ISO9001 Certified

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E

mod. MP-01

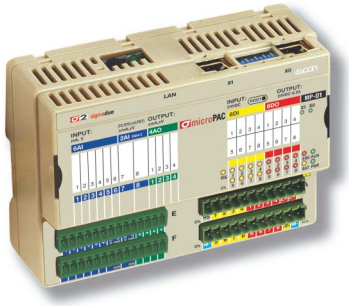
M.I. MP-01-01/09.07
Cod. J30-658-1AMP-01 E

Installation Manual

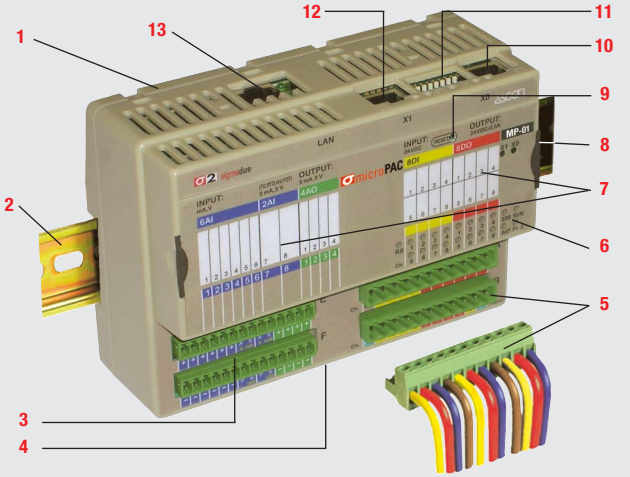
Contents

Integrated system, CPU module with on-board I/O mod. MP-01

σ2 SERIES



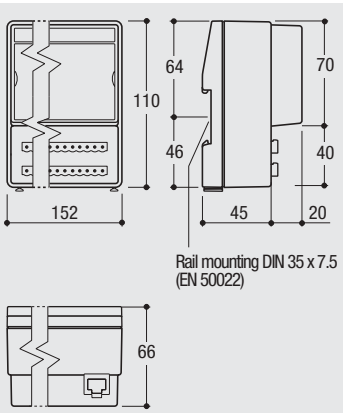
General description



1 - Model identification label (on the back side of the module);
2 - DIN RAIL 35 x 7.5 (EN50022);
3 - Male Molex 14 poles plugs (**E** and **F**), pitch 3.8mm; the female plugs have fast snap-ON connectors, with screw or spring terminals to connect the 8 analogue inputs and the 4 analogue outputs;
4 - Slides to install an additional terminal block 2 x 11 poles (accessory);
5 - Male 11 poles plugs (**A** and **B**), pitch 5.0mm; the female 11 poles plugs have fast snap-ON connectors with screw or spring terminals to connect the power supply, the 8 digital Inputs and the 8 digital outputs;
6 - Status LED: **RS**: status of the Run/Stop commad digital input, 1...8 yellow: status of the 8 digital inputs; 1...8 red: status of the 8 digital outputs; 4 diagnostic: **ERR** (error), **RUN** (program status run/stop), **BAT** (battery status), **PWR** (power supply ON);
7 - Removable and writable label to identify the connected I/O (TAG number);
8 - Bus to connect the external I/O modules;
9 - Reset button;
10 - RJ45 plug (labelled X0) to connect an RS232/485 terminal (also for setup purposes);
11 - Microswitches to configure the serial ports (positions X0 and X1);
12 - RJ45 plug (labelled X1) to connect a Modbus RTU bus (Master/Slave) using an RS485 serial communication port;
13 - RJ45 plug (labelled LAN) to connect the Ethernet TCP/IP network for programming purposes or for the MODBUS through the TCP port.

Installation

Dimensions (mm)



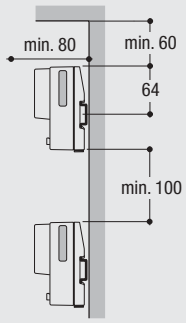
Operating conditions

Environmental condition		Suggestion
Operating conditions	°C Temperature 0...+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 ventilation flow of air, respect the distances between modules and walls or other modules.

