

P-Connect EtherNet/IP™ connection gateway

BP series

Operating instructions

ZE_FOG149A24-ENG

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1 INFORMATION ON THIS DOCUMENT

1.1 Function

These operating instructions provide information on installation, connection and safe use for the following articles: BP A1CL••••. The articles described in this document are also identified with the commercial name "P-Connect".

1.2 Target audience

The operations described in these operating instructions must be carried out by qualified personnel only, who are fully capable of understanding them, and with the technical qualifications required for operating the machines and plants in which the safety devices are to be installed.

1.3 Application field

These operating instructions apply exclusively to the products listed in paragraph FUNCTION, and their accessories.

1.4 Original instructions

The Italian language version is the original set of instructions for the device. Versions provided in other languages are translations of the original instructions.

1.5 Notes about this document

This document shows how to configure a BP unit using an Allen Bradley CompactLogix PLC (BP A1CL••••). The software used in the examples is Studio 5000 Logix Designer® v35.00.

The use of the BP gateway is only allowed in combination with the devices listed in the "WIRING INSTRUCTIONS" manual for their respective versions.

Unauthorised use or changing system components is not allowed.

The client is responsible for all safety functions, particularly for safety integration in accordance with CIP Safety™ specifications.

It is the responsibility of the installer to make sure that the configuration of the BP unit is correct and compliant with the relevant risk assessment for the application, safety standards, and applied regulations. Pizzato Elettrica holds no responsibility if the following manual is used improperly.

Information contained in this document is subject to change without notice. Pizzato Elettrica assumes no responsibility for possible errors that may be present in this document.

2 Symbols used


This symbol indicates any additional information.


Warning: any failure to observe this warning note can cause damage or malfunction, including possible loss of the safety function.

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3 Description

3.1 Device description

The P-Connect BP series gateway is a network-based I/O interface device with safety functions designed for use in industrial contexts.

The unit can be used to connect the following devices:

- Up to two NG/NS series safety switches with a wide selection of options using modular adapters, heads, and actuators from the range of products.
- A chain of emergency stop devices.
- Up to two BN series control device units.
- Up to two AN series handles.

The gateway integrates a network switch that facilitates "daisy-chain" connection without any additional hardware.

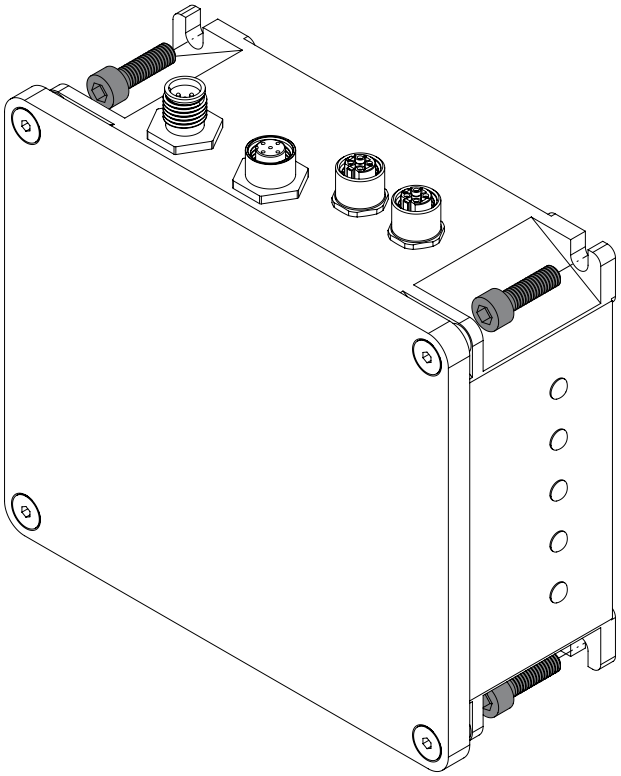
3.2 Intended use of the device

- The device described in these operating instructions is designed to be applied on industrial machines for state monitoring of movable guards.
- The direct sale of this device to the public is prohibited. Installation and use must be carried out by qualified personnel only.
- The use of the device for purposes other than those specified in these operating instructions is prohibited.
- Any use other than as expressly specified in these operating instructions shall be considered unintended by the manufacturer.
- Also considered unintended use:
    a) Using the device after having made structural, technical, or electrical modifications to it;
    b) Using the product in a field of application other than as described in paragraph TECHNICAL DATA.

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4 Installation instructions

⚠ Attention: Installing a safety device is not sufficient to ensure operator safety or compliance with machine safety standards or directives. Before installing a safety device, perform a specific risk analysis in accordance with the key health and safety requirements in the Machinery Directive. The manufacturer guarantees only the safe functioning of the product to which these operating instructions refer, and not the functional safety of the entire machine or entire plant.



The device must always be fixed to the machine using at least two M6 flat head screws with resistance class 4.6 or higher. The screws must have at least a number of threads engaged equal to or greater than their own diameter. The device must never be fixed with less than the specified number of screws.

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5 Instructions for proper use

5.1 Installation

⚠ Attention: Installation must be carried out by qualified staff only.

- Do not modify the device for any reason.
- Do not exceed the tightening torques specified in the present manual.
- The safety category of the system (according to EN ISO 13849-1), including the safety device, also depends on the external components connected to it and their type.
- Before installation, make sure the device is not damaged in any part.
- Before installation, ensure that the connection cables are not powered.
- Avoid excessive bending of connection cables in order to prevent any short circuits or power failures.
- Do not paint or varnish the device.
- Do not drill the device.
- Do not use the device as a support or rest for other structures, such as raceways, sliding guides or similar.
- Before commissioning, make sure that the entire machine (or system) complies with all applicable standards and EMC Directive requirements.
- The fitting surface of the device must always be smooth and clean.
- The documentation required for correct installation and maintenance is available online in various languages on the Pizzato Elettrica website.
- - Should the installer be unable to fully understand the documents, the product must not be installed and the necessary assistance may be requested from the manufacturer (see paragraph SUPPORT).
- Always attach the following instructions to the manual of the machine in which the device is installed.
- These operating instructions must be kept available for consultation at any time and for the whole period of use of the device.

5.2 Maintenance and functional tests

⚠ Attention: Do not disassemble or try to repair the device. In case of any malfunction or failure, replace the entire device.

⚠ Attention: In case of damages or wear it is necessary to change the whole device. Correct operation cannot be guaranteed if the device is deformed or damaged.

- Perform all the foreseen safety functions prior to commissioning the machine and at least once a year (or after a prolonged shutdown).
- The device has been created for applications in dangerous environments, therefore it has a limited service life. Although still functioning, after 20 years from the date of manufacture the device must be replaced completely. The date of manufacture is placed next to the product code (see paragraph MARKINGS).

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5.3 Wiring

⚠ Attention: Check that the supply voltage is correct before powering the device.

- Keep the charge within the values specified in the electrical operation categories.
- Only connect and disconnect the device when the power is off.
- Discharge static electricity before handling the product by touching a metal mass connected to earth. Any strong electrostatic discharge could damage the device.
- Power the safety device and the other components connected to it from a single SELV/PELV source and in accordance with the applicable standards.
- Always connect the protection fuse (or equivalent device) in series with the power supply for each device.
- During and after the installation do not pull the electrical cables connected to the device.

5.4 Additional requirements for safety applications with operator protection functions

Provided that all previous requirements for the devices are fulfilled, for installations with operator protection function additional requirements must be observed:

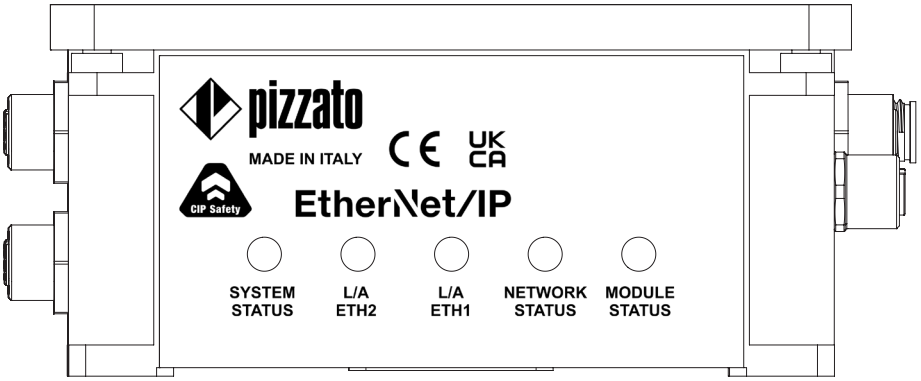
- Utilization implies knowledge of and compliance with following standards: EN 60947-1, EN ISO 13849-1, EN 62061.

