**INSTALLATION AND USER MANUAL**code: **80990B - 12-2016 - ENG****ATTENTION!**

This manual must always be available to operators of the devices described here.

Always make sure that you have the latest version of the manual, which is available for free download from the GEFRAN website (www.gefran.com).

Installers and/or maintenance personnel are required to read this manual and to precisely follow the instructions contained in it and in its attachments.

GEFRAN will not be liable for any damage to persons and/or property, or to the product itself, caused by failure to follow the instructions and observe the warnings given below.



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REVISION DOCUMENTS

DATE	CODE	UPDATE
07-2013	80990A	First emission
12-2016	80990B	Analog out +/-10V accuracy

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PREFACE

Avvertenze e sicurezza

While all the information contained in this manual has been carefully checked, Gefran S.p.A. accepts no responsibility for the possible presence of errors or for damage to persons and/or property caused by the improper use of the manual. Gefran S.p.A. also reserves the right to make changes to the contents and form of this manual and to the characteristics of the devices illustrated at any time and without prior warning.

The installation of the devices illustrated in the manual must be carried out by qualified technicians in compliance with the laws and standards in force and in agreement with the instructions contained in the manual.

If the CAN-IO is used in applications with the risk of damages to persons, machinery or materials, its use in conjunction with

alarms is essential.

It is advisable to envisage the possibility of checking the intervention of the alarms during regular operation.

Before interacting with the board, the operator must receive full training in the procedures of operation, emergency, diagnosis and maintenance of the system.

Printing conventions used in the manual

Pay attention to the use of the following symbols.



Highlights particularly important information which influences the correct operation of the product or of safety or an instruction which must absolutely be followed.



Highlights a risk condition for the safety of the installer or the user, due to the presence of dangerous levels of voltage.

Glossary

CAN	Controller Area Network, also known as CAN-bus, is a standardised bus that enables the devices to communicate with each other.	RAM	Random Access Memory Electronic memorising device which enables the reading and writing of data.
CANopen	CAN communication protocol. Protocol specification for devices used in automation systems.	RS-232	Standard which defines a low-speed serial transmission interface for the exchange of data between digital devices, such as modems.
Work cycle	Fraction of time that represents the active state of a device, circuit, etc. in relation to the total time considered.	RS-485	Standard, at physical level, for serial connection with 2 wires.
Data logger	Enables the storage of information for filing records or further processing.	SD Card	Card for memorising large amounts of digital data.
Duration of settlement	Time required for the output value to reach and remain above 90 % of the final value.	SDRAM	Synchronised access RAM.
Encoder	Rotative position transducer.	Strain gauge	See Electric resistance extensometer.
Electric resistance extensometer	Sensor that transforms small dimensional deformations of a body subject to mechanical or thermal stress in changes of electric.	USB	Universal Serial Bus, serial communication and feeding standard created to connect peripherals to computers.
Ethernet	Standard for local networks (LAN).		
FLASH	Non-volatile memory in the solid state.		
FRAM	Non-volatile RAM faster than the Flash memory.		
FTP	File Transfer Protocol. Allows the upload and download of data files between the controller and other digital devices.		
LSB	Least Significant Bit. It defines the minimum resolution of a measurement.		
LSS	Layer Setting Services.		
Modbus	Open serial communication protocol, de facto standard in communication between industrial electronic devices. Modbus RTU is the most common implementation of this standard, Modbus TCP/IP is that specific m for Ethernet networks.		
Opto isolated	Circuit configuration which, through an electronic component called an opto-isolator, allows the transferral of a signal between two circuits while maintaining galvanic separation.		
PID	Regulation algorithm.		
PLC	Programmable Logic Controller. A digital computer specialised in the management of industrial processes.		
PWM	Pulse-Width Modulation. Technique for controlling power towards electric devices.		

GENERAL

Overview of the solution and functionalities

CAN-IO is IO Remote module for the management of remote inputs and outputs, which can be completely customised to suit customer requirements, adapting perfectly to the machine or system to control. Thanks to its flexibility and ease of use, CAN-IO can be used in a variety of sectors and for numerous process and automation process controls, such as:

- the wood industry (gluing, etc.);
- packaging (packing, labelling, etc.);
- food industry (pasteurisers, etc.);
- chemical industry (autoclaves, etc.);
- metal working (washing, etc.);
- plastic working (dryers, coolers, etc.).

Architecture

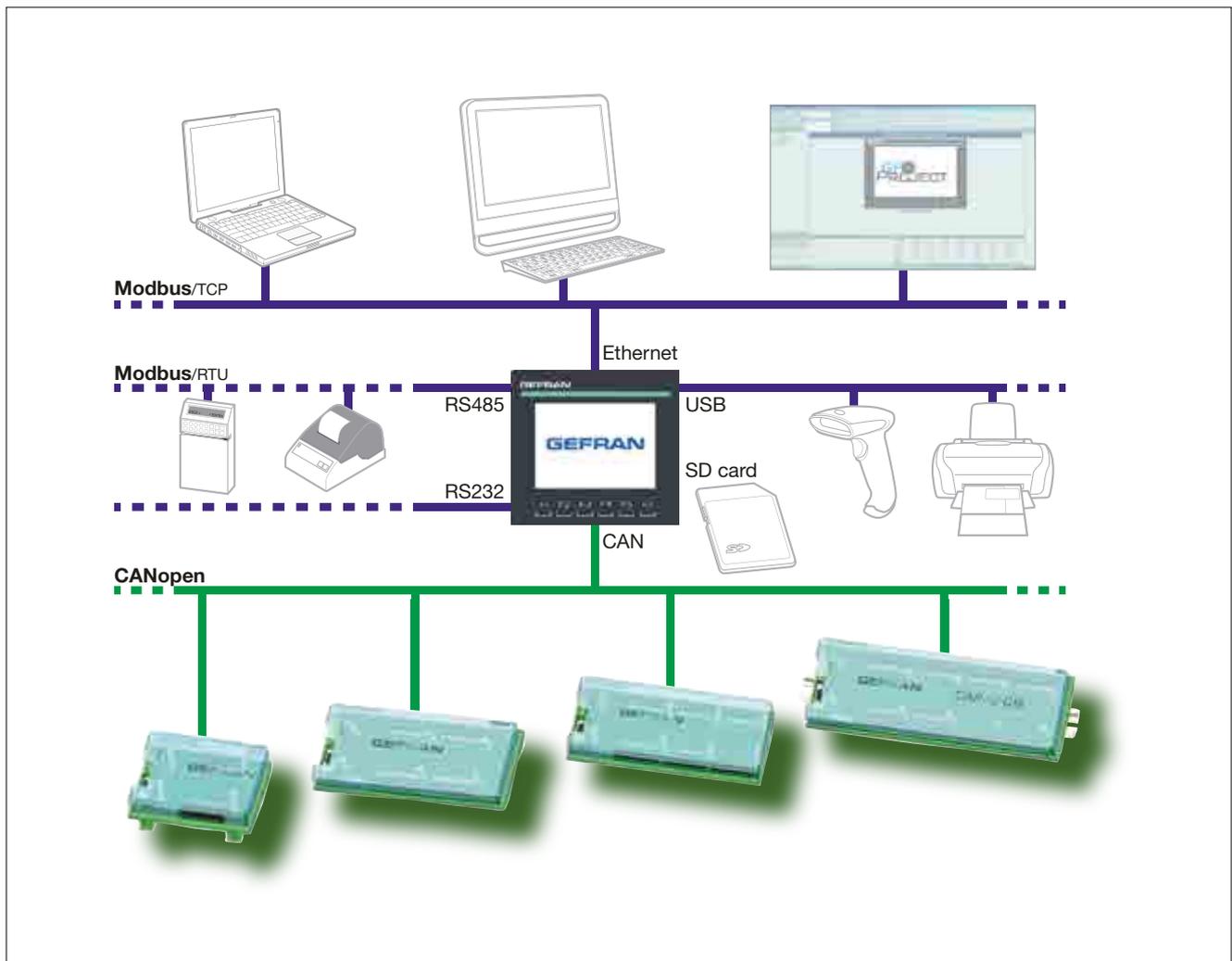


Figure 1 - System architecture

CAN-IO



The remote input and output module (I/O) allows:

- acquisition of multiple information for the appliances controlled and from the environment, via signals and sensors;
- control and regulate appliances through different types of signals and commands.

The modules are available in different models and can manage up to a total of 40 channels (inputs and outputs) each, with the following limits type (see ordering codes):

- digital inputs: 24 max;
- fast digital inputs (meters): 6 max;
- digital outputs: 16 max in total (outputs 0.5 A: 16 max;
- outputs 2 A: 16 max; relay outputs: 8 max);
- PWM outputs: 8 max;
- Temperature inputs (thermocouples, thermo resistance PT100, thermo resistance PT1000): 10 max in total;
- analogue inputs (power input ± 10 V, current input 0/4...20 mA, extensometer input, potentiometer input): 8 max in total;
- analogue outputs (power outputs ± 10 V, current outputs 0/4...20 mA): 8 max in total.

The main characteristic of the module is that it is assembled according to user requirements, combining different type inputs and outputs on the same card, in the quantities required. In this way they adapt perfectly to the requirements of the machine or system to be controlled.

The modules can be prepared for assembly on DIN runner or plate, according to requirements.

Technical data

POWER	Operating voltage	24 Vdc $\pm 25\%$
	Absorbed current (at 24 Vdc)	700 mA max
	Dissipated power	12 W max
	Connections	Screw terminals, max wire section 1 mm ²
CONNECTIONS	CAN Port	Opto-isolated DB9 M: Connector
	I/O Ports	Connectors depending on the configuration. Type 1: screw terminals, max wire section 1 mm ² ; for relay max wire section 2.5 mm ² Type 2: click-in, female, 12-pole Type 3: comb
COMMUNICATION PROTOCOLS	CAN	CANopen (NMT slave) Version: communication profile DS301 v. 4.02 device profile DS401
	Module addresses available	128
	Transmission speed	10, 20, 50, 100, 125, 250, 500 (predefined), 800, 1000 kbit/s, selectable via hardware or software

DISPLAY LED	Card	1 yellow "Power" LED 1 green "Run" LED
	Bus CAN	1 green "Run" LED 1 red "Run" LED
	Digital input	1 green "Status" LED
	Digital output	1 green "Status" LED Output 0.5 A: yellow "Power" LED every 8 outputs; Output 2 A: yellow "Power" LED every 4 outputs
	Fast counter	1 green "Status" LED
	Relay output	1 green "Status" LED
	PWM output	1 green "Status" LED 1 yellow "Power" LED every 8 outputs
CAN PROTOCOL	Module address configuration	1 switch + 2 16-position dials
	Transmission speed configuration	Via procedure with module address dials or via software
	Bus termination configuration	2 switch
DIGITAL INPUT	Max number	24 (orderable in groups: 3, 6, 9, 12, 15, 18, 21, 24)
	Type	Absorption of current type 1, 2, 3
	Rated voltage	24 Vdc
	Max input voltage	32 Vdc
	Max input current	6.5 mA
	Switch threshold	Low level: ≤ 8 Vdc High level: ≥ 9 Vdc
	Hardware filter	100 Hz
	Switch delay	0 -> 1: 100 μ s 1 -> 0: 85 μ s
	Protections	Polarity inversion Overvoltage: max 1 kV per 1 ms
	Electric insulation	Channel-channel: no Channel-bus: 2 kV
FAST DIGITAL INPUT	Max number	6 (orderable in groups: 3, 6)
	Type	Absorption of current type 1, 2, 3
	Rated voltage	24 Vdc
	Max input voltage	32 Vdc
	Max input current	6,5 mA
	Switch threshold	Low level: ≤ 8 Vdc High level: ≥ 9 Vdc
	Hardware filter	50 kHz
	Switch delay	0 \Rightarrow 1: < 500 ns 1 \Rightarrow 0: < 500 ns
	Position / counter output format	Type: DINT Resolution: 32 bit (-2147483648 ... 2147483647)
	Speed output format	Type: DINT Resolution: 32 bit (-2147483648 ... 2147483647) LSB: 0.1 impulses/s

FAST DIGITAL INPUT	Period measurer / impulse duration measurer output format	TYPE: DINT Resolution: 32 bit (0 ... 21,4 s) LSB: 10 ns
	Frequency measurer output format	TYPE: DINT Resolution: 32 bit (0 ... 500 kHz) LSB: 0,1 Hz
	Protections	Polarity inversion Overvoltage: max 1 kV per 1 ms
	Electric insulation	Channel-channel: no Channel-bus: 2 kV
	Main functions	6 one-way incremental encoders [A] max; 2 one-way incremental encoders + zero notch [A+Z] max; 2 two-way incremental encoders [AB] max; 2 two-way incremental encoders + zero notch [AB+Z] max; Max 6 count forward [Counter]
	Auxiliary functions	Period measurer Frequency measurer Duty-cycle measurer Positive/negative impulse measurer
THERMOCOUPLE TEMPERATURE INPUT	Max number	10 (orderable in groups: 2, 4, 6, 8, 10)
	Type	Thermocouple J, K, R, S, T, E, B, L, N
	Type of connection	2 wires (insulated and non-insulated)
	Through band	0,5 Hz
	Input impedance	> 1 MΩ
	Sampling time (for all channels)	100 ms
	Resolution	0,1 °C / °F
	Max error @ 25 °C	±0,5% scale bottom
	Thermocouple use interval (scale)	J: 0 ... 1000 °C / 32 ... 1830 °F K: 0 ... 1300 °C / 32 ... 2372 °F R: 0 ... 1750 °C / 32 ... 3182 °F S: 0 ... 1750 °C / 32 ... 3182 °F T: -200 ... 400 °C / -392 ... 752 °F E: -100 ... 750 °C / -212 ... 1382 °F B: 0 ... 1820 °C / 32 ... 3308 °F L: -200 ... 400 °C / -392 ... 752 °F N: 0 ... 1300 °C / 32 ... 2372 °F
THERMO RESISTANCE TEMPERATURE INPUT	Max number	10 (orderable in groups: 2, 4, 6, 8, 10)
	Type	Thermo resistance PT100 or PT1000
	Type of connection	2 or 3 wires
	Through band	0,5 Hz
	Input impedance	PT100: 12 kΩ PT1000: 120 kΩ
	Sampling time (for all channels)	100 ms
	Resolution	0,1 °C / °F
	Max Error @ 25 °C	±0,5% scale bottom
	Use interval (scale)	-200...850 °C / -392...1562 °F
	Protections	Polarity inversion: yes Overvoltage: max 1 kV per 1 ms
	Electric insulation	Channel-channel: no Channel-bus: 2 kV

ANALOGUE INPUT IN VOLTAGE ±10 V	Max number	8 (orderable in groups: 2, 4, 6, 8)
	Type	Single-ended voltage ±10 V
	Input filter	Low-pass, 3rd order Cutting frequency: 20 Hz
	Input impedance	> 1 MΩ
	Sampling time (for all channels)	5 ms
	Output format	Type: INT Resolution: 13 bit (-4096 ... 4095) LSB: 2,44 mV
	Max error @ 25 °C	±0,5% scale bottom
	Protections	Polarity inversion: yes Overvoltage: max 1 kV per 1 ms
	Electric insulation	Channel-channel: no Channel-bus: 2 kV
ANALOGUE INPUT IN CURRENT 0/4 ... 20 mA	Max number	8 (orderable in groups: 2, 4, 6, 8)
	Type	Current 0 ... 20 mA
	Input filter	Low-pass, 3rd order Cutting frequency: 20 Hz
	Input impedance	100 Ω
	Sampling time (for all channels)	5 ms
	Output format	Type: UINT Resolution: 14 bit (0 ... 20 mA: 0 ... 16384 4 ... 20 mA: 3277 ... 16384) LSB: 4,88 µA
	Max error @ 25 °C	±0,5% fondo scala
	Protections	Polarity inversion: yes Overvoltage: max 1 kV per 1 ms
	Electric insulation	Channel-channel: no Channel-bus: 2 kV
POTENTIOMETER ANALOGUE INPUT	Max number	8 (orderable in groups: 2, 4, 6, 8)
	Type	Potentiometer 2 kΩ min.
	Transducer power	5 V, 150 mA max
	Input filter	Low-pass, 3rd order Cutting frequency: 20 Hz
	Input impedance	> 1 MΩ
	Sampling time (for all channels)	5 ms
	Output format	Type: UINT Resolution: 12 bit LSB: 1,22 mV
	Max error @ 25 °C	±0,5% scale bottom
	Protections	Polarity inversion: yes Overvoltage: max 1 kV per 1 ms
Electric insulation	Channel-channel: no Channel-bus: 2 kV	

