

USER MANUAL

PROFINET IO / ETHERNET/IP - MODBUS RTU&TCP GATEWAYS



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Introduction

The content of this documentation refers to products and technologies described in it.

All technical data contained in the document may be changed without notice.

The content of this documentation is subject to periodic review.

To use the product safely and effectively, read the following instructions carefully before use.

The product must be used only for the use for which it was designed and manufactured: any other use is under the full responsibility of the user.

Installation, programming and set-up are allowed only to authorized, physically and intellectually suitable operators.

Set-up must be performed only after correct installation and the user must follow all the operations described in the installation manual carefully.

Seneca is not responsible for failures, breakages and accidents caused by ignorance or failure to apply the stated requirements.

Seneca is not responsible for any unauthorized modifications.

Seneca reserves the right to modify the device, for any commercial or construction requirement, without the obligation to promptly update the reference manuals.

No liability for the contents of this document can be accepted.

Use the concepts, examples and other content at your own risk.

There may be errors and inaccuracies in this document that could damage your system, so proceed with caution, the author(s) will not take responsibility for it.

Technical specifications are subject to change without notice.

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ORIGINAL INSTRUCTIONS

Document revisions

DATE	REVISION	NOTES	AUTHOR
16/12/2022	0	First revision for new dual core CPU Aligned with firmware 117 revision	MM
26/04/2023	1	New operating modes introduced with firmware 204 revision	MM
27/04/2023	2	Various fixes	MM
21/07/2023	3	Corrected the report on chapter 8: MODBUS DIAGNOSTICS	AZ
24/07/2023	5	Added support for E-series Gateway	MM

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1. PRELIMINARY WARNINGS

 **ATTENTION!**

This user manual extends the information from the installation manual to the configuration of the device. Use the installation manual for more information.

 **ATTENTION!**

In any case, SENECA s.r.l. or its suppliers will not be responsible for the loss of data/revenue or consequential or incidental damages due to negligence or bad/improper management of the device, even if SENECA is well aware of these possible damages.

SENECA, its subsidiaries, affiliates, group companies, suppliers and distributors do not guarantee that the functions fully meet the customer's expectations or that the device, firmware and software should have no errors or operate continuously.

1.1. DESCRIPTION

The Z-KEY-P, R-KEY-LT-P, Z-KEY-2ETH-P products allow to convert data coming from the Modbus serial bus or Modbus TCP-IP Ethernet into the Profinet IO bus or vice versa.

The Z-KEY- E, R-KEY-LT- E, Z-KEY-2ETH- E products allow to convert data coming from the Modbus serial bus or Modbus TCP-IP Ethernet into the Ethernet IP bus or vice versa.

1.2. PROFINET IO PROTOCOL

PROTOCOL	
Type of protocol	Profinet IO, Class A Device, Cyclic Real-time (RT) and Acyclic Data
MEMORY	
Memory size	In Gateway Master and Gateway Slave modes: 512 bytes max in reading and 512 bytes max in writing (20 slots max)

1.3. ETHERNET/IP PROTOCOL

PROTOCOL	
Type of protocol	ETHERNET/IP Adapter, 1 connection read/write

MEMORY**Memory size**

512 bytes max in reading and 512 bytes max in writing

1.5. GATEWAY DEVICES

<i>PRODUCT</i>	<i>ETHERNET PORTS No.</i>	<i>PORTS No. RS232/RS485 (CONFIGURABLE)</i>	<i>RS485 PORTS No.</i>	<i>ISOLATED SERIAL PORTS</i>	<i>PROTOCOL</i>
Z-KEY-P	1	1	1	Yes, both ports	PROFINET-IO
R-KEY-LT-P	1	1	NO	NO	PROFINET-IO
Z-KEY-2ETH-P	2	1	1	Yes, both ports	PROFINET-IO
Z-KEY-E	1	1	1	Yes, both ports	ETHERNET/IP
R-KEY-LT-E	1	1	1	NO	ETHERNET/IP
Z-KEY-2ETH-E	2	1	1	Yes, both ports	ETHERNET/IP

2. ETHERNET PORT

The factory configuration of the Ethernet port is:

STATIC IP: 192.168.90.101

SUBNET MASK: 255.255.255.0

GATEWAY: 192.168.90.1

Multiple devices must not be inserted on the same network with the same static IP.

 **ATTENTION!**

**DO NOT CONNECT 2 OR MORE FACTORY-CONFIGURED DEVICES ON THE SAME NETWORK, OR THE DEVICE WILL NOT WORK
(CONFLICT OF IP ADDRESSES 192.168.90.101)**

3. FIRMWARE UPDATE

In order to improve, add or optimize the functions of the product, Seneca releases firmware updates on the device section on the www.seneca.it website

The firmware update is made using the appropriate command on the Easy Setup2 software or the webserver.

 **ATTENTION!**

UPDATING THE FIRMWARE OF THE PROFINET IO DEVICES FROM A 1xx TO A 2xx REVISION WILL LOSE THE CONFIGURATION.

**ON THE SENECA WEBSITE THERE IS AN EXCEL TEMPLATE THAT IMPORTS A CONFIGURATION OF THE TAGS CARRIED OUT WITH A 1xx FIRMWARE AND CONVERTS IT IN THE NEW MODE "GATEWAY PROFINET IO MODBUS MASTER" OF THE 2xx FIRMWARE REVISIONS
FOR MORE INFO REFER TO THE TEMPLATE ITSELF**

⚠ ATTENTION!

NOT TO DAMAGE THE DEVICE DO NOT REMOVE THE POWER SUPPLY DURING THE FIRMWARE UPDATE OPERATION.

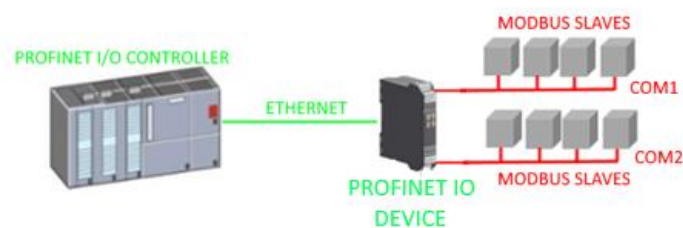
4. OPERATING MODE

4.1. "-P" VERSIONS

The Gateway allows you to operate in 3 different modes:
PROFINET IO DEVICE / MODBUS MASTER GATEWAY
PROFINET IO DEVICE / MODBUS SLAVE GATEWAY
GATEWAY WITH PORT#1 AND PORT#2 MASTER TAG.

4.1.1. PROFINET IO DEVICE / MODBUS MASTER GATEWAY

This operating mode is the most used and allows you to connect a Profinet IO PLC controller with Modbus RTU/ASCII Slave I/O devices



The Gateway, in the serial part, works as a Modbus master device and in the Ethernet part as a Profinet IO Device.

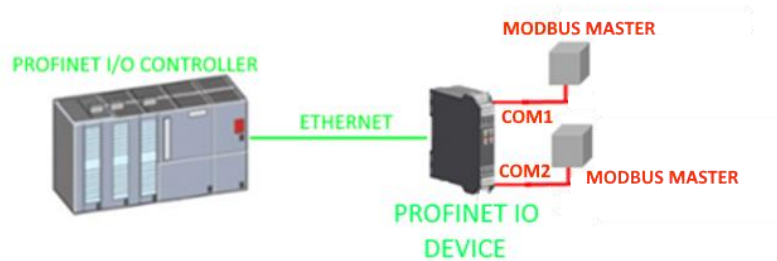
Modbus requests (read or write commands) are configured in the device and a GSDML file is automatically generated.

Once this file is imported into the PLC development software (e.g. TIA PORTAL) all configured IO will be accessible without any other configuration.

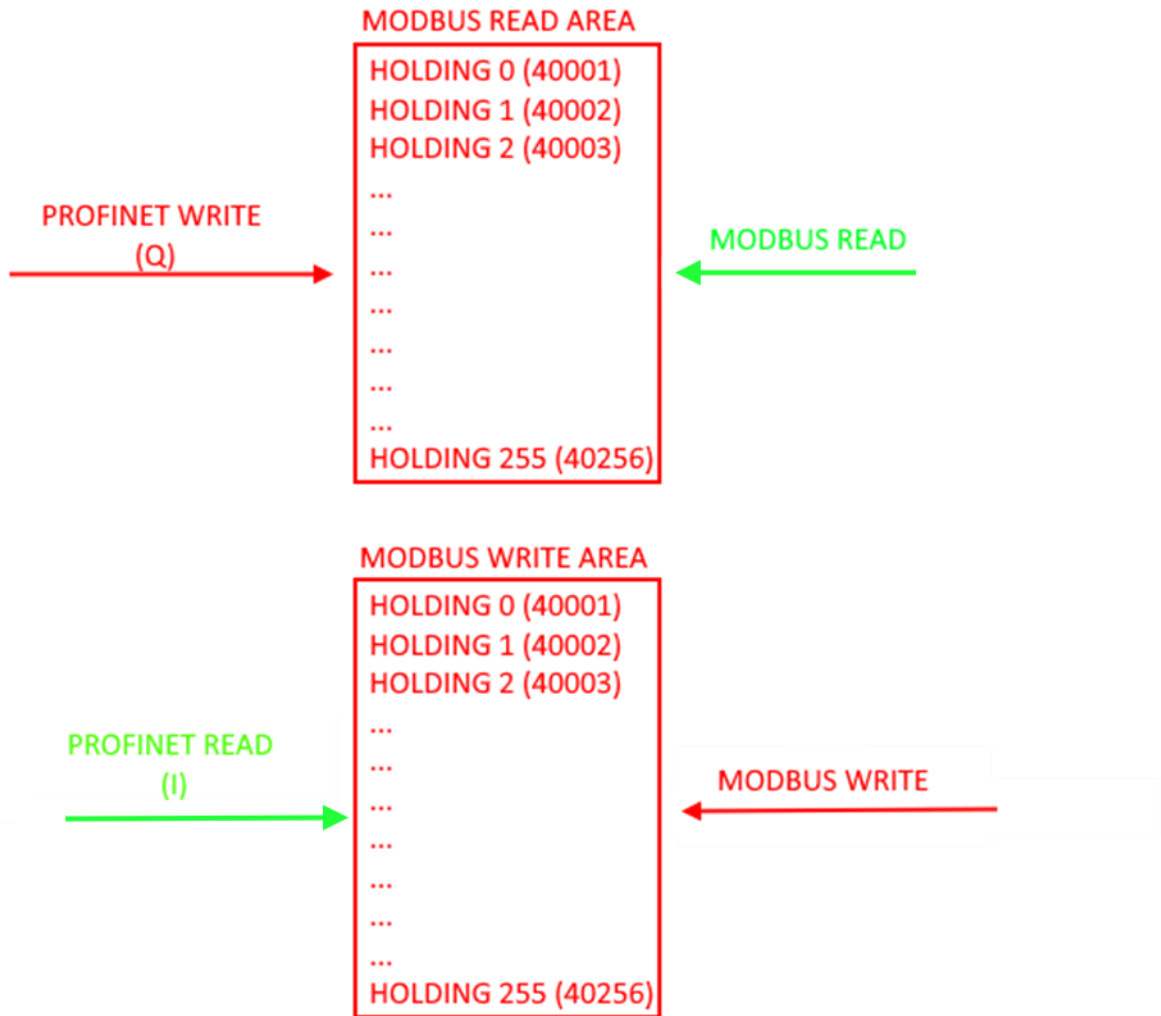
In addition to serial devices it is also possible to connect up to 3 Modbus TCP-IP servers.

4.1.2. PROFINET IO DEVICE / MODBUS SLAVE GATEWAY

This operating mode allows you to connect a Profinet IO PLC controller with a maximum of 1 or 2 devices (based on the number of serial ports available in the gateway) of the Modbus RTU/ASCII Master type (typically of the PLCs).



The gateway provides two different areas of 512 bytes for reading and 512 bytes for writing. Bytes are available from Modbus Holding Register 0 to Holding Register 255 inclusive. The "Modbus Read Area" is only readable by Modbus and only writable by Profinet. The "Modbus Write Area" is only writable by Modbus and only readable by Profinet.



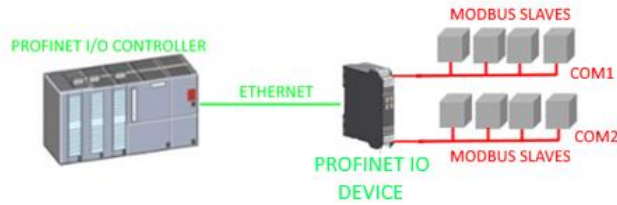
⚠ ATTENTION!

THE GATEWAY CREATES TWO DIFFERENT MODBUS AREAS, ONE FOR READING AND ONE FOR WRITING.

FOR EXAMPLE IF YOU WRITE BYTES FROM MODBUS THESE WILL END UP IN THE WRITING AREA AND THEN THEY WILL NOT BE READABLE BY THE MODBUS ITSELF

4.1.3. **GATEWAY WITH PORT#1 AND PORT#2 MASTER TAG**

This operating mode *is not recommended for use by the customer*, it has been maintained for backward compatibility with previous versions of the gateway and allows you to connect a Profinet IO PLC controller with Modbus RTU/ASCII Slave I/O devices



The Gateway, in the serial part, works as a Modbus master device and in the Ethernet part as a Profinet IO Device.

Differently from the *GATEWAY PROFINET IO DEVICE / MODBUS MASTER* mode, here the Modbus commands are not defined, only the variables (TAGs), subsequently the firmware internally performs an optimization by creating Modbus request commands.

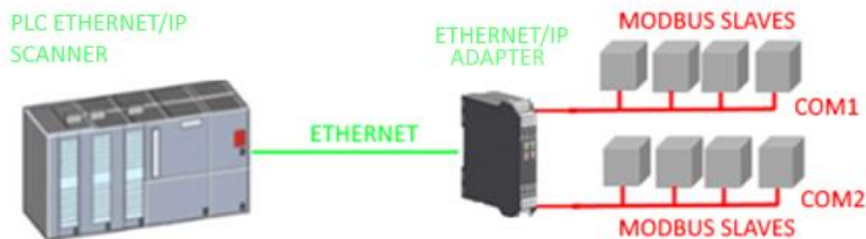
Also in this mode it is possible to define, in addition to the serial devices, up to 3 Modbus TCP-IP servers.

4.2. “-E” VERSIONS

The Gateway allows you to operate in the following mode:
GATEWAY ETHERNET/IP ADAPTER / MODBUS MASTER

4.2.1. GATEWAY ETHERNET/IP ADAPTER / MODBUS MASTER

This operating mode allows you to connect an ETHERNET/IP PLC scanner with Modbus RTU/ASCII Slave I/O devices



The Gateway, in the serial part, works as a Modbus master device and in the Ethernet part as a Ethernet /IP Adapter.

Modbus requests (read or write commands) are configured in the device and an EDS file is automatically generated.

Once this file is imported into the PLC development software (e.g. Rockwell STUDIO 5000) all configured IO will be accessible without any other configuration.

In addition to serial devices it is also possible to connect up to 3 Modbus TCP-IP servers.

5. **GATEWAY CONFIGURATION**

5.1. **“-P” GATEWAY CONFIGURATION VIA EASY SETUP 2 AND TIA PORTAL**

The easiest method to configure the gateway is through the Easy Setup2 software. For more information, refer to the help in the software.

5.1.1. **"PROFINET IO - MODBUS MASTER GATEWAY" CONFIGURATION**

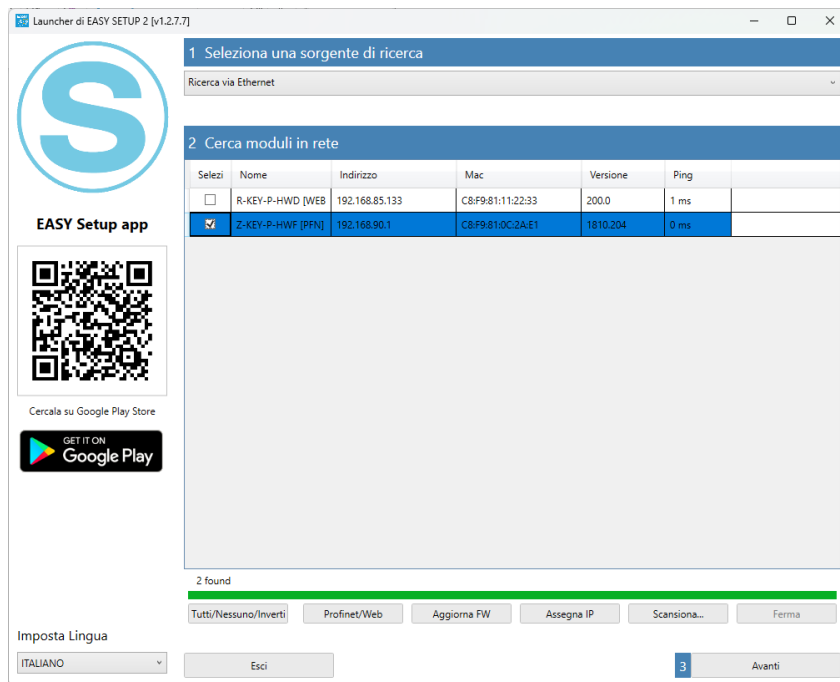
You want to connect a Siemens™ PLC to two Seneca Modbus RTU slave devices:
Z-10-D-IN (SLAVE STATION ADDRESS 1)
Z-10-D-OUT (SLAVE STATION ADDRESS 2).

In the example we will use the Z-KEY-P product (the steps are exactly the same for the other R-KEY-LT-P and Z-KEY-2ETH devices).

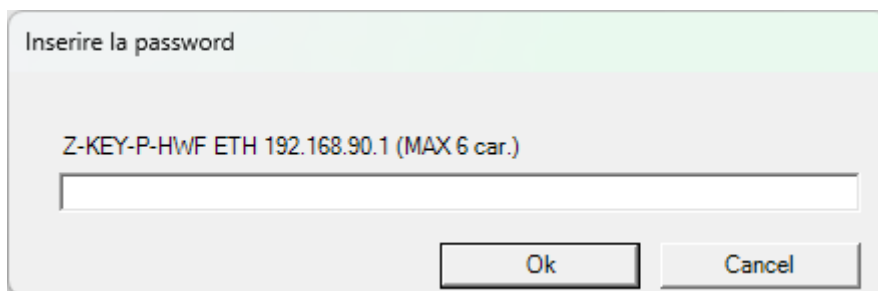
The 10 digital inputs of the Z-10-D-IN are from coil address 1 to coil address 10 of station address #1
The 10 digital outputs of the Z-10-D-OUT are from coil address 1 to coil 10 of Station Address #2



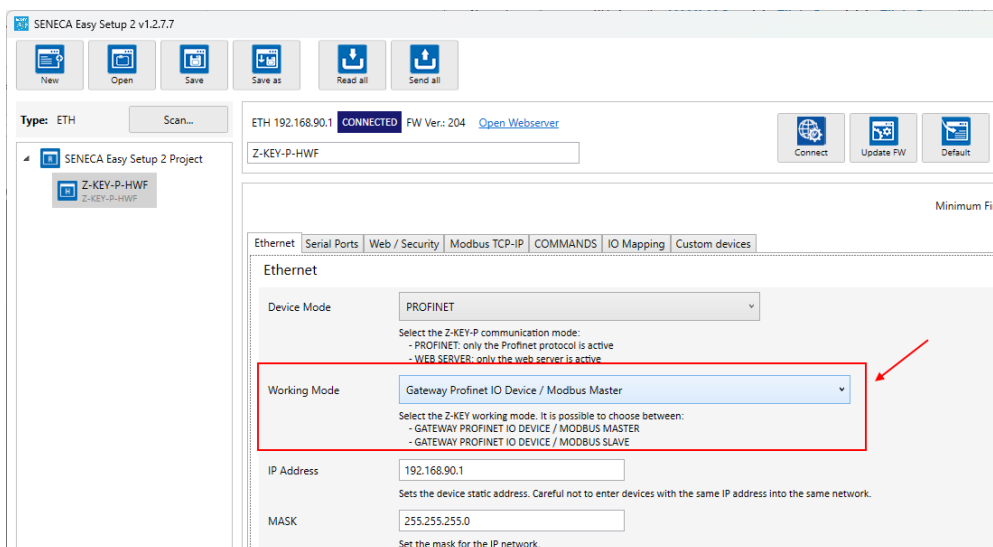
First we disconnect the PLC from the Ethernet network.
Now we use the Easy Setup 2 software selecting the Z-KEY-P product (with SCAN or in manual entry):



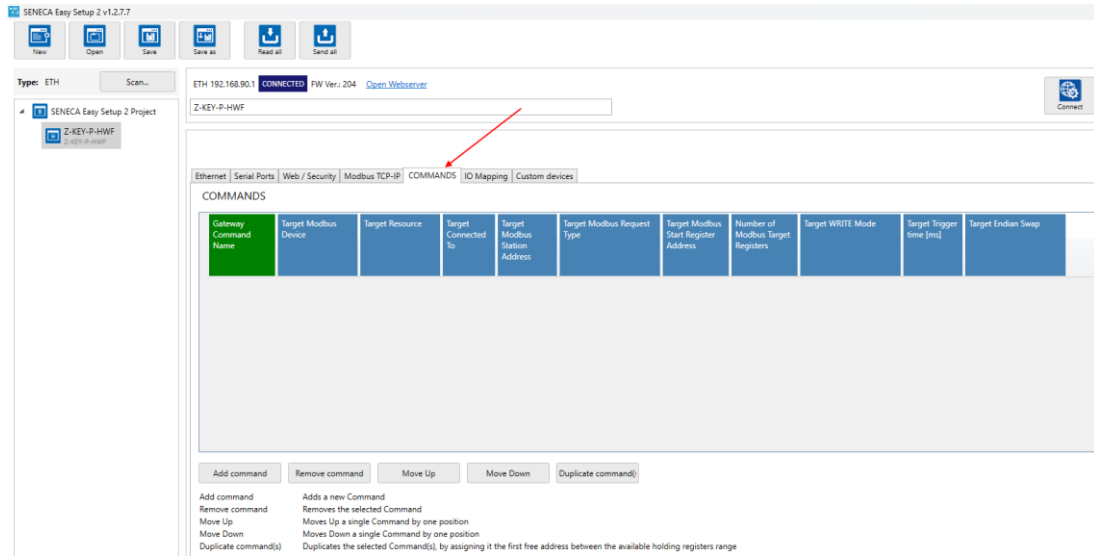
At this point the device access password is requested (default: admin):



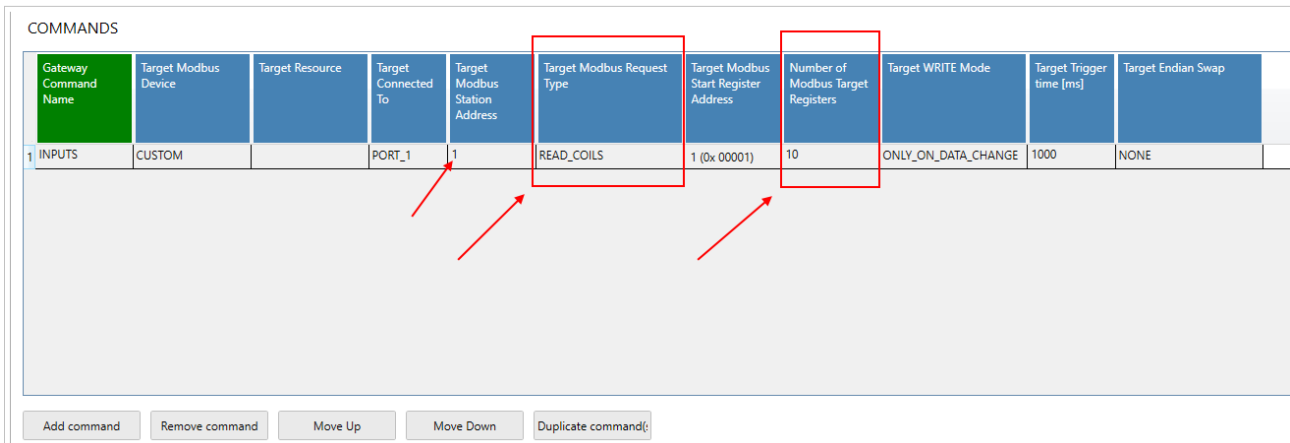
Once the password has been entered, select the Profinet IO Device / Modbus Master mode Gateway:



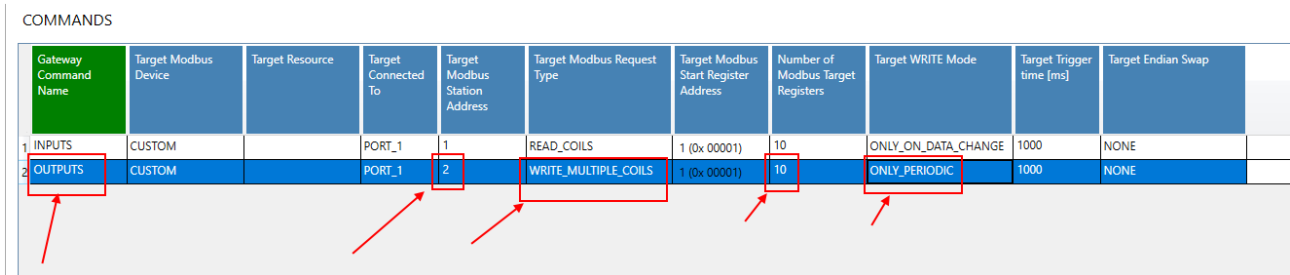
Now let's add the Modbus commands to acquire the inputs and write the outputs, select the COMMANDS section:



We add the reading of 10 coil registers relating to the 10 digital inputs of Z-10-D-IN:

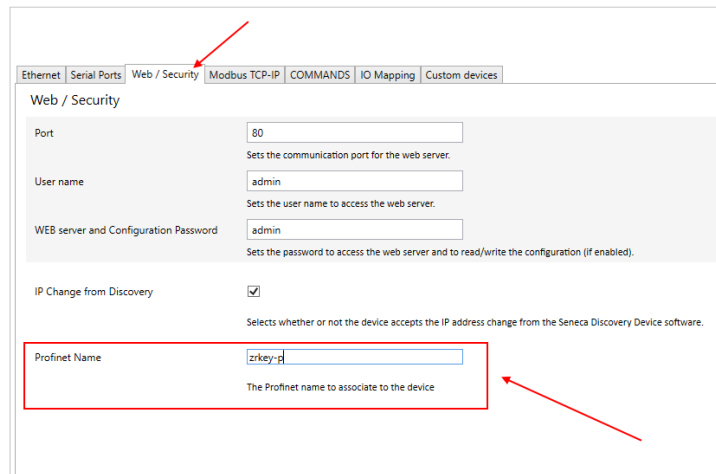


Now let's add the writing of 10 coil registers related to the 10 digital outputs of Z-10-D-OUT:



We set the writings in "Only Periodic" so they will always be performed every 1000 ms.

