USER MANUAL

ZE-P SERIES

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Date	Revision	Notes
10/02/2023	0	First Revision
13/04/2023	1	Update time updated Some screenshots of the step-by-step configuration replaced
17/04/2023	2	English version

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Contents

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1.1. COMPARISON BETWEEN THE MODELS IN THE SERIES

MODEL	*NR 4 DIGITAL INPUTS WITH COUNTERS*	*NR 2 ANALOG INPUTS*	*NR 2 DIGITAL OUTPUT RELAYS*	*NR 1 ETHERNET 100 Mb*	*NR 1 RS485 NR1 RS485/RS232*
ZE-2AI-P	NO	YES	NO	YES	NOT USED
ZE-4DI-2AI-2DO-P	YES, NO COUNTERS	YES	YES	YES	NOT USED

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1.2. ANALOGUE INPUTS AND MEASUREMENT UPDATE TIME

All models include 2 analogue inputs (max resolution 16 bit) which can be configured separately for current or voltage.

1.2.1. Sampling time and refresh value on Profinet bus

The sampling time is a parameter that can be modified from the hardware configuration of the Profinet IO Master and is unique for both channels.

The range of possible values varies from 10 ms to 300 ms in steps of 1 ms.

Considering that there are 2 channels in total, the measurement update time of a single channel is double the set sampling time.

Depending on the sampling time set, the measurement update times detected (with 2ms Profinet update time) are shown in the following table:

SAMPLING TIME CONFIGURATION FOR CHANNEL 1 AND 2	REAL PROFINET REFRESH TIME PER CHANNEL
10 ms	About 60 ms
20 ms	About 80 ms
40 ms	About 120 ms

1.2.2. Measurement resolution and stability

The resolution of the analogue digital converter (ADC) depends on the set sampling time, in particular:

If the sampling time of the channel is < 150 ms the ADC is set with a resolution of 12 bits

If the sampling time of the channel is >= 150 ms the ADC is set with a resolution of 16 bits

In addition to the resolution of the measurement, it should be noted that the greater the sampling time, the lower the stability of the measurement.

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1.3. ETHERNET COMMUNICATION

ZE models include a fast Ethernet port (100Mbit); the built-in TCP-IP protocol supports:

-static IP or DHCP address

-Gateway support

-Profinet IO device protocol

-Web server (password/user protection)

The default configuration for the Ethernet port is:

- static IP address 192.168.90.101

ATTENTION!

BEFORE CONNECTING A ZE MODULE TO THE DATA NETWORK (ETHERNET PORT), MAKE SURE THAT THE IP ADDRESS 192.168.90.101 IS NOT USED BY ANOTHER ETHERNET DEVICE.

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1.4. CONNECTION TO THE WEB SERVER

To access the webserver, open a browser and type (with default IP address):

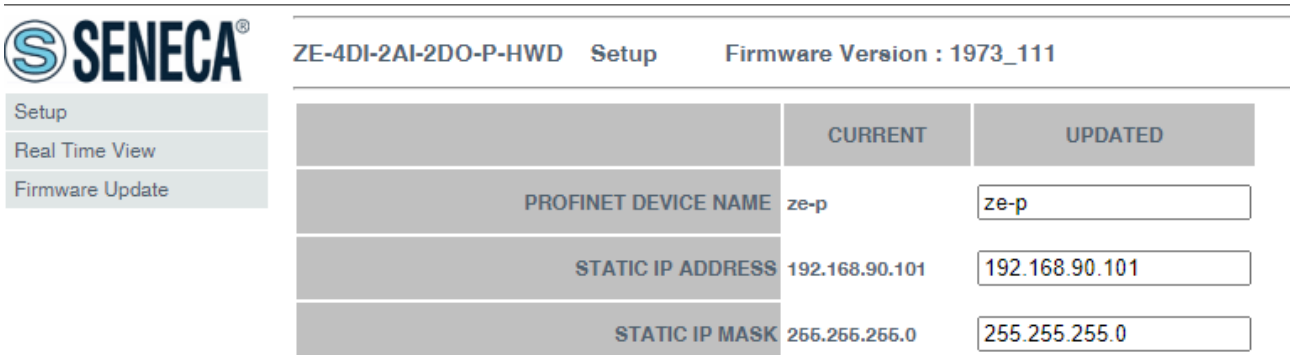
http://192.168.90.101/

The default username and password are:

Username: admin

Password: admin

If the IP configuration is successful, the web server appears as follows:



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2. PROFINET IO

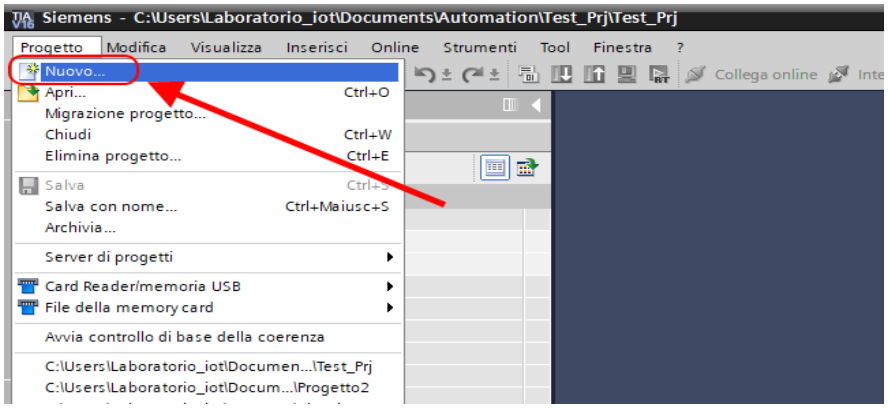
Type of protocol: Class A Device, Cyclic Real-time (RT) and Acyclic Data

The device has been tested using the following PLCs:

SIEMENS S7 1200 and 1500 (TIA Portal 16)

2.1. STEP BY STEP CREATION OF A PROJECT WITH SIEMENS PLC (TIA PORTAL 16)

Creating a new project:



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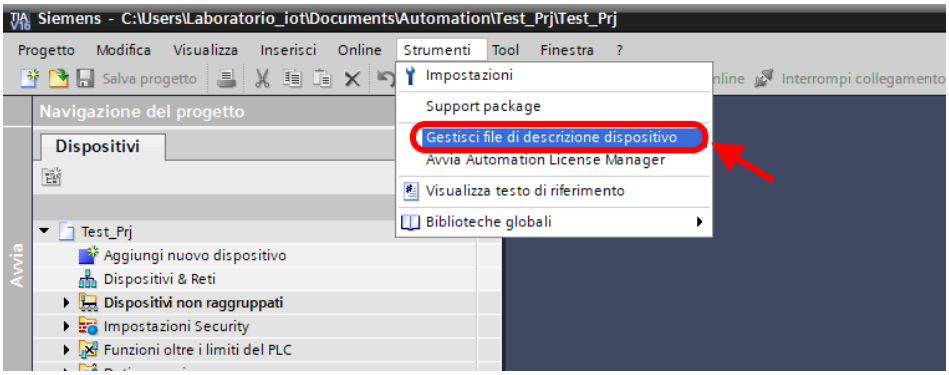
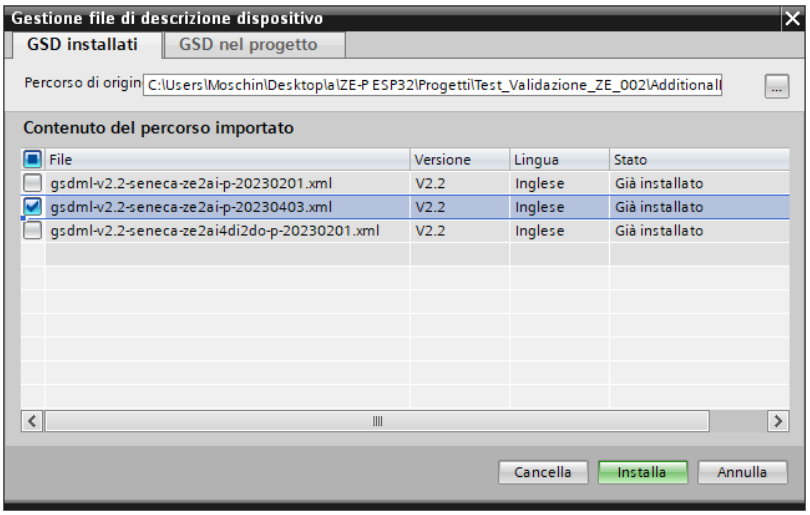
2.1.1. INSTALLING THE GSD FILE

Install the GSD file of the Seneca product:



Point to the directory where the file is and press OK, then the list of GSD files in the folder will appear:



Click on "install".

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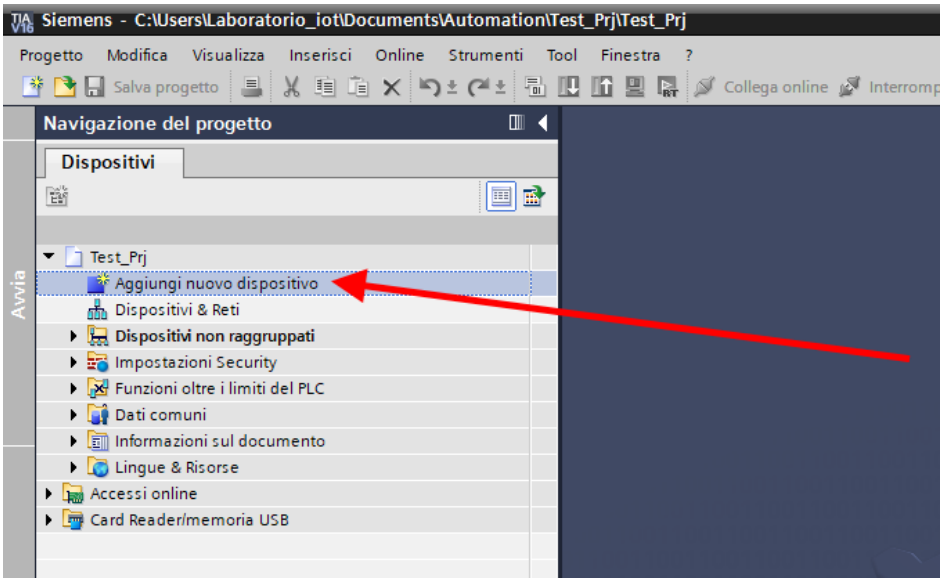
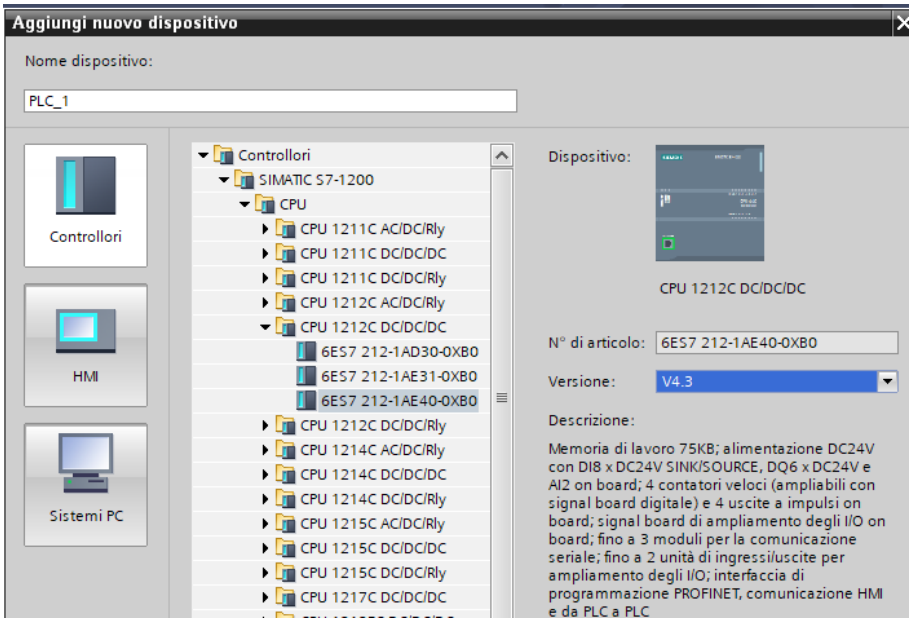
2.1.2. INSERTION OF THE SIEMENS PLC IN THE PROJECT

Now insert the Siemens PLC (in our example a SIEMATIC S7 1200), click on "Add new device ...":