ELECTRIC RESISTANCE EXTENSOMETER ANALOGUE INPUT ("strain gauge")	Max number	8 (orderable in groups: 2, 4, 6, 8)
	Type	Differential, strain gauge, 2,2 mV/V, 3,3 mV/V
	Transducer power	5 V, 150 mA max
	Input filter	Low-pass, 2nd order Cutting frequency: 20 Hz
	Input impedance	> 1 M Ω
	Sampling time (for all channels)	5 ms
	Output format	Type: UINT Resolution: 16 bit LSB: 0,38 μ V
	Erreore max @ 25 °C	\pm 0,5% scale bottom
	Protections	Polarity inversion: yes Overvoltage: max 1 kV per 1 ms
	Electric insulation	Channel-channel: no Channel-bus: 2 kV
DIGITAL OUTPUT 0,5 A	Max number	16 (orderable in groups: 2, 4, 6, 8, 10, 12, 14, 16)
	Composition	Every 8 outputs a power wire
	Type	Current emission
	Rated voltage	24 Vdc \pm 25%
	Max output current	Single output: 0.5 A Group of 8 outputs: 4 A
	Switch delay	0 \Rightarrow 1: 30 μ s 1 \Rightarrow 0: 50 μ s
	Protections	Short circuit Overload : I \geq 0.7 A (according to IEC 61131-2) Overtemperature Overvoltage: max 1 kV per 1 ms
	Electric insulation	Channel-channel: no Channel-bus: 2 kV
DIGITAL OUTPUT 2 A	Max number	16 (orderable in groups: 2, 4, 6, 8, 10, 12, 14, 16)
	Composition	Every 4 outputs a power wire
	Type	Current emission
	Rated voltage	24 Vdc \pm 25%
	Max output current	Single output: 2 A Group of 4 outputs: 8 A
	Switch delay	0 \Rightarrow 1: 20 μ s 1 \Rightarrow 0: 50 μ s
	Protections	Short circuit Overload: I \geq 2,7 A (according to IEC 61131-2) Overtemperature Overvoltage: max 1 kV per 1 ms
	Electric insulation	Channel-channel: no Channel-bus: 2 kV

RELAY OUTPUT, SINGLE CONTACT	Max number	8 (orderable in groups: 2, 4, 6, 8)
	Type	Single N.O. contact
	Rated voltage	30 Vdc / 250 Vac
	Max current	5 A
	Mechanical duration	20 x 10 ⁶ operations
	Contact duration	70.000 operations
	Protections	Overvoltage: max 430 V @ 1 mA
	Electric insulation	Channel-channel: yes Channel-bus: 3 kVrms
RELAY OUTPUT, EXCHANGE CONTACT	Max number	4 (orderable in groups: 2, 4)
	Type	exchange contact N.O., N.C.
	Rated voltage	30 Vdc / 250 Vac
	Max current	5 A
	Mechanical duration	20 x 10 ⁶ operations
	Contact duration	2 A: 300.000 operations 5 A: 70.000 operations
	Protection	Overpressure: max 430 V @ 1 mA
	Electric insulation	Channel-channel: yes Channel-bus: 3 kVrms
PWM OUTPUT	Max number	8 (orderable in groups: 2, 4, 6, 8)
	Composition	Every 8 outputs a power wire
	Type	Current emission
	Rated voltage	25 Vdc ±25%
	Max output current	Single output: 1 A Group of 8 outputs: 8 A
	Output configuration	PWM Frequency
	PWM output	Duty cycle: resolution 0.01% Frequency: resolution 0.01 Hz Max frequency: 5 kHz
	Frequency output	Duty cycle: resolution 50% Frequency: resolution 0.01 Hz Max frequency: 50 kHz
	Output format	Type: INT Resolution: 13 bit (-4096 ... 4095) LSB: 2,44 mV
	Switch delay	0 ⇒ 1: 1,5 µs 1 ⇒ 0: 1 µs
	Protections	Short circuit Overload : I ≥ 1.4 A Overtemperature Overvoltage: max 1 kV per 1 ms
	Electric insulation	Channel-channel: no Channel-bus: 2 kV

ANALOGUE OUTPUT VOLTAGE ±10 V	Max number	8 (orderable in groups: 2, 4, 6, 8)
	Type	Single ended voltage ±10 V
	Max output current	20 mA
	Refreshing time	10 ms
	Settling time ("settling time")	1 ms
	Output format	Type: INT Resolution: 13 bit (-4096 ... 4095) LSB: 2,44 mV
	Max error @ 25 °C	±0,5% scale bottom
	Protections	Short circuit ±10V: yes Overpressure: max 1 kV per 1 ms
	Electric insulation	Channel-channel: no Channel-bus: 2 kV
ANALOGUE OUTPUT CURRENT 0/4 ... 20 mA	Max number	8 (orderable in groups: 2, 4, 6, 8)
	Type	Current, 0 ... 20 mA
	Max voltage	12 V
	Max charge	600 Ω
	Refreshing time	5 ms
	Settling time ("setting time")	1 ms
	Output format	Type: UINT Resolution: 12 bit (0 ... 20 mA: 0 ... 16384 4 ... 20 mA: 3277 ... 16384) LSB: 1,22 µA
	Max error @ 25 °C	±0,8% scale bottom
	Protections	Overvoltage: max 1 kV per 1 ms
Electric insulation	Channel-channel: no Channel-bus: 2 kV	
ENVIRONMENTAL CONDITIONS	Operating temperature	0 ... +50 °C (according to IEC 68-2-14)
	Storage temperature	-20 ... +70 °C (according to IEC 68-2-14)
	Relative humidity	5 ... 95% RH non-condensing (in according to IEC 68-2-3)
ASSEMBLY		Direct on plate, with spacers On 35 mm DIN bar, horizontal or vertical (optional)
DEGREE OF PROTECTION		IP 20 (optional)
WEIGHT		Depending on the I/O configuration For assembly on plate: 0.6 kg max For assembly on DIN runner: 0,85 kg max
CERTIFICATION		CE UL by specific request
CE STANDARDS	EMC conformity (electromagnetic compatibility)	Observance of Directive 2014/30/EU EN61131-2: Programmable Controllers Part 2: Equipment requirements and test.
	LV conformity (low voltage)	

Dimensions

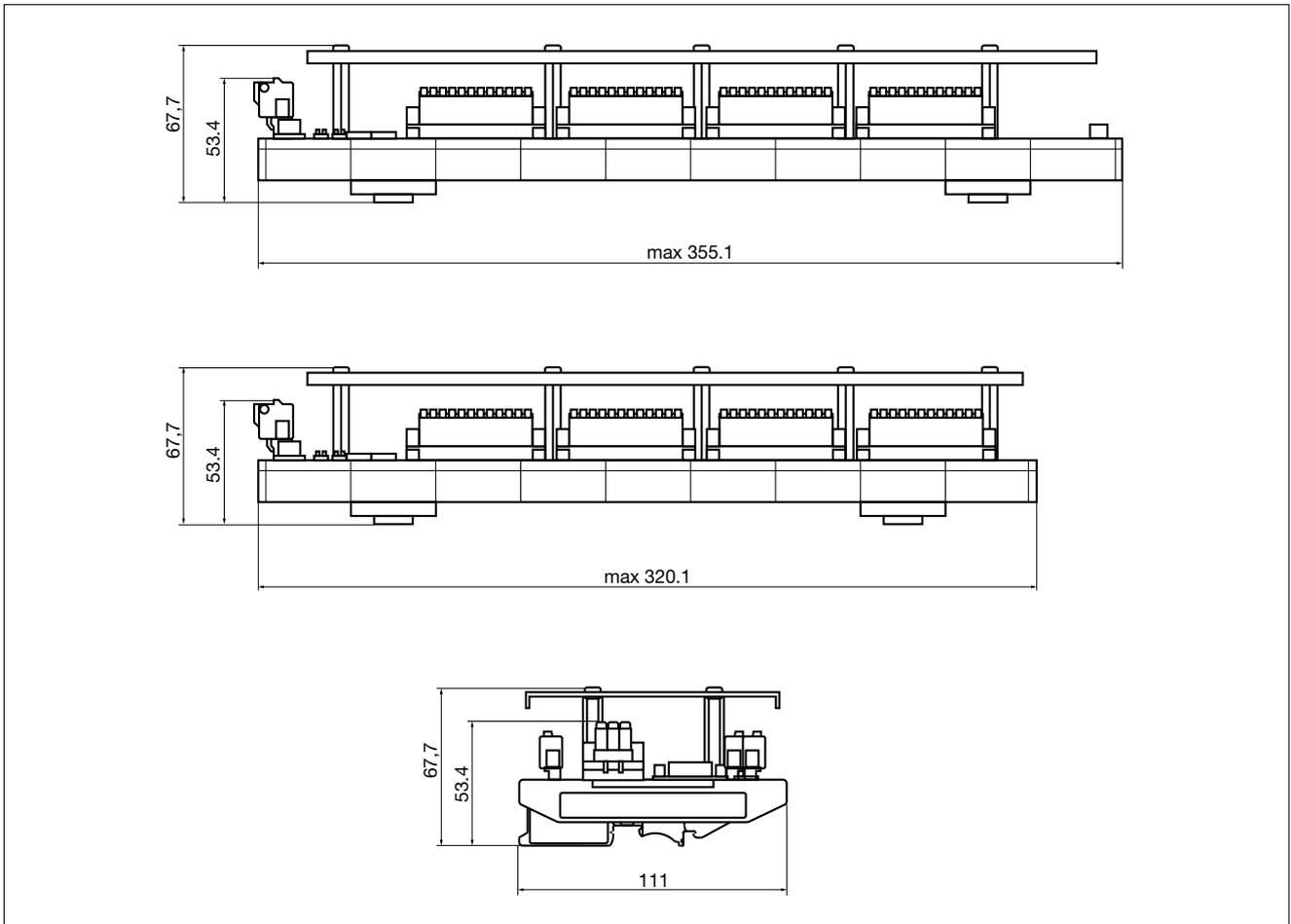


Figure 4 - Dimensions CAN-IO, versions for assembly on DIN runner

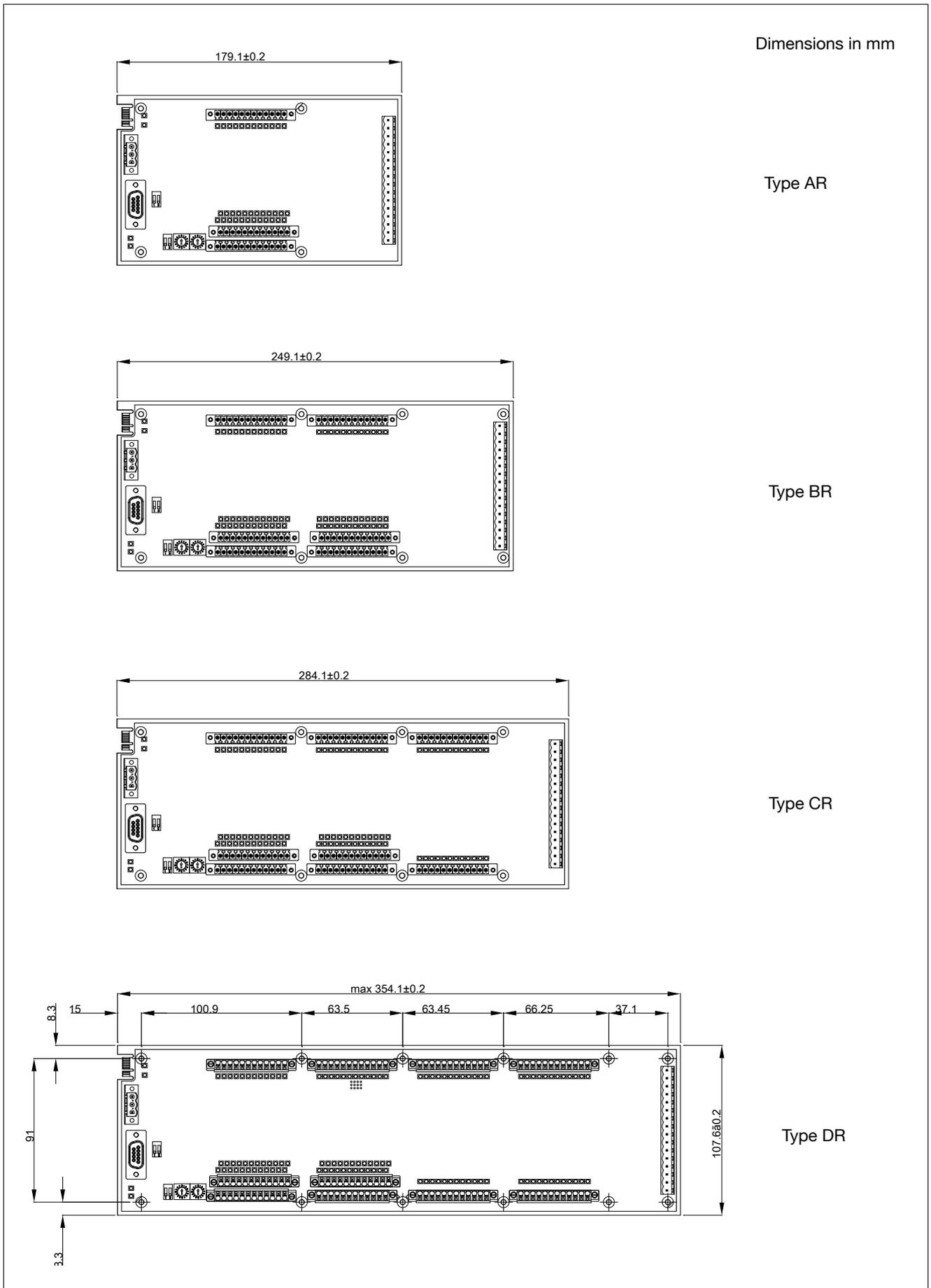
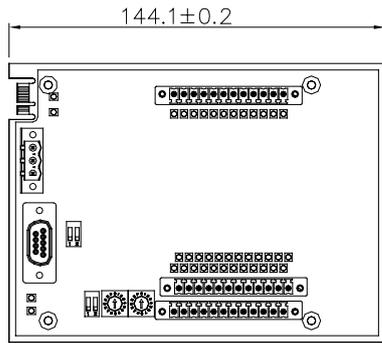
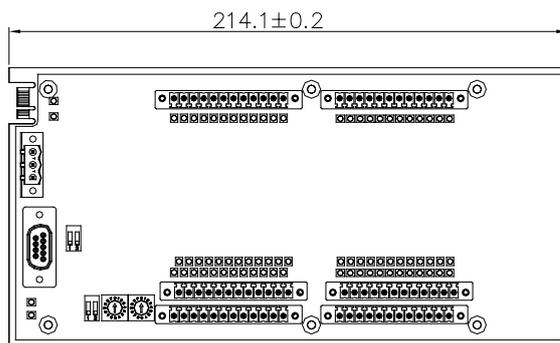


