# USER MANUAL

MODBUS TO PROFINET IO GATEWAY

# $SENECA^{\circ} \in$

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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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# **Document revisions**

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# 1. INTRODUCTION

#### Â

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

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have no errors or operate continuously.

#### 1.1. **DESCRIPTION**

The products Z-KEY-P, R-KEY-LT-P, Z-KEY-2TH-P autonomously read the registers of devices on a Modbus serial/ethernet bus and make them available for access by a Profinet IO controller.

Each Modbus variable (tag) is converted to Profinet, a maximum of 500 variables (tags) can be defined.

The integrated webserver can be used to configure the device and for diagnostic purposes.

Below are the connection configurations of a classic use case:





#### 1.2. Z-KEY-P COMMUNICATION PORT SPECIFICATIONS

ETHERNET COMMUNICATION PORT		
Type         Ethernet 100 baseT RJ45 front		
Configuration	Via integrated Webserver or Easy Setup 2	
Industrial communication protocol	Profinet IO, Modbus TCP-IP client	
Factory address       Static address 192.168.90.101		

#### RS485/RS232 SERIAL COMMUNICATION PORTS

Number of ports	2	
Туре	COM#1 RS485 port for IDC10 connector	
	Terminal COM#2 RS485/RS232 port	
Baud rate	From 1200 to 115200 bit/s	
Protocol	Modbus RTU master, Modbus ASCII master, Modbus TCP-IP	
	server	
USB COMMUNICATION PORT		
Number of ports	1	
Туре	Driver Windows/Linux Virtual Com CDC standard	
Protocol	Modbus RTU Slave	
Configuration	Not modifiable 115200 bit/s, 8 bits, No parity, 1 stop bit, station	
	address 1	



#### 1.3. Z-KEY-2ETH-P COMMUNICATION PORT SPECIFICATIONS

ETHERNET COMMUNICATION PORT		
Type         2x Ethernet 100 baseT RJ45 front in switch configuration		
Configuration	Via integrated Webserver or Easy Setup 2	
Industrial communication protocol	Profinet IO, Modbus TCP-IP client, Modbus TCP-IP server	
Factory address	Static address 192.168.90.101	

RS485/RS232 SERIAL COMMUNICATION PORTS		
Number of ports	2	
Туре	RS485 COM#1 port for IDC10 connector	
	COM#2 RS485/RS232 terminal port	
Baud Rate	From 1200 to 115200 bit/s	
Protocol	Modbus RTU master, Modbus ASCII master	
USB COMMUNICATION PORT		
Number of ports	1	
Туре	Driver Windows/Linux Virtual Com CDC standard	
Protocol	Modbus RTU Slave	
Configuration	Not modifiable: 115200 bit/s, 8 bit, No parità, 1 stop bit, station	
	address 1	

#### 1.3. R-KEY-LT-P COMMUNICATION PORT SPECIFICATIONS

ETHERNET COMMUNICATION PORT		
Type         1x Ethernet 100 baseT RJ45 frontale		
Configuration Via integrated Webserver or Easy Setup 2		
Industrial communication protocol	Profinet IO, Modbus TCP-IP client, Modbus TCP-IP server	
Factory address	Static address 192.168.90.101	

RS485/RS232 SERIAL COMMUNICATION PORTS		
Number of ports 1		
Туре	COM#1 RS485/RS232 terminal port	
Baud Rate	From 1200 to 115200 bit/s	
Protocol	Modbus RTU master, Modbus ASCII master	



#### 2. ETHERNET PORT

The factory configuration of the Ethernet port is:

STATIC IP: 192.168.90.101 SUBNET MASK: 255.255.0.0 GATEWAY: 192.168.90.1

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

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. 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 into webserver mode using the Easy Setup2 or Seneca Device Discovery software, it is also possible to change the operating mode by pressing the side button following the procedure:

To force the webserver mode:

- 1. Switch on the device
- 2. Hold down the PS1 button until all the LEDs flash quickly.
- 3. Release the button
- 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 indicate webserver mode

To force Profinet mode:

- 1. Switch on the device
- 2. Hold down the PS1 button until all the LEDs flash quickly.
- 3. Release the button
- 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

stop flashing slowly to indicate the Profinet mode.



#### 4. 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 3)

#### STEP 2: SENECA DISCOVERY DEVICE SOFTWARE INSTALLATION

Download (from the Seneca website in the Z-KEY-P section) and install the Seneca Discovery Device software.

#### **STEP 3: SEARCH FOR THE DEVICE**

Run the software and press the "SCAN" button: the software will search for the Ethernet devices in the network. Locate the device (factory address 192.168.90.101):

#### STEP 4 CHANGE OF IP ADDRESS

Select the device and press the "Assign IP" button, set a configuration compatible with your PC, for instance:

😹 AssignIP				×
DHCP				
IP				
192.168.1.101				
Netmask				
255.255.255.0				
Gateway				
192.168.1.1				
	Oł	<	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

# 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



#### 5. CONFIGURING THE DEVICE FROM EASY SETUP 2

Devices can be configured using the Easy Setup2 configuration software. For more information, please refer to the help in the software.

#### 6. WEBSERVER DEVICE CONFIGURATION

For further information on the access to the webserver of a new device, please refer to chapter 0.

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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

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

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. 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 Tag

It is the section that allows adding/modifying the tags (that is the variables) of the Modbus devices connected to the gateway.

#### Firmware Update

It is the section that allows updating the firmware and database.

#### Database Update

It is the section that allows updating the firmware and database.

#### **Traffic Monitor**

It allows to analyse the ModBUS frames of the serials.





#### 6.2. "STATUS" SECTION

In the status section, it is possible to view the tag values in real time together with their fail/ok status:

50 tags per page maximum can be displayed, the maximum number of pages is 10.

Some basic information among which the device interrogation loop time of both serials is displayed in the top part of the page.

On this page it is also possible to view the mapping that the Modbus tags will have in Profinet IO.

#### 6.3. "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 operation mode, currently only gateway mode is supported.

#### 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.

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#### PORT #1 DELAY BETWEEN POLLS [ms]

Waiting time before making a new serial request.

#### 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 per 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 per Z-KEY-P and Z-KEY-2ETH-P)** Selects the communication speed of the COM #2 serial port

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

Sets the wait time before defining fail.

# PORT #2 DELAY BETWEEN POLLS [ms] (only per Z-KEY-P and Z-KEY-2ETH-P)

Waiting time before making a new serial request.

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

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

#### PORT #2 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.

#### 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 webserver.



#### 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 per 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...10 PORT** Sets the port for max. 10 remote TCP-IP Modbus servers

#### MODBUS TCP-IP SERVER#1...10 ADDRESS

Sets the IP address for max. 10 remote TCP-IP Modbus servers

#### MODBUS TCP-IP CLIENT TIMEOUT [ms]

Sets the timeout for remote TCP-IP Modbus servers

#### MODBUS TCP-IP CLIENT DELAY BETWEEEN POLLS [ms]

Sets the waiting time between one call and the next of the TCP-IP client ModBUS

#### 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 guarantine.

#### MODBUS TCP-IP CLIENT MAX READ NUM

Sets the maximum number of simultaneous serial 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 serial 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.



#### 6.3.1. SAVING A CONFIGURATION ON A FILE

A configuration that includes:

CONFIGURATION TAG

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	



#### 6.3.2. IMPORTING A CONFIGURATION FROM A FILE

A configuration that includes:

CONFIGURATION TAG

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	

#### 6.4. "TAG SETUP" SECTION

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

A tag represents a variable (typically 1 or 2 ModBUS addresses depending on the type of data) that will be converted into Profinet IO.

Using the ADD button you can add a new tag. Using the MODIFY button it is possible to modify an existing tag. Using the DEL button it is possible to delete an existing tag.

#### GATEWAY TAG NAME

It is the identifying name of the tag

#### 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 TAG.

#### TARGET MODBUS START REGISTER

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It represents the starting Modbus address of the TAG (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 REGISTER DATA TYPE

It represents the type of data of the tag used (Bit, Unsigned 16 bit, Unsigned 32 bit etc...). In the case of a Seneca device it is filled in automatically.

#### TARGET MODBUS WRITE MODE

If you need to write the TAG via Profinet IO, it allows you to select the writing technique on the Modbus side: Periodic or Data change.

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

Data Change: writing occurs only if the tag changes its value.

Periodic or data Change: combines the two previous modes.

#### TARGET MODBUS WRITE PERIODIC TIME [s]

It represents the time interval in the case of TARGET MODBUS WRITE MODE of the TIMED type

#### 6.5. "FIRMWARE UPDATE" SECTION

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



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

#### 6.6. "DATABASE UPDATE" SECTION

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



#### 7. MAPPING OF MODBUS TAGS ON PROFINET

It is possible to view how the ModBUS TAGs have been converted to Profinet IO through the table on the "status" page of the webserver.

In particular, the fields are:

#### GATEWAY TAG NR

It represents the incremental number of the TAG, a maximum of 500 tags are supported.

#### GATEWAY TAG NAME

It is the mnemonic name of the TAG

#### GATEWAY MODBUS START REGISTER

It is the ModBUS address of the TAG in the internal memory of the device (for future use).

#### TAG VALUE

It represents the current value of the tag.

#### TAG READING STATUS

It represents the status of the tag whether OK or FAIL

#### TAG DATA TYPE

It represents the type of data of the TAG: Boolean, Unsigned 16. Signed 16, Unsigned 32, Signed 32 or Signed 64

#### NR BYTE

It represents the NR of bytes in which the tag is converted into profinet.