5.5 Limits of use

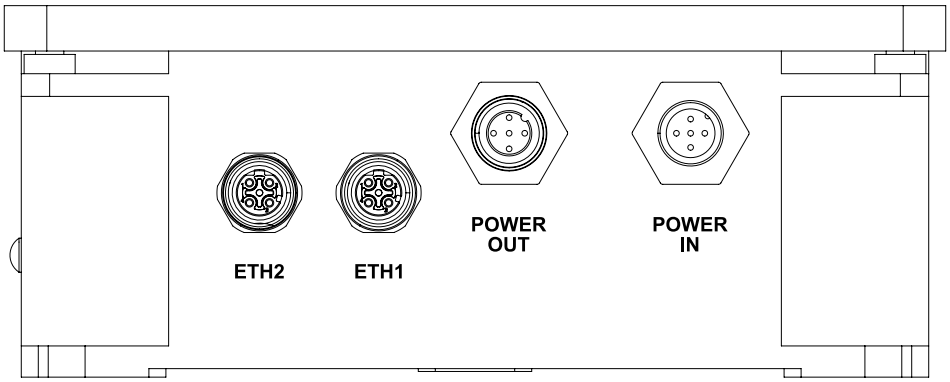
- Use the device following the instructions, complying with its operation limits and the applicable safety regulations.
- The devices have specific application limits (min. and max. ambient temperature, IP protection degree, etc.). These limitations are met by the device only if considered individually and not as combined with each other.
- The manufacturer's liability is to be excluded in the following cases:
  1) Use not conforming to the intended purpose;
  2) Failure to adhere to these instructions or regulations in force;
  3) Mounting not performed by qualified and authorised personnel;
  4) Omission of functional tests.
- For the cases listed below, before proceeding with the installation contact our technical assistance service (see paragraph SUPPORT):
  a) In nuclear power stations, trains, airplanes, cars, incinerators, medical devices or any application where the safety of two or more persons depend on the correct operation of the device;
  b) Applications not contemplated in this instruction manual.

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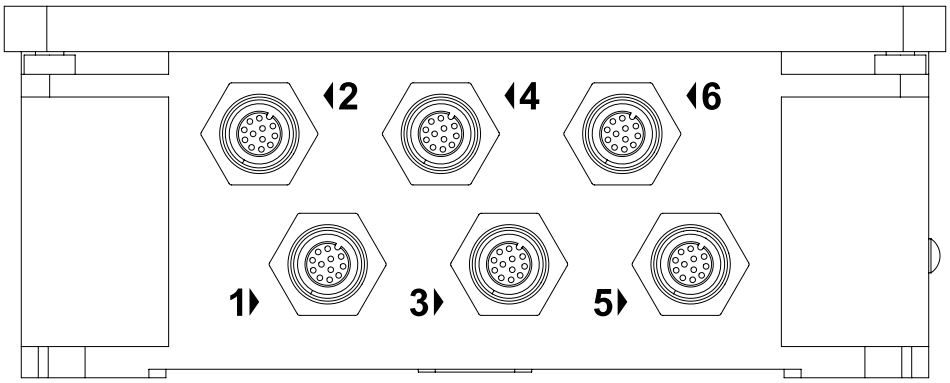
6 Device views



View "Side with LEDs"



View "Side with network and power connectors"

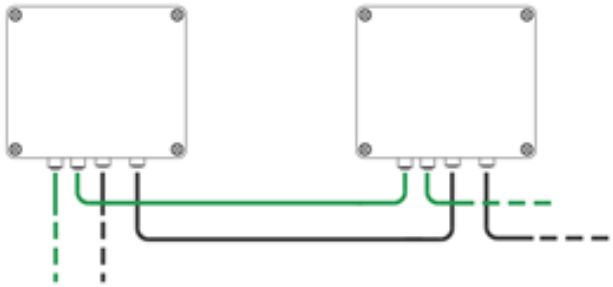


View "Side with device connectors"

Note: the images may vary based on the type of device chosen (for example in terms of shape, position, and numbering of the connectors).

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7 Series connection of the device



All P-Connect gateways are equipped with a double connector for the power supply of the device and for the fieldbus network connection. This makes it easy to install several P-Connect gateways in series by simply connecting the input and output connectors together. This feature was specially designed to reduce the time required for installation, disassembly and replacement of components during maintenance.

If the devices are powered independently, the limit of gateways that can be connected in series depends on the number of nodes supported by the PLC. If, on the other hand, power is supplied via series connection, then the limit of connected devices results from the voltage drop in the 'POWER IN' and 'POWER OUT' cables.

Pay attention to the wire cross-section (mm^2) and to the cable length to guarantee that the device will operate in the specified operating voltage range. The connectors integrated in the gateway are provided with two pins for 24 Vdc and two pins for 0 Vdc.

Pin	Function
1	+24 Vdc
2	0 Vdc
3	0 Vdc
4	+24 Vdc
5	GND

Attention: Make sure that all power supply input pins are connected. Pin 1 and 4 connected to +24 V, Pin 2 and 3 connected to 0 V. This doubles the wire cross-section (0.25 mm^2 x 2) and allows for less voltage drop along the series connection of the devices.

The table below provides an estimate of the number of P-Connect units that can be installed with connection to the power supply in series, based on the total length of the cable used. This refers to use of Pizzato 5-pole cable (5 x 0.25 mm^2) or equivalent with one of the standard P-Connect configurations.

L [m]	No. P-Connect (cable 5 x 0.25 mm^2)
<10	4
<20	2
<45	1
45+	0

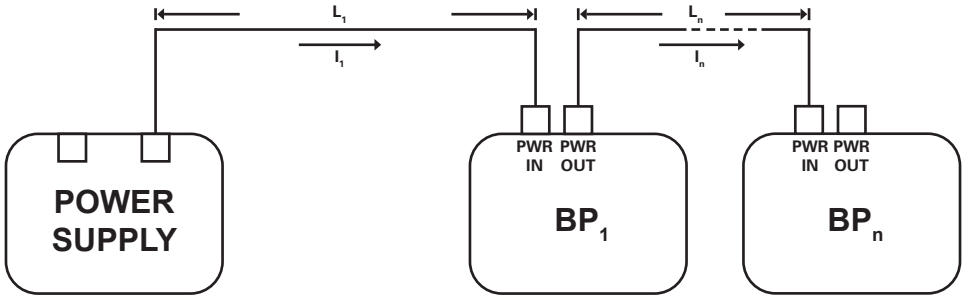
For a more accurate and less conservative calculation of the voltage drop, please consult the following paragraph EXAMPLE OF VOLTAGE DROP CALCULATION.

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7.1 Example of voltage drop calculation

Wire cross-section for Pizzato 5-pole cables: VF CA5●●●M 0.25 mm² (23 AWG)
VF CA5●●●M-MD 0.5 mm² (20 AWG)

The rated operating voltage of the module is indicated in paragraph TECHNICAL DATA in this manual.



$$V_{BP1} = V_{PWR} - 2 \cdot \rho \cdot \frac{L_1 \cdot I_1}{S}$$

$$V_{BP\,n} = V_{BP\,n-1} - 2 \cdot \rho \cdot \frac{L_n \cdot I_n}{S}$$

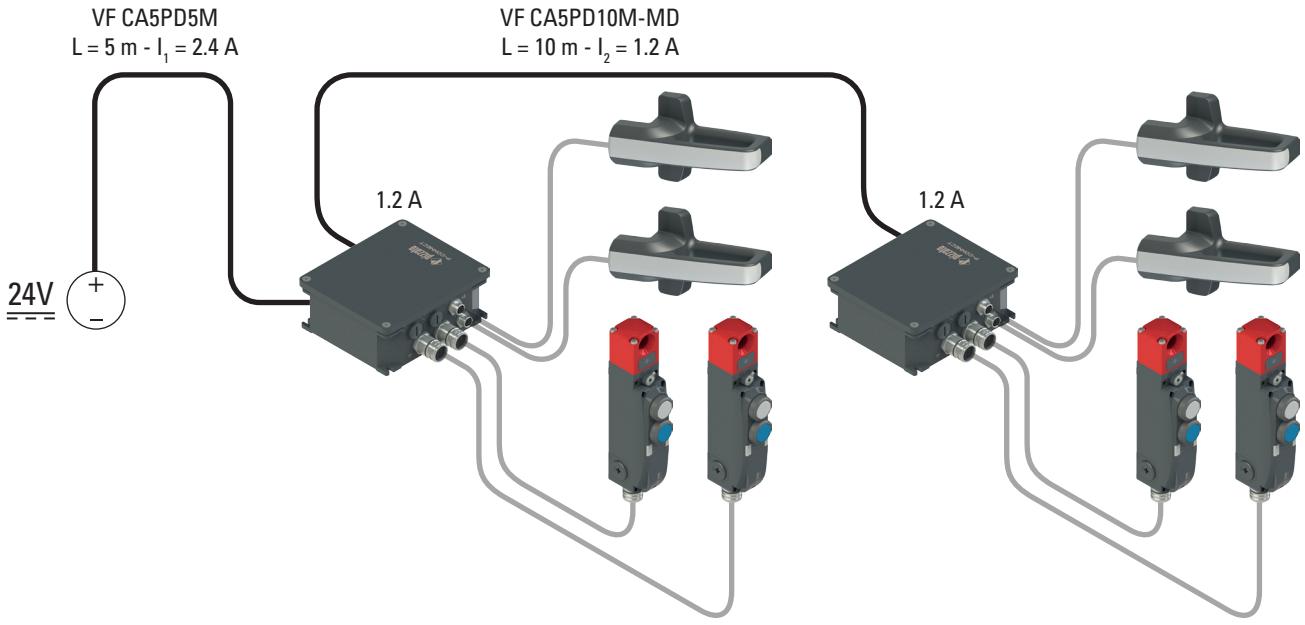
$$\rho \text{ (copper resistivity @ 20°C)} = 0.018 \left[\frac{\Omega \cdot mm^2}{m}\right]$$