Enter the profinet name of the device:



Ethernet | Serial Ports | **Web / Security** | Modbus TCP-IP | COMMANDS | IO Mapping | Custom devices

Web / Security

Port: 80
Sets the communication port for the web server.

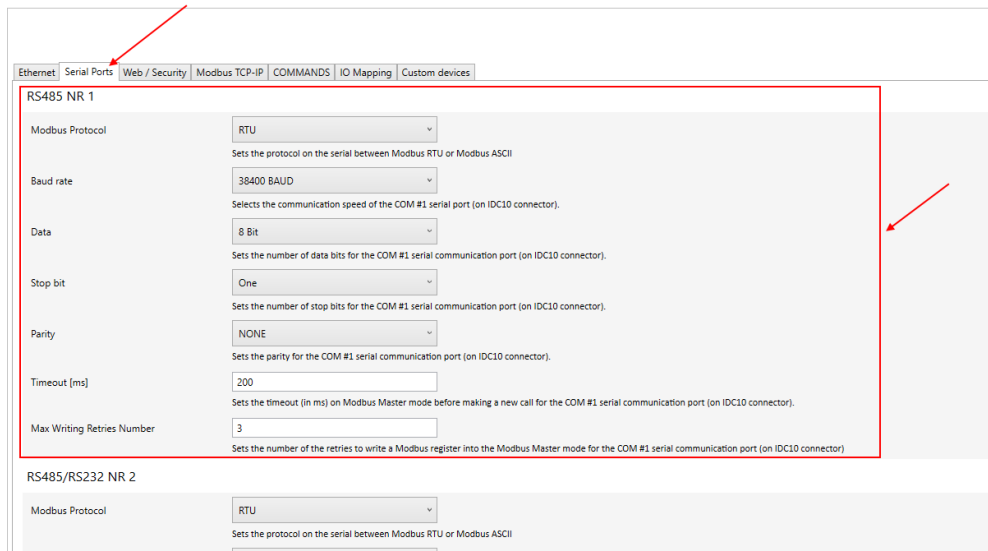
User name: admin
Sets the user name to access the web server.

WEB server and Configuration Password: admin
Sets the password to access the web server and to read/write the configuration (if enabled).

IP Change from Discovery:
Selects whether or not the device accepts the IP address change from the Seneca Discovery Device software.

Profinet Name: zrkey:
The Profinet name to associate to the device

Let's verify that serial port 1 is configured correctly for slave devices:



Ethernet | Serial Ports | **Web / Security** | Modbus TCP-IP | COMMANDS | **IO Mapping** | Custom devices

RS485 NR 1

Modbus Protocol: RTU
Sets the protocol on the serial between Modbus RTU or Modbus ASCII

Baud rate: 38400 BAUD
Selects the communication speed of the COM #1 serial port (on IDC10 connector).

Data: 8 Bit
Sets the number of data bits for the COM #1 serial communication port (on IDC10 connector).

Stop bit: One
Sets the number of stop bits for the COM #1 serial communication port (on IDC10 connector).

Parity: NONE
Sets the parity for the COM #1 serial communication port (on IDC10 connector).

Timeout [ms]: 200
Sets the timeout (in ms) on Modbus Master mode before making a new call for the COM #1 serial communication port (on IDC10 connector).

Max Writing Retries Number: 3
Sets the number of the retries to write a Modbus register into the Modbus Master mode for the COM #1 serial communication port (on IDC10 connector)

RS485/RS232 NR 2

Modbus Protocol: RTU
Sets the protocol on the serial between Modbus RTU or Modbus ASCII

At this point we export the GSDML file from the "IO Mapping" section:

Ethernet Serial Ports Web / Security Modbus TCP-IP COMMANDS IO Mapping Custom devices

IOMapping

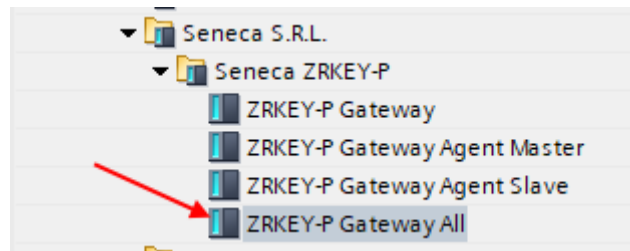
Command Mnemonic	Internal Address	Data Flow Direction	Quantity
1 INPUTS	0	R	2
2 OUTPUTS	0	W	2

Auto mapping (R) Auto mapping (W) User part 10IN10OUT 4/26/2023 Create GSDML

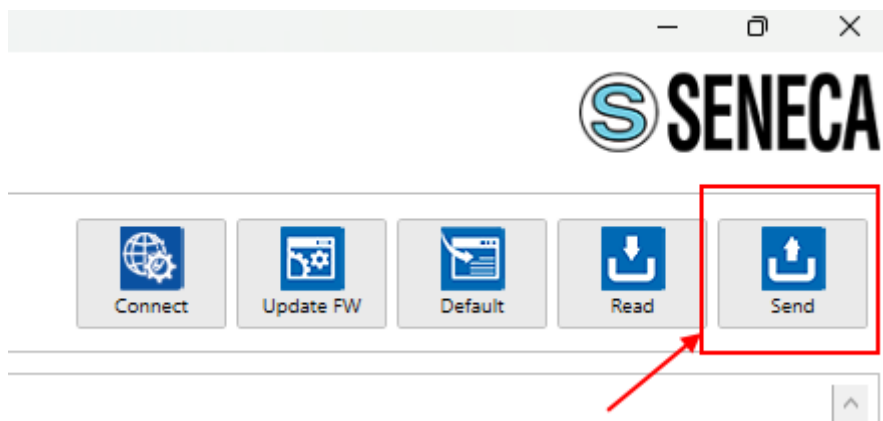
- 1 We press the button to calculate the offsets of the readings
- 2 We press the button to calculate the write offsets
- 3 We enter a name to recognize the GSDML file
- 4 We export the GSDML file

⚠ ATTENTION!

IT IS ALSO POSSIBLE TO DOWNLOAD A GSDML FILE (Gateway All) FROM THE WWW.SENECA.IT WEBSITE (IN THE SECTION RELATED TO PROFINET GATEWAYS) AND COMPOSE YOUR OWN CONFIGURATION FROM TIA PORTAL WITHOUT HAVING TO IMPORT THE FILE EACH TIME.

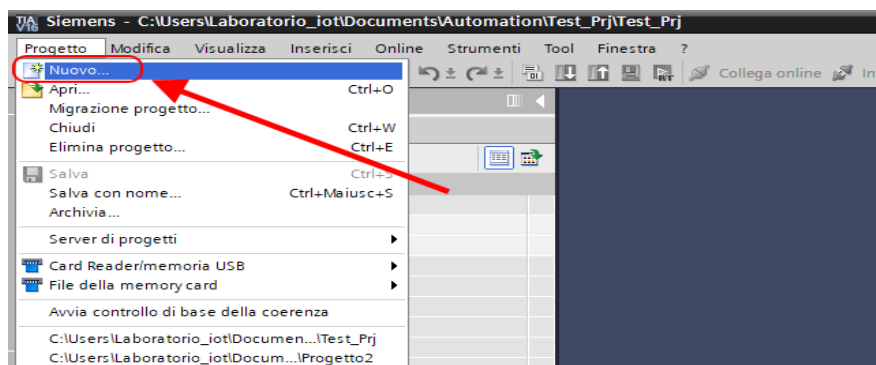


Now let's send the configuration to the device with the "send" button:

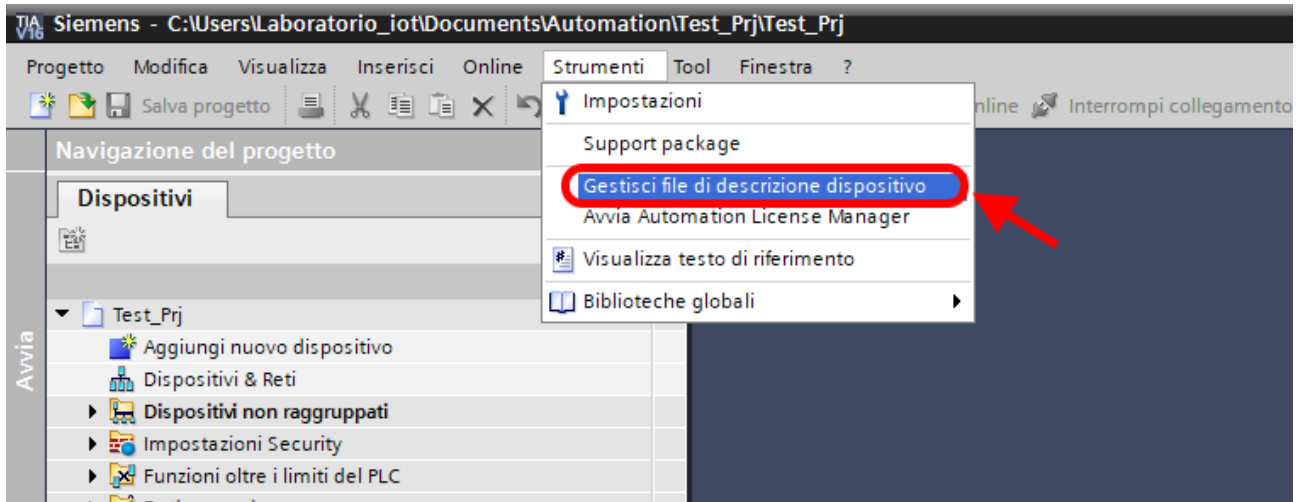


We can now move on to configuring the PLC via Tia Portal™:

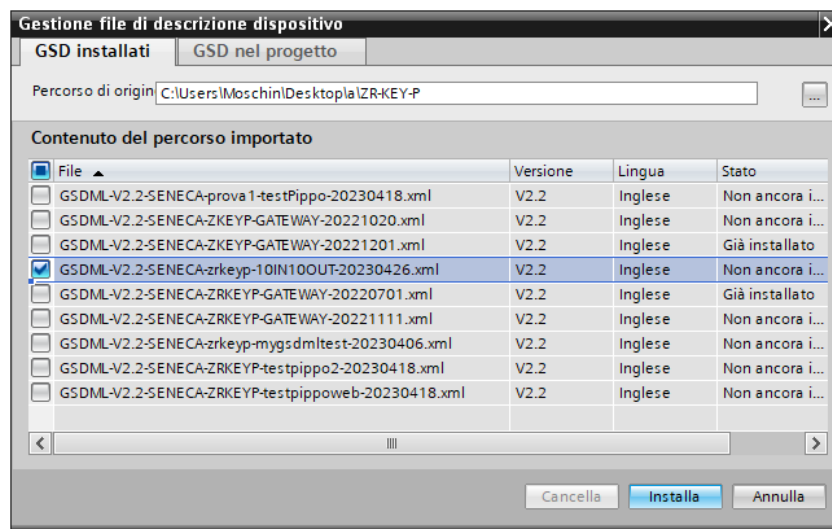
Creating a new project:



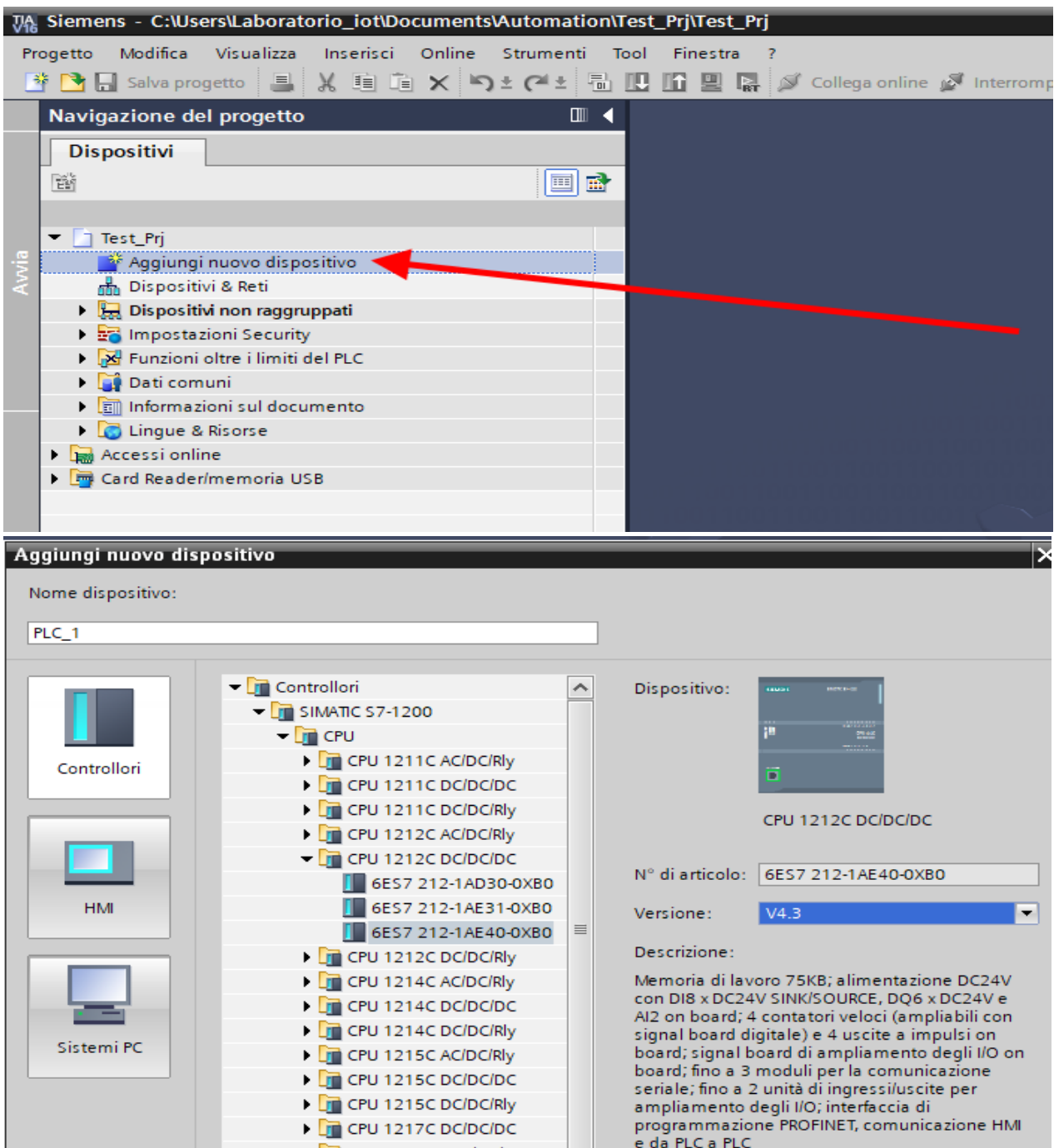
Install the GSD file of the Seneca product:



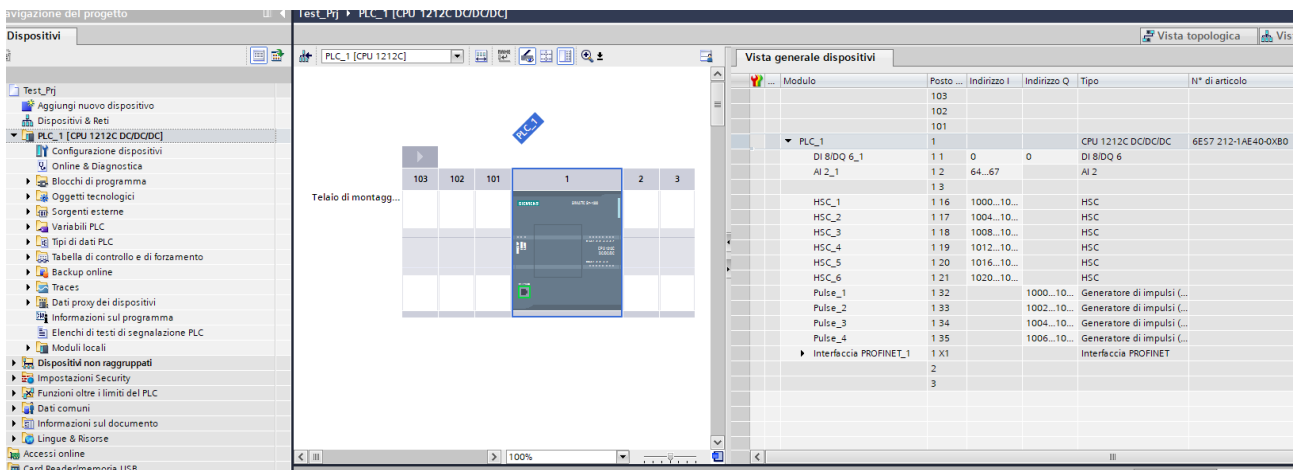
Point to the directory where we previously saved the GSDML file and press INSTALL.



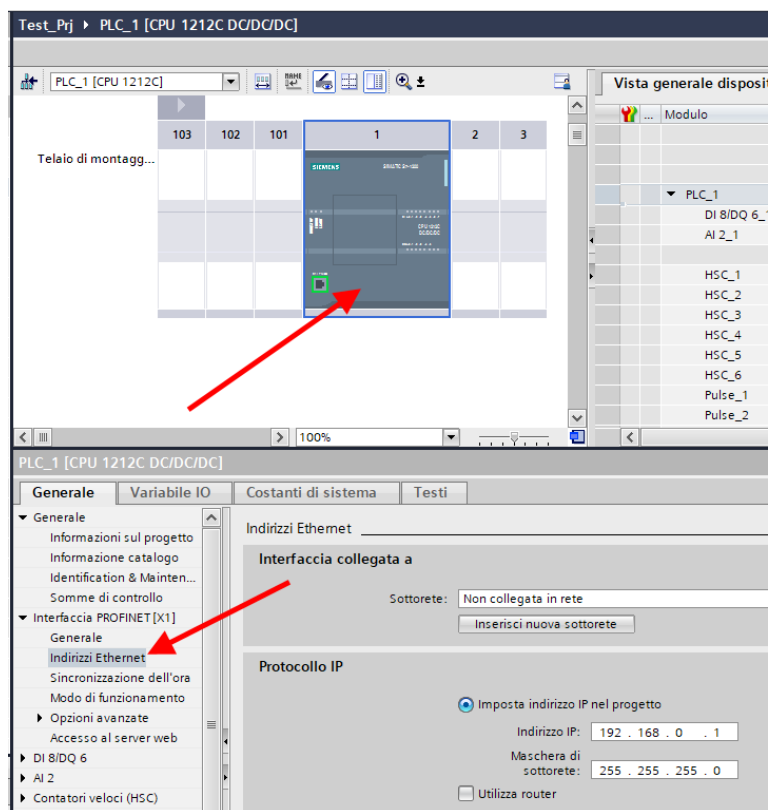
Now insert the Siemens PLC (in our example a SIEMATIC S7 1200), click on "Add new device ...":



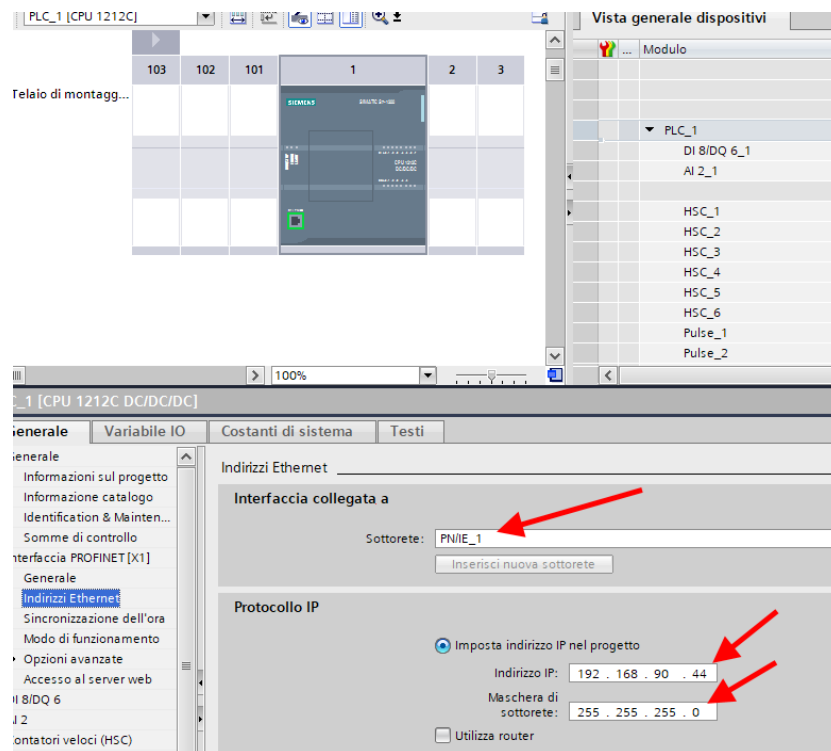
Confirm and the PLC will be added to the rack:



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

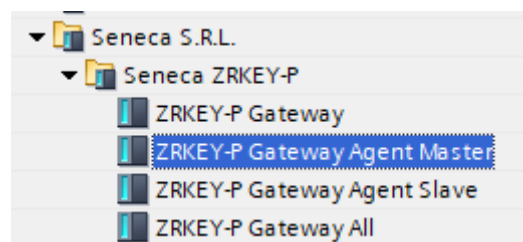


Set the IP you want for the PLC (in this case 192.168.90.44) and the PLC subnet:

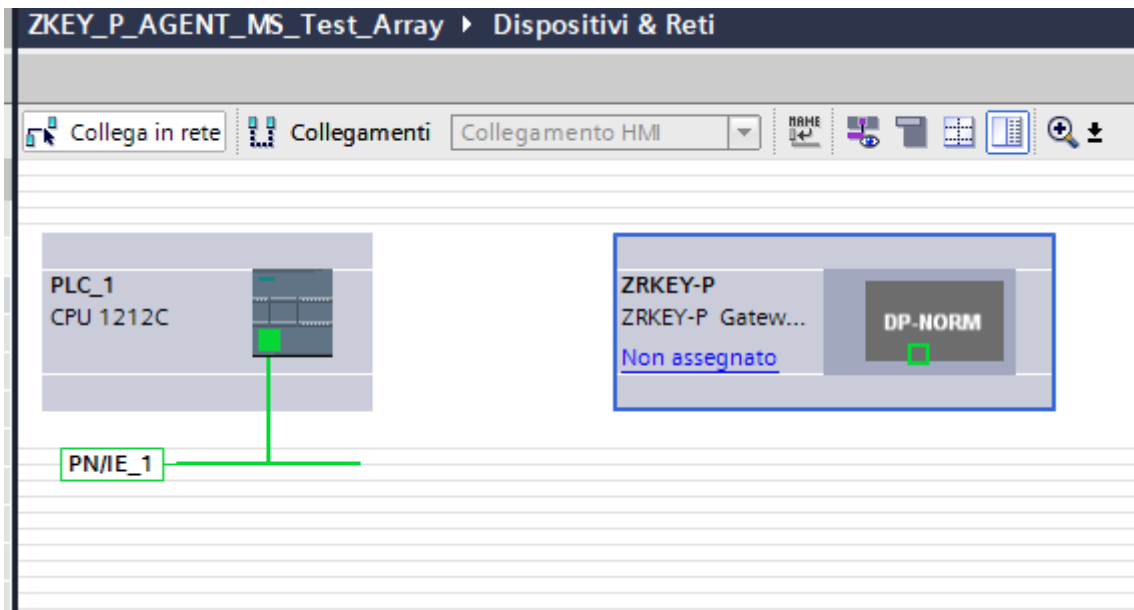


Move on to “devices and network” view:

On the right select "Hardware Catalogue" and then under "Additional Field Equipment" -> PROFINET IO -> GATEWAY -> Seneca SRL - ZR-KEY-P Gateway-> ZRKEY-P Gateway Agent Master

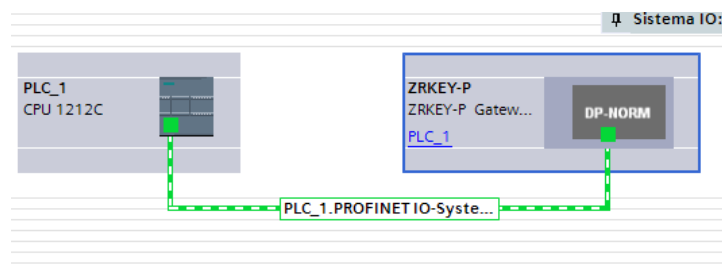
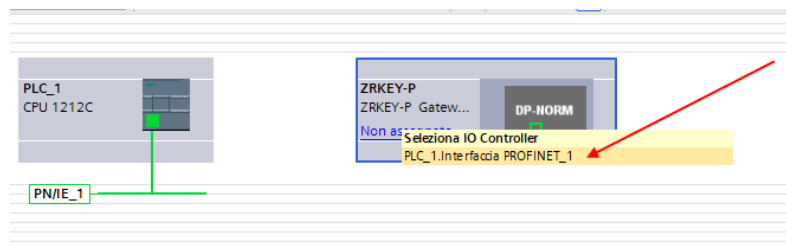


Drag the device to the network view:

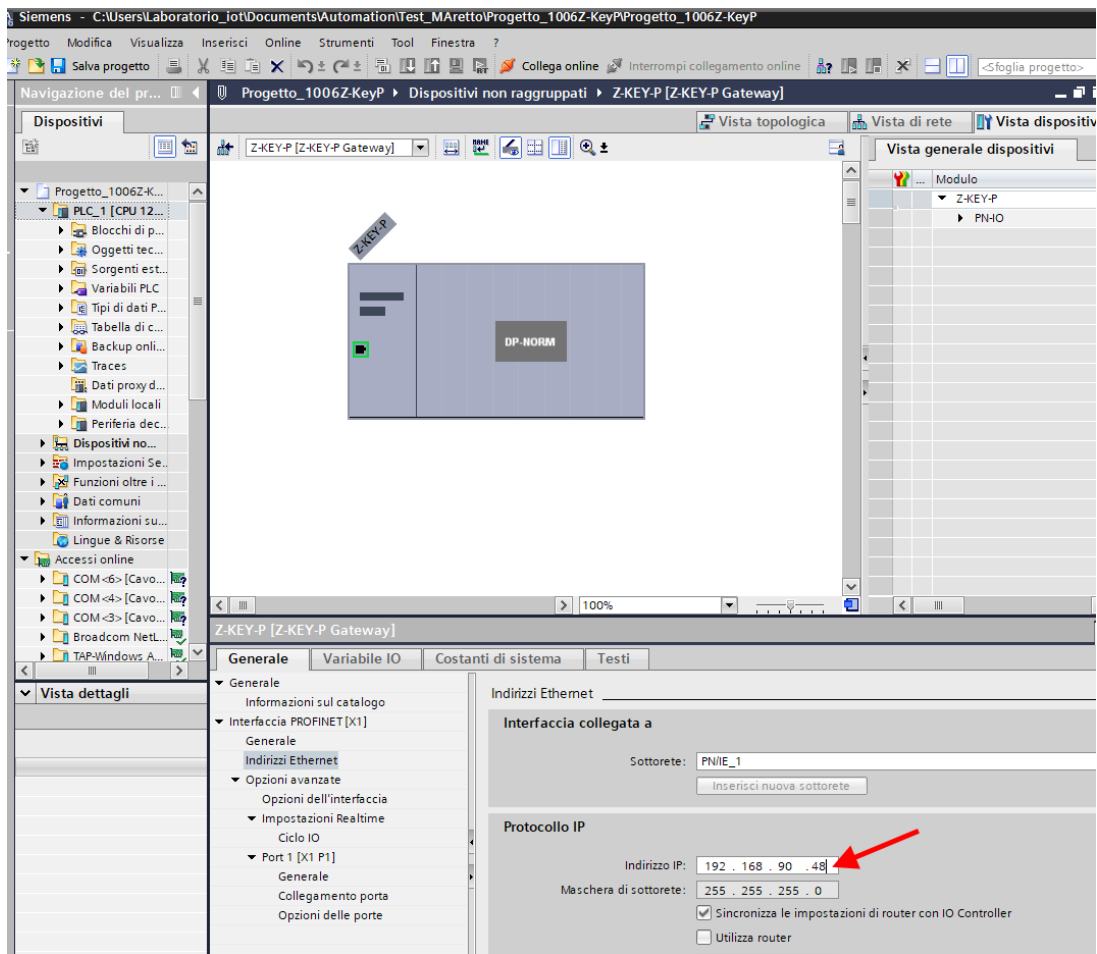


Now associate it with the PLC:

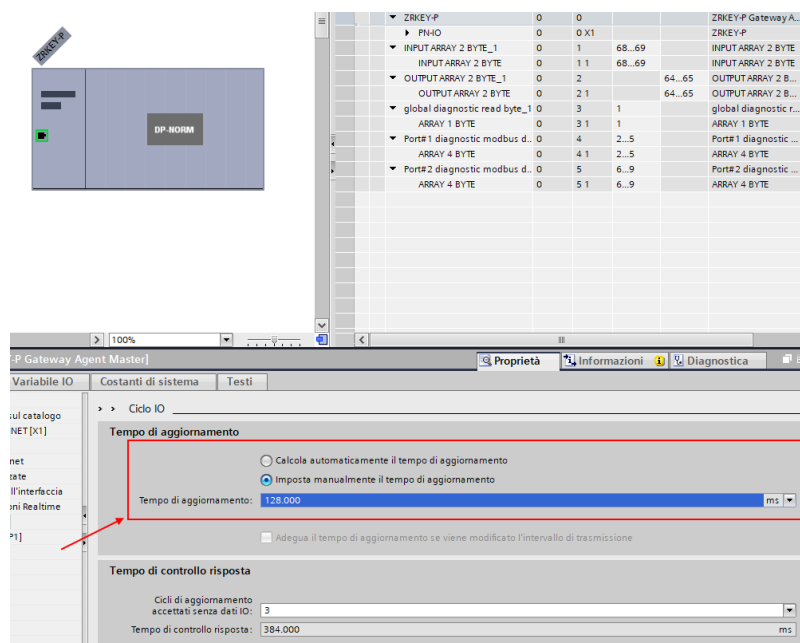
Click with the left mouse button on "Not assigned" and then select the PLC:



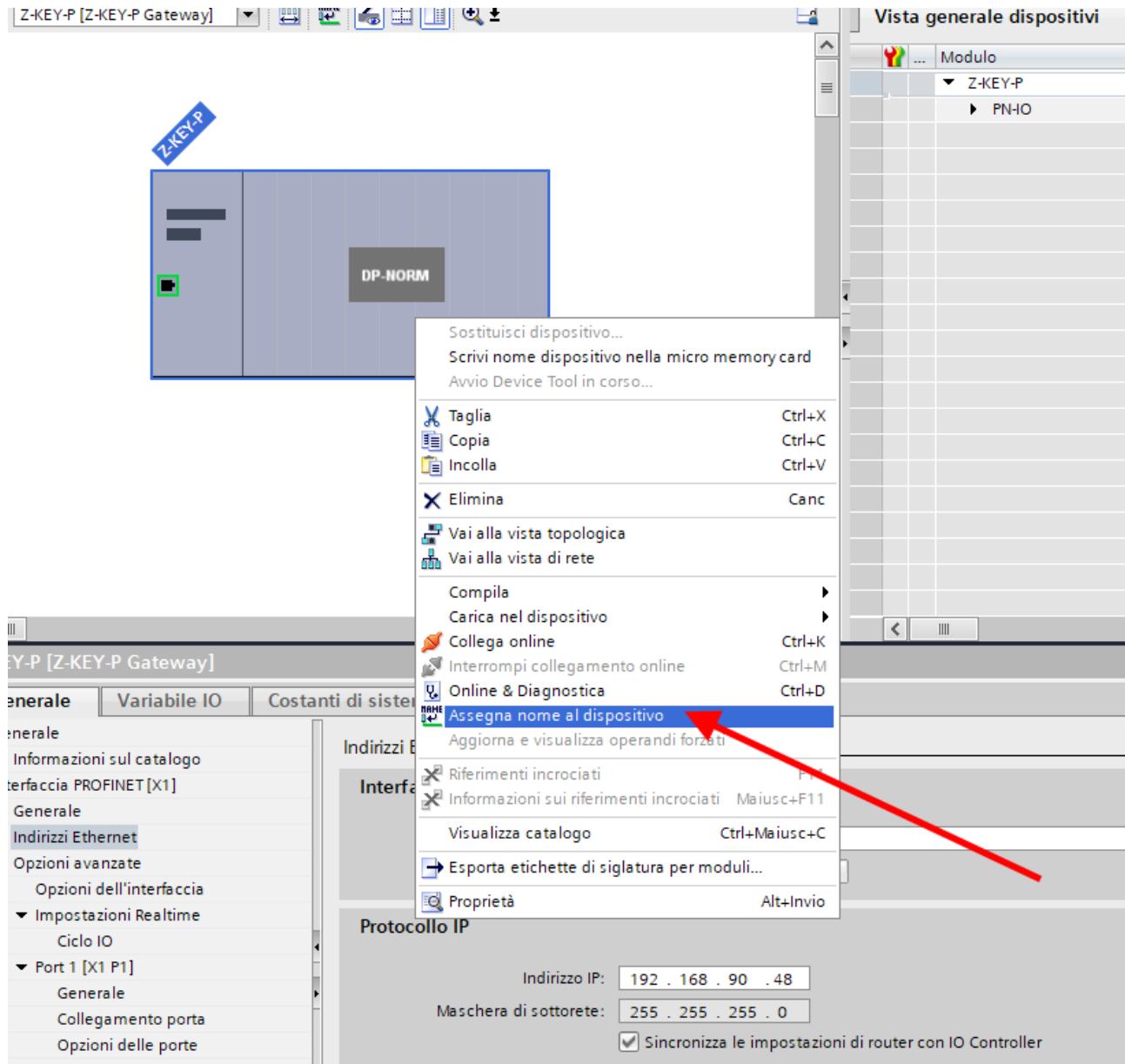
Click twice on the Seneca device and configure the IP address here too (for example 192.168.90.48) and the timing:



Depending on the project it is necessary to set the cycle time (typically 128 ms):

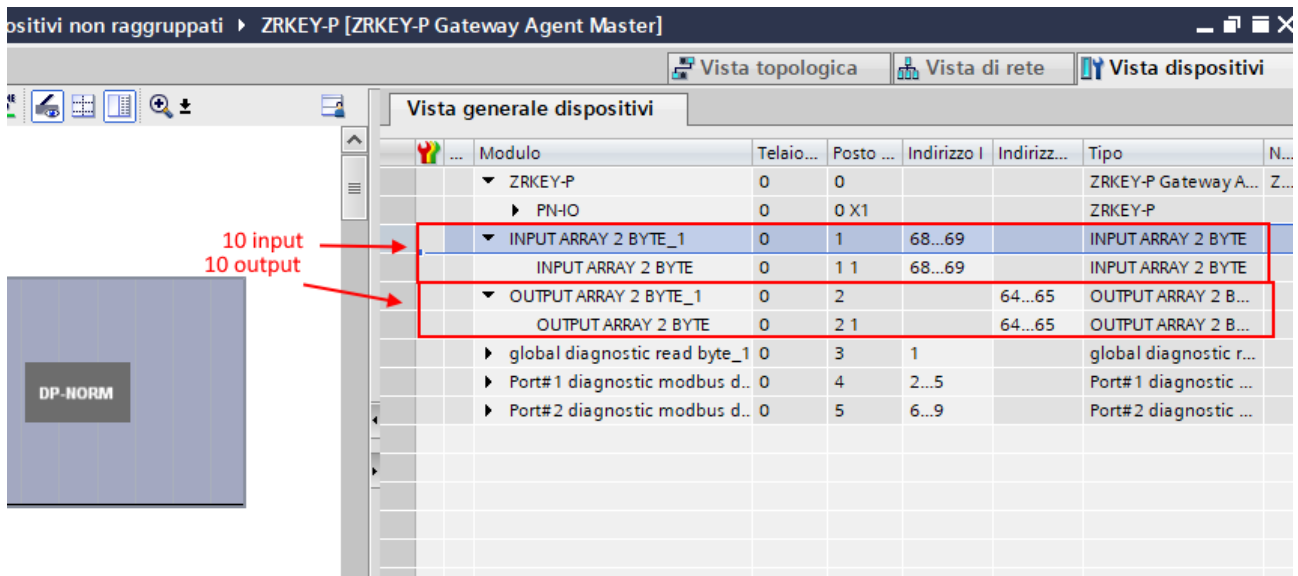


In Profinet the devices are identified by their name, so right click on the Seneca device and select "Assign device name"



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

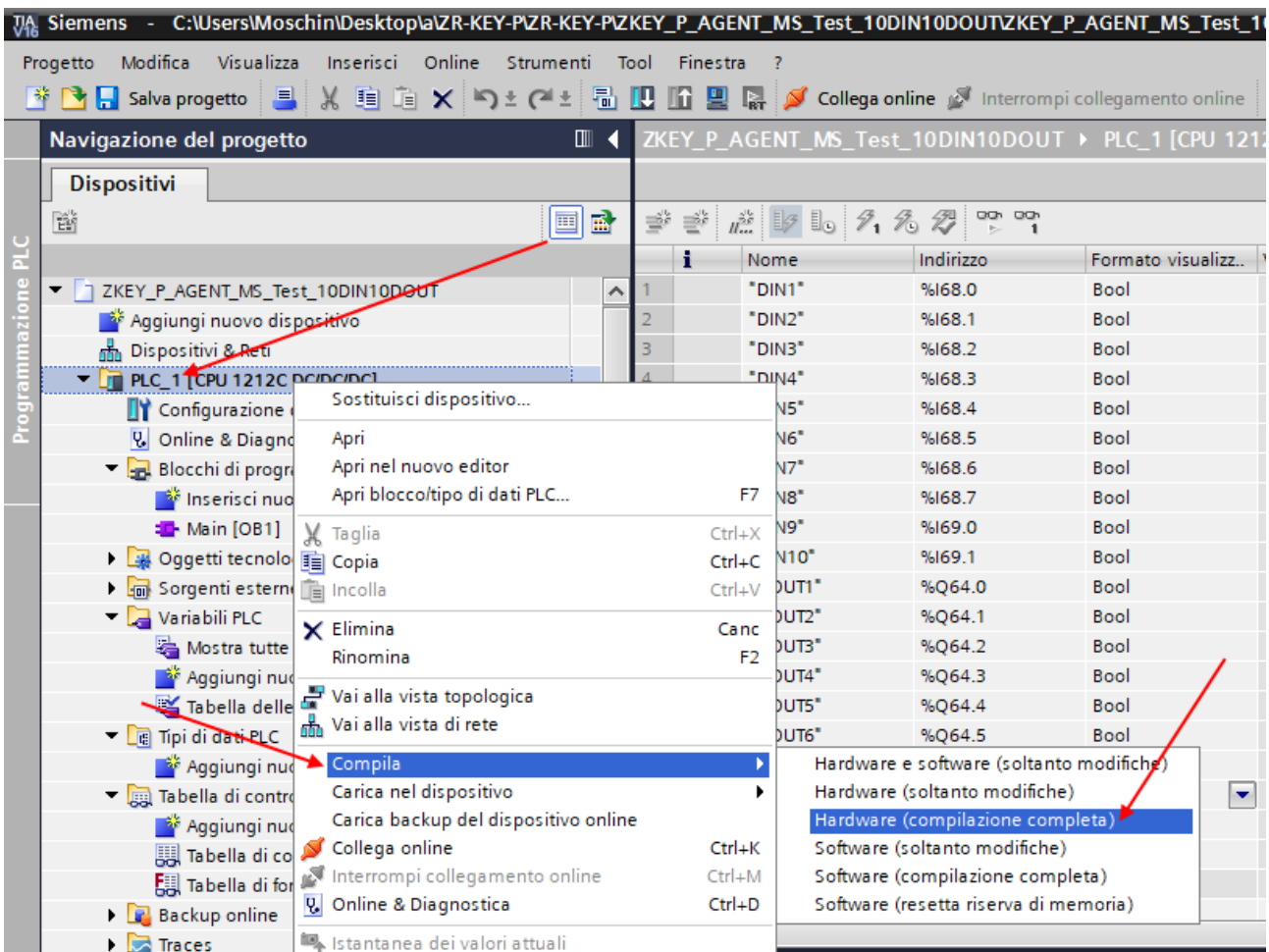
The IO configuration has already been prepared having imported the GSDML project (otherwise if you have imported the generic GSDML file "Gateway All" you must drag the correct number of read/write bytes):



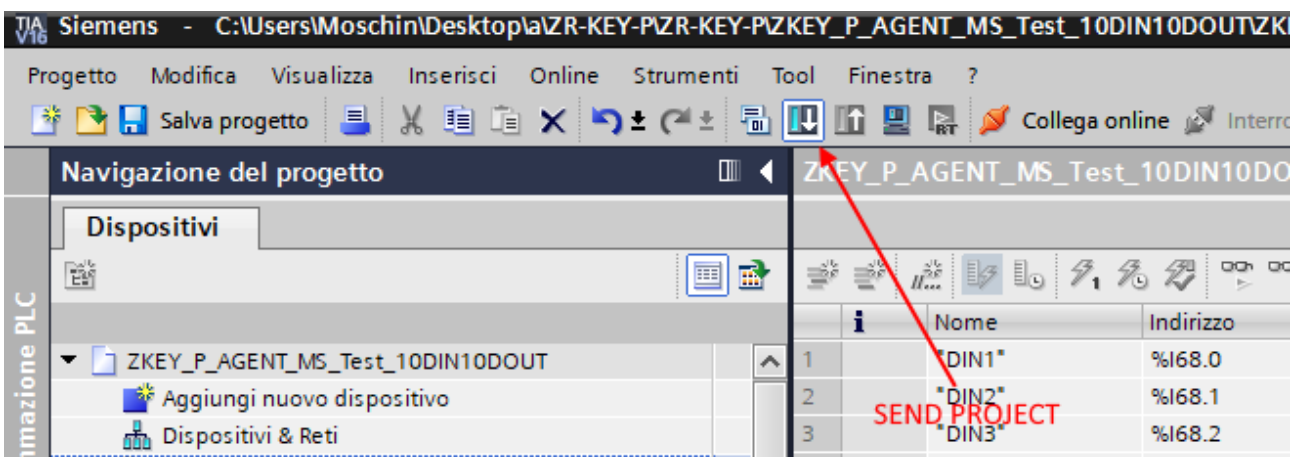
Modulo	Telaio...	Posto ...	Indirizzo I	Indirizz...	Tipo
▼ ZRKEY-P	0	0			ZRKEY-P Gateway A...
▶ PN-IO	0	0 X1			ZRKEY-P
▼ INPUT ARRAY 2 BYTE_1	0	1	68...69		INPUT ARRAY 2 BYTE
INPUT ARRAY 2 BYTE	0	1 1	68...69		INPUT ARRAY 2 BYTE
▼ OUTPUT ARRAY 2 BYTE_1	0	2		64...65	OUTPUT ARRAY 2 B...
OUTPUT ARRAY 2 BYTE	0	2 1		64...65	OUTPUT ARRAY 2 B...
▶ global diagnostic read byte_1	0	3	1		global diagnostic r...
▶ Port#1 diagnostic modbus d...	0	4	2...5		Port#1 diagnostic ...
▶ Port#2 diagnostic modbus d...	0	5	6...9		Port#2 diagnostic ...

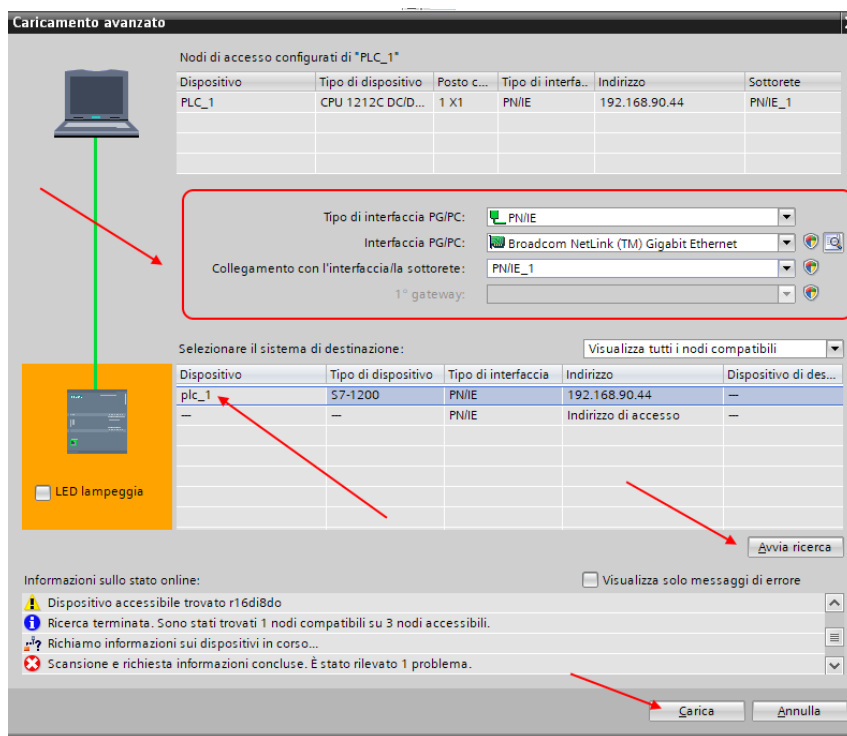
In particular, the 10 inputs are available at addresses I68 and I69 while the outputs are located at addresses Q64 and Q65.

Now the devices are configured, all that remains is to compile and send the configuration to the PLC.
To compile we select the complete hardware compilation:

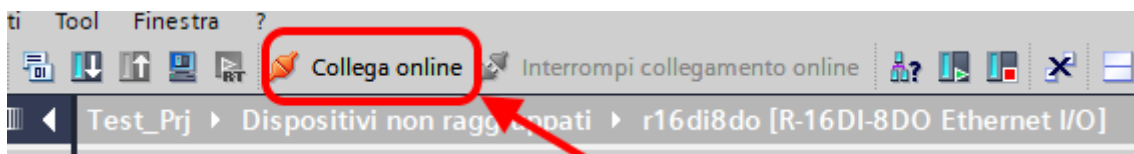


Then press icon to send the project to the PLC:

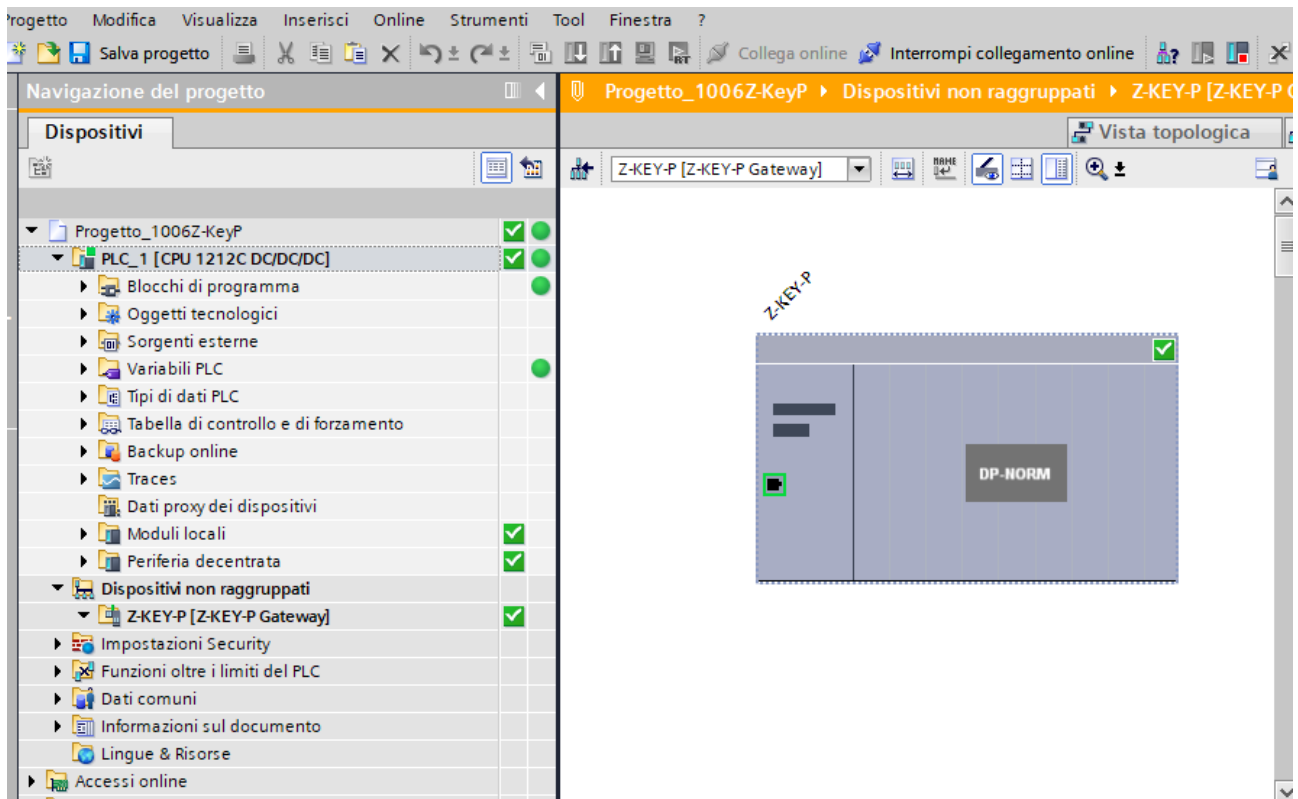




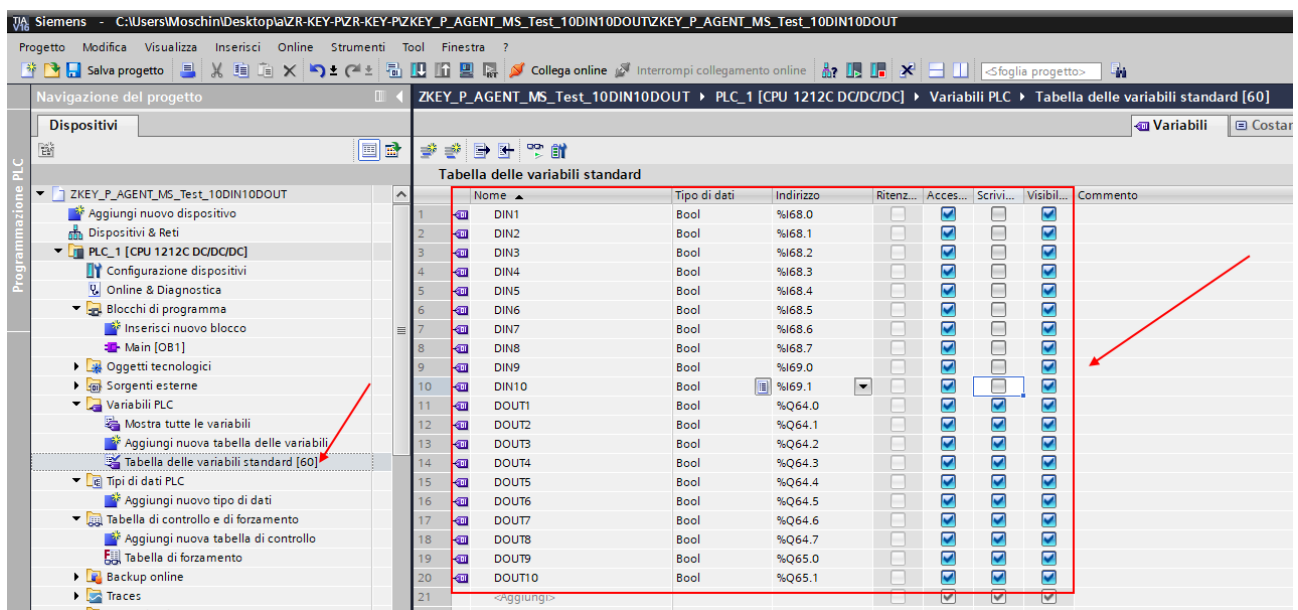
Let's go online to check if there are any errors:



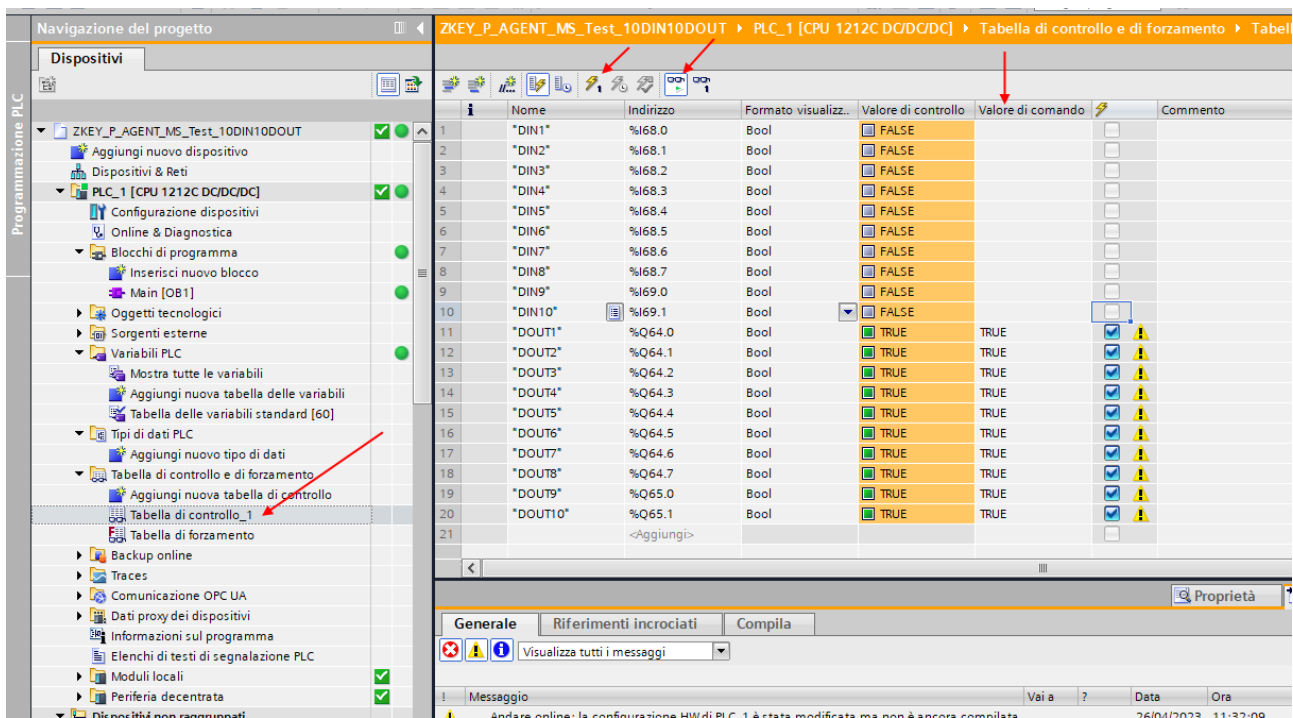
If everything is correct you will get a green icon next to the Seneca device:



It is also possible to read and write the IO (for debugging purposes) directly from the TIA portal. Then define the variables for the PLC referring to the above addresses:



And then define a control table:



Here it is now possible to read inputs and force write outputs.

