# USER MANUAL

## *Z-KEY / Z-KEY WIFI*

### MODBUS ETHERNET SERIAL GATEWAY

### AND SERIAL DEVICE SERVER


**SENECA s.r.l.**

Via Austria, 26 – 35127 –PADOVA – ITALY

Tel. +39.049.8705355 – 8705359 Fax. +39.049.8706287

Web site: www.seneca.it

Technical assistance: supporto@seneca.it (IT), support@seneca.it (Other)

Commercial reference: commerciale@seneca.it (IT), sales@seneca.it (Other)



This document is property of SENECA srl. Duplication and reproduction are forbidden, if not authorized. Contents of the present documentation refers to products and technologies described in it. All technical data contained in the document may be modified without prior notice Content of this documentation is subject to periodical revision.

To use the product safely and effectively, read carefully the following instructions before use. The product must be used only for the use for which it was designed and built. Any other use must be considered with full responsibility of the user. The installation, implementation and set-up is allowed only for authorized operators; these ones must be people physically and intellectually suitable. Set up must be performed only after a correct installation and the user must perform every operation described in the installation manual carefully. Seneca is not considered liable of failure, breakdown, accident caused for ignorance or failure to apply the indicated requirements. Seneca is not considered liable of any unauthorized changes. Seneca reserves the right to modify the device, for any commercial or construction requirements, without the obligation to promptly update the reference manuals.

No liability for the contents of this documents can be accepted. Use the concepts, examples and other content at your own risk. There may be errors and inaccuracies in this document, that may of course be damaging to your system. Proceed with caution, and although this is highly unlikely, the author(s) do not take any responsibility for that. Technical features subject to change without notice.



MI00379-11





Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

| Date | Revision | Notes |
|---|---|---|
| 06/02/2015 | 00 | First revision. |
| 31/03/2015 | 01 | Added Export tag setup Webserver function, added Seneca discovery and Easy Z-KEY utilities. |
| 08/04/2015 | 02 | Added Glossary.<br>Added Z-modem protocol issue through internet<br>Minor fix |
| 14/07/2015 | 03 | Added support for 7 bits Uarts (from SW004100_105) |
| 20/11/2015 | 04 | Added CGI command chapter |
| 18/05/2016 | 05 | Added Gateway Optimzed function from revision Firmware 4100_108<br>Added Chapter Easy Setup APP for Android<br>Added Chapter Seneca Discovery Device<br>Updated Seneca Device Discovery Chapter |
| 01/12/2016 | 06 | Removed WARNING about using multi TCP Clients in Bridge mode |
| 02/11/2017 | 07 | Changed PDF title |
| 03/05/2018 | 08 | Changed document to new code: from MI00379x to MI00379_xx<br>Updated for Firmware revision 119 |
| 02/10/2018 | 09 | Added Modbus Register<br>-LAST_LOOP_TIME_COM1<br>-LAST_LOOP_TIME_COM2<br>In the extended diagnostic |
| 20/02/2019 | 10 | Updated for Firmware revision 300 (Z-KEY):<br>-New: Serial Sniffer<br>-New: Added support to Seneca Cloudbox HTTP REST APIs<br>-New: Gateway Serial to Ethernet |



Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

| | | |
|---|---|---|
| | | -New: Modbus ASCII supported<br><br>-New: Added new product Z-KEY WIFI |
| 22/01/2021 | 11 | Modificato la velocità della porta Ethernet (100) |



Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

*Table of Contents*

1. GLOSSARY ..... 8

2. INTRODUCTION ..... 10

2.1. Features ..... 10

3. ELECTRICAL CONNECTIONS ..... 12

3.1. Terminal Positions ..... 12

4. DEBUG LEDS (Z-KEY) ..... 14

5. DEBUG LEDS (Z-KEY WIFI) ..... 14

6. DEFAULT (FACTORY) CONFIGURATION ..... 15

7. ETHERNET COMMUNICATION ..... 17

7.1. Searching Z-KEY / Z-KEY WIFI devices in a network with the Seneca Discovery Utility ..... 17

7.2. Changing the IP address from the USB port ..... 18

8. WIFI CONNECTION (ONLY Z-KEY-WIFI MODEL) ..... 21

8.1. Wifi mode: Access Point ..... 22

8.1. Wifi mode: Station ..... 22

8.2. Wifi mode: First Configuration Access Point ..... 22

9. THE EMBEDDED WEBSERVER ..... 23

9.1. Access to the webserver ..... 23

10. WEBSERVER WIFI CONFIGURATION FOR Z-KEY-WIFI (ONLY Z-KEY-WIFI) ... 25

11. MODBUS RTU / ASCII AND MODBUS TCP-IP PROTOCOL ..... 26

11.1. Modbus function code supported ..... 26

12. GATEWAY MODBUS TCP-IP TO MODBUS RTU/ASCII ..... 28

**12.1. How it works ..... 28**

**12.2. Modbus Gateway Webserver configuration ..... 29**

**13. GATEWAY WITH SHARED MEMORY ..... 34**

**13.1. Gateway with shared memory Modbus TCP-IP / Modbus RTU (Port 1 and Port 2 Modbus Master) ..... 35**

**13.2. Gateway with shared memory Modbus TCP-IP / Modbus RTU (1 port Master and 1 port Slave) ..... 37**

13.2.1. How it works ..... 38

**13.3. Gateway with shared memory Modbus TCP-IP / Modbus RTU (2 port Slaves) ..... 39**

13.3.1. How it works ..... 40

**13.4. Gateway with shared memory Modbus TCP-IP / Modbus MIX RTU-TCP-IP ..... 41**

**13.5. Modbus Gateway with shared memory configuration ..... 42**

13.5.1. Modbus Gateway with shared memory HTTP POST configuration ..... 46

**13.6. Simplified Tags Diagnostic ..... 47**

**13.7. Extended Tags Diagnostic ..... 48**

**13.8. Modbus Gateway Tags Setup, export and import ..... 49**

**13.9. Modbus Gateway Real Time view ..... 51**

**13.10. Using the Microsoft Excel ™ template for Tags setup ..... 52**

**14. GATEWAY SERIAL TO ETHERNET ..... 54**

14.1.1. HOW IT WORKS ..... 54

**14.1. Modbus Gateway Serial to Ethernet Webserver configuration ..... 55**

**15. EXTEND RS485 OVER ETHERNET: MODBUS SERIAL TO ETHERNET AND THEN ETHERNET TO SERIAL ..... 60**

**16. REMOTE SERIAL COM PORT ..... 60**

**16.1. How it works ..... 61**

**16.2. Remote Serial Com Port Webserver configuration ..... 61**

**16.3. Seneca Serial to Ethernet Connect ..... 66**

16.3.1. Installing Seneca Serial to Ethernet Connect driver ..... 66

16.3.2. Select the Com port for Seneca Serial to Ethernet Connect ..... 68

16.3.3. Configuring Seneca Serial to Ethernet Connect ..... 70

16.3.4. Debugging the Connection ..... 70

16.3.5. Changing the COM port number ..... 71



Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

17. TRAFFIC MONITOR (NOT FOR “REMOTE SERIAL COM” MODE) .....76

18. INSTALLING MULTIPLE Z-KEY / Z-KEY WIFI IN A NETWORK USING THE “DHCP FAIL MODE” .....78

19. THE CUSTOM WEBSERVER .....78

20. ACCESSING THE Z-KEY / Z-KEY WIFI FROM INTERNET .....79

21. THE KIT-USB .....81

22. THE RS232 DB9 CABLE .....81

23. WINDOWS USB DRIVERS INSTALLATION .....82

24. FIRMWARE UPDATE.....84

24.1. Firmware Update from Webserver .....84

24.2. Firmware Update from FTP server .....84

24.3. Firmware Update from microSD card.....85

25. SENECA DISCOVERY DEVICE.....85

26. EASY SETUP APP FOR ANDROID.....86

27. CGI (COMMON GATEWAY INTERFACE) COMMAND.....87



LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

# *Seneca Z-KEY / Z-KEY WIFI*

***CAUTION!***

***UNDER ANY CIRCUMSTANCES, SENECA S.R.L. OR ITS SUPPLIERS SHALL NOT BE RESPONSIBLE FOR LOSS OF RECORDING DATA/INCOMES OR FOR* CONSEQUENTIAL OR INCIDENTAL DAMAGE DUE TO NEGLECT OR RECKLESS MISHANDLING *OF Z-KEY / Z-KEY WIFI, EVEN THOUGH SENECA IS WELL AWARE OF THESE POSSIBLE DAMAGES.***

***SENECA, ITS SUBSIDIARIES, AFFILIATES, COMPANIES OF THE GROUP, ITS SUPPLIERS AND RETAILERS SHALL NOT GUARANTEE THAT THE FUNCTIONS WILL SATISFY COMPLETELY CUSTOMER'S EXPECTATIONS OR THAT Z-KEY / Z-KEY WIFI, THE FIRMWARE AND THE SOFTWARE SHALL HAVE NO ERRORS OR WORK CONTINUOUSLY.***



Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

# 1. Glossary

- *Modbus RTU*

An open protocol for the serial communications developed by Modicon Inc. (AEG Schneider Automation International S.A.S.). Simple and robust, it has since become a de facto standard communication protocol.

For more info http://www.modbus.org/specs.php

- *Modbus ASCII*

A variant or the Modbus RTU protocol where the communication is in ASCII format.

For more info http://www.modbus.org/specs.php

- *MODBUS TCP-IP*

The Modbus RTU protocol with a TCP interface that runs on Ethernet.

For more info http://www.modbus.org/specs.php

- *MODBUS BRIDGE*

A device that translates, in real time, from Modbus TCP-IP ethernet protocol to Modbus RTU serial protocol.

- *MODBUS GATEWAY*

A device that translate Modbus TCP-IP protocol to Modbus RTU protocol using a buffered memory (called shared memory). The shared memory can be accessed by multiple devices through Modbus TCP-IP, Modbus RTU, Webservers etc… but must be configured. The Modbus Gateways are used for speed-up and for simplify a Modbus network.

- *SERIAL DEVICE SERVER (REMOTE COM PORT)*

A device that enables devices with an RS-232, RS-422 or RS-485 serial interface to connect to an IP network. This makes it possible to use Ethernet in place of serial cables, minimizing workstation clutter and also allowing serial devices to be placed far away from the computers with which they are used. A Serial device server is virtually transparent to the serial protocol.

- *MODBUS RTU MASTER-SLAVE*



Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

The Master is connected with one or more slaves, the slave waits for an incoming register(s) request from the master. Only one master is allowed, for overcome this limitation you must use a Modbus gateway.

- *MODBUS TCP-IP CLIENT-SERVER*

The Client (called Master in Modbus RTU) establishes a connection with the Server (called Slave in Modbus RTU). The Server waits for an incoming connection from the Client. Once a connection is established, the Server then responds to the registers queries from the Client.

- *WEBSERVER*

A software that store, process and deliver web pages to clients. Clients web can be PCs, Smartphones, Tablets with a browser (Chrome, Internet Explorer, Firefox etc…).



Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

# 2. Introduction

Z-KEY is composed from:
Nr 2 independent serial ports (one RS485 and a RS232/RS485 configurable port)
Nr 1 Fast Ethernet 100 MBits
Nr 1 USB port

the Z-KEY WIFI also include a WIFI connection.

The USB port can be used also like a communication port supporting the Modbus RTU protocol for configuration purpose.

An internal Webserver is also available for configuration and real time values view, a custom webserver con be loaded into a microSD card (not supplied).

Z-Key is configurable in 7 different modes:

- ***Gateway Modbus TCP-IP to Modbus RTU / ASCII***
- ***Gateway with shared memory Modbus TCP-IP to Modbus RTU / ASCII***
- ***Gateway with shared memory Modbus TCP-IP to Modbus RTU / ASCII (1 port slave and 1 port Master)***
- ***Gateway with shared memory Modbus TCP-IP to Modbus RTU / ASCII (2 ports slaves)***
- ***Gateway Modbus TCP-IP and Modbus RTU / ASCII to HTTP POST (Cloudbox)***
- ***Gateway Modbus RTU / ASCII to Modbus TCP-IP***
- ***Remote Serial COM port***

Z-KEY WIFI con also be configured with the Wifi port in Station or Access Point mode (up to 6 Station Devices can be connected).

