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COMPANY WITH MANAGEMENT SYSTEM CERTIFIED BY DNV GL
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model eP4

M.I. eP4-00/18.06
Cod. ISTR-MIeP4ENG00

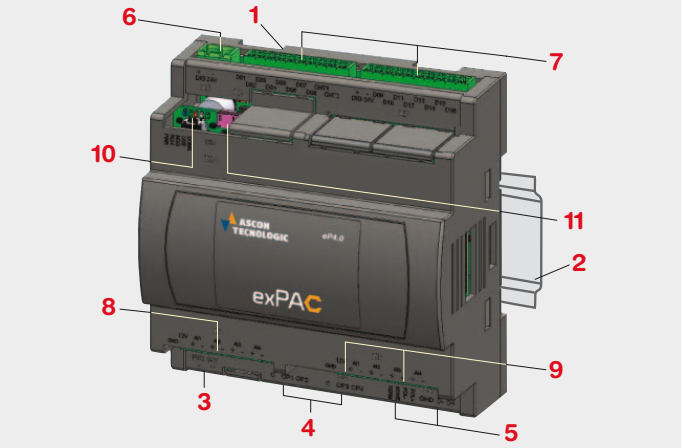
Installation Manual

Contents

I/O expansion module with 3 connection options

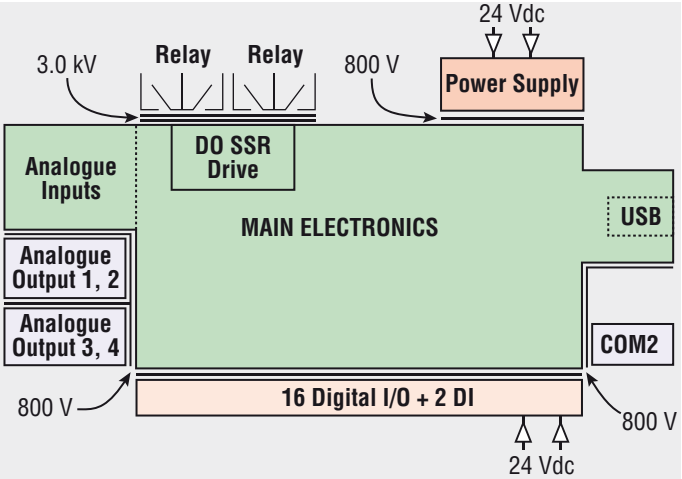
L I N E

General description



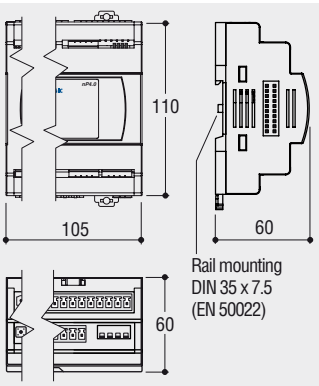
1 Model identification label (**on the back side of the module**);
2 DIN RAIL 35 x 7.5 (EN50022);
3 **X1** 24 Vdc Power Supply plug;
4 **X2** OP1... OP2 Digital Output SPST relay or 24 Vdc SSR drive;
X3 OP3... OP4 Digital Output SPST relay or 24 Vdc SSR drive;
5 **X4** COM2 RS485 serial port and SW2 switches for line settings;
6 **X5** 24 Vdc input for DØ1... DØ8 when configured as Digital Output;
7 **X6** DØ1... DØ8 configurable DI/DO + 2 DI pulse counters (CNT1, CNT2);
X7 24 Vdc input + DØ9... D16 configurable DI/DO;
8 **X8** 5 V Ratiometric, 12 Vdc AI Power and AI1... AI4 universal analog input;
9 **X9** AO1... AO2 mA or V analog outputs;
X10 AO3... AO4 mA or V analog outputs;
10 **Status/diagnostic LED**s (PWR, RUN, MSG, USB, COMS) + **Reset Button**;
11 **X11** USB micro AB type port;

Isolation scheme



Installation

Dimensions (mm)