5.1.2. "PROFINET IO - MODBUS SLAVE GATEWAY" CONFIGURATION

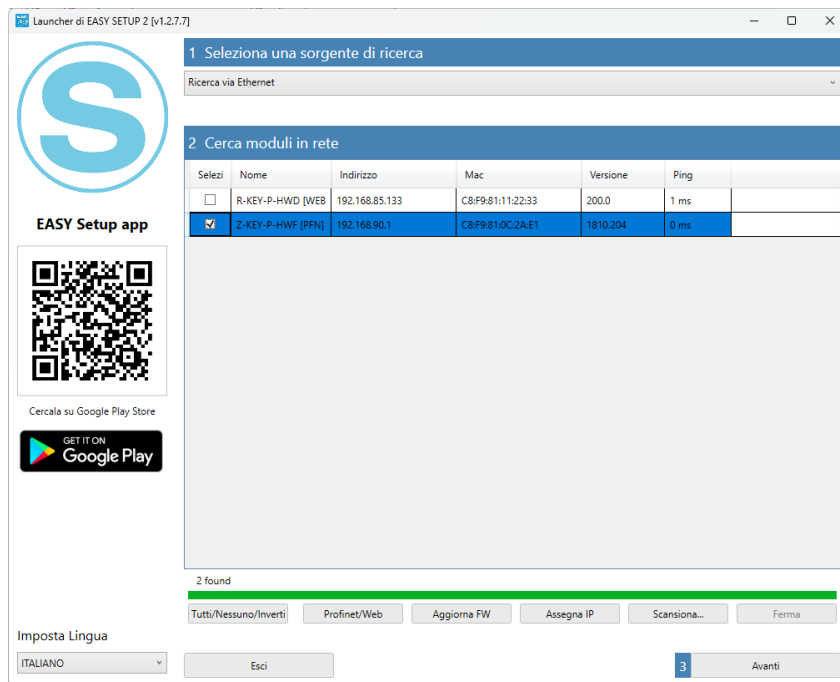
You want to connect a Siemens™ PLC to another PLC connected to serial port 1. The serial PLC supports the Modbus Master protocol.

In the example we will use the Z-KEY-P product (the steps are exactly the same for the other R-KEY-LT-P and Z-KEY-2ETH devices).

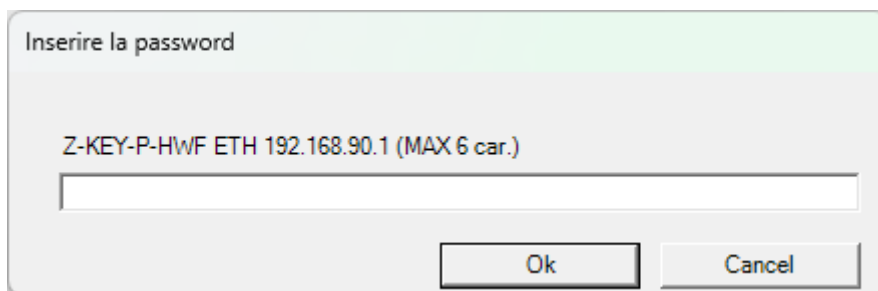
Suppose you want to exchange 10 bytes from the serial PLC to the Siemens PLC and 5 bytes from the Siemens PLC to the serial PLC.

First we disconnect the PLC from the Ethernet network.

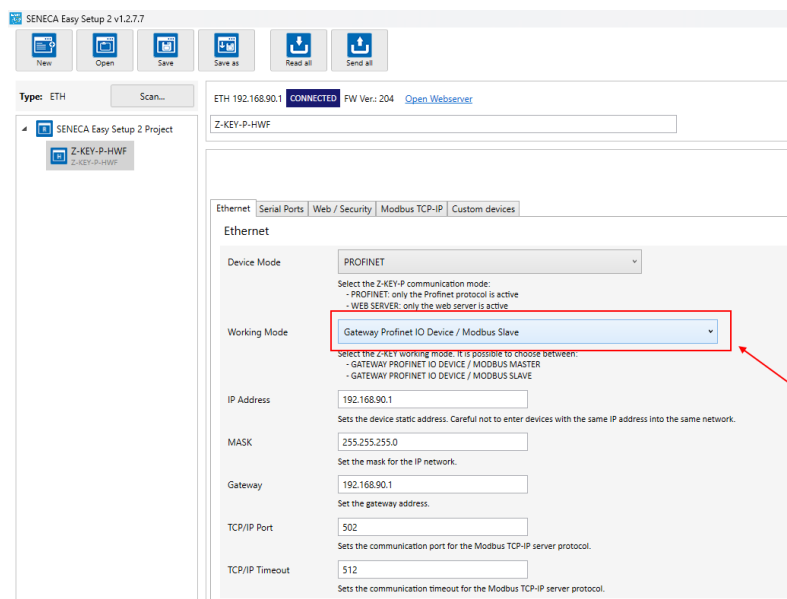
Now we use the Easy Setup 2 software selecting the Z-KEY-P product (with SCAN or in manual entry):



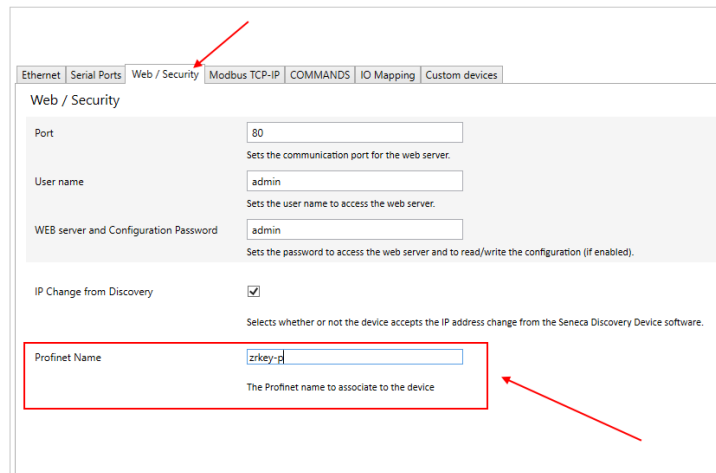
At this point the device access password is requested (default: admin):



Once the password has been entered, select the Profinet IO Device / Master slave Gateway mode:

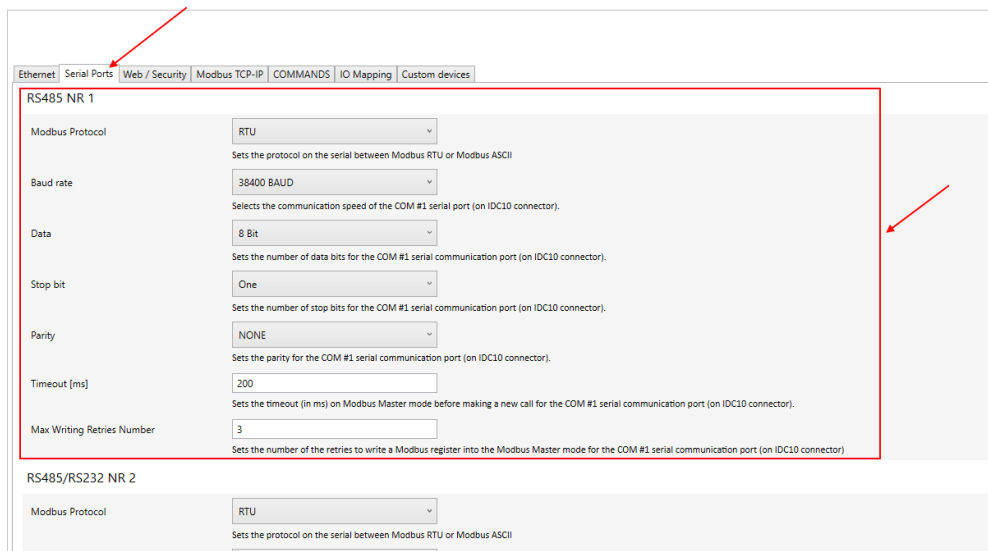


Enter the profinet name of the device:



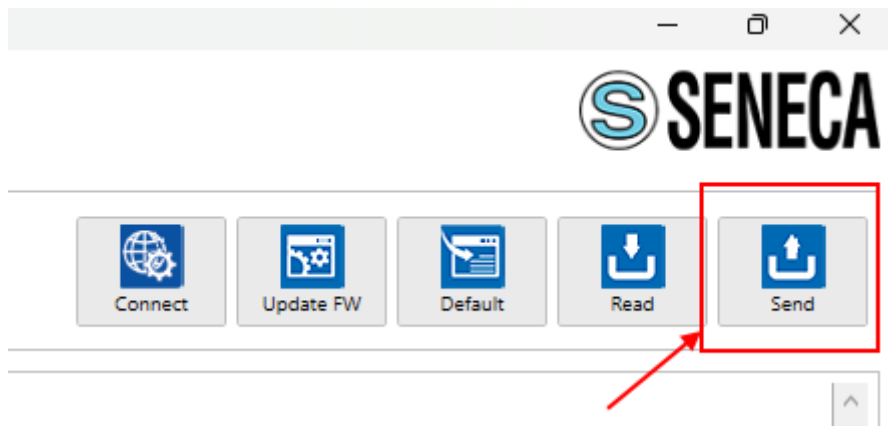
The screenshot shows the 'Web / Security' configuration page. The 'Profinet Name' field is highlighted with a red box and a red arrow pointing to it. The field contains the text 'zrkey-d'. Below the field is the description: 'The Profinet name to associate to the device'. Other fields include 'Port' (80), 'User name' (admin), and 'WEB server and Configuration Password' (admin). A checkbox for 'IP Change from Discovery' is checked.

Check that serial port 1 is configured correctly for the serial PLC:



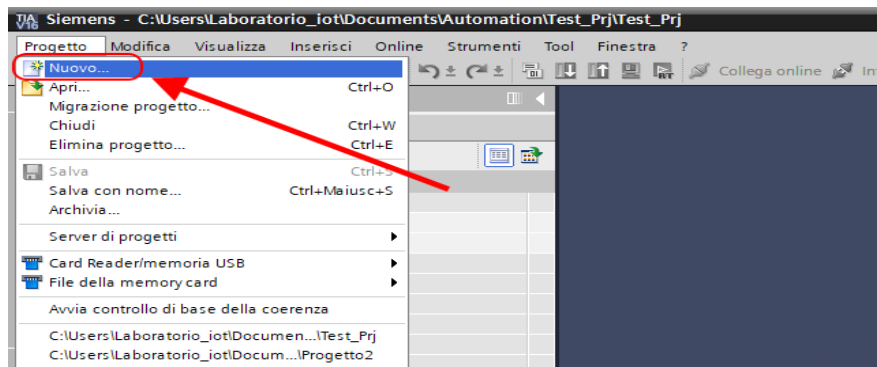
The screenshot shows the 'Serial Ports' configuration page. The 'RS485 NR 1' configuration section is highlighted with a red box and a red arrow pointing to it. The configuration includes: Modbus Protocol (RTU), Baud rate (38400 BAUD), Data (8 Bit), Stop bit (One), Parity (NONE), Timeout [ms] (200), and Max Writing Retries Number (3). Below this section is the 'RS485/RS232 NR 2' configuration section.

Now let's send the configuration to the device with the "send" button:

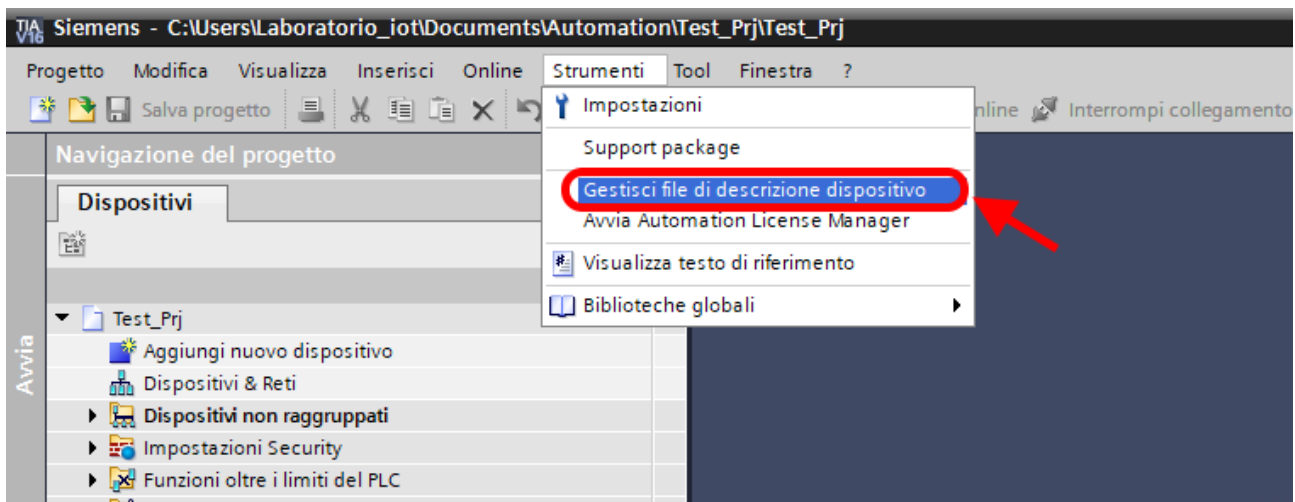


We can now move on to configuring the PLC via Tia Portal™:

Creating a new project:

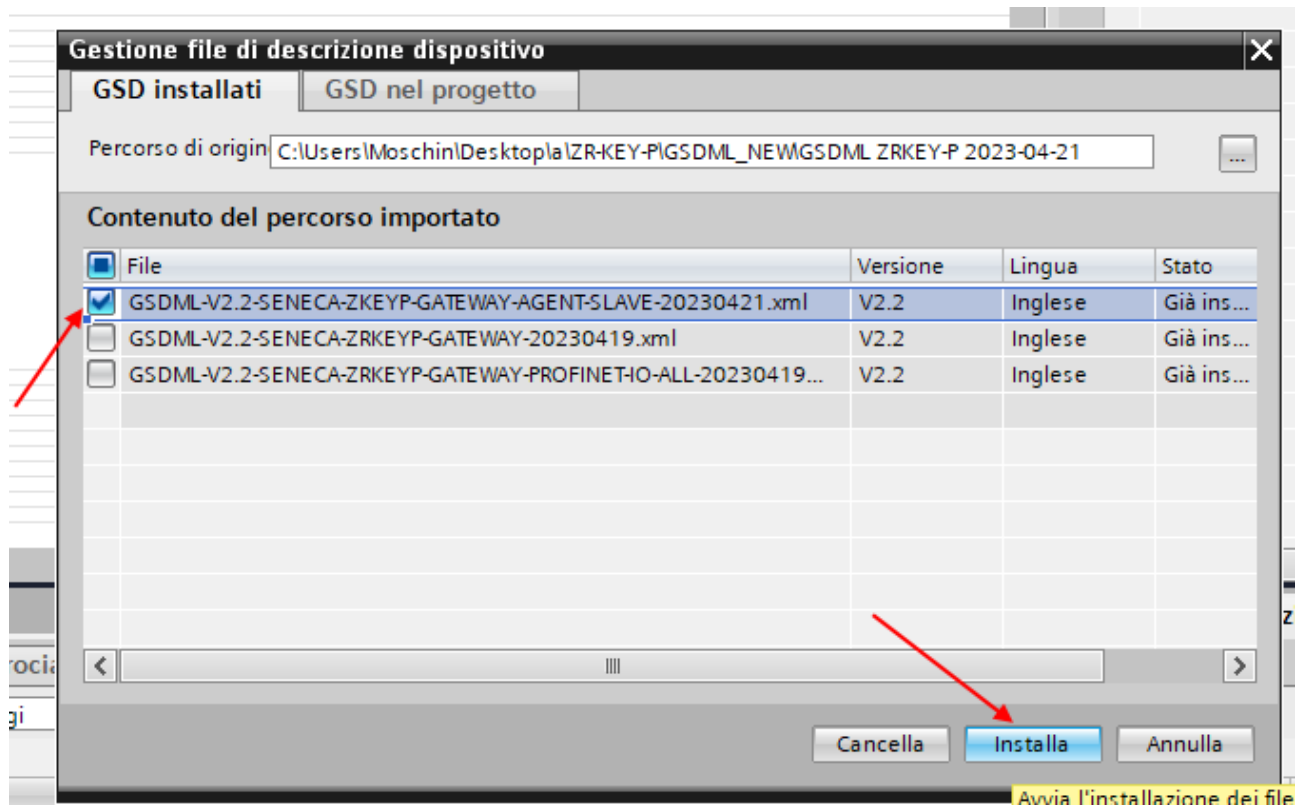


Install the GSD file of the Seneca product:

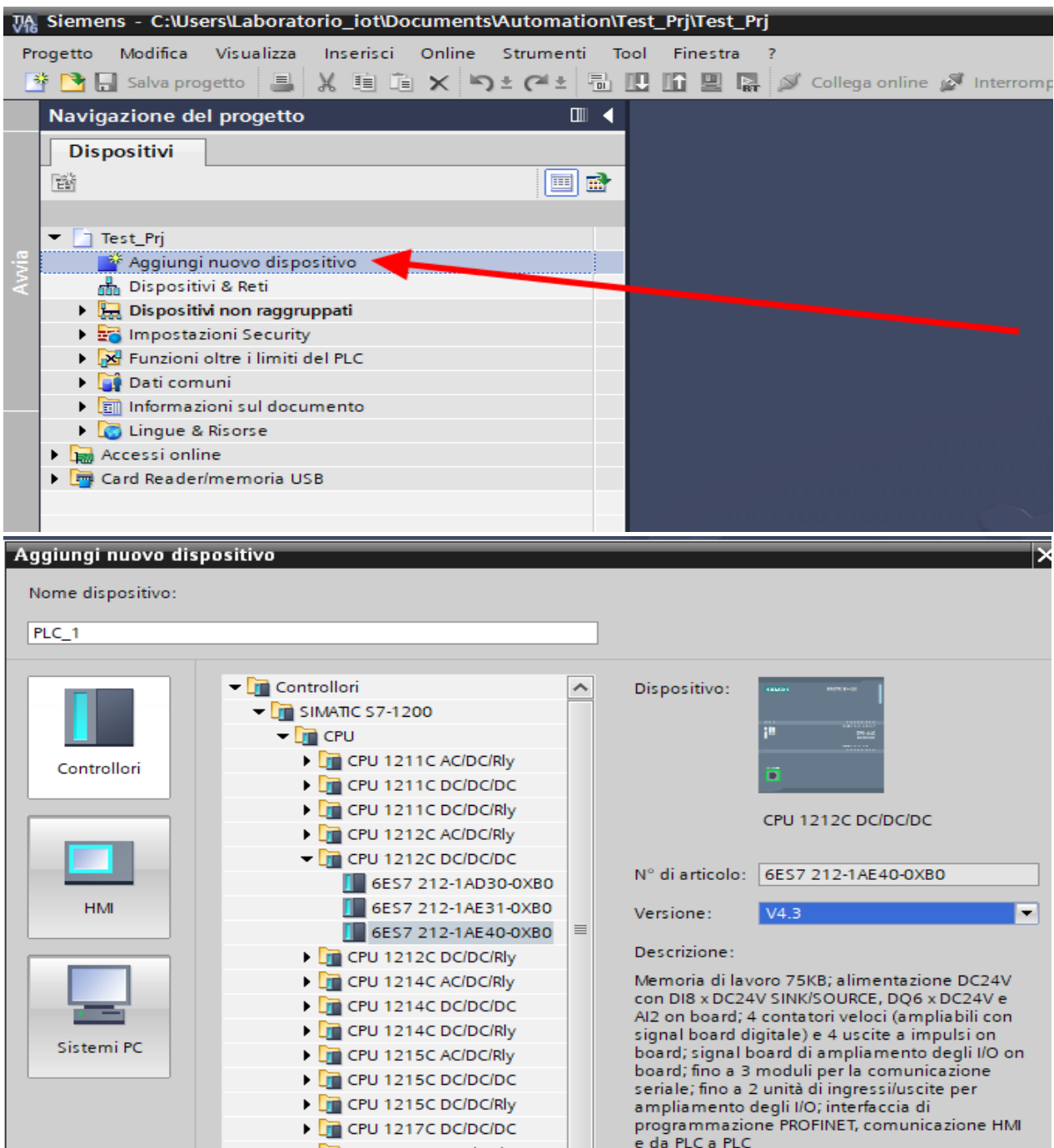


For the Modbus Slave mode, the GSDML file is generic and can be downloaded from the www.seneca.it website in the gateway section of the key-p series.

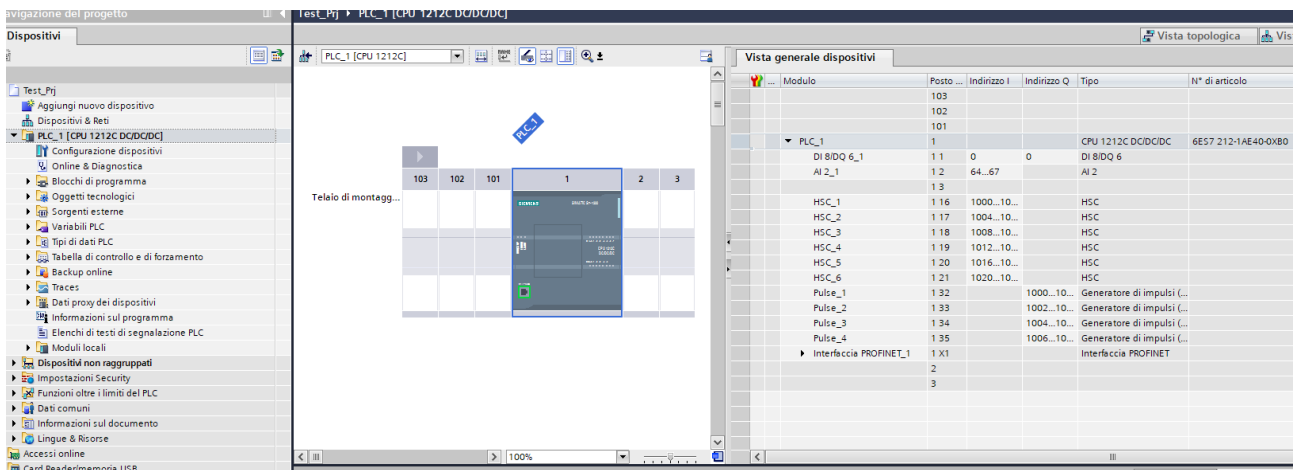
Point to the directory where you saved the GSDML file and press INSTALL.