S = wire cross-section [mm²]

7.1.1 Practical calculation example

Note: The configuration in the diagram has a maximum consumption of 1.2 A per P-connect unit.

The following Pizzato cables were used for calculation: VF CA5●●●M 0.25 mm2 (23 AWG)
VF CA5●●●M-MD 0.5 mm2 (20 AWG).



$$V_{BP1\text{-}2} = V_{PWR} - 2 \cdot \rho \cdot \frac{L_1 \cdot I_1}{S} - 2 \cdot \rho \cdot \frac{L_2 \cdot I_2}{S} =$$

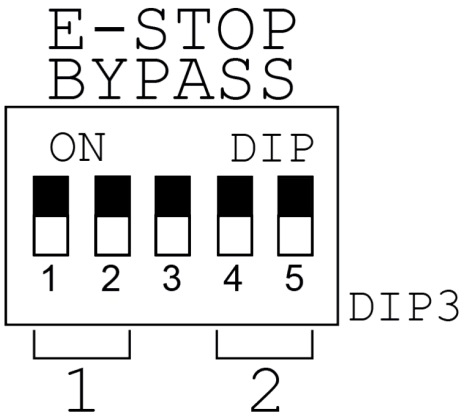
$$V_{BP1\text{-}2} = 24\,V - 2 \cdot 0.018 \frac{\Omega\ mm^2}{m} \cdot \frac{5\ m \cdot 2.4\ A}{2 \cdot 0.25\ mm^2} - 2 \cdot 0.018 \frac{\Omega\ mm^2}{m} \cdot \frac{10\ m \cdot 1.2\ A}{2 \cdot 0.5\ mm^2} = 22.7\ V$$

The configuration in the diagram functions correctly as the voltage resulting from the calculation, 22.7 V, is within the supply voltage range for P-Connect of 24 V ± 15%.

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8 Bypass of emergency stop buttons

Some of the BP gateway configurations can be used to manage up to two emergency stop buttons, but these are connected in series to each other inside the gateway. If you are not going to use both emergency stop buttons, it is necessary to bypass one of them using the "DIP3" switch (called "E-STOP BYPASS") located under the cover of the BP gateway.



If the first two switches "1" and "2" are switched "ON" this bypasses the first emergency stop button connected. The two switches "4" and "5" bypass the second emergency stop button connected. The switches must only be operated when the BP gateway is OFF, to prevent incoherent input test signal readings.

⚠ Warning: always check on the machine that the actual emergency stop configuration works as expected.

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9 EtherNet/IP™: Signalling LEDs

On the BP series connection box there are three LEDs to indicate the state of the device during normal operation:

- System status: multicolour signal, which through sequences of lighting, flashing and colour changes, indicates the various operating states of the device to the user, as well as any warnings or errors concerning internal electronic components;
- Network status: State monitoring of the connected Ethernet network;
- Module status: Signalling for diagnostic events.

⚠ Attention: The LEDs are NOT reliable indicators and it cannot be guaranteed that they provide accurate information. They should ONLY be used for general diagnostics during commissioning and troubleshooting. Do not attempt to use LEDs as operational signals.

9.1 Signalling LED “SYSTEM STATUS”

The predefined sensor operating states (OFF, RUN, ERROR, SET) are indicated by a constantly lit LED.

Every Warning / Error event is managed according to priority. A flashing LED always signals the highest priority event (lowest priority code = highest priority).

LED state	Description	Notes / Troubleshooting
Off ○	Not powered	No power supply: • Check the supply voltage • Check that the power supply cable is properly connected
Green ●	Online (RUN)	Normal device operation
Yellow ●	Wait	Waiting for network start-up • Check for possible signals on “NETWORK STATUS” and “MODULE STATUS” LEDs
Red ●	Error state	If steady red: serious internal error. • Restart the gateway • If the error persists, contact technical assistance
(((●)))		If flashing red, see Table 2

Table 1

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If an ERROR event is identified, the LED cycles between continuous light corresponding to the ERROR state (see Table 1) with one of the illumination sequences listed in Table 2, each of which corresponds to a different message type.

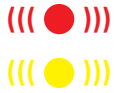
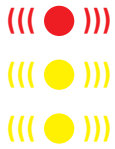
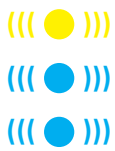
Priority code	LED flashing	Description	Notes / Troubleshooting
0	Red x 2 	Voltage error	Voltage out of permitted range: • After the gateway voltage has returned within the permitted threshold, restart the gateway
1	Red x 1 	Temperature error	Temperature out of permitted range: • After the gateway operating temperature has returned within the permitted threshold, restart the gateway
2	Red x 1 Yellow x 1 	Error - Supply current of connected devices	Device current exceeds permitted limit: • Separate the connected devices from the gateway, check for malfunctioning, and restart the gateway
3	Red x 1 Yellow x 2 	Error - Current at non-safety outputs	Current of connected devices exceeds permitted limit: • Separate the connected devices from the gateway, check for malfunctioning, and restart the gateway • Check that the load connected to the non-safety outputs is within the operating limits
4	Reserved		
5	Yellow x 1 Blue x 2 	Error - IP address	"ADDRESS" DIP switches in incorrect position: • Check that the DIP switches are correctly set to a value other than zero

Table 2

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If a WARNING event is identified, the LED cycles between continuous light corresponding to the current operating state (see Table 1) with the corresponding illumination sequence listed in Table 3.

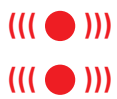
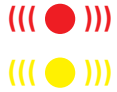
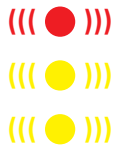
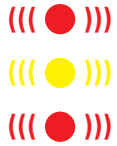
Priority code	LED flashing	Description	Notes / Troubleshooting
6	Red x 2 	Warning - Voltage	Voltage close to permitted limits: • Check the supply voltage of the gateway and adjust it to within the allowed range
7	Red x 1 	Warning - Temperature	Temperature close to permitted limits: • Check the operating temperature of the gateway and bring it back to within the allowed range
8	Red x 1 Yellow x 1 	Warning - Supply current of connected devices	Current close to permitted limits: • Check that there are no malfunctions on the devices connected to the gateway
9	Red x 1 Yellow x 2 	Warning - Total current on non-safety outputs above limit	Total current delivered on non-safety outputs close to permitted limits: • Check that there are no malfunctions on the devices connected to the gateway • Check that the load connected to the non-safety outputs is within the operating limits
10	Reserved		
11	Red x 1 Yellow x 1 Red x 1 	Warning - Safety inputs or outputs	Check inputs and outputs for short circuits

Table 3

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9.2 Signalling LED “NETWORK STATUS”

LED state	Description	Notes / Troubleshooting
Off ○	Offline	No power supply: • Check the supply voltage • Check that the power supply cable is properly connected No connection to the PLC: • Check that the network cable is properly connected • Check that an IP address has been assigned to the device
Green ●	Online and connected	Connection to the PLC established
Green, blinking (((●)))	Online	Online, no connection to the PLC established: • Check the configuration of the gateway
Red ●	Error - IP address	IP address duplicated: • Assign a unique IP address to the gateway
Red, blinking (((●)))	Connection timeout	The connection with the PLC has stopped working: • Check network cabling

9.3 Signalling LED “MODULE STATUS”

LED state	Description	Notes / Troubleshooting
Off ○	Not initialized	No power supply: • Check the supply voltage • Check that the power supply cable is properly connected Gateway not yet started up
Green ●	Online (RUN)	Gateway started up and in RUN state
Green, blinking (((●)))	Not configured and offline	Gateway awaiting configuration
Red ●	Internal error	Serious internal error: • Restart the gateway • If the error persists, contact technical assistance
Red, blinking (((●)))	Recoverable error	The current configuration of the gateway differs from that used by the PLC: • Check configuration

9.4 Signalling LED “L/A” (Link/Activity)

LED state	Description
Off ○	No link, no activity
Green ●	Link (100 Mbit/s) established
Green, flickering (((●)))	Activity (100 Mbit/s)
Yellow ●	Link (10 Mbit/s) established
Yellow, flickering (((●)))	Activity (10 Mbit/s)

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10 Communication data

10.1 Safety and non-safety inputs

The communication data that can be read in the various gateway configurations will be explained in the following paragraphs.

