



***Operation and maintenance instructions CPU PROFIBUS-DP Series CX01 fieldbus node***



***Made in Italy***

The products are designed and manufactured in conformity with the following directives:

- 2004/108/CE

They also comply partially or totally with regard to the applicable parts of the following standards:

- CEI EN 61131-2

The website [www.camozzi.it](http://www.camozzi.it) contains a section to download the relative CE Declarations of Conformity

**1. Product identification**

	<p>Tabella di conversione della data di produzione.</p>		86-1400-0001 Rev. D																																																																																																																																																																																																		
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	<b>Operation and maintenance instructions</b> <b>CPU PROFIBUS-DP Series CX01 module</b>	5000004824
		Version 01

## 2. General recommendations

The recommendations regarding safe use in this document should be observed at all times.

- Some hazards can only be associated with the product after it has been installed on the machine/equipment. It is the task of the final user to identify these hazards and reduced the associated risks accordingly.
- The products dealt with in this manual may be used in circuits that must comply with the standard EN ISO 13849-1.
- For information regarding component reliability, contact Camozzi.
- Before proceeding with use of the product, carefully read all information in this document.
- Conserve this document in a safe place accessible to all personnel throughout the product life cycle.
- This document should accompany the product in the event of transfer to a new owner or user.
- The instructions in this manual must be observed together with the instructions and additional information regarding the product in this manual, available from the following reference links:
  - web site <http://www.camozzi.com>
  - Camozzi general catalogue
  - Technical assistance service
- Assembly and start-up operations must be performed exclusively by qualified and authorized personnel on the basis of these instructions.
- It is the responsibility of the system/machine designer to ensure the correct selection of the most suitable pneumatic component according to the intended application.
- It is recommended to use suitable protections to minimize the risk of physical injury.
- For all situations not contemplated in this manual and in situations in which there is the risk of potential damage to objects, or injury to persons or animals, contact Camozzi for advice.
- Never make unauthorized modifications to the product. In this case, any damage or injury to objects, persons or animals will be the responsibility of the user.
- All relevant product safety standards must be observed at all times.
- Never intervene on the machine/system before verifying that all working conditions are safe.
- Before installation and maintenance, ensure that the specific envisaged safety locks are active, and then disconnect the electrical mains (if necessary) and system pressure supply, discharging all residual compressed air from the circuit and deactivating residual energy stored in springs, condensers, recipients and gravity.
- After installation or maintenance, the system pressure and electrical power supply (if necessary) must be reconnected, after which the operator must check correct operation and sealing efficiency of the product. In the event of sealing failure or malfunction, the product must not be used.

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- The product may only be used in observance of the specifications provided; if these requirements are not met, the product may only be used on authorization by Camozzi.
- Avoid covering the equipment with paint or other substances that may reduce heat dissipation.

### 3. General characteristics and conditions of use

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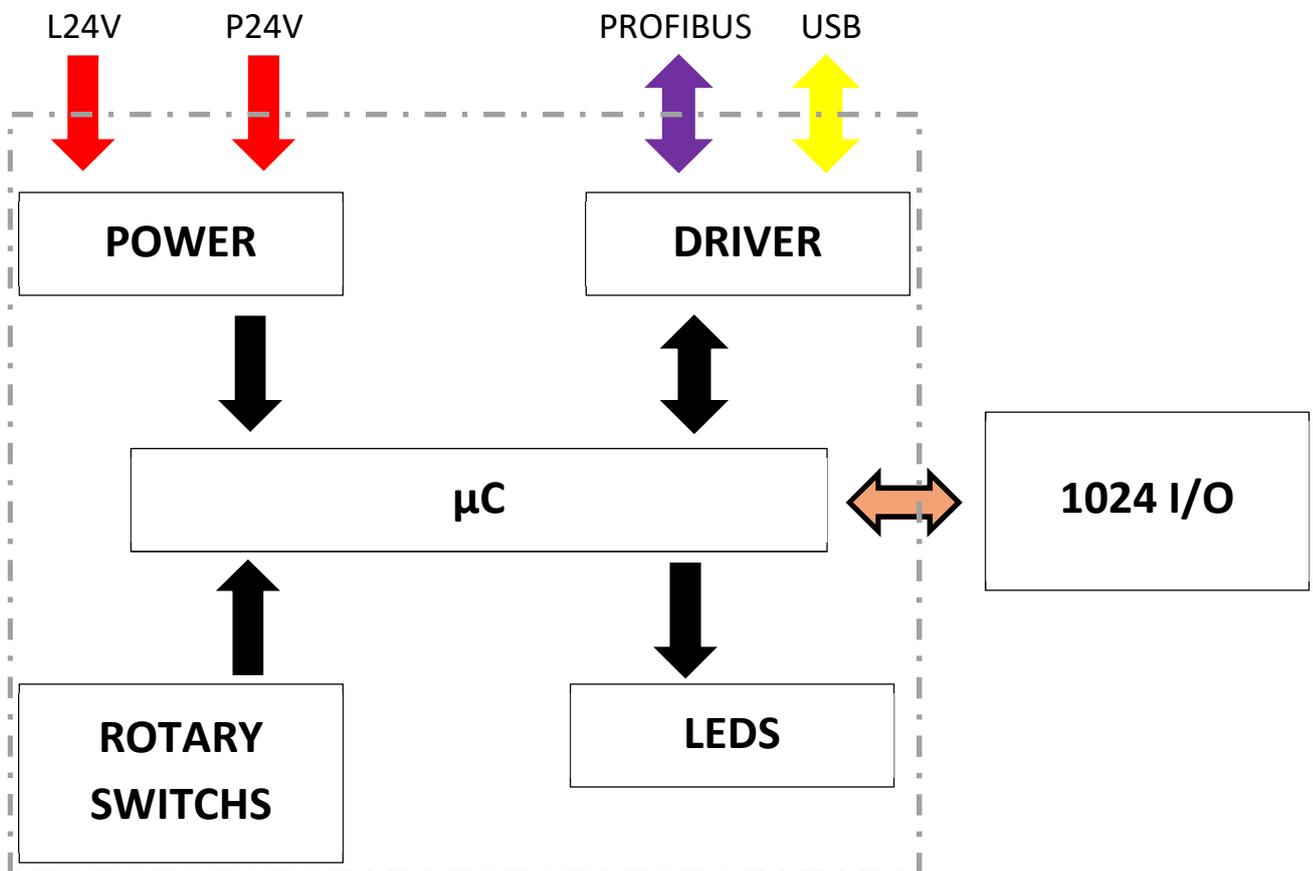
**General characteristics and conditions of use**

