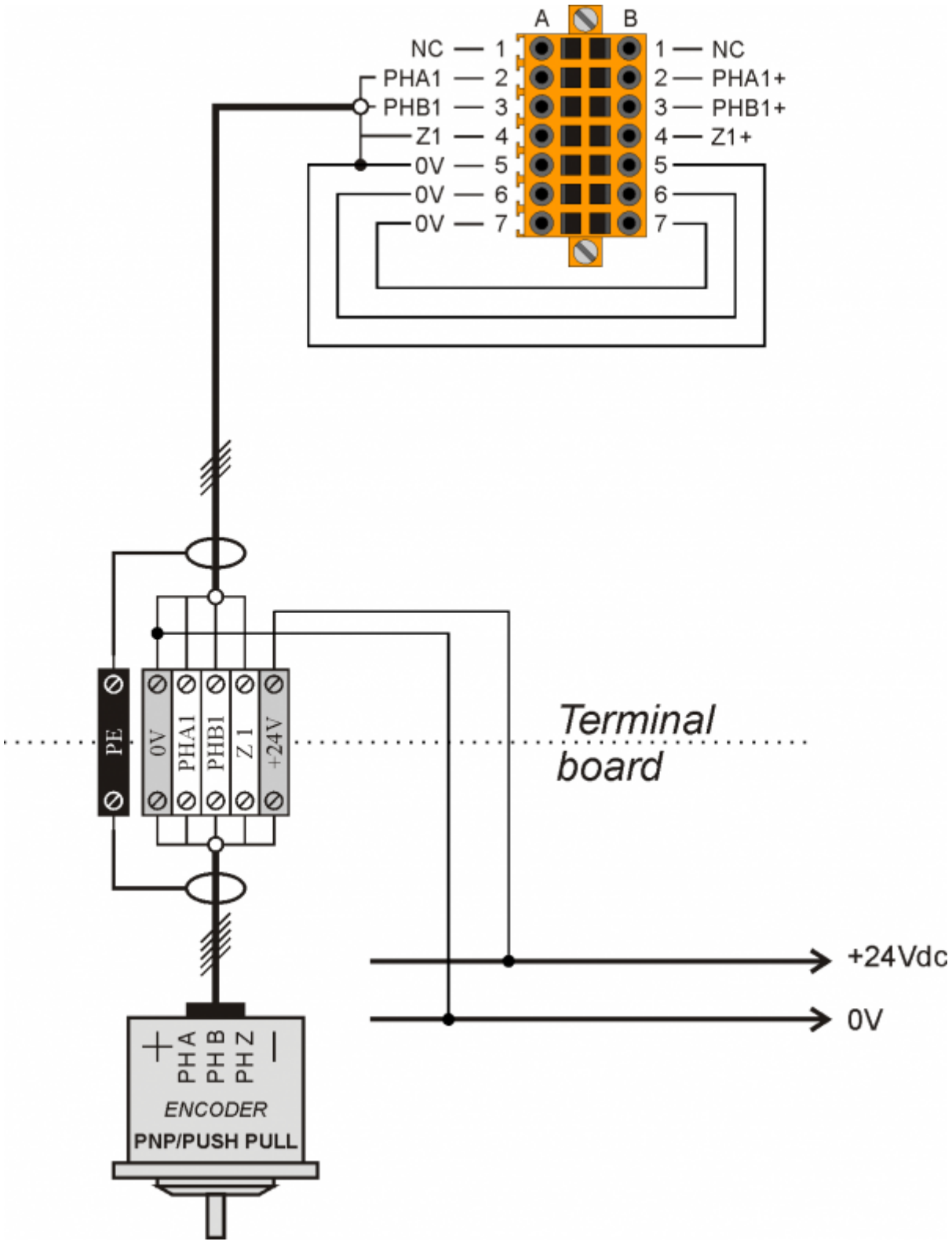
4.1 Digital inputs



4.2 Line Driver counter inputs