The process image of the exchanged safety data contains both the data and the status of the input or output to be read.

Bit	Function	Value	Description
DIx	Current state of the safety input x	0	Input not active (safe state)
		1	Input active
QDIx	Safety input qualifier x	0	Corresponding input is in error state
		1	Corresponding input is in normal state
QDOx	Safety output qualifier x	0	Corresponding safety output is in error state
		1	Corresponding safety output is in normal state

The signals marked with DI indicate the status of the safety inputs in real time. The qualification bits QDIx and QDOx indicate whether a safety-relevant error has been detected on the corresponding input or output channel of the BP gateway. The value "0" indicates that the state of the respective input or output has switched to fail-safe state due to a malfunction caused, for example, by a short circuit. The value "1" of the qualifier indicates proper functioning.

10.2 Safety and non-safety outputs

The output process image data is used, on the one hand, to check the states of the digital safety outputs of the BP gateway and, on the other hand, to send acknowledgement data for safety-relevant errors regarding the digital inputs and outputs of the gateway. If the safety input or output switches to fail-safe state, a reset of the associated qualifier is required to acknowledge the failsafe state of the PLC by setting the ERDIx/ERDOx bit to "1". Once the reset operation has been performed, reset the ERDIx/ERDOx bits to "0".

Bit	Function	Value	Description
DOx	Activation of safety output x	0	Output not active (safe state, low)
		1	Output active
ERDIx	Reset safety input qualifier x	0	Input error reset not requested
		1	Input error reset requested
ERDOx	Reset safety output qualifier x	0	Output error reset not requested
		1	Output error reset requested

⚠ Do not use qualifiers of safety inputs and outputs (QDIn and QDOn) to activate safety functions.

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11 Configuration of P-Connect using Studio 5000 Logix Designer®

P-Connect configuration starts with the project view screen (Fig. 1).

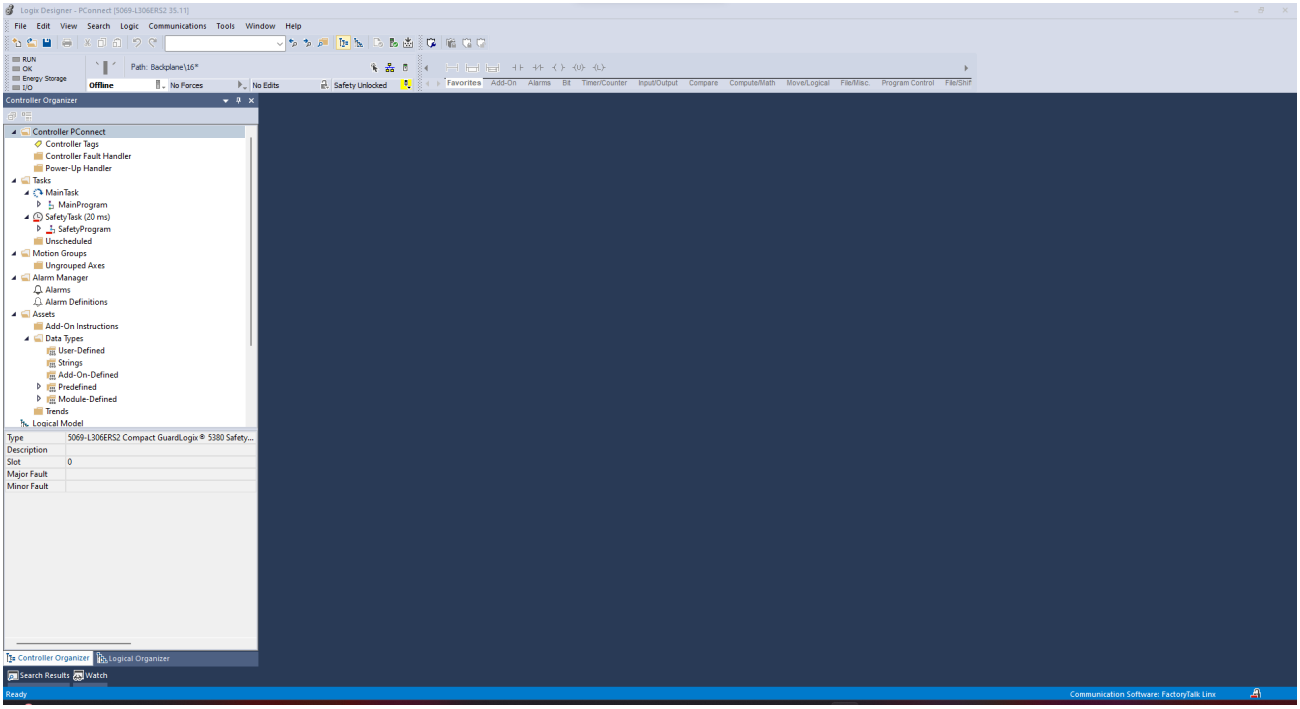


Fig. 1

11.1 Installation of configuration file

Before installing a new BP device, it is necessary to download the corresponding file (identified by the extension .EDS) in Studio 5000 Logix Designer, which contains the specific device configuration settings. It will then be possible to add the P-Connect to the project in both online and offline mode.

The configuration file can be downloaded from the website www.pizzato.com from the specific product page and has the filename BP_A1CLxxxx_r1.eds.

To install the EDS configuration file, go to the "Tools" menu and click on "EDS Hardware Installation Tool" (Fig. 2).

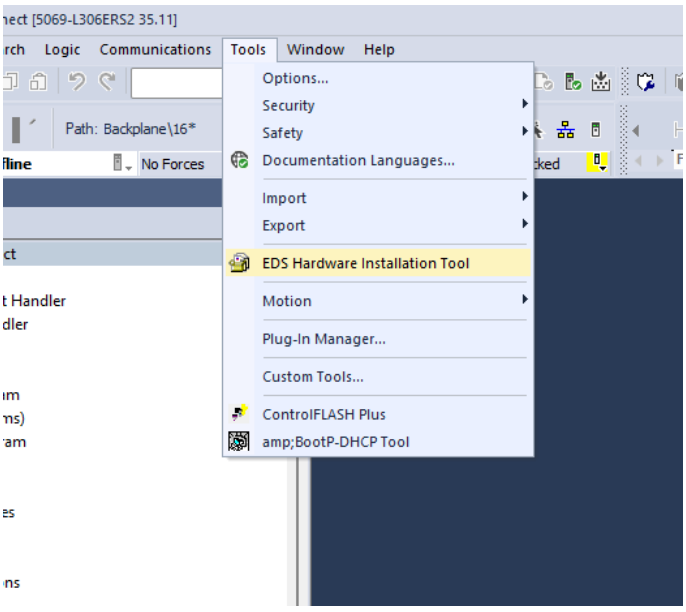


Fig. 2

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A window will appear with the name "Rockwell Automation's Device Wizard"; click "Next". On the following page, select "Register a device description file(s)" from the list and continue to the next step (Fig. 3).

