AC³nP System

Installation Manual

21/03 - Code: ISTR_I_AC3NP_E_01_--

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Preface

The products described in this manual should be installed, operated and maintained only by qualified personnel who is familiar with automation safety topics and applicable national standards.

Using this manual

Specifications within the text of this manual are given in the International System of Units (SI), with non SI equivalents in parentheses.

Fully Capitalized words within the text indicate markings found on the equipment.

Words **in bold** style within the text indicate markings found in the Configuration Tools.

Warnings, Cautions and Notes are used to emphasize critical instructions:

DANGER!

Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

Caution

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury, or property damage.

Note: Highlights important information about an operating procedure or the equipment.

General warnings

DANGER!

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.

WARNING

We warrant that the products will be free from defects in material and workmanship for 18 months from the date of delivery. Products and components that are subject to wear due to conditions of use, service life and misuse are not covered by this warranty.

Current Documentation on the Internet

Make sure you are always working with the latest version of this document.

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New manual revisions, when published, and can be found online at:

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Chapter 1
Product Description

1-1 AC³nP Hardware

The AC³nP system has been specifically projected to substitute the AC Station controller, but can also be used as a normal Multiloop control system.

The main components of an AC³nP system are:

- P04 Operator Panel;
- nP4 CPU;
- An Ethernet cable to connect the CPU to the Operator Panel;
- Mounting kit (a plastic adapter to install the P04 into the cutout made for the AC-Station, a metal plate to mount the CPU and two metal clamps to fit the structure to the front panel of the cabinet).

Additional (optional) components of the AC³nP system:

- Up to two eP4 expansion modules.
- Optional accessories:
  - 24 Vdc Power supply (APS2ALDR);
  - 6 ports 10/100/1000 Ethernet Switch (APS2ATOPEH2306).

1-1-1 Types of installation

There are 2 different ways to install an AC³nP system:

- Front panel (or Standard) mounting;
- Remote installation (the P04 and the CPU will be installed far from each other).

The installation of the CPU with 2 expansion modules requires the remote installation.

The communications between the P04 Operator Panel and the nP4 CPU are granted by the Ethernet connection.

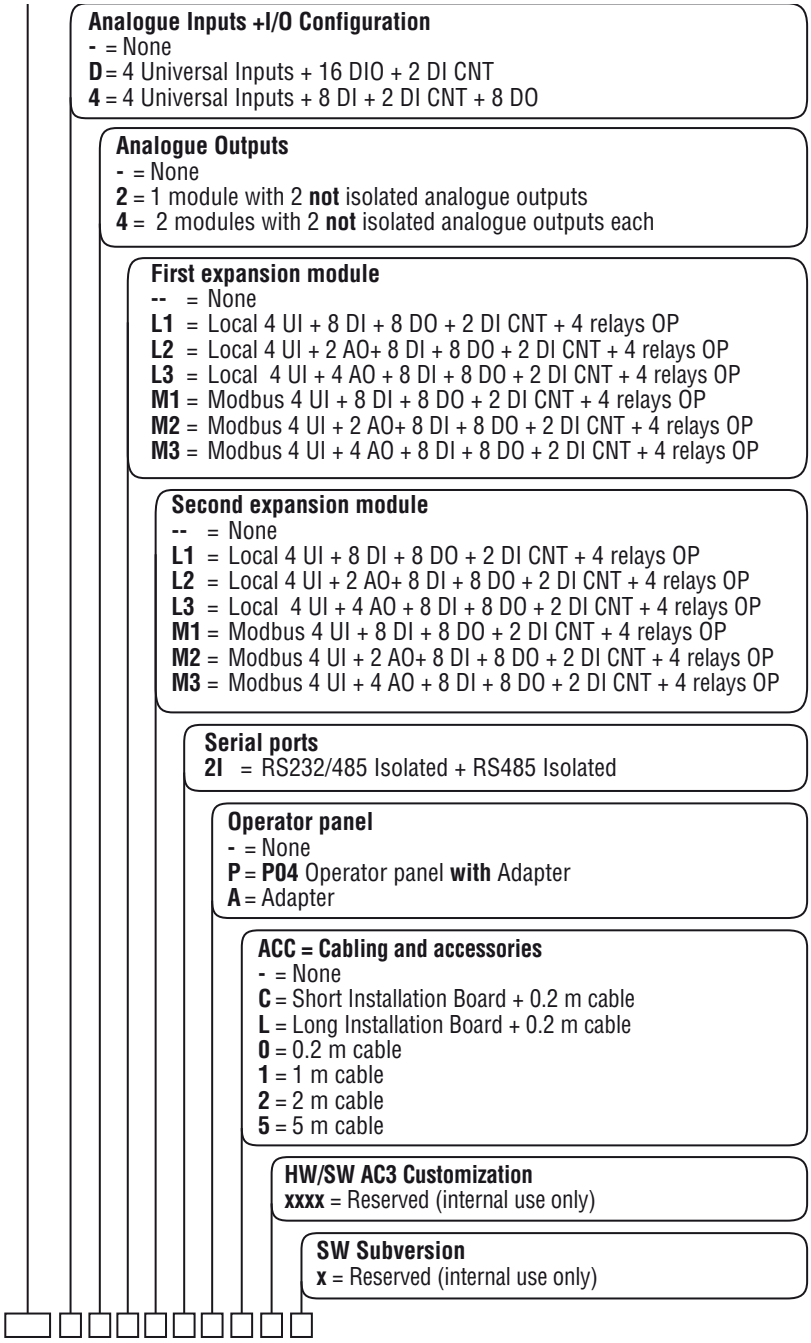
When the AC³nP replaces an AC-Station (or is Standard mounted), the dedicated adapter and the installation plate must be present in the order, otherwise the plate would not be necessary.

Sometimes the Standard mounting solution cannot be used due to the overhall dimensions of the system.

The following table shows the installation options.

AC³nP system configuration	Installation type
PO04 + nP4	All installation types possible, the Front Panel mounting uses the “Short installation plate”
PO04 + nP4 + 1 eP4 expansion module	All installation types possible, the Front Panel mounting uses the “Long installation plate”
PO04 + nP4 + 2 eP4 expansion modules	Only the Remote installation type is possible with this configuration