Figure 5 - dimensions, versions for assembly on plate, with relay

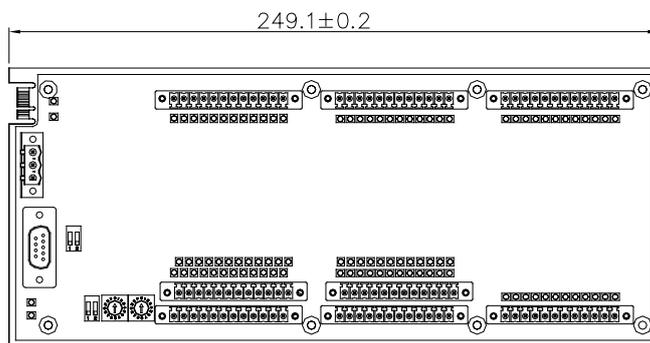
Dimensions in mm



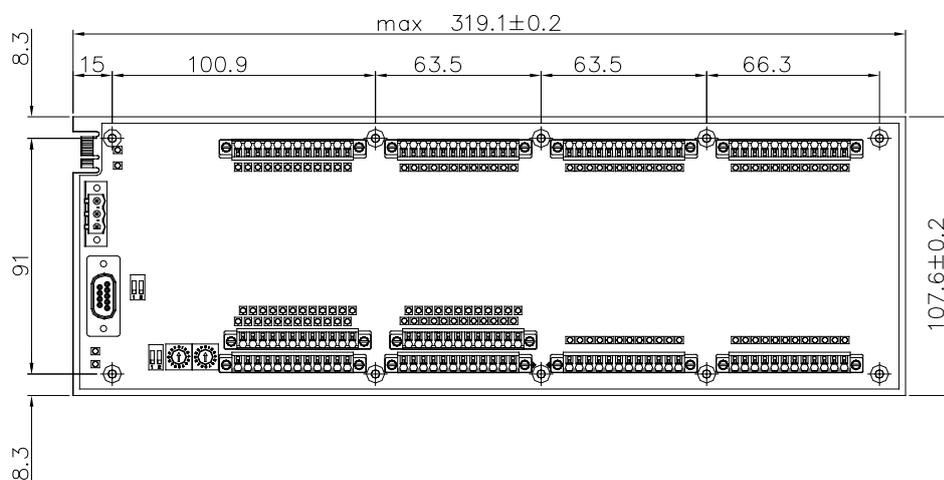
Type A



Type B



Type C



Type D

Figure 6 - CAN-I/O, dimensions, versions for assembly on plate, without relay

CAN-IO module assembly



Attention: CAN-IO modules can be supplied in the version for assembly onto plate and in the version for assembly onto 35 mm DIN runner.

For assembly, follow the instructions relating to the version of the module owned.

Assembly on plate

The fastening holes of the CAN-IO module have a diameter of 4.5 mm. Figure 17 shows the positions of the holes on the various models of module. Figures 5 and 6 show the distances between the centres of the fastening holes. The spacer for connection with the plate must have a minimum length of 12 mm.

For correct assembly, it is necessary to use all the fastening holes envisaged on the card.

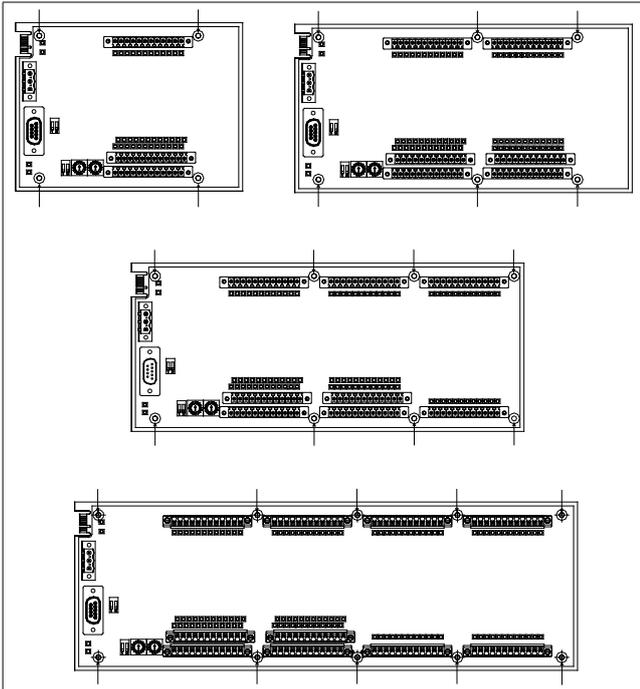


Figure 7 - Fastening hole position

Assembly on DIN runner

The card can be fitted with two hooks for fitting to 35 mm DIN runners. To fasten the card in place, insert the upper part of the hook over the runner, turn the card and press it until it clicks into place, hooking also under the runner.

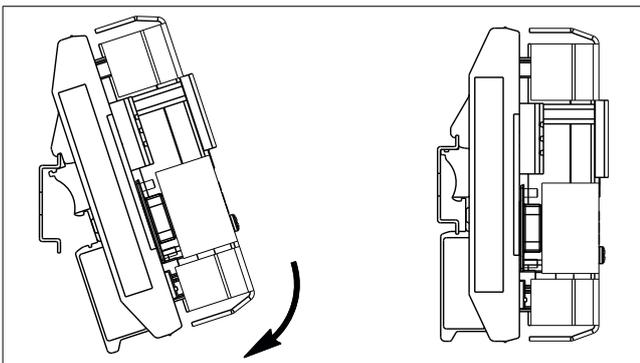


Figure 8 - Assembly on DIN runner

To remove a card fastened to a DIN runner, release the 2 lower hook, levering slightly with a screwdriver and turning the card to release it.

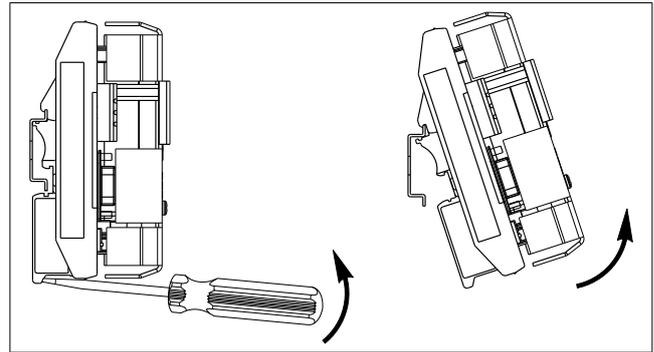


Figure 9 - Dismantling from DIN runner

Positioning

The CAN-IO module is installed vertically on the long side or the short side. In this second case, the power connections and CAN have to face downwards.

The module cannot be installed horizontally.

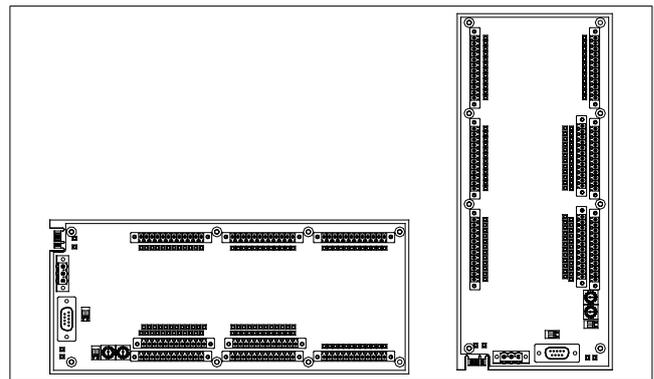


Figure 10 - CAN-IO assembly direction

CAN-IO module connections

Connectors, signals and configuration element

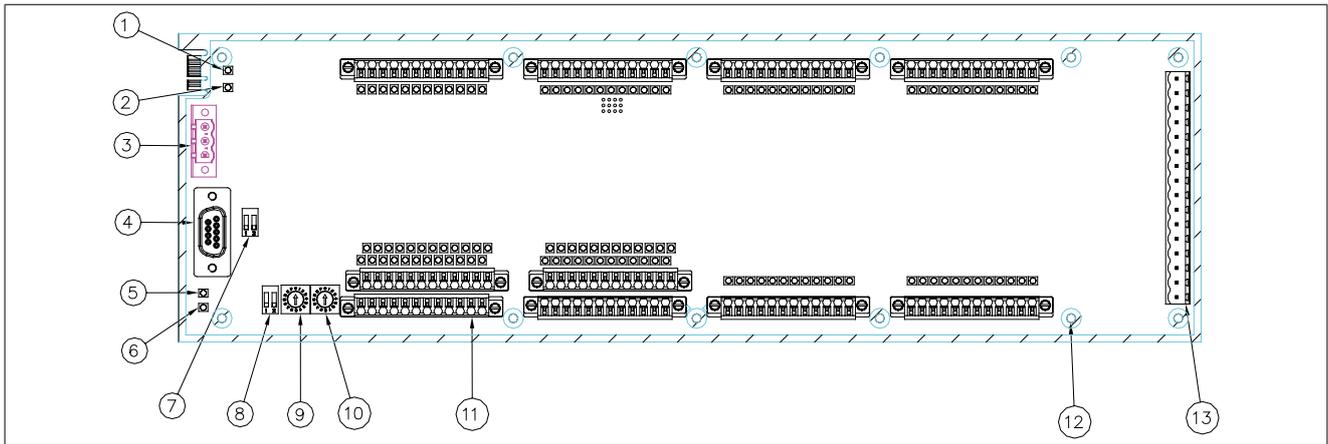


Figure 11 - CAN-IO module element position

N.	Description	Connector / indicator	Note
1	Power	Yellow LED	
2	Run	Green LED	programme running
3	Power input 24 Vdc \pm 25%	Terminal block	
4	CAN Port	DB9 M (D-sub 9 pin male)	
5	CAN Run	Green LED	
6	CAN Fail	Red LED	
7	CAN termination	Switch	
8	CAN address hundreds selection	Switch	
9	CAN address tens selection	Dial	
10	CAN address units selection	Dial	
11	I/O connections		
12	Plate fastening holes		
13	Relay connections		only in CAN-IO modules with relay

Figure 11 shows a general card with type 1 I/O connectors. Depending on the customer's requirements, the card may also have been supplied with other types of connector. The use of the single connector is identified by its silkscreened details.

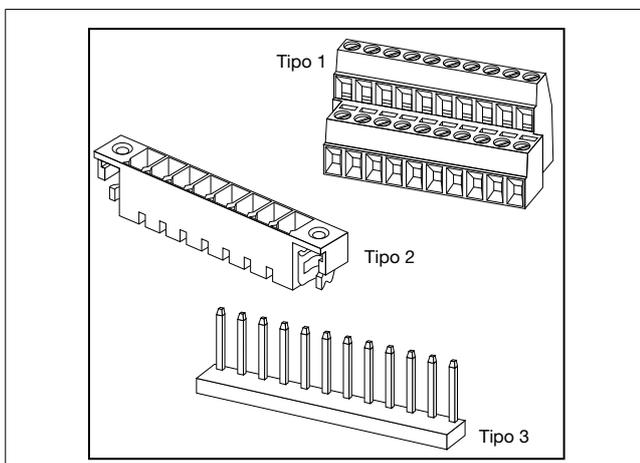


Figure 12 - Types of I/O connector

Power

The CAN-IO module must be connected to a 24 Vdc power supply unit. The same 24 Vdc power supply can feed several devices (controller and CAN-IO modules).

Make sure that the current issued by the power supply is higher than the total maximum current absorbed by all the devices connected.

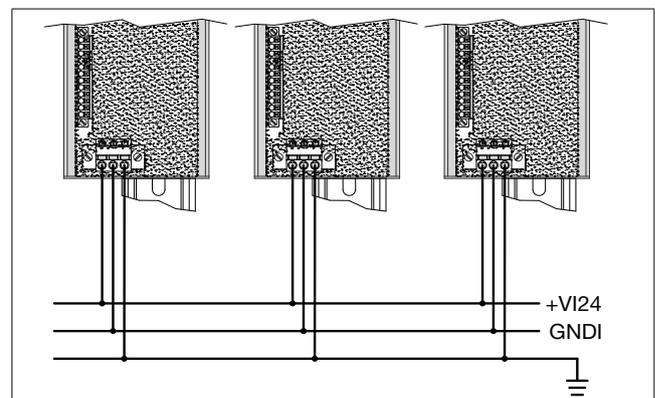


Figure 13 - CAN-IO module multiple power supply

Considering that the device has no switch, it is necessary to install one before it, with a protective fuse. The switch has to be positioned in the immediate vicinity of the device and be easy for the operator to reach.

For the 24 Vdc power supply unit, use a separate line from that used for electromechanical power devices such as relays, contactors, solenoids, etc.

If there are considerable changes in the mains voltage, use a voltage stabiliser.

Near to high frequency generators or arc welders, use adequate grid filters.

Connect the power cables to the power connector. Fit the cylindrical nucleus in ferrite, supplied with the product, as close as possible to the device to limit the susceptibility of the device to electromagnetic disturbance (figure 14).

The 24 Vdc power supply cables must follow a separate path from the power cables of the plant or machine.

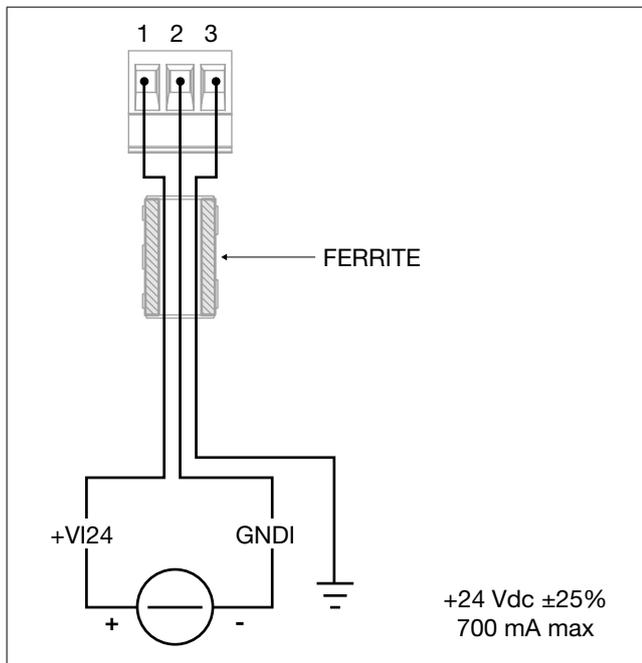


Figure 14 - CAN-IO power connection



Attention: Amake sure that the earth connection is efficient. A non-existent or inefficient earth connection can make the operation of the device unstable, due to excessive environmental disturbance. In particular, check that:

- the voltage between ground and earth is <math>< 1V</math>;
- the ohm resistance is <math>< 6 \Omega</math>.

CAN

Connect the cable for the CAN field bus. The CAN bus connects the CAN-IO modules to the Integrated Controller and Operator Panel.

Considering that the CAN port is opto-isolated, it is not necessary to disconnect the power to the device before connecting it.

For the wiring of the line, use an approved cable. Fasten the cable connector to that of the controller with the appropriate screws.

Pin	Name	Description
1		
2	CAN_L	CAN-Low (CAN-)
3	GND	Ground (mass)
4		
5	EARTH	Earth
6		
7	CAN_H	CAN-High (CAN+)
8		
9		

The CAN-IO module is equipped with a line termination.



Attention: if the module is the latest device on the CAN line, activate the termination, switching both switches to ON (see figure 15).

The CAN-IO module leaves the factory with the termination deactivated (OFF).