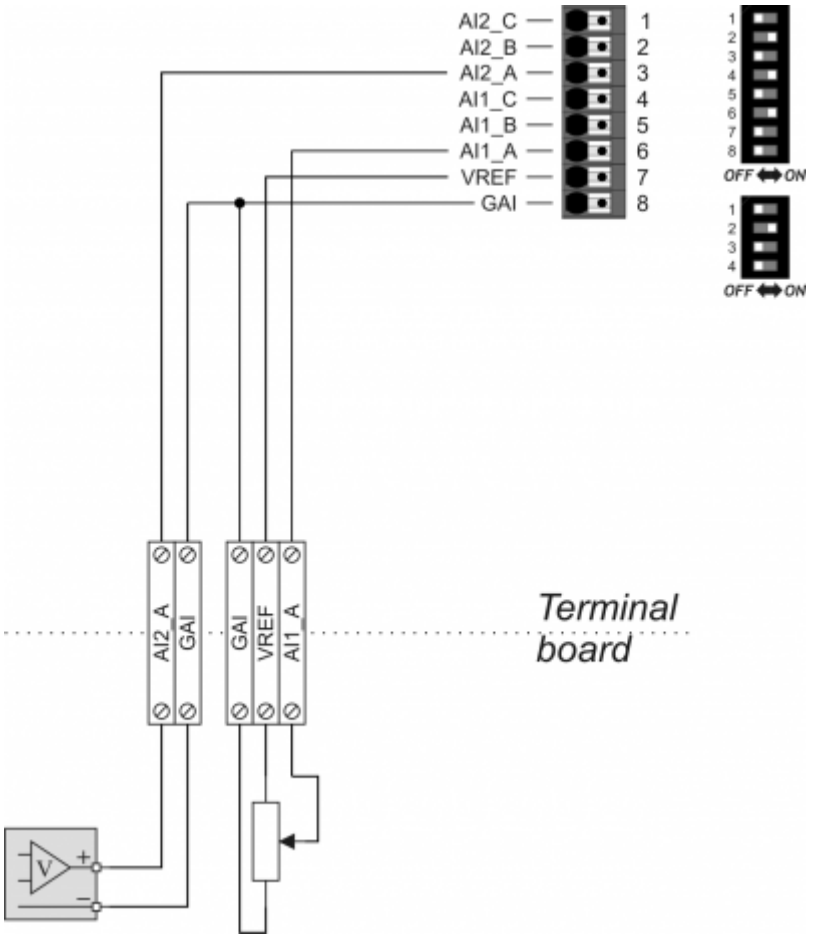


4.3 PNP / Push Pull counter inputs

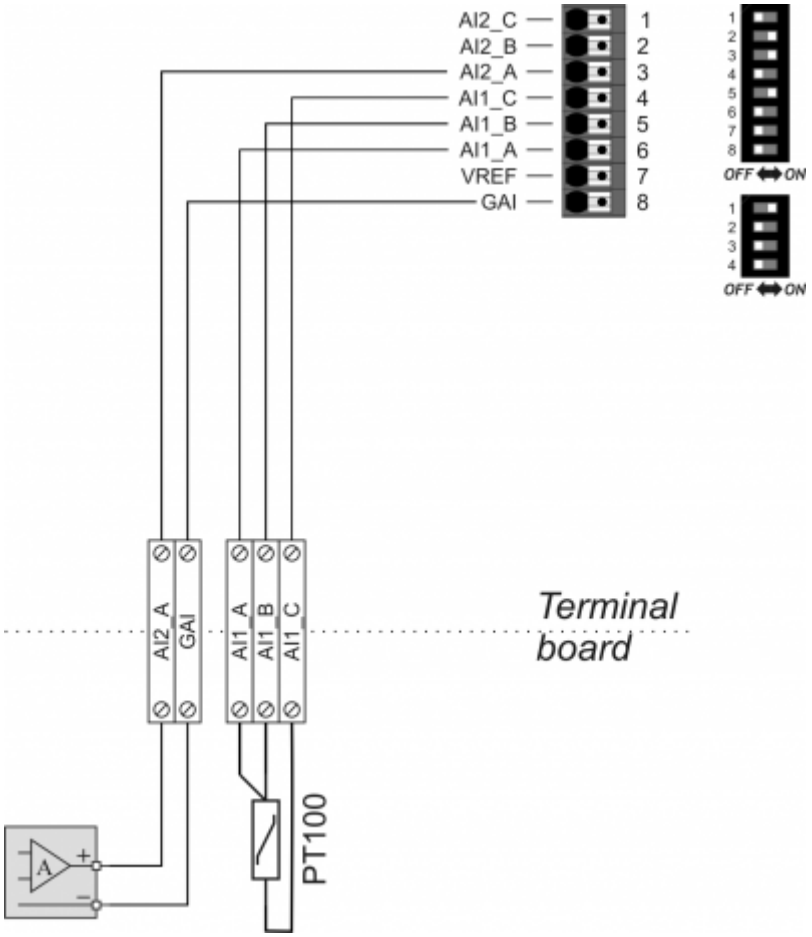