1-1-2 Order code



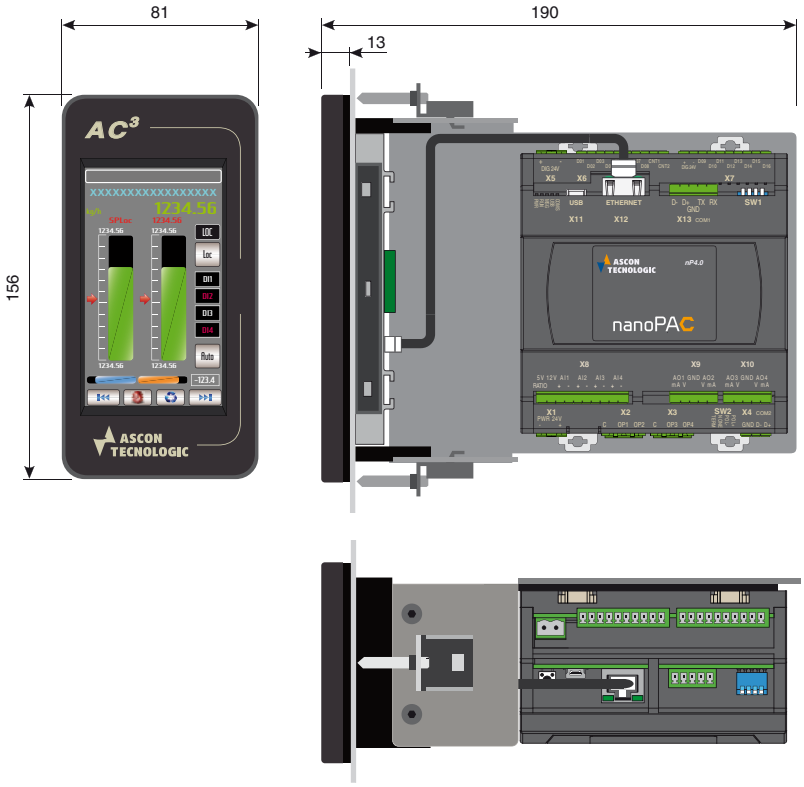
1-2 Physical dimensions

1-2-1 System dimensions

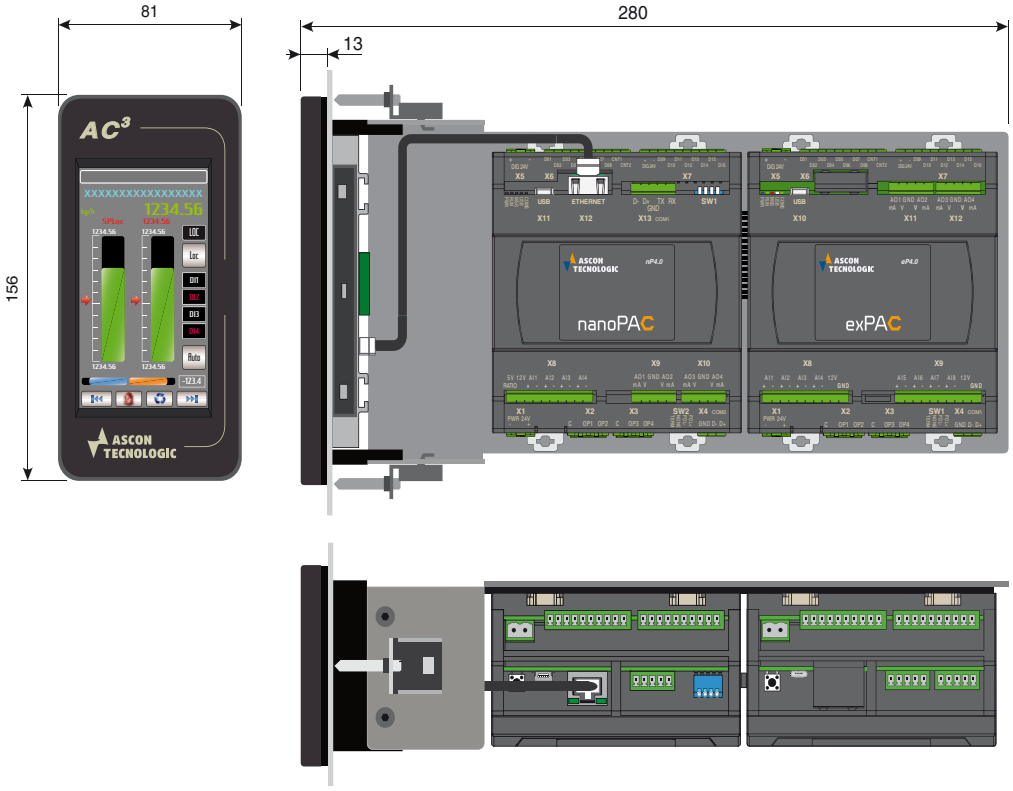
Standard mounting

When installing the System for the Standard mounting mode, it can use two different mounting plates depending on the number of expansion modules that are to be installed.

Dimensions with the display adapter and the short mounting plate



Dimensions with the display adapter and the long mounting plate



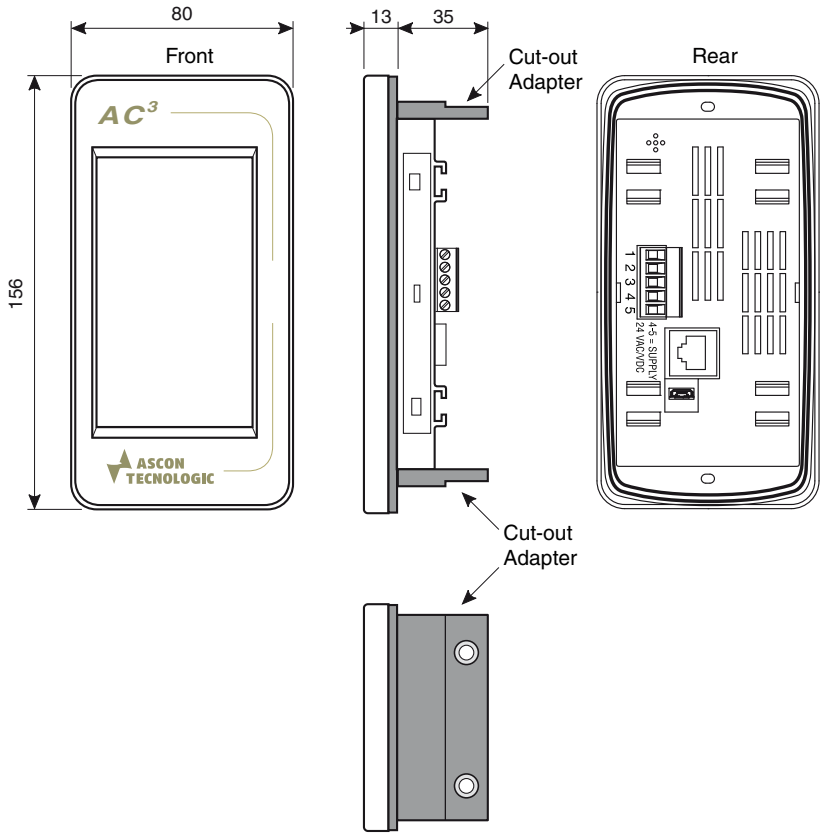
Remote mounting

When installing a Remote mounting System, it can be considered as composed by two distinct pieces:

- The P04 Operator Panel (with the Cutout adapter);
- The nP4 CPU with the expansion module(s).

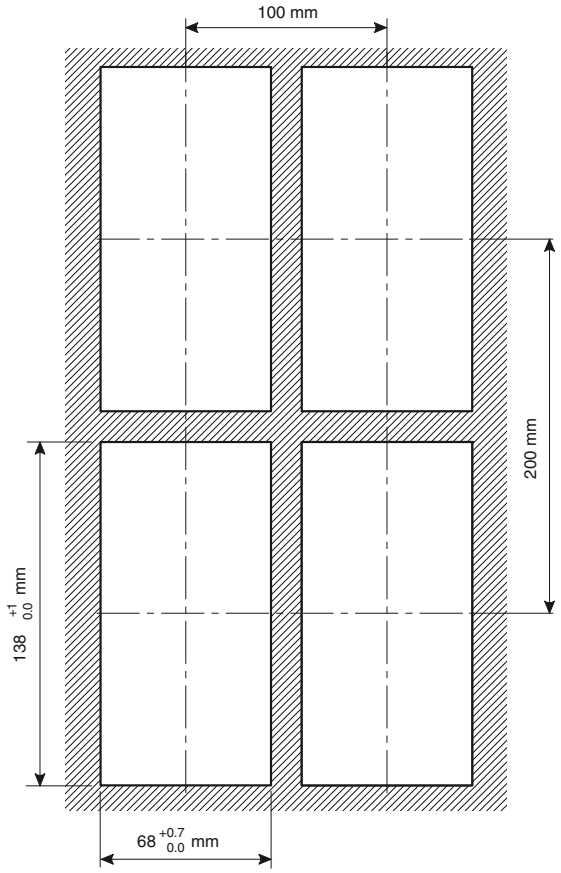
The communications between the P04 Operator Panel and the nP4 CPU are granted by the Ethernet connection.

Dimensions of the P04 Operator Panel with the Cutout adapter



1-3 Panel Cutout

1-3-1 Panel Cutout dimensions and space

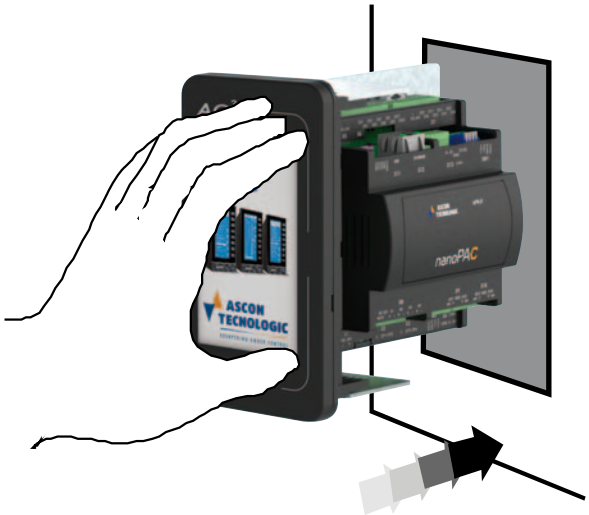


1-4 Installing the Hardware

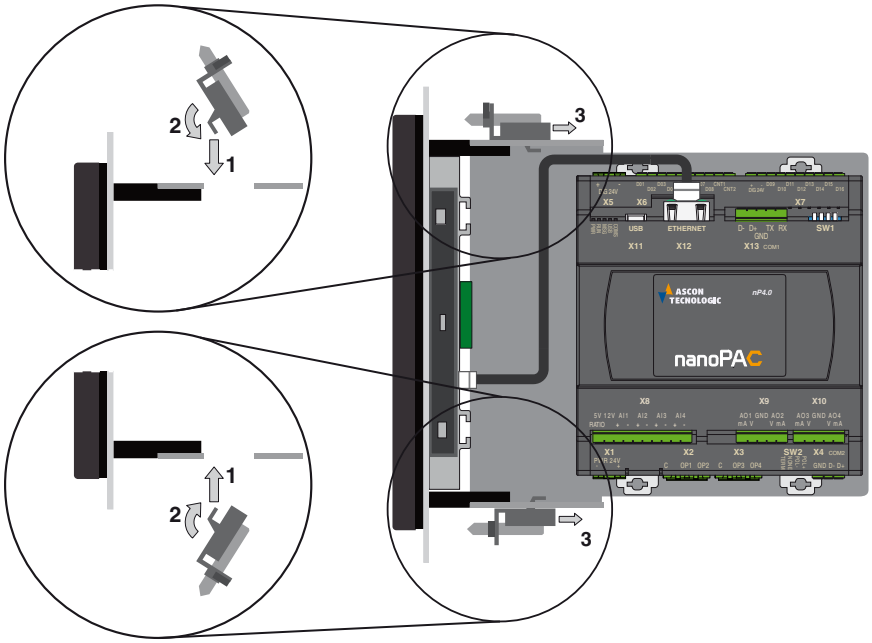
1-4-1 Front Panel Installation

The Front Panel installation of an AC³nP system is quite simple:

- Insert the System in the cutout made on the front panel of the cabinet;



- Fit the two mounting clamps, fixing them in the slots at the top and bottom side of the the metal plate. To hook the clamps, slide them away from the panel;



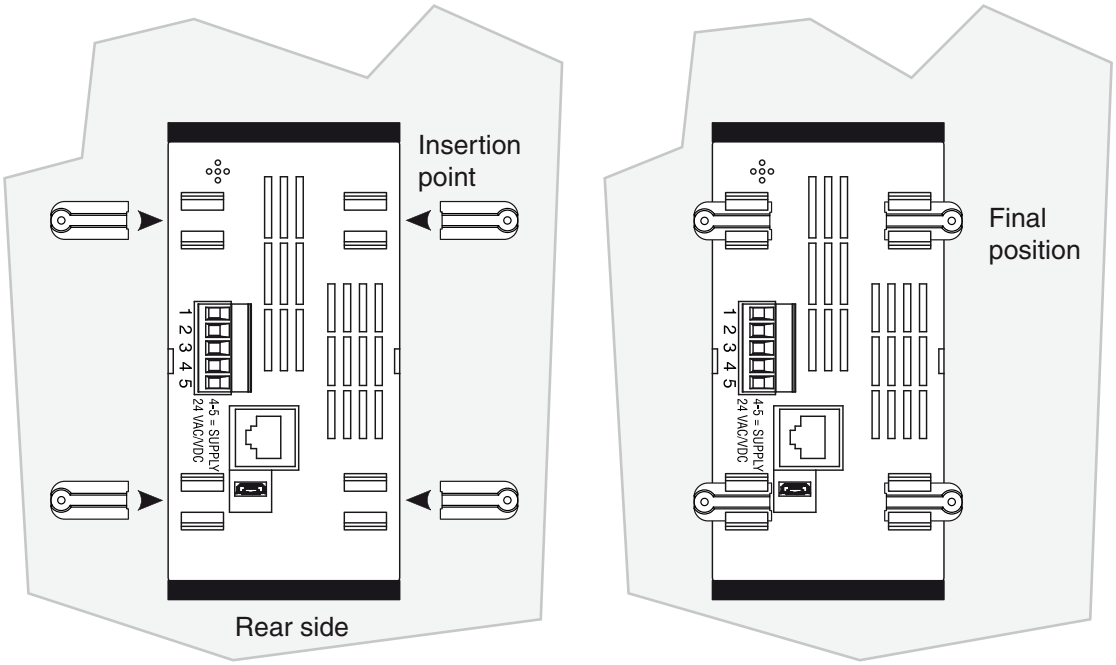
- Rotate clockwise the clamps screws until the instrument is firmly locked to the cabinet panel. Do not over tighten the screws, to avoid panel distortions.

1-4-2 Remote Installation

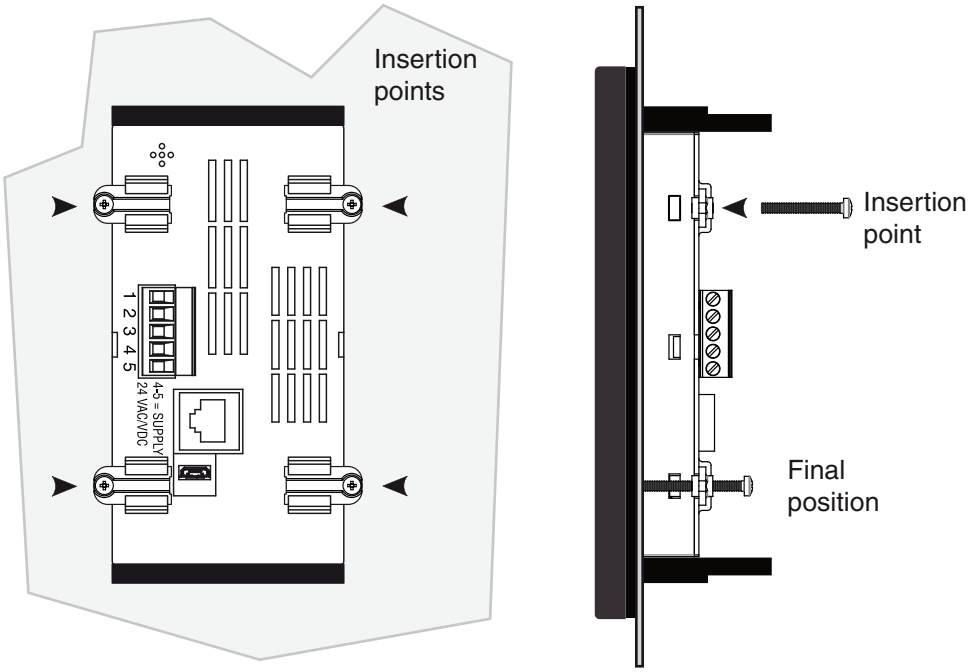
The Remote installation of an AC³nP system requires a little more time:

- Insert the System with the adapter in the cutout made on the front panel of the cabinet;

- Insert the four mounting clamps, in the rear side of the P04 Operator Panel as illustrated;



- Now mount a retaining screw in the hole present in each clamp;

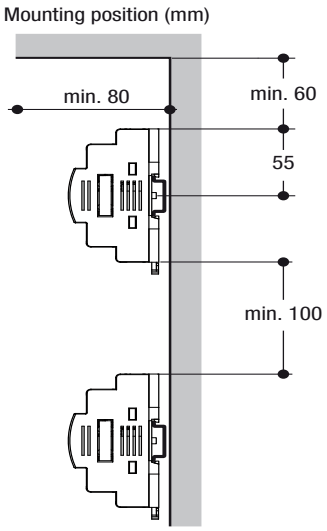


- Rotate clockwise the four clamps screws until the instrument is firmly locked to the cabinet panel. Do not over tighten the screws, to avoid panel distortions;
- The nP4 CPU and the expansion modules must be mounted on a dedicated DIN rail located in the same cabinet or, in the case of a remote installation, in a different one. The Operator Panel and the CPU communicate through the Ethernet cable.

Installing the modules on a DIN rail

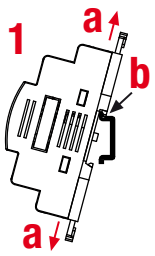
Mounting Position

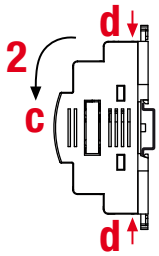
Select a mounting position in accordance with the distances indicated in the illustration that follows:



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

Mounting/Removing the modules on/from the DIN rail

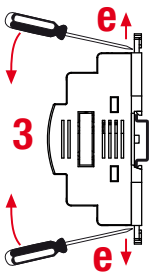


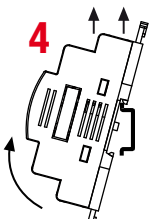


Mounting Instructions

1. Open the 4 plastic spring slides in the upper and lower part of the CPU (a), clip the upper part of the module to the DIN rail (b);

2. Rotate the module downwards (c), then close the 4 spring slides (d).





Removing Instructions

Switch OFF the Power Supply;

3. Open the 4 plastic spring slides by inserting a flat-blade screwdriver as indicated (e);

4. Turn and lift the module upwards to remove it from the DIN rail.

Connecting the expansion modules

The I/O modules are already set.

The I/O expansion modules (max. 2) must be mounted on the right of the last mounted module.

The modules (CPU included) must be powered OFF when connected to each other.

All the modules must be removed from the DIN rail before to connect or disconnect the bus.

1. **Switch OFF the Power Supply;**
2. Insert the connector of the bus in the rightmost module. A position key identifies the insertion versus of the connector;
3. Mount the modules on the DINrail.

To remove the I/O expansion modules invert the mounting sequence described.

Chapter 2
Hardware Description

2-1 Technical specification

2-1-1 AC³nP System Assembly

The AC³nP System is composed by a P04 Touch Screen Panel device and an nP4 Control Unit. The system, optionally, can be installed as splitted version where the P04 Panel can be installed remotely from the nP4 Unit.

The data exchange between the two devices is performed through an Ethernet Communcations.