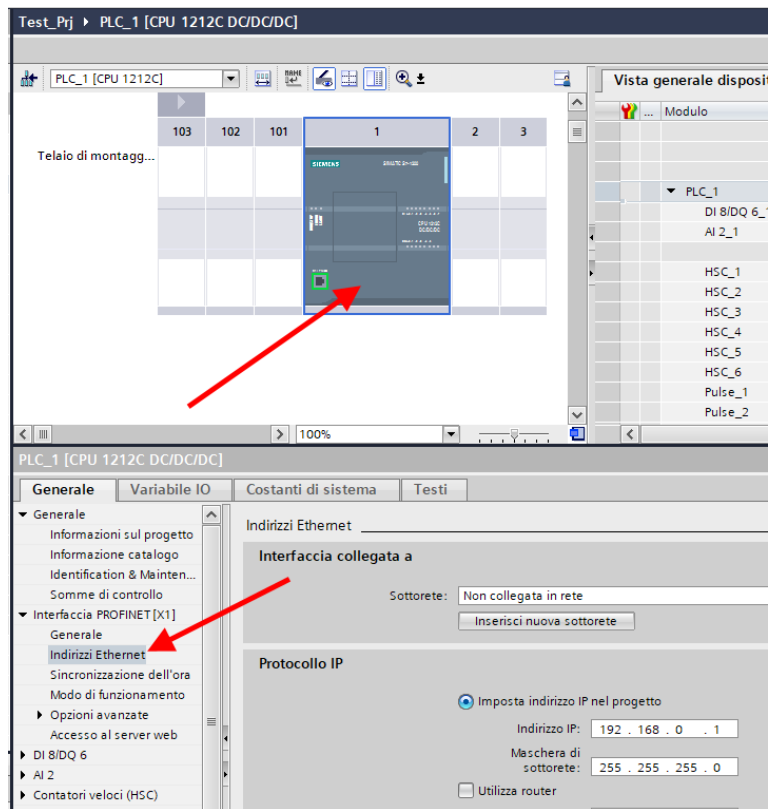
Now insert the Siemens PLC (in our example a SIEMATIC S7 1200), click on "Add new device ...":



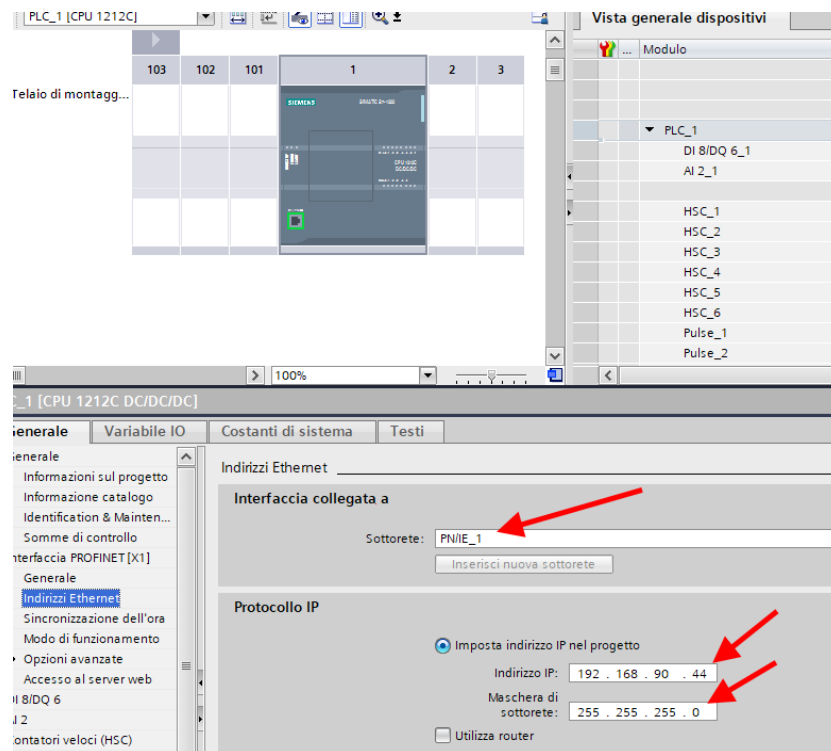
Confirm and the PLC will be added to the rack:



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



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

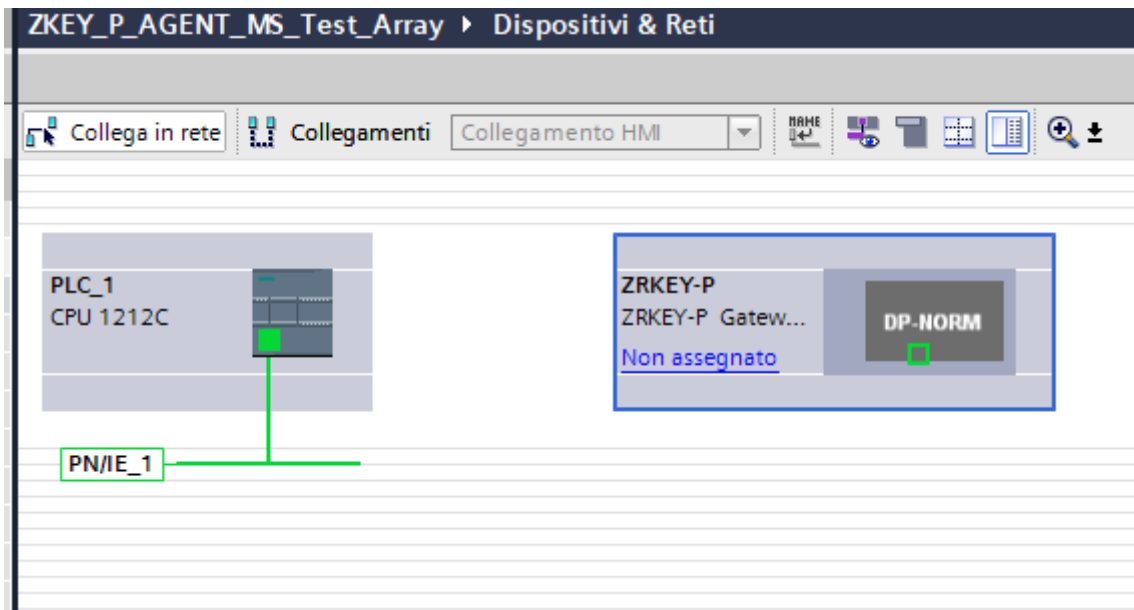


Move on to “devices and network” view:

On the right select "Hardware Catalogue" and then under "Additional Field Equipment" -> PROFINET IO -> GATEWAY -> Seneca SRL -> ZR-KEY-P Gateway -> ZRKEY-P Gateway Agent Slave

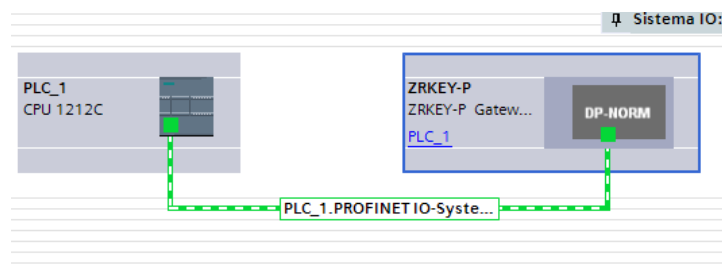
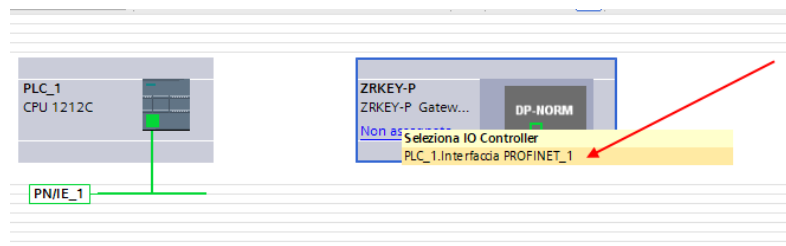


Drag the device to the network view:

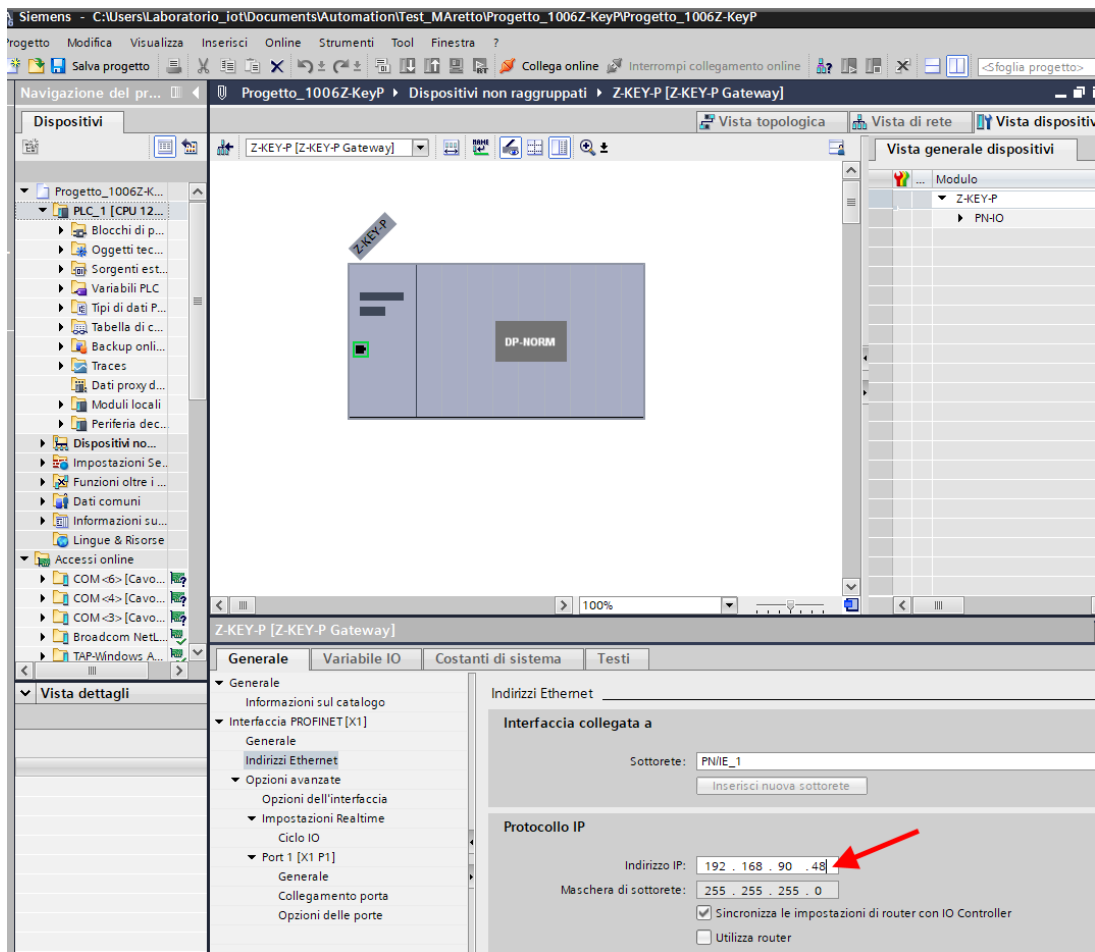


Now associate it with the PLC:

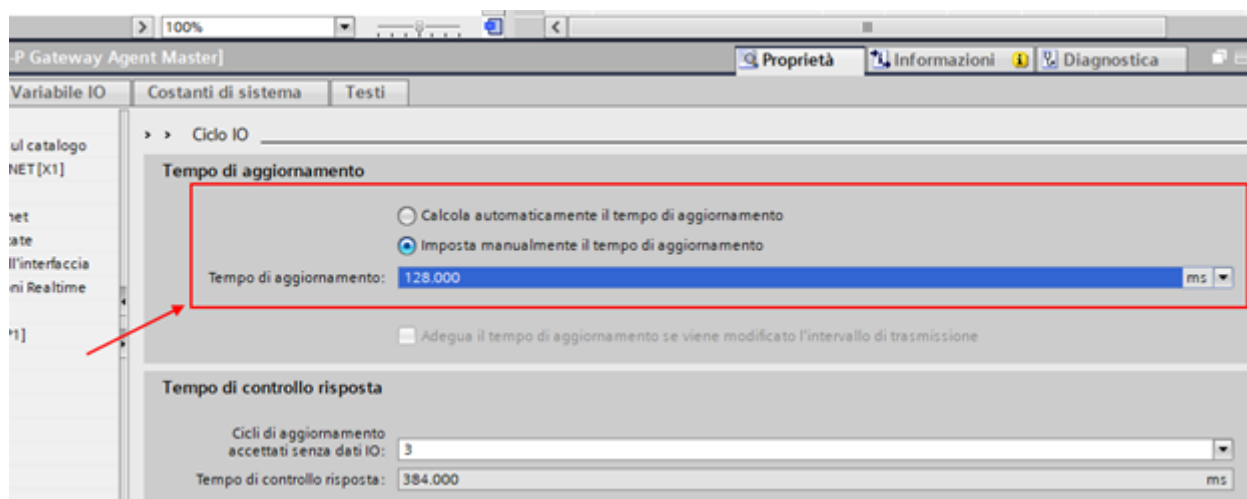
Click with the left mouse button on "Not assigned" and then select the PLC:



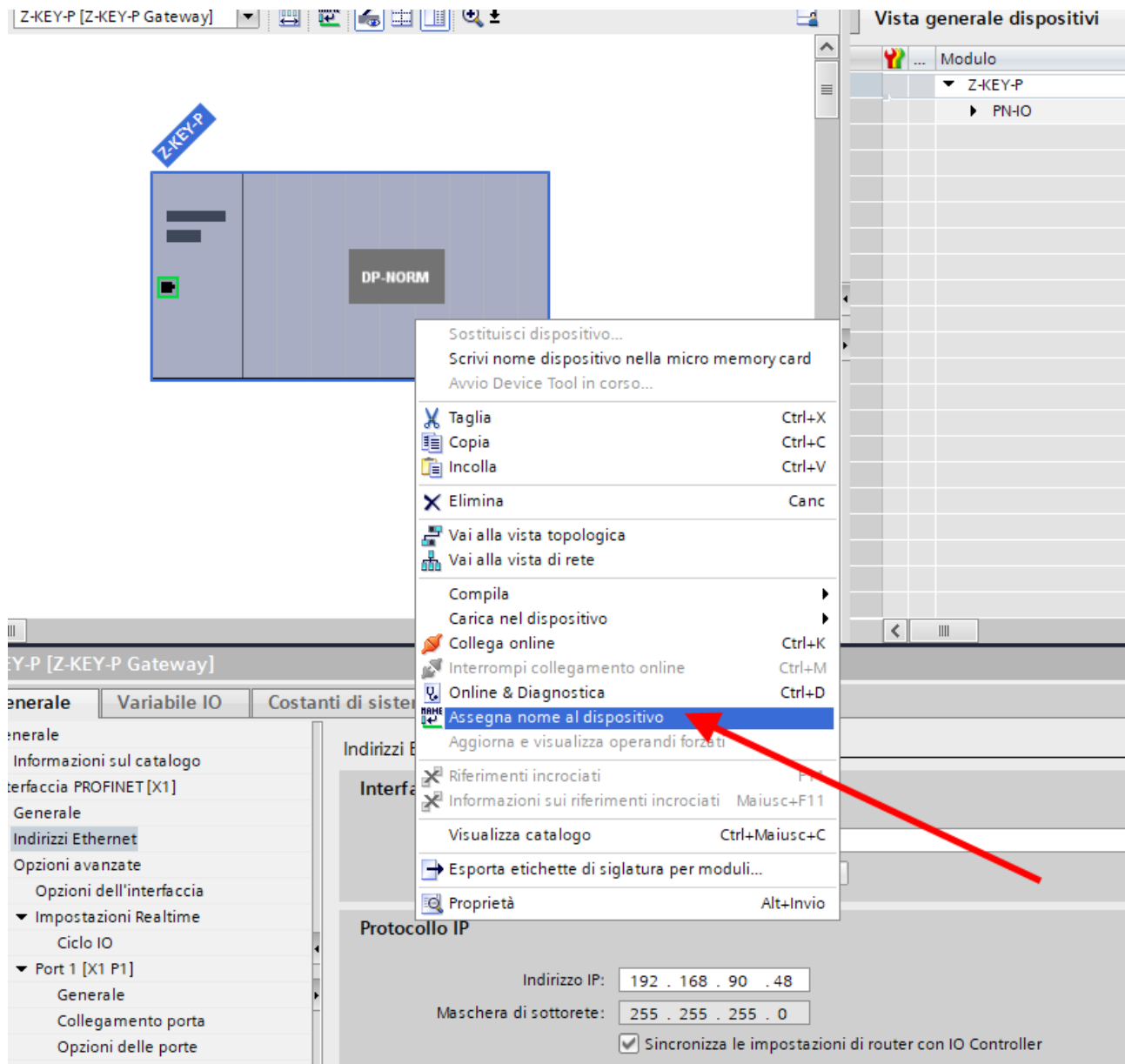
Click twice on the Seneca device and configure the IP address here too (for example 192.168.90.48) and the timing:



Depending on the project it is necessary to set the cycle time (typically 128 ms):



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

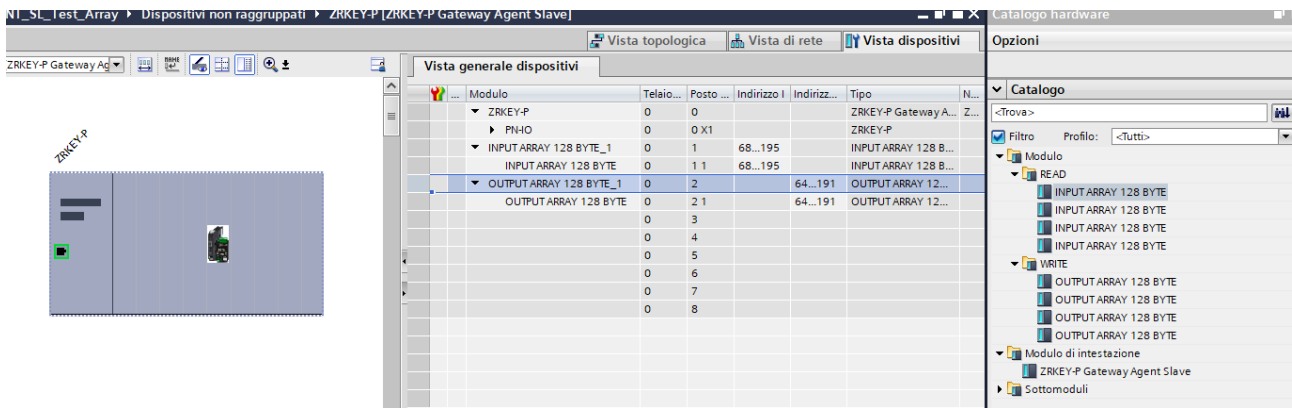


Scan the network with "Update list" and set (if necessary) the device name with "Assign name".

You said that you want to get the following map:

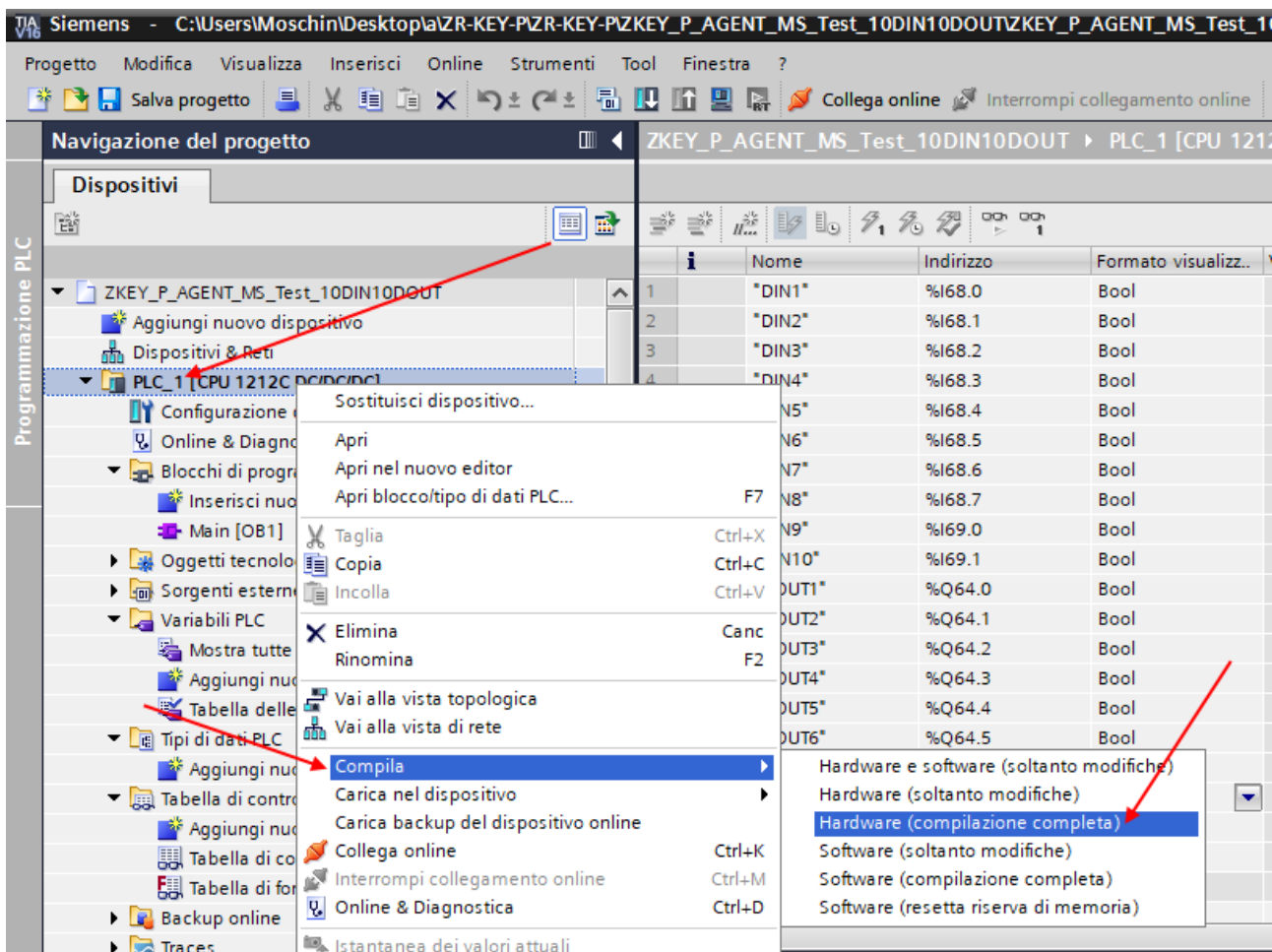
SERIAL PLC -> Writes 10 Byte on Modbus -> SIEMENS PLC Reads 10 Byte from Profinet
 SIEMENS PLC -> Writes 5 Bytes on Profinet -> SERIAL PLC Reads 5 Bytes from Modbus

The IO configuration must therefore be prepared:

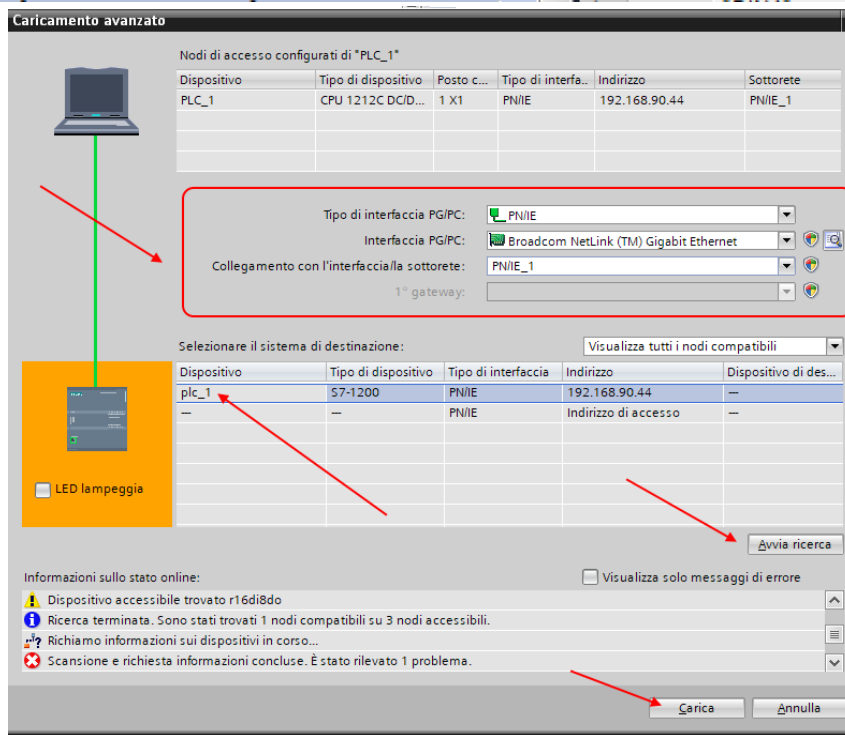
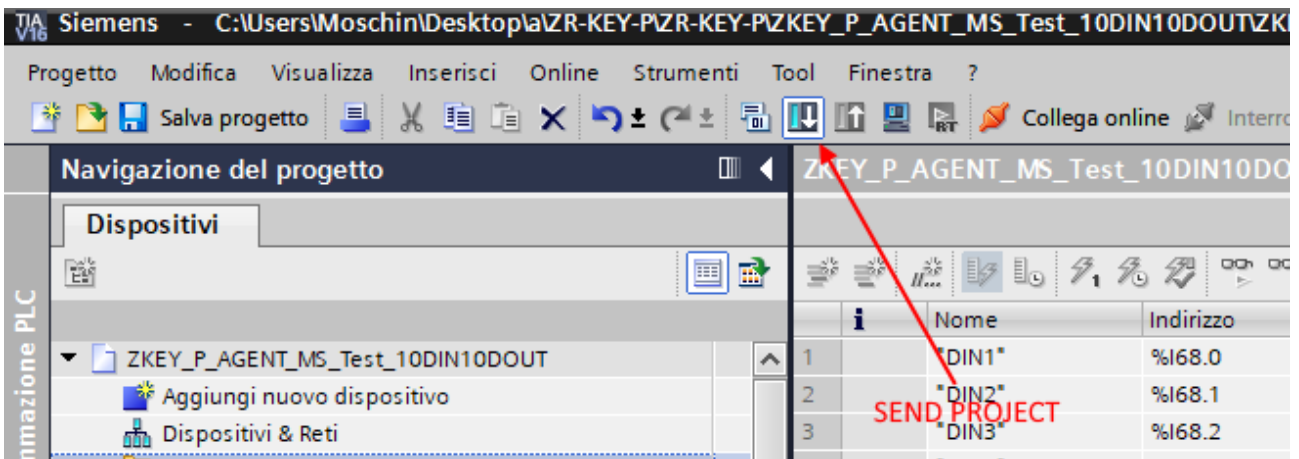


Move one 128-byte array for inputs and another 128-byte array for outputs. You will only need 10 bytes for writing and 5 bytes for reading.