4.4 Analog inputs

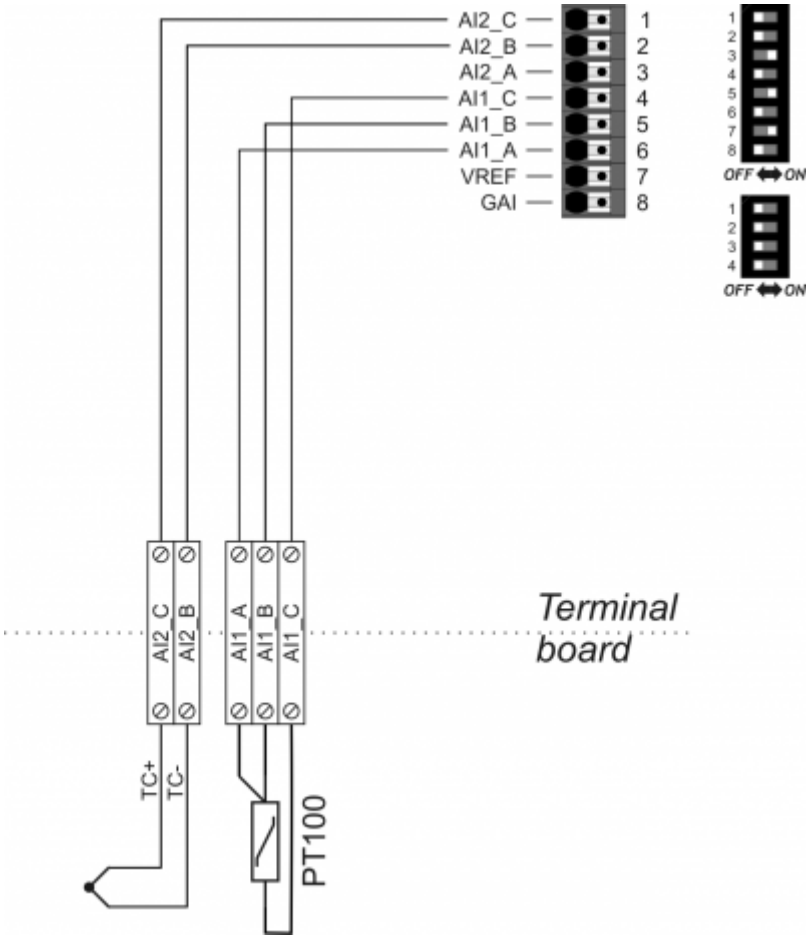
4.4.1 Potentiometric input 1 and voltmetric input 2