## 2.1. Features

Z-KEY MODEL:

- *Fast Ethernet port (100 Mbit/s)*
- *Support for Transparent Remote Serial Port, Modbus Gateway (real time bridge), Modbus gateway with shared memory*
- *HTTP POST protocol data send (Seneca Cloudbox supported)*
- *Multiprotocol Gateway, Bridge support: Modbus TCP-IP server protocol (by the fast Ethernet), Modbus RTU master/slave independent configurable on the NR 2 serial ports (NR 1 RS485, and NR 1 RS232/RS485).*
- *Transparent Ethernet to serial connection with Seneca Ethernet to serial driver connection, no protocol dependent.*
- *Internal webserver for complete configuration*
- *Up to 8 simultaneous client Modbus TCP-IP supported (Bridge or Gateway mode)*
- *Up to 10 simultaneous server Modbus TCP-IP supported (Gateway mode)*
- *Gateway mode: up to 500 Modbus TAG (up to 1000 Modbus registers)*
- *Export/Import Tags setup from Webserver*
- *Export/Import Tags setup to Excel™ template*
- *USB port for changing IP address configuration*
- *Customizable embedded Webserver with CGI support on microSD card*
- *Configurable by Webserver or by USB (Easy setup software)*
- *Replica of the Modbus registers on TCP-IP protocol, Modbus RTU*
- *Baud rate for Modbus RTU: from 1200 baud up to 115200 baud*
- *1500 Vac galvanic isolation between power supply and communication*



Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

- *Quick installation on DIN 46277 rail*
- *Removable screw terminals with section of 2.5 mm2*
- *Firmware update by internal Webserver, FTP server or microSD card*

Z-KEY WIFI MODEL:

- *Fast Ethernet port (100 Mbit/s)*
- *WIFI Port with WPA2, WPA and WEP encryption*
- *WIFI Station (WPA2, WPA or WEP encryption) or Access Point Mode (WEP encryption)*
- *Support for Transparent Remote Serial Port, Modbus Gateway (real time bridge), Modbus gateway with shared memory*
- *HTTP POST protocol data send (Seneca Cloudbox supported)*
- *Multiprotocol Gateway, Bridge support: Modbus TCP-IP server protocol (by the fast Ethernet), Modbus RTU master/slave independent configurable on the NR 2 serial ports (NR 1 RS485, and NR 1 RS232/RS485).*
- *Transparent Ethernet to serial connection with Seneca Ethernet to serial driver connection, no protocol dependent.*
- *Internal webserver for complete configuration*
- *Up to 8 simultaneous client Modbus TCP-IP supported (Bridge or Gateway mode)*
- *Up to 10 simultaneous server Modbus TCP-IP supported (Gateway mode)*
- *Gateway mode: up to 500 Modbus TAG (up to 1000 Modbus registers)*
- *Export/Import Tags setup from Webserver*
- *Export/Import Tags setup to Excel™ template*
- *USB port for changing IP address configuration*
- *Customizable embedded Webserver with CGI support on microSD card*
- *Configurable by Webserver or by USB (Easy setup software)*
- *Replica of the Modbus registers on TCP-IP protocol, Modbus RTU*
- *Baud rate for Modbus RTU: from 1200 baud up to 115200 baud*
- *1500 Vac galvanic isolation between power supply and communication*
- *Quick installation on DIN 46277 rail*
- *Removable screw terminals with section of 2.5 mm2*
- *Firmware update by internal Webserver, FTP server or microSD card*



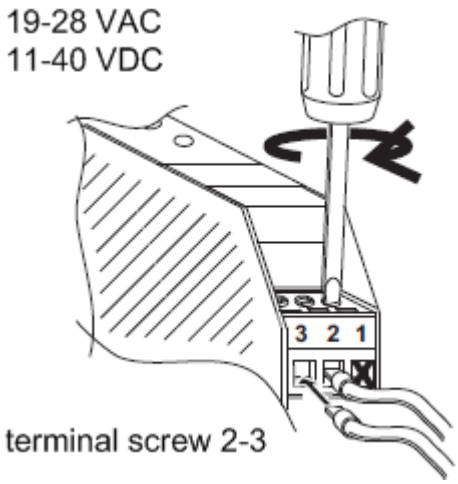
Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

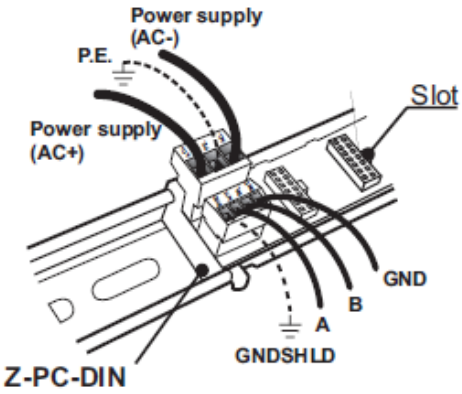
# 3. Electrical Connections

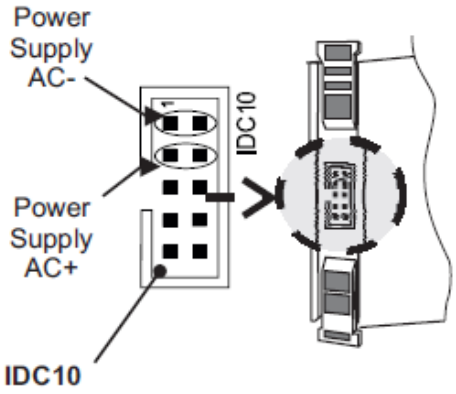
For more info please refer to the Installation manual, downloadable from www.seneca.it in the Z-KEY \ Z-KEY WIFI section.

## 3.1. Terminal Positions

For power ON Z-KEY / Z-KEY WIFI, connect the screw terminal 2-3 or use the Seneca BUS for connect the IDC10 connector:




The RS485#1 is available from the IDC10 connector

The RS485/RS232 port #2 is available from the screw terminals 10-11-12:



Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

| RS485 | SW2=OFF |
|---|---|
| 10 GND<br>11 A (+)<br>12 B (-) | Connection for RS485 communication.<br>Note: the indication of RS485 connection polarity is not standard, it may be inverted on some devices. |

| RS232 | SW2=ON |
|---|---|
| 10 GND<br>11 RX<br>12 TX | Connection for RS232 communication.<br>RS232 interface is fully configurable. |

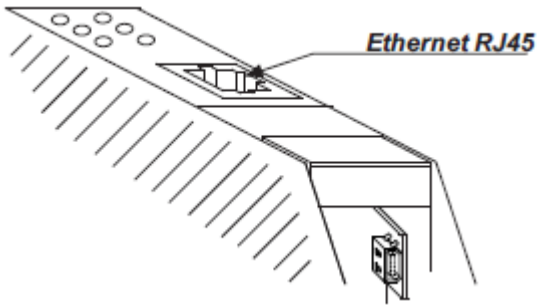
For configure port 2 in RS485 mode set the SW2 to OFF:



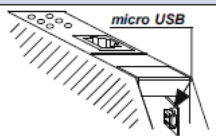
For configure port 2 in RS232 mode set the SW2 to ON:



Note: before to insert the cable into RJ45 connector, remove the protection rubber:



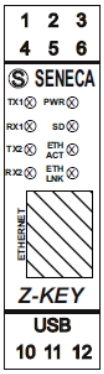

Micro USB port for a PC connection:

| micro USB *port (front panel)* | |
|---|---|
|  | USB micro port for an additional serial connection. |



Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

## 4. Debug Leds (Z-KEY)




| LED | STATE | MEANING |
|---|---|---|
| TX1 | FLASHING | Data transmission on RS485 port #1 |
| RX1 | FLASHING | Data reception on RS485 port #1 |
| TX2 | FLASHING | Data transmission on RS485/RS232 port #2 |
| RX2 | FLASHING | Data reception on RS485/RS485 port #2 |
| PWR | ON | Z-KEY is POWERED ON |
| SD | FLASHING | ACCESSING TO THE SD CARD |
| ETH TRF | FLASHING | Data traffic on Ethernet port |
| ETH LINK | ON | Ethernet port connected |

## 5. Debug Leds (Z-KEY WIFI)

| LED | STATE | MEANING |
|---|---|---|
| TX1 | FLASHING | Data transmission on RS485 |



Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

| | | |
|---|---|---|
| | | port #1 |
| RX1 | FLASHING | Data reception on RS485 port #1 |
| TX2 | FLASHING | Data transmission on RS485/RS232 port #2 |
| RX2 | FLASHING | Data reception on RS485/RS485 port #2 |
| PWR | ON | Z-KEY WIFI is POWERED ON |
| SD | FLASHING | ACCESSING TO THE SD CARD |
| ETH TRF | FLASHING | Data traffic on Ethernet port |
| ETH LINK | ON | Ethernet port connected |
|  4 LED | ON | Signal Strenght 0 = MIN 4 = MAX |
| AP | FLASHING | Wifi in Access Point for first configuration (without user/password) |
| AP | ON | Wifi in Access Point mode |
| ST | ON | Wifi in Station mode |

## 6. Default (Factory) Configuration

The default (factory) configuration is:

IP STATIC: 192.168.90.101

Gateway: 192.168.90.1

Mode: Modbus RTU Gateway on port 1 and port 2

For return to the default configuration:

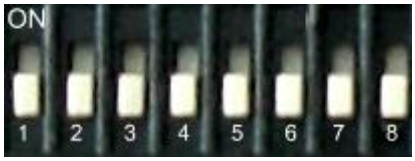
1) *Switch off Z-KEY / Z-KEY WIFI*
2) *Move to "ON" all the dip switched:*



Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000




3) *Switch ON Z-KEY / Z-KEY WIFI*
4) *Wait 10 seconds*
5) *Switch OFF Z-KEY / Z-KEY WIFI*
6) *Switch OFF all the dip switches:*




Now Z-KEY / Z-KEY WIFI is loaded with the default configuration.



Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

# 7. Ethernet communication

The Z-KEY / Z-KEY WIFI include a fast Ethernet port (100 Mbit), the TCP-IP integrated protocol supports:

-Static IP address or DHCP

-Gateway support

-Modbus TCP-IP server protocol (support up to 8 Modbus TCP-IP client at the same time)

-Webserver (with user / password protection)

The default configuration for the Ethernet port is:

- *Static IP address 192.168.90.101*
- *Gateway 192.168.90.1*

All the functionality are also available from the Wifi Connection

***WARNING!***

***BEFORE CONNECT Z-KEY / Z-KEY WIFI ON THE NETWORK BE SURE THAT THE IP ADDRESS 192.168.90.101 IT'S NOT USED BY ANOTHER ETHERNET DEVICE!***

***WARNING!***

***DON'T CONNECT MORE THAN 1 Z-KEY / Z-KEY WIFI WITH THE DEFAULT IP ADDRESS ON THE NETWORK! IF YOU NEED TO CONNECT MORE THAN ONE Z-KEY IN A NETWORK SIMULTANEOUSLY REFERS TO THE CHAPTER 18.***

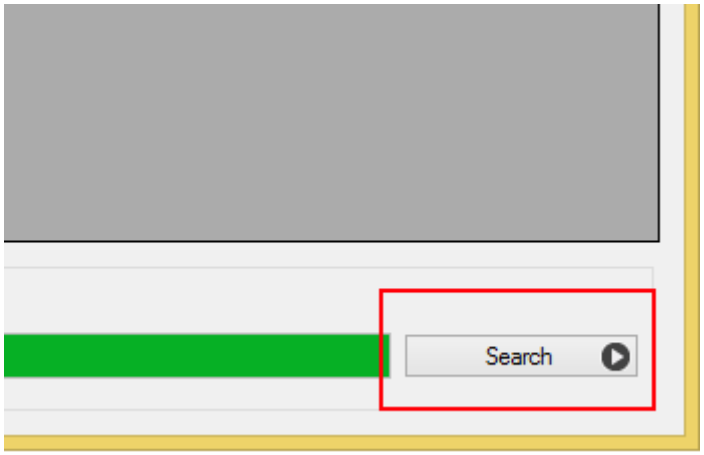
## 7.1. Searching Z-KEY / Z-KEY WIFI devices in a network with the Seneca Discovery Utility

From the seneca website (www.seneca.it) in the Z-KEY section you can freely download the Seneca Discovery Utility for obtain the actual Z-KEY / Z-KEY WIFI ip address in your network.

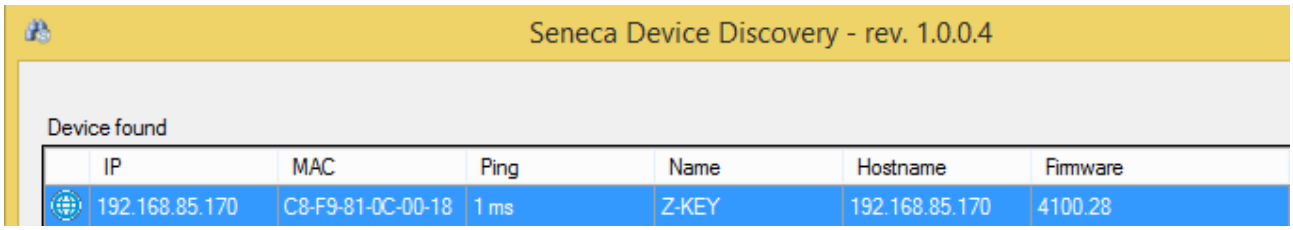
Click on Search for start the discovery process:



Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000




A list of devices found will be displayed:




## *7.2. Changing the IP address from the USB port*

From the seneca website (www.seneca.it) in the Z-KEY / Z-KEY WIFI section you can freely download the Seneca Easy Setup software.