2-1-2 P04 Operator Panel

Display characteristics

Item	Description
LCD type	TFT display
Screen dimension	4.3”
Screen format	16/9
Touch-screen	Resistive
Resolution	480 x 272
Number of colours	262 k
Back light	LED

Storage characteristics

Item	Description
RAM	128 MB
Flash	128 MB (Operating System + Program + 16 MB user space)
Memory card	MicroSD (max. capacity 8GB)
USB	2.0 full speed (max. distance <3 m)

Communication characteristics

Item	Description
Ethernet	10/100Mb/s (max. distance <100 m)
RS485	Not available

Electrical characteristics

Item	Description
Power Supply	24VDC, ±10%
Current consumption	300mA @ 24VDC
Internal fuse	Not available

Mechanical characteristics

Item	Description
Dimensions (H x L x W)	83 x 159 x 28 mm
Cutout	68 x 138 (P04 with front panel mounting adapter)
	68 x 127 (panel only)
Weight	200 g

Environmental characteristics

Item	Description
Operating Temperature	0... 55°C
Storage Temperature	-20... +60°C
Relative Humidity	85% RH
Protection degree	Front panel: IP65, Rear side: IP20
CE standards	EN61151-3, 61000-3-3:1995+A1:2001+A2:2005

2-1-3 nP4 CPU Module

General and environmental characteristics

Features	Description
Power supply	24 Vdc (-15... +25 %)
Power consumption	12 VA (+5 W with I/O modules)
Operating temperature	-20... 50°C (-4... 122°F)
Storage temperature	-40... 70°C (-40... 158°F)
Relative Humidity	5...95 % w/o condensation
Mounting	Omega DIN A rail
Dimensions	**W**: 108 **H**: 110 **D**: 60 (mm) - 6 DIN module
Weight	512 g
Protection Degree	IP20
Safety	Compliance to EN 61131-2 Isolation class II (50 Vrms), EN61010-1
Approvals	CE (UL pending)

Functional characteristics

Features	Description
Programming languages	IL, ST, FBD, LD, SFC, CFC
Program memory	Max. 4 MB internal or on USB key
Dynamic memory	32 MB SDRAM
Retentive memory	64 kB redundant – 128 kB MRAM
Data retention	15 years (for Flash memory)
Min. cycle time	Typical 7 ms
Timer resolution	1 ms min.
Real Time Clock	With rechargeable backup battery
Max. PID number	Unlimited, application memory usage dependent

Universal Analogue Inputs (AI1... AI4)

AI1... AI4 are Universal Analogue Inputs that can be configured from the Setup Telnet session.

Features	Description
Type of input	0/4... 20 mA, 0/1... 5 V, 0/2... 10 V, Thermocouple (type J, K, L, N, R, S, T), PT100 (2 wires), PT1000, NTC (Semitec 103AT-2), Potentiometer or 5 V Ratiometric
Resolution	16 bit
Accuracy	0.1 % of span (linear inputs)/0.2% (Temperature)
Input impedance	120 kΩ (V), < 200 Ω (mA)
Isolation	800 V between analogue outputs, power supply, digital I/Os and communication ports (when isolated)
Input connectors	X8

Analogue Output (AO1... AO4)

AO1... AO4 are the Analogue Outputs which can be configured from the Setup Telnet session.

Features	Description
AO1... AO4 **[note]**	0/1... 5 V, 0/2... 10 V, 0/4... 20 mA
Load	< 500 Ω (mA), > 1 kΩ (V)
Resolution	12 bit
Accuracy	0.1% full scale
Isolation	800 V between analogue outputs, power supply, digital I/Os and communication ports (when isolated)
Connectors	X9 and X10

Note: All the available input types are listed at: *"Setup Temperature Channels"* on page 31 and *"Setup the Selected AI Channel"* on page 30.
All the available output types are listed at: *"AO Channels Setup Menu"* on page 33.

I/O Characteristics

Digital Channels (D01... D16)

Features	Description
Type	Configurable as Digital Input (OFF = 0... 3 V, ON = 5... 30 V) or Digital Output (24 Vdc, 0.7 A each)
Isolation	800 V channels/power supply
	800 V channels/logic components
Compliance	IEC/EN 61131-2 (type 1)
Connectors	X6 and X7

Note: The watchdog timer function output, in case, is the DO16.

Pulse Counter/Frequency Meter Digital Input (CNT1... CNT2)

Features	Description
Type	Configurable as Standard DI, Pulse Counter or Frequency-meter (up to 5 kHz)(note)
Isolation	800 V channels/power supply
	800 V channels/logic components
Compliance	IEC/EN 61131-2 (type 1)
Connector	X6

Note: The Frequency meter function will be available in a future release.

Specific Digital Outputs (OP1... OP4)

OP1 to OP4 are designed to be Digital Outputs only: the type can be selected from the ordering code as Relay (code **R**), SSR drive (code **S**) or Mixed (code **M**).

2 A SPST Relay

OP1... OP4 as relay outputs with SPST (Single pole, single throw).

Features	Description
Contact configuration	SPST (Single Pole, Single Throw)
Contact rate	2 A (for resistive loads)
Isolation	3 kV between channel and Power Supply and between channel and main electronics
Output connectors	X2 and X3

0/12 Vdc external SSR

OP1... OP4 as 0/12 Vdc outputs for SSR drive.

Features	Description
Power output	10 mA, 12 Vdc
Isolation	None
Output connectors	X2 and X3

Auxiliary Analogue Output

Features	Description	
Power output 1	+5 Vdc	Ratiometric sensor power supply
	30 mA max.	Max. load
	X8	Output terminal connector
Power output 2	+12 Vdc	Passive transmitter power supply
	80 mA max.	Max. load
	X8	Output terminal connector

Communication ports

Serial Communication ports (COM1 and COM2)

Features	Description
Isolation	800 V between analogue inputs, analogue outputs, digital IOs, power supply and each other (optional)
Connector	X13 (COM1) and X4 (COM2)

2-1-4 Installation Kit

The installation kit is a mandatory item when the AC³nP System is to be installed in place of an AC Station or Front Panels mounted.

It consists of some hardware parts to allow the front panel installation:

- Front panel Adapter;
- 2 Allen screws to install the P04 touch screen display in the front panel adapter;
- Mounting plate with a DIN rail that allows the installation of the nP4;
- 4 conical head Allen screws to assemble the mounting plate to the front panel adapter.
- 2 clamps to fix the structure to the font panel.

Mechanical characteristics

Item	Description
Dimensions (H x L x W)	156 x 81 x 190 (280) mm short plate (long plate)
Cutout	68 x 138 (P04 with front panel mounting adapter)
Weight	Sort plate730 g; long plate: 1200 g

Terminal specifications

Description		PlugsA and B terminals		PlugsA and B terminals	
Flexible cable section:		0.2... 2.5 mm² (AWG24... AWG12)		0.08...1.5 mm² (AWG28... AWG16)	
	Stripped wire	**Screw:** 7mm; **Spring:** 10mm		**Screw:** 7mm; **Spring:** 10mm	
	Flat blade screwdriver	0.6 x 3.5 mm	0.4 x 2.5 mm		
	Tightening torque	0.5...0.6 Nm		0.4...0.5 Nm	

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.

WARNING

Please note that the maximum current capacity for each terminal is 8A.

WARNING

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

WARNING

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

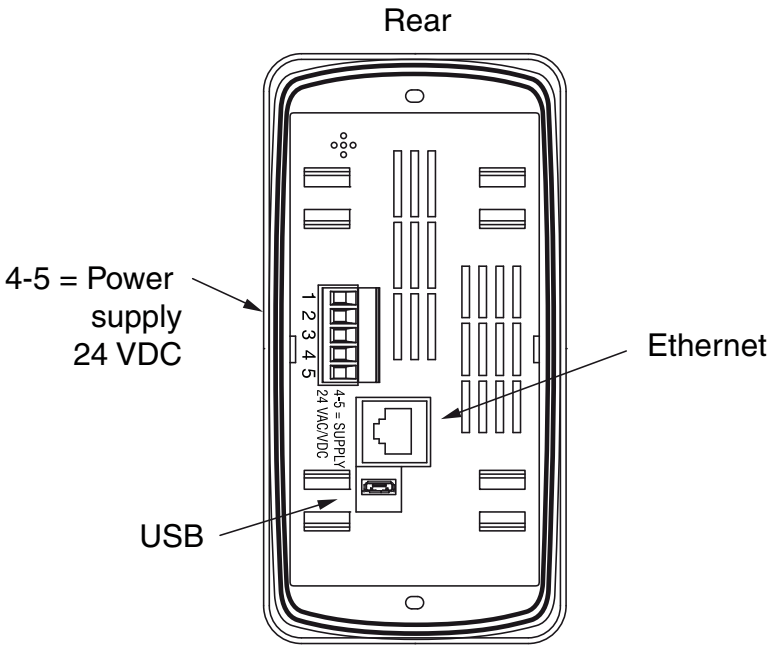
2-2 Hardware Description

2-2-1 P04 Operator Panel

Touch Screen Panel

The P04 operator panel is used directly from the Touch Screen Area.

Connections and Ports



Power Supply connection

The power supply is to be provided to the operator panel via terminals 4 and 5 of the terminal block. The connector is not polarized as the panel is internally protected. The plus (+) and minus (-) power supply poles can be freely connected to terminals 4 and 5.

Ethernet connection

The LAN Ethernet port (TCP/IP) is dedicated to interface the P04 Operator Panel to the nP4 Control Unit.

USB port

The USB port can be used to upload a startegy in the P04 Operator Panel.