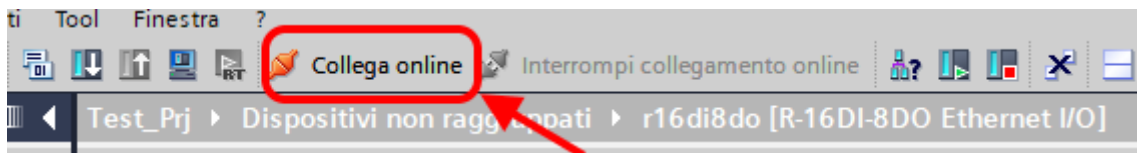
Now the devices are configured, all that remains is to compile and send the configuration to the PLC. To compile we select the complete hardware compilation:



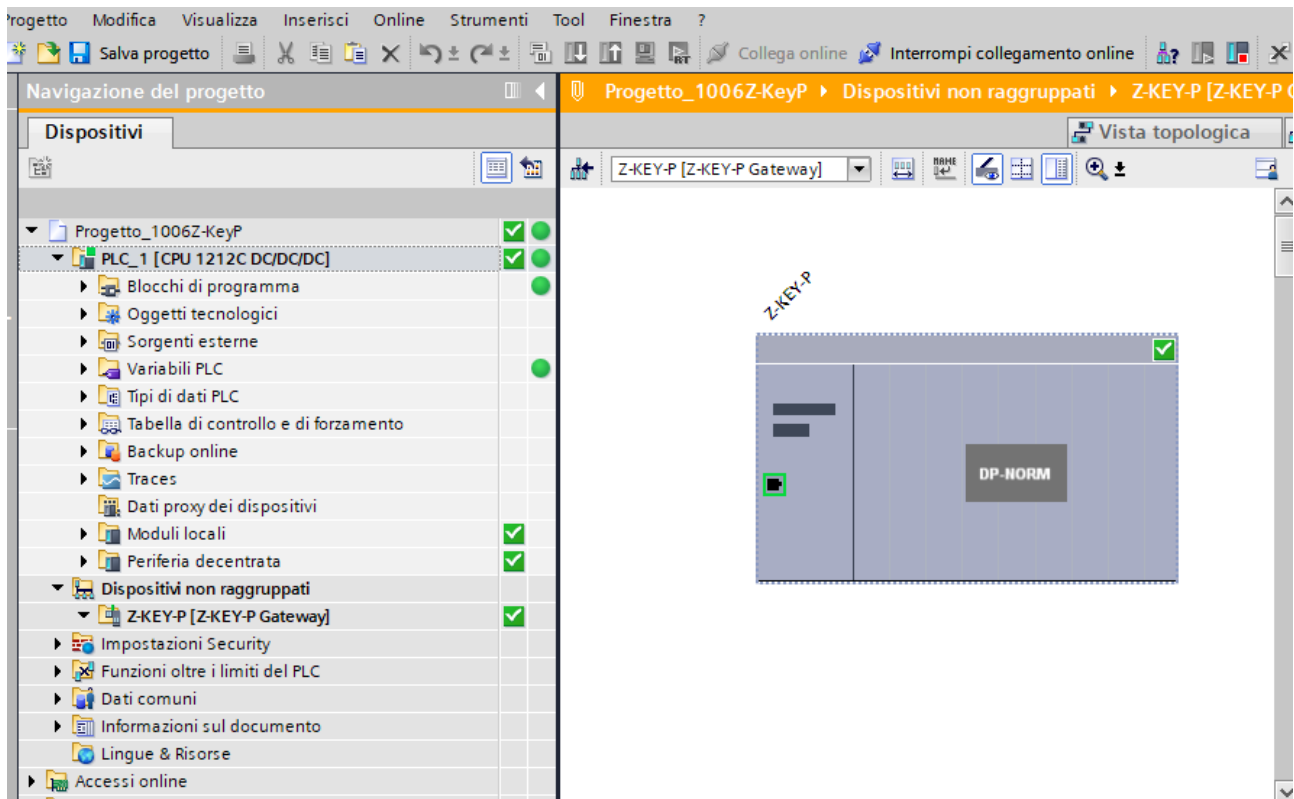
Then press icon to send the project to the PLC:



Let's go online to check if there are any errors:



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



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

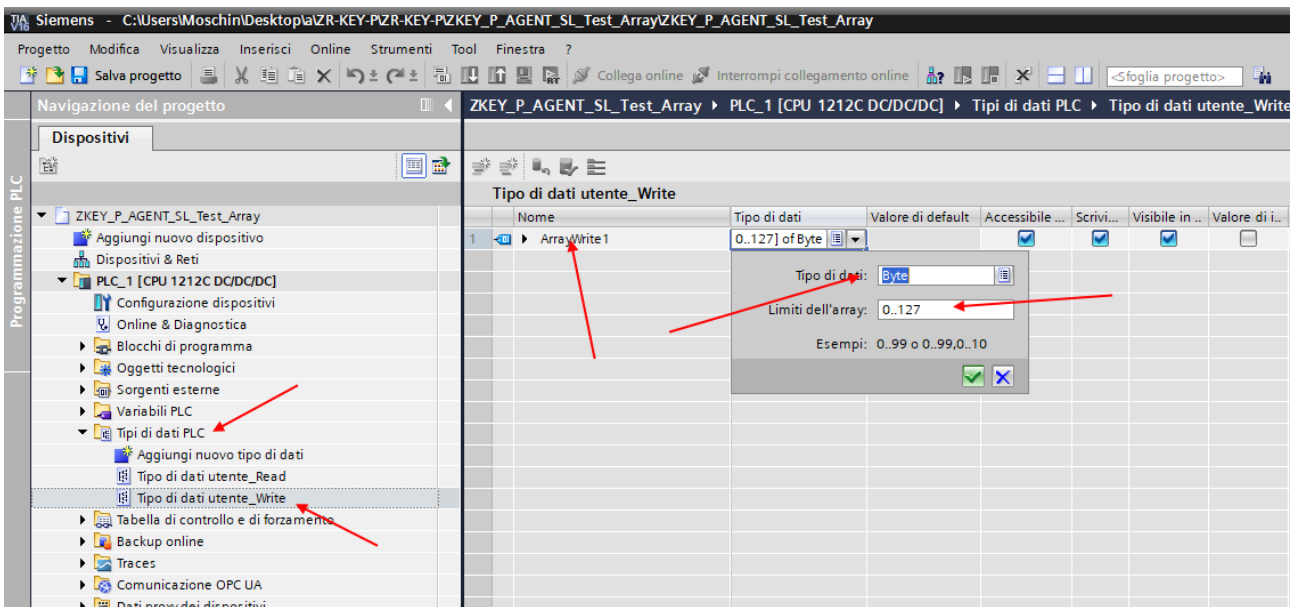
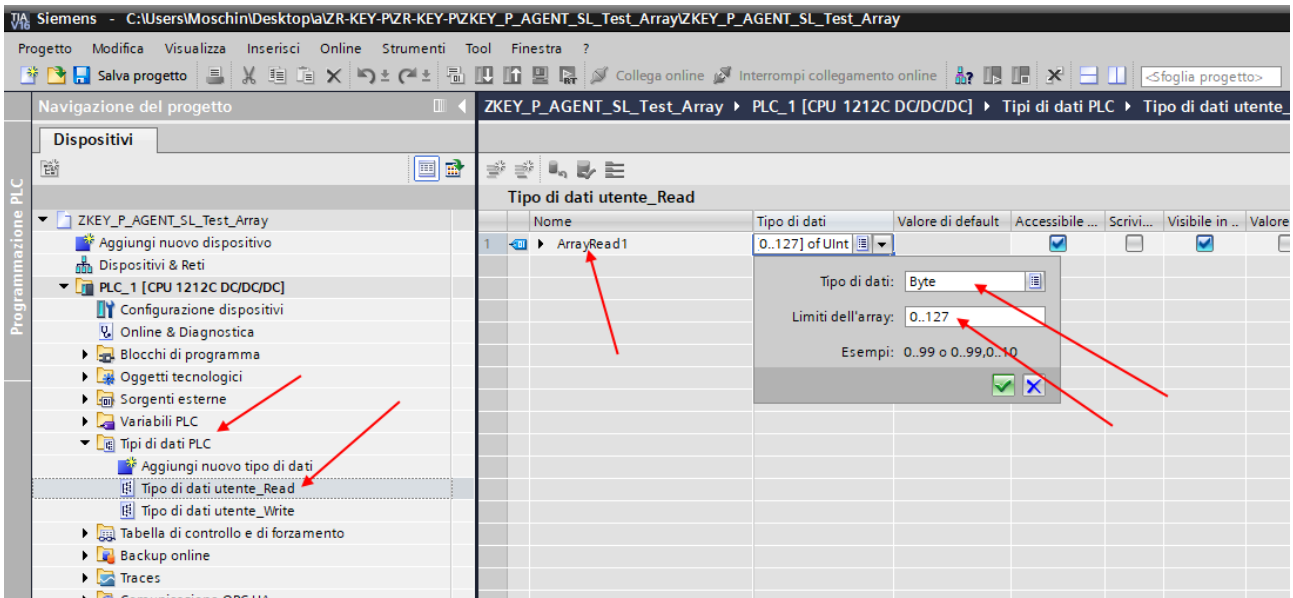
Important:

Registers written in Modbus cannot be read by Modbus but only by Profinet
 Registers read by Modbus cannot be written by Modbus but only by Profinet

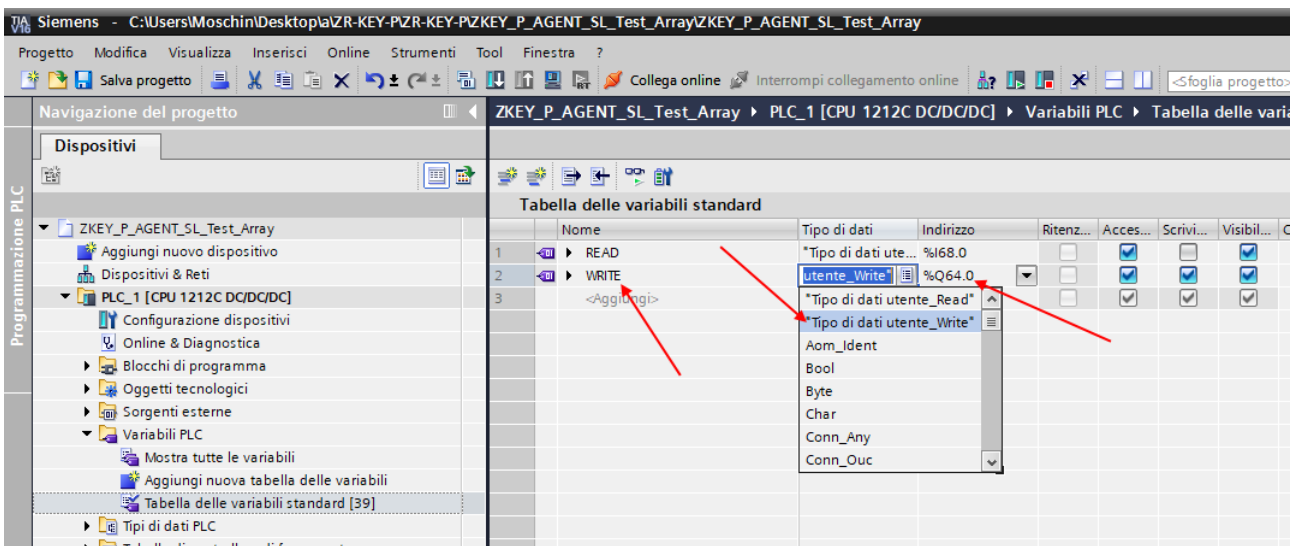
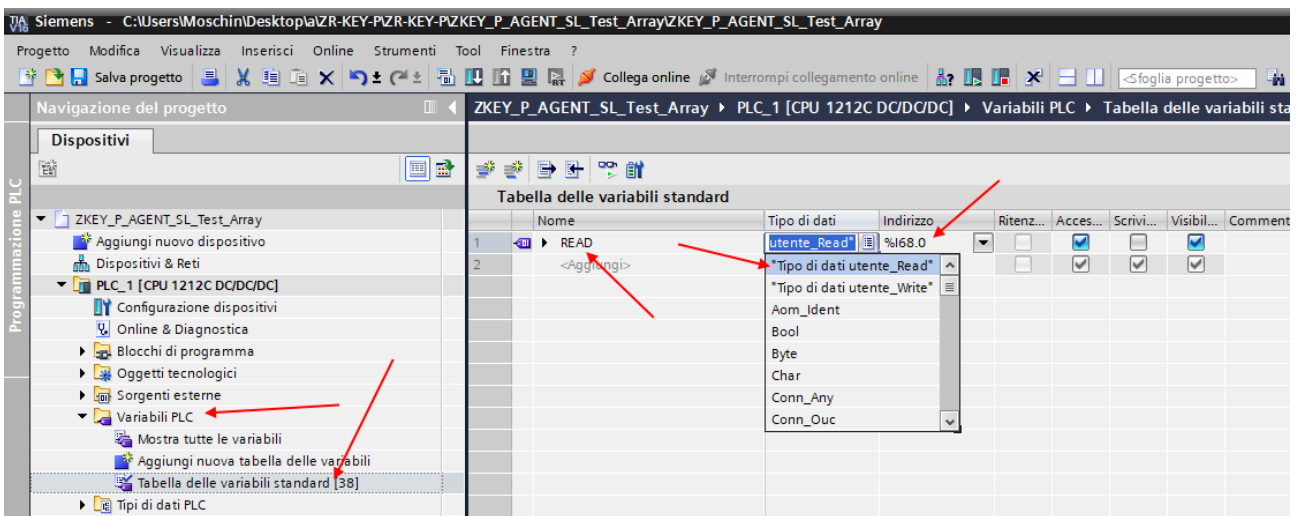
Then define the variables for the PLC.

It is convenient to define data types to manage arrays:

Create two data types, one for read and one for write, each of 128 bytes



Now define the PLC variables using the newly created ones as data type:



This way you created the arrays (albeit beyond our needs):
For example the array of reads:

ZKEY_P_AGENT_SL_Test_Array ▶ PLC_1 [CPU 1212C DC/DC/DC] ▶ Variabili PLC ▶ Tabella delle variabili standard [39]

Variabili Costanti ute

Tabella delle variabili standard

	Nome	Tipo di dati	Indirizzo	Ritenz...	Acces...	Scrivi...	Visibil...	Commento
1	READ	*Tipo di dati ute...	%I68.0		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
2	ArrayRead1	Array[0..127] o...	%I68.0		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
3	ArrayRead1[0]	Byte	%IB68		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
4	ArrayRead1[1]	Byte	%IB69		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
5	ArrayRead1[2]	Byte	%IB70		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
6	ArrayRead1[3]	Byte	%IB71		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
7	ArrayRead1[4]	Byte	%IB72		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
8	ArrayRead1[5]	Byte	%IB73		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
9	ArrayRead1[6]	Byte	%IB74		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
10	ArrayRead1[7]	Byte	%IB75		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
11	ArrayRead1[8]	Byte	%IB76		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
12	ArrayRead1[9]	Byte	%IB77		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
13	ArrayRead1[10]	Byte	%IB78		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
14	ArrayRead1[11]	Byte	%IB79		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
15	ArrayRead1[12]	Byte	%IB80		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
16	ArrayRead1[13]	Byte	%IB81		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
17	ArrayRead1[14]	Byte	%IB82		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
18	ArrayRead1[15]	Byte	%IB83		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
19	ArrayRead1[16]	Byte	%IB84		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
20	ArrayRead1[17]	Byte	%IB85		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
21	ArrayRead1[18]	Byte	%IB86		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
22	ArrayRead1[19]	Byte	%IB87		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

Proprietà Informazioni

And then define a control table using the following notation:

Siemens - C:\Users\Moschin\Desktop\laZR-KEY-PZR-KEY-PZKEY_P_AGENT_SL_Test_Array\ZKEY_P_AGENT_SL_Test_Array

Progetto Modifica Visualizza Inserisci Online Strumenti Tool Finestra ?

Salva progetto

Collega online Interrompi collegamento online

Navigazione del progetto ZKEY_P_AGENT_SL_Test_Array ▶ PLC_1 [CPU 1212C DC/DC/DC] ▶ Tabella di controllo e di forzamento ▶ Tabella di

Dispositivi

Programazione PLC

ZKEY_P_AGENT_SL_Test_Array

Aggiungi nuovo dispositivo

Dispositivi & Reti

PLC_1 [CPU 1212C DC/DC/DC]

Configurazione dispositivi

Online & Diagnostica

Blocchi di programma

Oggetti tecnologici

Sorgenti esterne

Variabili PLC

Tipi di dati PLC

Tabella di controllo e di forzamento

Aggiungi nuova tabella di controllo

Tabella di controllo_1

Tabella di forzamento

Backup online

Traces

Comunicazione OPC UA

Dati proxy dei dispositivi

	Nome	Indirizzo	Formato visualizz.	Valore di controllo	Valore di comando
1	"READ".ArrayRead1[0]	%IB68	Esadecimale		<input type="checkbox"/>
2	"READ".ArrayRead1[1]	%IB69	Esadecimale		<input type="checkbox"/>
3	"READ".ArrayRead1[2]	%IB70	Esadecimale		<input type="checkbox"/>
4	"READ".ArrayRead1[3]	%IB71	Esadecimale		<input type="checkbox"/>
5	"READ".ArrayRead1[4]	%IB72	Esadecimale		<input type="checkbox"/>
6	"READ".ArrayRead1[5]	%IB73	Esadecimale		<input type="checkbox"/>
7	"READ".ArrayRead1[6]	%IB74	Esadecimale		<input type="checkbox"/>
8	"READ".ArrayRead1[7]	%IB75	Esadecimale		<input type="checkbox"/>
9	"READ".ArrayRead1[8]	%IB76	Esadecimale		<input type="checkbox"/>
10	"READ".ArrayRead1[9]	%IB77	Esadecimale		<input type="checkbox"/>
11	"WRITE".ArrayWrite1[0]	%QB64	Esadecimale		<input type="checkbox"/>
12	"WRITE".ArrayWrite1[1]	%QB65	Esadecimale		<input type="checkbox"/>
13	"WRITE".ArrayWrite1[2]	%QB66	Esadecimale		<input type="checkbox"/>
14	"WRITE".ArrayWrite1[3]	%QB67	Esadecimale		<input type="checkbox"/>
15	"WRITE".ArrayWrite1[4]	%QB68	Esadecimale		<input type="checkbox"/>
16					

The 5 bytes of Profinet writing are the 5 bytes of reading from modbus (3 Modbus Bytes = 6 bytes).
The 10 bytes of Profinet readings are the 10 bytes of modbus writing (5 Modbus registers = 10 bytes).

Here it is now possible to read inputs and force write outputs.

Profinet writes in the “Write” arrays are read by Modbus like this:

The screenshot shows the LAD editor for PLC_1 [CPU 1212C DC/DC/DC] with a table of control and forcing data. The table lists various read and write operations. A red box highlights the 'WRITE' array elements, with an arrow pointing to the label 'PROFINET WRITE'. On the right, the ModScan32 - ModSca1 window is open, showing the configuration for a Modbus read operation. The 'MODBUS Point Type' is set to '03: HOLDING REGISTER'. The 'Address' is 0001 and 'Length' is 3. A red box highlights the resulting Modbus read values: 40001: <1122H>, 40002: <3344H>, and 40003: <5500H>. An arrow labeled 'MODBUS READ' points to these values.

i	Nome	Indirizzo	Formato visualizz..	Valore di controllo	Valore di comando	Comme
1	"READ".ArrayRead1[0]	%IB68	Esadecimale	16#11		
2	"READ".ArrayRead1[1]	%IB69	Esadecimale	16#22		
3	"READ".ArrayRead1[2]	%IB70	Esadecimale	16#00		
4	"READ".ArrayRead1[3]	%IB71	Esadecimale	16#00		
5	"READ".ArrayRead1[4]	%IB72	Esadecimale	16#00		
6	"READ".ArrayRead1[5]	%IB73	Esadecimale	16#00		
7	"READ".ArrayRead1[6]	%IB74	Esadecimale	16#00		
8	"READ".ArrayRead1[7]	%IB75	Esadecimale	16#00		
9	"READ".ArrayRead1[8]	%IB76	Esadecimale	16#00		
10	"READ".ArrayRead1[9]	%IB77	Esadecimale	16#00		
11	"WRITE".ArrayWrite1[0]	%QB64	Esadecimale	16#11	16#11	<input checked="" type="checkbox"/>
12	"WRITE".ArrayWrite1[1]	%QB65	Esadecimale	16#22	16#22	<input checked="" type="checkbox"/>
13	"WRITE".ArrayWrite1[2]	%QB66	Esadecimale	16#33	16#33	<input checked="" type="checkbox"/>
14	"WRITE".ArrayWrite1[3]	%QB67	Esadecimale	16#44	16#44	<input checked="" type="checkbox"/>
15	"WRITE".ArrayWrite1[4]	%QB68	Esadecimale	16#55	16#55	<input checked="" type="checkbox"/>
16		<Aggiungi>				

Writes from modbus are read by profinet like this:

The screenshot shows the LAD editor for PLC_1 [CPU 1212C DC/DC/DC] with a table of control and forcing data. A red box highlights the 'READ' array elements, with an arrow pointing to the label 'PROFINET READ'. On the right, the ModScan32 - ModSca1 window is open, showing the configuration for a Modbus write operation. The 'MODBUS Point Type' is set to '02: COIL'. The 'Address' is 0001 and 'Length' is 0005. A red box highlights the resulting Modbus write values: 0001: AABB (HEX), 0002: CCDD (HEX), 0003: EFFF (HEX), 0004: 9988 (HEX), and 0005: 7766 (HEX). An arrow labeled 'MODBUS WRITE' points to these values.

i	Nome	Indirizzo	Formato visualizz..	Valore di controllo	Valore di comando	Comme
1	"READ".ArrayRead1[0]	%IB68	Esadecimale	16#AA		
2	"READ".ArrayRead1[1]	%IB69	Esadecimale	16#BB		
3	"READ".ArrayRead1[2]	%IB70	Esadecimale	16#CC		
4	"READ".ArrayRead1[3]	%IB71	Esadecimale	16#DD		
5	"READ".ArrayRead1[4]	%IB72	Esadecimale	16#EE		
6	"READ".ArrayRead1[5]	%IB73	Esadecimale	16#FF		
7	"READ".ArrayRead1[6]	%IB74	Esadecimale	16#99		
8	"READ".ArrayRead1[7]	%IB75	Esadecimale	16#88		
9	"READ".ArrayRead1[8]	%IB76	Esadecimale	16#77		
10	"READ".ArrayRead1[9]	%IB77	Esadecimale	16#66		
11	"WRITE".ArrayWrite1[0]	%QB64	Esadecimale	16#11	16#11	<input checked="" type="checkbox"/>
12	"WRITE".ArrayWrite1[1]	%QB65	Esadecimale	16#22	16#22	<input checked="" type="checkbox"/>
13	"WRITE".ArrayWrite1[2]	%QB66	Esadecimale	16#33	16#33	<input checked="" type="checkbox"/>
14	"WRITE".ArrayWrite1[3]	%QB67	Esadecimale	16#44	16#44	<input checked="" type="checkbox"/>
15	"WRITE".ArrayWrite1[4]	%QB68	Esadecimale	16#55	16#55	<input checked="" type="checkbox"/>
16		<Aggiungi>				

5.2. “-E” GATEWAY CONFIGURATION WITH WEBSERVER AND STUDIO 5000 LOGIX DESIGNER® SOFTWARE

The version used in this chapter of the Studio 5000 software is 35.00.00.