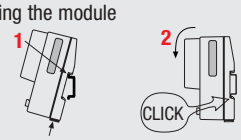
Mounting position (mm)



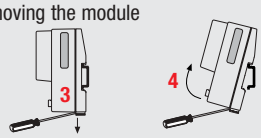
Mounting/removing the modules on/from the DIN rail

1 Close the spring slide, then clip the upper part of the module on the rail;
2 Rotate the module downwards till to the click;
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.

Mounting the module

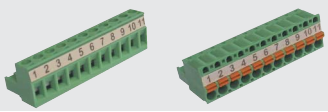


Removing the module

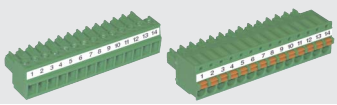


Accessories

11 poles connectors
With screw terminals: AP-S2/SPINA-V11
With spring terminals: AP-S2/SPINA-M11



14 poles connectors
With screw terminals: AP-S2/SPINA-V14
With spring terminals: AP-S2/SPINA-M14



Additional terminal block
AP-S2/TB-211-1

Power supply 45W - 2A/24 Vdc
AP-S2/AL-DR45-24

Power supply 120W - 5A/24Vdc
AP-S2/AL-DR120-24

Connecting the expansion modules

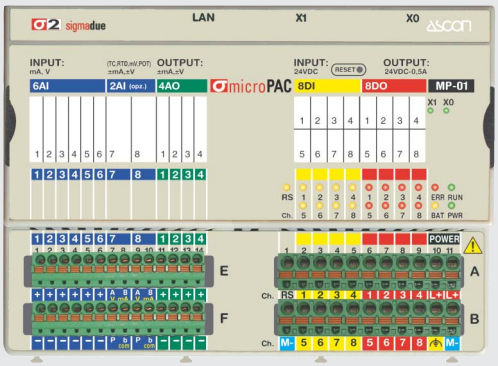
The I/O module are already set.
The I/O expansion modules (max. 2) must be mounted on the right of the last mounted module.
The modules (CPU included) must be powered OFF when connected to each other.
All the modules must be removed from the DIN rail before to connect or disconnect the expansion modules.

1 Switch OFF the Power Supply;
2 Insert the connector of the bus in the right-most module. A position key identifies the insertion versus of the connector;
3 Mount the modules on the DIN rail.

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

Electrical connections

Terminals connections and plugs



Pin	Label	Signals
E1...E6	+	6 analogue inputs (+ pole)
E7, E9*	A V	2 universal analogue inputs (A terminals or V/±V measure)
E8, E10*	B mA	2 universal analogue inputs (B terminals or mA/±mA measure)
E11...E14	+	4 optional universal analogue outputs (+ pole)
F1...F6	-	6 analogue inputs (- pole)
F7, F9*	P	2 universal analogue inputs (potentiometer terminals)
F8, F10*	b com	2 universal analogue inputs (b terminals or common)
F11...E14	-	4 optional universal analogue outputs (- pole)

* These 2 analogue inputs are optional (see the Model Code for details). If present can be:
- Universal (TC , V/mA measures, potentiometer);
- High level (±V, ±mA measures).

Terminal "**b**" (terminals F8, F10) are the common terminals (**com** /- pole) of the 2 inputs.

Pin	Label	Signals
A1	RS	Run/Stop input terminal
A2... A5	1...4	4 digital input terminals
A6... A9	1...4	4 digital output terminals
A10, A11	L+	+24V power supply terminals
B1	M-	0V power supply terminal
B2... B5	5...8	4 digital input terminals
B6... B9	5...8	4 digital output terminals
B10	⏚	Hearth terminal
B11	M-	0V power supply terminal

Description		Plugs **A** and **B** terminals		Plugs **E** and **F** 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	0.4 x 2.5 mm	0.4 x 2.5 mm
	Tightening torque	0.5...0.6 Nm	-	0.4...0.5 Nm	-

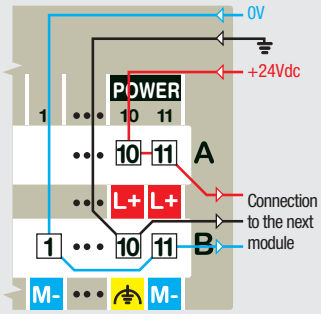
Technical data:
- Two 11 poles plugs (**A** and **B**) pitch 5.0mm and two 14 poles plugs (**E** and **F**) pitch 3.8mm
- Made with self extinguishing material as required by UL94 V0 standard
- Overvoltage cathegory/pollution degree II/2
- Max. load current/section 8A/2.5mm² at 65°C
- Test pulse voltage: 4 kVp.