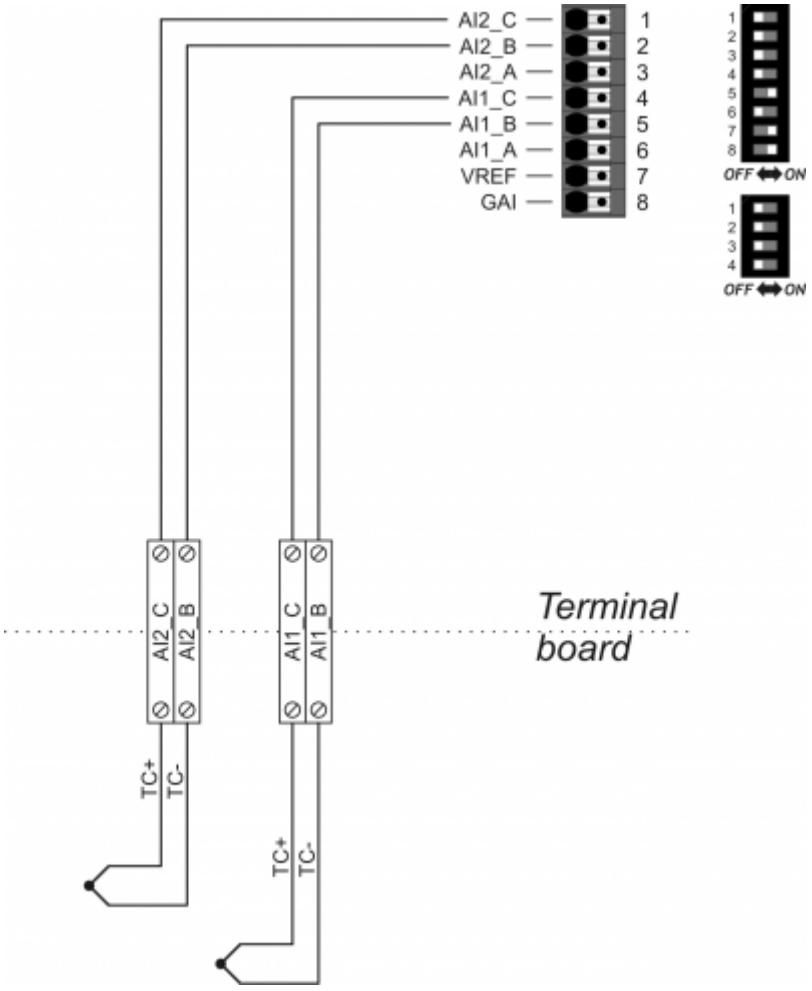
4.4.2 PT100 input 1 and amperometric input 2



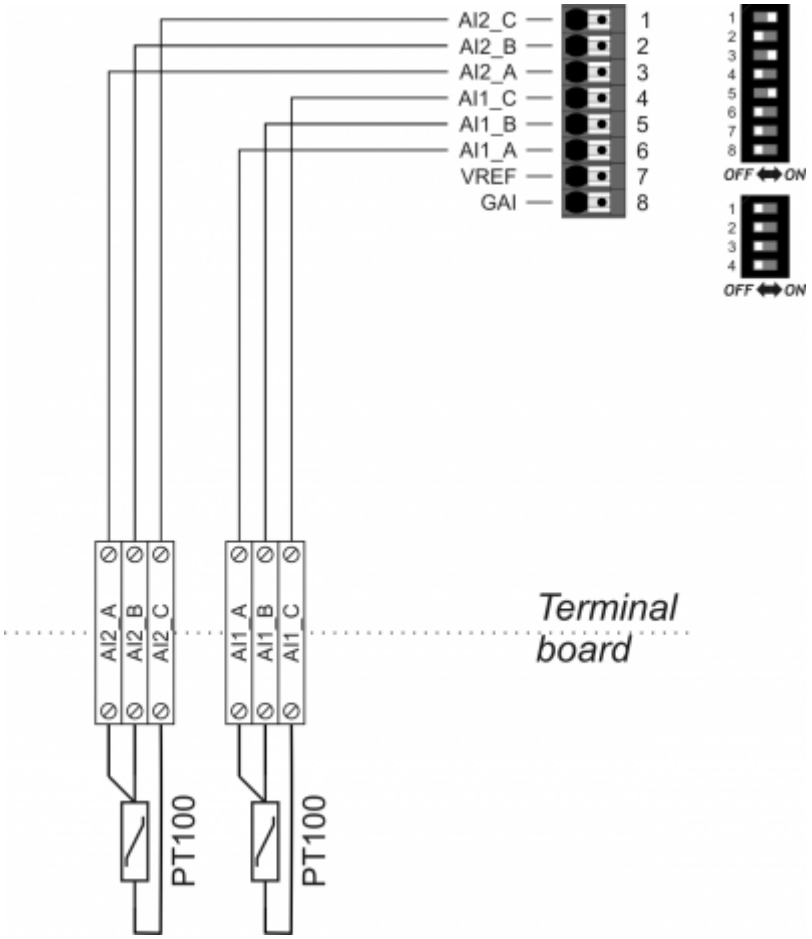
4.4.3 PT100 input 1 and termocouple input 2