First you need to configure the Gateway via the webserver:

Let's configure the basic Ethernet/IP parameters:

ETHERIP DEVICE SERIAL NUMBER	1	1
MODBUS TCP-IP CLIENT	DISABLED	DISABLED
STOP MODBUS READING WHEN NO ETHERIP CONNECTION	Disabled	Disabled
ETHERIP O->T RUN/IDLE HEADER	Enabled	Disabled
ETHERIP T->O RUN/IDLE HEADER	Disabled	Disabled
ETHERIP VENDOR ID	65535	65535
ETHERIP DEVICE TYPE	1	0
ETHERIP PRODUCT CODE	60000	60000
ETHERIP MAJOR REVISION	1	1
ETHERIP MINOR REVISION	1	1
ETHERIP DIAGNOSTIC	Disabled	Disabled

Confirm with "APPLY">

Let's configure 1 Modbus Read register and 2 Modbus Write registers:


Z-KEY-E Setup Command 1 Firmware Version : 1984_105

	CURRENT	UPDATED
MNEMONIC NAME		TAG1
TARGET MODBUS DEVICE		CUSTOM
TARGET RESOURCE		
TARGET CONNECTED TO		PORT#1
TARGET MODBUS STATION ADDRESS		1
TARGET MODBUS START REGISTER ADDRESS		1
TARGET MODBUS REQUEST TYPE		READ HOLDING REGISTER
TARGET REGISTER DATA LENGTH		1
TARGET MODBUS PERIODIC TRIGGER (ms)	1000	1000
ENDIAN SWAP		NONE

Equivalent to the address in the Seneca documentation : 40001

	CURRENT	UPDATED
MNEMONIC NAME	TAG2	TAG2
TARGET MODBUS DEVICE	CUSTOM	CUSTOM
TARGET RESOURCE		
TARGET CONNECTED TO	PORT#1	PORT#1
TARGET MODBUS STATION ADDRESS	2	2
TARGET MODBUS START REGISTER ADDRESS	1	1
TARGET MODBUS REQUEST TYPE	WRITE MULTIPLE HOLDING REGISTER	WRITE MULTIPLE HOLDING REGISTER
TARGET REGISTER DATA LENGTH	2	2
TARGET MODBUS TRIGGER	WRITE ONLY ON DATA CHANGE	WRITE ONLY ON DATA CHANGE
ENDIAN SWAP	NONE	NONE

Equivalent to the address in the Seneca documentation : 40001

APPLY

Now on the “Status” section let's export the EDS file using the “GET EDS FILE” button:

ACTUAL IP ADDRESS : 192.168.90.101
 ACTUAL IP MASK : 255.255.255.0
 ACTUAL GATEWAY ADDRESS: 192.168.90.1
 ACTUAL MAC ADDRESS: c8-f9-81-0e-2e-de

REBOOT

GET ALL TAG AS CSV FILE

GET EDS FILE

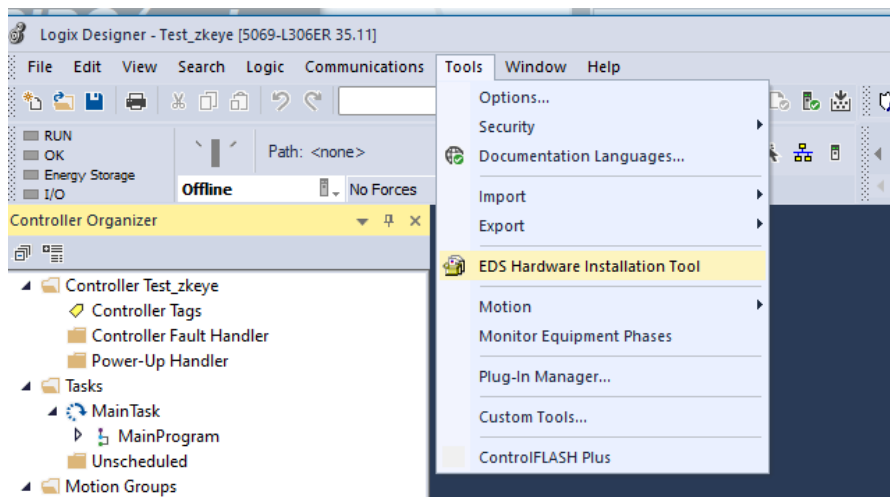
DATA FLOW DIRECTION: ETHERIP WRITE
 START ADDRESS (HEX): 00
 LENGTH: 64
 FORMAT: HEX

INTERNAL ADDRESS	0x00	0x01	0x02	0x03	0x04	0x05	0x06	0x07	0x08	0x09	0x0A	0x0B	0x0C	0x0D	0x0E	0x0F
00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
10	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
20	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
30	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00

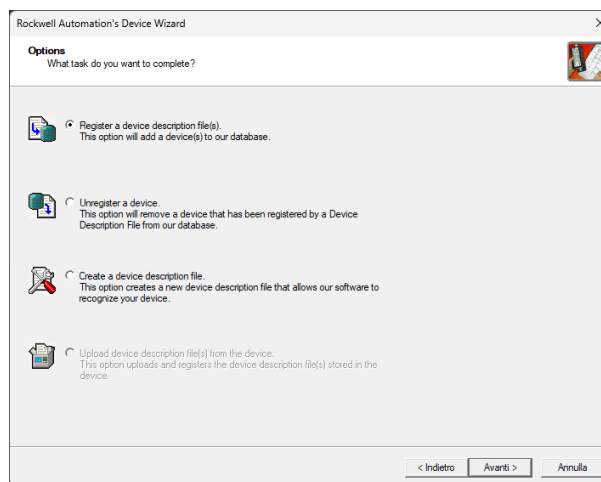
The gateway configuration is complete.

Now in the Studio 5000 software we import the EDS file we have just exported:

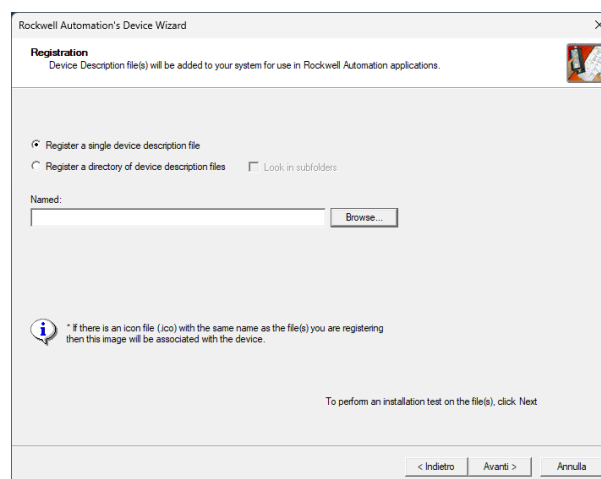
In the TOOLS-> EDS Hardware Installation Tool menu:

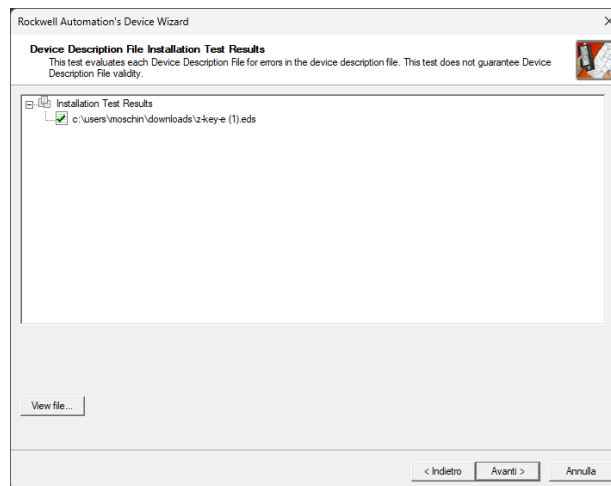


We select “Register a device description”:

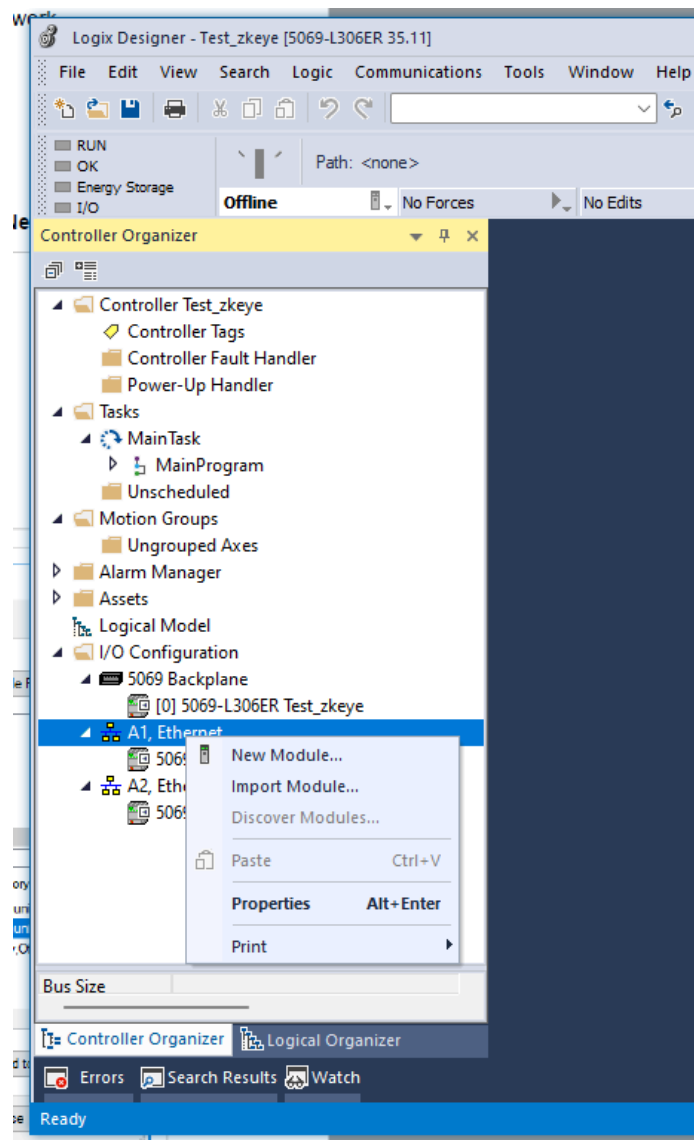


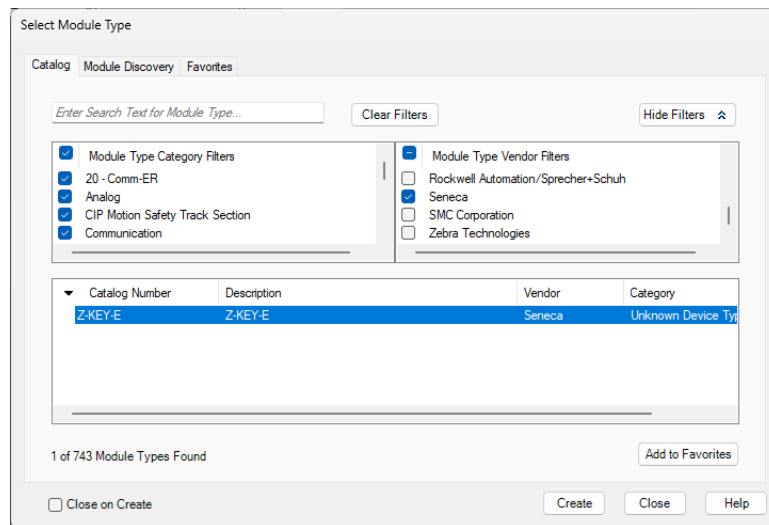
We select the EDS file exported from the webserver:



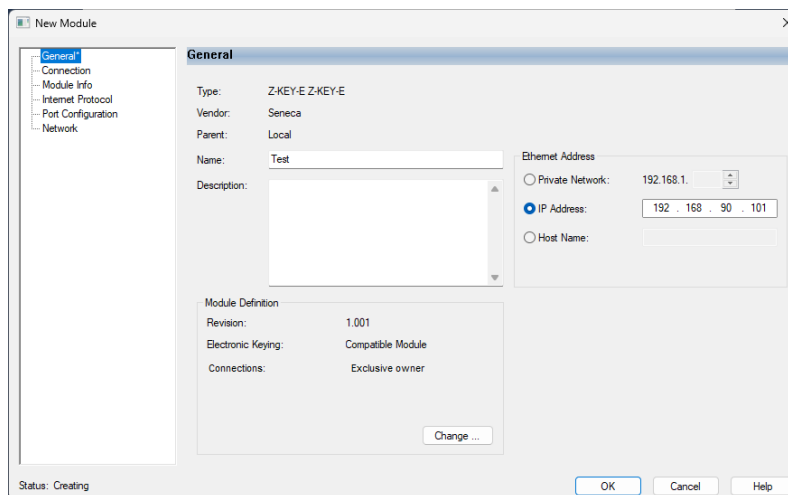


Now we insert the Seneca module by right clicking on the Ethernet port and selecting “New Module”:

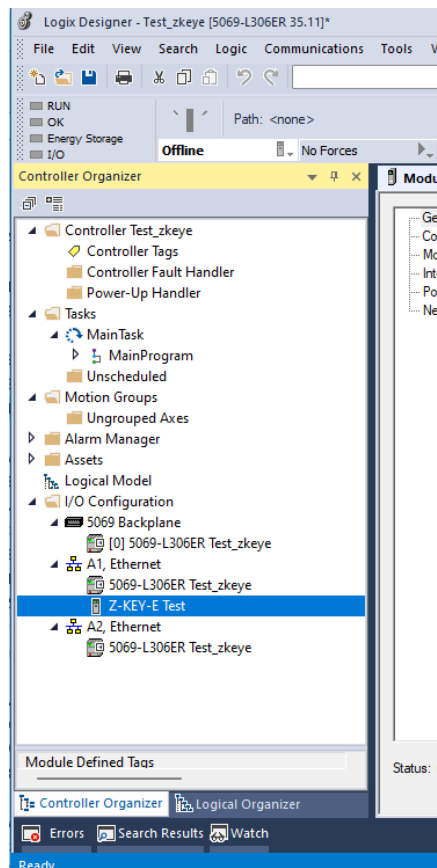




We configure it with the IP address chosen previously:



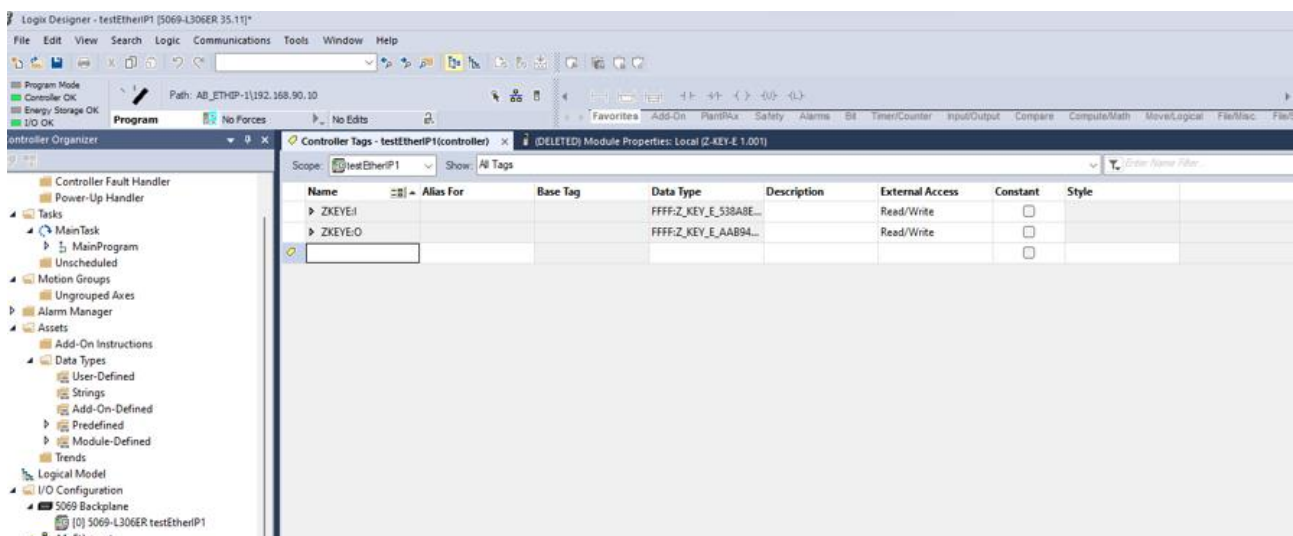
And we confirm with OK:



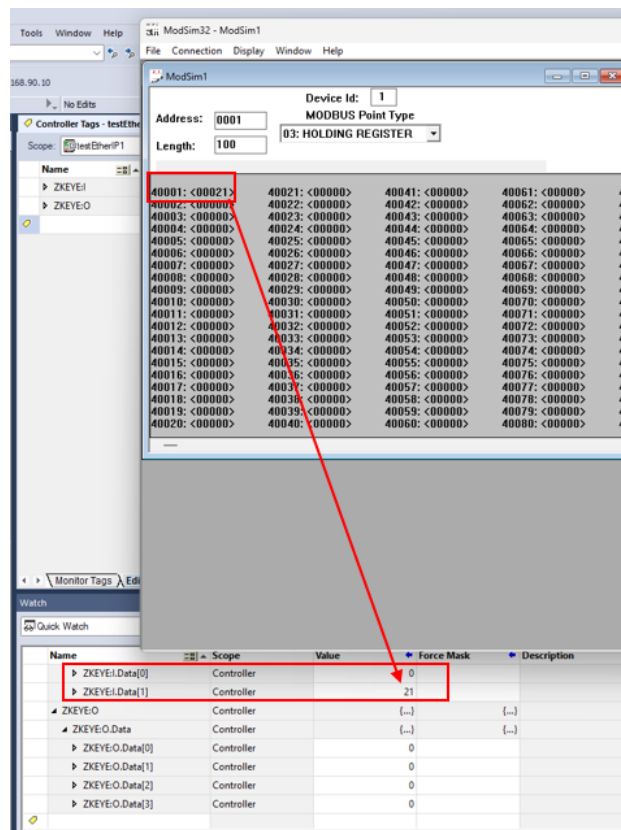
Having configured the gateway with 1 read register (2 bytes) and 2 write registers (4 bytes) you will have the following:

ZKEYE:I represents the 2 read bytes

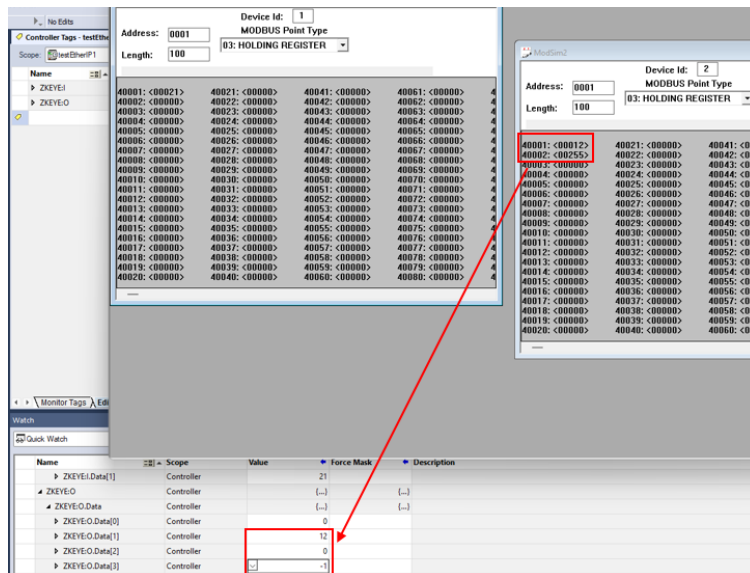
ZKEYE:O represent the 4 write bytes:



The value read by modbus is visible in the ZKEYE:I bytes



While the writings are commanded by ZKEYE:O:



Where -1 in 2's complement equals byte 255

6. GATEWAY WEBSERVERS

6.1. "-P" GATEWAY WEBSERVER

6.1.1. WEBSERVER MODE AND PROFINET MODE

The device is normally in Profinet mode; in Profinet mode the device can be configured only through the Easy Setup 2 software.

In order to access the internal webserver it is necessary to put the device in Webserver mode using the Easy Setup2 or Seneca Device Discovery software, it is also possible to change the operating mode by pressing the button following the procedure:

6.1.2. MANUAL PROCEDURE FOR SWITCHING FROM PROFINET MODE TO WEBSERVER MODE AND VICE VERSA

To force webserver mode:

- 1) Turn on the device
- 2) Keep the PS1 button pressed until all LEDs turn off
- 3) Release the button
- 4) The device restarts and the LEDs
On Z-KEY-P: PWR and SD/COM
On Z-KEY-2ETH-P: PWR and COM
On R-KEY-LT-P: PWR and COM
flash slowly to show webserver mode

To force Profinet mode:

- 1) Turn on the device
- 2) Keep the PS1 button pressed until all LEDs turn off
- 3) Release the button
- 4) The device restarts and the LEDs
On Z-KEY-P: PWR and SD/COM
On Z-KEY-2ETH-P: PWR and COM
On R-KEY-LT-P: PWR and COM

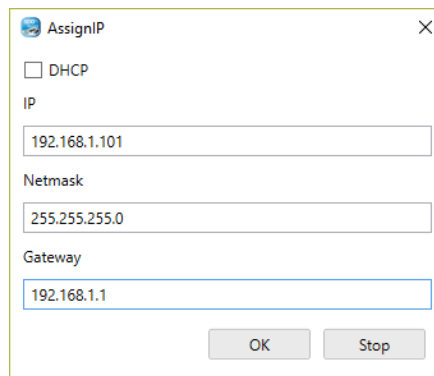
end flashing slowly to show Profinet mode.

6.1.3. STEP BY STEP GUIDE FOR THE FIRST ACCESS TO THE WEBSERVER

STEP 1: POWER THE DEVICE AND CONNECT THE ETHERNET PORT, PUT THE DEVICE IN WEBSERVER MODE (SEE CHAPTER 6.1.1)

SENECA DISCOVERY DEVICE SOFTWARE STEP 2

Launch SCAN, select the device and press the “Assign IP” button, set a configuration compatible with your PC, for instance:



The image shows a dialog box titled "AssignIP" with a close button (X) in the top right corner. It contains a checkbox for "DHCP" which is unchecked. Below it are three text input fields: "IP" with the value "192.168.1.101", "Netmask" with the value "255.255.255.0", and "Gateway" with the value "192.168.1.1". At the bottom of the dialog are two buttons: "OK" and "Stop".

Confirm with OK. Now the device can be reached via Ethernet from your PC.

STEP 5 ACCESS TO THE CONFIGURATION WEBSERVER

ENTER your access credentials:

user: admin

password: admin

 **ATTENTION!**

**THE WEB BROWSERS WHICH HAVE BEEN TESTED FOR COMPATIBILITY WITH THE DEVICE
WEBSERVER ARE:
MOZILLA FIREFOX AND GOOGLE CHROME.
THEREFORE, THE OPERATION WITH OTHER BROWSERS IS NOT GUARANTEED**

6.1.4. **WEBSERVER DEVICE CONFIGURATION**

For further information on the access to the webserver of a new device, please refer to chapter 6.1.3.

 **ATTENTION!**

**THE WEB BROWSERS WHICH HAVE BEEN TESTED FOR COMPATIBILITY WITH THE DEVICE
WEBSERVER ARE:
MOZILLA FIREFOX AND GOOGLE CHROME.
THEREFORE, THE OPERATION WITH OTHER BROWSERS IS NOT GUARANTEED**

 **ATTENTION!**

**AFTER THE FIRST ACCESS CHANGE USER NAME AND PASSWORD IN ORDER TO PREVENT
ACCESS TO THE DEVICE TO UNAUTHORIZED PEOPLE.**

 **ATTENTION!**

IF THE PARAMETERS TO ACCESS THE WEBSERVER HAVE BEEN LOST, TO ACCESS IT, IT IS NECESSARY TO GO THROUGH THE PROCEDURE TO RESET THE FACTORY-SET CONFIGURATION

6.1.4.1. WEBSERVER SECTIONS

The Webserver is divided into pages (sections) representing the various gateway functions:

Status

It is the section that displays the values of the configured tags in real time.

Setup

It is the section that allows the device basic configuration.

Setup Modbus Commands / Tags

It is the section that allows you to add/modify the Modbus commands or the tags (i.e. the variables) of the Modbus devices connected to the gateway.

I/O Mapping

In PROFINET IO / MODBUS MASTER GATEWAY mode only this is the section that allows you to export the current configuration into the GSDML file and to remap the bytes relating to the data coming from the Modbus protocol.

Firmware Update

This is the section that allows you to update the device firmware.

Database Update

It is the section that allows you to update the database of Modbus Seneca devices.

Serial Traffic Monitor

It allows to analyse the ModBUS frames of the serials.

6.1.4.2. “STATUS” SECTION

Depending on the selected operating mode, it displays:

PROFINET IO DEVICE / MODBUS MASTER GATEWAY

In the status section it is possible to view the mapping of the bytes associated with the registers coming from Modbus in real time.

PROFINET IO DEVICE / MODBUS SLAVE GATEWAY

In the status section it is possible to view the mapping of the bytes associated with the registers coming from Modbus in real time.

6.1.4.3. “SETUP” SECTION

DHCP (ETH) (default: Disabled)

Sets the DHCP client to get an IP address automatically.

STATIC IP (default: 192.168.90.101)

Sets the device static address. Careful not to enter devices with the same IP address into the same network.

STATIC IP MASK (default: 255.255.255.0)

Sets the mask for the IP network.

STATIC GATEWAY (default: 192.168.90.1)

Sets the gateway address.

WORKING MODE

Sets the operating mode:

TCP-IP PORT (default: 502)

Sets the communication port for the Modbus TCP-IP client protocol.

TCP-IP TIMEOUT [ms] (default 512 ms)

Sets the waiting time for a request to be considered in timeout.

PORT #1 MODBUS PROTOCOL (default RTU)

Sets the protocol on the serial between Modbus RTU or Modbus ASCII

PORT #2 MODBUS PROTOCOL (default RTU)

Sets the protocol on the serial between Modbus RTU or Modbus ASCII

PORT #1 BAUDRATE (default: 38400 baud)

Selects the communication speed of the COM #1 serial port

PORT #1 DATA BITS (default: 38400 baud)

Selects the communication speed of the COM #1 serial port

PORT #1 PARITY (default: None)

Sets the parity for the COM #1 serial communication port.

PORT #1 STOP BIT (default: 1)

Sets the number of stop bits for the COM #1 serial communication port.

PORT #1 TIMEOUT [ms]

Sets the wait time before defining fail.

PORT #1 WRITING RETRIES (default: 3)

Selects the number of writing attempts to be made on a serial slave before returning an error.

PORT #1 MAX READ NUM

Sets the maximum number of simultaneous serial reading ModBUS registers, the firmware will use this value to optimize the ModBUS readings.

PORT #1 MAX WRITE NUM

Sets the maximum number of simultaneous writing ModBUS registers of the serial, the firmware will use this value to optimize the ModBUS writings.

PORT #2 BAUDRATE (default: 38400 baud) (only for Z-KEY-P and Z-KEY-2ETH-P)

Selects the communication speed of the COM #2 serial port

PORT #2 DATA BITS (default: 38400 baud) (only for Z-KEY-P and Z-KEY-2ETH-P)

Selects the communication speed of the COM #2 serial port

PORT #2 PARITY (default: None) (only for Z-KEY-P and Z-KEY-2ETH-P)

Sets the parity for the COM #2 serial communication port.