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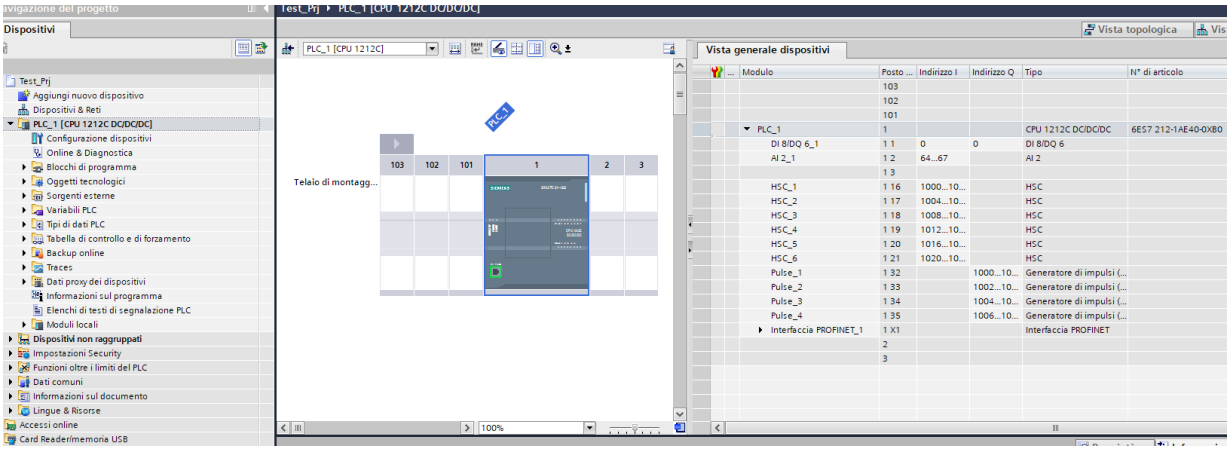
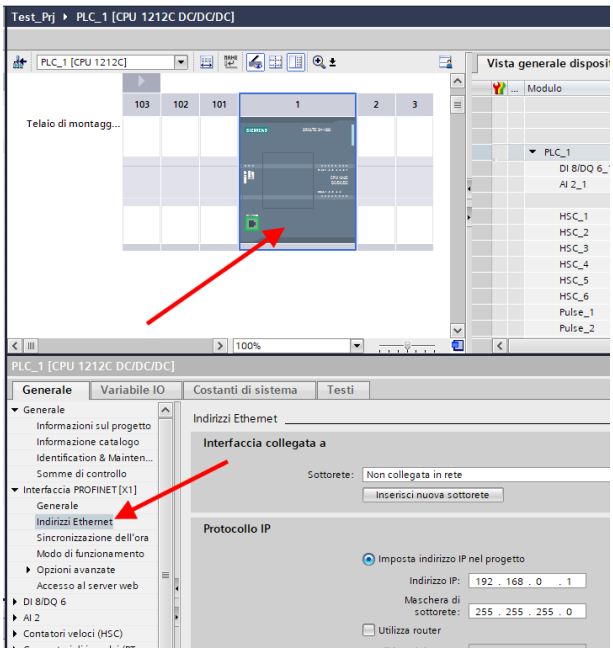
Confirm and the PLC will be added to the rack:



Now click on the PLC and select Profinet interface -> Ethernet addresses



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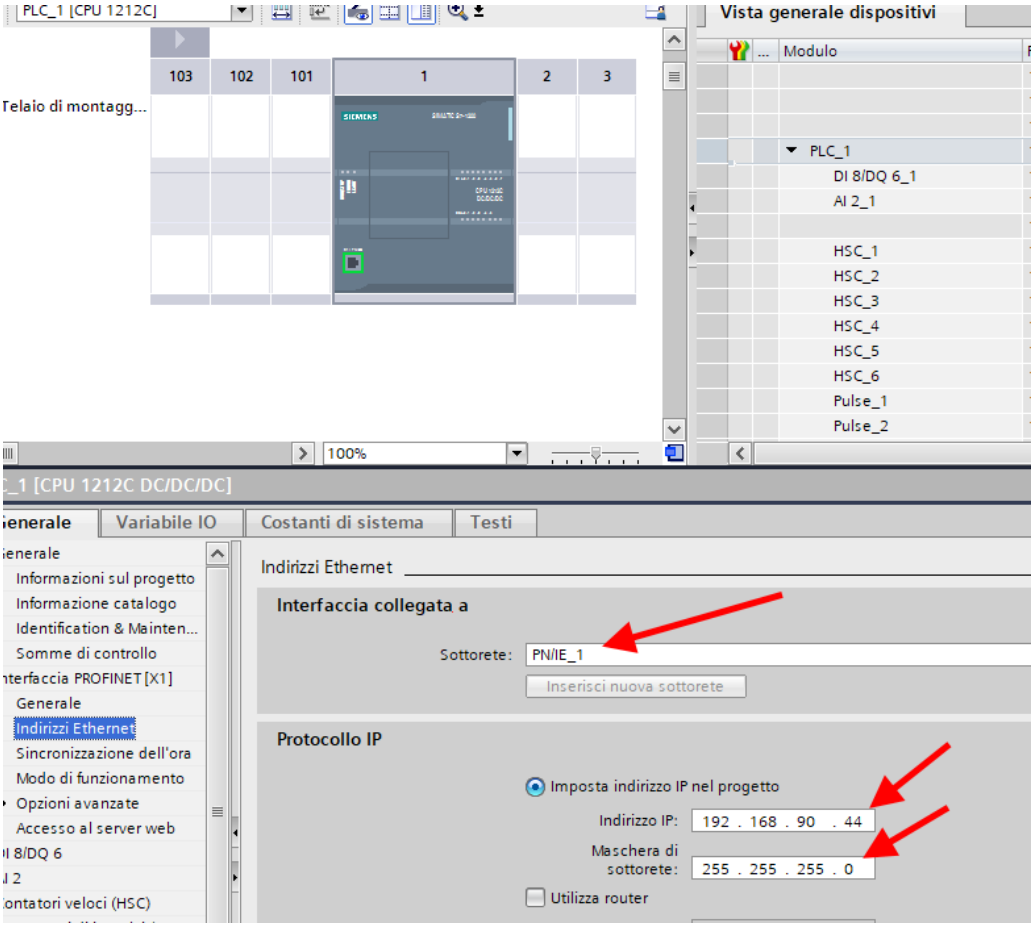
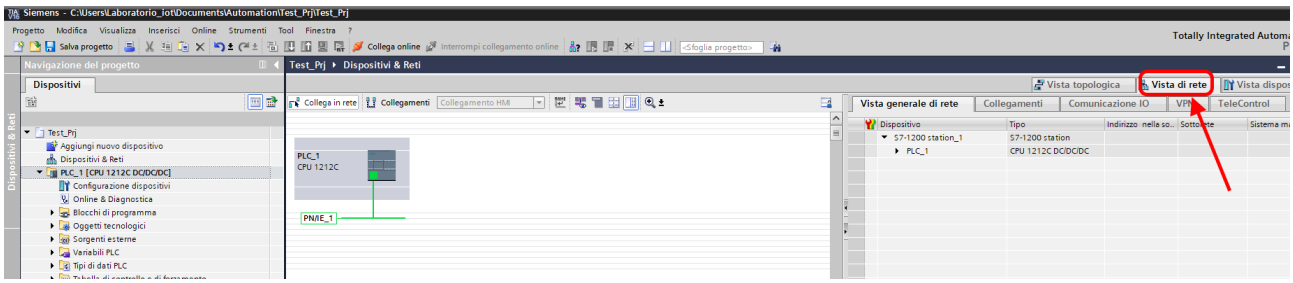
Set the IP you want (in this case 192.168.90.44) and the PLC subnet:



Move on to the network view:



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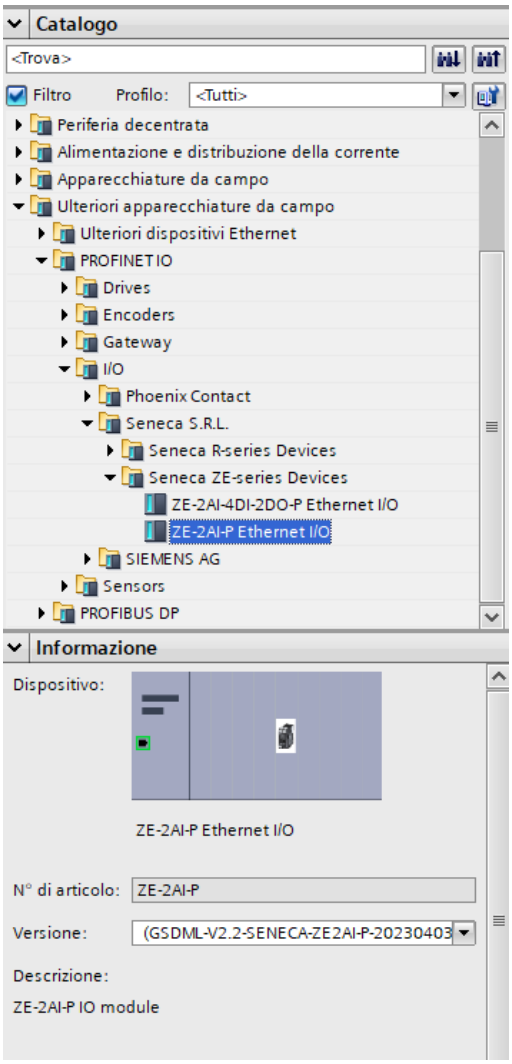
2.1.3. INSERTION OF THE PROFINET SENECA IO

On the right, select "Hardware Catalogue" and then under "Additional Field Device" ->PROFINET IO -> I/O -> Seneca ZE-Series-> Header module (in the example a ZE-2AI-P device is shown):



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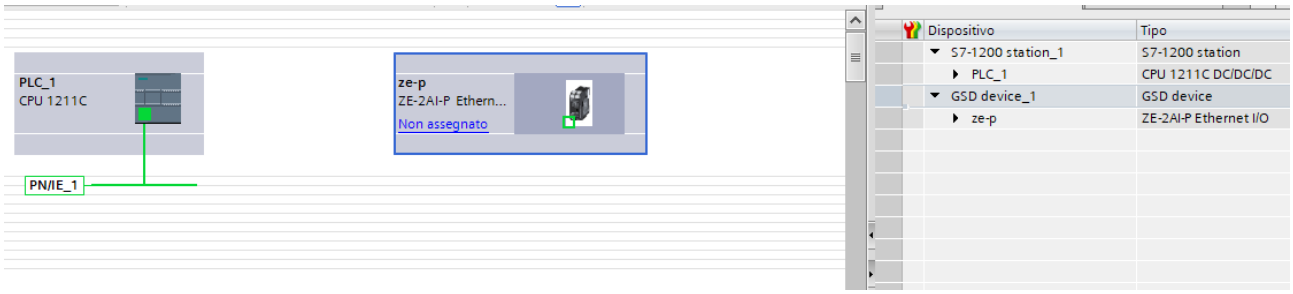
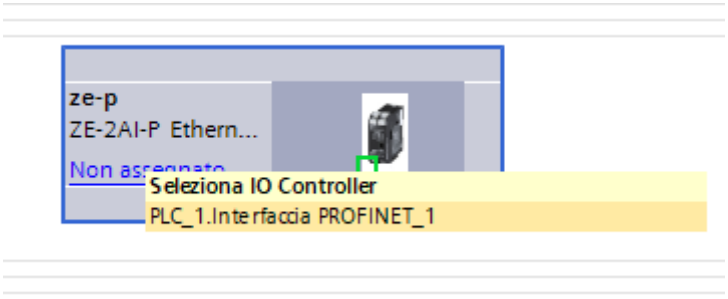
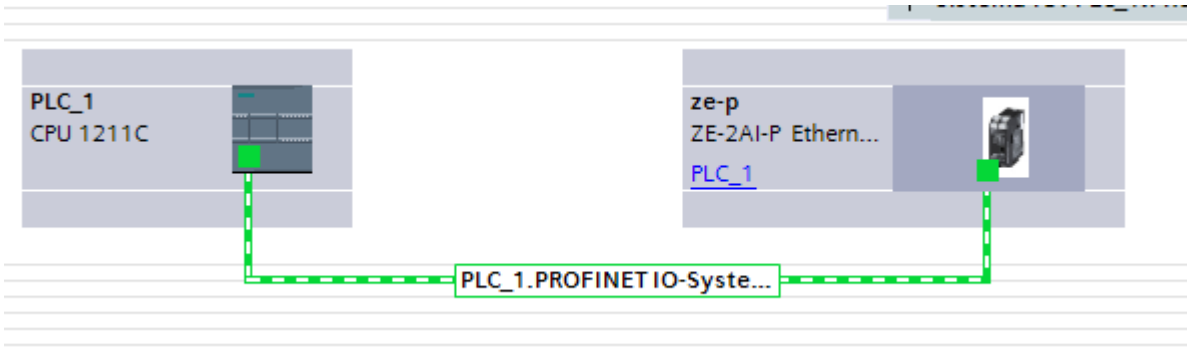
Drag the device to the network view:



Now associate it to the PLC by clicking with the left mouse on "Not assigned" and then select the PLC:





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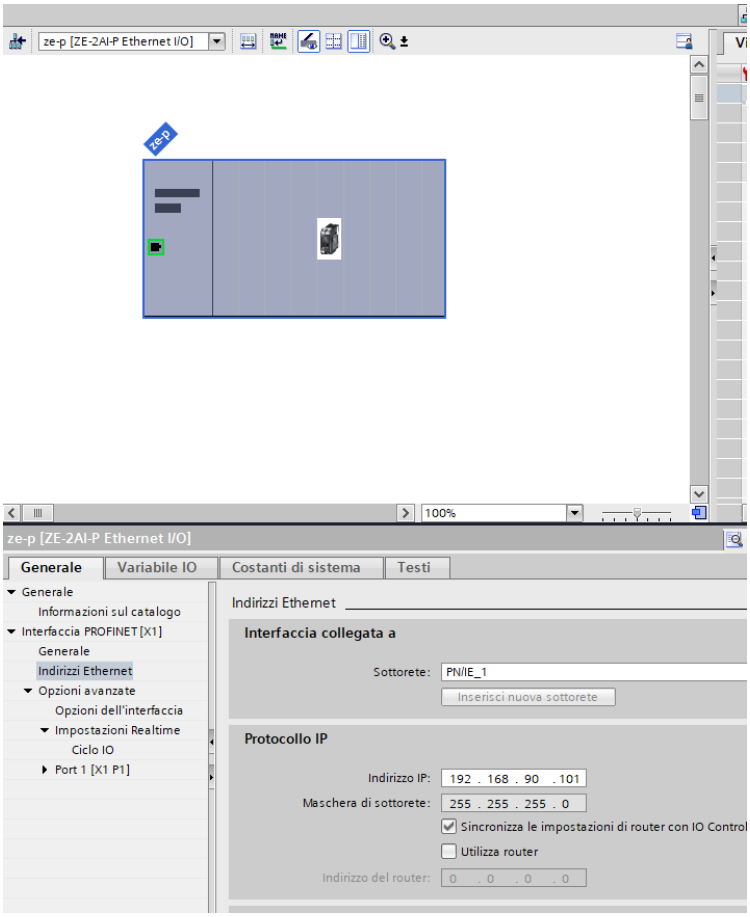
Click twice on the Seneca device and configure the IP address here too (for example 192.168.90.48):



In Profinet the devices are identified by their name, so right click on the Seneca device and select "Assign device name"

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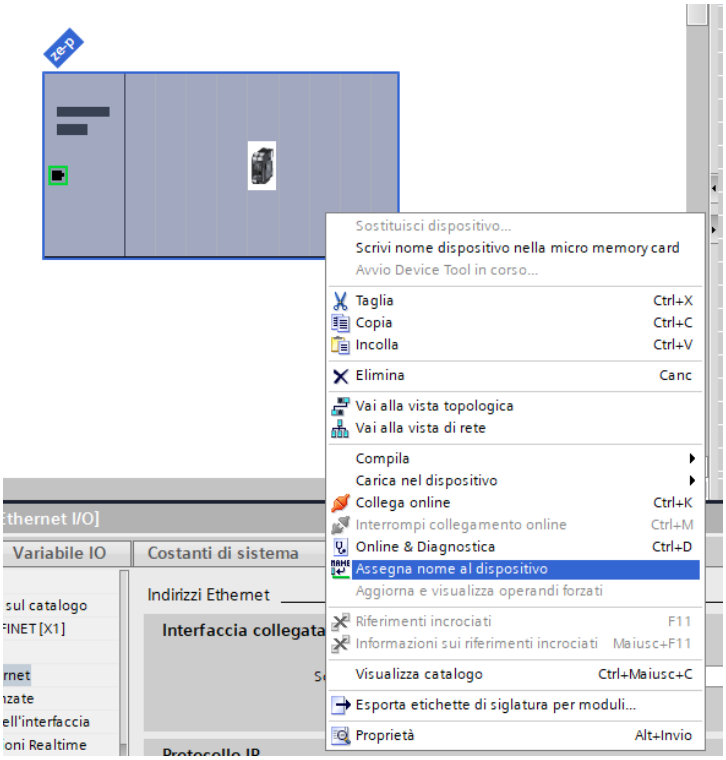

Scan the network with "Update list" and set (if necessary) the device name with "Assign name".

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2.1.4. I/O DATA

Depending on the model, the device provides the following data:

ZE-2AI-P MODEL

SLOT	*No. OF BYTES*	*TYPE*	*INFO*
AIN ENG	*4*	*READ*	*Represents the measurements of the two analogues scaled in engineering units. The scale values can be set via the hardware configuration of the Profinet IO Master.* *Byte[0][1] = AIN1 value* *Byte[2][3] = AIN2 value*
AIN *(optional)*	*4*	*READ*	*Represents the measurements of the two analogues in mV/uA* *Byte[0][1] = AIN1 value* *Byte[2][3] = AIN2 value*
DIAGNOSTIC *(optional)*	*1*	*READ*	*Allows to detect the anomaly status related to the analogue measures. The interpretation is to be carried out in bits as follows:* *bit .0 = NOT USED* *bit .1 = AIN1 underflow* *bit .2 = AIN1 overflow* *bit .3 = AIN2 underflow* *bit .4= AIN2 overflow*

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ZE-4DI-2AI-2DO-P MODEL

SLOT	*No. OF BYTES*	*TYPE*	*INFO*
AIN ENG	*4*	*READ*	*Represents the measurements of the two analogues scaled in engineering units. The scale values can be set via the hardware configuration of the Profinet IO Master.* *Byte[0][1] = AIN1 value* *Byte[2][3] = AIN2 value*
DIN/DOUT	*2*	*1 BYTE READ* *1 BYTE WRITE*	*Represents the states of the digital inputs and digital outputs.* *READ:* *bit .0 = DIN1* *bit .1 = DIN2* *bit .2 = DIN3* *bit .3 = DIN4* *WRITE:* *bit .0 = DOUT1* *bit .1 = DOUT2*
AIN *(optional)*	*4*	*READ*	*Represents the measurements of the two analogues in mV/uA* *Byte[0][1] = AIN1 value* *Byte[2][3] = AIN2 value*
DIAGNOSTIC *(optional)*	*1*	*READ*	*Allows to detect the anomaly status related to the analogue measures. The interpretation is to be carried out in bits as follows:* *bit .0 = NOT USED* *bit .1 = AIN1 underflow* *bit .2 = AIN1 overflow* *bit .3 = AIN2 underflow* *bit .4= AIN2 overflow*