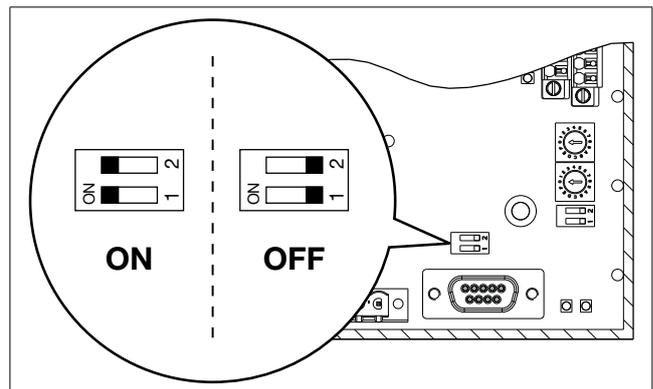


Figure 15 - Switch for CAN line termination

The CAN line must be terminated at both ends.

If the device at the end of the CAN line is not equipped with its own termination, it is possible to terminate the line installing a resistor (120 Ω , 1/4W, tolerance 5%), as shown in figure 16.

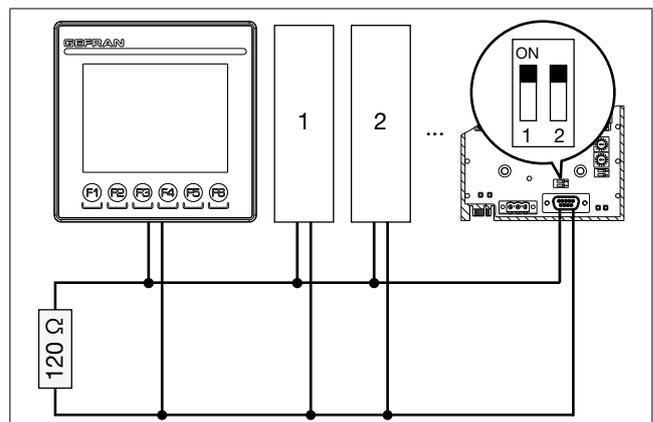


Figure 16 - CAN bus line terminations

Heading the wires

The wires are not insulated. When using type 1 or 2 connectors it is optionally possible to head the wires with cable sockets

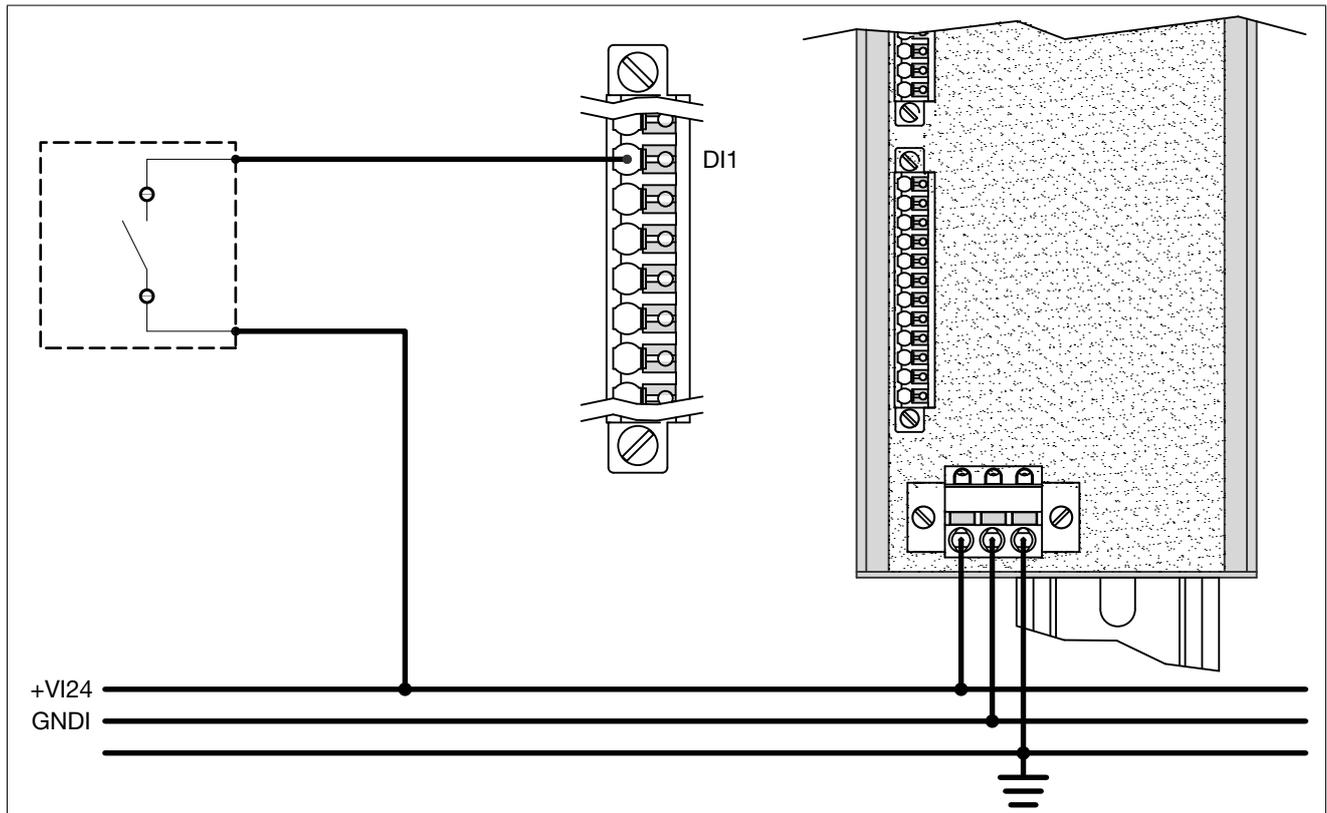
Identification of inputs and outputs

The inputs and outputs of the module are identified on the card with the following codes:

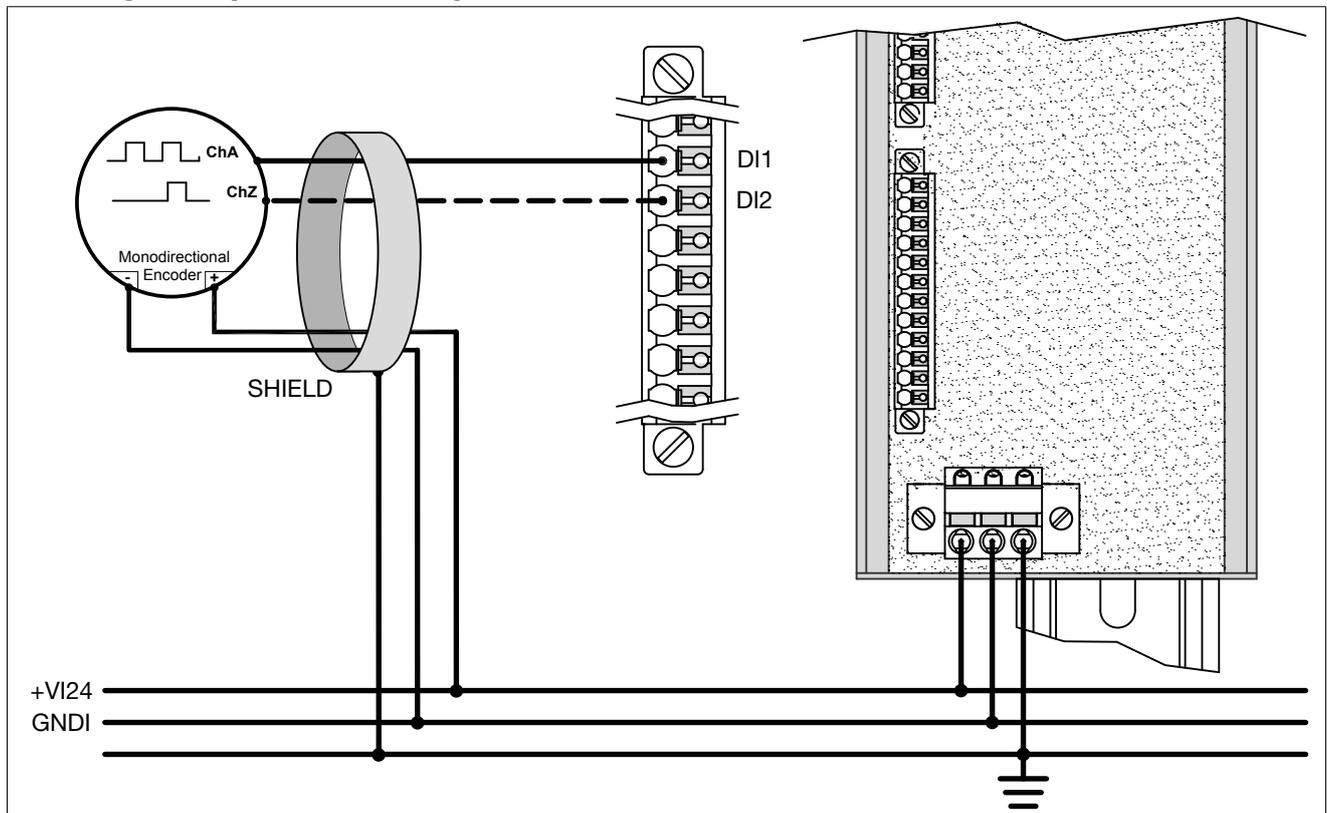
Code	Interval	Description
+VI24		Card power +24 Vdc
GNDI		Ground (0 V)
PSx+	from PS1+ to PS3+	Digital power, positive pole
PSx-	from PS1+ to PS3-	Digital power, reference pole
DGND		Reference ground for digital pins
AGND		Reference ground for analogue pins
$\frac{\perp}{-}$		Functional earth
DIx	from DI1 to DI24	Digital input
HSC_x	from HSC_1 to HSC_6	Fast digital input
POTx+	from POT1+ to POT8+	Potentiometer input, positive pole power
POTx-	from POT1- to POT8-	Potentiometer input, reference pole power
POTxS	from POT1S to POT8S	Potentiometer input, signal
SGx+	from SG1+ to SG8+	Electric resistance extensometer input, positive pole power
SGx-	from SG1- to SG8-	Electric resistance extensometer input, negative pole power
SGxP	from SG1P to SG8P	Electric resistance extensometer input, positive pole
SGxN	from SG1N to SG8N	Electric resistance extensometer input, negative pole
TCx+	from TC1+ to TC10+	Thermocouple input, positive pole
TCx-	from TC1- to TC10-	Thermocouple input, negative pole
RTx+	from RT1+ to RT10+	Thermo resistance input PT100, positive pole
RTx-	from RT1- to RT10-	Thermo resistance input PT100, negative pole
RTxC	from RT1C to RT10C	Thermo resistance input PT100, third wire
RTKx+	from RTK1+ to RTK10+	Thermo resistance input PT1000, positive pole
RTKx-	from RTK1- to RTK10-	Thermo resistance input PT1000, negative pole
RTKxC	from RTK1C to RTK10C	Thermo resistance input PT1000, third wire
DOLx	from DOL1 to DOL16	Digital output 0,5 A / PWM output
DOHx	from DOH1 to DOH16	Digital output 2 A
HSO_x	from HSO_1 to HSO_8	Fast digital output
AOVx	from AOV1 to AOV8	Analogue output in voltage
AOCx	from AOC1 to AOC8	Analogue output in current
ROx	from RO1 to RO8	Relay output
Com ROx		Relay output, common pole