2-2-2 nP4 CPU

The sigmaline **nP4** base unit can house up to 30 I/O ports:

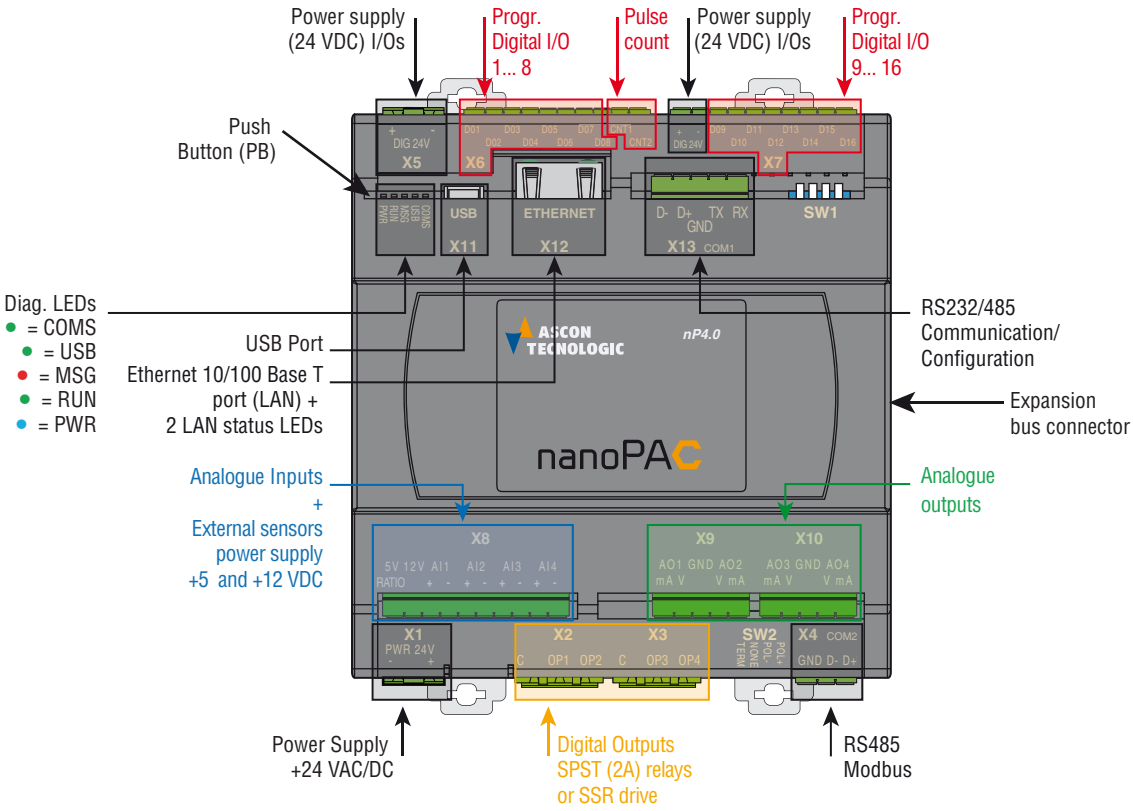
4 AI Universal analogue inputs configurable as mA, V, thermocouple, PT100, Pt1000, NTC, potentiometer or 5 V ratiometric (connector X8);

0/2/4/ AO High level analogue outputs mA or V (connector X9 and X10);

16 DIG Configurable Digital Inputs or Outputs 24 Vdc (connectors X6 and X7);

2 DI Standard digital input, pulse counter or frequency meter (up to 5 kHz)(connector X6);

4 OP General purpose digital outputs: SPST relay (2 A) or SSR drive (connectors X2 and X3).



WARNING

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

WARNING

1) By pressing the **PB** button at the CPU power ON it is possible to **restore the Factory Default parameters**.

2) Immediately after CPU Power ON, if a recognized USB key is present, by pressing the **PB** button will be possible to manage the upload / download of all the files related to the project from / to the USB Key as described in the "*Chapter 6 - USB Mass Storage Device*".

3) While the PLC program is running, if the **PB** button will be pressed, it behaves as a Standard digital input as described in "*Chapter 10 - Digital Inputs Status (D01... D16)*".

2-2-3 CPU Diagnostic LEDs

The table that follows describe in detail LED functions and behaviours (**note 1**).

LED	Colour	Action (note 1)	Description
PWR	Blue	ON	Power Supply present
RUN LED while normal CPU or Bootloader operations			
RUN	Green	OFF	PLC Program stopped or not present
		ON	PLC Program running
		Blinking	Telnet Watch Monitor session active
		Flickering	Telnet Configuration session active
		Single flash	Bootloader - Work in progress
		Double flash	Bootloader - Operations result OK
		Triple flash	Bootloader - Operations result KO
MSG LED while normal CPU or Bootloader operations			
MSG	Red	OFF	No Errors - Firmware present
		ON	Firmware not present
		Blinking	Backup battery low
		Flickering	Flash File System error
		Single flash	Checksum error in RETAIN data
		Double flash	Calibration file error
		Triple flash	Configuration error (Reset to Factory Default)
USB LED while normal CPU or Bootloader operations			
USB	White	OFF	Reserved
		ON	USB Host key present
		Blinking	Access to USB key
		Flickering	File transfer active
		Single flash	Wait for PB button to USB files management
		Double flash	Reserved
		Triple flash	Reserved
COMS LED while normal CPU or Bootloader operations			
COMS	Green	OFF	Reserved
		ON	Bootloader - USB host
		Blinking	Bootloader - TFTP with IP as Factory default
		Flickering	Bootloader - TFTP with customer's IP
		Single flash	COM1 data traffic
		Double flash	COM2 data traffic
		Triple flash	COM1 and COM2 data traffic

Notes: 1. As the ON/OFF sequence of the LEDs has a specific meaning, it is important that the user recognizes each LED status:

Sequence	Meaning
OFF	The LED is not lit
Steady ON	The LED is lit in a stable way
Blinking	The LED blinks at a frequence of 2.5 Hz (slow)
Flickering	The LED blinks at a frequence of 10 Hz (fast)
Single flash	The LED lits once for at least 200 ms
Double flash	The LED lits twice with pulses of 200 ms each
Triple flash	The LED lits three with pulses of 200 ms each

2. The first time %M variables have been defined as RETAIN, the system needs to reboot in order to properly create the dedicated files. The error indication will disappear automatically in case of positive result.

WARNING

While the CPU is writing a new firmware to the internal Flash memory, an alternate blinking between the RUN and MSG + USB + COMS LEDs will indicate the status and progress of the reserved specific operations!

In case of problem to access internal File System, the CPU could perform a format of it: in this particular specific case, ALL the LEDs will blink in a way which simulates a bargraph filling!

2-2-4 eP4 Expansion module

The sigma**line nP4** base unit can house up to 30 I/O ports:

4 AI Universal analogue inputs configurable as mA, V, thermocouple, PT100, Pt1000, NTC, potentiometer (connectors X8, X9);

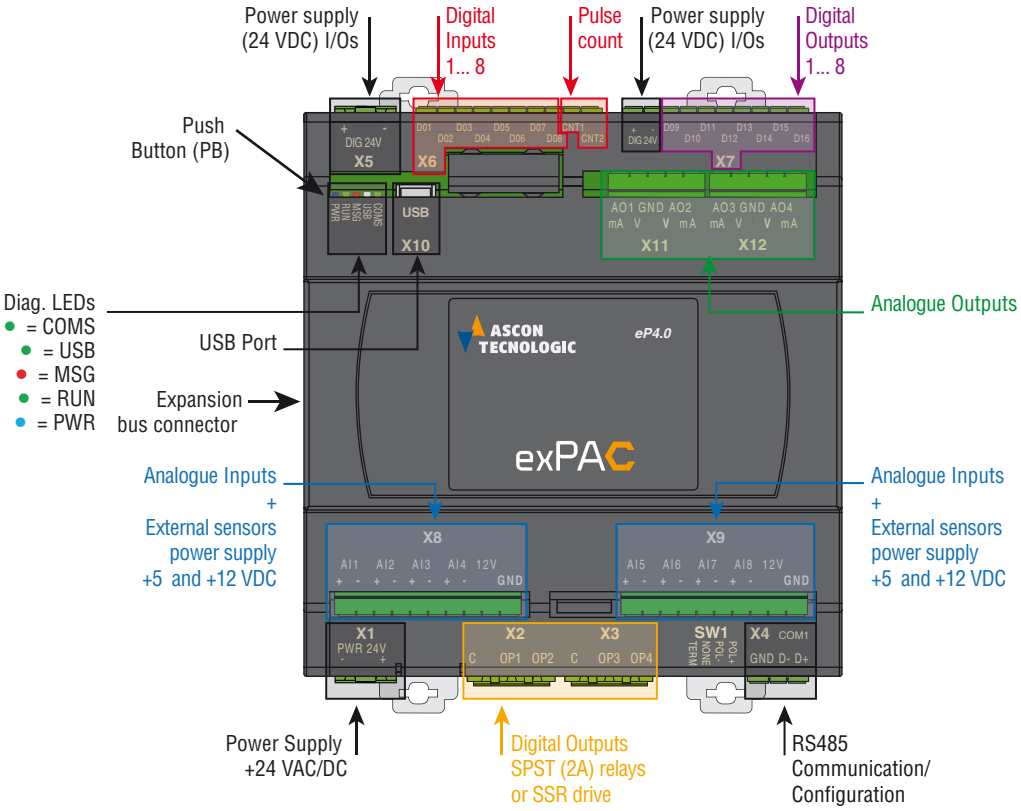
0/2/4/ AO High level analogue outputs mA or V (connector X11 and X112);

8 DI Free of Voltage Contacts Digital Inputs (connectors X6);

8 DO 24 Vdc Digital Outputs (connector X7);

2 DI Standard digital input, pulse counter or frequency meter (up to 5 kHz)(connector X6);

4 OP General purpose digital outputs: SPST relay (2 A) or SSR drive (connectors X2 and X3).



STOP

WARNING

1) By pressing the **PB** button at the eP power ON it is possible to **restore the Factory Default parameters**.

