

model sP4/sP8

Installation Manual
22/10 - Code: ISTR_I_SP-SERIES_E_02_--

Installation Manual

Contents

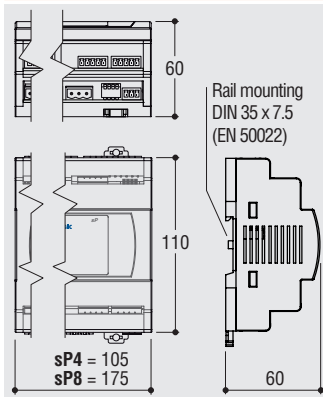
- General description
- Accessories
- Installation
- Electrical connections
- Electric safety

Integrated system, CPU module with on-board I/O



Installation

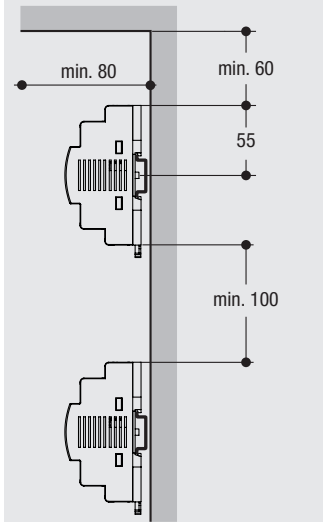
Dimensions (mm)



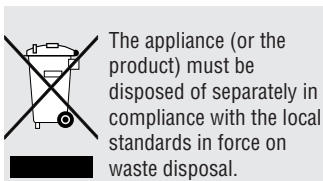
Mounting position

- 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)



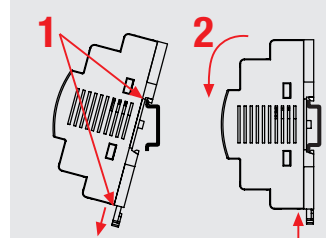
Disposal



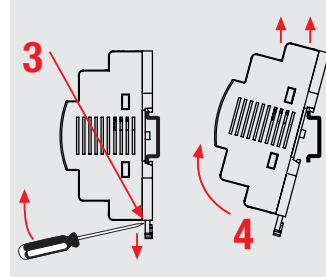
DIN rail Placing

- 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



Operating conditions

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

Wiring rules

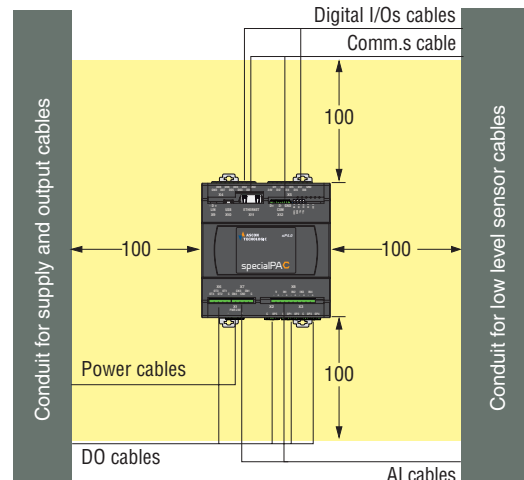
Description	Plugs of all terminals	
Flexible cable section:	Pitch 5 mm:	0.2... 2.5 mm ² (AWG24... AWG12)
	Pitch 3.5 mm:	0.14... 1.5 mm ² (AWG28... AWG16)
Stripped wire	Screw: 7mm	
Flat blade screwdriver	Pitch 5 mm:	0.6 x 3.5 mm
	Pitch 3.5 mm:	0.4 x 2.5 mm
Tightening torque	Pitch 5 mm:	0.5... 0.6 Nm
	Pitch 3.5 mm:	0.22... 0.25 Nm

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 category/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.

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.
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 power lines and 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 only one side.

- ⚠ **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.

- ⚠ - For indoor use only.
- ⚠ - Max. usage altitude: 2000 m on the sea level.

Electrical connections

Terminals connections and plugs

Warning!

In the tables that follow, are listed and briefly described all the terminals present on the PAC systems (sP4 and sP8).

The different Relay options (SPST-NO relay, SSR or SSR drive output for OP1... OP4 and OP6... OP9 Outputs) must be ordered as omogeneous in group of two (e.g.: When OP1 is ordered as SPST-NO relay, OP2 must be the same; if an SSR drive output is required it will be placed in a different output block).