Connection diagrams

Digital input

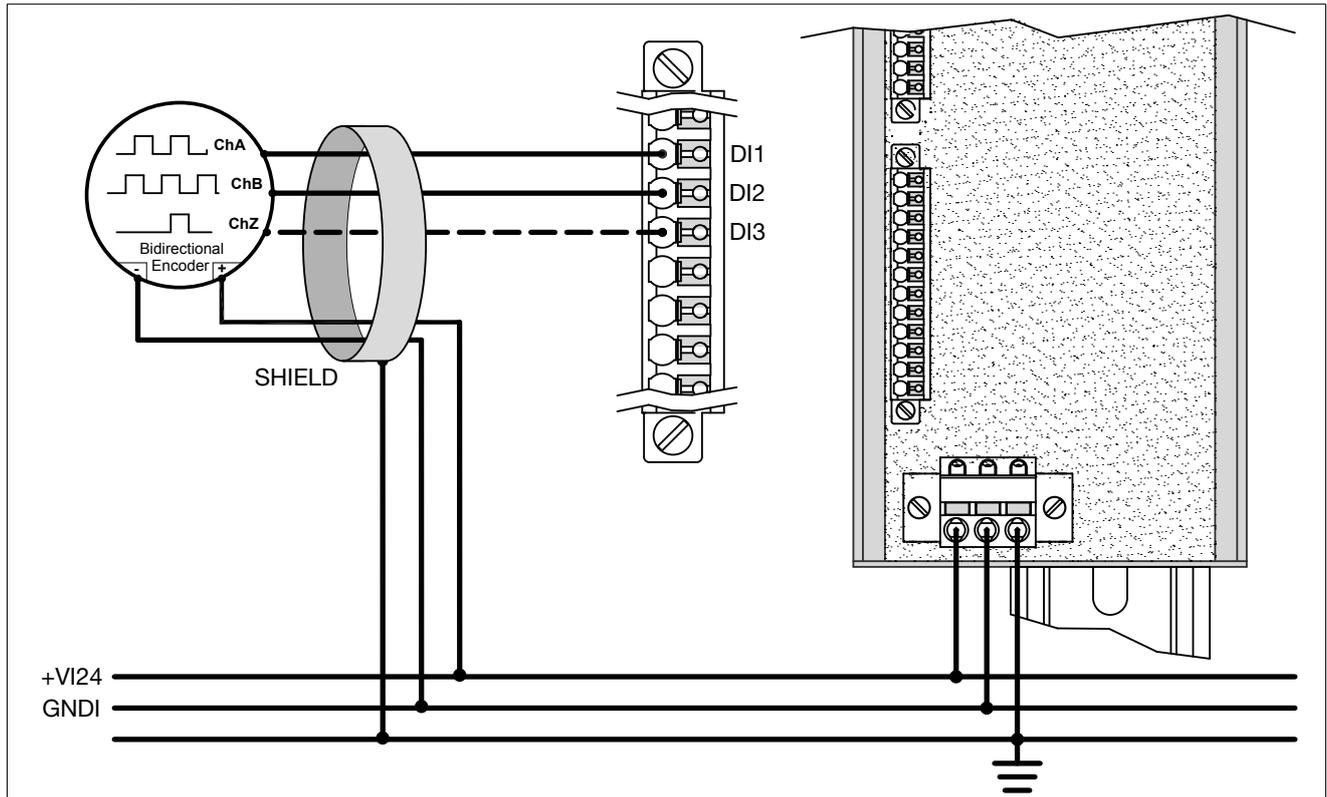


Fast digital input – One-way encoder



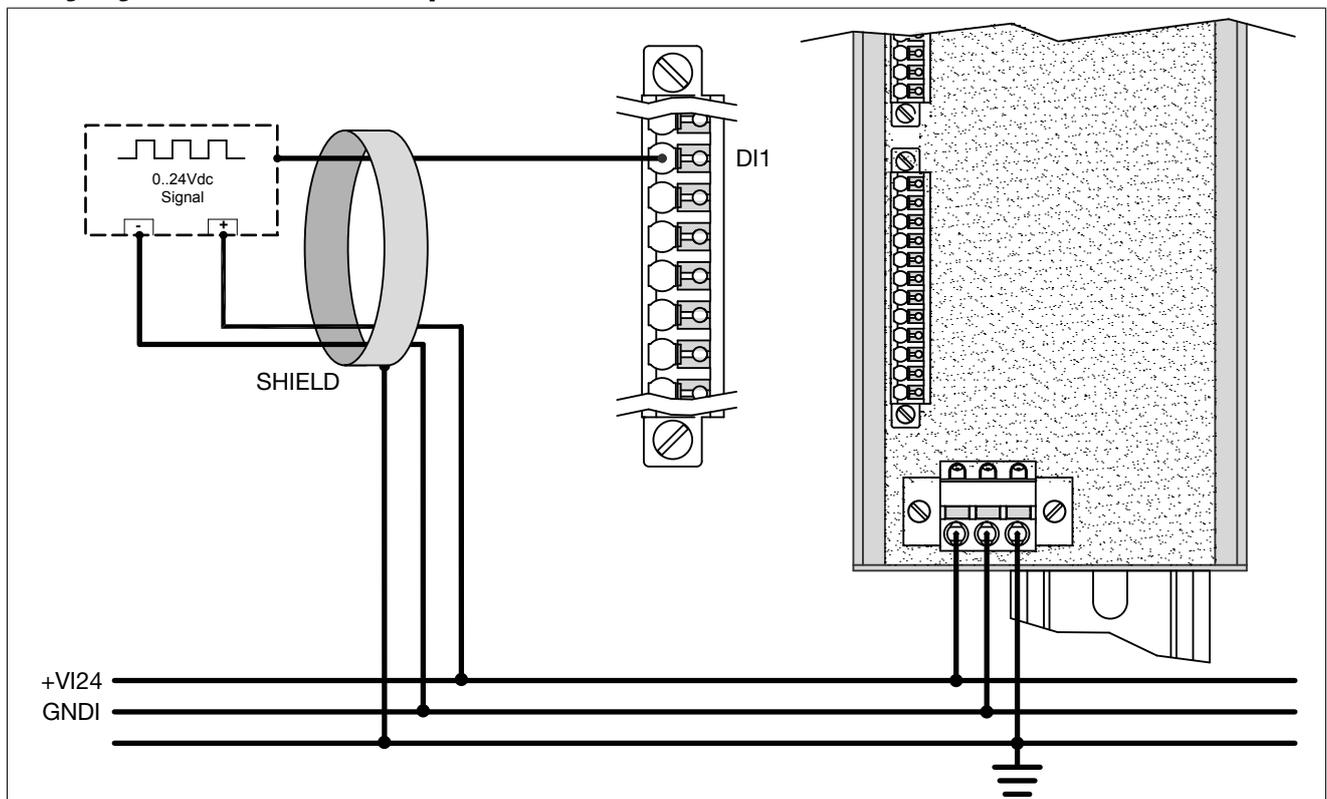
Use a screened cable with 4 conductors and connect the screening to the earth bar as close as possible to the module. The input has to be configured via software.

Fast digital input – Two-way encoder



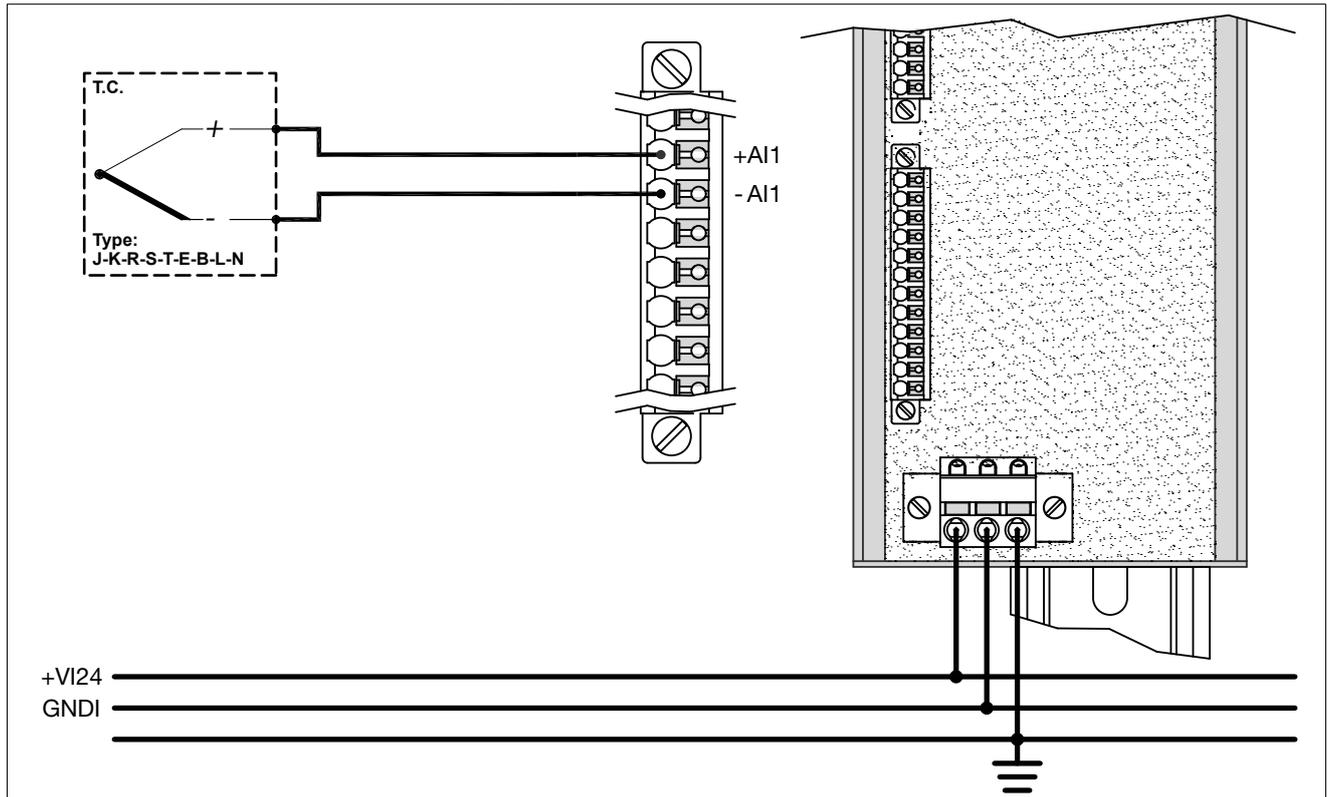
Use a screened cable with 5 conductors and connect the screening to the earth bar as close as possible to the module. The input has to be configured via software.

Fast digital input – Impulse counter / Period measurer / Frequency measurer / Duty-cycle measurer / Impulse duration measurer



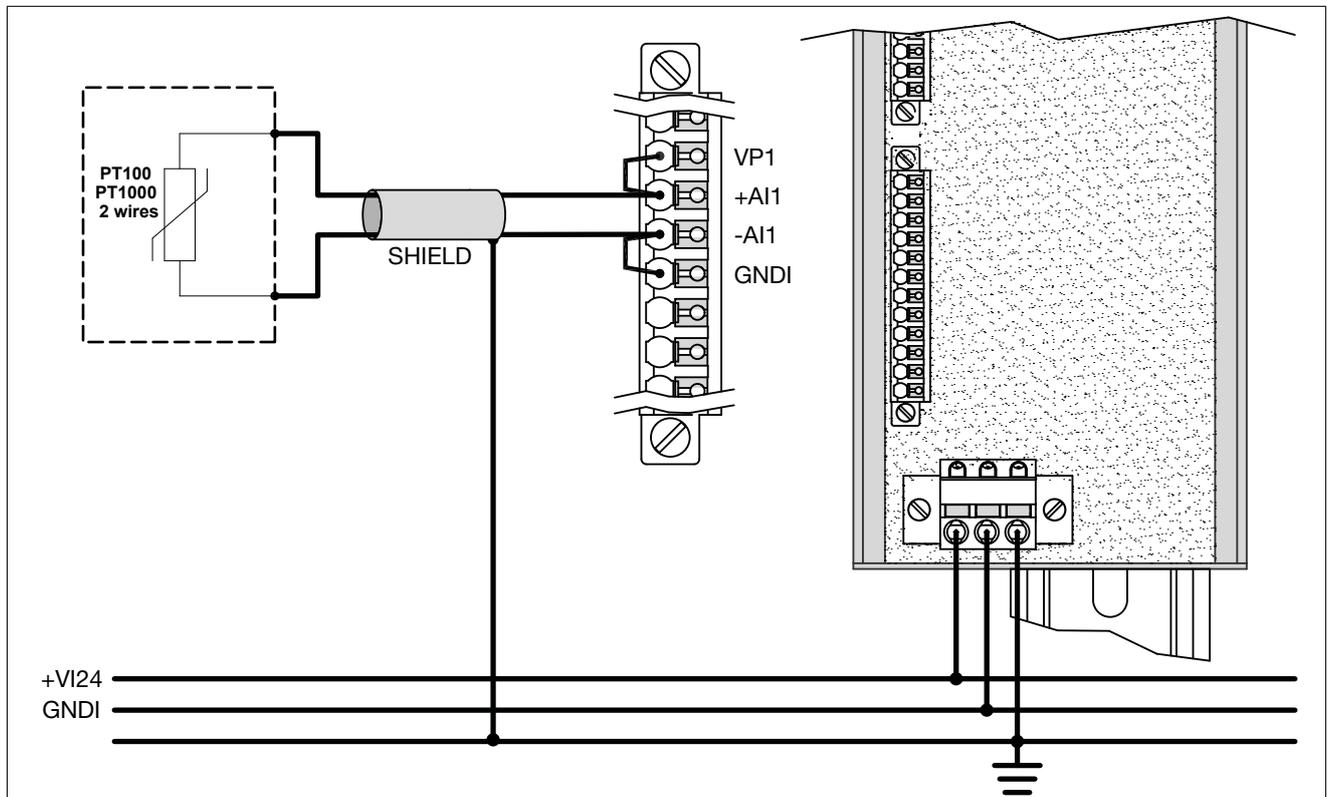
Use a screened cable with 3 conductors and connect the screening to the earth bar as close as possible to the module. The input has to be configured via software.

Thermocouple temperature input



For the connection use a compensated cable. If using a screened cable, connect the screening to the earth bar as close as possible to the probe. The screening is connected to earth on the hot joint of the probe.

Thermo resistance temperature input PT100 and PT1000 with 2 wires

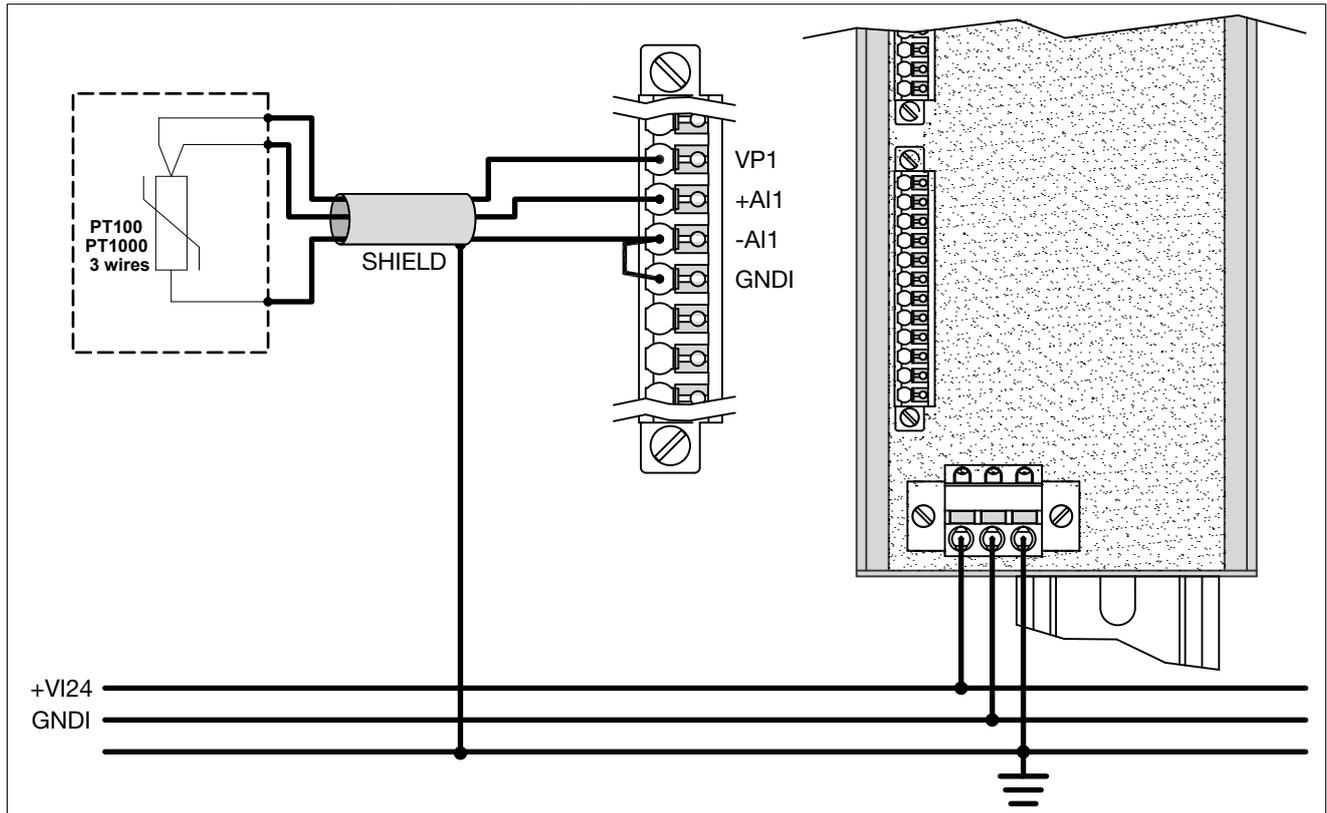


Use a screened bipolar cable and connect the screening to the earth bar as close as possible to the module.



Attention: do not forget to bridge the VP1 port with + AI1 and the GNDI port with -AI1.

Thermo resistance temperature input PT100 and PT1000 with 3 wires

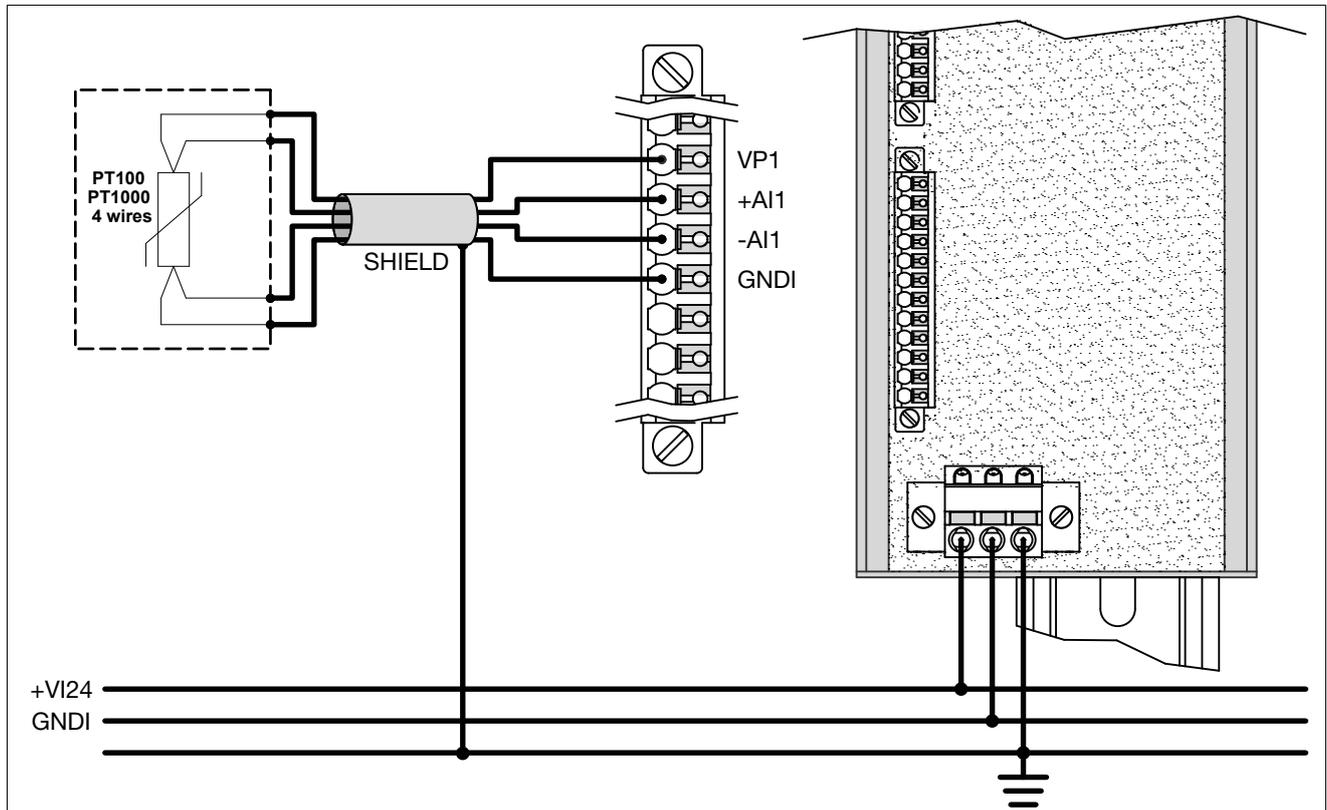


Use a screened cable with 3 conductors and connect the screening to the earth bar as close as possible to the module.