2) While the PLC program is running, if the **PB** button will be pressed, it behaves as a Standard digital input as described in "*Chapter 10 - Digital Inputs Status (D01... D16)*".

2-2-5 ePP4 Expansion Module Diagnostic LEDs

The table that follows describe in detail the eP4 Expanioon Module LED functions and behaviours (**note 1**).

LED	Colour	Action (note 1)	Description
PWR	Blue	ON	Power Supply present
RUN LED while normal CPU or Bootloader operations			
RUN	Green	OFF	Bootloader - Work in progress
		ON	Configuration session ended
		Blinking	Configuration session in progress
MSG LED while normal CPU or Bootloader operations			
MSG	Red	OFF	No Errors
		ON	An error occurred
USB LED while normal CPU or Bootloader operations			
USB	White	OFF	Reserved
		ON	USB Host key present
		Blinking	Wait for PB button to USB files management
COMS LED while normal CPU or Bootloader operations			
COMS	Green	OFF	No communications
		ON	Communication in progress

Note: As the ON/OFF sequence of the LEDs has a specific meaning, it is important that the user recognizes each LED status:

Sequence	Meaning
OFF	The LED is not lit
Steady ON	The LED is lit in a stable way
Blinking	The LED blinks at a frequence of 2.5 Hz (slow)
Flickering	The LED blinks at a frequence of 10 Hz (fast)
Single flash	The LED lits once for at least 200 ms
Double flash	The LED lits twice with pulses of 200 ms each
Triple flash	The LED lits three with pulses of 200 ms each

WARNING

To point out the configuration parameters export/import result, the **COM LED** (in case of **success**) or the **MSG LED** (in case of **failure**) flashes for four seconds.

Chapter 3
Electrical Connections

3-1 Electric safety and electromagnetic compatibility

Class II instrument, rear panel mounting.

This instrument has been designed in compliance with:

- Regulations on electrical equipment:
  - according to regulations on the essential protection requirements in electrical equipment EN 61010-1
- Regulations on Electromagnetic Compatibility according to:
  - Regulations on RF emissions:
    EN61000-6-4 industrial environments;
  - Regulation on RF immunity:
    EN61000-6-2 industrial equipment and system.

It is important to understand that it's responsibility of the installer to ensure the compliance of the regulations on safety requirements and EMC.

This controller has no user serviceable parts and requires special equipments and specialised engineers to be repaired. For this purpose, the manufacturer provides technical assistance and the repair service for its Customers. Please, contact your nearest Agent for further information.

All the information and warnings about safety and electromagnetic compatibility are marked with the ⚠CE sign, at the side of the note.

3-1-1 How to increase the electromagnetic immunity

For maximum immunity to disturbance use FIL00014 filter. Install it between the outlet and the power supply, closest to 24 V power supply.

A good ground connection is required between the filter case and the earth.

In addition a FIL00013 clamp filter could be placed on the analogue inputs, outputs and communication cables positioned close to the device and winding a cable loop in the clamp filter as illustrated.

3-2 Installation Precautions and Notes

3-2-1 CE Installation Precautions

All wirings must comply with the local regulations;

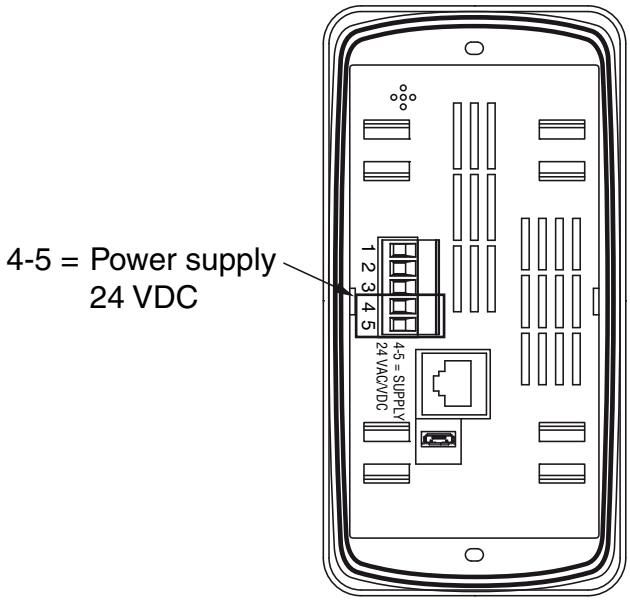
- The supply wiring should be routed away from the power cables;
- Avoid to use electromagnetic contactors, power relays and high power motors nearby;
- Avoid power units nearby, especially if controlled in phase angle;
- Keep the low level sensor input wires away from the power lines and the output cables. If this is not achievable, use shielded cables on the sensor input, with the shield connected to earth.

3-2-2 Installation Notes

- Make sure that the power supply voltage is the same indicated on the instrument label.
- Switch ON the power supply only after all the electrical connections have been completed.

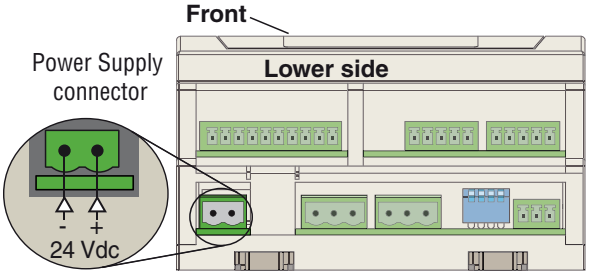
3-3 Power Supply Connections

3-3-1 P04 Power Supply



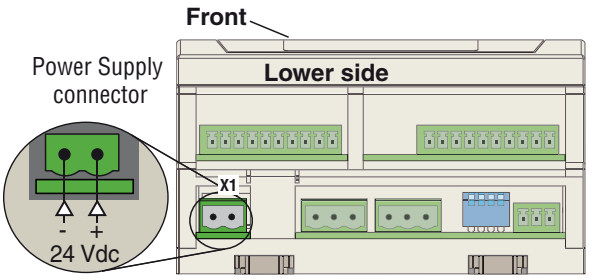
The power supply is to be provided to the operator panel via terminals 4 and 5 of the terminal block. The connector is not polarized as the panel is internally protected. The plus (+) and minus (-) power supply poles can be freely connected to terminals 4 and 5.
The power supply terminals ar fully isolated from the communication connectors.

3-3-2 nP4 CPU Power Supply (connector X1)



- 24 VDC (–10... +15%), 15 W max..

3-3-3 eP4 Expansion Module Power Supply (connector X1)

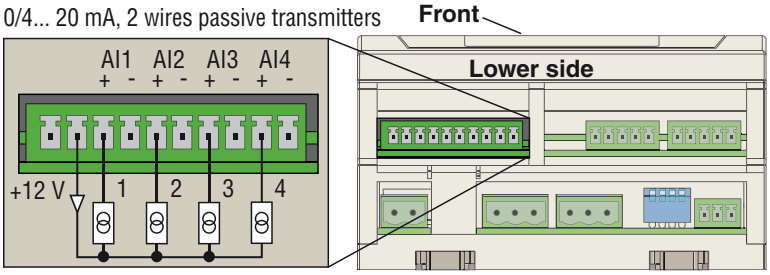


- 24 VDC (–10... +15%), 15 W max..

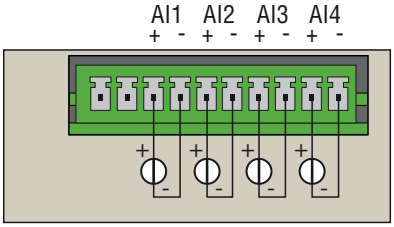
3-4 nP4 CPU Analogue Input Connections (connector X8)

- For the analogue inputs, 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 kW (V), <200 W (mA).