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<b>Assembly position</b>	Any
<b>Overall dimensions</b>	L = 122,6 mm; W = 90,7 mm; H = 48,9 mm
<b>Weight</b>	425 gr approximately
<b>Ambient temperature</b>	0 ÷ 50 °C
<b>Ambient humidity</b>	Max 90%
<b>IP protection rating according to EN 60529</b>	IP65 (full system)
<b>Vibrations</b>	In according with CEI EN 61131-2
<b>Continuous shock</b>	In according with CEI EN 61131-2
<b>Electrical connection</b>	M12
<b>Electrical power supply</b>	24Vdc -15%/+20%
<b>Digital Output Current consumption</b>	Max 4,5A (limited by fuse)
<b>Logic, Digital Input and Analog I/O Current consumption</b>	Max 2,0A (limited by fuse)
<b>Total Current consumption</b>	Max 4,8A @ 20°C (not limited by fuse)
<b>Output maximum number</b>	1024
<b>Input maximum number</b>	1024
<b>Slave address selectable</b>	From 1 to 126
<b>Protocol</b>	ProfiBus DPV0

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#### 4. Electrical circuit



#### 5. Product storage and transport

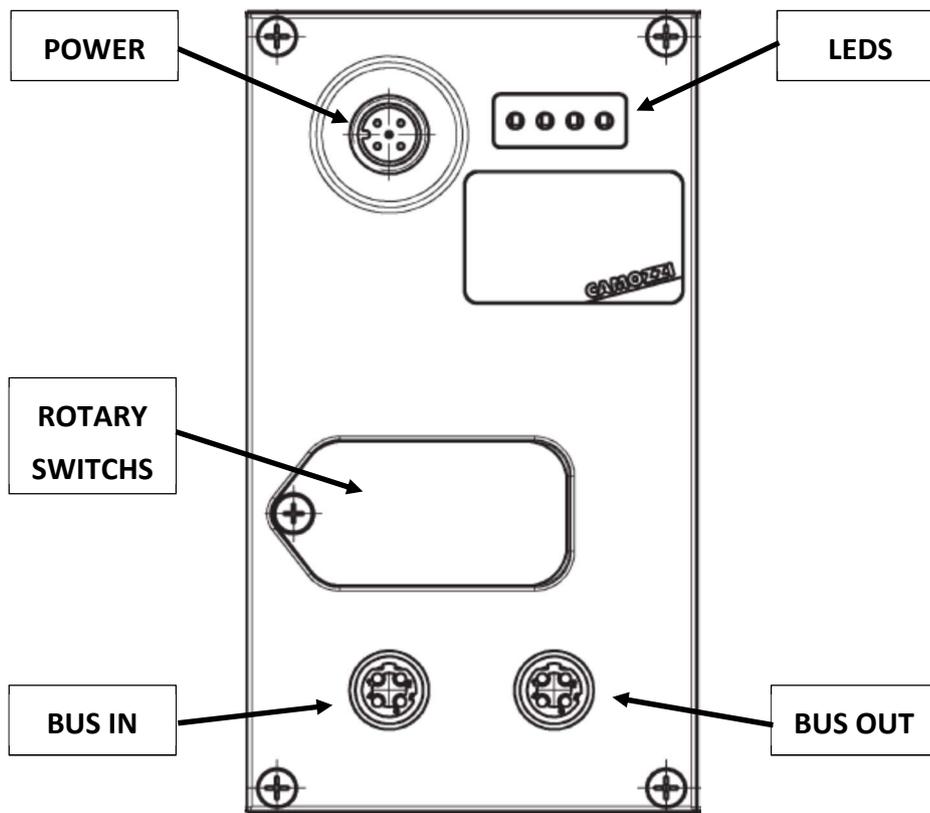
- Adopt all measures possible to avoid accidental damage to the product during transport, and when available use the original packaging.
- Observe the specified storage temperature range of -10 - 50 °C.

#### 6. System general description

The CPU module allow to control and manage the activation of digital and / or analog outputs according to the commands received from the ProfiBus-DP external bus and to transmit on the external bus diagnostic information provided by the system and the digital and/or analog inputs.

The system consists of a CPU module (ProfiBus-DP slave device) that communicates with a ProfiBus-DP Master via the bus up to 12 Mb/s (automatic speed search).