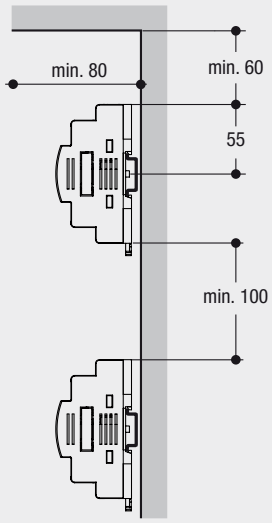
Operating conditions

Environmental condition			Suggestion
Operating conditions	°C	Temperature -20...+50°C	
	%Rh	Umidity: 5... 95% Rh non condensing	
Special conditions	°C	Temperature > 50°C	Use forced ventilation
	%Rh	> 95% RH	Warm up
		Conducting atmosphere	Use filter
Forbidden conditions		Corrosive atmosphere	
		Explosive atmosphere	

Mounting position

- Mount the module vertically;
- In order to help the air ventilation flow, respect the distances between modules and walls or other modules.

Mounting position (mm)



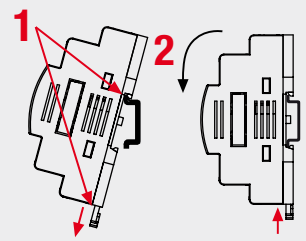
Disposal

The appliance (or the product) must be disposed of separately in compliance with the local standards in force on waste disposal.

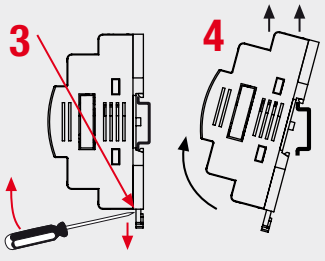
Mounting/removing the modules on/from the DIN rail

1 Open the 2 spring slides on the lower part of the CPU, clip the upper part of the module to the rail;
2 Rotate the module downwards, then close the 2 spring slides;
3 Switch OFF the Power Supply. Lower the spring slide by inserting a flat-blade screwdriver as indicated;
4 Turn and lift the module upwards to remove the CPU from the DIN rail.

Mounting the module

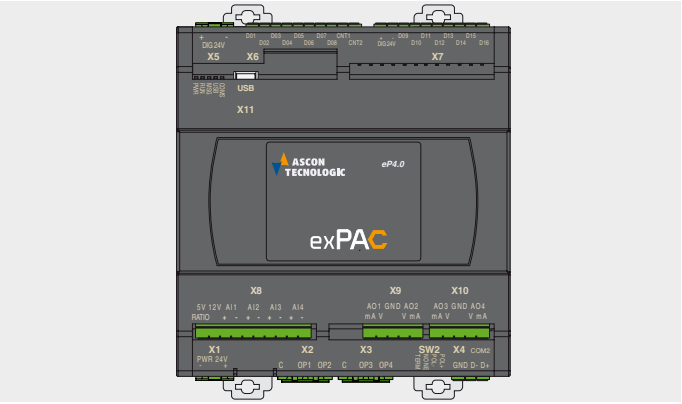


Removing the module



Electrical connections

Terminals connections and plugs



Conn.	Label	Signals
X1	Supply 24 Vdc	0 V Power Supply
		+24 V Power Supply
X2	C	OP1, OP2 common
	OP1	SPST NO pole/SSR drive
	OP2	SPST NO pole/SSR drive
X3	C	OP3, OP4 common
	OP3	SPST NO pole/SSR drive
	OP4	SPST NO pole/SSR drive
X4	GND	COM2 - RS485
	D-	
	D+	
X5 24 V	+	For DØ1... DØ8 when DO
	-	For DØ1... DØ8 when DO

Conn.	Label	Signals
X9	mA	AO1 Current output
	V	AO1 Voltage output
	GND	AO1, AO2 ground
	V	AO2 Voltage output
	mA	AO2 Current output
X10	mA	AO3 Current output
	V	AO3 Voltage output
	GND	AO3, AO4 ground
	V	AO4 Voltage output
	mA	AO4 Current output
X11	USB	MicroUSB type port

Description		Plugs of all terminals
Flexible cable section:		Pitch 5 mm: 0.2... 2.5 mm² (AWG24... AWG12) Pitch 3.5 mm: 0.14... 1.5 mm² (AWG28... AWG16)
L	Stripped wire	**Screw:** 7mm
	Flat blade screwdriver	Pitch 5 mm: 0.6 x 3.5 mm Pitch 3.5 mm: 0.4 x 2.5 mm
	Tightening torque	Pitch 5 mm: 0.5... 0.6 Nm Pitch 3.5 mm: 0.22... 0.25 Nm