3-4-1 2 Wires Trasmitters Inputs

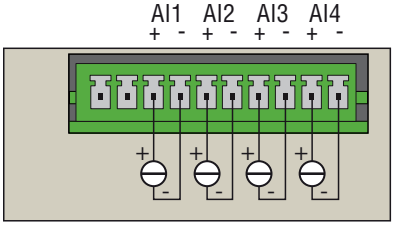


3-4-2 Voltage Inputs



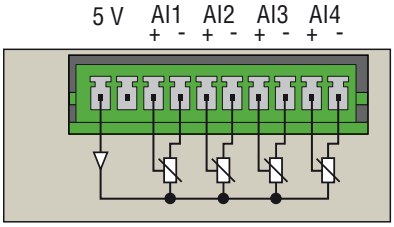
0/1/2... 5/10 V Active Transmitter

3-4-3 mA Inputs



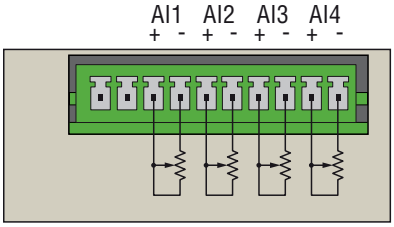
4... 20 mA Active Transmitter

3-4-4 0... 5 V Ratiometric 3 Wires Inputs



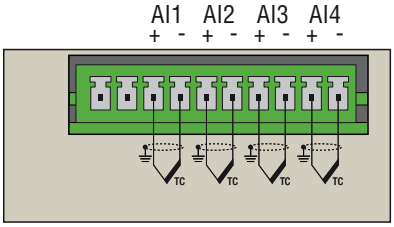
0...5 Vdc Ratiometric 3 wires

3-4-5 Potentiometer Inputs



Potentiometer Inputs

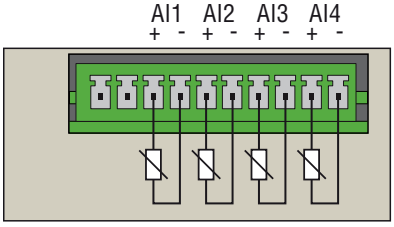
3-4-6 J, K, L, N, R, S, T Thermocouple Type Inputs



TC Inputs

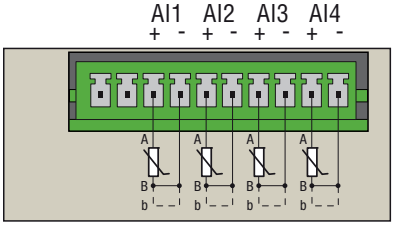
- To extend the connection, use always compensation cable of the correct type for the thermocouple used;
- When present, the shield must be connected to a proper earth (at only one end).

3-4-7 NTC Inputs



NTC Inputs

3-4-8 Pt100, Pt1000 (2 wires) Inputs



PT100/PT1000 2 wires Inputs

- When 2 wires system is used and the distance between the module and the sensor is 15 m, the use of a 1.5 mm^2 section cable produces a 1°C (1.8°F) measure error.

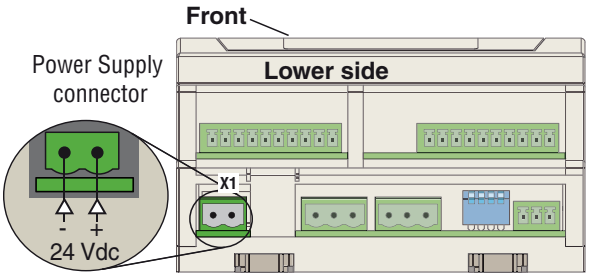
WARNING

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

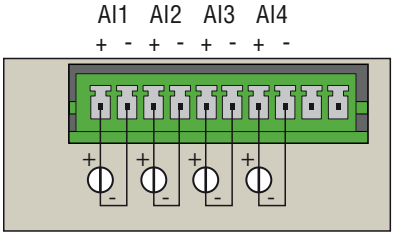
3-5 eP4 Expansion Module Analogue Input Connections (connectors X8 and X9)

- For the analogue inputs, 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 kW (V), <200 W (mA).

3-5-1 2 Wires Trasmitters Inputs

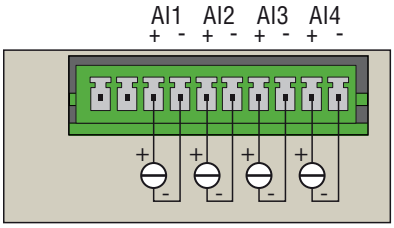


3-5-2 Voltage Inputs



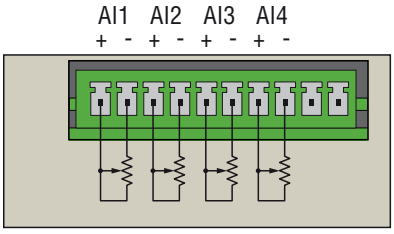
0/1/2... 5/10 V Active Transmitter

3-5-3 mA Inputs



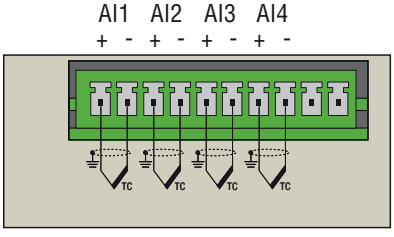
4... 20 mA Active Transmitter

3-5-4 Potentiometer Inputs



Potentiometer Inputs

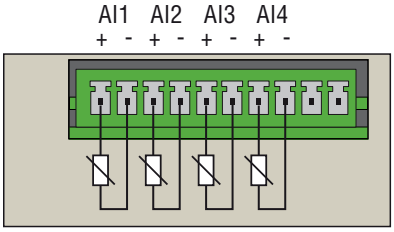
3-5-5 J, K, L, N, R, S, T Thermocouple Type Inputs



TC Inputs

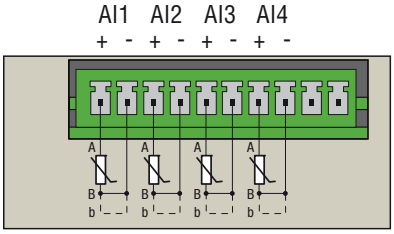
- To extend the connection, use always compensation cable of the correct type for the thermocouple used;
- When present, the shield must be connected to a proper earth (at only one end).

3-5-6 NTC Inputs



NTC Inputs

3-5-7 Pt100, Pt1000 (2 wires) Inputs



PT100/PT1000 2 wires Inputs

- When 2 wires system is used and the distance between the module and the sensor is 15 m, the use of a 1.5 mm^2 section cable produces a 1°C (1.8°F) measure error.

WARNING

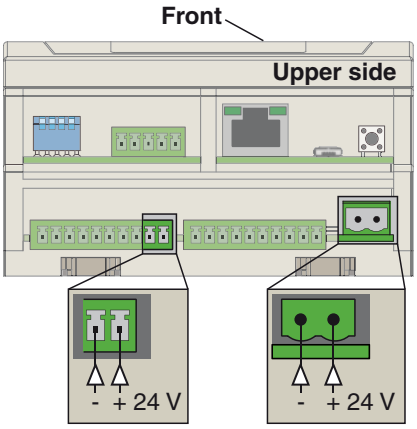
When AI1... AI8 are configured as: TC, NTC, Pt100 or Pt1000, is MANDATORY to short-circuit the terminals (+, -) of the unused channels.

3-6 Digital Input Connections

3-6-1 Power supply for Digital Channels (connectors X5 and X7)

WARNING

These connectors are valid for both the nP4 CPU and the eP4 Expansion Module

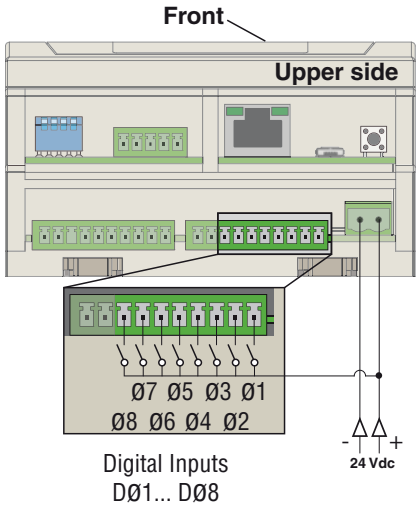


24 Vdc Channels Power supply

- 24 Vdc Digital Channels Power Supply;
- These 2 power supply terminals are internally connected.

3-6-2 Digital Inputs DI1... DI8 Connections (connector X6)

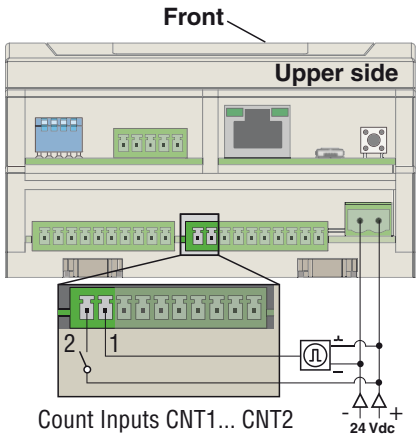
Contact Input



Digital Inputs DØ1... DØ8

- Example of connection when D1... D8 are configured as Digital Inputs;
- Isolation: 800V between the Digital Inputs and the Main Electronics;
- This description is valid for both the nP4 CPU and the eP4 Expansion Module.

3-6-3 CNT1... CNT2 Pulse Count Inputs Connections (connector X6)



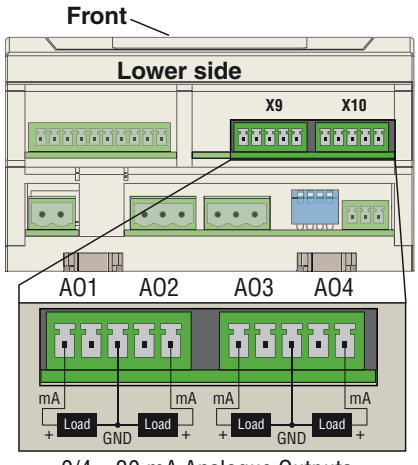
Count Inputs CNT1... CNT2

- Both channels can manage signals up to 5 kHz;
- Isolation: 800V between the Count Input channels and Main Electronics;
- This description is valid for both the nP4 CPU and the eP4 Expansion Module.