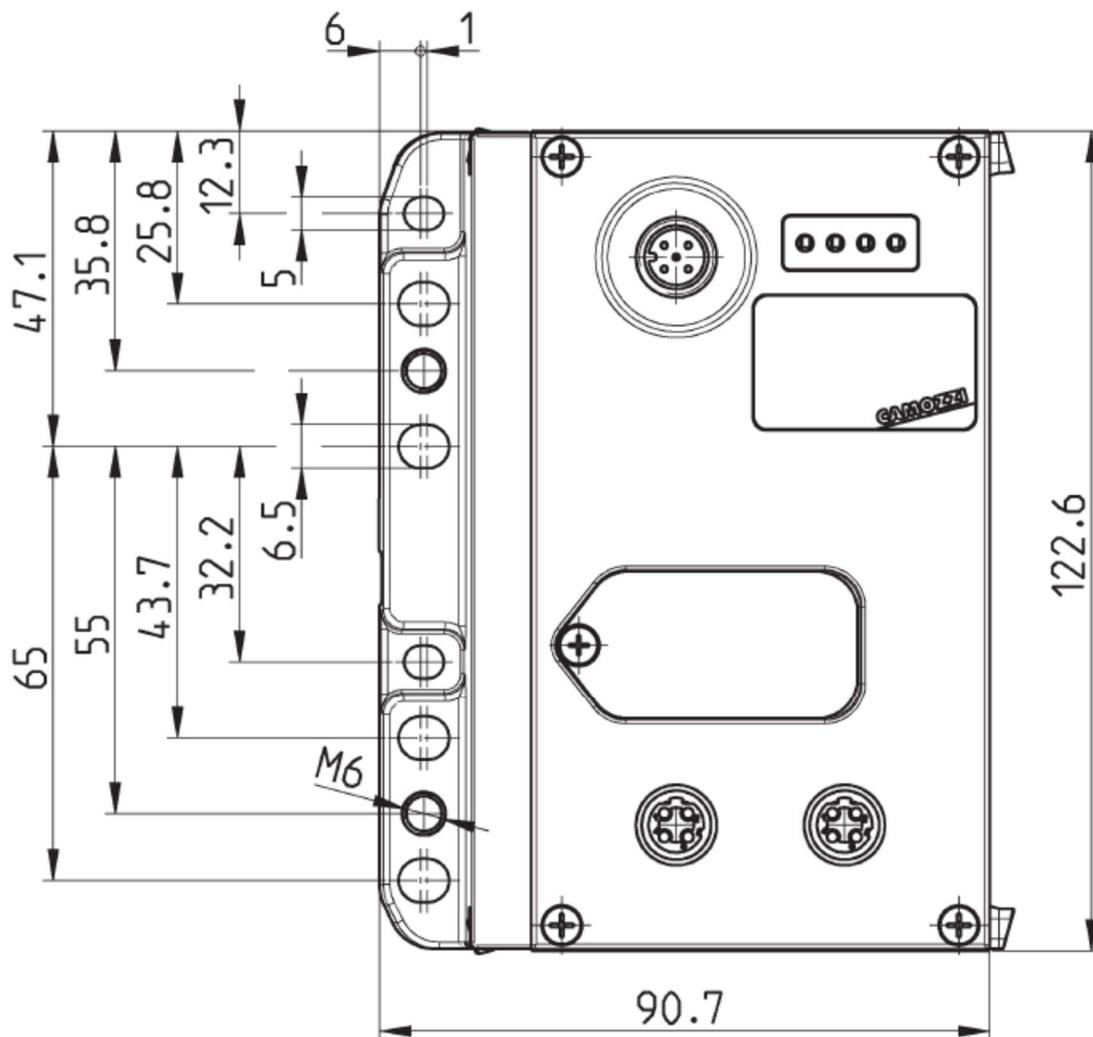
On the right side of the CPU module you can connected the input and output modules, analog and digital, and adapters that allow you to connect integrally the island a few series of valves. In addition a number of modules that allow you to remotely locate the modules above. For more details refer to the "**Operation and maintenance - Bus System Internal Camozzi**" manual.



## 7. Installation and start-up

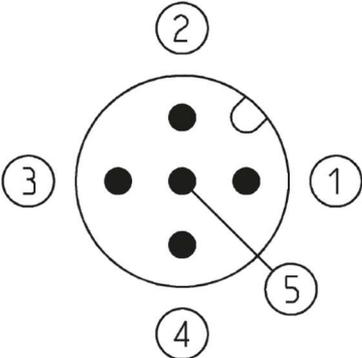
- During unpacking, take great care not to damage the product.
- Check whether there are any fault caused by product transport or storage.
- Separate all packaging material to enable the recovery or disposal in accordance with current standards in the country of use.
- Before operating the component, ensure that the stated specifications and performance correspond to requirements.
- During component installation, ensure suitable voltage overload protection devices are fitted.
- During component installation, ensure that no hazards are generated due to mechanical movements.
- Install the component in an area where the set-up and maintenance phases are easily performed without generating hazards for the operator.
- Close off any connections with suitable safety caps/covers.
- The components must be fixed correctly using, where possible, the specific anchors and ensuring that the fixture remains efficient even when the actuator is repeatedly used at a high frequency and in the presence of strong vibrations.
- In the case of strong vibrations envisage suitable devices/systems able to dampen the effect on the component.

- Envisage the installation of dehumidifiers to avoid the formation of humidity or condensation on internal components.
- If the device is used to activate an actuator on which any accidental movement can generate a hazard, envisage suitable locking devices on the mobile section of the actuator.
- Ensure that the connectors are correctly connected and secured.
- The device can be connected to DIN rails using the relative elements PCF-E520 fitted on the rear of the body.
- The component can be directly fixed to a support using the 8 holes (of which 2 threaded M6) present on the side of the body

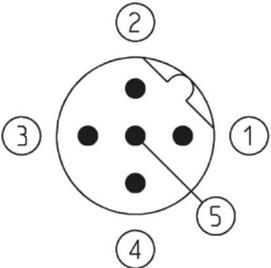


- This illustrates the pins of the M12 connector located on the upper section CPU module:

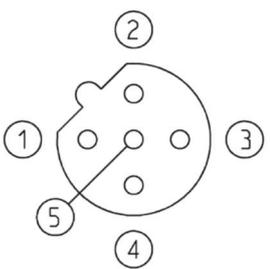
POWER Connector M12A 5 poles male		
Pin	Segnale	Descrizione
1	<b>L24V</b>	24Vdc power supply (logic, digital input, analog I/O): connect to the positive pole of the 24Vdc power supply (ref. <b>GND</b> ).
2	<b>P24V</b>	24Vdc power supply (digital output): connect to the positive pole of the 24Vdc power supply (ref. <b>GND</b> ).
3	<b>GND</b>	Common (reference pin 1 and 2): connect to the negative pole of the 24Vdc power supply (compulsory).
4	<b>EARTH</b>	Earth connection
5	<b>NC</b>	Not connected