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

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.

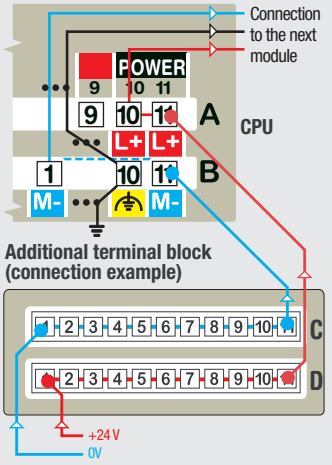
Power supply



- 24Vdc (–15...+25%), 5W max.
- The power supply terminals A10 - A11 and B1 - B11 are internally connected; using these terminals it is possible to bring the power supply to other modules.

Functional earth terminal. This type of earthing does not protect against electrical shocks.

Additional terminal block TB-211-1

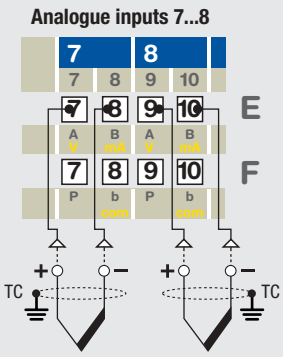


An additional terminal block can be installed on the CPU module using the two slides located in the lower part of the module case.

The additional terminal block has no active components inside, only two 11 pitch 5.0mm contacts connectors.

All the 11 contacts of each connector (**C** and **D**) are internally connected and can be used to make multiple connections (see the example).

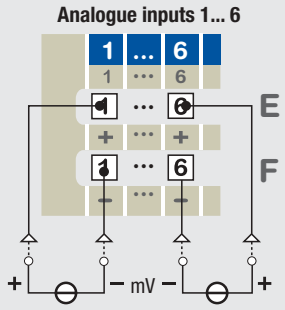
J, K, L, N, R, S, T thermocouple type input (opt.)



Line impedance: 150Ω max.

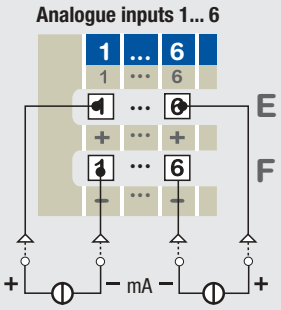
- Respect the polarity shown;
- To extend the connection, use always compensation cable of the correct type for the thermocouple used;
- When present the shield must be connected to a proper earth (at only one end).

Voltage input



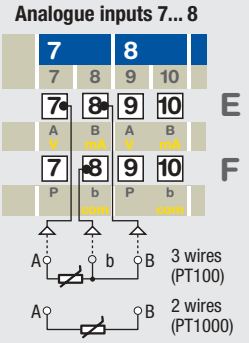
Respect the polarity shown

mA input



Respect the polarity shown

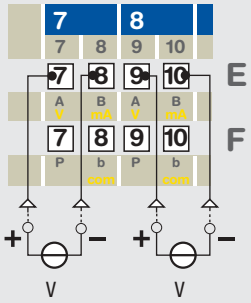
Pt100, Pt1000 resistance thermometers (2, 3, 4 wires) input (opt.)



- The connection example refers only to input 7, for input 8 copy the same connection configuration;
- When 3 wires system is used, always use cables of the same section (1mm² min.)(max. resistance 20Ω/line);
- When 2 wires system is used and the distance between the module and the sensor is 15 m, the use of a 1.5 mm² section cable produces a 1°C (1.8°F) measure error.