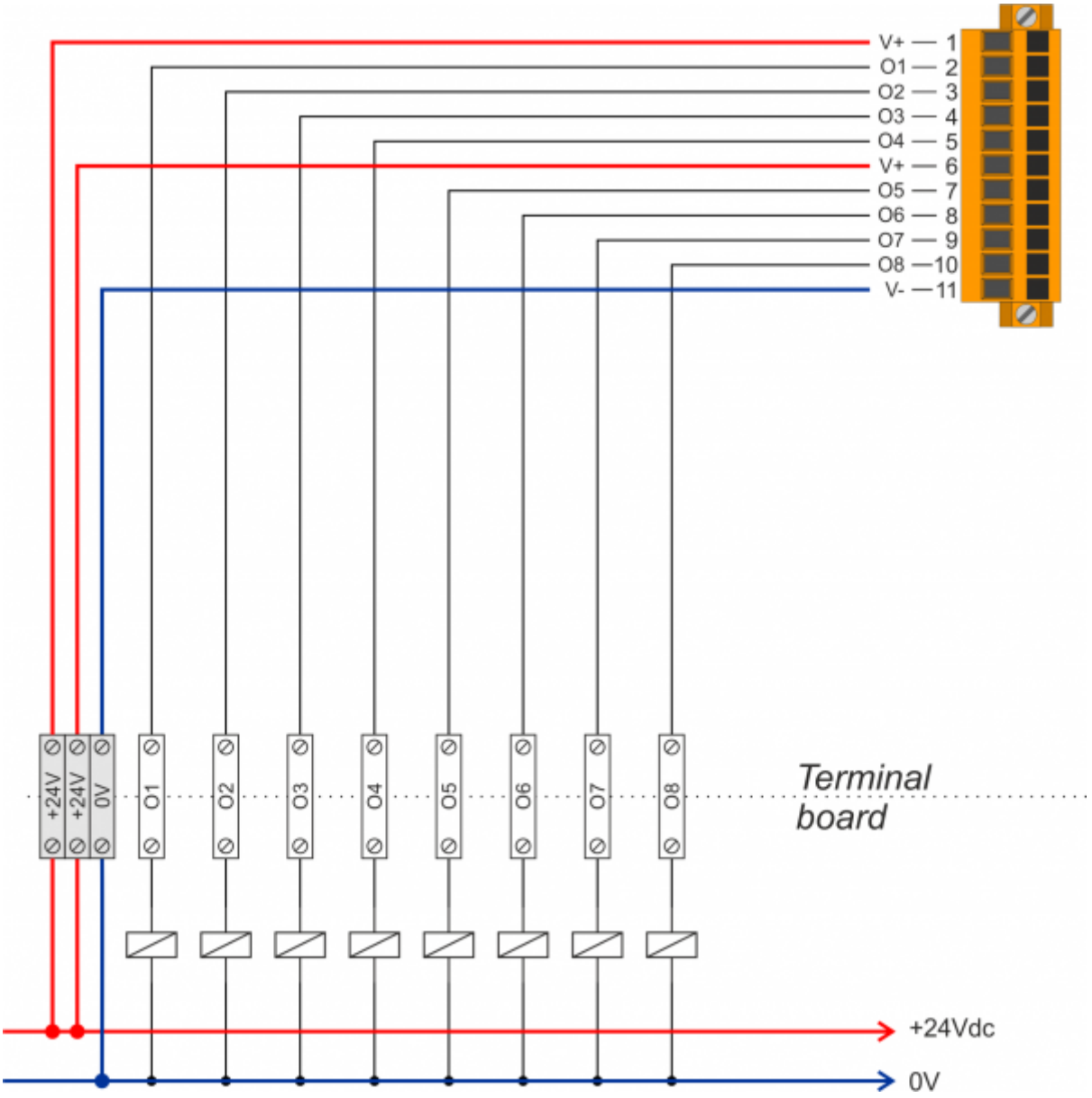
4.4.4 Termocouple inputs 1 and 2



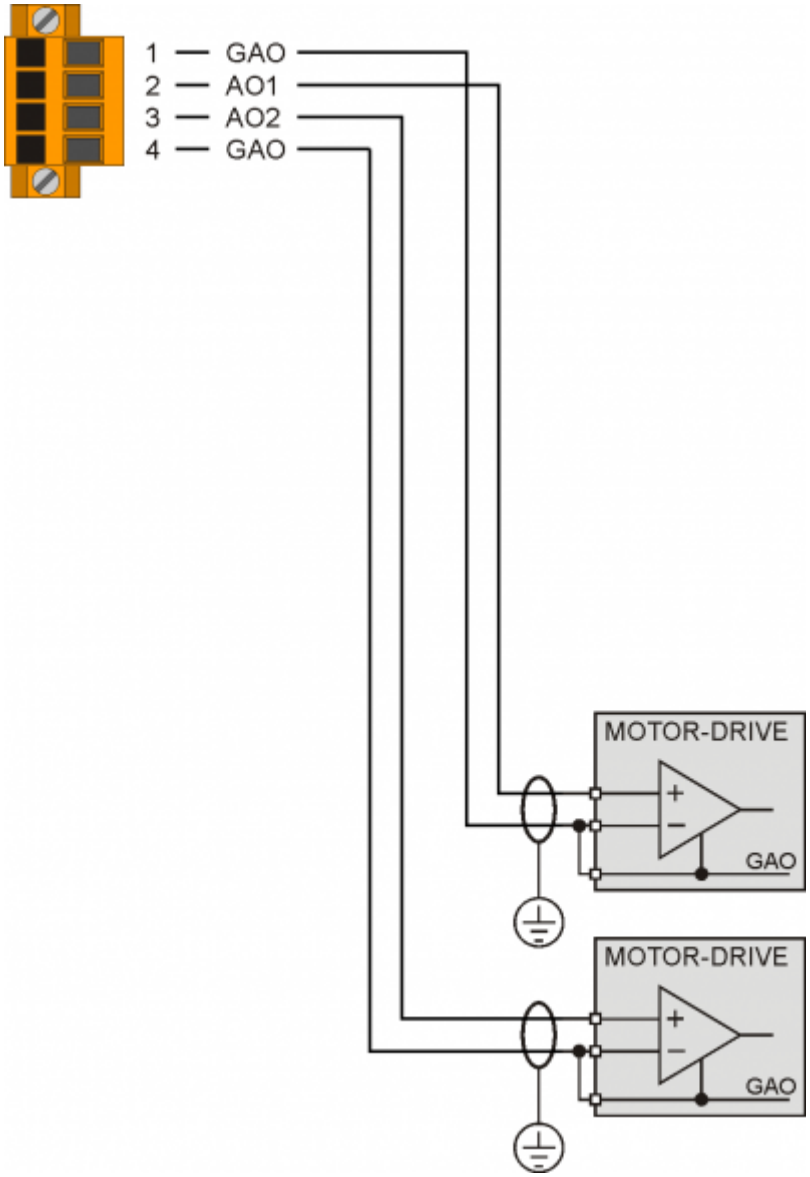
4.4.5 PT100 inputs 1 and 2



4.5 Protected digital outputs



4.6 Analog outputs



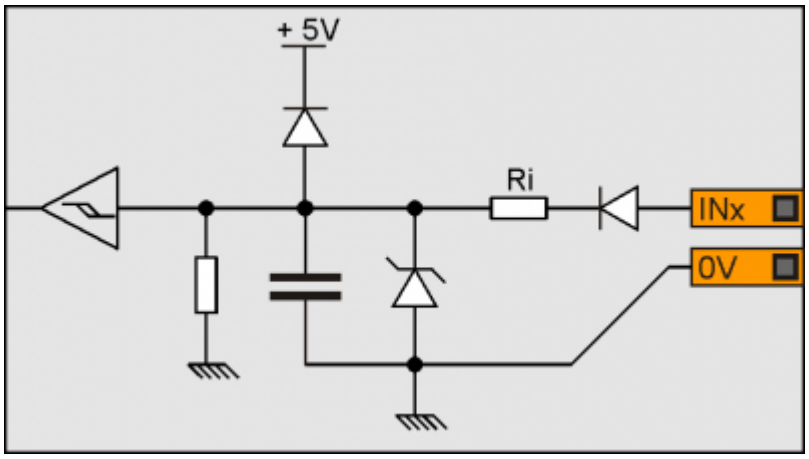
5. Electrical features

The following are the hardware electrical features .
Maximum and minimum frequency values and actual acquisition times, can depend