BUS IN Connector M12B 5 poles male		
Pin	Segnale	Descrizione
1	<b>NC</b>	Not connected
2	<b>A</b>	ProfiBus A-line
3	<b>NC</b>	Not connected
4	<b>B</b>	ProfiBus B-line
5	<b>EARTH</b>	Earth connection



BUS OUT Connector M12B 5 poles female		
Pin	Segnale	Descrizione
1	<b>+5V</b>	5V power supplied by board
2	<b>A</b>	ProfiBus A-line
3	<b>GND5V</b>	Common of the 5V
4	<b>B</b>	ProfiBus B-line
5	<b>EARTH</b>	Earth connection

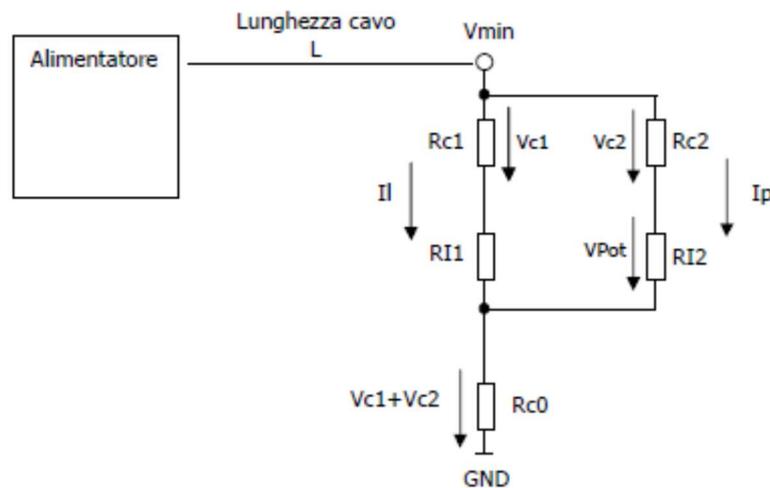


For electrical connection are available the following wired connectors.

CONNETTORE	CODICE	DESCRIZIONE
POWER	CS-LF04HB	Power supply straight connector
	CS-LR04HB	Power supply sangled connector
BUS IN	CS-MF05HC	Bus-In M12 female straight connector
	CS-MR05HC	Bus-In M12 female angled connector
BUS OUT	CS-MM05HC	Bus-Out M12 male straight connector
	CS-MS05HC	Bus-Out M12 male angled connector

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- Use only power able to ensure a reliable electrical isolation of the supply voltage according to IEC 742 / EN 60742 / VDE 0551 with a minimum strength of 4 kV isolation Protected Extra Low Voltage, PELV.
  - The user must take the necessary measures to prevent damage to the system caused by non-periodic overvoltage spikes on the power lines produced by power break to high-energy equipment.
  - The voltage interruptions are permitted according to the severity level PS2.
  - About electromagnetic compatibility, the CPU module is designed to work in area A.
  - The board implements a protection against inversion of polarity on the power supply voltage.
  - The power supply voltage must be within the range of 24V±10%.  
The rated voltage of the CPU module is 24 VDC -15% / + 20% (as indicated by the Standard IEC 61131-2). If the loads connected to the initial node may require severest tolerances of the value of the supply voltage, the power supply voltage must comply with these. If the inputs connected to the initial node may require in the severest tolerances of the value of the supply voltage, the logic supply voltage of the node must comply with these.  
For example, if you connect the valves HN Series, the tolerance of the power supply voltage must be ± 10%. If you connect the CSH sensors with power supply 10-30V (-58% / + 25%), the tolerance of the logic supply voltage is -15% / + 20%.  
For the system it is mandatory to connect the logic voltage (pin 1), otherwise the initial module remains off.  
For the correct operation of the system is mandatory to connect to the initial module the logic voltage (pin 1), the power voltage (pin 2), the reference to 0 V (GND, pin 3) and the earth.
  - On supply cables of a valve group, it produces a voltage drop that dependent by load. This can create that the supply voltage (logic and power) does not fall within the allowable tolerance. If the sections of the cables for the power supply and for the logic power supply are the same, it is possible to apply the following formula in order to calculate the length. To limit the effects of induced noises, it is recommended to limit the length of the power cable to 3 mt.
- Before is necessary to calculate:
- The maximum current value for Logic+Input (I1) and for Power (I2)
  - The minimum power supply value expected during operation (Vmin), whereas it depends on the load connected and that the mains voltage can have oscillations.
- Use the value below in the following formula explained by the electrical drawing.



- $I_l$  = Logic current + SPI input current
- $I_p$  = Power current (loads)
- $R_{c1} + R_{c2}$  = Cable resistance
- $R_{c0}$  = Common cable resistance
- $L$  = Cable length

In order to calculate the cable length use this formula:

$$L \leq \frac{[(V_{\min} - V_{p \min}) \times S \times K_{cu}]}{(2I_p + I_l)}$$

Where:

- $V_{p \min}$ : minimum tension necessary for output
- $V_{\min}$ : minimum tension expected from power supply
- $I_l$ : current necessary for logic and sensor
- $I_p$ : current necessary for output
- $S$ : cable section
- $K$ : cable conductance (copper conductance  $K_{cu} = 56 \text{ m}/(\text{mm}^2 \cdot \Omega)$ )

Example:

$V_{\min} = 24 \text{ V}$

$V_{p \min} = 21.6 \text{ V}$

$I_l = 1 \text{ A}$

$I_p = 1 \text{ A}$  (40 Series H coils)

$S = 0,75 \text{ mm}^2$

$K_{cu} = 56 \text{ m}/(\text{mm}^2 \cdot \Omega)$

$$L \leq \frac{[(24 - 21,6) \times 0,75 \times 56]}{(2+1)} = 33,6m$$

- To improve immunity to disturbance and prevent damage, it is recommended to connect the device to the circuit earthing system using any one of the holes on the aluminium body.
- Using the rotary switches under the transparent cover, you are able to set the ProfiBus slave address. The rotary switch on the right side indicates the unit while the rotary switch on the left side indicates the address tens to set. For the tens an hexadecimal rotary switch is used, so you can set up to 126 ProfiBus addresses (1 to 126).