The other I/O can be freely ordered (except for the Strain Gauge input that has a fixed position as Input IN1 at connector X1 and PWM/Frequency Output that cannot be on Connector X17 outputs).



Conn.	Label	Connection	Signals
X1	PWR 24 V	-	0 Vdc Power Supply
		+	+24 Vdc Power Supply
X2	OP5	C	OP5 common
		OP5	SPST NO relay (5 A)
X3	OP1... OP4	C	OP1, OP2 common
		OP1/OP2	SPST-NO (2 A)/SSR (0.3 A)/SSR drive
		C	OP3, OP4 common
		OP3/OP4	SPST-NO (2 A)/SSR (0.3 A)/SSR drive
X4	DO1... DO8	GND	Ground reference for Digital Output (max. current: 1.6 A)
		DO1... DO8	Digital Output 1... 8 (24 V, 0.5 A each max.)(Warning)
		24V	+24 Vdc Digital Inputs Power Supply
X5	DI1... DI8	DI1... DI8	24 Vdc Digital Input 1... 8 (EN61131 - type 1, 2 and 3)
		GND	Ground reference for Digital Inputs
		C	Generic Outputs 1... 4 Common Terminal
X6	OT1... OT4	OT1... OT4	Generic Output 1... 4 (V, mA, PWM/Frequency or 12 Vdc DO)
		C	Special Inputs 1... 4 Common Terminal
X7	CN1... CN4	CN1... CN4	Pulse Counter, Frequency Meter or Digital Input 1... 4
		V	Power Supply source for IN1... IN4 Analogue Inputs (5 Vdc, 50 mA or 12 Vdc, 100 mA)
X8	IN1	-	Generic Input 1 terminals (DI, mA, TC, Pt100, Pt1000, NTC, Potentiometer, Ratiometric, Voltage and Strain Gauge)
		+	Generic Input 1 terminals (DI, mA, TC, Pt100, Pt1000, NTC, Potentiometer, Ratiometric, Voltage and Strain Gauge)
	IN2... IN4	-	Generic Input 2... 4 terminals (DI, mA, TC, Pt100, Pt1000, NTC, Potentiometer, Ratiometric, Voltage)
		+	Generic Input 2... 4 terminals (DI, mA, TC, Pt100, Pt1000, NTC, Potentiometer, Ratiometric, Voltage)
X9	LIN	-	External Display Power Supply, Negative Pole
		D	External Display Data Line
		+	External Display Power Supply, Positive Pole
X10	USB		MicroUSB type port
X11	ETHERNET		RJ45 10/100 Ethernet port
X12	COM	D+	
		D-	RS485 Serial Port
		GND	

Conn.	Label	Connection	Signals
X13	OP10	C	Common terminal
		NC	NC terminal of SPDT relay (5 A)
		NO	NO terminal of SPDT relay (5 A)
X14	OP6... OP9	C	OP6, OP7 common terminal
		OP6, OP7	SPST-NO (2 A)/SSR (0.3 A)
		C	OP8, OP9 common terminal
		OP8, OP9	SPST-NO (2 A)/SSR (0.3 A)
X15	DO9... DO16	GND	Ground reference for Digital Output (max. current: 1.6 A)
		DO9... DO16	Digital Output 9... 16 (24 V, 0.5 A each max.)(Warning)
X16	DI9... DI16	24V	+24 Vdc Digital Inputs Power Supply
		DI9... DI16	Digital Input 9... 16 (EN61131 - type 1, 2 and 3)
X17	OT5... OT8	GND	Ground reference for Digital Inputs
		OT5... OT8	Generic Outputs 5... 8 Common Terminal
X18	V	-	Power Supply source for IN5... IN8 Inputs (12 Vdc, 100 mA)
		+	Power Supply source for IN5... IN8 Inputs (12 Vdc, 100 mA)
		-	Generic Input 5... 8 terminals (DI, mA, TC, Pt100, Pt1000, NTC, Potentiometer, Ratiometric, Voltage)
		+	Generic Input 5... 8 terminals (DI, mA, TC, Pt100, Pt1000, NTC, Potentiometer, Ratiometric, Voltage)