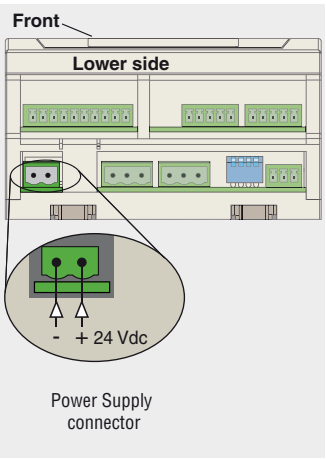
Conn.	Label	Signals
X6	DØ1... DØ8	Configurable Digital I/O
	CNT1... 2	Digital pulse count
X7	+ (24 V)	For DØ9... D16 when DO
	-	For DØ9... D16 when DO
	DØ9... D16	Configurable Digital I/O
X8	5V	5 V power for ratiometric inputs
	12V	12 V power for sensor excitation
	AI1... AI4 (+ -)	Universal analog input channels

Technical data:
- The green terminals are male connectors (pitch 3.5 or 5 mm), the correspondent female connectors have screw or spring terminals for connecting the wires;
- Made with self extinguishing material as required by UL94 V0 standard;
- Overvoltage cathegory/pollution degree II/2;
- Max. load current/section 8A/2.5mm² at 65°C;
- Test pulse voltage: 4 kVp.

⚠ Make sure that the overall current absorption (modules and field devices) matches the power supply;

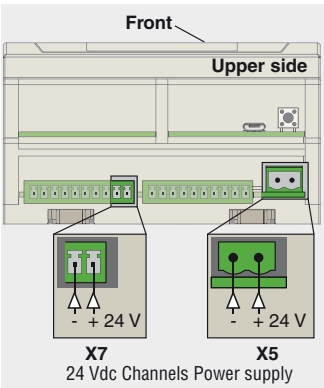
⚠ In order to avoid excessive voltage drops, install the most power consuming modules closer to the power supply.

X1 - Power supply



- Connector **X1**: 24 VDC (–10... +15%), 15 W max..

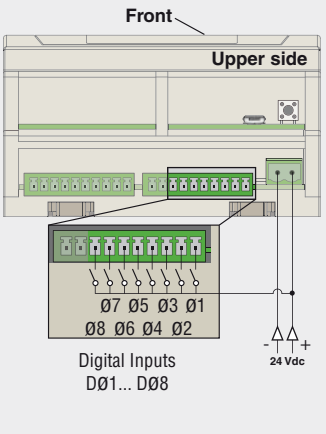
X5/X7 - Power supply for Digital Channels



- **X5** and **X7** connectors (**+** and **–** terminals): 24 Vdc Digital Channels Power Supply;
- These 2 power supply terminals are internally connected.

⚠ The amount of current that must be supplied to this connectors depends by the number of channels configured as outputs (DØ1... D16).

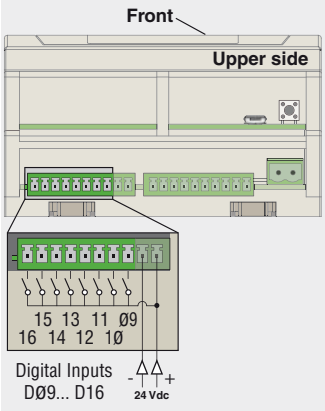
X6 - Digital Inputs DØ1... DØ8 Connections



- Example of connection when DØ1... DØ8 are configured as Digital Inputs;
- Isolation: 800V between the Digital Inputs and the Main Electronics;

⚠ For proper electrical connection, refer to **X5/X7 - Power supply for Digital Channels**.