#### 8. SUPPORTED MODBUS COMMUNICATION PROTOCOLS

The Modbus communication protocols supported are:

- Modbus RTU master (from #1 and #2 serial ports)
- Modbus TCP-IP Client (from the Ethernet port) up to 10 remote TCP-IP Modbus Servers

For more information on these protocols, see the website: <u>http://www.modbus.org/specs.php</u>.

#### 8.1. SUPPORTED MODBUS FUNCTION CODES

The following Modbus functions are supported:

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



(function 1)

(function 5)

All 32-bit tags are contained in 2 consecutive Modbus registers All 64-bit tags are contained in 4 consecutive Modbus registers Z-KEY-P



# 9. STEP BY STEP CONFIGURATION EXAMPLE OF THE DEVICE USING THE WEBSERVER

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

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

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



Now we use the Easy Setup 2 software and select Z-KEY-P:

We add the first input of Z-10-D-IN to slave address #1 on serial port #1, to do this we select the device Z-10-D-IN from the list and as resource INPUT1. Now rename the TAG to IN1:



KEY-P										Connetti Default	Test
orta di connessi ndirizzo stazione Aodalità di scritt empo di periodi	ilone e modbus Target ture sul target licită (sec)		S64MSW (64 bit con segn UGMISW (64 bit senza se S64LSW (64 bit senza seg UG4LSW (64 bit senza seg Seleziona la porta seriale sull Inseriati l'Indiritzo del dispos Modalità di scrittura sul dispo Periodicità in secondi per la s	no con il MSW all'indirizzo mie geno con il MSW all'indirizzo mio o con il LSW all'indirizzo mino geno con il LSW all'indirizzo mii o Z-KEY alla quale lo stave mo tivo modbuc (anche chiamato psitivo target crittura in modalità periodica.	nore) minore) re) dous è connesso. i indirizzo del nodo Modb con o senza modifica dati	Nut) 3					
Numero tag Gateway	Indirizzo registro di partenza modbus Gateway	Nome tag Gateway	Dispositivo modbus Target	Risorsa del dispositivo Target	Indirizzo registro di partenza modbus Target	Tipo richiesta modbus Target	Tipo di dato del registro Target	Porta di connessione	Indirizzo stazione modbus Target	Modalità di scrittura sul target	Tempo di periodicità (sec)
1	1 (40001)	IN1	Z-10-D-IN	INPUT 1	1 (10001)	DISCRETE_INPUT	BOOL	PORT_1	1	ONLY_ON_DATA_CHANGE	500
1	1 (40001)	INT	2-10-D-IN		1 (10001)	DISCRETE_INPUT	BOOL	PORT_1	1	ONIY_ON_DATA_CHANGE	500
1 vggiungi Ta	1 (40001) ag Cancella Tag	IN1	Z-10-D-IN Sposta giù Duplica	INPUT 1	1 (10001)	DISCRETE_INPUT	BOOL	PORT_1	1	ONIY_ON_DATA_CHANGE	500

We duplicate the tag for all 10 inputs and modify the INPU2, INPUT3 etc... resources. Same operation for the 10 outputs of Z-10-D-IN on slave addresss#2 and serial port #1 in order to obtain the following table:

Numero tag Gateway	Indirizzo registro di partenza modbus Gateway	Nome tag Gateway	Dispositivo modbus Target	Risorsa del dispositivo Target	Indirizzo registro di partenza modbus Target	Tipo richiesta modbus Target	Tipo di dato del registro Target	Porta di connessione	Indirizzo stazione modbus Target	Modalità di scrittura sul target	Tempo di periodicità (sec)
1	1 (40001)	IN1	Z-10-D-IN	INPUT 1	1 (10001)	DISCRETE_INPUT	BOOL	PORT_1	1	ONLY_ON_DATA_CHANGE	500
2	2 (40002)	IN2	Z-10-D-IN	INPUT 2	2 (10002)	DISCRETE_INPUT	BOOL	PORT_1	1	ONLY_ON_DATA_CHANGE	500
3	3 (40003)	IN3	Z-10-D-IN	INPUT 3	3 (10003)	DISCRETE_INPUT	BOOL	PORT_1	1	ONLY_ON_DATA_CHANGE	500
4	4 (40004)	IN4	Z-10-D-IN	INPUT 4	4 (10004)	DISCRETE_INPUT	BOOL	PORT_1	1	ONLY_ON_DATA_CHANGE	500
5	5 (40005)	IN5	Z-10-D-IN	INPUT 5	5 (10005)	DISCRETE_INPUT	BOOL	PORT_1	1	ONLY_ON_DATA_CHANGE	500
6	6 (40006)	IN6	Z-10-D-IN	INPUT 6	6 (10006)	DISCRETE_INPUT	BOOL	PORT_1	1	ONLY_ON_DATA_CHANGE	500
7	7 (40007)	IN7	Z-10-D-IN	INPUT 7	7 (10007)	DISCRETE_INPUT	BOOL	PORT_1	1	ONLY_ON_DATA_CHANGE	500
8	8 (40008)	IN8	Z-10-D-IN	INPUT 8	8 (10008)	DISCRETE_INPUT	BOOL	PORT_1	1	ONLY_ON_DATA_CHANGE	500
9	9 (40009)	IN9	Z-10-D-IN	INPUT 9	9 (10009)	DISCRETE_INPUT	BOOL	PORT_1	1	ONLY_ON_DATA_CHANGE	500
10	10 (40010)	IN10	Z-10-D-IN	INPUT 10	10 (10010)	DISCRETE_INPUT	BOOL	PORT_1	1	ONLY_ON_DATA_CHANGE	500
11	11 (40011)	OUT1	Z-10-D-OUT	OUTPUT 1	1 (1)	COIL	BOOL	PORT_1	2	ONLY_ON_DATA_CHANGE	500
12	12 (40012)	OUT2	Z-10-D-OUT	OUTPUT 2	2 (2)	COIL	BOOL	PORT_1	2	ONLY_ON_DATA_CHANGE	500
13	13 (40013)	OUT3	Z-10-D-OUT	OUTPUT 3	3 (3)	COIL	BOOL	PORT_1	2	ONLY_ON_DATA_CHANGE	500
14	14 (40014)	OUT4	Z-10-D-OUT	OUTPUT 4	4 (4)	COIL	BOOL	PORT_1	2	ONLY_ON_DATA_CHANGE	500
15	15 (40015)	OUT5	Z-10-D-OUT	OUTPUT 5	5 (5)	COIL	BOOL	PORT_1	2	ONLY_ON_DATA_CHANGE	500
16	16 (40016)	OUT6	Z-10-D-OUT	OUTPUT 6	6 (6)	COIL	BOOL	PORT_1	2	ONLY_ON_DATA_CHANGE	500
17	17 (40017)	OUT7	Z-10-D-OUT	OUTPUT 7	7 (7)	COIL	BOOL	PORT_1	2	ONLY_ON_DATA_CHANGE	500
18	18 (40018)	OUT8	Z-10-D-OUT	OUTPUT 8	8 (8)	COIL	BOOL	PORT_1	2	ONLY_ON_DATA_CHANGE	500
19	19 (40019)	OUT9	Z-10-D-OUT	OUTPUT 9	9 (9)	COIL	BOOL	PORT_1	2	ONLY_ON_DATA_CHANGE	500
20	20 (40020)	OUT10	Z-10-D-OUT	OUTPUT 10	10 (10)	COIL	BOOL	PORT_1	2	ONLY_ON_DATA_CHANGE	500

Aggiungi Tag Cancella Tag Sposta su Sposta giù Duplica Tag(s)

We check that the configuration is correct in the configuration test. We can now move on to the configuration of the PLC.



#### 9.1. STEP-BY-STEP CONFIGURATION EXAMPLE WITH A SIEMENS™ PLC THROUGH TIA PORTAL™16

Let's start the configuration on the TIA Portal:

Creating a new project:

₩ Siemens - C:\Users\Laborato	orio_iot\Docume	nts \Automatio	n\Test_Pr	j\Test_Prj		
Progetto Modifica Visualizza	Inserisci Onlin	ne Strumenti	Tool F	inestra ?		
Nuovo		ש_± (יו ± ⊑	i II II		🚿 Collega onlir	ne 🚀 Inte
Apri Migrazione progetto	Ctrl+O		4			
Chiudi	Ctrl+W					
Elimina progetto	Ctrl+E		*			
🔚 Salva	Ctrl+3					
Salva con nome	Ctrl+Maiusc+S					
Archivia						
Server di progetti	•					
Card Reader/memoria USB	•					
Tile della memory card	•					
Avvia controllo di base della co	erenza					
C:\Users\Laboratorio_iot\Docum	nen\Test_Prj					
C:\Users\Laboratorio_iot\Docun	n\Progetto2					

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:



Then import the Seneca gsd file:

Gestione file di de	scrizione dispositivo			×				
GSD installati	GSD nel progetto							
Percorso di origin E:	1							
Contenuto del percorso importato								
File		Versione	Lingua	Stato				
GSDML-V2.2-SEN	IECA-ZKEYP-GATEWAY-20210304.xml	V2.2	Inglese	Non ancora installato				
<				>				
		C	ancella Ir	nstalla Annulla				

Press "install".