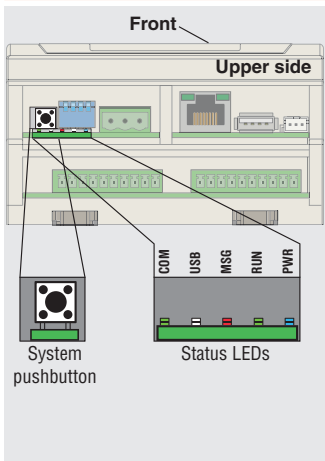
On both the PAC systems are present, near the X12 COM Connector, a block with 4 microswitches (POL+, POL-, NONE and TERM) described later in this manual and, under the microswitches block, 5 diagnostic LEDs (COM, USB, MSG, RUN, PWR) fully described in the sPx User Guide.

Warning!

Digital Outputs DO1... DO16 (connectors X4 and X15) are 24 V active outputs. **The current consumption of each output must not exceed 0.5 A and their cumulative output current must be less than 1.6 A** (whatever the feeding method).

All the connectors and terminals described in the table that follows can be found only on the sP8 model.

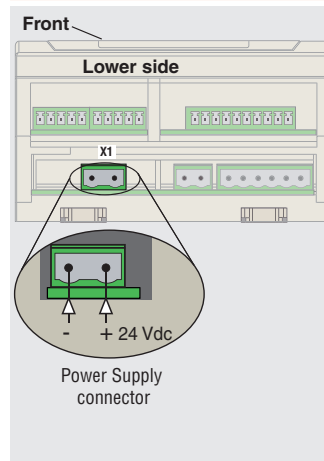
Sytem Pushbutton and Status LEDs



- The 5 Status LEDs are: COM (green), USB (white), MSG (RED), RUN (green) and PWR (blue).
- The meaning of the various LEDs behaviours are fully described in the "sP4/sP8 User Manual".

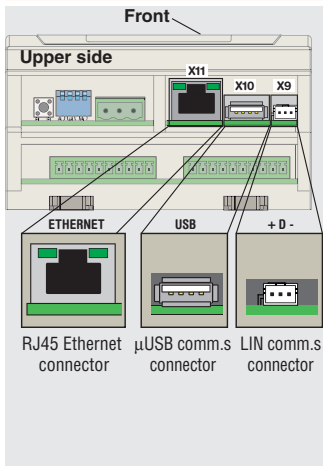
The system pushbutton performs different operations accordingly to the system status but does not restart the CPU or the 1131 application.

X1 - Power supply



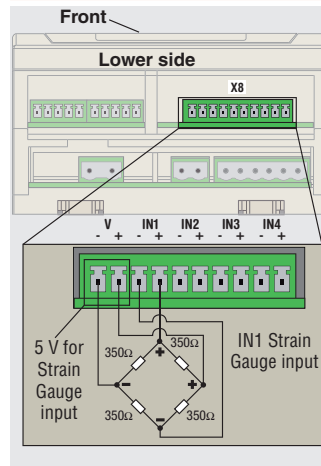
- Connector X1: 24 Vdc (-10... +15%);
- Device power consumption: 10 W max. (sP4); 15 W max. (sP8).

X09, X10, X11 - USB port + Ethernet + LIN Port



- The LIN Port allows to connect a digital display through a dedicated cable;
- µUSB type AB port (X11) to connect a flash drive (Firmware, system files upload/download or data logging).
- The Ethernet connection is made through a standard RJ45 connector, the 2 green LEDs in the Ethernet connector show the port status and the communication traffic.

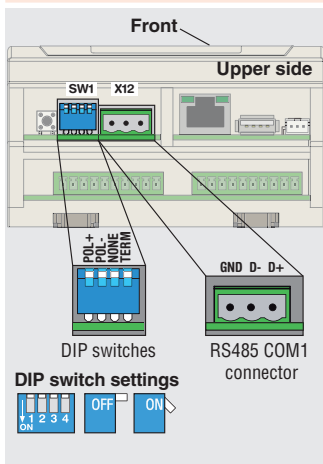
X8 - IN1... IN4 Analogue Input Connections



- Respect the polarity shown;
- Pay attention to correctly connect the power source (5/12 Vdc);
- When the Strain Gauge or the Ratiometric Inputs are chosen the V+ terminal supplies the 5 Vdc necessary to power the inputs;
- Type: Strain Gauge (IN1), Ratiometric, 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, Potentiometer;
- Resolution: 16 bit;
- Accuracy: 0.5% of span (linear inputs), 0.5% (temp.) $\pm 1^{\circ}\text{C}$ (cold junction);
- Input impedance: 120 k Ω (V), <200 Ω (mA).