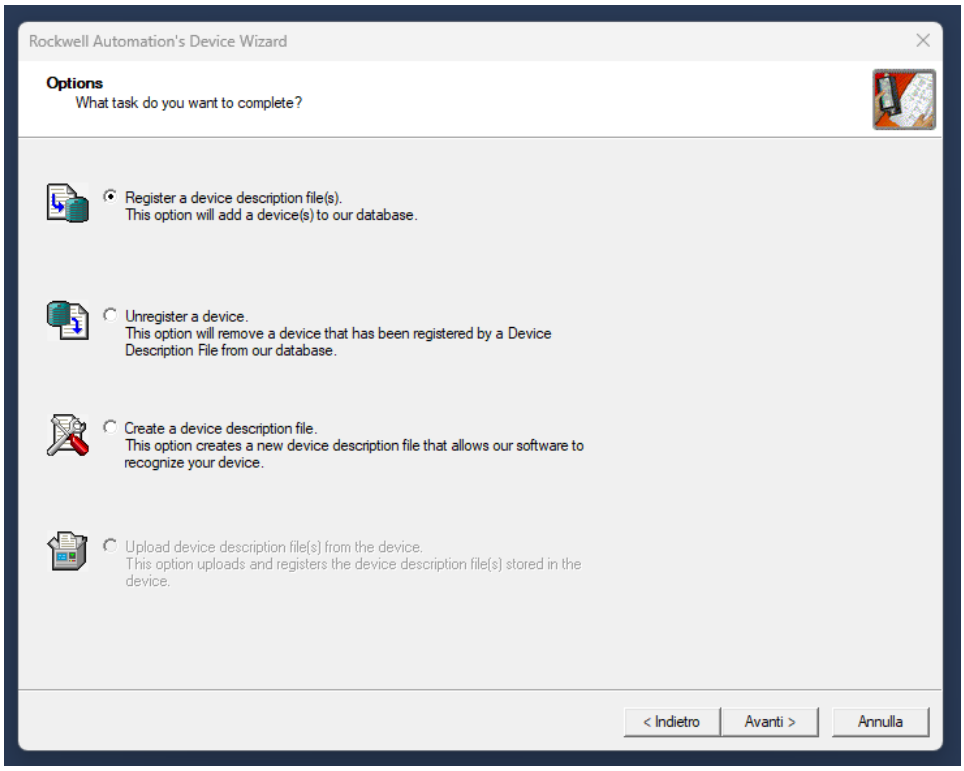


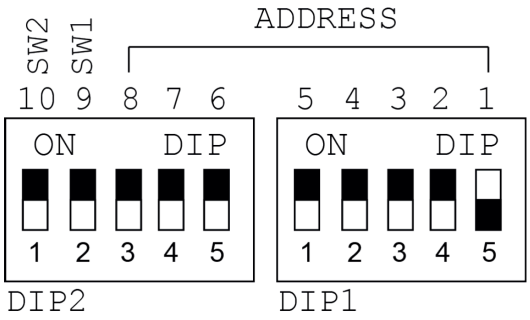
Fig. 3

Click the "Browse..." button, and select the location where the EDS file has been downloaded. Continue until installation is complete.

11.2 Setting/changing IP address

The housing contains 8 "ADDRESS" DIP switches that can be modified by the user and enable selection of one of the following modes:

- Freely changeable IP using Logix Designer (if all DIP switches are set to ON)(default condition);
- Fixed IP and settable from hardware.



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11.2.1 Setting IP address via hardware

The final 8 DIP switches are used for this purpose and represent the binary equivalent of the last octet of the IP address. The remainder (the first 3 groups of octets) is fixed to 192.168.1.xxx.
You can therefore set a value between 1 and 254 (255 allows to change the IP address by software) taking care that the address is not already in use by other devices on the network.
To change the IP address, therefore:

- Remove the four screws on the cover
- Change the position of DIP switches 1-8
- Close the cover, ensuring that a tightening torque of 1.2 Nm is applied
- Restart the device

Switches SW1 and SW2 are not used in this application.

11.2.2 Setting IP address via Logix Designer

If all the switches from 1 to 8 are in the ON position, the IP address can be changed directly using software.
In the "Communications" menu, click on "Who Active". From the page that opens, to launch the search, select the network on which the BP gateway has been installed. Click on the icon  of the corresponding line.

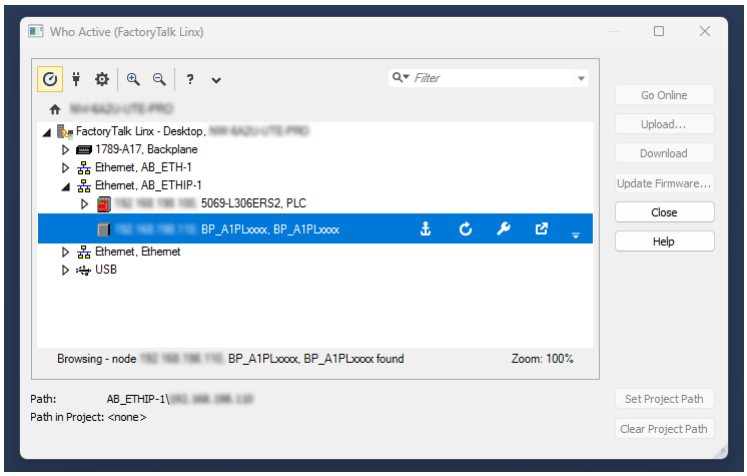


Fig. 4

On the tab "Internet Protocol", enter the new IP address and then click "Apply". A restart is required for the changes to be applied.

The factory default IP address is 192.168.1.1 and, when the change is activated via software, the previously set IP address is maintained until a new change is made.

Changing the position of DIP switches 1-8, followed by a restart, overwrites the previously set IP address.

⚠ Assign the IP address before using the safety device on the field.

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11.3 Adding an OFFLINE BP device

A new BP device can be added to the project without it being connected. Right click on the network port of the PLC where the BP will be connected and select "New Module..."

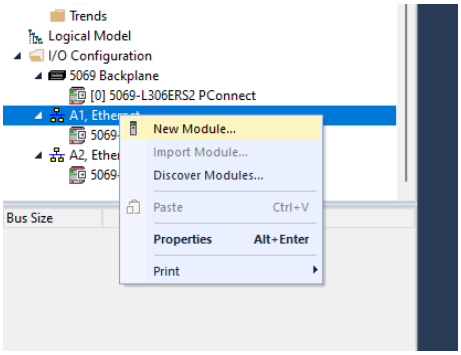


Fig. 5

A window will display all installed devices. Select the correct device, identifiable using the "Catalog Number" as "BP_A1CLxxxx" and click "Create".

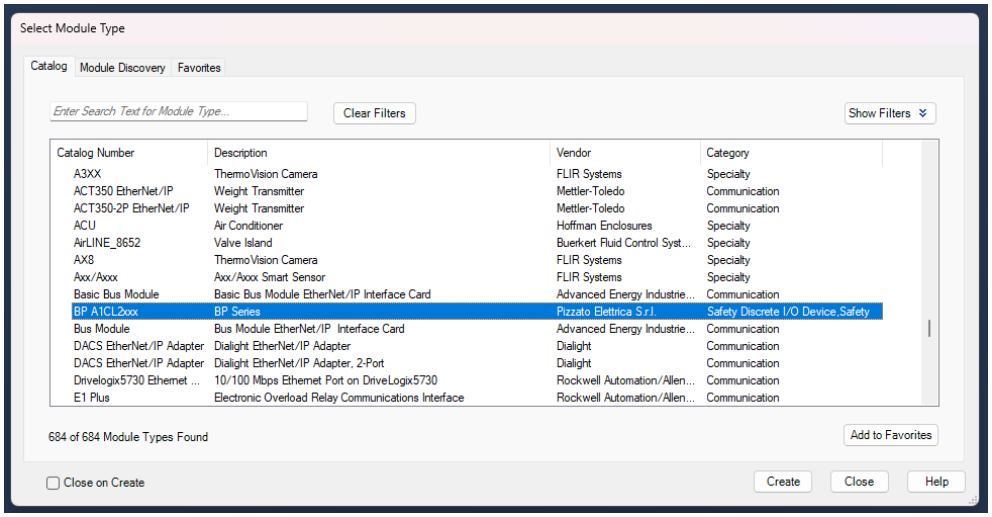


Fig. 6

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On the next page, the following parameters must be set in order to configure communication between the gateway and PLC:

- IP address
- Name (which will identify the module within the project)

The IP address must be the same address set as indicated in paragraph SETTING/CHANGING IP ADDRESS

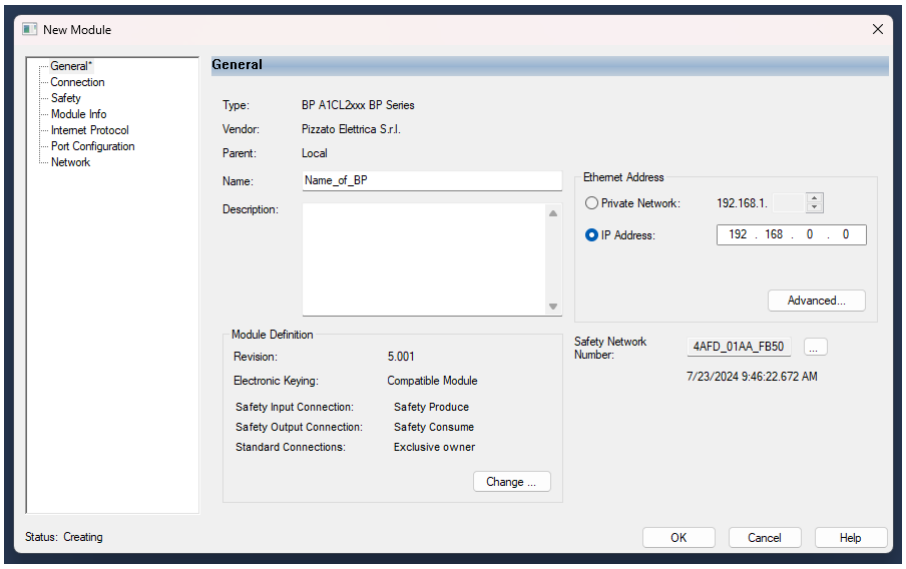


Fig. 7

On the "Safety" tab, unselect the box "Configuration Signature:" and click "OK".