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



Aggiungi nuovo disp	ositivo	_		>
Nome dispositivo:				
PLC 1			1	
			]	
	🗢 🛅 Controllori	^	Dispositivo:	44434 BERT-1
	▼ 1 SIMATIC \$7-1200			
	🛨 📊 CPU			1 <sup>10</sup> 21.42
Controllori	CPU 1211C AC/DC/Rly			-
	CPU 1211C DC/DC/DC			L
	CPU 1211C DC/DC/Rly			
	CPU 1212C AC/DC/Rly			61012120000000
	CPU 1212C DC/DC/DC		100 II	
	6ES7 212-1AD30-0XB0		N° di articolo:	6ES7 212-1AE40-0XB0
HMI	6ES7 212-1AE31-0XB0		Versione:	V4.3
	6ES7 212-1AE40-0XB0	≡		
	CPU 1212C DC/DC/Rly		Descrizione:	
	CPU 1214C AC/DC/Rly		Memoria di lav	oro 75KB; alimentazione DC24V
	CPU 1214C DC/DC/DC		AI2 on board: 4	V SINK/SOURCE, DQ6 x DC24V e
	CPU 1214C DC/DC/Rly		signal board d	igitale) e 4 uscite a impulsi on
Sistemi PC	CPU 1215C AC/DC/Rly		board; signal b	ooard di ampliamento degli I/O on
	CPU 1215C DC/DC/DC		seriale: fino a 3	2 unità di ingressi/uscite per
	CPU 1215C DC/DC/Rly		ampliamento	degli I/O; interfaccia di
	CPU 1217C DC/DC/DC		programmazio e da PLC a PLC	ne PROFINET, comunicazione HMI



Confirm and the PLC will be added to the rack:

avigazione del progetto 🛛 🕮	Test_Prj → PLC_1 [C	.PU 121	2C DC	DCDCJ	l											
Dispositivi															🚝 Vista	topologica 🛛 📥 Vis
	🖹 🔐 PLC_1 [CPU 12120	c]	•	🖽 🖾	1 🖌 🗄	🗄 🔝 🔍 ±				Vista	a generale dispositivi					
									^		Modulo	Posto	Indirizzo I	Indirizzo Q	Tipo	N° di articolo
Test_Prj												103				
Aggiungi nuovo dispositivo									=			102				
💼 Dispositivi & Reti												101				
PLC_1 [CPU 1212C DC/DC/DC]					×						▼ PLC 1	1			CPU 1212C DC/DC/DC	6ES7 212-1AE40-0XB0
🛐 Configurazione dispositivi											DI 8/DO 6 1	11	0	0	DI 8/DO 6	
😵 Online & Diagnostica											AL2 1	12	6467		AI 2	
🕨 🔂 Blocchi di programma		103	102	101		1	2	3			_	13				
Oggetti tecnologici	Telaio di montagg				101010-5	201270 21-022					HSC 1	1 16	100010		HSC	
Sorgenti esterne											HSC 2	1.17	100410		HSC	
🕨 🔁 Variabili PLC							_				HSC 3	1 18	100810		HSC	
Tipi di dati PLC					11					•	HSC 4	1 19	101210		HSC	
Tabella di controllo e di forzamento						5000				-	HSC 5	1 20	101610		HSC	
Backup online										•	HSC 6	1.21	102010		HSC	
🕨 🔄 Traces					<b>1</b>						Pulse 1	1 32		100010	Generatore di impulsi (	
Dati proxy dei dispositivi											Pulse 2	1 33		100210	Generatore di impulsi (	
🔡 Informazioni sul programma											Pulse 3	1 34		1004_10	Generatore di impulsi (	
Elenchi di testi di segnalazione PLC											Pulse 4	1 35		1006_10	Generatore di impulsi (	
Moduli locali											Interfaccia PROFINET 1	1 X1			Interfaccia PROFINET	
Dispositivi non raggruppati												2				
🕨 📷 Impostazioni Security												3				
Funzioni oltre i limiti del PLC																
🕨 🙀 Dati comuni																
<ul> <li>Informazioni sul documento</li> </ul>																
🕨 📷 Lingue & Risorse									~							
🔚 Accessi online	< 11			>	100%		<b>-</b>		. 📵	<					111	
🤄 Card Reader/memoria USB																

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 the network view:





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

			Totally Integrated Auto	matio POR	n TAl
		_	Catalogo hardware		□ ▶
tagli	Elenco	Simboli	Opzioni		_
		·			
			✓ Catalogo		
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			🕨 🛅 Sistemi PC		
			Azionamenti e starter		
			🕨 🧊 Componenti di rete		
			Rileva e controlla		
			Periferia decentrata		
			Alimentazione e distribuzione della corrente		
			Apparecchiature da campo		
			Ulteriori apparecchiature da campo		
			Ulteriori dispositivi Ethernet		_
			PROFINE I IO		_
			Encodors		-
			Gateway		
			▼ Seneca S RI		-
			Seneca Z-KEY-P		
			Z-KEY-P Gateway		
			SIEMENS AG		
			▶ [ <u>]]</u> 1/O		
追 🛛 🕄 D	iagnostica		Sensors		¥
			✓ Informazione		
			Dispositivo:		^
			Z-KEY-P Gateway		



Drag the device to the network view:

• <u> </u>		
r 🗉 🖣	Progetto_1006Z-KeyP > Dispositivi & Reti	
		🚆 Vista topologica 🛛 🛗 Vist
💷 🐿	Collega in rete	🔽 🖑 🖫 🖿 🖽 🛄 🍳 ± 🛛 🖬 🚺
		4 Sistema IO: PLC_1.PROFINET IO-System (100)
-K ∧ I 2 i p est <sup>2</sup> LC ti P i c nli / d cali	PLC_1 CPU 1212C PLC_1.PROFINET IO-Syste	Z-KEY-P Z-KEY-P Gateway Non assegnato



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):

Siemens - C:\Users\Laborator	io_iot\Documents\Automation\Test_MAret	to\Progetto_1006Z-KeyP\Progetto_	1006Z-KeyP	
Progetto Modifica Visualizza I	nserisci Online Strumenti Tool Finestr	a ?		
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			VEV D Catouroul	
	Progetto_10062-KeyP Dispositiv	vi non raggruppati 🕨 Z-KET-P [Z-I	KET-P Gatewayj	
Dispositivi			🚽 Vista topologica	📩 Vista di rete 📑 Vista dispositiv
🖬 🗐 🐄	🛃 Z-KEY-P [Z-KEY-P Gateway] 💌 🛄	🕎 🖌 🗄 🔲 🔍 t	-	Vista generale dispositivi
				^
▼ Progetto 1006Z-K				Modulo
▼ ■ PLC 1 [CPU 12				Z-KEY-P
Blocchi di p	A.A.			► PN-IO
Dggetti tec	TENE			
Sorgenti est	, in the second s			
🕨 🔚 Variabili PLC				
🕨 间 Tipi di dati P				
🕨 🔝 Tabella di c				
Backup onli		DP-NORM		-
🕨 🔀 Traces	_			-
Dati proxy d				
Moduli locali				-
Periferia dec				
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🕨 📷 Impostazioni Se				
🕨 🔀 Funzioni oltre i				
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▶ 🛄 COM <3> [Cavo 🌆	7.KEY.P [7.KEY.P Gateway]			
🕨 🛄 Broadcom NetL 🕎				
TAP-Windows A	Generale Variabile IO Costa	anti di sistema Testi		
Vista dottagli	▼ Generale	Indirizzi Ethomot		
• Vista dettagii	Informazioni sul catalogo			
	▼ Interfaccia PROFINET [X1]	Interfaccia collegata a		
	Generale			
	Indirizzi Ethernet	Sottorete	: PN/IE_1	
	<ul> <li>Opzioni avanzate</li> </ul>		Inserisci nuova sottoret	e
	Opzioni dell'interfaccia			
	✓ Impostazioni Realtime	Protocollo IP		
	Ciclo IO	1		
	▼ Port 1 [X1 P1]	Indirizzo IP	: 192 . 168 . 90 . 48 🕇	
	Generale	Maschera di sottorete	: 255 . 255 . 255 0	
	Collegamento porta		Sincronizza le imposta	zioni di router con 10 Controller
	Opzioni delle porte			
			Utilizza router	

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





Z-KEY-P [Z-KEY-P Gateway] 💌 🖽 🖾	I 🛄 🔍 ± 🖂 🗠	Vista generale dispositivi
	^	- Wodulo
	=	▼ Z-KEY-P
	_	▶ PN-IO
DP-NC	Sostituisci dispositivo Scrivi nome dispositivo nella micro memory card Avvio Device Tool in corso Taglia Ctrl+X	
	🛅 Copia Ctrl+C	
	i Incolla Ctrl+V	
	🗙 Elimina Canc	
	Image: Second state of the second	
	Carica nel dispositivo	
	💋 Collega online Ctrl+K	
:Y-P [Z-KEY-P Gateway]	Interrompi collegamento online Ctrl+M	
enerale Variabile IO Costanti di siste	V. Online & Diagnostica Ctrl+D	
nerale	Angiorna e visualizza operandi foratt	
Informazioni sul catalogo Indirizzi		
terfaccia PROFINET [X1] Inter	Riferimenti incrociati	
Generale	Maiusc+F11	
Indirizzi Ethernet	Visualizza catalogo Ctrl+Maiusc+C	
Opzioni avanzate	Esporta etichette di siglatura per moduli	
Opzioni dell'interfaccia		
▼ Impostazioni Realtime Proto		]
Ciclo IO	.010 IP	
▼ Port 1 [X1 P1]	Indirizzo IP: 102 168 00 48	
Generale •	192.100.90.48	
Collegamento porta	Maschera di sottorete: 255 . 255 . 255 . 0	
Opzioni delle porte	Sincronizza le impostazio	ni di router con IO Controller

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



In our Modbus configuration we have 10 read only tags (the 10 inputs of the Z-10-D-IN) and 10 write tags (the 10 outputs of the Z-10-D-OUT).