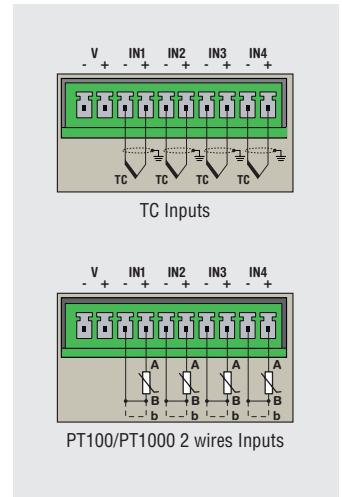
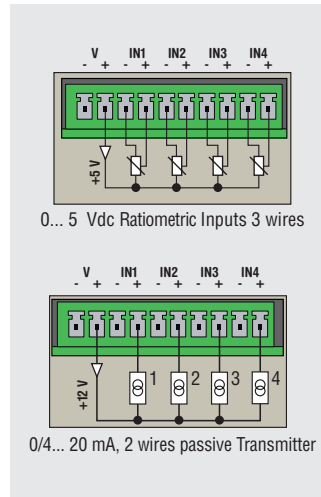
⚠ Verify the option ordered for IN1... IN4 Inputs.

X13 - COM1 RS485 Serial Communications Port

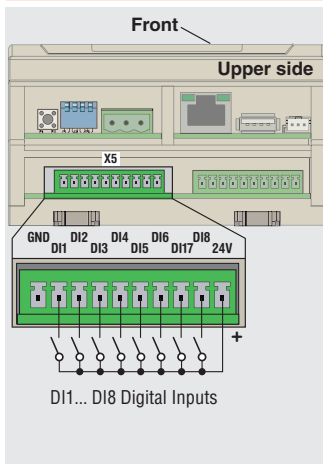


- Connect an RS485 terminal (also for setup purposes). Through this port, using the Modbus RTU protocol (master/slave) or serial ASCII the PLC can connect a fieldbus network;
- Isolation from Main electronics: 800 V (**optional**).
- The line settings can be configured using the specific DIP switches:

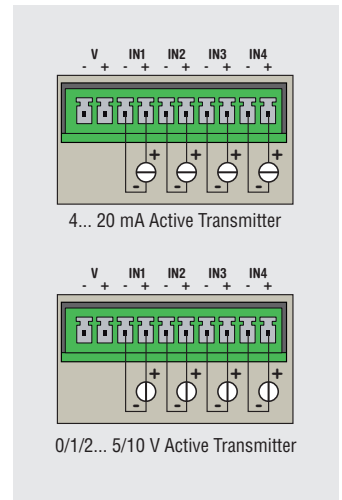
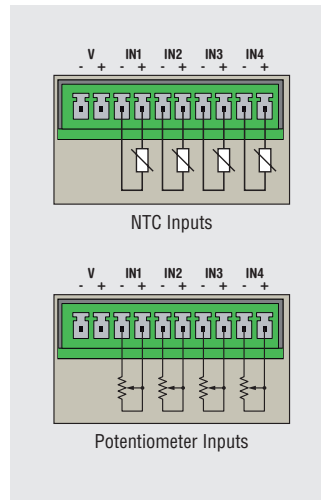
SW	Description	Default
1	Line polarization Pull-Up	OFF
2	Line polarization Pull-Down	OFF
3	Not used	
4	110 Ω line termination	OFF



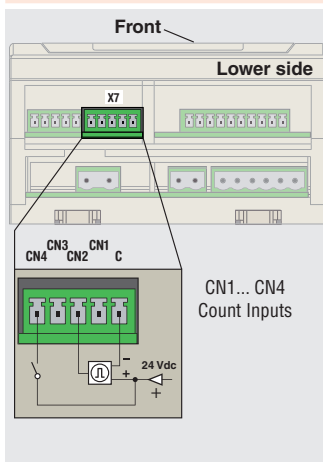
X5 - DI1... DI8 Digital Inputs Connections



- DI1... DI8 connection example;
- The input circuit is internally closed to the System negative (-) pole (connector X1).