The Z-KEY section launch the EASY Z-KEY Utility for changing or obtaining the Z-KEY / Z-KEY WIFI actual IP:



Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000




Connect Z-KEY to a PC with a standard micro USB cable, power up the Z-KEY and Click on “TEST” to obtain the actual IP address:



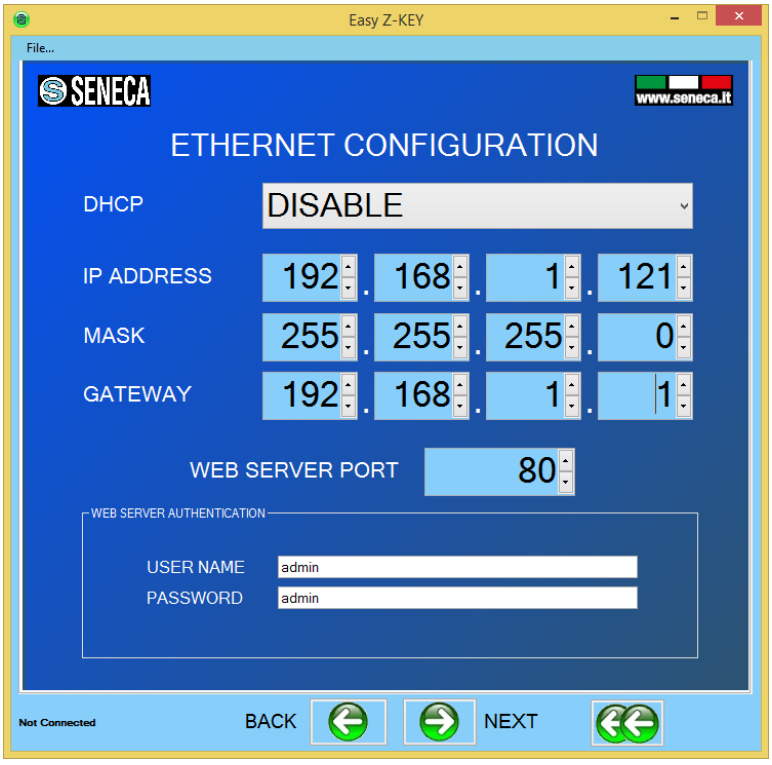

For changing the actual IP configuration return to the home page and click on “CONFIGURATION”:



Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000




Than click on “Automatic Search”, read the configuration from the Z-KEY than modify the actual configuration with the new parameters:




Then click on “send configuration to Z-KEY” button:



Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000




## 8. Wifi connection (only Z-KEY-WIFI model)

The Wifi port can be used in addition to the ethernet port.

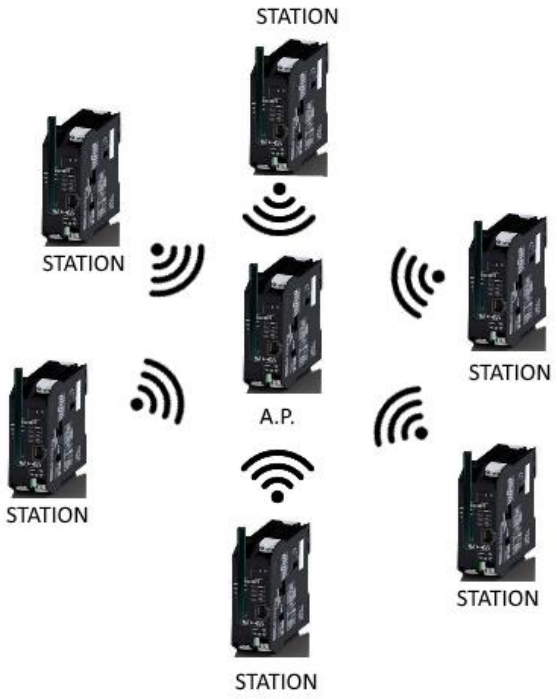
Can be configured in 3 different ways: “Access point (AP)”, “Station” or “First Configuration Access point“.

***CAUTION!***

***The wifi connection can not be used to drive packet from ethernet to wifi or viceversa but only to/from serial to / from ethernet/wifi***



Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000




## 8.1. Wifi mode: Access Point

The access Point mode is used to create a wifi network using Z-KEY-WIFI.

In this way you don't need an external Router WIFI, up to 6 Z-KEY-WIFI can be connected to one Z-KEY-WIFI in Access Point mode.

***CAUTION!***

***In Access Point mode is possible to use only the WAP encryption.***

## 8.1. Wifi mode: Station

The Station mode is used for connect the Z-KEY-WIFI to an existing WIFI network.

## 8.2. Wifi mode: First Configuration Access Point

For set the device in the "First Configuration Access Point" mode you must:

1) ***Press the lateral button***
2) ***Keeping the button pressed and power up the device***
3) ***Release the button after 5 seconds***



Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

In this mode the device will be in Access Point mode but the Wifi connection is open (without an encryption) so it's possible to use for example a cellular for configure the device with the webserver.

# 9. The embedded Webserver

The Z-KEY include a Webserver for setup or for view the real time TAGs value.

For Access to the internal webserver type in a browser:

***http://192.168.90.101***

***where 192.168.90.101 is the default ip address.***

The webserver can be protected by a user name and a password.

If you are using Internet explorer 9 (or newer) you must enable the compatibility mode (see the arrow below):




The Z-KEY Embedded Webserver works with the following browser:

-Internet explorer

-Firefox

-Chrome

-Android

-Iphone/Ipad

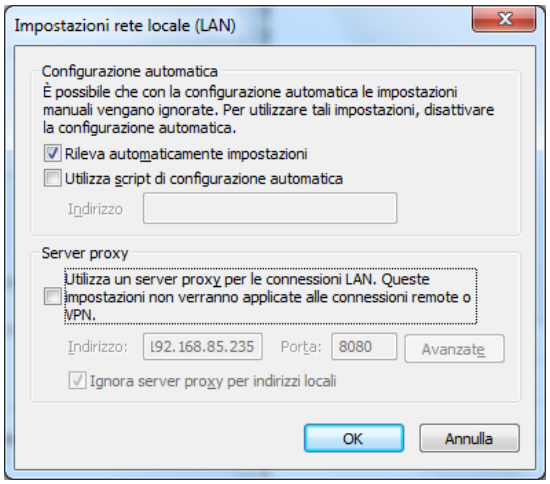
## 9.1. Access to the webserver

For connect an Ethernet device to the Z-KEY Webserver you must have the two Ip addresses compatible.



Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

Also you must disable the flag on the proxy server configuration into the browser:

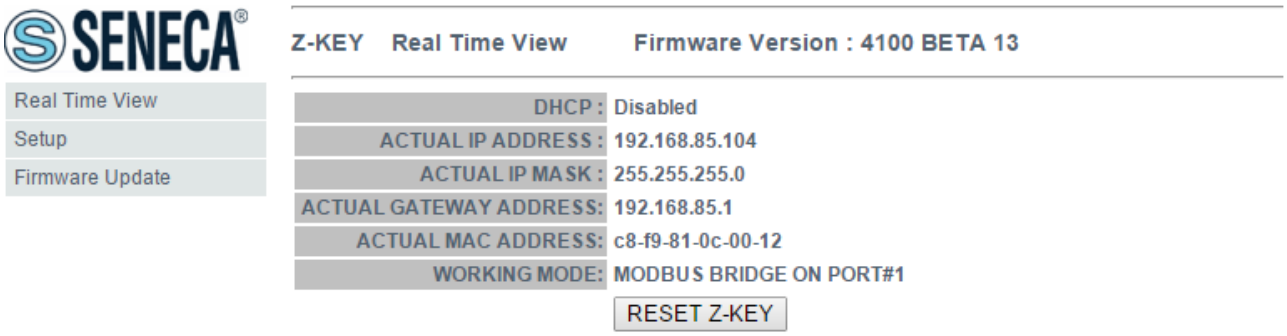



For example if the Z-KEY address is 192.168.90.101 with subnet mask 255.255.255.0 the other device must have the ip starting with 192.168.90, so for example 192.168.90.102 can works.

The Z-KEY / Z-KEY WIFI ethernet port supports the auto-switching mode so it's possible to connect an Ethernet device point to point without the need of a Router or Switch.

If the ip configuration it's made correctly the webserver appear:

***http://192.168.90.101***

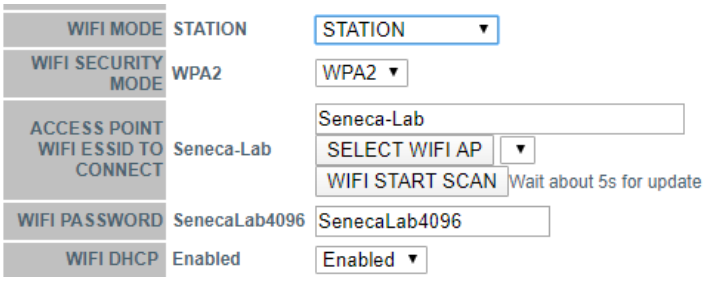





Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

# 10. Webserver wifi configuration for Z-KEY-WIFI (Only Z-KEY-WIFI)

The Z-KEY-WIFI webserver include a new section called WIFI:




***WIFI MODE***

*Select between STATION (connect to an existing wifi network) or ACCESS POINT (create a new wifi network).*

***WIFI SECURITY MODE (ONLY STATION MODE)***

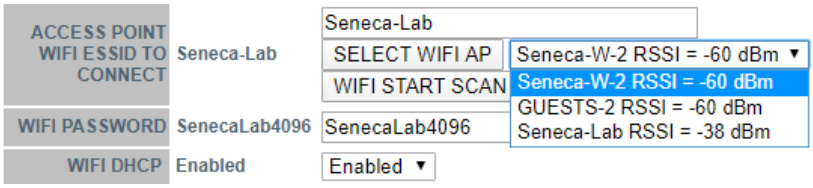
*Select the security mode to use for the wifi network. You can select between WEP, WPA and WPA2. Checks the right security mode in the Access Point device before select this parameter (default is WPA2). Note that in WAP mode* only hexadecimal digits can be used for the password:

Digits from “0” to “9” and letters from “a” to “f”.

***ACCESS POINT WIFI ESSID TO CONNECT (ONLY STATION MODE)***

*In STATION MODE Press the “WIFI START SCAN” button for obatin a list of WIFI network to connect to.*

*Then press “SELECT WIFI AP” button for select the desired network*




***WIFI PASSWORD (ONLY STATION MODE)***

*Select the password for the selected wifi network.*

***WIFI DHCP (ONLY STATION MODE)***

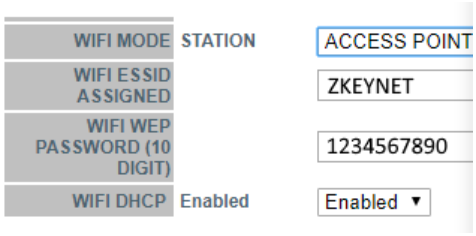
*Select for obatin a WIFI IP address from the Access Point device or to select a Static IP configuration*

***WIFI ESSID ASSIGNED (ONLY ACCESS POINT MODE)***



Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

*Insert a ESSID name for the new Wifi network that you are creating*




***WIFI WEP PASSWORD (ONLY ACCESS POINT MODE)***

In Access Point mode only the WEP Security can be used, insert the network password (10 hexadecimal digits for obtain a 64 bit key ). Note that only hexadecimal digits can be used for the password:

Digits from “0” to “9” and letters from “a” to “f”.

***WIFI DHCP (ONLY ACCESS POINT MODE)***

*Enable or not the DHCP server mode for the station devices.*

# 11. Modbus RTU / ASCII and Modbus TCP-IP protocol

The Modbus protocols supported by the Z-KEY are:

Modbus RTU Master

Modbus RTU Slave

Modbus ASCII Master

Modbus ASCII Slave

Modbus TCP-IP Server

Modbus TCP-IP Client

for more information about this protocols please refer to Modbus specification website:

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

For using the USB Port you must install the USB driver first (see chapter 23)

## 11.1. Modbus function code supported

The following Modbus functions are supported:

***Read Coils (function 1)***

***Read Discrete Inputs (function 2)***



Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

***Read Holding Register (function 3)***

***Read Input Registers (function 4)***

***Write Single Coil (function 5)***

***Write Single Register (function 6)***

***Write Multiple registers (function 16)***

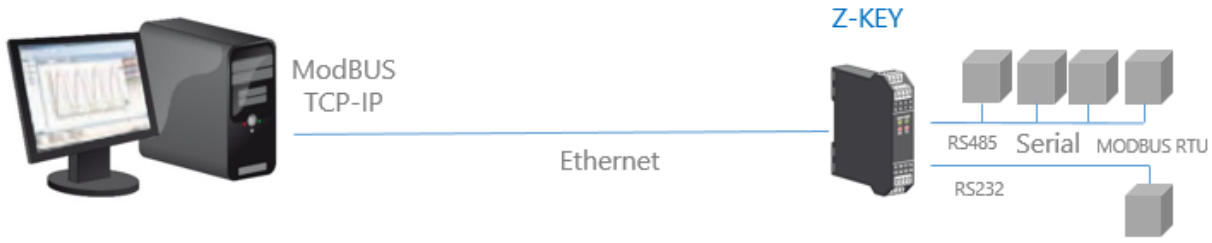


Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

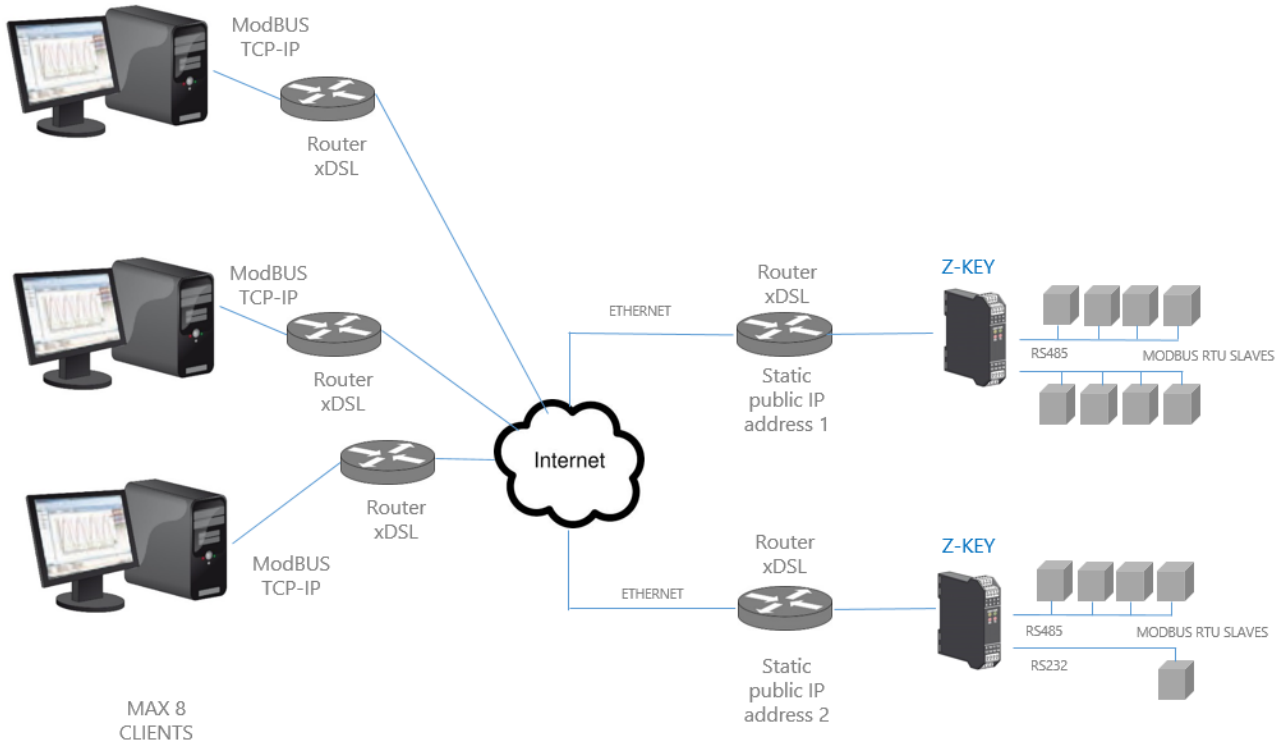
# 12. Gateway Modbus TCP-IP to Modbus RTU/ASCII

In this scenario a Modbus TCP-IP master is connected with ethernet to Z-KEY, one or more Modbus RTU slaves (for example the Z-PC Seneca Series) are connected to the RS232/RS485 serial ports.

An example of LAN connection is represented into this figure:




Also a remote communication through internet with multiple clients is possible:




For internet communication the Routers connected to the Z-KEY / Z-KEY WIFI must have a static ip address (or a DDNS service activated).
A Maximum of 8 simultaneous Modbus TCP-IP clients is supported.

## 12.1. How it works

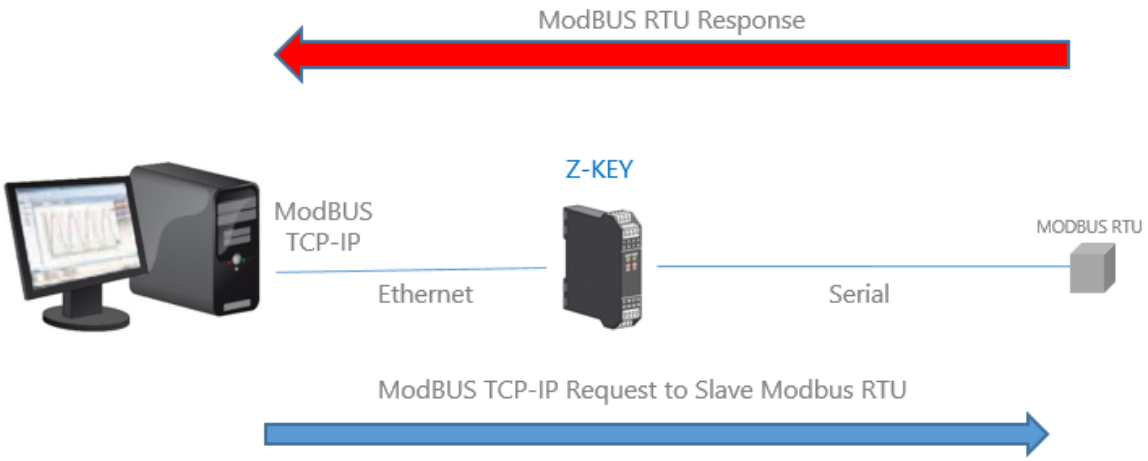


Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

The Bridge Modbus TCP-IP to Modbus RTU/ASCII is the simplest way to communicate with Modbus slaves by an ethernet / wifi connection.

There is no need to configure which registers must be requested because the conversion from IP to serial is executed in real time.

Only the serial configuration must be made (baud rate, parity etc…).




The Master (client) Modbus TCP-IP request a modbus register by ethernet, then the Z-KEY / Z-KEY WIFI convert the request to the serial Modbus RTU/ASCII slave, the Modbus RTU/ASCII response is also retranslated in Modbus TCP to the Master.