Each boolean Tag in profinet is converted into a byte, so we will need 10 bytes to read for the Z-10-D-IN and 10 bytes to write for the Z-10-D-OUT.

So drag a 10-byte array to read:



#### And 10 Bytes to write:

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	I Progetto_1006Z-KeyP ► Dispo	sitivi non raggruppati 🕨 Z-Kl	EY-P [Z-KEY-P Gateway]		_ # = ×	🕻 📼Z-KEY-P Gate		Catalogo hardware	■ □ >
			🛃 Vista topologica	🔥 Vista di rete	📑 Vista dispositivi	Elenco Sim	ooli 🚺 🚺	Opzioni	
1 🔝	🛃 Z-KEY-P [Z-KEY-P Gateway] 💌	🖽 🖭 🍊 🖽 🛄 🍳 ±	📑 🛛 Vista ge	nerale dispositivi	]				
			<u>^</u>	Aodulo	Telaio Posto	1 V.		✓ Catalogo	
			=	Z-KEY-P	0 0 /	Configuraz Online		<trova></trova>	fèi lèi
	2.8			<ul> <li>PN-IO</li> </ul>	0 0 X1	dispositivi Diagnos	ca	Filtro Profilo: <tutti></tutti>	- 1
	1,45			Port 1	0 0 X1 P1	i de se		8 tags diagnostic status read byte	^
				10 read byte_1	0 1			I global diagnostic read byte	
				<ul> <li>10 write byte 1</li> </ul>	0 2 =	Z-KEY-P 10 rea	I	- Cm READ	
	_			ARRAY 10 BYTE	0 21	- byte_		1 read byte	
		00 V0011			3			10 read byte	
		DP-NORM			0 4	10 write		12 read byte	
					0 5	byte_1		le read byte	
					0 6			22 read byte	
			-		0 7			4 read byte	=
					0 8			64 read byte	
					0 9			8 read byte	
					0 10			- 🕞 WRITE	
					0 11				
					0 12			10 write byte	
					0 14			12 write byte	
					0 15			16 write byte	
			~		0 16	/		2 write byte	
	<	> 100%		Ш	>			32 write byte	_
	10 write byte 1 [10 write byte]			O Pro	orietà 🐴 Informazio	ni 🖳 Diagnostica		4 write byte	~
	To time by a_1 [To time by a]		_					V Informazione	•
	Generale Variabile IO Co	ostanti di sistema    Testi							<u>^</u>
	- Generale	Generale					^	Dispositivo:	
	Informazione catalogo	DP-NORM							
	Norma: 10 units hore 1								
	Nome I uvinte system								
	Autore: Laboratono_ot						10 write bute		
		Co	mmento:				^	to white byte	

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Now the devices are configured, all that remains is to compile and send the configuration to the PLC. The first icon compiles the second sends the project:

₩ Siemens - C:\Users\Laborate	orio_iot\Documents\	Automation\Test_	_Prj\Test_Prj
Progetto Modifica Visualizza	Inserisci Online	Strumenti Tool	Finestra ?
📑 📑 🔚 Salva progetto 🛛 昌	X 🗉 🗈 🗙 🍤	± 🔧 🗟 🖳	🚹 🖳 🛃 💋 Colleg
Navigazione del progetto			pila Pri 🕨 Dispositivi
Dispositivi	COMPILE		SEND

Before sending the project to the PLC select the Ethernet interface and start the search, select the PLC and press "Load".

Caricamento avanzato		1.000				
	Nedi di accesso confi	igurati di "RLC 1"				
	Dispositivo	Tipo di dispositivo	Posto c	Tino di inter	a Indirizzo	Sottorete
	PLC_1	CPU 1212C DC/D	1 X1	PN/IE	192.168.90.44	PN/IE_1
		Tipo di interfaccia F	G/PC:	PN/IE		<b>•</b>
		Interfaccia P	G/PC:	Broadcom I	NetLink (TM) Gigabit Et	hernet 💌 💎 🔯
×	Collegamento d	on l'interfaccia/la sotto	orete:	PN/IE_1		
		1° gate	way:			-
		. 9	···-)· [			
	Selezionare il sistema	a di destinazione:			Visualizza tutti i nod	li compatibili 🛛 🔻
	Dispositivo	Tipo di dispositivo	Tipo di	interfaccia Ir	ndirizzo	Dispositivo di des
	plc_1	\$7-1200	PN/IE	1	92.168.90.44	
i	-		PN/IE	li	ndirizzo di accesso	-
<b>a</b>						
📃 LED lampeggia		$\sim$				
						<u>Avvia ricerca</u>
Informazioni sullo stato or	nline:				📃 Visualizza solo m	essaggi di errore
🛓 Dispositivo accessibi	le trovato r16di8do					^
🚹 Ricerca terminata. So	no stati trovati 1 nodi (	compatibili su 3 nodi a	ccessibili.			
Richiamo informazion	ni sui dispositivi in cors	0				
Scansione e richiesta	informazioni concluse	e. E stato rilevato 1 prol	olema.			~
					<u>C</u> ari	ca <u>A</u> nnulla

Once the project has been sent, RUN the PLC:





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

ti	Too	bl	Fin	estr	a ?	_		-											
1			lî		RT	ø	Collega onli	ne	ş	Interromp	i colle	gamen	to onlir	ne	<mark>#?</mark>			×	
		Te	st_	Prj	► D	isp	ositivi non	rag		. ppati 🕨	r160	di8do	[R-16	DI-8	3DO	Eth	nerne	et I/(	<b>)]</b>
	- 64																		

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

rogetto Modifica Visualizza Inserisci Online Strumenti	Tool Finestra ?
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Navigazione del progetto 🔲 🖣	Progetto_1006Z-KeyP > Dispositivi non raggruppati > Z-KEY-P [Z-KEY-P ]
Dispositivi	🛃 Vista topologica 👔
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	🔐 Z-KEY-P [Z-KEY-P Gateway] 💌 🖽 🔛 🕼 🕄 🛄 🔍 ±
▼ Progetto_1006Z-KeyP	=
▼ [] PLC_1 [CPU 1212C DC/DC/DC]	
🕨 🕨 🕞 Blocchi di programma	1.Et.x
🕨 🕨 🖓 Oggetti tecnologici	1.5
Sorgenti esterne	
🕨 🕨 🖓 Variabili PLC	
🕨 🛅 Tipi di dati PLC	
🕨 🥅 Tabella di controllo e di forzamento	
🕨 📴 Backup online	
🕨 📴 Traces	DP-NORM
📲 Dati proxy dei dispositivi	
🕨 🖬 Moduli locali 🗹	
🕨 🧊 Periferia decentrata 🗹	
🔻 🖳 Dispositivi non raggruppati	
🔻 🛄 Z-KEY-P [Z-KEY-P Gateway]	
🕨 🚰 Impostazioni Security	
Funzioni oltre i limiti del PLC	
🕨 🥁 Dati comuni	
Informazioni sul documento	
🐻 Lingue & Risorse	
Accessi online	~

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



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

₩A	As Siemens - C:\Users\Laboratorio_iot\Documents\Automation\Test_Prj										
Pr	Progetto Modifica Visualizza Inserisci Online Strumenti	То	ol Finestra ?								
	🌁 🞦 🔚 Salva progetto 🛛 🔒 🐰 🏥 🗊 🗙 🏹 🛨 (레 🏼 🖥		🗓 🚹 🖳 🐺 💋 Collega online 🖉 Interro	mpi collegamento	online 👫 ኲ	<b>.</b> ×		Sfogli	a progett	•> 🖬	
	Navigazione del progetto	4	Test_Prj ▶ PLC_1 [CPU 1212C DC/DC/D	C] 🕨 Variabili	PLC 🕨 Tabella	delle va	riabili st	tandard	[36]		
	Dispositivi										
			🖸 🥐 🖻 🛃 🕫 🛍								
Ĕ			Tabella delle variabili standard								
e	▼ 📑 Test_Prj	^	Nome	Tipo di dati	Indirizzo	Ritenz	Acces	Scrivi	Visibil	Commento	
Zio	💣 Aggiungi nuovo dispositivo		1 <aggiungi></aggiungi>				<ul> <li>Image: A start of the start of</li></ul>	<b>~</b>	<ul> <li>Image: A start of the start of</li></ul>		
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le l	PLC_1 [CPU 1212C DC/DC/DC]										
5	Configurazione dispositivi										
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	🕨 🔙 Blocchi di programma										
	Oggetti tecnologici										
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	🔻 🔁 Variabili PLC										
	la Mostra tutte le variabili										
	💣 Aggiungi nuova tabella delle variabili										
	🍯 Tabella delle variabili standard [36] 🥿										
	🕨 🗽 Tipi di dati PLC										
	<ul> <li>Tabella di controllo e di forzamento</li> </ul>										
	📑 Aggiungi nuova tabella di controllo										
	📖 Tabella di forzamento					_	_	_	_		

Add the variables related to the IO (10 digital inputs and 10 digital outputs). The addresses are written here:

ļ	Progetto_1006Z-KeyP 🕨 Dispositivi non raggruppati 🕨 Z-KEY-P [Z-KEY-P Gateway] 🛛 🗖 🗖 🗮 🗙											
				🖶 Vista top	ologica	📥 Vi	sta di re	te 🚺	Vista dispositivi	٦		
t	• 🖬	Vista	generale dispositivi									
	-	<u> </u>	Modulo	Tel	aio Post	to Indi	rizzo I Ind	dirizzo Q	Тіро			
			<ul> <li>Z-KEY-P</li> </ul>	0	0				Z-KEY-P Gateway	^		
			PN-IO	0	0 X	1			Z-KEY-P			
	=	_	<ul> <li>10 read byte_1</li> </ul>	0	1	11	0		10 read byte			
	=	=	ARRAY 10 BYTE	0	11	11	0		ARRAY 10 BYTE			
			<ul> <li>10 write byte_1</li> </ul>	0	2	_ <b>_</b>	1.	.10	10 write byte			
			ARRAY 10 BYTE	0	2 1		1.	.10	ARRAY 10 BYTE	≡		
				0	3		<u> </u>					
				0	4			Т				
		4		0	5							
				0	6			1				
		•		0	7							
				0	8							
				0	9							



Therefore the bytes from IB1 to IB10 contain the 10 inputs, the bytes from QB1 to QB10 the outputs. Define the following table by hand, set the output tags as writable:

eway) _ T = X @PU 1212C DC/DC/DC) > Variabili PLC > Tabella delle variabili standard [56] _ T = X Ordini	
🔐 Variabili 🗉 Costanti utente 💭 Costanti di sistema 🛛 Opzioni	
INPUTS 🕏 🔮 🖼 🕫 🛍	
con Indirizzo Indi	
Nome Tipo di dati Indirizzo Ritenz Acces Scrivi Visi	
1 💷 IN1 Byte %IB1 🗌 🗹 🔽 Trova:	
P1 2 💷 IN2 Byte %IB2 🗌 🗹	
110 3 💷 IN3 Byte %IB3 🗌 🗹 🗌 Solo parole intere	
110 4 4 IN4 Byte %B4	
110 = 5 C INS Byte %B5 S Maiuscole/minuscole	
110 6 💷 IN6 Byte %IB6 🗌 🗹 📄 🗹 📃 Cerca in strutture subor	dinate
7 💷 IN7 Byte %IB7 🗹 🗹 Cerca in testi nascosti	
8 📲 INS Byte %688	
9 ≪⊒ IN9 Byte %IB9 🗹 🗹	
10 - INIO Byte %BIO Statespressioni regola	1
1 💷 OUTI Byte %QB1 🗹 🗹 🐼 Giù	WRITEABLE
2 🐨 OUT2 Byte %Q82	
3 40 OUT3 Byte %QB3 ☑ ☑ 4 4 0 5 0	
14 📲 OUT4 Byte %Q84 🗹 🗹 🗹	
5 💷 OUT5 Byte %Q85 🗹 🗹	
6 💷 OUT6 Byte %Q86 🛛 🗹 🗹 Sostituisci:	
17 - 40 OUT7 Byte %Q87 🛛 🗹 🗹	
8 💷 OUT8 Byte %Q88 🗌 🗹 🗹 💿 Tutto il documento	
OUTPUTS 9 COUTP Byte %Q89 COUTP COUTPUTS	
Byte SQB10 Bite SQB10 Bite Bite	
Selezione Selezione	

After this operation, define a new control table:

Click on "Add new control table" and then insert the variables





Since you have already defined them previously, just select the ones we want to monitor from the list:

ø	C DC/DC/D	C] 🕨 Tabel	lla di controllo e	di forzamento	) 🕨	Tabella di c	ontro	ollo_1	- 1	₽∎×
<b>*</b>	🥐 🚛 🐓	L. 91 %	27 <sup>00</sup> n 00n ▶ 1							
	i Nome		Indirizzo	Formato visuali	zz	Valore di cont	rollo	Valore di com	ando	9
1	"IN1"		%IB1	Esadecimale	•					
2	- <b>⊡</b> "IN	1"	В	yte	%IB	1			^	
		2"	В	yte	%IB	2				
		3"	В	yte	%IB	3				
		4"	В	yte	%IB	4				
	-••• "IN	5"	В	yte	%IB	5				
	-••• "IN	6"	В	yte	%IB	6				
	-••• "IN	7"	В	yte	%IB	7				
	- <b>1</b> 1	8"	B	yte	%IB	8			~	

Once you have added all of them you will get:

ø	C DC/DC/DC]  Tabel	la di controllo e d	li forzamento 🕨	Tabella di contro	ollo_1i	
ý	🔮 🏥 😼 🗓 🌮 16	200 00h 2 ⊳ 1				_
_	i Nome	Indirizzo	Formato visualizz	Valore di controllo	Valore di comando	9
1	"IN1"	%IB1	Esadecimale			
2	"IN2"	%IB2	Esadecimale			
3	"IN3"	%IB3	Esadecimale			
4	"IN4"	%IB4	Esadecimale			
5	"IN5"	%IB5	Esadecimale			
6	"IN6"	%IB6	Esadecimale			
7	"IN6"	%IB6	Esadecimale			
8	"IN7"	%IB7	Esadecimale			
9	"IN8"	%IB8	Esadecimale			
10	"IN9"	%IB9	Esadecimale			
11	"IN10"	%IB10	Esadecimale			
12	"OUT1"	%QB1	Esadecimale			
13	"OUT2"	%QB2	Esadecimale			
14	"OUT3"	%QB3	Esadecimale			
15	"OUT4"	%QB4	Esadecimale			
16	"OUT5"	%QB5	Esadecimale			
17	"OUT6"	%QB6	Esadecimale			
8	"OUT7"	%QB7	Esadecimale			
19	"OUT8"	%QB8	Esadecimale			
20	"OUT9"	%QB9	Esadecimale			
21	"OUT10"	%QB10	Esadecimale 🔽			
		Americani		T		

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Now compile, send the project and go online with the PLC (all operations seen previously):

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

0	C DC/DC/DC] •	Tabella di controll	o e di forzamento 🕨	Tabella di contro	llo_1 🗕 🖬	
		_ *				
<b>*</b>	🔮 🚛 📝 🌆 🏾	91 % # 😰 🐨				
	i Nome	Indirizzo	Formato visualizz	Valore di controllo	Valore di comando	9
1	"IN1"	%IB1	Esadecimale	16#00		
2	"IN2"	%IB2	Esadecimale	16#00		
3	"IN3"	%IB3	Esadecimale	16#00		
4	"IN4"	%IB4	Esadecimale	16#00		
5	"IN5"	%IB5	Esadecimale	16#00		
6	"IN6"	%IB6	Esadecimale	16#00		
7	"IN6"	%IB6	Esadecimale	16#00		
8	"IN7"	%IB7	Esadecimale	16#00		
9	"IN8"	%IB8	Esadecimale	16#00		
10	"IN9"	%IB9	Esadecimale	16#00		
11	"IN10"	%IB10	Esadecimale	16#00		
12	"OUT1"	🔳 %QB1	Esadecimale 💌	16#00		
13	"OUT2"	%QB2	Esadecimale	16#00		
14	"OUT3"	%QB3	Esadecimale	16#00		
15	"OUT4"	%QB4	Esadecimale	16#00		
16	"OUT5"	%QB5	Esadecimale	16#00		
17	"OUT6"	%QB6	Esadecimale	16#00		
18	"OUT7"	%QB7	Esadecimale	16#00		
19	"OUT8"	%QB8	Esadecimale	16#00		
20	"OUT9"	%QB9	Esadecimale	16#00		
21	"OUT10"	%QB10	Esadecimale	16#00		

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

To control the outputs, it is necessary to enter 1 or 0 in the "Command value" column and then press the icon with the lightning bolt to order the writing.



#### 9.2. STEP-BY-STEP CONFIGURATION EXAMPLE WITH A CODESYS™ 3.5 PLC

In Codesys, create a new standard project:



Configure the PLC by selecting it in the tree on the left and then browsing the network:

Select the PLC after scanning the network:

eleziona dispositivo		>
Selezionare il percorso di rete al controllo:		
Gateway-1	Nome del dispositivo: raspberrypi Wink	te
	Indirizzo del dispositivo: 0301.A02C	
	Driver blocco: UDP	
	Fornitore del sistema di destinazione: 35 - Smart Software Solutions GmbH	
	Nome del sistema di destinazione: CODESYS Control for Raspberry Pi SL	
	<u>O</u> K Annull	a



The PLC is now connected to the system:

Sfoglia la rete	Gateway 🕶	Dispositivo 👻	
		Gateway	
		IP-Address: localhost	Nome del dispositivo: raspbenypi
		1217	0301.A02C
			Target ID: 0000 0010
			Tipo di sistema di destinazione: 4102
			Fornitore del sistema di destinazione: 3S - Smart Software Solutions GmbH
			Versione del sistema di destinazione: 3.5.16.0

Now that the PLC has been detected, move on to insert a profinet port on standard Ethernet: Right click on device and "add device":





#### Then add the Profinet IO Master:



Double click on Ethernet, set the Ethernet port and the IP address of the PLC (in this case use 192.168.90.44):

Test.project* - CODESYS		
File Modifica Visualizza Progetto Compilazi	ione Inlinea Debug Tools Fi	nestre Guida Automation Server
È ☞ 🖬   ቆ   ∽	<b>4 %      % % %  </b> ¶  ≌• (	🕆 🛗 🛛 Application [Device: Logica PLC] 👻 🧐 🔶 🔳 💐   🖓 🖙 🖻
Dispositivi 👻 🛱 🗙	Device PN_Controller	Ethernet X
Text     Text	Generale Log Stato Ethernet Device mapping I/O Ethernet Device IEC Objects Informazione	Network interface eth0