X7 - CN1... CN4 Special Inputs Connections



In the drawing are connected only 2 counter inputs as an example (CN2 and CN4).

Frequency meter input:

- The channels can manage up to 10 kHz signals having a duty-cycle that guarantees minimum of ON signal of 20 μs ;

Impulse counter input:

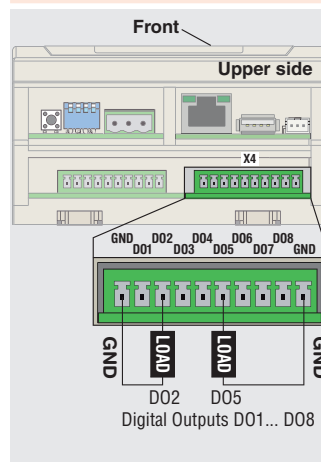
- The minimum time of an impulse must be 20 μs

Digital input:

- The input circuit is internally closed to the System negative (-) pole (connector X1).

⚠ Verify the option ordered for CN1... CN4 Inputs.

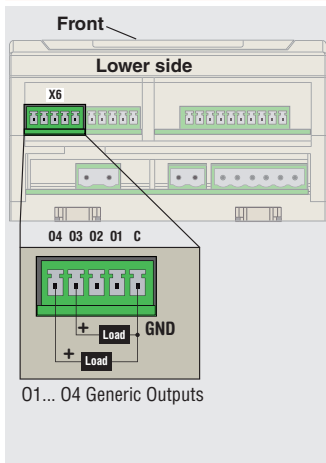
X4 - DO1... DO8 Digital Outputs Connections



- The 8 digital output loads must not exceed **0.5 A each**;
- In the drawing are connected only 2 outputs as an example (DO3 and DO6);
- The load circuit is closed by the negative (-) pole (connector X4).

⚠ 24 V active outputs, each output must not exceed 0.5 A and the total Output current must be less than 1.6 A.

X6 - OT1... OT4 Generic Output Connections



- Respect the polarity shown;
- Resolution: 14 bit;
- Accuracy: 0.1%;
- In the drawing are connected only 2 outputs as an example (OT3 and OT4).

0/4... 20 mA analogue output:

- Type: 0/4... 20 mA;
- Load: < 500 Ω ;

0/1... 5 V, 0/2... 10 V analogue output:

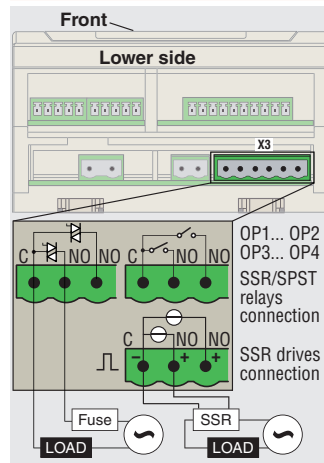
- Type: 0/1... 5 V, 0/2... 10 V;
- Load: > 1 k Ω .

Digital output:

- Output voltage: 12 V;
- Max. supplied current: 10 mA.

⚠ Verify the option ordered for OT1... OT4 Outputs.

X3 - OP1... OP4 SPST-NO Relays/SSR/SSR drives Outputs Connections



- The Output terminals are: OP1... OP4 of connector X3 (see "Terminals connections and plugs" for details);
- All these type of outputs are protected with varistors.

Relays:

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

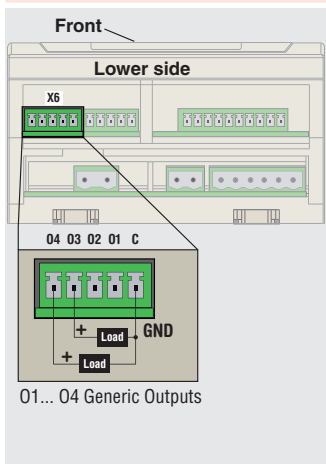
SSR:

- Rate: 0.3 A, 250 Vac or 2 A, 24 Vdc;
- Zero Crossing Function (Vac type);
- Isolation: 2500V between channel and main electronics.