on any additional software filters, for example to see the “QMOVE:sys004” system variable.

5.1 PNP 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.**



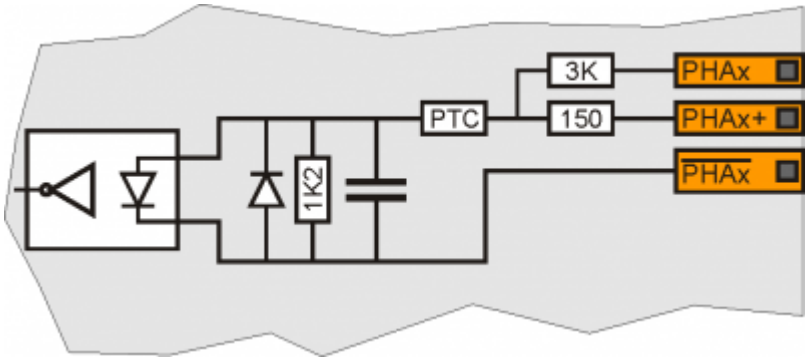
5.2 200KHz bidirectional counter inputs

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



5.3 Analog inputs

5.3.1 Conversion times

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:

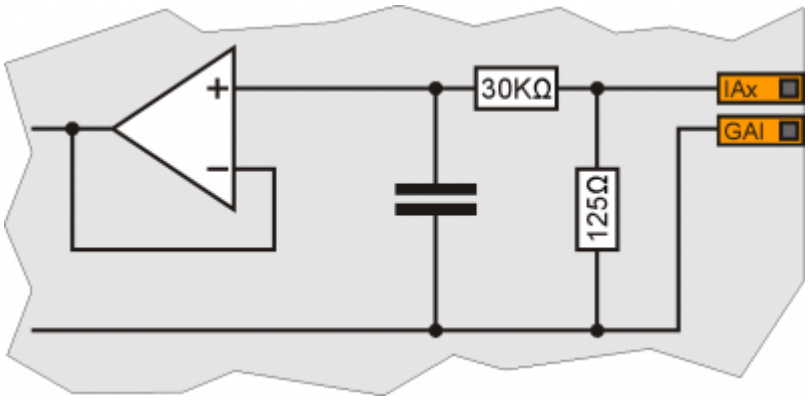
Analog Input Configuration		Conversion time per channel
Input 1	**Input 2**	
DC[1)]	-	4.6 ms
-	DC[2)]	4.6 ms
DC[3)]	DC[4)]	9.3 ms
DC[5)]	TC	9.3 ms
DC[6)]	PT100	79.1 ms
TC	-	9.3 ms
-	TC	9.3 ms
TC	DC[7)]	9.3 ms
TC	TC	9.3 ms
TC	PT100	83.8 ms
PT100	-	74.5 ms
-	PT100	74.5 ms
PT100	DC[8)]	79.1 ms
PT100	TC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