Set also the address range for the Profinet peripheral, double click on PN\_Controller:



Now you need to connect the Seneca slave device PROFINET IO to the profinet master (controller). First install the GSD file of the Seneca IO. Select Tools->Device Repository:

Test.project* - CODESVS		
File Modifica Visualizza Progetto Compilaz	ione In linea Debug Too	Is Finestre Guida Automation Server
🛅 🛎 🖬   🖨   🗠 🗠 🐇 🛍 🛍 🗙   🛤 🌿 d	🛎 🍇 । 🗷 🔊 🖄 🖄 🖉	Gestore pacchetti
	1	Repository librerie
Dispositivi 👻 🕂 🗙	Device 🗙 🚺	Repository dispositivi
Test		Repository stili di visualizzazione
Device (CODESYS Control for Raspberry Pi SL)	Impostazioni comunicazi	Repository delle licenze
E Logica PLC	Applicazioni	Gestore di licenze
Application		•
Gestore libreria	Salva e ripristina	Scripting •
PLC_PRG (PRG)		Personalizza
Se MainTack	File	Opzioni
	Log	Importazione ed esportazione opzioni in corso Gat
Profinet_CommunicationTask	p)	Device Reader
PN_Controller.CommCycle	Impostazioni PLC	Undate Parahera / Di
Profinet_IOTask		
Ethernet (Ethernet)	Shell PLC	Port:
PN Controller (PN-Controller)		1217



Now import the GSD file selecting Profinet IO Slave:



Press "Install":

.FX Profinet Device	35 - Smart Software Solutions GmbH 3.5.15.40	CODESYS PLC running as Pr	ofinet Dev Esporta	
🖡 💿 Installare la descrizione de	el dispositivo		×	
	esto PC → UBUNTU-SERV (E:)			
<sup>DI</sup> Organizza <del>▼</del> Nuova ca	irtella		E: 🔻 🔟 😮	
	Nome	Ultima modifica Tipo	Dimensione	
r F 🔤 Z-key-p-distlO-t	GSDML-V2.2-SENECA-ZKEYP-GATEWAY-20210512.xml	12/05/2021 17:22 Docume	ento XML 30 KB	
Dropbox				
F. 📃 Questo PC				
📃 Desktop				
2- 🔮 Documenti				
🚽 🦊 Download				
🔚 Immagini				
🁌 Musica				
i Oggetti 3D			File di configurazione descrizione dis	oositivo EtherCAT XML (*.xml)
🚦 Video			File di configurazione PROFIBUS DP V	5.0(*.gs?) SDML* xml)
🏪 OS (C:)			File di descrizione dispositivo (*.devd	esc.xml)
👝 UBUNTU-SERV (I			File di descrizione dispositivo sercos File EDS e DCF (*.eds. *.dcf)	(ML (*.xml)
👝 UBUNTU-SERV (E: 🗡			IO-Link Device Description (IODD) (*( Tutti i file di descrizione supportati (*,	DDD1.1.xml;*IODD1.0.1.xml) xml:*.eds:*.dcf:*.as?)
Nome	file: GSDML-V2.2-SENECA-ZKEYP-GATEWAY-20210512.xml		File di configurazione PROFINET IO (G	SDML*.xml)
			Apri Annulla	

Now point to the correct folder and press OK.

Select the file type as GSDML "PROFINET IO configuration file". Codesys has now added the GSD file correctly.



sizione	System Repository (C:\ProgramData\CODESYS\Devices)				Modifica
escrizioni	dispositivi installati				
Stringa pe	r una ricerca full-text Produttore:	<tutti i="" produttori=""></tutti>		~	Installa
Nome	Image: Slave Profinet IO           ₩3 ADAM 6 100PN Compact I/O           ₩3 CIFX Profinet Device           ₩3 Codesys Fic PN Device           ₩3 Fit PN Side Device for PNEO controller V           ₩3 Fit PN Codesystem	Produttore Advantech Co., Ltd. 3S - Smart Software Solutions GmbH 3S - Smart Software Solutions GmbH Beschoff LAUMAS Eletronica Srl Sence S. R.L. tht PDev rt-labs	Versione SW=V 1 2 1, HW=1 SW=V3.x, HW=2 SW=V1.0.0, HW=1 3.5.13.0 SW=V1.00, HW=V1.00 SW=2.0, HW=3 SW=FW REV 2xx, HW=1 SW=21.0, HW=41.0 SW=74.00, FW=41.0	Descrizione: A ADAM-6100PN IO module CODESYS PLC running as Profinet De CODESYS PLC configured as a Profinet CODESYS PLC running as Profinet De PROFINET I/O device - EtherCAT alav NLC 524E, firmware V2.0 - V2.X, sup R-1601-800-PL module Example for a ProfinetID device 21557 D Community for	Disinstalla Esporta
	glocket + Oateway     serces III     serces III     ontroll (PLC)     (SSDML-V2.2-SENECA-2KEYP-GATEWAY-20210512     impossible trovare if file collegate E: 72KEYP-bmp. i     Dispositivo "Z-KEY-P Gateway" installato nel repoi	mi er questa descrizione dispositivo il file mancat torr dispositivi	SW-501D 1000, HW-1	ZTELT Galeway induce	Dettagli

First compile the project and log in to the PLC:



Now we have verified the correct functioning of the connection with the PLC.



At this point add the Z-KEY-P device, right click under PN-Controller and choose Add Device:

Dispositivi		· · · · · · · · · · · · · · · · · · ·	•	<b>џ</b>	×
TestZ-KEY-P					•
🖮 📺 Device (CODESYS Control for R	aspbe	rry Pi SL)			
🖃 🗐 Logica PLC					
🖹 🌍 Application					
🗂 📶 Gestore libreria					
PLC_PRG (PRG)					
😑 🌃 Configurazione di a	ttività				
🖹 😂 MainTask					
PLC_PRG					
🖹 🗳 Profinet_Comm	nunica	tionTask			
PN_Contro	ller.Co	ommCycle			
Profinet_IOTas	sk				
Ethernet (Ethernet)					
PN_Controller (PN-Cont	X	Taglia			
SoftMotion General Axis Po		Conia			
I <sup>2</sup> C		locolla			
2 SPI		Incolla			
GPIOs_A_B (GPIOs A/B)	$ \mathbf{X} $	Elimina			
Comewire		Refactoring			
<pre>Callela device</pre>	Ē.	Proprietà			
	100	Aggiungi oggetto			/
		Aggiungi cartella		×	
	(	Aggiungi dispositivo	$\supset$	)	
		Inserisci dispositivo			
		Trova dispositivi			
		Disattiva dispositivo.			
		Aggiorna dispositivo			



Then select the Z-KEY-P and press "Add Device":