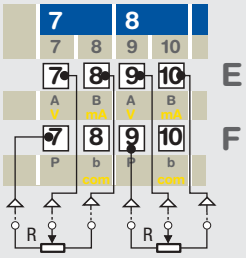
V input (opt.)

Analogue inputs 7... 8
0...10 V



Potentiometer input (opt.)

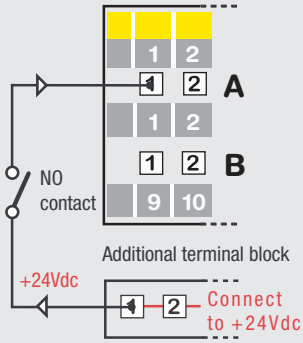
Analogue inputs 7... 8



R = 100Ω... 10kΩ max.

Digital Inputs 1...8 Type II (EN61131-2)

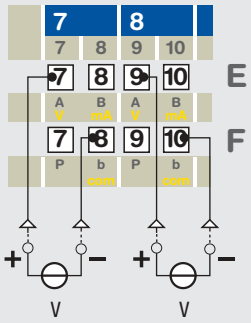
Contact input



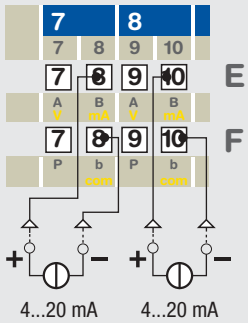
- Respect the polarity;
- When present the shield must be connected to a proper earth (at only one end).

High level inputs (optional)

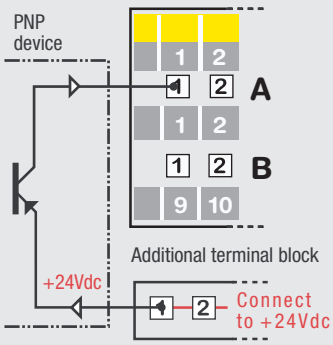
High level analogue inputs 7... 8
-10... +10V/0...10 V



High level analogue inputs 7... 8
-20... 20/0... 20/4... 20 mA



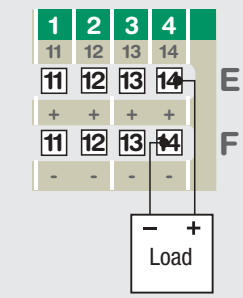
Source (PNP) device



- Respect the polarity.
- When present the shield must be connected to a proper earth (at only one end);
- If the input device needs to be powered by the module, verify that the current consumption does not exceed the power supply limits.

Analogue outputs 1...4 (opt.)

Analogue load

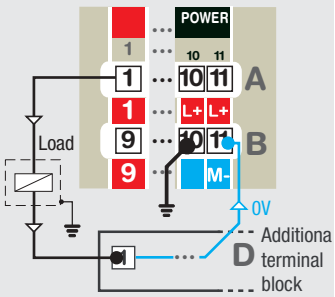


Respect the polarity shown

- The user can choose the number of analogue output installed in the central unit (0, 2 or 4 outputs);
- Respect the polarity.

Digital Output 1...8 (PNP) Source Type

Source (PNP) device

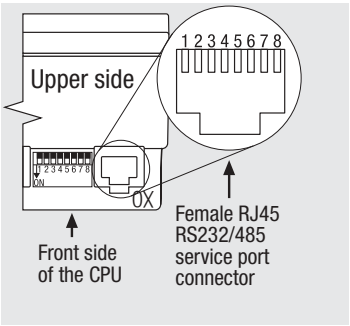


- 24 Vdc, 0.5A digital outputs
- Respect the polarity
- When present the shield must be connected to a proper earth (at only one end).

Communications connections

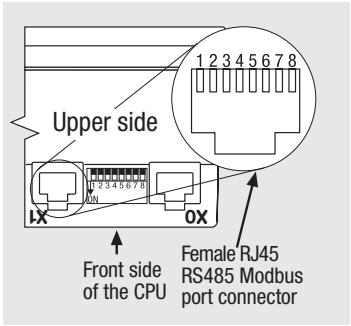
On the CPU module are present all the communications ports. Connect the cable of the varoious interfaces as follows:

X0 port RS232/485 Service/Modbus Port connector



The RS232 Service Port can be used to configure the CPU and its devices using a dumb VT100 terminal. The RJ45 RS232/485 Service Port connector is located in the upper side (on the right) of the CPU (item 10 in "General description" at page 1). Looking the hole of the plug the 8 contacts are arranged as illustrated in the draw.