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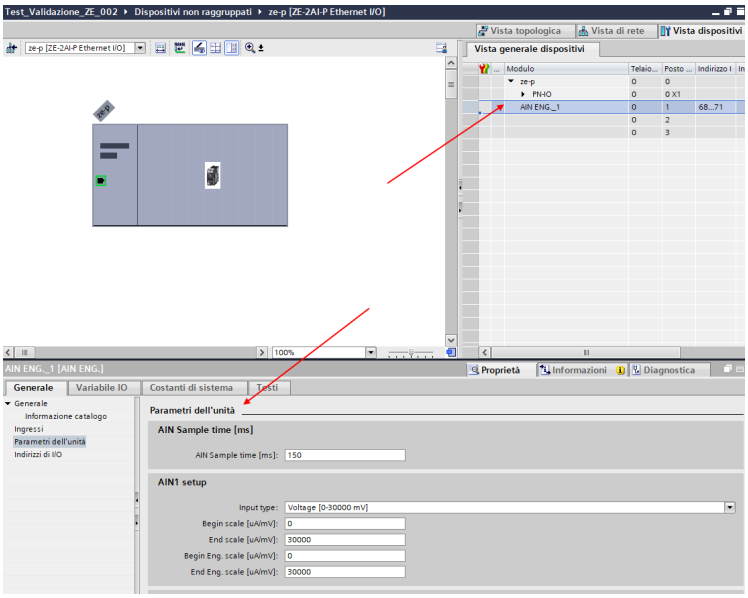
2.1.5. CONFIGURATION OF THE PARAMETERS OF THE SENECA IO

It is possible to configure the device directly from the development environment of the Profinet IO Master without any external software aid.

To obtain this, from the hardware configuration of the project, click on the ZE series IO device to bring up the details of the "Unit parameters":



Carry out the desired parameterization and then recompile and download the project into the target PLC. At the next start of the PLC the configuration will be sent directly to the device via Profinet.

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2.1.5.1. CONFIGURATION PARAMETERS OF THE ZE-P SERIES

AIN Sample Time [ms]

Allows you to set the sampling time of the analogue inputs.

For information on the possible values and behaviour of the channels, see par. 1.2.1

AIN Setup

Input Type: Select if the respective input is a voltage or current input

Begin Scale [mV/uA]: measurement scale start, expressed in mV [0-30000 mV] or in uA [0-20000 uA]

End Scale [mV/uA]: scale of measurement end, expressed in mV [0-30000 mV] or in uA [0-20000 uA]

Begin Eng. Scale: Engineering scale start, associated with the measurement scale start [-32768 - + 32767]

End Eng. Scale: Engineering scale end, associated with the start of the measurement scale [-32768 - + 32767]

Example:

Input Type = Current

Begin Scale = 4000 [uA]

End Scale = 20000 [uA]

Begin Eng. Scale = 0

End Eng. Scale = 1000

The engineering measure will be 0 with an input of 4 mA, it will be 1000 with an input of 20 mA and will follow a linear trend between these two extremes, for example it will be 500 with an input of 12 mA (50% of the electrical scale)

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DIN/DOUT Setup

DIN Input Type: Selects the type of digital input if PNP or NPN

DOUT Fail mode: Selects whether or not to activate the fail state in case of communication timeout. If the PLC no longer communicates for the set Timeout time, then the digital outputs go into the FAIL state.

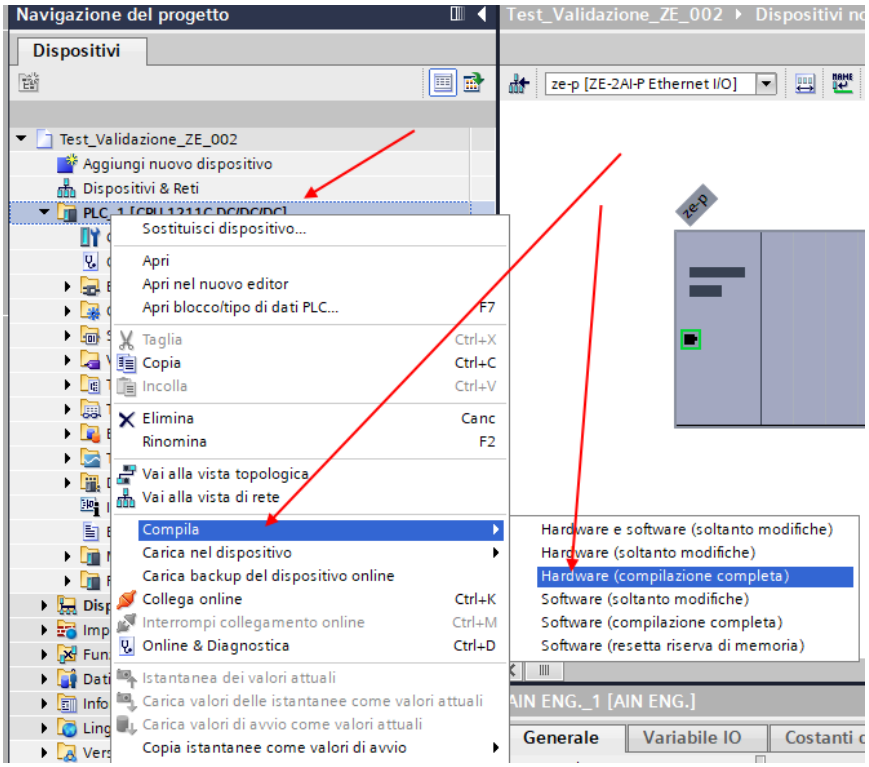
DOUT Fail Timeout [s]: allows you to set the communication Timeout time in seconds after which the outputs are brought to the FAIL state.

DOUT1/DOUT2 when in fail mode: Sets the state that the digital outputs must have in case of FAIL.