me Z_KEY_P_C	Sateway				
zione					
Aggiungi disp	ositivo 🔘 Inserisci dispos	<b>itivo</b> 🔵 Innesta disp	ositivo 🔘 Aggiorna disp	ositivo	
tringa per una ric	erca full-text	Produttore:	<tutti i="" produttori=""></tutti>		
Nome			Produttore		Versione
🗉 🚹 Bus di cam	npo				
🖹 🛲 Profin	et IO				
🖹 - 🛲 SI	lave Profinet IO				
	ADAM-6100PN Compact I	/0	Advantech Co., Lt	d.	SW=V 1 2 1,
<mark>6</mark>	CIFX Profinet Device		3S - Smart Softwa	re Solutions GmbH	SW=V3.x, HW=
	Codesys Plc PN Device		3S - Smart Softwa	e Solutions GmbH	SW=V1.0.0, HV
···· •	CODESYS Profinet Device	t	3S - Smart Softwar	re Solutions GmbH	3.5.13.0
	EL6631-0010 V2.0		Beckhoff		SW=V1.00, HW
<b>6</b>	LAUMAS-RE/PNS V2.0		LAUMAS Elettronic	a Srl	SW=2.0, HW=3
•	🖞 R-16DI-8DO-P Ethernet I	/0	Seneca S.R.L.		SW=FW REV 2
$\sim$	H rt labo DEMO device, for	PNIO controller with P	Dev rt-labs		SW=Z1.0, HW:
( ···· •	Z-KEY-P Gateway		Seneca S.R.L.		SW=BUILD 100
: Raggruppare p	ber categoria 🗌 Visualizz	are tutte le versioni (;	olo per utenti avanzati) [	Visualizza versioni	obsolete
: Raggruppare p	ver categoria □ Visualizz KEY-P Gateway	are tutte le versioni (;	olo per utenti avanzati) [	Visualizza versioni	obsolete
: Raggruppare p ] Nome: Z-1 Produtto Grunni: S	ver categoria ☐ Visualizz KEY-P Gateway <b>re:</b> Seneca S.R.L. Jave Profiner 10	are tutte le versioni (;	olo per utenti avanzati) [	Visualizza versioni	obsolete
Raggruppare p Mome: Z-1 Produtto Gruppi: S Versione	ver categoria Visualizz KEY-P Gateway <b>re:</b> Seneca S.R.L. lave Profinet IO :: SW-BUILD 1000, HW=1	are tutte le versioni (;	olo per utenti avanzati) [	] Visualizza versioni	obsolete
Raggruppare p Nome: Z-1 Produtto Gruppi: S Versione Numero i Descrizio	Visualizz KEY P Gateway re: Seneca S.R.L. Jave Profinet IO SW =0ULD 1000, HW = 1 modello: Z-KEY P modello: Z-KEY P	are tutte le versioni (;	olo per utenti avanzati) [	☐ Visualizza versioni	obsolete
Raggruppare p Nome: Z-1 Produtto Gruppi: S Versione Numero I Descrizio	Ver categoria ☐ Visualizz KEY P Gateway re: Seneca S.R.L. Jave Profinet IO : SW = BUILD 1000, HW = 1 modello: Z+KEY P ne: Z+KEY P Gateway modu	are tutte le versioni (;	olo per utenti avanzati) [	☐ Visualizza versioni	obsolete
Raggruppare p Nome: 2-4 Produtto Gruppis Versione Numero i Descrizio	Visualizz KEY P Gateway re: Seneca S.R.L. Jave Profinet IO : SW =0ULD 1000, HW = 1 modello: Z + KEY P one: Z + KEY P Gateway modu	are tutte le versioni (;	olo per utenti avanzati) [	☐ Visualizza versioni	obsolete
Raggruppare p Nome: Z-4 Produtto Gruppis S Versione Numero i Descrizio	Ver categoria KEY P Gateway re: Seneca S.R.L. Jave Profinet IO SW =01LD 1000, HW = 1 modello: Z+KEY P one: Z+KEY P Gateway modu	are tutte le versioni (;	olo per utenti avanzati) [	Visualizza versioni	obsolete
Raggruppare p Nome: Z-4 Produtto Gruppis S Versione Numero I Descrizio	Visualizz KEY P Gateway re: Seneca S.R.L. Jave Profinet IO : SW =0ULD 1000, HW = 1 modello: Z-KEY P one: Z-KEY P Gateway modu	are tutte le versioni (;	olo per utenti avanzati) [	Visualizza versioni	obsolete
Raggruppare p Nome: Z-4 Produtto Gruppi: S Versione Numero I Descrizio	Visualizz KEY-P Gateway re: Seneca S.R.L. lave Profinet IO : SW=BUILD 1000, HW=1 modello: Z-KEY-P nne: Z-KEY-P Gateway modu	are tutte le versioni (; le	olo per utenti avanzati) [	Visualizza versioni	obsolete
Raggruppare p Nome: Z-4 Produtto Gruppi: S Versione Numero I Descrizio	Ver categoria Visualizz KEY-P Gateway vere: Seneca S.R.L. lave Profinet IO 2: SW =BUILD 1000, HW = 1 modello: Z-KEY-P one: Z-KEY-P Gateway modu el dispositivo selezionat	are tutte le versioni (; le o come ultimo "figl	olo per utenti avanzati) [ o" di	Visualizza versioni	obsolete
Raggruppare p Nome: Z-4 Produtto Gruppi: S Versione Numero I Descrizio	Ver categoria ☐ Visualizz KEY-P Gateway re: Seneca S.R.L. lave Profinet IO : SW =BUILD 1000, HW = 1 modello: Z+KEY-P me: Z+KEY-P Gateway modu el dispositivo selezionat	are tutte le versioni (; le o come ultimo "figi	olo per utenti avanzati) [ o" di	Visualizza versioni	obsolete



Click on the Z-KEY-P device and configure the ip address:

ositivi	* # X	Z_KEY_P_Gateway X	
THE VERT P     Device (CODEST'S Control for Respering PR 9.)     Device (CODEST'S Control for Respering PR 9.)     Device (CODEST'S Control for Respering PR 9.)     Device (CODEST'S Control for Respective PR 9.)     Device (CODEST'S Control for Respective PR 9.)     Device (Control for Respectine PR 9.)     Device (Control for Respectine PR 9.)     Device (C		Cenerale Options Log PNIO mapping I/O PNIO IEC objects Stato Informazione	Nome Stazione Z-KEY-P Station status Parameto IP Indirizzo IP Sectore di Gateway predefinito Communication Send clock (ms) Rapporto diliduzione 4 VLAN ID Classe RT RC Closs 1 (Legacy) V Classe RT RC Closs 1 (Legacy) V Face Classe RT RC Closs 1 (Legacy) V Parametri Valore Tipo dati Valori consentiti Descrizione

Now insert the configuration (10 bytes of reading for the Z-10-D-IN and 10 bytes of writing for the Z-10-D-OUT):

Right click on Z-KEY-P and select "Add device":

Dispositivi	•	<b>д х</b>	
Image: Second			
↓       (1/2) Z/KCY P. Gateway _ 1 (2/KEY P Gateway)         ↓       SoftMotion General Axis Pool         ↓       I/C         ↓       SPI         ↓       GPIOs A/B (GPIOs A/B)         ↓       Onewire         ↓       Camera device         ↓ <vuoto></vuoto>		Taglia Copia Incolla Elimina Refactoring Proprietà Aggiungi oggetto Aggiungi cartella	
	ſ	Aggiungi dispositivo Inserisci dispositivo Disattiva dispositivo Aggiorna dispositivo Modifica oggetto Modifica oggetto con Modifica mapping I/O Importa i mapping dal file csv Esporta i mapping nel file csv	



#### Add the 10 read bytes and the 10 write bytes:







Die

Z-KEY-P

The PLC (Raspberry-pi) is quite slow and not real time, consequently it cannot manage the profinet at maximum speed so we modify the values by setting safety parameters:

	(m	
ostvi 🗸 e 🗙	PN_Controller   Z_KE	(_P_Gateway_1 X ) Device     ARRAY_10_BYTE     ARRAY_10_BYTE_1
Brocket/*     Brocket/*	General Dig Colorest Options Log PhilD mapping I/O PhilD mapping I/O PhilD Recognes Skrie Diformatione	Non-Ration [2076]

Check that everything is correct by compiling and running the PLC.



Now see how it is possible to read and write the Modbus IO from IO Profinet.

To write and read the status of the IO you have to insert a few code lines under PRG.

In the program, read the inputs from the %IB3 address to the %IB12 address as it is obtained from here:

evice [Connetto] (CODESYS Control for Raspherry Pi SL)	Generale	Find		Filter Visualizza tutti		- 4	
ogica PLC		Variabile	Mapping	Canale	Indirizzo	Tipo	
Application [Esegui]	PNIO SubModule mapping I/O	B- 10		10 read byte	96783	APPAY ID 91 OF BYTE	
📲 Gestore libreria	PNIO SubModule IEC Objects	B- 10		10 read byte[0]	PAIR3	BYTE	
PLC_PRG (PRG)	The businesses of the	B 10		10 read byte[1]	96784	BYTE	
🗏 🧱 Configurazione di attività	Stato	· · · ·		10 read byte[2]	<b>MATERS</b>	BYTE	
🖷 😏 🍪 MainTask		B 10		10 read byte[3]	36786	BYTE	
DLC_PRG	Informazione	B 10		10 read byte[d]	96187	BYTE	
😑 😏 🕵 Profinet_CommunicationTask				10 read byte[5]	BGTBB	BYTE	
PN_Controller.CommCycle		. No. 10		10 read byte[6]	RCTRO	BYTE	
- 😏 🍪 Profinet_IOTask				10 read byte[7]	861810	BYTE	
Ethernet (Ethernet)				10 read byte[7]	967011	BYTE	
PN_Controller (PN-Controller)		1.4		10 read byte[0]	067912	DVTE	
Z KEY P Gateway 1 (Z-KEY-P Gateway)				Torreso Dyte[9]	9(1912	Enumeration of PVTE	
C  C  C  C  C  C  C  C  C  C  C  C  C				100373	1015	Littline addit of DTTL	
California Canada Avia Daal							
or choice in the real was poor							



And write in the address from %QB0 to %QB9 as it is obtained from here:

-	# X PN_Controller	EY_P_Gateway_1	Device A	RRAY_10_BYTE		(_10_BYTE_1 × 🗍 _10.	
stZ-KEY-P	<ul> <li>Canazala</li> </ul>	Find Filter Visualizes tutti					
Device [Connetto] (CODESYS Control for Raspberry Pi SL)	Generale						
Logica PLC	PNIO SubModule mapping I/O	Variabile	Mapping	Canale	Indirizzo	Tipo	
🖹 🚫 Application [Esegui]	Finite SubFieldure mapping ye	B- 🐪		10 write byte	%QB0	ARRAY [09] OF BYTE	
- 🎁 Gestore libreria	PNIQ SubModule IEC Objects	÷.		10 write byte[0]	%QB0	BYTE	
PLC_PRG (PRG)		8-59		10 write byte[1]	%OB1	BYTE	
🖻 🧱 Configurazione di attività	Stato	6-5		10 write byte[2]	%OB2	BYTE	
🖻 😏 🈂 MainTask		8-50		10 write byte[3]	%QB3	BYTE	
-@1 PLC_PRG	Informazione	B- 🍫		10 write byte[4]	%QB4	BYTE	
🖶 😏 🎲 Profinet_CommunicationTask		8-59		10 write byte[5]	%OB5	BYTE	
PN_Controller.CommCyde		6-5		10 write byte[6]	%086	BYTE	
- 😏 🍪 Profinet_IOTask		8-10		10 write byte[7]	%QB7	BYTE	
🕞 🔟 Ethernet (Ethernet)		B- 🍫		10 write byte[8]	%QB8	BYTE	
PN_Controller (PN-Controller)		B-50		10 write byte[9]	%089	BYTE	
🖹 😏 🗐 Z_KEY_P_Gateway_1 (Z-KEY-P Gateway)		- <b>N</b>		Outputs CS	%IB14	Enumeration of BYTE	
C II _ 0_read_phyte (10 read byte)     C II _ ARRAY_10_97TE (ARRAY 10 BYTE)     C II _ ARRAY_10_97TE (ARRAY 10 BYTE)     C II _ ARRAY_10_97TE (ARRAY 10 BYTE)     Softwoon General Ars Pool     Softwoon General Ars Pool     Softwoon General Ars Pool							

Declare an 8-bit variable (Byte) for each of the 10 inputs and a bit variable (Byte) for each of the 10 outputs. In the program, instead, read the inputs from% IB3 to% IB12 and write the outputs from% QB0 to% QB9:



Go into login and start.