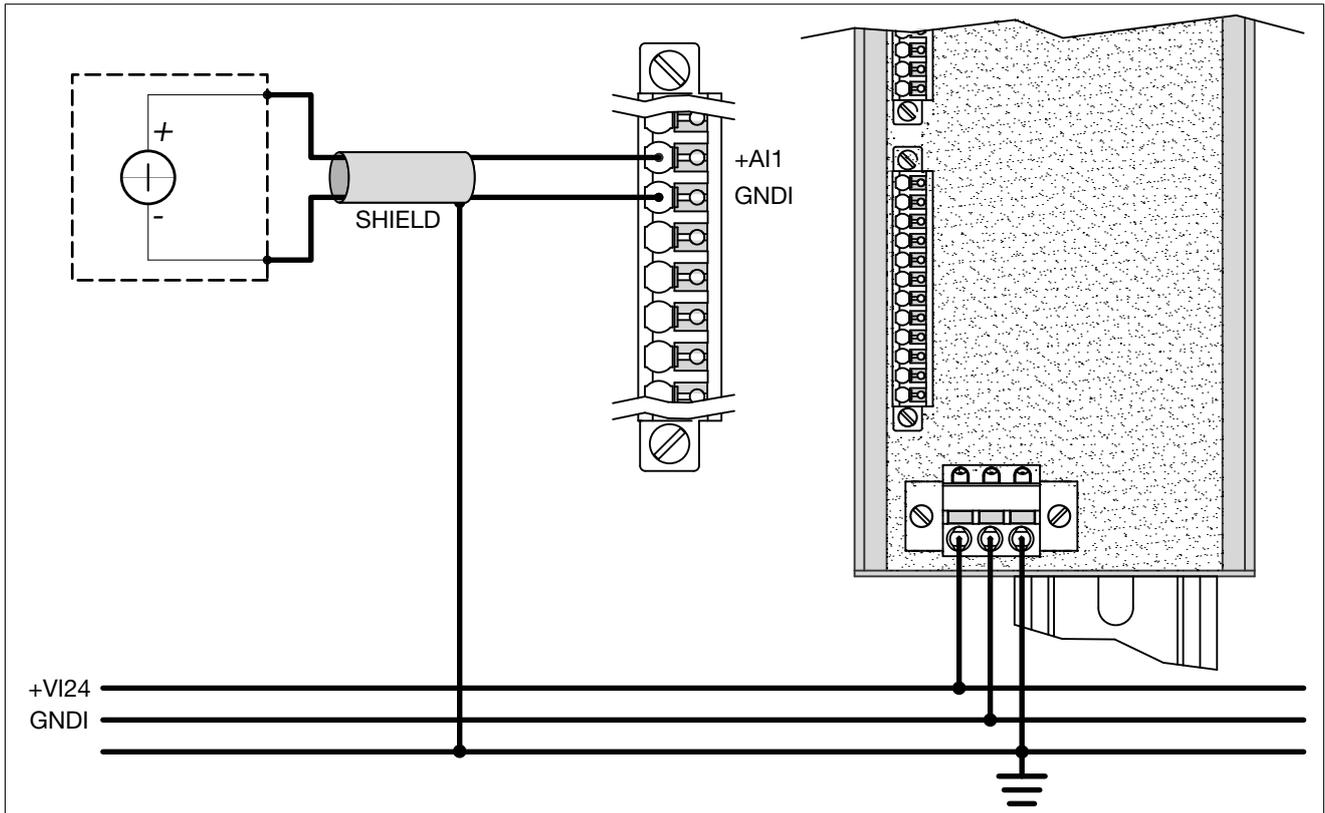
Attention: do not forget to bridge the GNDI port with -AI1.

Thermo resistance temperature input PT100 and PT1000 with 4 wires



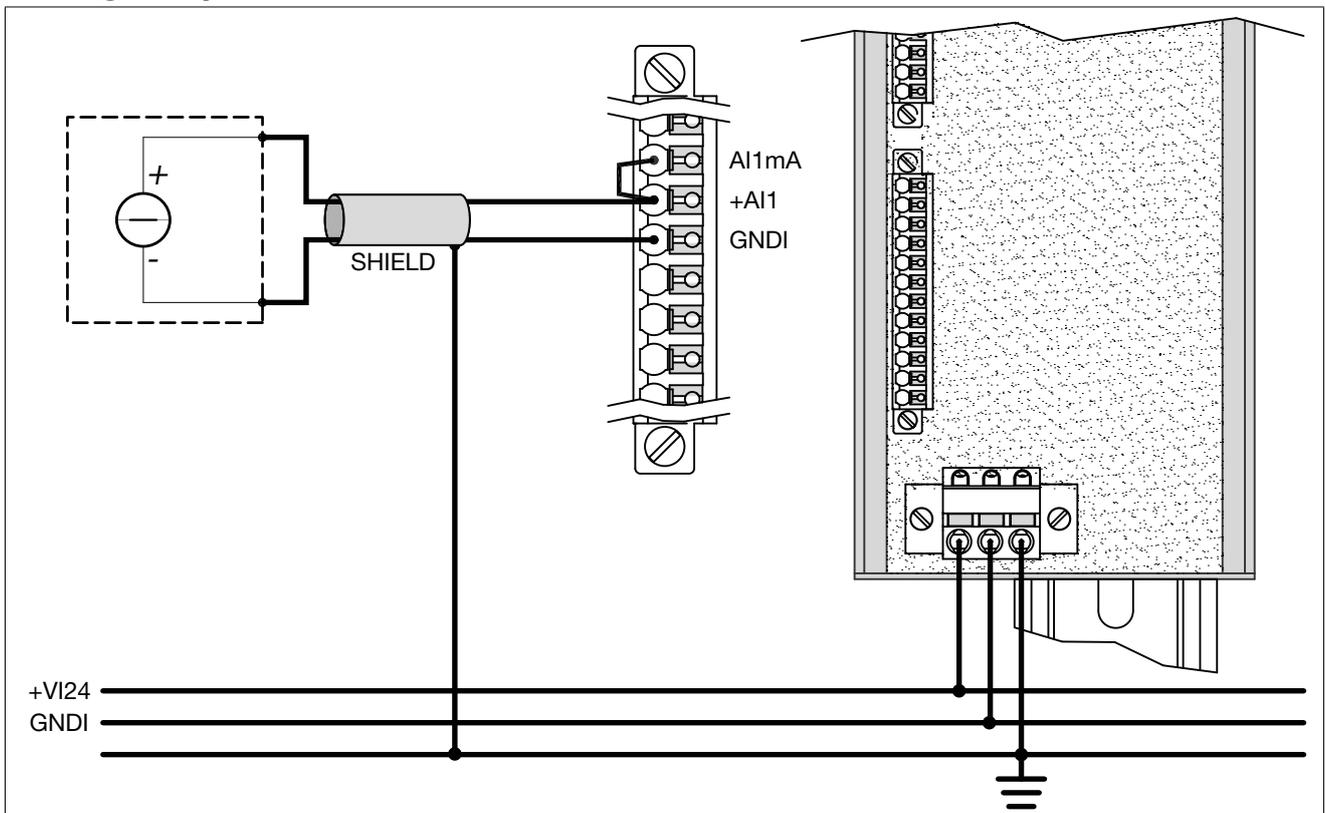
Use a screened cable with 4 conductors and connect the screening to the earth bar as close as possible to the module.

Analogue input in voltage



Use a screened bipolar cable and connect the screening to the earth bar as close as possible to the source of voltage.

Analogue input in current

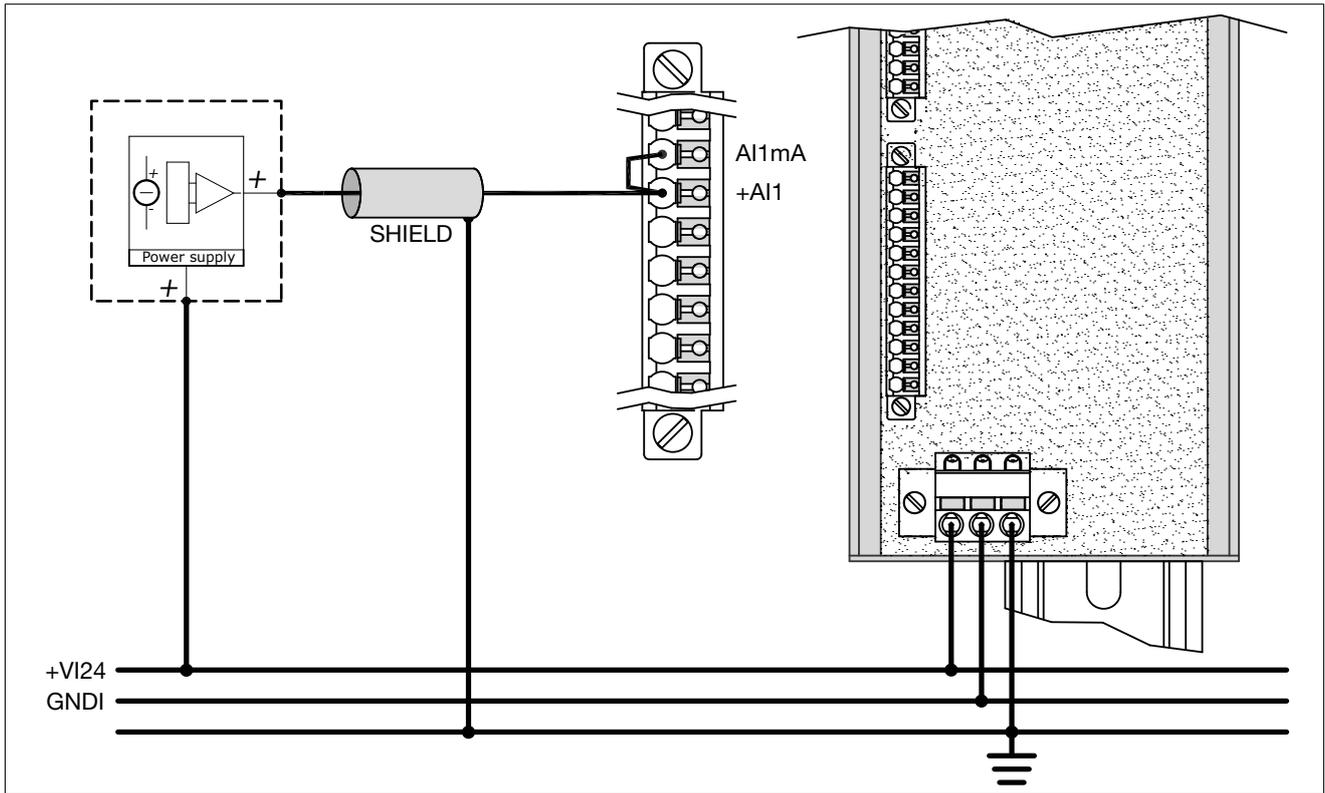


Use a screened bipolar cable and connect the screening to the earth bar as close as possible to the source of current.



Attention: do not forget to bridge the AI1mA port with +AI1.

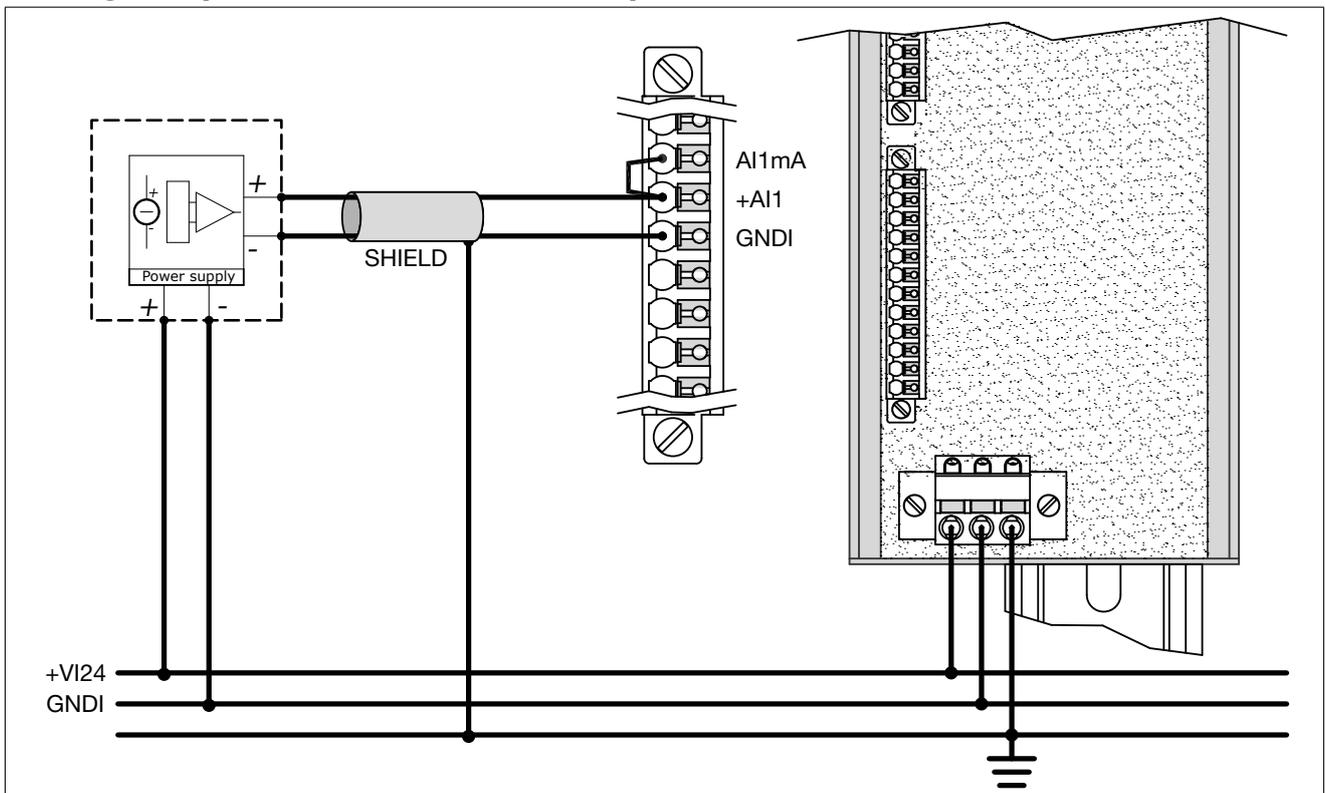
Analogue input in current – 2-wire amplified transducer



Use a screened bipolar cable and connect the screening to the earth bar as close as possible to the module.