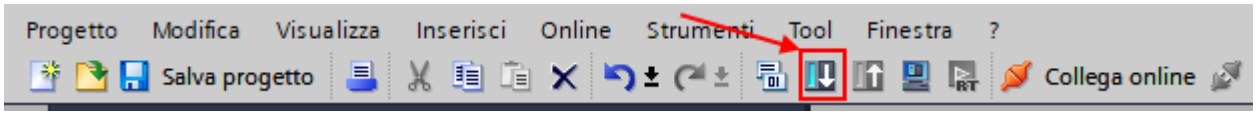
2.1.6. COMPILATION AND SENDING OF THE PROJECT TO THE SIEMENS PLC

Now that the devices are configured, all that remains is to compile and send the configuration to the PLC.

The compilation must be followed as "complete"



Then just hit the submit project icon:



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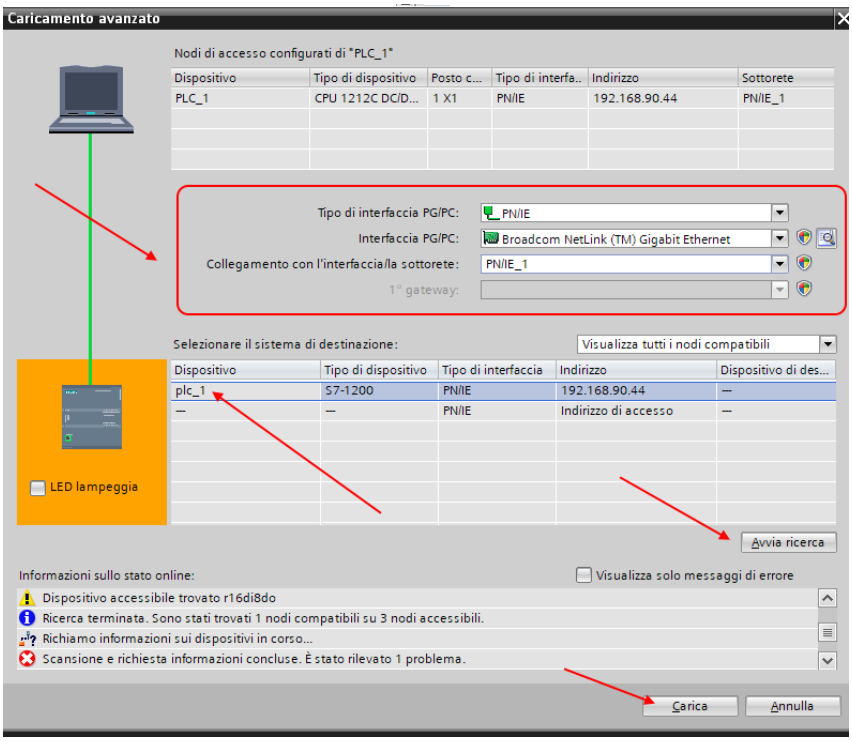
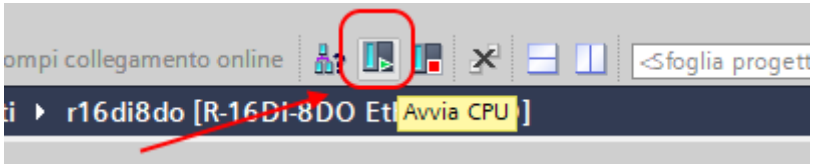
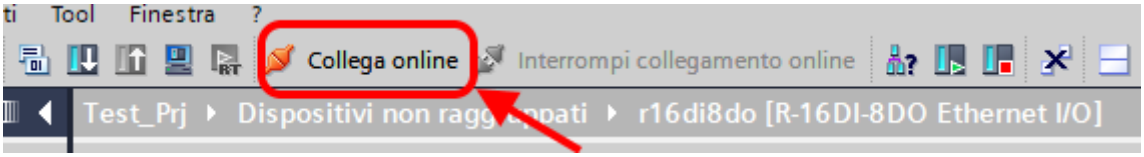
Before sending the project to the PLC, you are asked to select the ethernet interface and start the search, in order to select the PLC and press "Load".



Once the project has been sent, RUN the PLC:



And go ON-Line so as to check if there are any errors:



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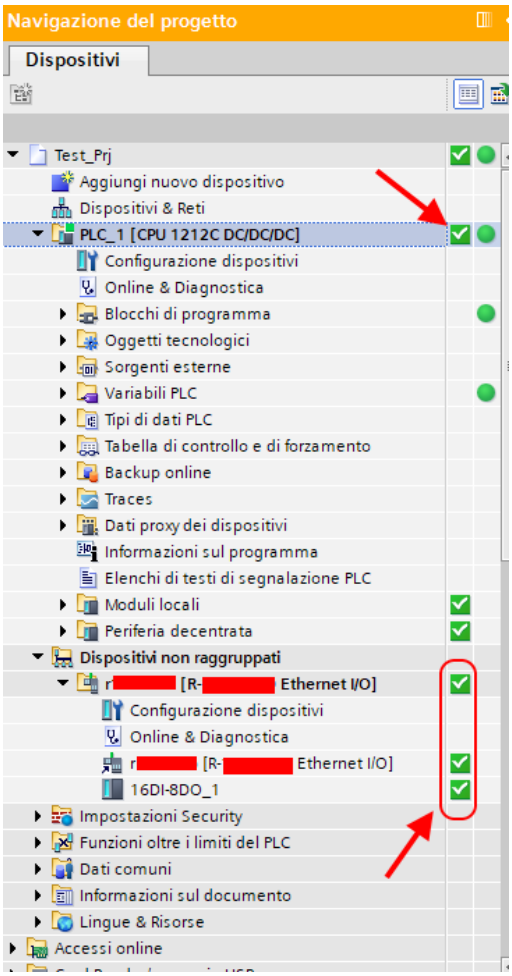
If everything is correct you will get a green icon next to the Seneca device:



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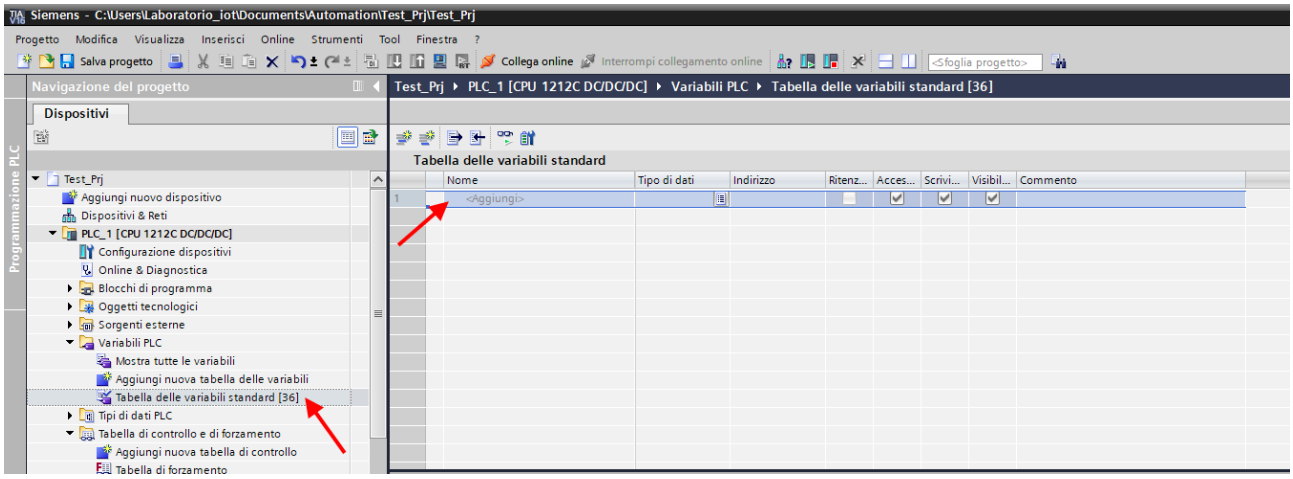
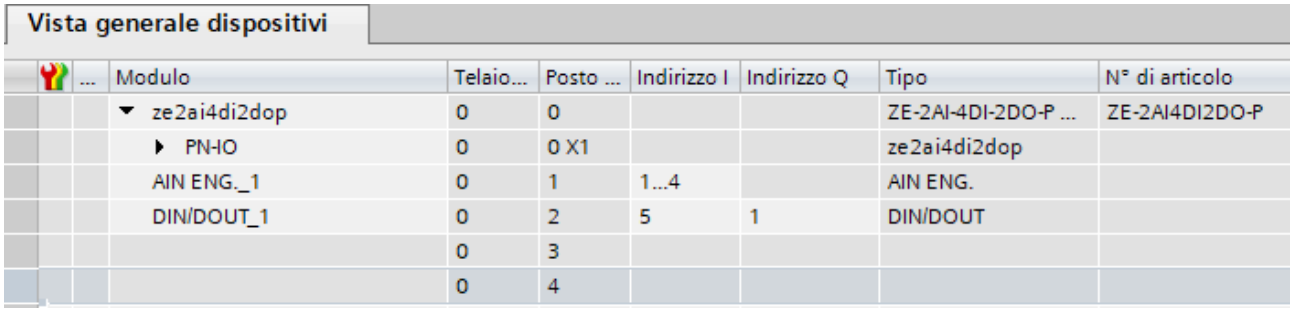
2.1.7. READING AND WRITING OF THE SENECA IO FROM TIA PORTAL

It is possible to read and write the Seneca IO (for debugging purposes) directly from the TIA portal.

Define the PLC tags directly in the "standard tag table":



Now let's add the variables related to the IO, the addresses are shown here (for example for the ZE-4DI-2AI-2DO-P model):



...	Modulo	Telaio...	Posto ...	Indirizzo I	Indirizzo Q	Tipo	N° di articolo
	ze2ai4di2dop	0	0			ZE-2AI-4DI-2DO-P ...	ZE-2AI4DI2DO-P
	PN-IO	0	0 X1			ze2ai4di2dop	
	AIN ENG._1	0	1	1...4		AIN ENG.	
	DIN/DOUT_1	0	2	5	1	DIN/DOUT	
		0	3				
		0	4				

So:

Bytes I1 to I4 contain the analogue inputs in engineering format (i.e. after scaling) (IW1 for analogue input 1 and IW3 for analogue input 2)

Byte I5 contains the status of the 4 digital inputs, i.e. I5.0 the DIN1, I5.1 the DIN2, I5.2 the DIN3 etc…

Q1 contains the status of the 2 digital outputs, i.e. Q1.0 the DOUT1 and Q1.1 the DOUT2.

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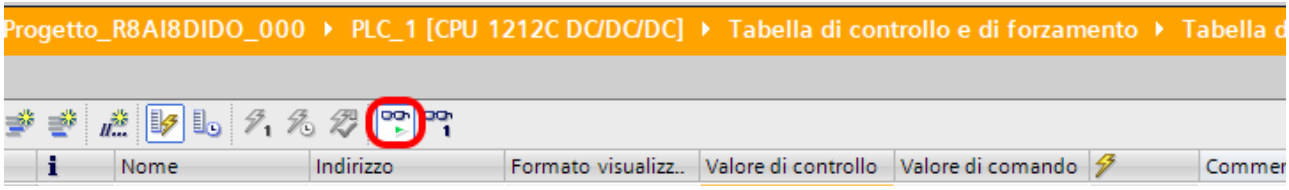
We define the 2 analogue inputs, the 4 digital inputs and the 2 digital outputs in the table of the standard variables:

Tabella delle variabili standard

	Nome	Tipo di dati	Indirizzo	Ritenz...	Acces...	Scrivi...	Visibil...	Comment
1	AIN1	UInt	%IW1	☐	☑	☐	☑	
2	AIN2	UInt	%IW3	☐	☑	☐	☑	
3	DIN1	Bool	%I5.0	☐	☑	☐	☑	
4	DIN2	Bool	%I5.1	☐	☑	☐	☑	
5	DIN3	Bool	%I5.2	☐	☑	☐	☑	
6	DIN4	Bool	%I5.3	☐	☑	☐	☑	
7	DOUT1	Bool	%Q1.0	☐	☑	☑	☑	
8	DOUT2	Bool	%Q1.1	☐	☑	☑	☑	
9	<Aggiungi>			☐	☑	☑	☑	

Now compile, send the project and go online with the PLC.

Once online, press the glasses icon to update the status of the variables.



Under the "Control value" column you can read the I/O value in real time.

To control the outputs, it is necessary to enter "TRUE" or "FALSE" in the "Command value" column and then press the icon with the lightning bolt to order the writing. Note the status of the LED relating to the commanded output.

In the "Control value" column, the status of the outputs is also read in real time.

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