The value of the inputs/outputs can be read here:

ositivi	<b>-</b> 7 ×	PN_Controller	Z_KEY_P_Gateway_1	Device	ARRAY_10_BYTE	ARRAY_1	0_BYTE_1		10_re
TestZ-KEY-P	-	Device.Applicatio	on.PLC_PRG						
Text-MP-P         COIL       Brack Efformating (COCDETS Control for Sacyberry R 9.)         COIL       Brack Efformating (COCDETS Control for Sacyberry R 9.)         COIL       Control (COCDET)         Control (Control (CocDET)       Control (Control (CocDET)         COIL       Control (Control (CocDET)         Control (Control		Device Applicatio Expressione Varinput1 Varinput2 Varinput3 Varinput4 Varinput4 Varinput5	MIL PIG			Tipo dati svite	Valore 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Valore preparato	Indirizzo
		VarOutputs VarOutput9 VarOutput10	ut60:= %1800; ut70:= %1800;			BYTE BYTE BYTE	0		J

while to write the outputs you just need to set the value in the bytes in the "prepared value" column. For example, set all the outputs to 1, then confirm on Debug  $\rightarrow$  Write values:

e In linea	Det	ug Tools Finestre Guida Autom	ation Server	_					
🎽 i 📕 🐄	►	Start	F5	1 CS CS	(10 minute 2	* [號] 글 [ 7/2			
	1	Stop	MAIUSC+F8						
		Ciclo singolo	CTRL+F5	Device	ARRAY 10 BYTE	ARRAY 10	BYTE 1	10 write byte	I 10 read
	10	Nuovo punto di interruzione						2	
y Pi SL)	5	Modifica punto di interruzione				Tipo dati	Valore	Valore preparato	Indirizzo
		Imposta/Rimuovi punto di interruzione	F9	1		BYTE	0		
	•	Disattiva punto di interruzione				BYTE	0		
	•	Attiva punto di interruzione				BYTE	0		
	CH.	Esequi istruzione/routine	E10			BYTE	0		
	4- G=	Esegui istrutione	E0			BYTE	0		
	a	Esci de internice e (nortine	MAULICC: E10	L		BYTE	0		
		Esci da Istruzione/routine	MAIOSC+PI0			BYTE	0		
	*=	Esegui fino a cursore		-		BYTE	0	_ <b>/</b>	
	\$	Definire l'istruzione seguente				BYTE	0		
	ф	Visualizza istruzione seguente				BYTE	0		
	0	Carity instant	CTRL 1 F7			DITE	0	1	
sy)		Scrivi valori	CIRL+F7			DTIC DVTE	0	-	
		Forza valori	F/ 🕨			BYTE	0	1	
IYTE)		Annulla la forzatura per tutti i valori	ALT+F7			BYTE	0	1	
	r	Commuta modalità controllo di flusso				BYTE	0	1	
0 BYTE)		Core Dump	•			BYTE	0	1	
						BYTE	0	1	
		Modalita Visualizza	•			BYTE	0	1	
		Ø VarOutput10				BYTE	0	1	
		7 VarInput6 0	:= %TB8 0 :			A 1	7		
		8 VarInput7 0	:= %IB9 0 ;						
		9 💿 VarInput8 0	:= %IB10 0;						
		10  VarInput9 0	:= %IB11 0 ;						
		11  VarInput10	) := %IB12 0;						
		12 //Outputs							
		13 • \$QB0 0 :=	VarOutput1 0 <						

And then with "Write values" all the outputs of the Z-10-D-OUT are activated.



#### Z-KEY-P

#### 10. MODBUS DIAGNOSTICS

The diagnostics management takes the timeout or exceptions to the Modbus requests of the tags into account. Z-KEY-P will introduce the OK status (0x35) or the FAIL status (0x15) in the "data status" field of the Profinet packets if at least one tag is in FAIL status.

There are also specific Bytes to obtain the status of the Modbus communication from Profinet so that the PLC can possibly perform some specific operations in case of fail.

If at least one ModBUS tag is in fail the "Global diagnostic" byte goes to 1, if all the tags are read correctly the byte goes to 0.

		📲 Vista topologica 🚽 🛍 Vista di rete	Vi:	sta dispo	sitivi						Opzioni
<b>1</b>	Vista ge	enerale dispositivi				\$	11 <sup>22</sup> 19 10 91 1	76 🛷 ° 🕫 n			
	<b>*</b>	Modulo	Telaio	Posto	Indirizzo I	i	Nome	Indirizzo	Formato visualizz	Valore	✓ Catalogo
^		Z-KEY-P	0	0		1	"IN1"	%IB1	Esadecimale	16#00	<trova></trova>
		PN-IO	0	0 X1		2	"IN2"	%IB2	Esadecimale	16#00	
	<b>_</b>	<ul> <li>10 read byte 1</li> </ul>	0	1	110	3	"IN3"	%IB3	Esadecimale	16#01	Filtro Profilo: <lutti></lutti>
		ARRAY 10 BYTE	0	11	110	4	"IN4"	%IB4	Esadecimale	16#00	▼ III Modulo
		<ul> <li>10 write byte 1</li> </ul>	0	2		5	"IN5"	%IB5	Esadecimale	16#00	
		ARRAY 10 BYTE	0	21		6	"IN6"	%IB6	Esadecimale	16#09	18 taos diagnostic status read byte
		global diagnostic read byte 1	0	-		7	"IN6"	9/18/C	coodecimale	10#00	global diagnostic read byte
	1	ARRAY 1 BYTE	0	3.1	11	8	1197	%IB7	Esadecimale	16#00	▶ 🛄 READ
		8 tags diagnostic status read byte 1	0	4	12	9	"IN8"	%IB8	Esadecimale	16#00	▶ Li WRITE
	1	ARRAY 1 BYTE	0	4.1	12	10	"IN9"	%IB9	Esadecimale	16#00	Modulo di intestazione
		<ul> <li>8 tags diagnostic status read byte 2</li> </ul>	0	5	13	11	"IN10"	%IB10	Esadecimale	16#00	Im Sottomoduli
=	1	ARRAY 1 BYTE	0	5.1	13	12	"OUT1"	%QB1	Esadecimale	16#00	
		<ul> <li>8 tags diagnostic status read byte 3</li> </ul>	0	6	14	13	"OUT2"	%QB2	Esadecimale	16#00	
	1	APPAY 1 BYTE	0	61	14	14	"OUT3"	%QB3	Esadecimale	16#00	
			0	7	· ]	15	"OUT4"	%QB4	Esadecimale	16#00	
Ξ.	_		0	9		16	"OUT5"	%QB5	Esadecimale	16#00	
si i	4		0	9		17	"OUT6"	%QB6	Esadecimale	16#00	
<u>5</u>			0	10		18	"OUT7"	%QB7	Esadecimale	16#00	
3	>		0	10		19	"OUT8"	%QB8	Esadecimale	16#00	
- Ki			0	12		20	"OUT9"	%QB9	Esadecimale	16#00	
			0	12		21	"OUT10"	%QB10	Esadecimale	16#00	
			0	14		22	"GENERAL"	%IB11	Esadecimale	16#00	
			0	14		23	"TAG1-8"	%IB12	Esadecimale 💌	16#00	
			0	15		24	"TAG9-15"	%IB13	Esadecimale	16#F0	
			0	16		25	"TAG16-20"	%IB14	Esadecimale	16#FF	✓ Informazione
~			0	17		26		<agglungi></agglungi>			Dispositivo:
			0	18							Dispositivo.
			0	19					1		DP-NORM
			0	20							
									<b>\</b>		

It is also possible to obtain the status of the individual tags using the "8 tags Diagnostic read byte" bytes. Each bit represents the status of a tag, where the first byte represents the first 8 tags, the second the other 8 etc.

If the bit is: 0 -> TAG OK 1 -> TAG FAIL

Having a maximum of 20 Slots available, it is not possible to obtain the diagnostics of each single tag on all 500.



#### 11. RESETTING THE DEVICE TO ITS FACTORY CONFIGURATION

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

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

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

#### 12. EXCEL TEMPLATE

In the case of entering many variables, it is convenient to use the excel template downloadable from the Seneca website in the Z-KEY-P section.

It is possible to insert the tags and then export them to the device's webserver.

A	CCESS FROM MODBU	JS SERIAL OR TCP/IP	TARGET MODBUS CONFIGURATION							Export CGI file
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]	Integration of the second seco
1	EXAMPLE	1	HOLDING REGISTER	16BIT UNSIGNED	RS485 #1	1	1	DATA CHANGE	500	
2										
3										
4										
5										
6										
7										

#### 13. MODBUS TCP-IP SERVER AND MODBUS PASS-THROUGH

By querying Z-KEY-P and R-KEY-LT-P through port 502 at slave address 254, it responds with the values of the tags in real-time.

By querying Z-KEY-P and R-KEY-LT-P via port 502 at the slave address from 1 to 253, the device converts Modbus TCP-IP requests into Modbus RTU (Pass-Through mode)

Address 255 is reserved for device configuration.