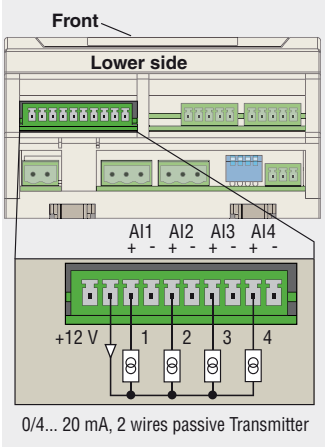
X7 - Digital Inputs DØ9... D16 Connections



- Example of connection when DØ9... D16 are configured as Digital Inputs;
- Isolation: 800V between the Digital Inputs and Main electronics;

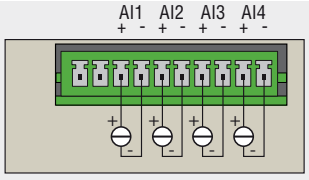
⚠ For proper electrical connection, refer to **X5/X7 - Power supply for Digital Channels**.

X8 - AI1... AI4 Analogue Input connection

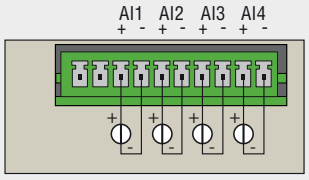


0/4... 20 mA, 2 wires passive Transmitter

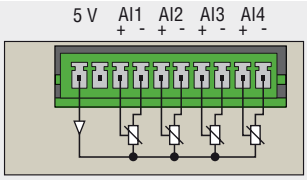
- For the analogue input, respect the polarity shown;
- Pay attention to connect the power source to each external sensor;
- Type: 0/4... 20 mA, 0/1... 5 V, 0/2... 10 V, T/c (J, K, L, N, R, S, T) PT100 (2 wires), PT1000, NTC, Potentiometer, Ratiometric (5 V);
- Resolution: 16 bit;
- Accuracy: 0.1% of span (linear inputs), 0.2% (temperature);
- Input impedance: 120 kΩ (V), <200 Ω (mA).



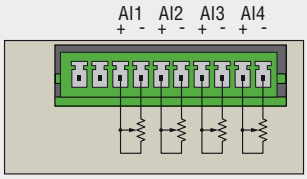
4... 20 mA Active Transmitter



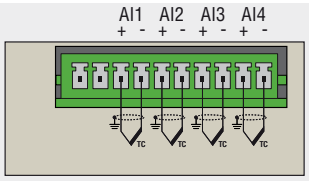
0/1/2... 5/10 V Active Transmitter



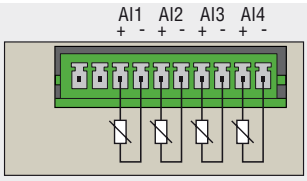
0...5 Vdc Ratiometric 3 wires



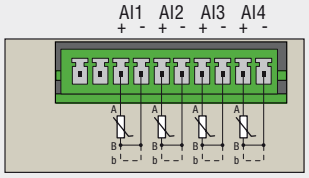
Potentiometer Inputs



TC Inputs



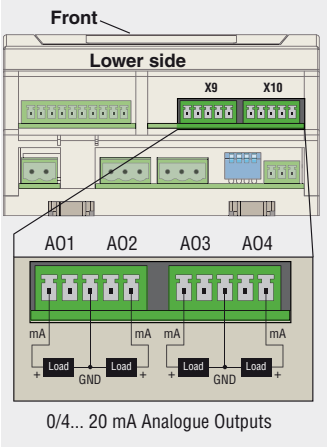
NTC Inputs



PT100/PT1000 2 wires Inputs

When AI1... AI4 are configured as: TC, NTC, Pt100 or Pt1000, is MANDATORY to short-circuit the terminals (+, -) of the unused channels.

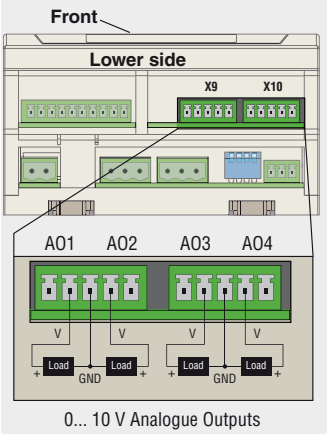
X9, X10 - AO1... AO4 Current Analogue Output Connections



0/4... 20 mA Analogue Outputs

- Respect the polarity shown;
- Type: 0/4... 20 mA;
- Load: < 500 Ω;
- Resolution: 12 bit;
- Accuracy: 0.1%;
- Isolation: 800V between the Analogue Ouputs and the Main Electronics.