⚠ Attention: do not forget to bridge the AI1mA port with +AI1.

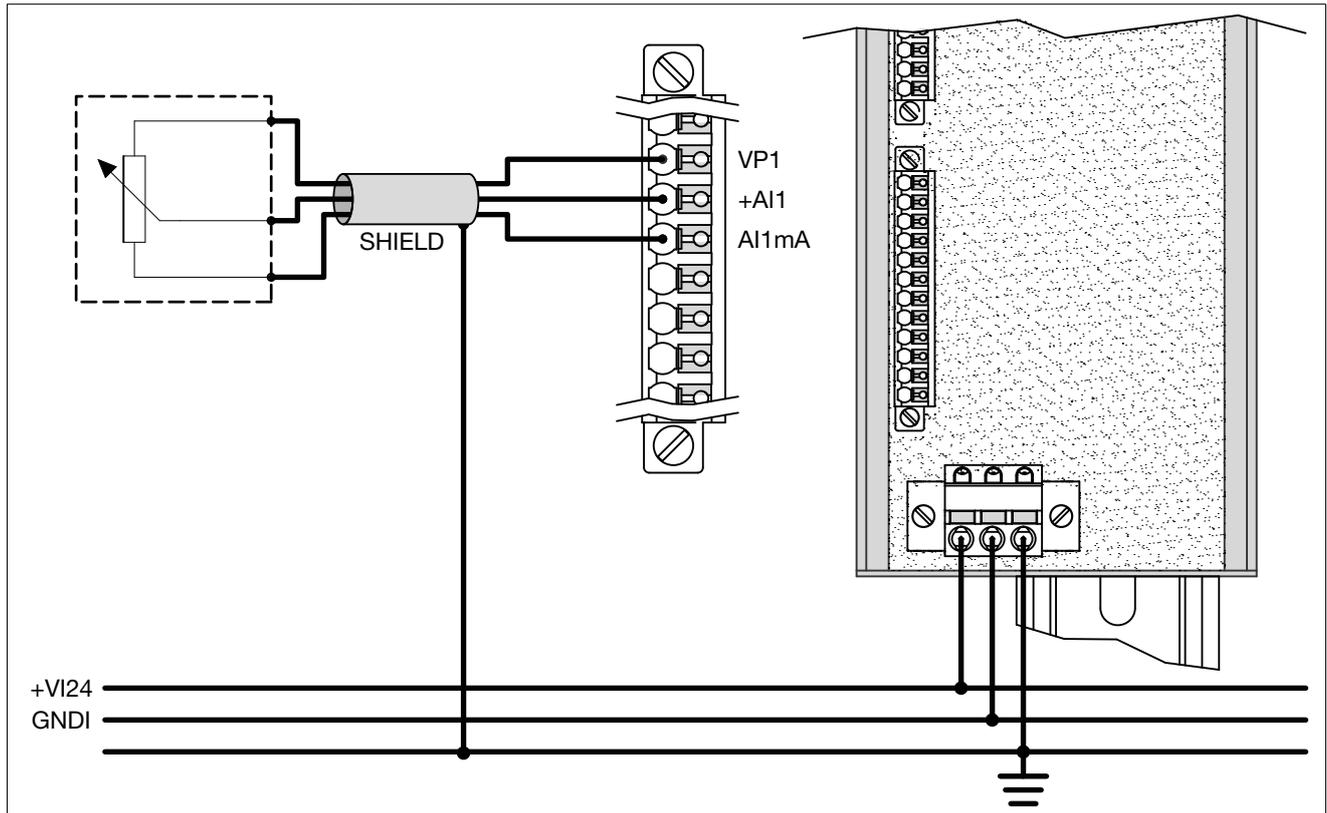
Analogue input in current – 4-wire amplified transducer



Use a screened bipolar cable and connect the screening to the earth bar as close as possible to the module.

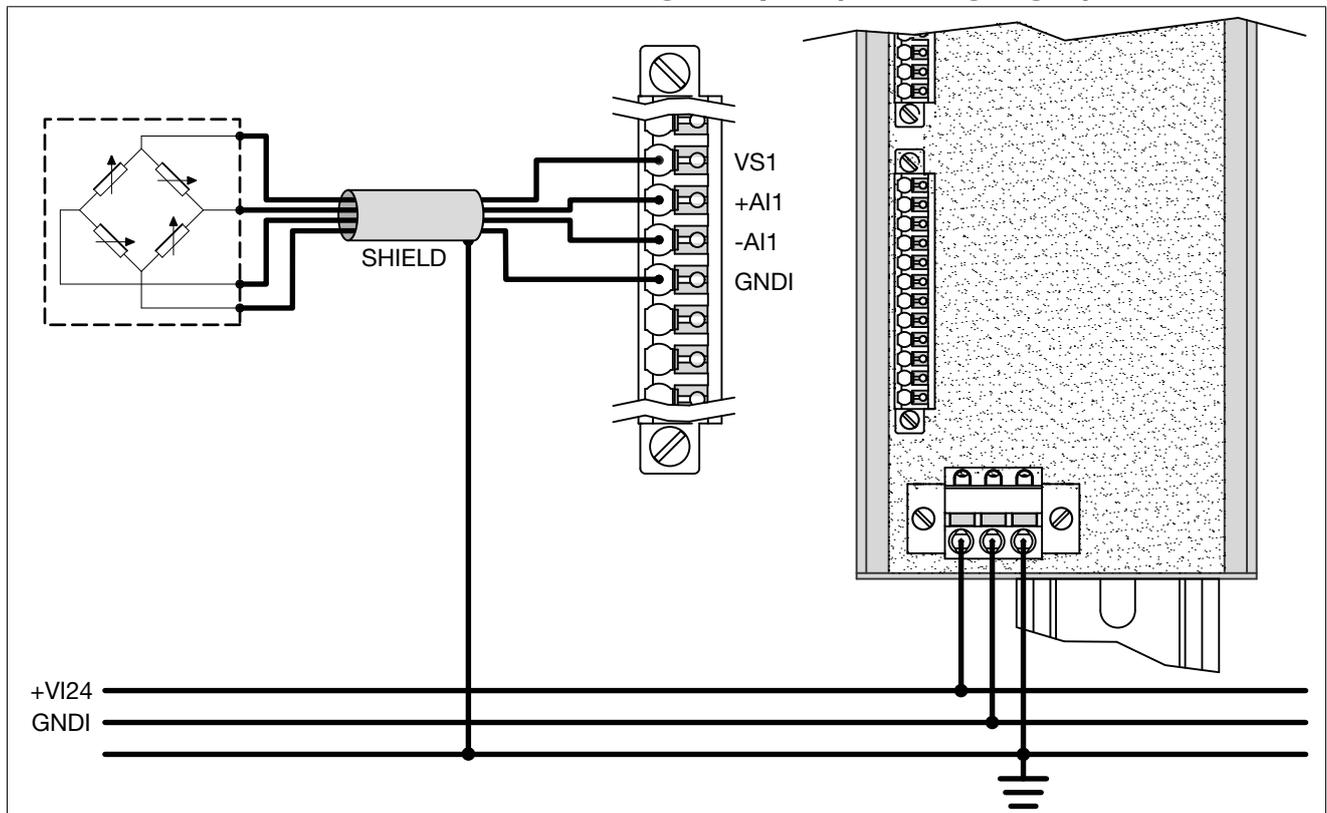
⚠ Attention: do not forget to bridge the AI1mA port with +AI1.

Potentiometer analogue input



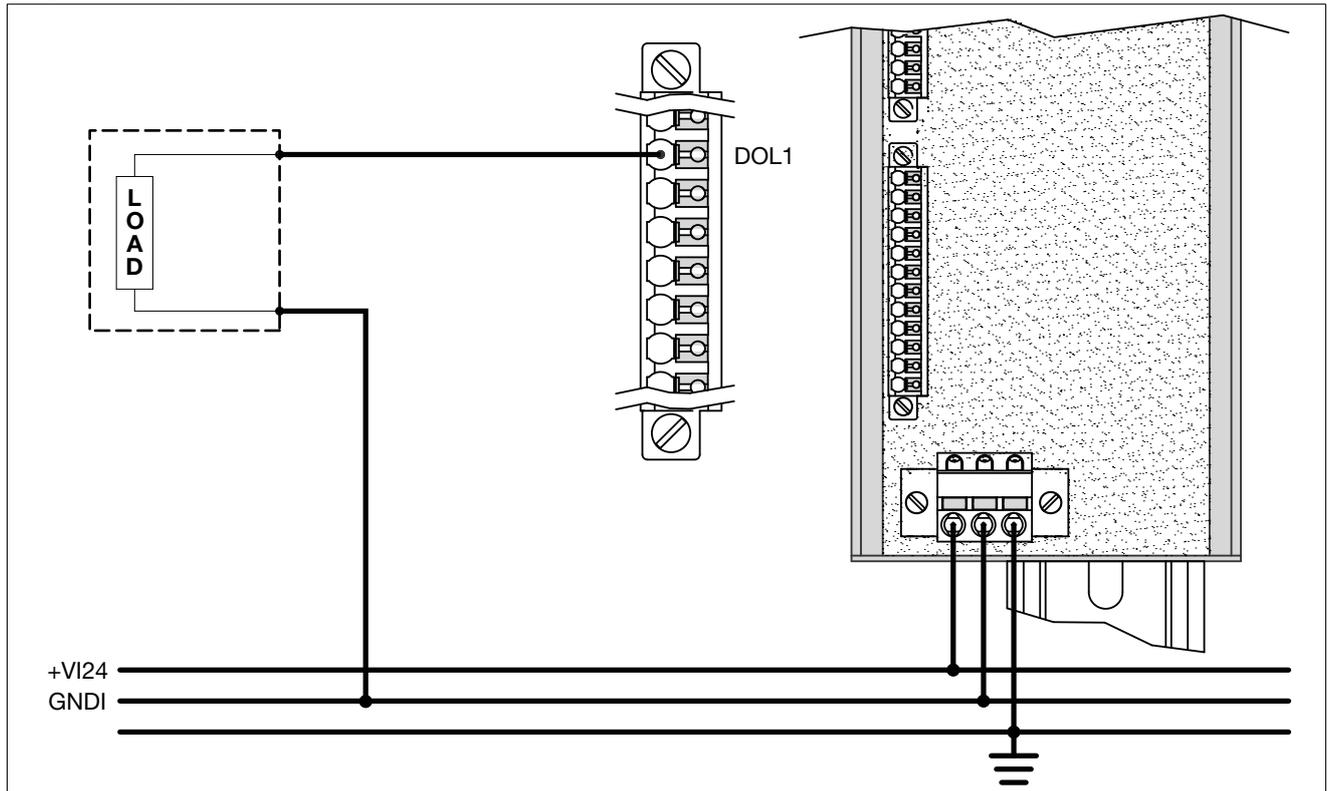
Use a screened cable with 3 conductors and connect the screening to the earth bar as close as possible to the module. The potentiometer must have a resistance value greater than or equal to 2 k Ω .

Electric resistance extensometer analogue input ("strain gauge")



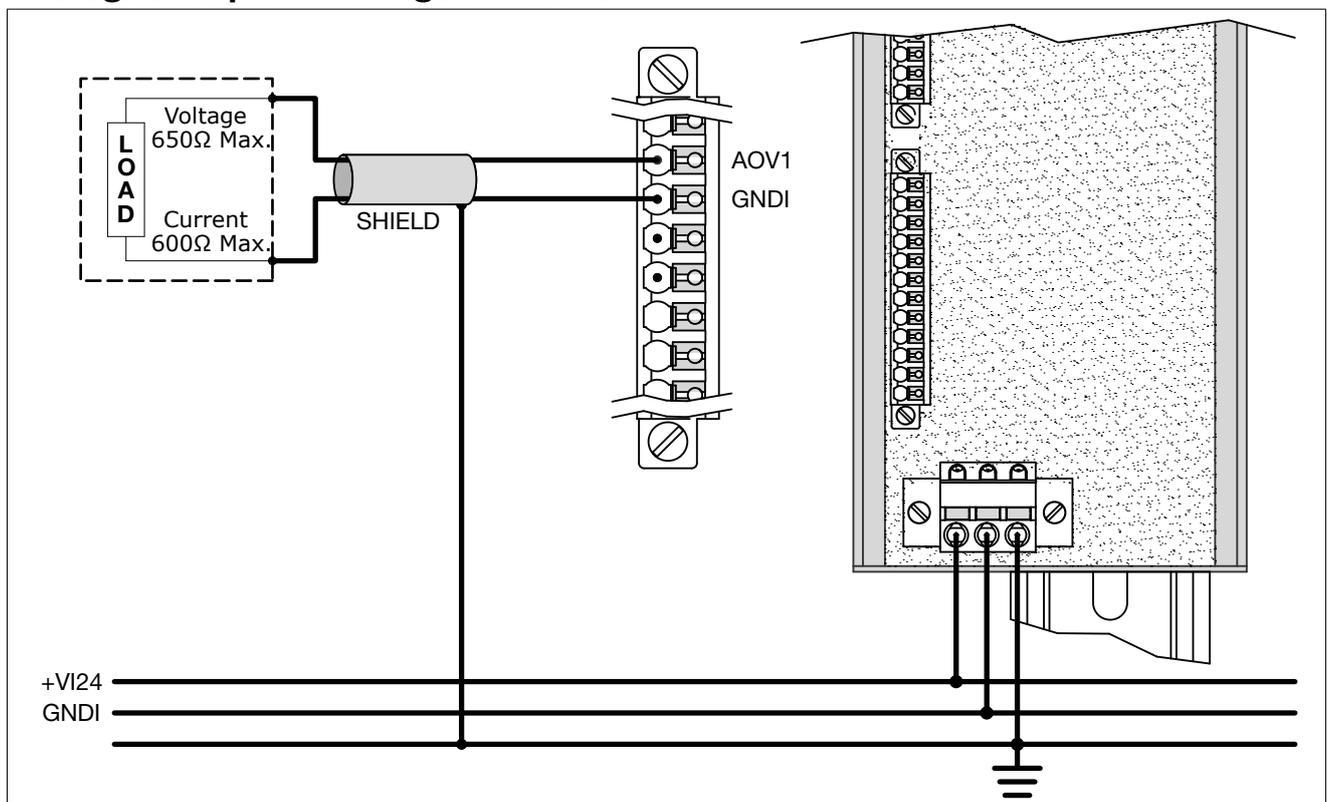
Use a screened cable with 4 or 6 conductors and connect the screening to the earth bar as close as possible to the module. For the calibration of the transducer, envisage the use of calibration wires outside the module.