Note: For proper electrical connection, refer to Power supply for Digital Channels (connectors X5 and X7).

3-7 nP4 CPU Analogue Output Connections (connectors X9 and X10)

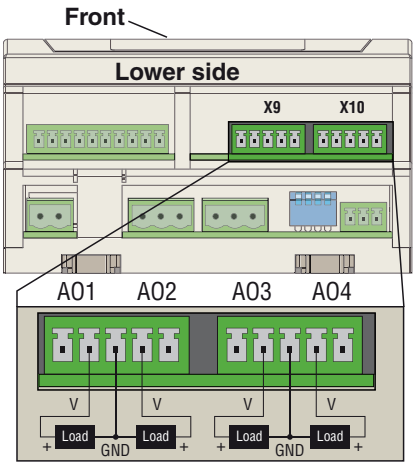
3-7-1 AO1... AO4 Current Analogue Output Connections



0/4... 20 mA Analogue Outputs

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

3-7-2 AO1... AO4 Voltage Analogue Output Connections

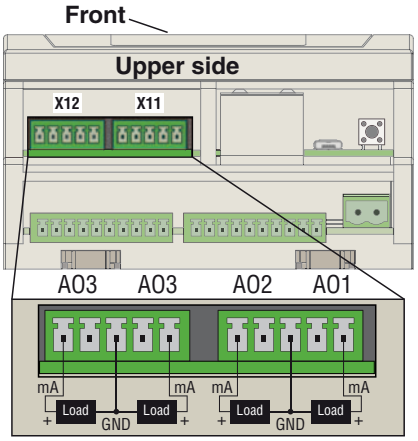


0... 10 V Analogue Outputs

- Respect the polarity shown;
- Type: 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.

3-8 eP4 Expansion Module Analogue Output Connections (connectors X11 and X12)

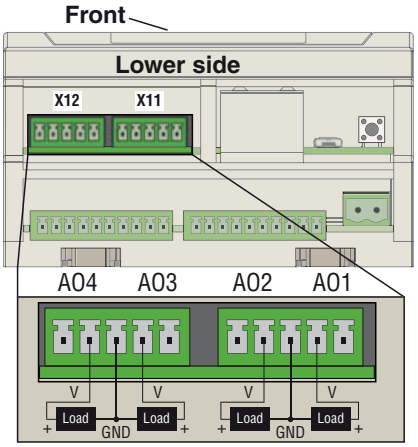
3-8-1 AO1... AO4 Current Analogue Output Connections



0/4... 20 mA Analogue Outputs

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

3-8-2 AO1... AO4 Voltage Analogue Output Connections

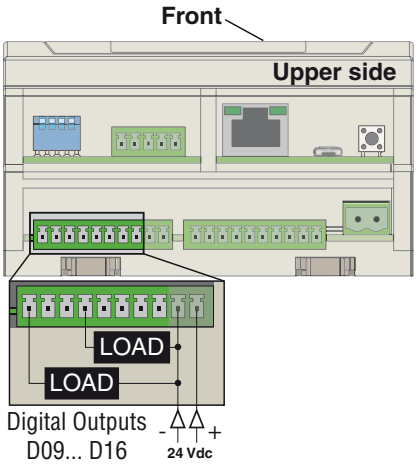


0... 10 V Analogue Outputs

- Respect the polarity shown;
- Type: 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.

3-9 Digital Output Connections

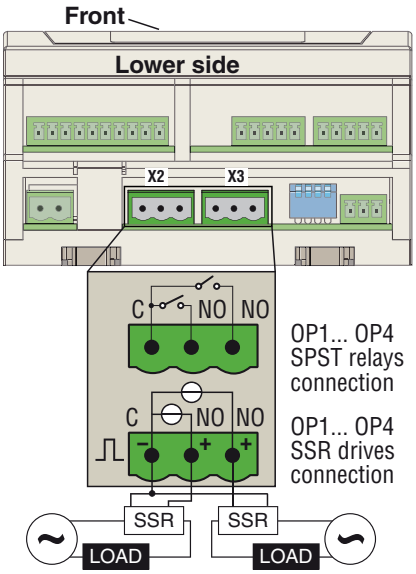
3-9-1 DO1... DO8 (PNP) Source Type Digital Output (connector X7)



- This description is valid for both the **nP4 CPU** and the **eP4 Expansion Module**;
- The Digital Outputs number of the terminals are: DO1... DO8
- The 8 output loads should not exceed 0.7 A each;
- In the drowing are connected only 2 loads as an example;
- Isolation: 800 V between the Digital Outputs and the Main Electronics.

Note: For proper electrical connection, refer to Power supply for Digital Channels (connectors X5 and X7).

3-9-2 OP1... OP4 SPST Relays/SSR Drive Digital outputs (connectors X2 and X3)



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.

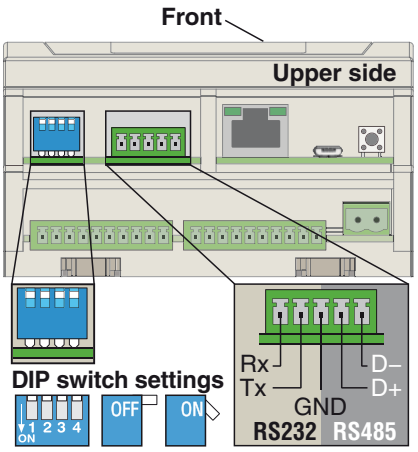
WARNING

These descriptions are valid for **both the nP4 CPU and for the eP4 Expansion Module**.

3-10 Communications connections

On the CPU module are present all the communications ports. Connect the cable of the various interfaces as follows.

3-10-1 COM1 RS232/485 Serial Communications Port (connector X13)



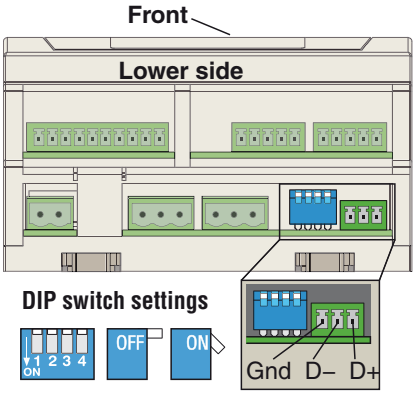
RS232/485 COM1 DIP switches + connector

- To connect an RS232/485 terminal (also for setup purposes). Through this port, using the Modbus protocol (master/slave) or serial ASCII the PLC can connect a fieldbus network;
- Isolation from Main electronics: 800 V (optional).
- RS485 (COM1) line settings can be configured using the specific DIP switches:

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

WARNING
This description is valid only for the nP4 CPU.

3-10-2 COM2 RS485 Serial Communication Port (connector X4)



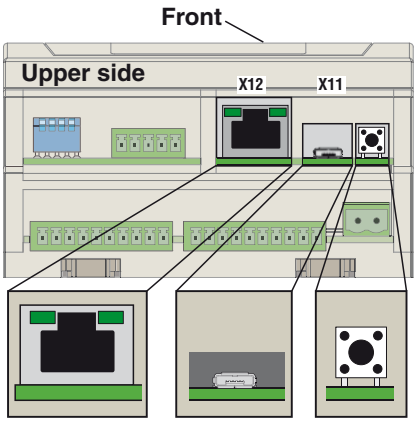
COM2: DIP switches + Connector

- RS485 port to connect a fieldbus network using the Modbus protocol (master/slave) or serial ASCII (Slave on the eP4 Expansion Module);
- Isolation from Main electronics: 800 V (optional).
- RS485 (COM2) line settings can be configured using the specific DIP switches (COM1 on the eP4 Expansion Module):

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

WARNING
This description is valid for both the nP4 CPU and for the eP4 Expansion Module; the only difference is that the port name on the eP4 is COM1.

3-10-3 USB port + Ethernet + System pushbutton (connectors X11and X12)



- The Ethernet connection is made through a standard J45 connector (not present on the eP4 Expansion Module);
- The 2 green LEDs near to the Ethernet connector show the port status and the communication traffic (not present on the eP4 Expansion Module);
- µUSB type AB port (X11) to connect a flash drive (Firmware, system files upload/download or data logging);
- System pushbutton.

WARNING

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

Appendix A
Accessories

A-1 Connection accessories

A-1-1 Spare connectors

For the spare connectors, contact your Ascon Tecnologic dealer.

A-2 Power Supply

A-2-1 Power supply 75W - 3A/24Vdc

NDR-75-24

A-2-2 Power supply 120W - 5A/24Vdc

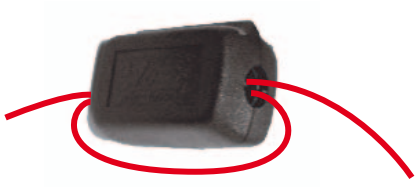
NDR-12024

A-3 Disturbance Protection Accesories

A-3-1 EMC Filter

FIL00014

A-3-2 EMC Clamp filter



FIL00013

A-4 Network Connection Accesories

A-4-1 Ethernet Switch

APS2ATOPEH2006/2306

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Fax +39/0381/698730
info@ascontecnologic.com