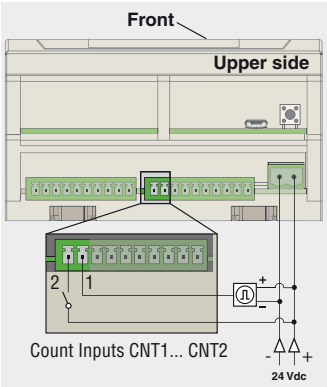
X9, X10 - AO1... AO4 Voltage Analogue Output Connections



0... 10 V Analogue Outputs

- Respect the polarity shown;
- Type: 0/4... 20 mA, 0/1... 5 V, 0/2... 10 V;
- Load: > 1 kΩ;
- Resolution: 12 bit;
- Accuracy: 0.1%;
- Isolation: 800V between the Analogue Ouputs and the Main Electronics.

X6 - CNT1... CNT2 Pulse Count Inputs Connections

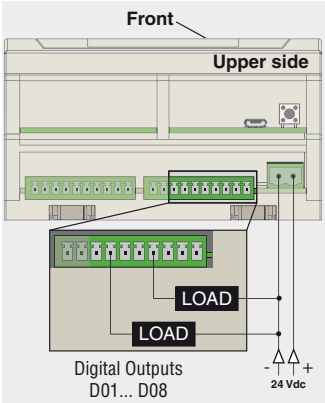


Count Inputs CNT1... CNT2

- Both channels can manage signals up to 5 kHz;
- Isolation: 800V between the Count Input channels and Main Electronics.

For proper electrical connection, refer to **X5/X7 - Power supply for Digital Channels**.

X6 - D01... D08 Digital Outputs Connections

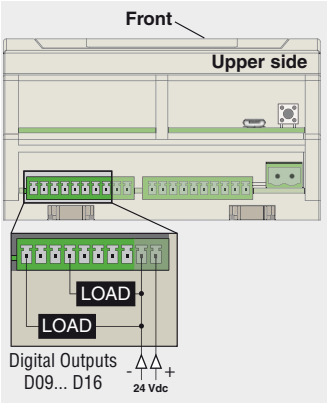


Digital Outputs
D01... D08

- The Digital Outputs number of the terminals are: D01... D08
- The 8 output loads should not exceed **0.7 A each**;
- In the drowing are connected only 2 loads as an example;
- Isolation: 800V between the Digital Outputs and the Main Electronics.

For proper electrical connection, refer to **X5/X7 - Power supply for Digital Channels**.

X7 - 09... 16 Digital Outputs Connections

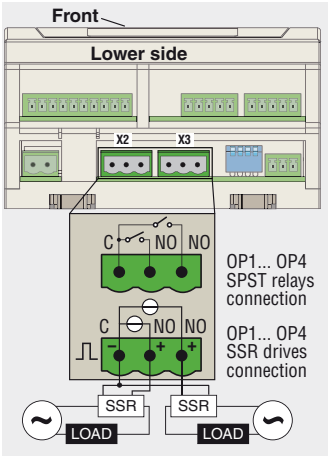


Digital Outputs
D09... D16

- The Digital Outputs number of the terminals are: D09... D16;
- The 8 output loads should not exceed **0.7 A each**;
- In the drowing are connected only 2 loads as an example;
- Isolation: 800V between the Digital Ouputs and the Main Electronics.

For proper electrical connection, refer to **X5/X7 - Power supply for Digital Channels**.

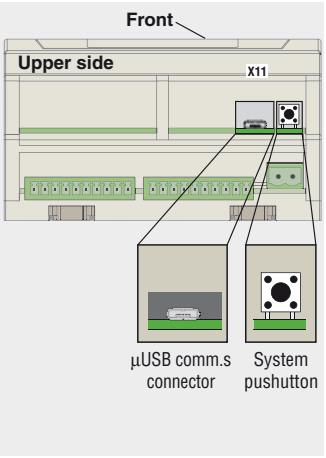
X2, X3 - Digital outputs OP1... OP4: SPST Relays/SSR drive



Relays:
- Rate: 2 A (for resistive loads);
- Isolation: 3 kV rms beween each channel and Power Supply and between each channel and Main electronics.