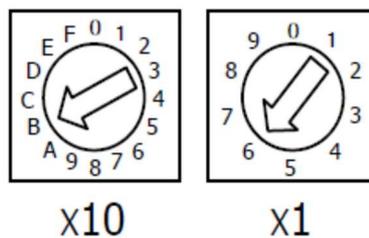
A = 10;

B = 11;

C = 12;

D, E, F = not used

For example, the following rotary switches are configured on ProfiBus address 116 (B6)



- In order to connect the CPU module to profiBus bus, is recommended to use a shielded twisted pair complies with Profibus specification:
  - Surge impedance: 125.....165 Ω (3.....20 MHz)
  - Capacitance per unit length: < 30 nF/Km
  - Loop resistance: < 110 Ω /km
  - Core diameter: > 0,64 mm
  - Core cross-section: > 0,34 mmq
- The Profibus segment maximum length depends from selected baud rate. The CPU module automatically adjusts its transmission speed of one of the baud rate indicated in the table:

Baud rate (Kbaud)	Segment maximum length (m)
9,6	1200
19,2	1200
45,45	1200
93,75	1200
187,5	1000
500	400

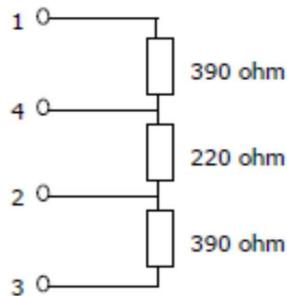
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1500	200
3000	100
6000	100
12000	100

If it is necessary to exceed the maximum lengths indicated below, you must use repeater.

- If the CPU module is the last node of the ProfiBus segment, it is necessary use the resistances termination for the bus: for the CPU module is provided the connector cod. CS-MQ05H0, connect it to the BUS OUT connector.

The following is the connection diagram of the resistors that constitute the termination, the numbers refer to the BUS OUT connector pins.

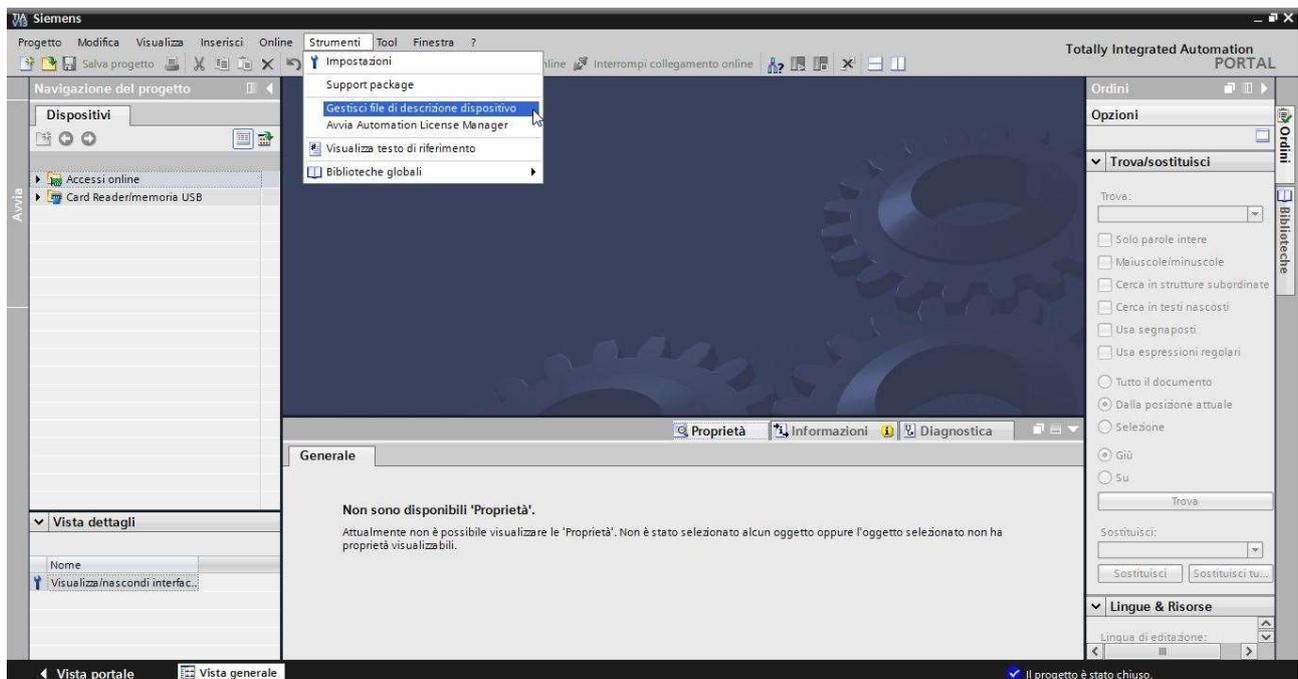


- For configuration of the CPU module and the connected modules, download the set-up file of the software **CX-Configurator** from the web site <http://www.camozzi.com> and proceed with installation according to the instructions on screen displayed during the process. For more details, please refer to the "**Operating and Maintenance Instructions - CX Configurator**".
- The CPU module supports the operating mode FREEZE and SYNC in accordance with the standard ProfiBus.
  - Freeze: all inputs managed from the CPU module are frozen. The CPU module sends continuously to the master the value of all inputs. Each of the Freeze command the values of the inputs are updated and sent to the master.
  - SYNC: all outputs managed by the CPU module are frozen. The CPU module does not react to any changes in the list of master level outputs. Each activation of the Sync command is send the value of the outputs.
- In order to configure the CX01 CPU module with a programmer/PC it is necessary to use the archive CX\_0A12.GSD. In addition to the slave characteristic data (ID Number, revision, etc.), the GSD file contains the identifiers of the modules that are used for the hardware configuration of the PLC. The GSD file of the CPU module can be downloaded from the website Camozzi.