SSR drives:

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

X6 - OT1... OT4 PWM/Frequency Output Connections



- Respect the polarity shown;
- Output range: 0.1... 200000 Hz;
- Max. Output load: 10 mA;

PWM Output:

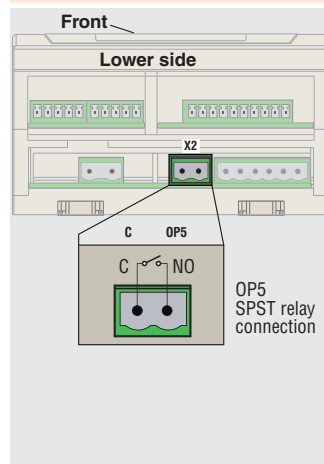
- 0.1... 500 Hz selectable duty-cycle with 0.1% accuracy,
- 0.5... 3 kHz selectable duty-cycle with 1% accuracy,

Frequency Output:

- 3... 10 kHz duty-cycle: fixed at 50%.

⚠ Verify the option ordered for OT1... OT4 Outputs.

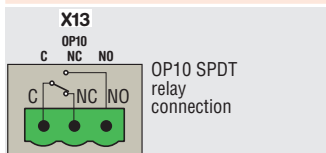
X2 - OP5 SPST-NO 5 A Relay Output Connections



- Rate: 5 A (for resistive loads);
- Isolation: 3 kV rms between the channel and Main electronics;
- This output is protected with a varistor.

Connections that can be present on the sP8 System

X13 - OP10 SPDT Relay (5A)



SPDT Relay:

- Rate: 5 A (for resistive loads);
- Isolation: 3 kV rms between the channel and Main electronics.

X14 - OP6... OP9 SPST Relays

The connection characteristics are the same described for the "X3 - OP1... OP4 SPST-NO Relays/SSR/SSR drives Outputs Connections" except for the fact that **cannot be SSR drives**.

X15 - DO9... DO16 Outputs

The connection characteristics are the same described for the "X4 - DO1... DO8 Digital Outputs Connections".

X16 - DI9... DI16 Inputs

The connection characteristics are the same described for the "X5 - DI1... DI8 Digital Inputs Connections".

X17 - OT5... OT8 Generic Outputs

The connection characteristics are the same described for the "X6 - OT1... OT4 Generic Output Connections" except for the fact that **cannot be PWM/Frequency outputs**.

X18 - IN5... IN8 Analogue Inputs

The connection characteristics are the same described for the "X8 - IN1... IN4 Analogue Input Connections" except for the V terminal that, in this connector, gives only 12 Vdc and IN1 that does not accept the Strain Gauge sensor.

How to Order

⚠ The codes in red refer to the sP8 only!

sP	= specialPac (CPU of the Programmable Logic Controller)
DIN Model	4 = 6 DIN Model 8 = 10 DIN Model
Display	- = No Display G = Graphic Display L = With Remote Display (connected to LIN output) M = Graphic Display + Remote Display (connected to LIN output)
Analogue Inputs (AI)	-, 1... 4, 5... 8 = From 0 to 8 Analogue Inputs
Analogue Outputs (AO)	-, 1... 4, 5... 8 = From 0 to 8 Analogue Outputs
Special Digital Inputs	-, 2, 4 = 0 or 2 or 4 Fast Count digital Inputs
Digital I/Os (Warning)	-- = No digital I/Os H8 = 8 Digital Inputs (HS) -H = 8 Digital Outputs HS 8H = 8 Digital Inputs + 8 Digital Outputs HS H6 = 16 Digital Inputs (HS) 6H = 16 Digital Outputs HS FH = 16 Digital Inputs + 16 Digital Outputs HS 8S = 8 Digital Inputs + 16 Digital Outputs HS 6S = 16 Digital Inputs + 8 Digital Outputs HS
Outputs (Relay/SSR/SSR drive)	-, 1... 5, 6... F = From 0 to 5/10 Outputs
Serial Communications Port	- = No Communications Port S = Not Insulated RS485 COM Port I = Insulated RS485 COM Port
Reserved (2/5 digits)	
Case and Packaging	G = Grey case, AT packaging W = White case, AT packaging A = Grey case, Neutral packaging B = White case, Neutral packaging
Case Personalization	AT = AT logo
Reserved (4/5 digits)	

⚠ Warning!
In case the Order Code of your system shows some codes related to the Digital I/Os different from those listed here, you must refer to the manual **ISTR_M_sP-LS_E_01 _--**.
Contact Ascon Tecnologic to get it for free.