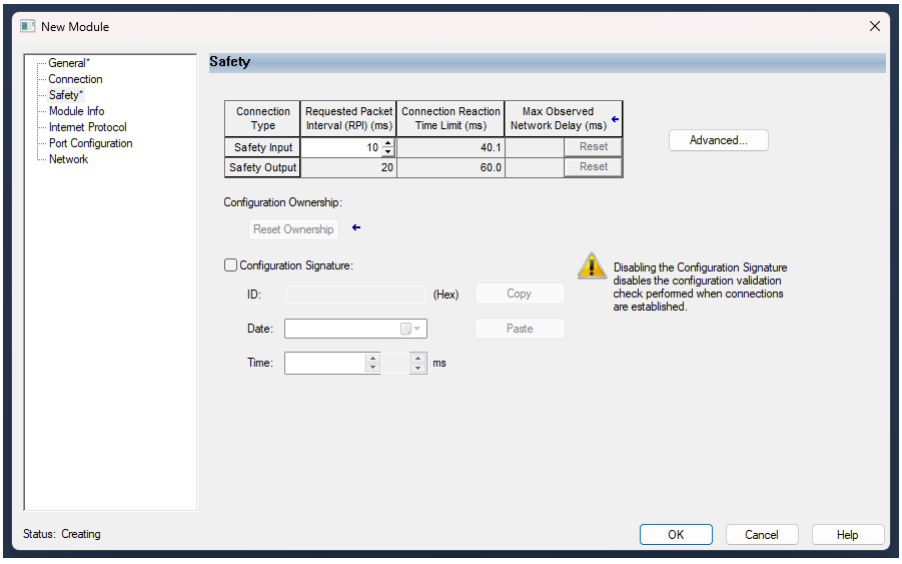


Fig. 8

The BP module will appear in the side bar on the left.

Download the project in the PLC.

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11.4 Adding an ONLINE BP device

Before adding the BP gateway to the project, ensure that the correct EDS file is already installed in Logix Designer and that the device is connected to the PLC network.

Switch the PLC to PROG mode and connect to it using the "Go Online" function.

Right click on the network port of the PLC where the BP will be connected and select "Discover Modules..."

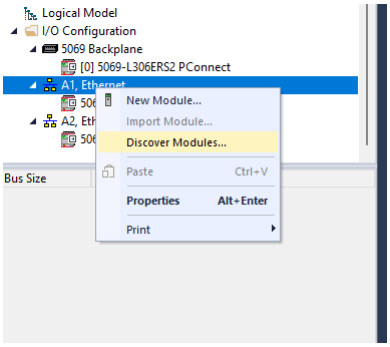


Fig. 9

Wait a few seconds until the BP is found and appears in the list, then click "Create".

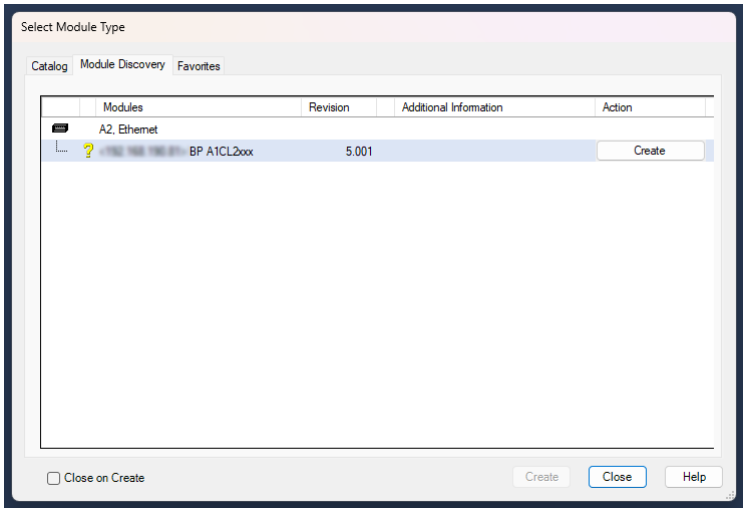


Fig. 10

Enter the name to be used to identify the BP module in the project and click OK. A new window will ask whether to create a new online module. Click "Yes".

At this point, the device status should be "running" and non-safety data will be exchanged.

To activate safety communication, the project must be set to "Offline". Next, in the gateway properties menu, click "Change..." in the section "Module Definition".

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In the window that appears, select "Safety Produce" for the first connection and "Safety Consume" for the second. Click "OK" when finished. A new window will request confirmation of the change to the module definition.

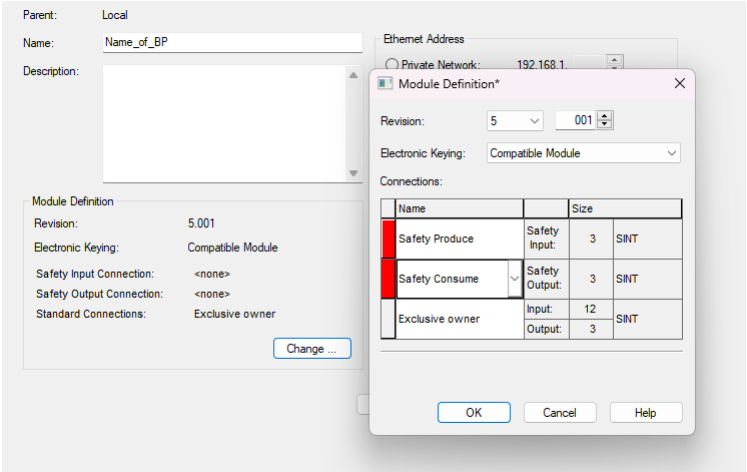


Fig. 11

Go online and download the project to complete installation.

11.5 Setting the Safety Network Number (SNN)

A Safety Network Number must be set for the BP gateway to ensure a unique connection between devices. To obtain this code, right click on the network name and select "Properties".

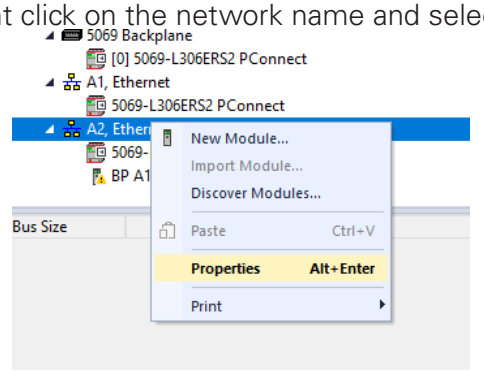


Fig. 12

The "Safety" tab will display all SNNs associated with each network.

Now, on the left bar, right click on the BP device and then select "Properties".

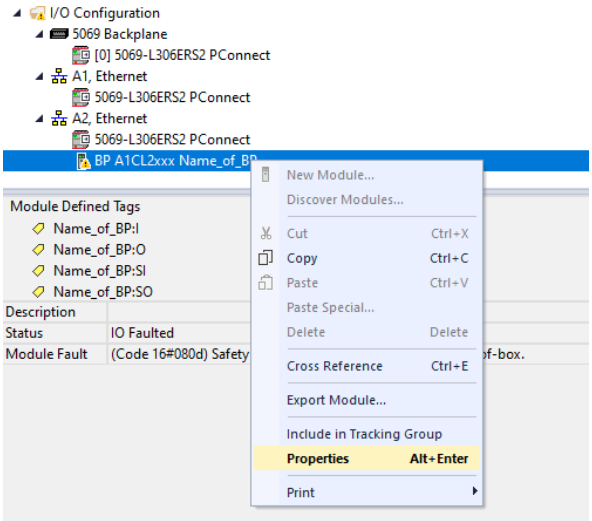


Fig. 13

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On the "General" tab, click the button "…" in the section "Safety Network Number".

The code that appears in the field must correspond with that displayed in the previous step. The default value should be correct. Click "Set" to apply it.