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

5.3.2 0-20mA analog input in amperometric configuration

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

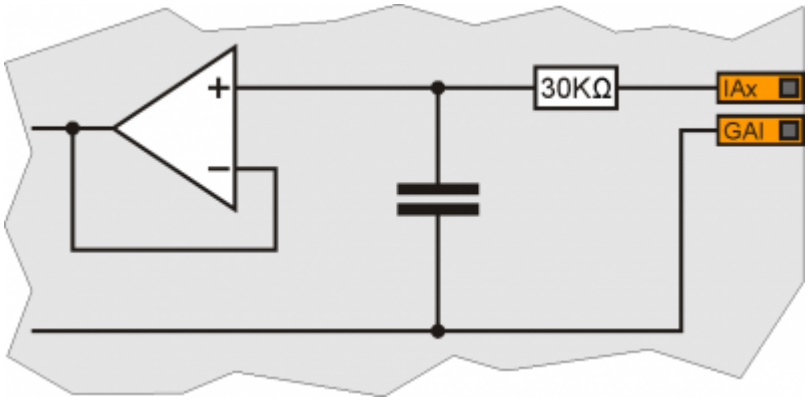
[1)] It depends on the Hardware versions
[2)] The sampling time of the device must be equal or higher than the conversion time



5.3.3 Analog input in potentiometric configuration

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

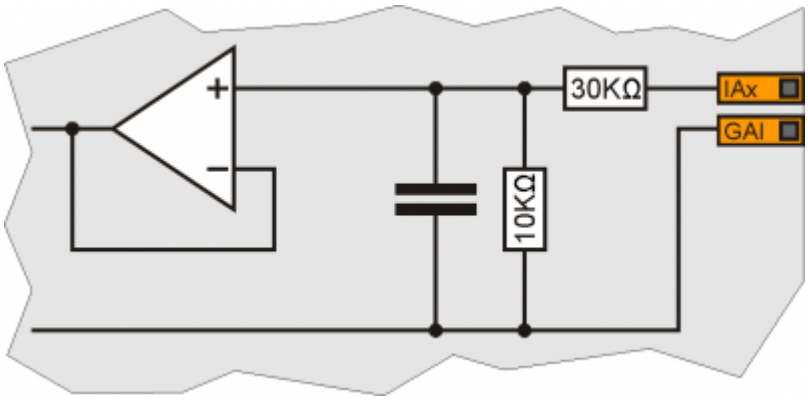
[1)] It depend on the Hardware versions
[2)] The sampling time of the device must be equal or higher than the conversion time



5.3.4 Analog input in voltmetric configuration

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



5.3.5 Analog input in PT100 configuration

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

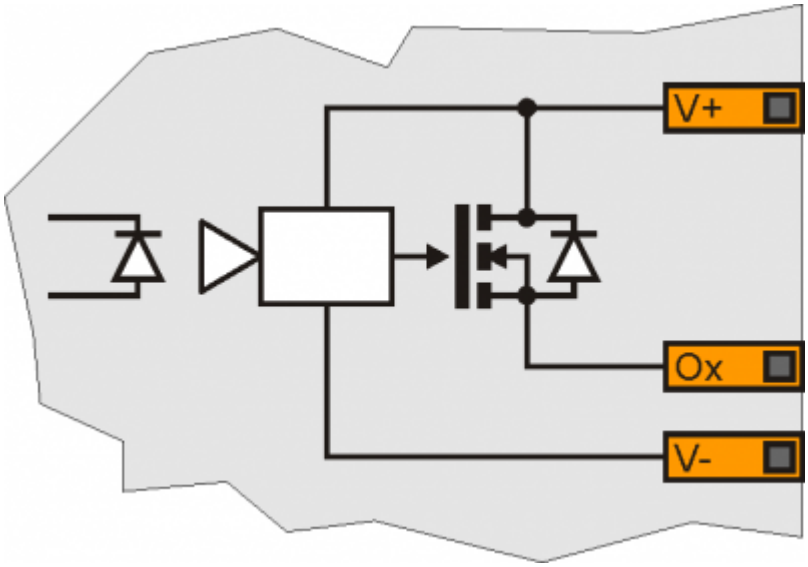
5.3.6 Analog input in termocouple configuration

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

5.4 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



5.5 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