PORT #2 STOP BIT (default: 1) (only for Z-KEY-P and Z-KEY-2ETH-P)

Sets the number of stop bits for the COM #2 serial communication port.

PORT# 2 TIMEOUT [ms] (only for Z-KEY-P and Z-KEY-2ETH-P)

Sets the wait time before defining fail.

PORT #2 WRITING RETRIES (default: 3) (only for Z-KEY-P and Z-KEY-2ETH-P)

Selects the number of writing attempts to be made on a serial slave before returning an error.

PORT #2 MAX READ NUM (only for Z-KEY-P and Z-KEY-2ETH-P)

Sets the maximum number of simultaneous reading ModBUS registers of the remote TCP-IP Modbus server, the firmware will use this value to optimize the ModBUS readings.

PORT #2 MAX WRITE NUM (only for Z-KEY-P and Z-KEY-2ETH-P)

Sets the maximum number of simultaneous writing ModBUS registers of the serial, the firmware will use this value to optimize the ModBUS writings.

WEB SERVER AUTHENTICATION USER NAME (default: admin)

Sets the username to access the webserver.

WEB SERVER PASSWORD (default: admin)

Sets the password to access the webserver and to read/write the configuration (if enabled).

WEB SERVER PORT (default: 80)

Sets the communication port for the web server.

IP CHANGE FROM DISCOVERY (default: Enabled)

Selects whether or not the device accepts the IP address change from the Seneca Discovery Device software.

PORT #1 AFTER FAIL DELAY [s]

Sets the number of quarantine seconds after a tag has been declared in fail (i.e. these tags are no longer considered) before being interrogated again.

PORT #2 AFTER FAIL DELAY [s] (only for Z-KEY-P and Z-KEY-2ETH-P)

Sets the number of quarantine seconds after a tag has been declared in fail (i.e. these tags are no longer considered) before being interrogated again.

PROFINET DEVICE NAME

Sets the name of the Profinet peripheral

MODBUS TCP-IP CLIENT

Enables or not the TCP-IP client Modbus

MODBUS TCP-IP SERVER#1...3 PORT

Sets the port for the max 3 remote TCP-IP Modbus servers

MODBUS TCP-IP SERVER#1...3 ADDRESS

Sets the IP address for the max 3 remote TCP-IP Modbus servers

MODBUS TCP-IP CLIENT TIMEOUT [ms]

Sets the timeout for remote TCP-IP Modbus servers

MODBUS TCP-IP CLIENT WRITING ATTEMPTS

Selects the number of writing attempts to be made on a remote TCP-IP Modbus server before returning an error and activating the quarantine.

MODBUS TCP-IP CLIENT MAX READ NUM

Sets the maximum number of simultaneous reading ModBUS registers of the remote TCP-IP Modbus server, the firmware will use this value to optimize the ModBUS readings.

MODBUS TCP-IP CLIENT MAX WRITE NUM

Sets the maximum number of simultaneous writing ModBUS registers of the remote TCP-IP Modbus server, the firmware will use this value to optimize the ModBUS writings.

SERVER AFTER FAIL DELAY

Sets the number of quarantine seconds after a tag has been declared in fail (i.e. these tags are no longer considered) before being interrogated again.

In addition, a configuration can be exported / imported via the webserver.

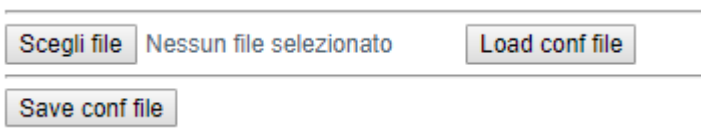
6.1.4.4. SAVING A CONFIGURATION ON A FILE

A configuration that includes:

CONFIGURATION
TAGS/COMMANDS

It can be saved to a file this way:

Go to the Setup section and select the file to save, press the "Save config" button



The screenshot shows a web interface with a file selection area. It contains a button labeled "Scegli file" (Choose file), a status indicator "Nessun file selezionato" (No file selected), and a button labeled "Load conf file". Below this area is a button labeled "Save conf file".

6.1.4.5. IMPORTING A CONFIGURATION FROM A FILE

A configuration that includes:

CONFIGURATION

TAGS/COMMANDS

It can be imported from a file this way:

Go to the Setup section and select the file to load, press the "Load config" button

Scegli file	Nessun file selezionato	Load conf file
Save conf file		

6.1.4.6. “COMMANDS/TAGS” SECTION (ONLY FOR PROFINET IO / MODBUS MASTER GATEWAY MODE)

In this section you can add, edit or delete a tag.

Using the ADD button you can add a new command.

Using the MODIFY button it is possible to modify an existing command.

Using the DEL button it is possible to delete an existing command.

MNEMONIC NAME

It is the identifying name of the command

TARGET MODBUS DEVICE

It represents the Seneca Modbus device selected from those available in the database.

In the case of a non-Seneca device, select CUSTOM.

TARGET RESOURCE

It represents the Seneca device variable you want to add.

TARGET CONNECTED TO

It selects the serial to be used for Modbus serial communication for the specified TAG.

TARGET MODBUS STATION ADDRESS

It selects the station address to use for the command.

TARGET MODBUS START REGISTER

It represents the starting Modbus address of the command (in the case of a Seneca device it is filled in automatically).

TARGET MODBUS REQUEST TYPE

It represents the type of Modbus command to use (Holding Register, Coil etc.).

In the case of a Seneca device it is filled in automatically.

TARGET MODBUS TRIGGER

If the command is about writing, it allows you to select the writing technique on the Modbus side: Periodic, or Data change or both.

Periodic: writing is carried out continuously with the set time interval

Data Change: writing occurs only if the command registers change their values.

Periodic or data Change: combines the two previous modes.

TARGET MODBUS WRITE PERIODIC TIME [ms]

It represents the time interval of the periodic reading.

ENDIAN SWAP

Allows you to swap a register read by Modbus, i.e.:

NONE: no swap

BYTE: shifts the high byte with low byte (for example Modbus reading 0xAABB will be converted to 0xBBAA)

WORD: In the case of a data type greater than a Modbus register (e.g. single precision Floating Point registers) it allows you to set which word (register) to use as the most significant part, for example:

Register 1 = 0xAABB

Register 2 = 0xCCDD

will become a single value 0xAABBCCDD if the parameter is NONE, otherwise 0xCCDDAABB if this parameter is active

BYTE AND WORD: as in the previous case but there will also be a byte swap, for example:

Register 1 = 0xAABB

Register 2 = 0xCCDD

Will become 0xDDCCBBAA

6.1.4.7. "I/O MAPPING" SECTION

It allows exporting the GSDML file created (in the case of IO / Modbus Master Gateway mode) and to move the contents of the bytes of the read and write buffers.

6.1.4.8. "FIRMWARE UPDATE" SECTION

In order to improve, add, optimize the functions of the product, Seneca releases firmware updates on the device section on the www.seneca.it website



ATTENTION!

NOT TO DAMAGE THE DEVICE DO NOT REMOVE THE POWER SUPPLY DURING THE FIRMWARE UPDATE OPERATION.

6.1.4.9. "DATABASE UPDATE" SECTION

Seneca releases new Database files of its updated ModBUS devices on the Z-KEY-P device section of the www.seneca.it website.

To update the database, select the file and press the "Update Database" button.

The device is already updated at the factory with the most recent database at the time of production

6.1.4.10. “SERIAL TRAFFIC MONITOR”

Allows you to view the serial packets that are in transit.

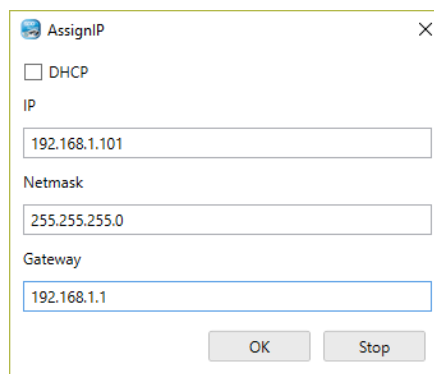
6.2. “-E” GATEWAY WEBSERVER

6.2.1. STEP BY STEP GUIDE FOR THE FIRST ACCESS TO THE WEBSERVER

STEP 1: POWER THE DEVICE AND CONNECT THE ETHERNET PORT, PUT THE DEVICE IN WEBSERVER MODE (SEE CHAPTER 6.1.1)

SENECA DISCOVERY DEVICE SOFTWARE STEP 2

Launch SCAN, select the device and press the “Assign IP” button, set a configuration compatible with your PC, for instance:



The screenshot shows a dialog box titled "AssignIP" with a close button (X) in the top right corner. It contains the following fields and controls:

- DHCP
- IP: 192.168.1.101
- Netmask: 255.255.255.0
- Gateway: 192.168.1.1
- Buttons: OK and Stop

Confirm with OK. Now the device can be reached via Ethernet from your PC.

STEP 3 ACCESS TO THE CONFIGURATION WEBSERVER

ENTER your access credentials:

user: admin

password: admin

ATTENTION!

**THE WEB BROWSERS WHICH HAVE BEEN TESTED FOR COMPATIBILITY WITH THE DEVICE
WEBSERVER ARE:
MOZILLA FIREFOX AND GOOGLE CHROME.**

THEREFORE, THE OPERATION WITH OTHER BROWSERS IS NOT GUARANTEED

6.2.2. **WEBSERVER DEVICE CONFIGURATION**

For further information on the access to the webserver of a new device, please refer to chapter 6.1.3.



ATTENTION!

**THE WEB BROWSERS WHICH HAVE BEEN TESTED FOR COMPATIBILITY WITH THE DEVICE
WEBSERVER ARE:**

MOZILLA FIREFOX AND GOOGLE CHROME.

THEREFORE, THE OPERATION WITH OTHER BROWSERS IS NOT GUARANTEED



ATTENTION!

**AFTER THE FIRST ACCESS CHANGE USER NAME AND PASSWORD IN ORDER TO PREVENT
ACCESS TO THE DEVICE TO UNAUTHORIZED PEOPLE.**



ATTENTION!

**IF THE PARAMETERS TO ACCESS THE WEBSERVER HAVE BEEN LOST, TO ACCESS IT, IT IS
NECESSARY TO GO THROUGH THE PROCEDURE TO RESET THE FACTORY-SET CONFIGURATION**

6.2.2.1. WEBSERVER SECTIONS

The Webserver is divided into pages (sections) representing the various gateway functions:

Status

It is the section that displays the values of the configured tags in real time.

Setup

It is the section that allows the device basic configuration.

Setup Modbus Commands / Tags

It is the section that allows you to add/modify the Modbus commands or the tags (i.e. the variables) of the Modbus devices connected to the gateway.

I/O Mapping

This is the section that allows you to export the current configuration into the EDS file and to remap the bytes relating to the data coming from the Modbus protocol.

Firmware Update

This is the section that allows you to update the device firmware.

Database Update

It is the section that allows you to update the database of Modbus Seneca devices.

Serial Traffic Monitor

It allows to analyse the ModBUS frames of the serials.

6.2.2.2. “STATUS” SECTION

In the status section it is possible to view the mapping of the bytes associated with the registers coming from Modbus in real time and to export the EDS file from the current configuration.

6.2.2.3. “SETUP” SECTION

DHCP (ETH) (default: Disabled)

Sets the DHCP client to get an IP address automatically.

STATIC IP (default: 192.168.90.101)

Sets the device static address. Careful not to enter devices with the same IP address into the same network.

STATIC IP MASK (default: 255.255.255.0)

Sets the mask for the IP network.

STATIC GATEWAY (default: 192.168.90.1)

Sets the gateway address.

WORKING MODE

Sets the operating mode:

TCP-IP PORT (default: 502)

Sets the communication port for the Modbus TCP-IP client protocol.

TCP-IP TIMEOUT [ms] (default 512 ms)

Sets the waiting time for a request to be considered in timeout.

PORT #1 MODBUS PROTOCOL (default RTU)

Sets the protocol on the serial between Modbus RTU or Modbus ASCII

PORT #2 MODBUS PROTOCOL (default RTU)

Sets the protocol on the serial between Modbus RTU or Modbus ASCII

PORT #1 BAUDRATE (default: 38400 baud)

Selects the communication speed of the COM #1 serial port

PORT #1 DATA BITS (default: 38400 baud)

Selects the communication speed of the COM #1 serial port

PORT #1 PARITY (default: None)

Sets the parity for the COM #1 serial communication port.

PORT #1 STOP BIT (default: 1)

Sets the number of stop bits for the COM #1 serial communication port.

PORT #1 TIMEOUT [ms]

Sets the wait time before defining fail.

PORT #1 WRITING RETRIES (default: 3)

Selects the number of writing attempts to be made on a serial slave before returning an error.

PORT #1 MAX READ NUM

Sets the maximum number of simultaneous serial reading ModBUS registers, the firmware will use this value to optimize the ModBUS readings.

PORT #1 MAX WRITE NUM

Sets the maximum number of simultaneous writing ModBUS registers of the serial, the firmware will use this value to optimize the ModBUS writings.

PORT #2 BAUDRATE (default: 38400 baud) (only for Z-KEY-E and Z-KEY-2ETH-E)

Selects the communication speed of the COM #2 serial port

PORT #2 DATA BITS (default: 38400 baud) (only for Z-KEY-E and Z-KEY-2ETH-E)

Selects the communication speed of the COM #2 serial port

PORT #2 PARITY (default: None) (only for Z-KEY-E and Z-KEY-2ETH-E)

Sets the parity for the COM #2 serial communication port.

PORT #2 STOP BIT (default: 1) (only for Z-KEY-E and Z-KEY-2ETH-E)

Sets the number of stop bits for the COM #2 serial communication port.

PORT #2 TIMEOUT [ms] (only for Z-KEY-E and Z-KEY-2ETH-E)

Sets the wait time before defining fail.

PORT #2 WRITING RETRIES (default: 3) (only for Z-KEY-E and Z-KEY-2ETH-E)

Selects the number of writing attempts to be made on a serial slave before returning an error.

PORT #2 MAX READ NUM (only for Z-KEY- E and Z-KEY-2ETH- E)

Sets the maximum number of simultaneous reading ModBUS registers of the remote TCP-IP Modbus server, the firmware will use this value to optimize the ModBUS readings.

PORT #2 MAX WRITE NUM (only for Z-KEY- E and Z-KEY-2ETH- E)

Sets the maximum number of simultaneous writing ModBUS registers of the serial, the firmware will use this value to optimize the ModBUS writings.

WEB SERVER AUTHENTICATION USER NAME (default: admin)

Sets the username to access the webserver.

WEB SERVER PASSWORD (default: admin)

Sets the password to access the webserver and to read/write the configuration (if enabled).

WEB SERVER PORT (default: 80)

Sets the communication port for the web server.

IP CHANGE FROM DISCOVERY (default: Enabled)

Selects whether or not the device accepts the IP address change from the Seneca Discovery Device software.

PORT #1 AFTER FAIL DELAY [s]

Sets the number of quarantine seconds after a tag has been declared in fail (i.e. these tags are no longer considered) before being interrogated again.

PORT #2 AFTER FAIL DELAY [s] (only for Z-KEY- E and Z-KEY-2ETH- E)

Sets the number of quarantine seconds after a tag has been declared in fail (i.e. these tags are no longer considered) before being interrogated again.

MODBUS TCP-IP CLIENT

Enables or not the TCP-IP client Modbus

MODBUS TCP-IP SERVER#1...3 PORT

Sets the port for the max 3 remote TCP-IP Modbus servers

MODBUS TCP-IP SERVER#1...3 ADDRESS

Sets the IP address for the max 3 remote TCP-IP Modbus servers

MODBUS TCP-IP CLIENT TIMEOUT [ms]

Sets the timeout for remote TCP-IP Modbus servers

MODBUS TCP-IP CLIENT WRITING ATTEMPTS

Selects the number of writing attempts to be made on a remote TCP-IP Modbus server before returning an error and activating the quarantine.

MODBUS TCP-IP CLIENT MAX READ NUM

Sets the maximum number of simultaneous reading ModBUS registers of the remote TCP-IP Modbus server, the firmware will use this value to optimize the ModBUS readings.

MODBUS TCP-IP CLIENT MAX WRITE NUM

Sets the maximum number of simultaneous writing ModBUS registers of the remote TCP-IP Modbus server, the firmware will use this value to optimize the ModBUS writings.

SERVER AFTER FAIL DELAY

Sets the number of quarantine seconds after a Modbus command has been declared in fail (i.e. This command is no longer executed) before being interrogated again.

ETHERIP O->T RUN/IDLE HEADER

This option adds a 32-bit header for each class 1 packet sent from the Observer to the Target. Bit 0 indicates the RUN or IDLE status of the device.

ETHERIP T->O RUN/IDLE HEADER

This option adds a 32-bit header for each class 1 packet sent from the Target to the Observer. Bit 0 indicates the RUN or IDLE status of the device.

ETHERIP VENDOR ID

It allows to customise the Vendor ID in the EDS file.

ETHERIP DEVICE TYPE

It allows to customise the Device Type in the EDS file.

ETHERIP PRODUCT CODE

It allows to customise the Product Code in the EDS file.

ETHERIP MAJOR REVISION

It allows to customise the Major Revision in the EDS file.

ETHERIP MINOR REVISION

It allows to customise the Minor Revision in the EDS file.

DIAGNOSTIC

It allows you to activate or not the 9 bytes of Modbus diagnostics. The diagnostic bytes are inserted at the end of the reading area.

STOP MODBUS READING WHEN NO ETHERNET IP CONNECTION

If the connection with the PLC is lost, the device stops polling the Modbus registers and therefore allows any safety timeouts to be triggered on the outputs.

In addition, a configuration can be exported / imported via the webserver.

6.2.2.4. SAVING A CONFIGURATION ON A FILE

A configuration that includes:

CONFIGURATION
TAGS/COMMANDS

It can be saved to a file this way:

Go to the Setup section and select the file to save, press the "Save config" button

Scegli file	Nessun file selezionato	Load conf file
-------------	-------------------------	----------------

Save conf file

6.2.2.5. IMPORTING A CONFIGURATION FROM A FILE

A configuration that includes:

CONFIGURATION
TAGS/COMMANDS

It can be imported from a file this way:

Go to the Setup section and select the file to load, press the "Load config" button

Scegli file	Nessun file selezionato	Load conf file
-------------	-------------------------	----------------

Save conf file

6.2.2.6. “COMMANDS/TAGS” SECTION

In this section you can add, edit or delete a tag.

Using the ADD button you can add a new command.

Using the MODIFY button it is possible to modify an existing command.

Using the DEL button it is possible to delete an existing command.

MNEMONIC NAME

It is the identifying name of the command

TARGET MODBUS DEVICE

It represents the Seneca Modbus device selected from those available in the database.

In the case of a non-Seneca device, select CUSTOM.

TARGET RESOURCE

It represents the Seneca device variable you want to add.

TARGET CONNECTED TO

It selects the serial to be used for Modbus serial communication for the specified TAG.

TARGET MODBUS STATION ADDRESS

It selects the station address to use for the command.

TARGET MODBUS START REGISTER

It represents the starting Modbus address of the command (in the case of a Seneca device it is filled in automatically).

TARGET MODBUS REQUEST TYPE

It represents the type of Modbus command to use (Holding Register, Coil etc.).

In the case of a Seneca device it is filled in automatically.

TARGET MODBUS TRIGGER

If the command is about writing, it allows you to select the writing technique on the Modbus side: Periodic, or Data change or both.

Periodic: writing is carried out continuously with the set time interval

Data Change: writing occurs only if the command registers change their values.

Periodic or data Change: combines the two previous modes.

TARGET MODBUS WRITE PERIODIC TIME [ms]

It represents the time interval of the periodic reading.

ENDIAN SWAP

Allows you to swap a register read by Modbus, i.e.:

NONE: no swap

BYTE: shifts the high byte with low byte (for example Modbus reading 0xAABB will be converted to 0xBBAA)

WORD: In the case of a data type greater than a Modbus register (e.g. single precision Floating Point registers) it allows you to set which word (register) to use as the most significant part, for example:

Register 1 = 0xAABB

Register 2 = 0xCCDD

will become a single value 0xAABBCCDD if the parameter is NONE, otherwise 0xCCDDAABB if this parameter is active

BYTE AND WORD: as in the previous case but there will also be a byte swap, for example:

Register 1 = 0xAABB

Register 2 = 0xCCDD

Will become 0xDDCCBBAA

6.2.2.7. “I/O MAPPING” SECTION

Allows you to move the contents of the bytes of the read and write buffers.

6.2.2.8. "FIRMWARE UPDATE" SECTION

In order to improve, add, optimize the functions of the product, Seneca releases firmware updates on the device section on the www.seneca.it website

**ATTENTION!**

NOT TO DAMAGE THE DEVICE DO NOT REMOVE THE POWER SUPPLY DURING THE FIRMWARE UPDATE OPERATION.

6.2.2.9. “DATABASE UPDATE” SECTION

Seneca releases new Database files of its updated Modbus devices on the device section of the www.seneca.it website.

To update the database, select the file and press the "Update Database" button.

The device is already updated at the factory with the most recent database at the time of production

6.2.2.10. “SERIAL TRAFFIC MONITOR”

Allows you to view the serial packets that are in transit.

7. SUPPORTED MODBUS COMMUNICATION PROTOCOLS

The Modbus communication protocols supported are:

- Modbus RTU/ASCII master (from #1 and #2 serial ports)
- Modbus RTU/ASCII slave (from #1 and #2 serial ports)
- Modbus TCP-IP Client (from the Ethernet port) up to 3 remote TCP-IP Modbus Servers

For more information on these protocols, see the website:

<http://www.modbus.org/specs.php>.

7.1. SUPPORTED MODBUS FUNCTION CODES

The following Modbus functions are supported:

- Read Coils (function 1)
- Read Discrete Inputs (function 2)
- Read Holding Registers (function 3)
- Read Input Registers (function 4)
- Write Single Coil (function 5)
- Write Single Register (function 6)
- Write multiple Coils (function 15)
- Write Multiple Registers (function 16)

 **ATTENTION!**

All 32-bit variables are contained in 2 consecutive Modbus registers
All 64-bit variables are contained in 4 consecutive Modbus registers

8. MODBUS DIAGNOSTICS

Diagnostics management takes the timeout or exceptions to the Modbus requests into account.

9 Bytes are made available for diagnostics:

GLOBAL DIAGNOSTIC READ BYTE

PORT#1 DIAGNOSTIC MODBUS DEVICE ADDRESS (4 byte)

PORT#2 DIAGNOSTIC MODBUS DEVICE ADDRESS (4 byte)

 **ATTENTION!**

The diagnostic bytes are inserted at the end of the configured reading area

In the GLOBAL DIAGNOSTIC READ BYTE slot in particular, the bits have the following meaning:

If the Bit is 0 -> No Error

If the Bit is 1 -> At least one device is in fail

BIT 0 -> GENERIC SERIAL 1 FAIL

BIT 1 -> GENERIC SERIAL 2 FAIL

BIT 2 -> MODBUS TCP-IP SERVER 1 FAIL

BIT 3 -> MODBUS TCP-IP SERVER 2 FAIL

BIT 4 -> MODBUS TCP-IP SERVER 3 FAIL

The other bytes indicate which station address on the serials is in fail.

It is possible to detect the fail of up to 4 slave devices per port according to the following coding:

BYTE0 -> LOWEST STATION ADDRESS IN FAIL

...

BYTE3 -> HIGHEST STATION ADDRESS IN FAIL

For example if devices with the following station address are connected to serial port #1: 1, 8, 15, 24 and station 15 and 24 are in fail we will have that the "PORT#1 DIAGNOSTIC MODBUS DEVICE ADDRESS" slot will be worth:

BYTE0 -> 15

BYTE1 -> 24

BYTE 2 -> 0

BYTE 3 -> 0

9. **RESETTING THE DEVICE TO ITS FACTORY CONFIGURATION**

The factory configuration removes all configured commands and resets all parameters to default.

To reset the device to the factory configuration it is necessary to follow the procedure below:

Z-KEY-P/E / Z-KEY-2ETH-P/E:

- 1) Remove power from the device
- 2) Turn dip switches 1 and 2 to ON
- 3) Power up the device and wait at least 10 seconds
- 4) Remove power from the device
- 5) Turn dip switches 1 and 2 to OFF
- 6) At the next restart the device will have loaded the factory configuration

R-KEY-LT-P/E:


- 1) Remove power from the device
- 2) Turn 2 SW2 dip switches to ON
- 3) Power up the device and wait at least 10 seconds
- 4) Remove power from the device
- 5) Turn 2 SW2 dip switches to OFF.

6) At the next restart the device will have loaded the factory configuration

10. EXCEL TEMPLATES (ONLY “-P” MODELS)

Excel templates are available on the Seneca website (www.seneca.it Profinet series Gateway section).

ACCESS FROM MODBUS SERIAL OR TCP/IP			TARGET MODBUS CONFIGURATION						
TAG NR	GATEWAY TAG NAME	GATEWAY MODBUS REGISTER ADDRESS 1ST REGISTER -> ENTER 1 ETC...	TARGET MODBUS REGISTER TYPE	TARGET MODBUS DATA TYPE	TARGET CONNECTED TO	TARGET MODBUS START REGISTER (1ST HOLDING -> ENTER 1 1ST INPUT-> 1 etc...)	TARGET MODBUS SLAVE ADDRESS	WRITE MODE	WRITE TMO [ms]
1	EXAMPLE	1	HOLDING REGISTER	16BIT UNSIGNED	RS485 #1	1	1	DATA CHANGE	500
2									
3									
4									
5									
6									
7									



Export CGI file...
Import CGI file...

SENECA Z-KEY-P TAGS TEMPLATE FOR GATEWAY MODE. Export/Import to/from the Webservice

11. MODBUS TCP-IP SERVER AND MODBUS PASS-THROUGH

Querying the gateways via port 502 at the slave address 254, they respond with the values of the commands in real-time, otherwise, querying them via port 502 at the slave address from 1 to 253, they convert the Modbus TCP-IP requests to Modbus RTU (Pass-Through mode).

Address 255 is reserved for configuring the device with the Easy Setup2 software.