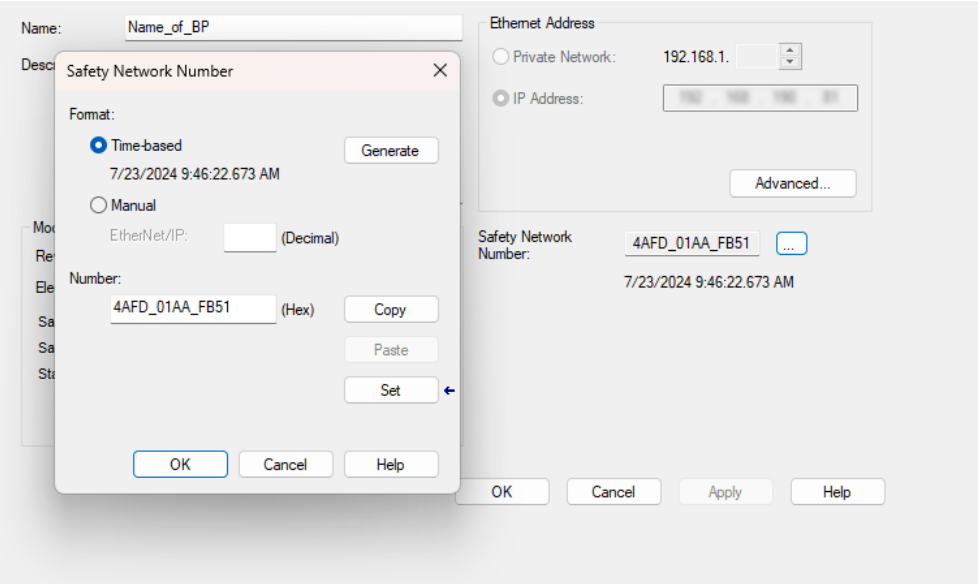


Fig. 14

⚠ Ensure that the SNN value for each subnetwork is unique on the entire system.

ⓘ In the event that the device has already been used and configured in another project, carry out a "Reset Ownership" before continuing.

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11.6 Conversion of hardware data

From the website www.pizzato.com it is possible to download a Logix Designer Add-On (see paragraph 11.7) that automatically converts all analogue values from the hardware into REAL data that are more easily legible for the user. Nevertheless, this activity can be performed using certain function blocks.

- Each data point is composed of 2 bytes that must be combined. Initially apply a "BTD" function on each data point to shift the most significant byte 8 bits to the left.
- Combine the data point from the previous step with the corresponding least significant byte using the "COP" function.
- The power supply voltage is expressed in [mV] and to display it in [V] the value must be divided by "1000". Use the "DIV" function for this purpose.

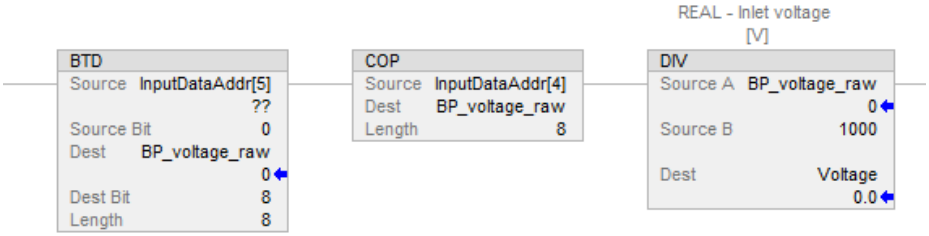


Fig. 15

- The temperature is indicated in [°C + 100], therefore use "SUB" to subtract "100".

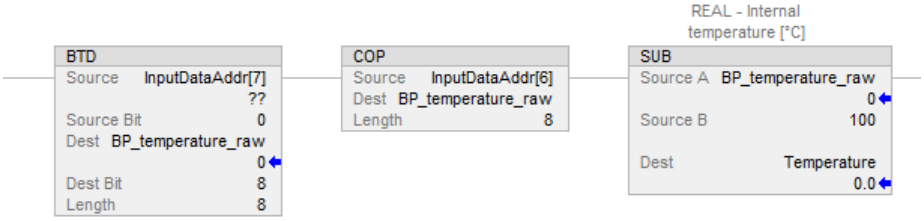


Fig. 16

- The current consumption is expressed in [mA] and to display it in [A] the value must be divided by "1000" using the "DIV" function.

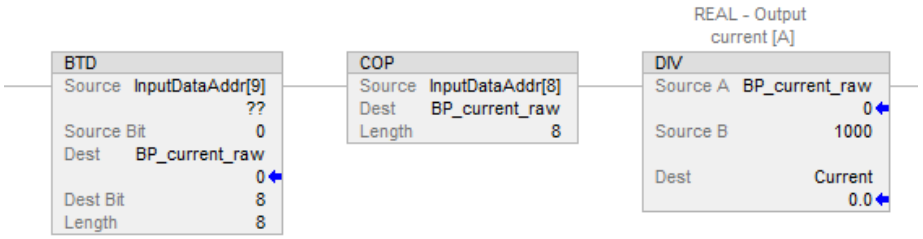


Fig. 17

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11.7 Pizzato Add-On

The Logix Designer Add-On supplied by Pizzato is optional but can provide an alternative solution for quicker installation of the gateway and creation of more easily legible PLC software.

It is freely available for download from www.pizzato.com with the filename "BP_AOI.L5X".

- To import it into the Logix Designer project, right click on "Add-On Instruction" in the lefthand menu. Select "Import Add-On Instruction…" and browse to the folder where the file has been downloaded. In the new window, click "OK" to confirm installation.

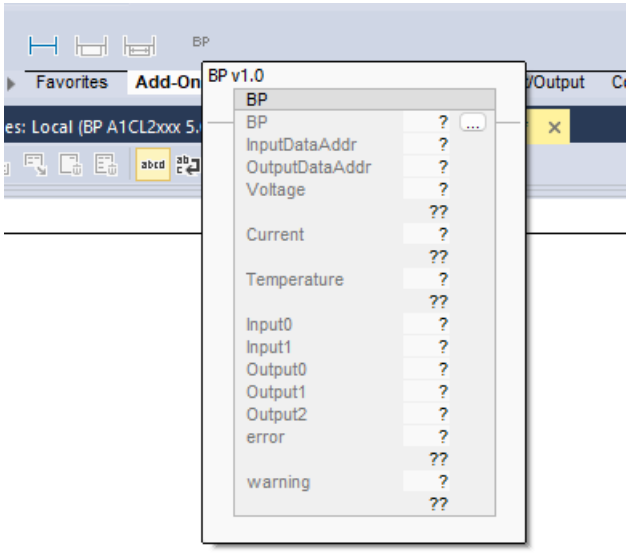


Fig. 18

- The instruction block to install the add-on in the program can be found in the "Language Element" bar of the "Add-On" tab. Simply drag it into the editor.
- Enter all parameters as follows:
  - **BP:** required to save all data from the function. Create a "BP" Controller Tag for this purpose.
  - **InputDataAddr:** location of the non-safety-input data from the gateway (typically Name_of_BP:I.Data)
  - **OutputDataAddr:** location of the non-safety-output data to be sent to the gateway (typically Name_of_BP:O.Data)
  - **Voltage:** REAL variable field in which the function writes the supply voltage in [V]
  - **Current:** REAL variable field in which the function writes the consumption current in [A]
  - **Temperature:** REAL variable field in which the function writes the internal temperature measured in [°C]
  - **Input*n*:** *n*-th byte of non-safety inputs as set out in the "WIRING INSTRUCTIONS" manual
  - **Output*n*:** *n*-th byte of non-safety outputs as set out in the "WIRING INSTRUCTIONS" manual
  - **Error:** error bit
  - **Warning:** warning bit

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12 Safety application rules

Warning 1	The BP gateway is designed to be used in the industrial automation sector or in process control systems. The BP gateway final user must verify if it is allowed to use the gateway in the final application.
Warning 2	The maximum supply voltage must not be exceeded to prevent permanent damage to the BP gateway.
Warning 3	An active sensor, connected to a DI-S input, must use the same VSS reference level as the BP gateway.
Warning 4	The minimum time between the change of a single safe input and the transmission to the safety field bus is 6 ms. In the case of simultaneous changes of the input level on all 6 safe digital inputs, the maximum reaction time of the safety application is 16 ms (approx. 2 ms processing time per changed input). The delay time introduced by the input and debounce filters must be added to the maximum reaction time.
Warning 5	The diagnostic test interval for dual channel DI-C inputs is 1 hour.
Warning 6	The test output signals are not isolated. They all use the same VSS ground potential.
Warning 7	When the safety signal is deactivated (safe state), the corresponding pin is not set to the VSS reference voltage.
Warning 8	The safe state of the digital outputs of the BP gateway is “off” (high impedance). Therefore, it is not permitted to connect a device or an external safety function (like a valve or a switch) that needs a “High” level to keep the safe state.
Warning 9	To obtain a safety protection level equal to SIL 3, PL e, Cat. 4, the digital outputs of the BP gateway must be activated and connected in dual channel mode.
Warning 10	The safety devices connected to the digital outputs of the BP gateway must be resistant to the test pulses of the safety outputs.
Warning 11	The diagnostic test interval for the safety outputs is 1 hour.
Warning 12	The maximum time between the reception of a safety telegram and the setting of the corresponding digital safety output is 7.7 ms.
Warning 13	The replacement of a faulty BP gateway can only be carried out by authorised and properly trained personnel. After replacement it is necessary to perform testing and validation of all the safety functions.
Warning 14	The internal temperature of the BP gateway has to be regarded as non-safety data and therefore must not be used to control any safety function on the safety controller side.
Warning 15	All downloads of a new program must be verified by the installer via safety application tests. The configuration can only be considered as “verified” (and settings definitive) once the tests have been successfully completed.
Warning 16	Test safety-connection configurations after having applied them on an originator to confirm that the intended connection is functioning as desired.
Danger 1	No repairs or changes to the BP gateway are allowed.
Danger 2	The BP gateway must be powered by a 24 V SELV/PELV power supply unit according to EN 60950-1, which limits maximum voltage in case of failure to 60 V.