RS485 Modbus Port connector



The RS485 Modbus Port can be used to connect a Modbus field-bus. The RJ45 RS485 Modbus Port connector is located in the upper side (on the left) of the CPU (item 12 in "General description" at page 1). Looking the hole of the plug the 8 contacts are arranged as illustrated in the draw.

Service Port connection

1 The RS232 cable must be shorter than 15 m.
2 The hardware default configuration of the Service Port is:
- Baud Rate: 9600 bps;
- Data: 8 bit;
- Stop bit: 1;
- Parity: none;
- Flow Control: none.

Note: Consult the "MP-01 User Manual" for details about the service port configuration.

Service Port signals

The signals present at the RJ45 connector of the Service Port are:

Pin	Signal
1	D+ (RS485)
2	D- (RS485)
3	GND (RS485)
4	GND (RS232)
5	RX (RS232)
6	TX (RS232)
7	NC
8	NC

RS485 Modbus Port connection

1 The maximum length of the RS485 cable is 1200m.
2 The default configuration of the Service Port is:
- Baud Rate: 9600 bps;
- Data: 8 bit;
- Stop bit: 1;
- Parity: none;
- Flow Control: none.

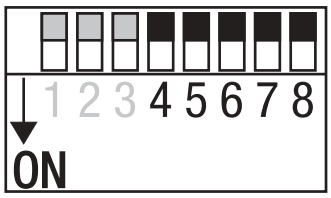
Note: The selection of DIP switches 4 and 5 must match the sellection operated by the configuration section (consult the "MP-01 User Manual").

RS485 Modbus Port signals

The signals present at the RJ45 connector of the Modbus Port are:

Pin	Signal
1	D+ (RS485)
2	D- (RS485)
3	GND (RS485)
4	NC
5	NC
6	NC
7	NC
8	NC

Service Port configuraton



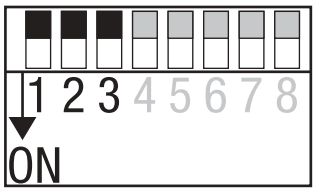
Some parameters of the Service Port can be configured using selectors 4...8 of the microswitch group located between the two serial ports (item 11 in "general description" at page 1).

The table that follows describes the selectable options.

Please note that the ON/OFF position of the microswitches is pointed out on the microswitces block.

Selector	ON	OFF
4	RS232 enabled	RS232 disabled
5	RS485	RS232
6	Termination resistance (ON/OFF) (110Ω) (default disabled = OFF)	
7	Line polarization Pull-Down (ON/OFF) (default disabled = OFF)	
8	Line polarization Pull-Up (ON/OFF) (default disabled = OFF)	

RS485 Modbus Port configuraton



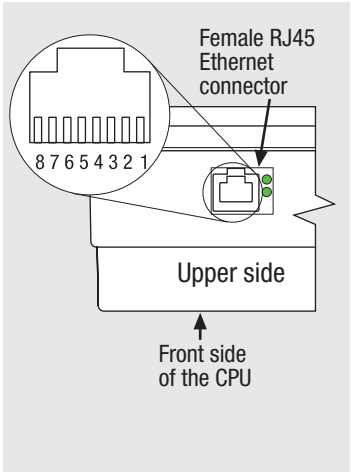
Some parameters of the RS485 Modbus Port can be configured using selectors 1...3 of the microswitch group located between the two serial ports (item 11 in "general description" at page 1).

The table that follows describes the selectable options.

Please note that the ON/OFF position of the microswitches is pointed out on the microswitces block.