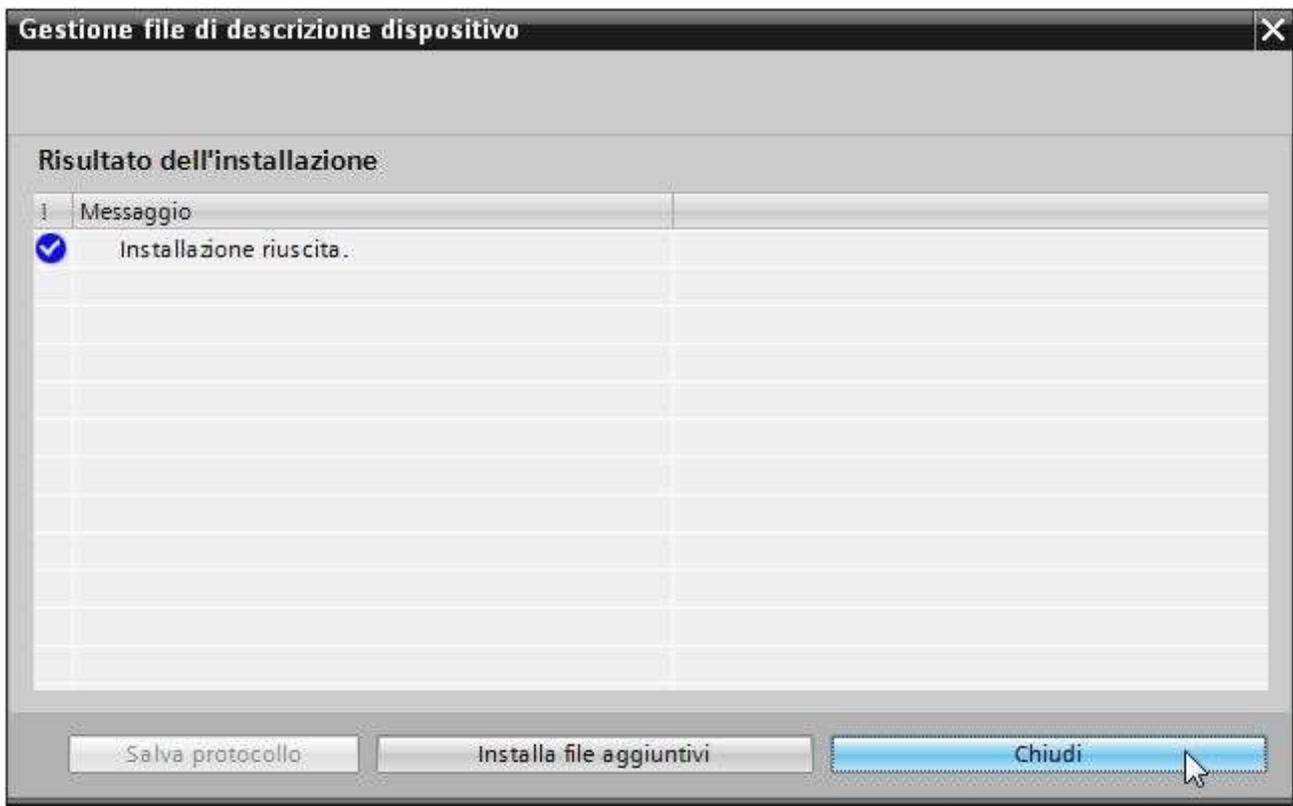
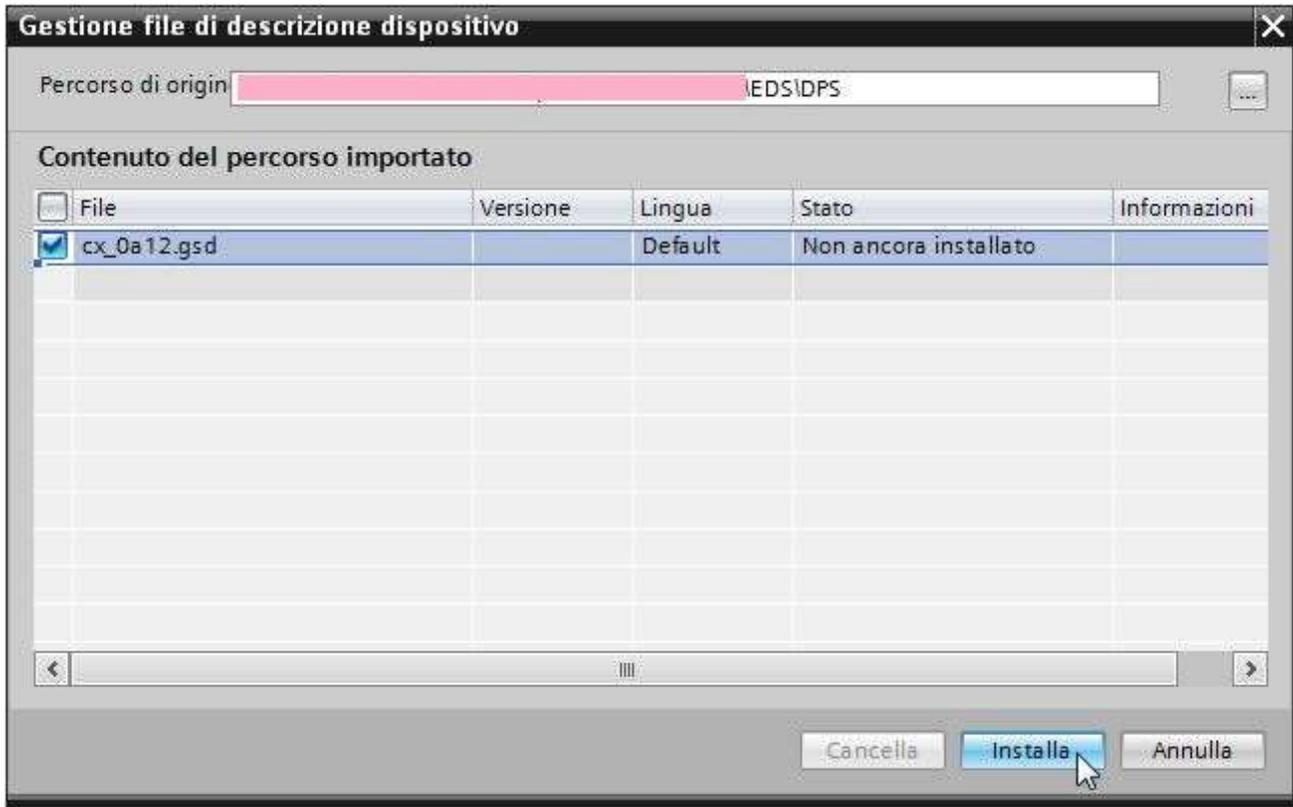
On the GSD file, the following modules are described. Use these modules on the programmer/PC in order to realize the CPU module HW configuration.