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Danger 3	The maximum operating life of the BP gateway must not exceed the 'mission time' (20 years). When the limit of the mission time is reached, the BP gateway must be replaced and permanently taken out of service.
Danger 4	The safety inputs must be configured as dual channel safe input to obtain a safety protection level of SIL 3, PL e, Cat 4. Additional measures may be necessary to exclude wiring faults or for the use of certified components.
Danger 5	The single-channel safety inputs of the BP gateway should only be used for safety applications if special precautions are applied. The safe operation of a single-channel input always requires additional safety measures or fault exclusions which must be taken into account in the overall design concept of the safety system. The values for SIL/PL are affected by the single-channel architecture. With single-channel applications, SIL 3/PL e cannot be achieved.
Danger 6	After detecting a safety-critical error, the BP gateway must not be kept in a safe state for more than 1 hour.
Danger 7	A faulty BP gateway must be replaced immediately.
Danger 8	If the BP gateway is on and does not correctly switch to the RUN state within a maximum of 8 hours, the gateway must be restarted. Subsequently, it must be checked by experienced service personnel to ensure safe operation.
Danger 9	The maximum operating altitude of 2000 m must not be exceeded.
Attention 1	The digital inputs not connected in dual channel mode will cause the BP gateway to signal inactive safety state for both channels.
Attention 2	Due to hardware limitations, the BP gateway with 3 dual channel inputs and a dual channel output has only one pair of configurable Test Outputs (TO).
Attention 3	The safety-related parts of the EDS (Electronic Data Sheet) of the BP Gateway must not be modified.

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13 Technical data

1) Housing

Housing:	Metal housing, powder-coated
Protection degree:	IP65 acc. to EN 60529 (with connectors of equal or higher protection degree)
Dimensions:	See paragraph DIMENSIONED DRAWING

2) Environmental data

Operating temperature:	-15°C … +50°C
Storage temperature:	-30°C … +70°C
Environmental rating:	2
Overvoltage category:	III

3) General data

Safety parameters	Maximum SIL	PL	Cat.
Monitoring function for the safety inputs of the BP gateway	3	e	4
Activation function for single-channel safety outputs of BP gateway	1	c	1
Activation function for dual-channel safety output of BP gateway	3	e	4

4) Power supply

Rated voltage (U_e):	24 Vdc SELV/PELV
Supply voltage tolerance:	±15%
Operating current at U_e voltage:	
- no devices connected:	0.1 A
- maximum supported current:	3.1 A
Insulation voltage U_i:	32 V
Shock and vibration resistance:	acc. to EN 60947-1
EMC protection:	acc. to EN 61000-4 and EN 61326-3-1
External protection fuse:	4 A type gG for a single BP gateway; for series connection the total load must be calculated

Features approved by UL:	
Electrical ratings:	24 Vdc, Class 2, 3.1 A Max
Environmental Ratings:	Type 1

Functional safety has not been evaluated by UL Solutions.

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5) Input and output circuits:

Number of safety inputs:	3 dual-channel
Number of safety outputs:	1 dual - channel (or 2 single - channel)
Number of non-safety inputs:	14
Number of non-safety outputs:	24
Number of test outputs:	2
Maximum voltage that can be applied to non-safety inputs:	24 Vdc ± 10%
Rated voltage of non-safety outputs:	24 Vdc
Maximum control current at non-safety outputs:	50 mA
Maximum current at test outputs:	100 mA
Maximum current at safe outputs:	250 mA

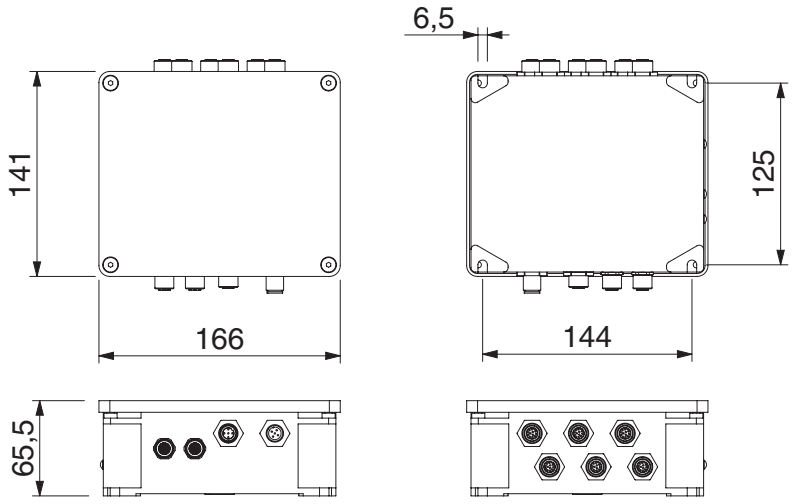
6) Compliance with standards:

EN 60947-1, EN 61326-1, EN 61326-3-1, EN IEC 63000, EN 60529, IEC 61784-3-3, EN 61508, EN 62061, EN ISO 13849-1, UL 61010-1, CSA NO. 61010-1, EN 61131-2.

7) Compliance with the requirements of:

Machinery Directive 2006/42/EC, EMC Directive 2014/30/EU, RoHS Directive 2011/65/EU.

14 Dimensioned drawing



All values in the drawings are in mm.

15 Markings

The outside of the device is provided with external marking positioned in a visible place. Marking includes:

- producer trademark
- product code
- batch number and date of manufacture. Example: A23 CS1-123456. The batch's first letter refers to the month of manufacture (A=January, B=February, etc.). The second and third letters refer to the year of manufacture (23 = 2023, 24 = 2024, etc…).

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16 Disposal



At the end of its service life, the product must be disposed of properly, according to the rules in force in the country in which the disposal takes place.

17 Support

The device has been created for safeguarding people's physical safety, therefore in case of any doubt concerning installation or operation methods, always contact our technical support service:

Pizzato Elettrica Srl - Italy

Via Torino, 1 - 36063 Marostica (VI)

Telephone +39.0424.470.930

E-mail tech@pizzato.com

www.pizzato.com

Our support service provides assistance in Italian and English.

18 EC Declaration of Conformity

I, the undersigned, as a representative of the following manufacturer:

Pizzato Elettrica Srl - Via Torino, 1 - 36063 Marostica (VI) – ITALY

hereby declare that the product is in conformity with whatever prescribed by the 2006/42/EC Machine Directive. The complete version of the present conformity declaration is available on our website www.pizzato.com

Marco Pizzato

DISCLAIMER:

Subject to modifications without prior notice and errors excepted. The data given in this sheet are accurately checked and refer to typical mass production values. The device descriptions and its applications, the fields of application, the external control details, as well as information on installation and operation, are provided to the best of our knowledge. This does not in any way mean that the characteristics described may entail legal liabilities extending beyond the "General Terms of Sale", as stated in the Pizzato Elettrica general catalogue. Customers/users are not absolved from the obligation to read and understand our information and recommendations and pertinent technical standards, before using the products for their own purposes. Taking into account the great variety of applications and possible connections of the device, the examples and diagrams given in the present manual are to be considered as merely descriptive; the user is deemed responsible for checking that the specific application of the device complies with current standards. This document is a translation of the original instructions. In case of discrepancy between the present sheet and the original copy, the Italian version shall prevail. All rights to the contents of this publication are reserved in accordance with current legislation on the protection of intellectual property. The reproduction, publication, distribution and modification, total or partial, of all or part of the original material contained therein (including, but not limited to, texts, images, graphics), whether on paper or in electronic form, are expressly prohibited without written permission from Pizzato Elettrica Srl.

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