Selector	ON	OFF
1	110Ω termination resistance (ON/OFF) (default disabled = OFF)	
2	Line polarization Pull-Down (ON/OFF) (default disabled = OFF)	
3	Line polarization Pull-Up (ON/OFF) (default disabled = OFF)	

LAN - Ethernet TCP/IP port connector



The Ethernet TCP/IP port RJ45 connector is located in the upper side of the CPU (item 13 in "General description" at page 1). Looking the hole of the plug the 8 contacts are arranged as illustrated in the draw.

Ethernet signals

The signals present on the RJ45 ethernet connector are those standard for all Ethernet TCP/IP connection.

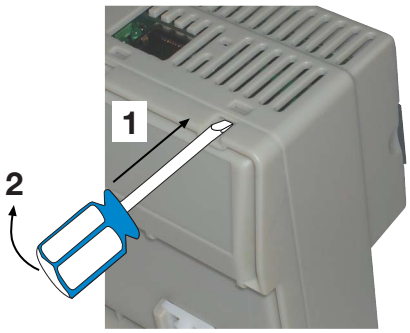
To connect correctly the CPU to the programming computer, use an ethernet "cross cable" in case of direct connection (no HUB or network router between the PC and the CPU); otherwise, if the Computer is not directly connected to the CPU, use a "patch cable" to connect the CPU.

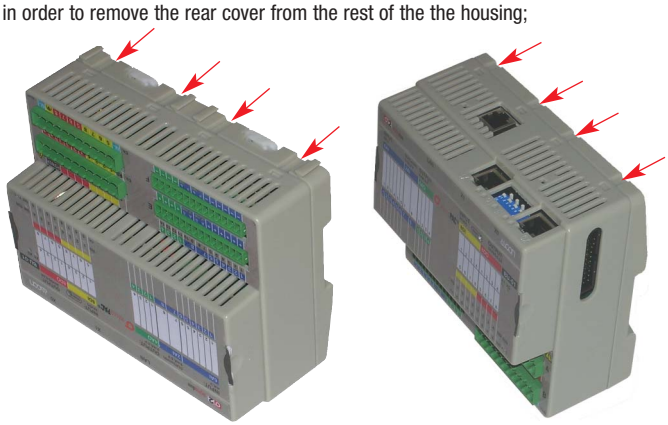
Pin	Signal
1	TX+
2	TX-
3	RX+
4	NC
5	NC
6	RX-
7	NC
8	NC

Replacing the RTC battery

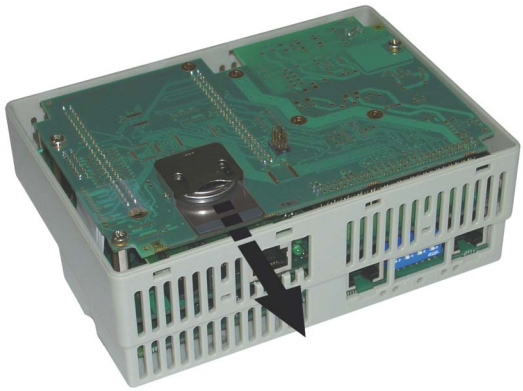
- With the blade of a screwdriver, free the 8 slots (at the top and bottom of the CPU) in order to remove the rear cover from the rest of the the housing;

⚠ WARNING!
The procedure to replace the RTC battery must be done with the 24Vdc power supply **CONNECTED** (the MP-01 Powered ON).