SSR drives:
- Voltage output 0/12 Vdc;
- Respect the polarity shown;
- Output not isolated.

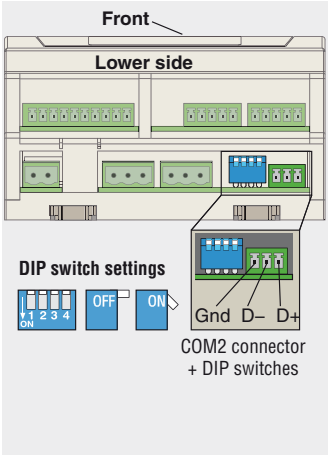
X11 - USB port + System pushbutton



- µUSB type AB port (X11) to connect a flash drive (Firmware, system files upload/download or data logging);
- System pushbutton.

The system pushbutton performs different operations accorndingly to the system status but does not restart the CPU or the 1131 application.

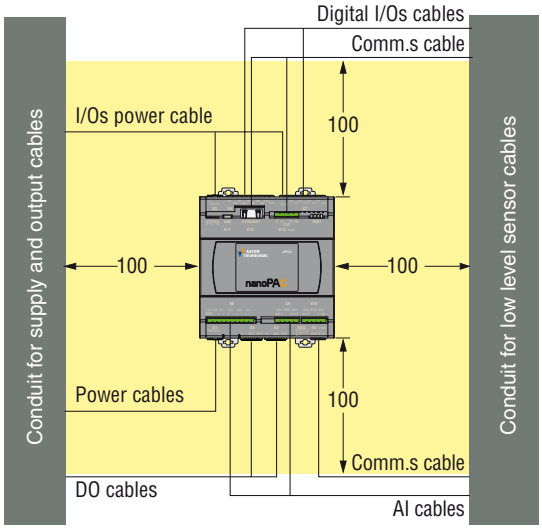
X4 - COM2 RS485 Serial Communication Port



- RS485 port to connect a fieldbus network using the Modbus protocol (master/slave) or serial ASCII;
- Isolation from Main electronics: always 800 V.
- RS485 (COM2) line settings can be configured using the specific DIP switches:

SW	Description	Default
1	110 Ω line termination	OFF
2	Not used	
3	Line polarization Pull-Down	OFF
4	Line polarization Pull-Up	OFF

Suggested wires routing



Despite the fact that the instrument has been designed to work in an harsh and noisy environment, it is strongly recommended to follow the following suggestions.

All the wiring must comply with the local regulations.

The supply wiring should be routed away from the power cables. Avoid to use electromagnetic contactors, power relays and high power motors nearby.

Avoid power units nearby, especially if controlled in phase angle. Keep the low level sensor input wires away from the power lines and the output cables.

Power lines and output cables must also be at **100 mm** (min.) away from the CPU. If this is not achievable, use shielded cables on the sensor inputs, with the shield connected to earth at one side only.

Warning!

Whenever a failure or a malfunction of the device may cause dangerous situations for persons, things or animals, please remember that the plant must be equipped with additional devices which will guarantee safety.

How to order

eP4 = CPU of the Programmable Logic Controller

A: Display
- **-** = No Display
- **D** = Display (available soon)

B: Optional Digital Outputs
- **-** = No Digital Outputs
- **M** = 2 Relay + 2 SSR drive
- **R** = 4 Relay
- **S** = 4 SSR Drive

C: Analogue Inputs
- **5** = 4 Universal and Ratiometric AI

D: Analogue Outputs
- **-** = No Analogue Output
- **2** = 1 isolated module with 2 not isolated AOs
- **4** = 2 isolated modules with 2 not isolated AOs each

E: Digital Channels
- **--** = No Digital Channels
- **88** = 8 Inputs + 8 Outputs + 2 DI Pulse Counters
- **16** = 16 configurable + 2 DI Pulse Counters

F: Field bus
- **E** = Ethernet

G: Communication Ports
- **-** = No Communication Ports
- **1S** = COM1
- **1I** = Isolated COM1
- **2S** = COM1 + Isolated COM2
- **2I** = Isolated COM1+ Isolated COM2
- **4I** = Isolated COM2

NP4 - E