Digital output - PWM



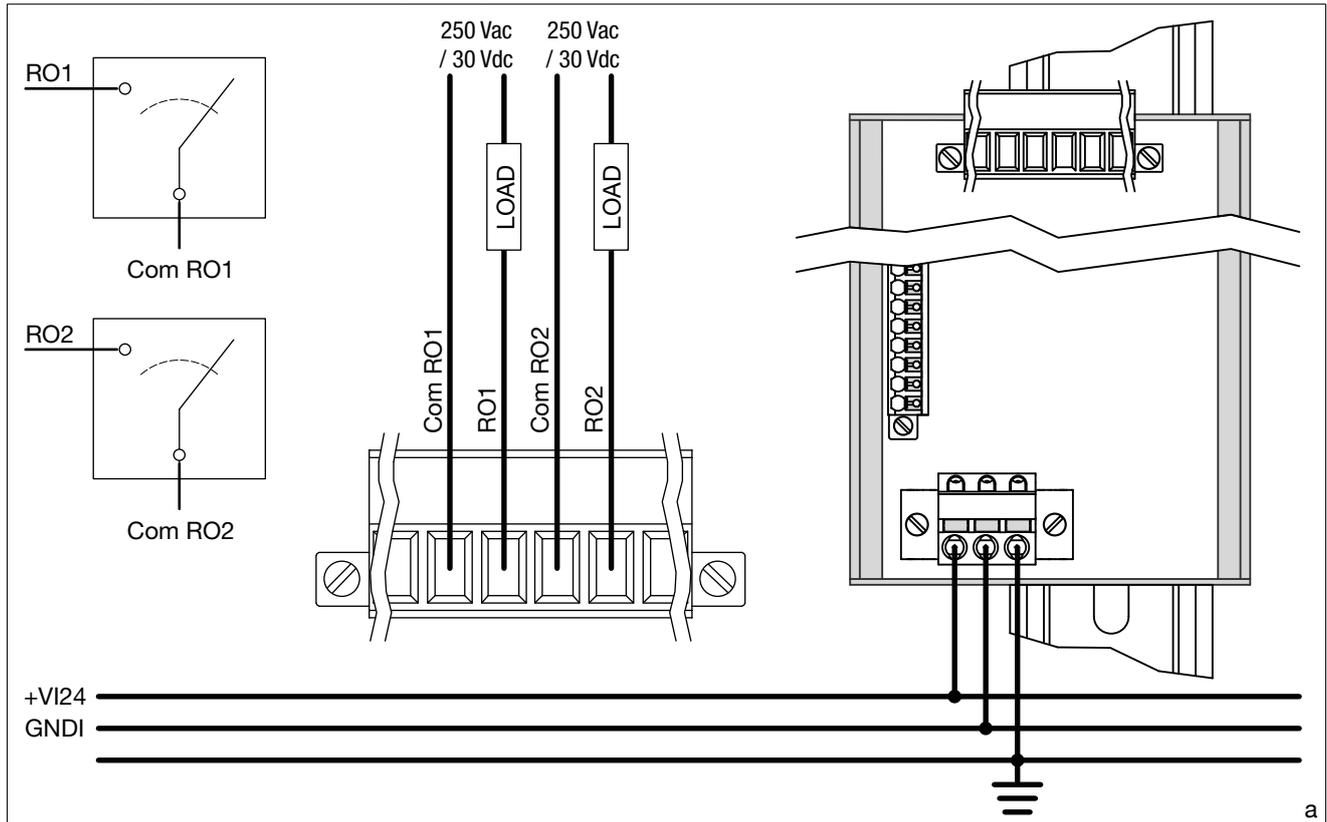
The digital output is available in three versions: 0.5 A, 2 A and PWM, identified respectively as DOLx and DOHx. Before connecting a charge, check that the Output chosen is adequate. Do not connect charges with higher absorption than that indicated in the technical specifications.

Analogue output in voltage / in current



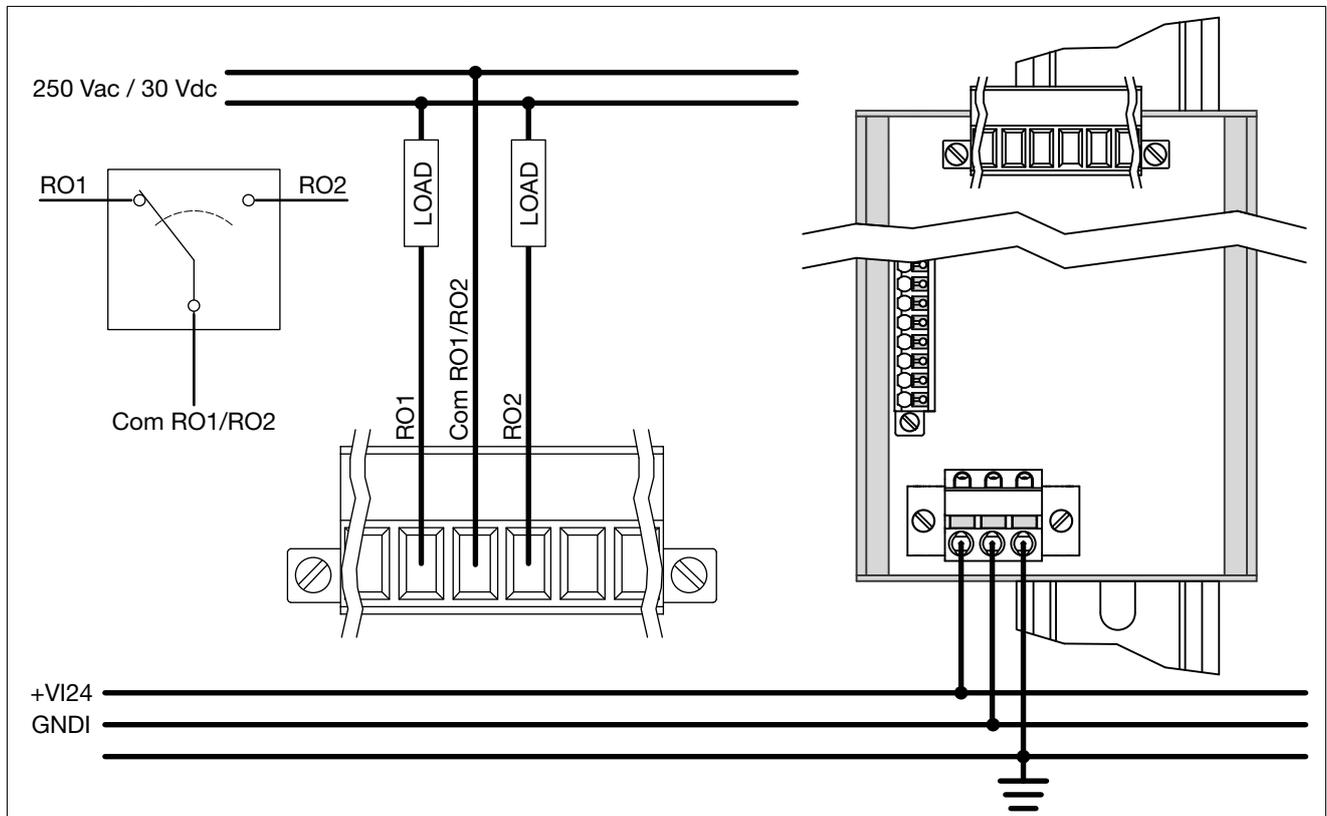
The analogue output is available in two versions: in voltage and in current, identified respectively as AOVx and AOCx. Do not connect charges that do not fall within the technical specifications. Use a bipolar screened cable and connect the screening to the earth bar as close as possible to the module.

N.O. single contact relay output



Do not connect charges with higher voltage or absorption than that indicated in the technical specifications.

Exchange contact relay output



Do not connect charges with higher voltage or absorption than that indicated in the technical specifications.

Configurations

CAN address

Set the node number of the CAN-IO module with the switch and dials.

The valid addresses range from 1 to 128.



Attention: there cannot be two devices (nodes) with the same address on the CAN bus

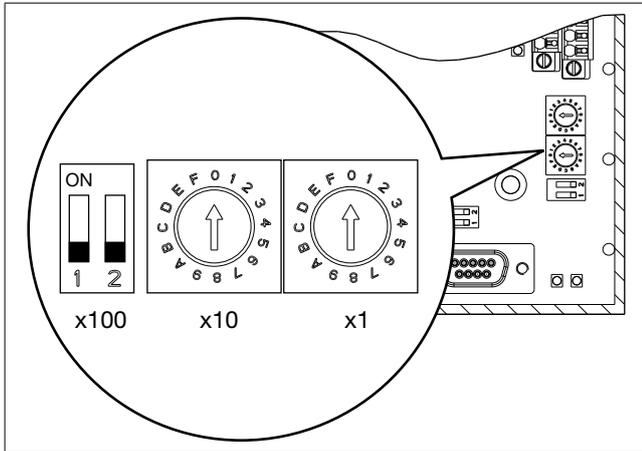


Figure 17 - Address switch and dials

To set an address, proceed as follows:

1. Use switch 2 to select the hundreds (OFF = 0, ON = 1).
2. Use the dial x10 to select the tens (from 0 to 9, A – F positions are not valid).



Attention: selecting position A starts the transmission speed change procedure

3. Use dial x1 to select the units (from 0 to 9, A – F positions are not valid).

Every change in node number generates a restart of the card with the new address acquired.

Examples of addresses

Indirizzo	Switch	Dial x10	Dial x1
8	OFF	0	8
73	OFF	7	3
125	ON	2	5

Setting the transmission speed

The factory configuration envisages a transmission speed of 500 kbit/s.

This speed can be changed from 10 kbit/s to 1000 kbit/s using the two 16-position dials x1 and x10 used to set the CAN address of the CAN-IO module.

The length of the bus network influences the maximum speed reachable, as shown in figure 18.

All the bus network devices have to operate at the same speed.

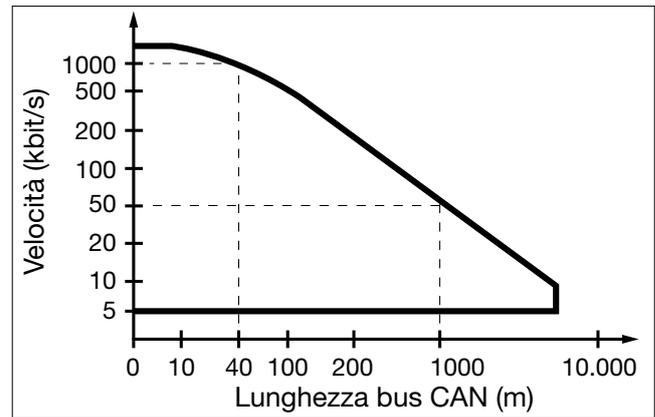


Figure 18 - CAN bus max transmission speed

The possible speed settings are:

Dial position x10	Dial position x1	Transmission speed
A	0	1000 kbit/s
A	1	800 kbit/s
A	2	(pre-set) 500 kbit/s
A	3	250 kbit/s
A	4	125 kbit/s
A	5	100kbit/s
A	6	50 kbit/s
A	7	20 kbit/s
A	8	10 kbit/s

To change the transmission speed, proceed as follows:

1. Set dial x1 to the position corresponding to the transmission speed required.
The operation of the LEDs of the CAN bus does not change.
2. Set dial x10 to position A.
The green LED is permanently on, the red LED is off.
3. The CAN-IO module restarts.
Wait for about 10 seconds, until the green and red LEDs start to flash.
4. Reset dial x10 to the ten of the node number.
5. Reset dial x1 to the unit of the node number.
6. The CAN-IO module restarts. Wait 10 seconds.
The transmission speed has been changed.

Example

To set the transmission speed at 250 kbit/s in a CAN-IO module with an address (node number) of 27, take the following steps:

1. Place dial x1 on 3.
2. Place dial x10 on A.
3. Wait for both the green and red LEDs to flash and place the dial x10 on 2.
4. Place dial x1 on 7.
5. Wait for 10 seconds until the CAN-IO module restarts.

Transmission speed can also be changed via software. In this case, sent an SDO command, followed by a reset with an on/off sequence of the CAN-IO module.

MAINTENANCE AND DIAGNOSTICS

Maintenance

Integrated Controller and Operator Panel

To clean the screen use a slightly damp soft cloth.
Do not use chemical or abrasive products.
Disconnect the power supply before cleaning the Controller.

CAN-IO Module

The CAN-IO module requires no maintenance.

Disposal



The Integrated Controller and Operator Panel and the CAN-IO module must be disposed of in compliance with the laws in force.
Some of the components used in the devices may damage the environment unless disposed of properly.

Diagnostics

Integrated Controller and Operator Panel

See the System Message screen of the set-up program.

CAN-IO Module

Should a CAN-IO malfunction, it is possible to gain information on the status of the device and its components from the LEDs.

LED	Control	Meanings	Possible actions
Power (yellow)	Power	ON: module powered	
		OFF: no power	Check that there are 24 Vdc at the glands of the power terminals and that the polarities are correct
Run (green)	Card status	ON: card working	
CAN Run (green)	CAN status	ON: "OPERATIONAL" status	
		OFF: "INIT" status (system configuration)	If the LED remains off, the device is broken
		Flashing: the device is in "PREOPERATIONAL" status	
		Single flash: the device is in "PREPARED" (or "STOPPED") status	
CAN Fail (red)	CAN operation	OFF: no error, the device works perfectly	
		ON: the CAN controller is in Bus Off. No communication is possible	Check the CAN line connections
		Single flash: the CAN controller error counters has reached "Warning" level	Check the CAN line connections and terminations

CAN-IO

Create the codes to suit the device configuration required

CAN-IO-D ## # ## ## # # A # # # # ## ## ## # # - # # #

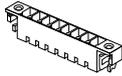
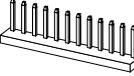
DIGITAL IO

Digital inputs (max 24)	
+24 VDC	00 / 03 / 06 / 09 / 12 / 15 / 18 / 21 / 24
Fast counters (max 6)	
Fast counter 50 kHz	0 / 3 / 6
Digital outputs (max 16)	
+24 VDC 0,5 A	00 / 02 / 04 / 06 / 08 / 10 / 12 / 14 / 16
+24 VDC 2 A	00 / 02 / 04 / 06 / 08 / 10 / 12 / 14 / 16
Relay, 250 VAC 5 A	0 / 2 / 4 / 6 / 8
PWM outputs (max 8)	
24 VDC 1 A, xxxx kHz max	0 / 2 / 4 / 6 / 8

ANALOGUE IO

Analogue inputs (max 8)	
±10 V	0 / 2 / 4 / 6 / 8
0-20 mA	0 / 2 / 4 / 6 / 8
Strain gauge 3,3 mV/V	0 / 2 / 4 / 6 / 8
Potentiometer	0 / 2 / 4 / 6 / 8
Temperature inputs (max 10)	
Thermocouples J, K, S, N, T, E, B, R	00 / 02 / 04 / 06 / 08 / 10
Pt100	00 / 02 / 04 / 06 / 08 / 10
Pt1000	00 / 02 / 04 / 06 / 08 / 10
Analogue outputs (max 8)	
±10 V	0 / 2 / 4 / 6 / 8
0-20 mA	0 / 2 / 4 / 6 / 8

PHYSICAL CHARACTERISTICS

DIN runner		
Absent		0
Present		1
IP protection rating		
Absent		0
IP20		1
Connector		
Screw terminals		1
Click, female, 12-pole		2
Comb		3

Code examples

CAN-IO-D 09 3 00 00 0 4 A 0 0 0 0 00 00 0 0 - 0 0 2
9 digital inputs, 3 fast counters, 4 PWM outputs; assembly on plate; click connectors

CAN-IO-D 00 0 00 00 4 0 A 0 0 0 2 04 00 00 0 2 - 1 1 1
4 relay outputs, 2 potentiometer inputs, 4 thermocouple inputs, 2 current analogue outputs 0-20 mA; assembly on DIN runner; IP20 protection rating; screw terminals

ATTENTION! The total number of inputs and Outputs cannot be more than 40.

Accessories

Ordering code		Description	Quantity per pack
		Female fly connector, 12-pole, for type 2 module connector	10
		Female fly connector, for type 3 module connector	10

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