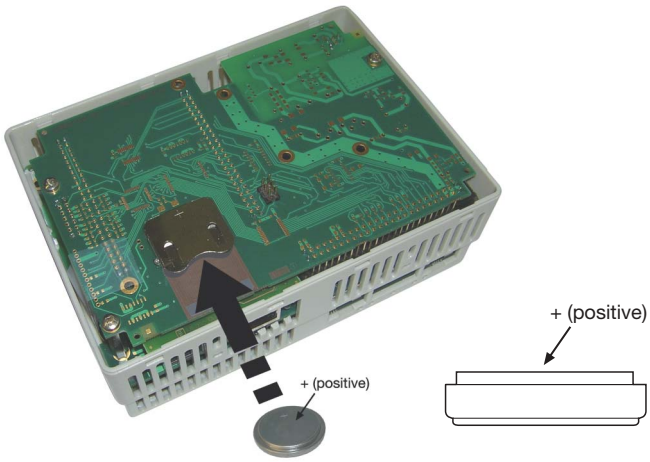




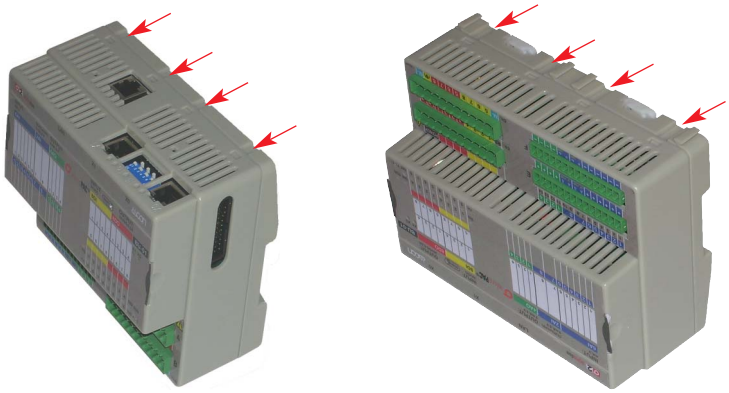
- Once the box of the CPU is open, locate the battery position and slide it out from the terminals (see image);



- Replace the battery with the positive pole facing the rear panel of the CPU and paying attention not to touch the battery with the fingers (see image);



- After the battery has been changed, the user can close the CPU rear cover:
  1 The rear cover must be positioned in order to put the two slides which lock the box to the DIN rail in the lower part (look at the CPU front to identify the upper and lower CPU side).
  2 After the two parts of the CPU have been aligned, press the two parts of the box in order to re-insert the 8 slots opened at the beginning of this setting procedure.



CE 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.

Before installing the module read the following instructions

Precautions ⚠CE

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.

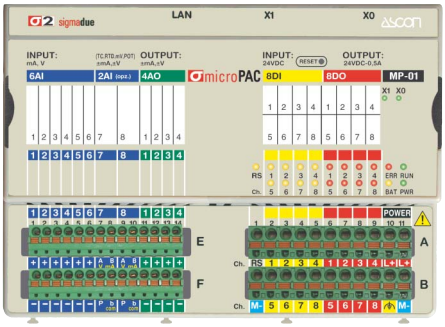
Notes

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

Configuration examples

A combination of up 2 expansion modules can be connected to the CPU in order to obtain the desired number of I/O.

Basic configuration

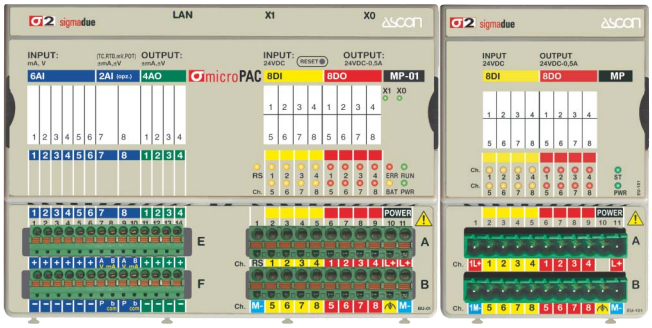


The basic configration is made by the central unit (CPU with integrated I/Os).
The basic configuration has:

- 6 analogue inputs (E1... E6);
- Up to 2 universal (optional) or high level (optional) inputs (E7, E8);
- Up to 4 (0, 2 or 4) universal analogue outputs (E11...E14);
- 8 Digital inputs (A2... A5 and B2... B5);
- 8 Digital outputs (A6... A9 and B6... B9).