Module description	Input bytes used on the PLC memory	Output bytes used on the PLC memory
1 Byte In	1	0
1 Byte Out	0	1
1 Word In	2	0
1 Word Out	0	2
...	...	...
64 Byte In	64	0
64 Byte Out	0	64
64 Word In	128	0
64 Word Out	0	128

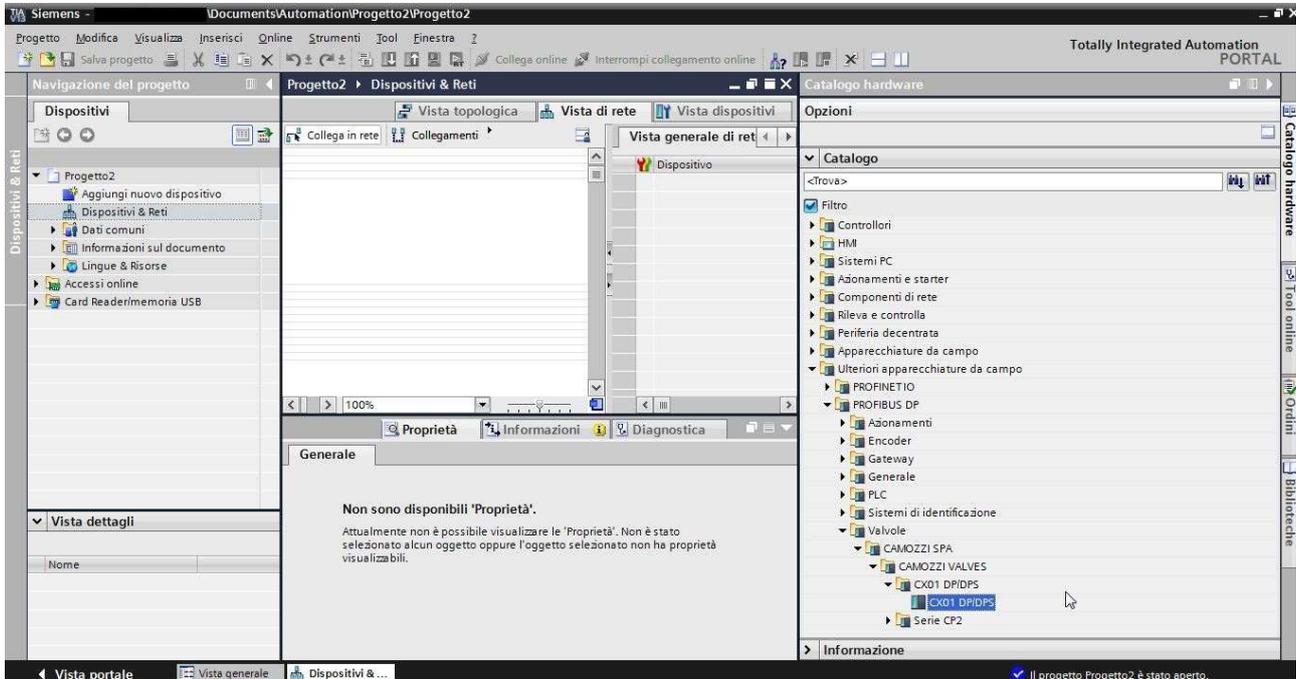
- The following steps describes some example about HW configuration realized with TIA portal software. It is assumed knowledge of the topics covered in the TIA software manuals.  
Used configurator: HW Configurator TIA Portal Version 13 SP1
- In order to import the GSD file and icons on TIA Portal configurator, refer to the following steps:



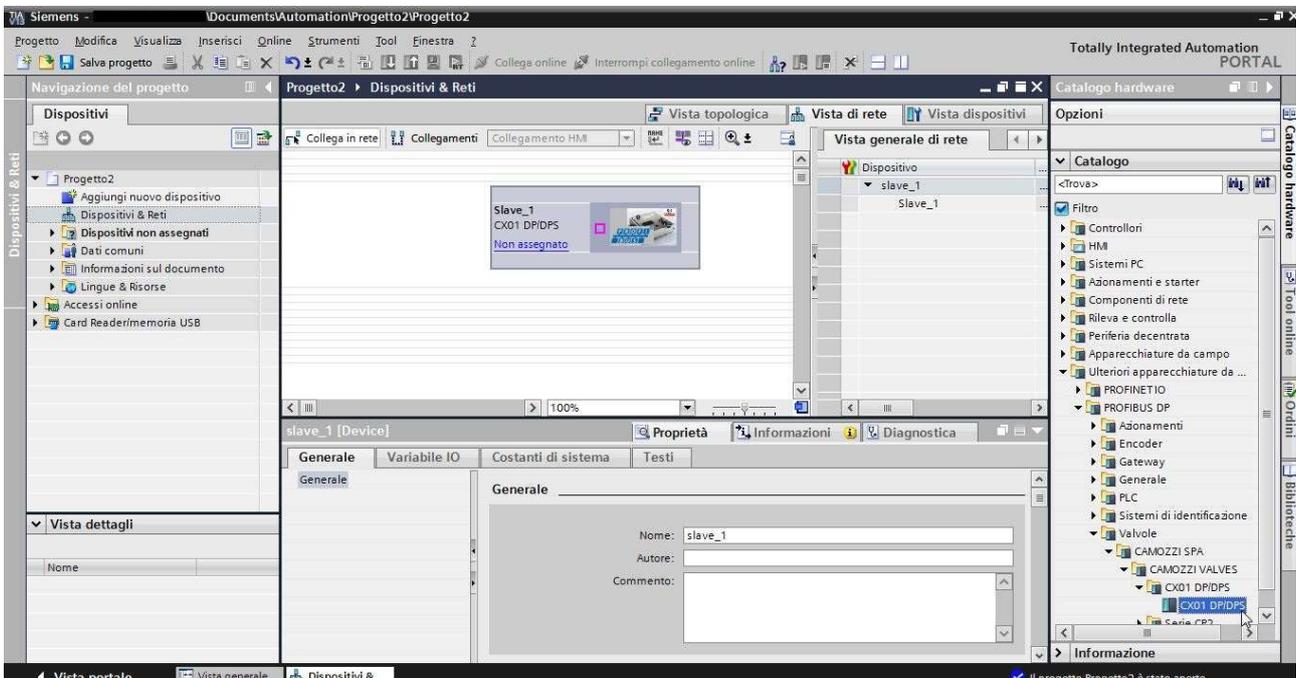




- When the procedure is completed, the slave node CX01 will be available with all its modules in the catalog of the HW configurator, on the folder: "Ulteriori apparecchiature da campo\PROFIBUS DP\Valvole\CAMOZZI SPA\CAMOZZI VALVES\CX01 DP/DPS.



- The slave node CX01 can be dragged around the window that displays the network.





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- On start-up of the software **CX-Configurator** the system verifies communication between the device and the PC where the configuration software is installed. In the event of communication failure, an error message is displayed.

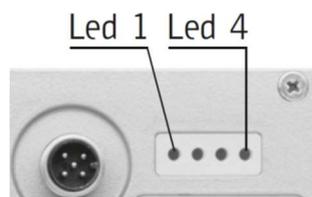
Type of fault	Causes	Remedy
Communication failure between CPU module and PC	Electrical power supply not connected	Connect the Electrical power supply by means of the M12 connector POWER.
	USB cable not connected	Connect the USB cable to one of the ports available on the PC and to the Micro USB connector under the transparent panel on the device.
	USB drivers not installed	Contact the Camozzi technical assistance service.

## 8. Use

- Ensure that the electrical power supply and all other operating conditions remain within the admissible values.
- The product may only be used in observance of the specifications provided; if these requirements are not met, the product may only be used on authorization by Camozzi.
- Observe the specifications on the identification data plate.

## 9. Troubleshooting and/or exceptional circumstances

- The following is the meaning of the LEDs on the top panel of the CPU Unit:



Led 2 (PWR)	Led 3 (COM)	Problem	Solution
 ON	 ON	The device is powered on and there are no communication errors.	
 OFF	 OFF	The logic power supply is not present.	Check the POWER connector.

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 ON	 ON	HW configuration error.	Check the HW configuration on PLC, check that you have entered more than 128 bytes of input and output.
 ON	 Cyclic blinking	Profibus Bus anomaly:	
		Profibus address not correct.	Check the correspondence between the address set on the initial with the hardware configuration to the PLC.
		Cable break or connector wiring error.	Check that the Profibus cable is not interrupted, check that the cables are properly wired into the connector and which are not reversed.
 ON	 Acyclic blinking	Not configured.	

## 10.Limitations on use

- Never exceed the technical specifications stated in the paragraph "General characteristics" and the Camozzi general catalogue.
- Do not install the product in environments where the air itself may generate hazards.
- With the exception of specific intended applications, do not use the product in environments where there is the risk of direct contact with corrosive gas, chemical products, salt water, water or steam.

## 11.Maintenance

- If performed incorrectly, maintenance may impair efficient operation of the product and harm persons in the vicinity.
- Check all conditions to prevent the inadvertent release of parts, and disconnect the power supply to enable the discharge of residual pressure from the system before performing work.
- Check whether it is possible to have the product serviced at a technical assistance centre.
- Never disassemble units when electrically powered.
- Shut off electric supplies before maintenance.
- Always remove accessories before maintenance.
- Always wear the correct personal protective equipment as envisaged by local authorities and in compliance with current legislation.

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- In the event of maintenance, replacement of worn parts, use exclusively the original Camozzi kits and ensure that operations are only performed by specialised and authorised personnel. Otherwise product approval will be rendered invalid.

## **12.Environmental notes**

- At the end of the product's life cycle, separate the relative materials to enable recycling.
- Observe all current standards in the country of use governing waste disposal.
- The product and relative parts all comply with the standards ROHS and REACH.

## **12. Contacts**

### ***Camozzi spa***

#### ***Società Unipersonale***

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[info@camozzi.com](mailto:info@camozzi.com)

[www.camozzi.com](http://www.camozzi.com)

### ***Product Certification***

National and International Directives, Regulations and Standards

[productcertification@camozzi.com](mailto:productcertification@camozzi.com)

### ***Technical assistance***

Technical information

Product information

Special products

Tel.+39 030 3792390

[service@camozzi.com](mailto:service@camozzi.com)