Extended configurations

CPU I/Os + 8 Digital Inputs and 8 Digital Outputs (1 module PM-D0-08/08-00)

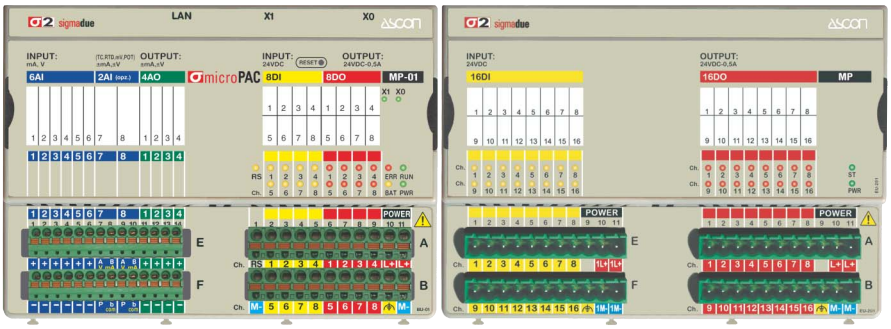


The extended configration can be obtained connecting to the central unit (CPU with integrated I/Os) 1 or 2 expansion modules for a total amount of the CPU I/Os plus 40 Digital Inputs and 40 Digital Outputs. For details, read carfully the installation manual of the module to be installed.

This configuration is composed by:

- 6 analogue inputs (E1... E6);
- Up to 2 universal (optional) or high level (optional) inputs (E7, E8);
- Up to 4 (0, 2 or 4) universal analogue outputs (E11...E14);
- 16 Digital inputs (A2... A5, B2... B5 of the Basic Unit and A2... A5, B2... B5 of the expansion unit);
- 16 Digital outputs (A6... A9 and B6... B9 of the Basic Unit and A6... A9 and B6... B9 of the expansion unit).

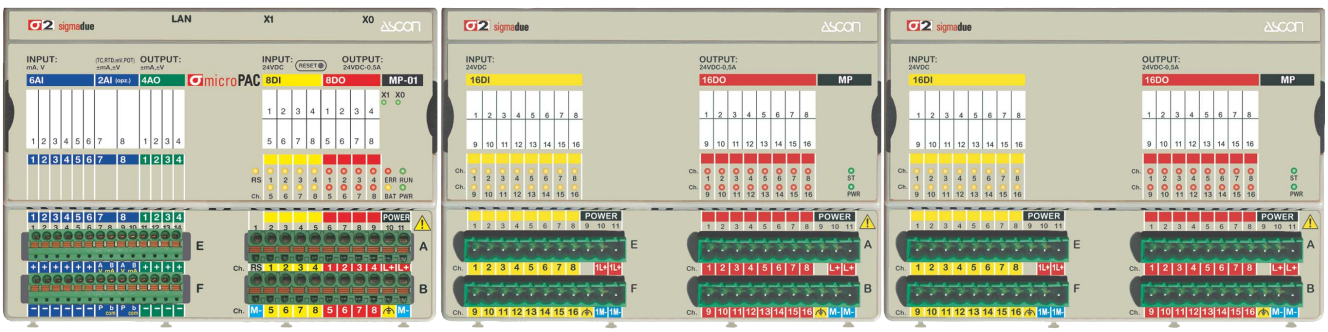
CPU I/Os + 16 Digital Inputs and 16 Digital Outputs (1 module PM-D0-16/16-00)



This configuration is composed by:

- 6 analogue inputs (E1... E6), up to 2 universal (optional) or high level (optional) inputs (E7, E8), up to 4 (0, 2 or 4) universal analogue outputs (E11...E14),
- 24 Digital inputs (A2... A5, B2... B5 of the Basic Unit and E1... E8, F1... F8 of the expansion unit) and
- 24 Digital outputs (A6... A9 and B6... B9 of the Basic Unit and A1... A8 and B1... B8 of the expansion unit).

CPU I/Os + 32 Digital Inputs and 32 Digital Outputs (2 modules PM-D0-16/16-00)



This is the maximum configuration and is composed by:

- 6 analogue inputs (E1... E6), up to 2 universal (optional) or high level (optional) inputs (E7, E8), up to 4 (0, 2 or 4) universal analogue outputs (E11...E14),
- 40 Digital inputs (A2... A5, B2... B5 of the Basic Unit and E1... E8, F1... F8 of both the expansion units) and
- 40 Digital outputs (A6... A9, B6... B9 of the Basic Unit and A1... A8 and B1... B8 of both the expansion units).