***CAUTION!***

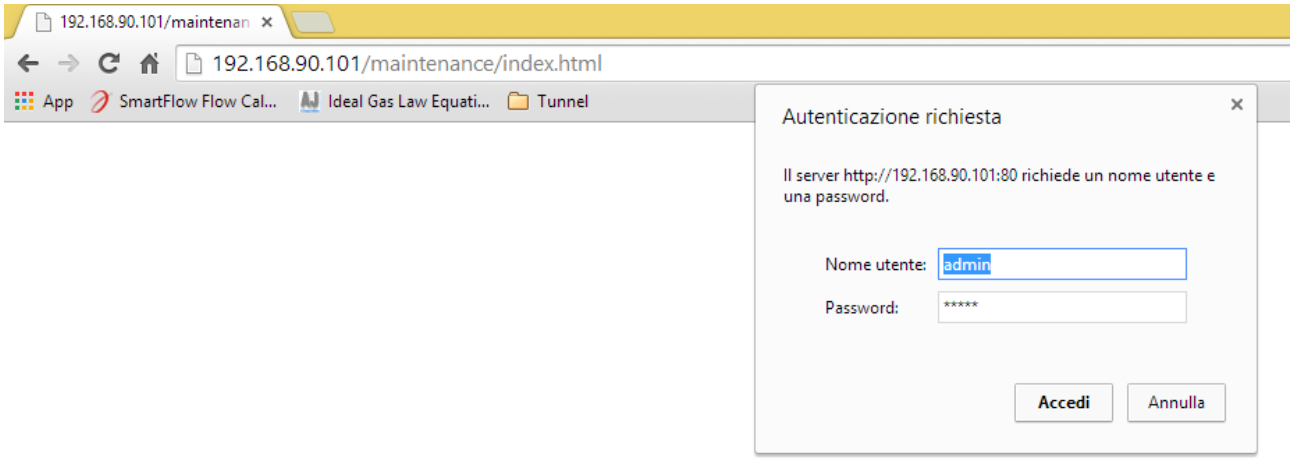
***It's not possible to connect two Modbus RTU slaves with the same Modbus address, if you need to connect 2 Modbus RTU slaves with the same Modbus address you must use 2 Z-KEYs.***

## *12.2. Modbus Gateway Webserver configuration*

Connect to the webserver by entering the ip address, by default:



Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000



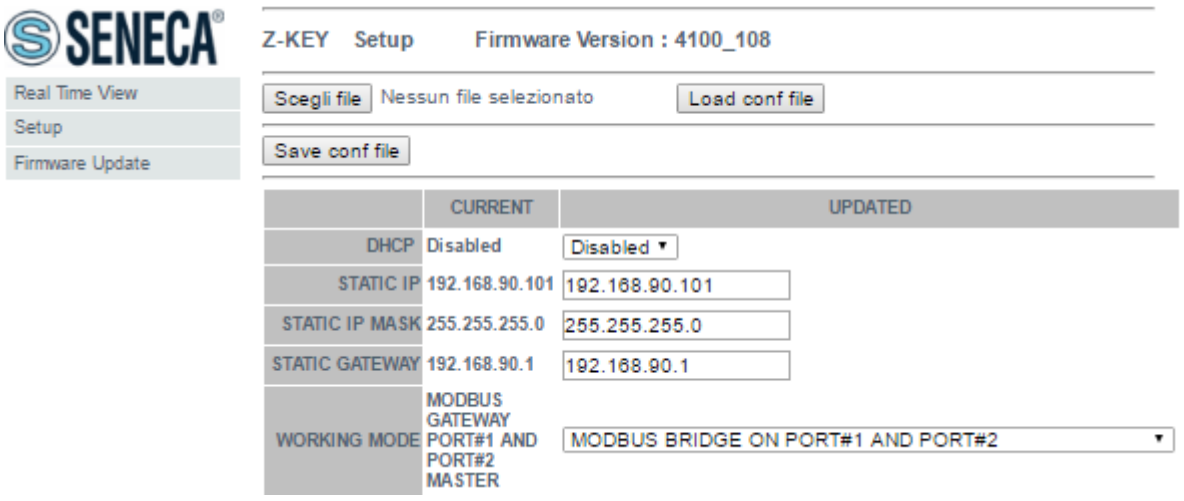

http://192.168.90.101

Enter the user name and password, by default:

User: admin

Password: admin

Now the Webserver can be used for configuring the Z-KEY / Z-KEY WIFI module, all parameters are visible clicking on “Setup” button to the left of the screen:




On the first column represents the parameter name, the second column (current) it’s the current parameter value. The last column can be used for changing the current configuration.

When a configuration it’s made you must confirm with “APPLY”, then the new configuration became operative.

If you need to reset to the default parameters click on “FACTORY DEFAULT” button.

The parameters are explained below:



Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

***DHCP***

*Disable: A static Ip address is used*

*Enable: The IP address, the IP-Mask and the Gateway address are obtained from the DHCP server.*

*The Z-KEY IP address can be read from the USB port with the Easy Setup test configuration, or with the Seneca Discovery utility (see the Z-KEY section on seneca web site for download).*

***STATIC IP ADDRESS***

*Static IP address when DHCP is Disable*

***STATIC IP MASK***

*mask when DHCP is Disable*

***STATIC GATEWAY***

*Gateway address when DHCP is Disable*

***WORKING MODE***

Select the Modbus Gateway working mode, then you can select which serial port use.

Modbus Gateway on port#1: the packets are routed only to serial port 1 (no packets are routed to serial port 2)

Modbus Gateway on port#2: the packets are routed only to serial port 2 (no packets are routed to serial port 1)

Modbus Gateway on port#1 and port#2: the packets are routed to serial port1 and serial port2 (***Note that in this case all the slaves modbus addresses must be different!***)

***TCP/IP PORT***

*TCP-IP port for Modbus TCP-IP Server protocol (Max 8 clients)*

***PORT #n PROTOCOL***

*Select between Modbus RTU or ASCII serial protocol*



Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

***PORT #n BAUDRATE***

*Used to Set the port baudrate*

***PORT #n BITS***

*Used to Set the number of bits for the serial communication.*

***PORT #n PARITY***

*Used to Set the port parity (None, Odd or even)*

***PORT #n STOP BITS***

*Used to Set the port parity (1 or 2; note that if the parity is set, only 1 bit can be used)*

***PORT #n TIMEOUT***

*Used to Set the timeout on Modbus Master mode before making a new call*

***WEB SERVER PORT***

*Used to Set the TCP-IP port for the Webserver*

***WEB SERVER AUTHENTICATION USER NAME***

*Used to Set the User Name for accessing the Webserver (if User Name and Password are leave empty no authentication is require for webserver access)*

***WEB SERVER AUTHENTICATION USER PASSWORD***

*Used to Set the Password for accessing the Webserver (if User Name and Password are leave empty no authentication is require for webserver access)*

***FTP SERVER PORT***



Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

*Used to Set the TCP-IP port for the FTP Server*

***FTP SERVER AUTHENTICATION USER NAME***

*Used to Set the User Name for accessing the FTP Server (if User Name and Password are leave empty no authentication is require for webserver access)*

***FTP SERVER AUTHENTICATION USER PASSWORD***

*Used to Set the Password for accessing the FTP server (if User Name and Password are leave empty no authentication is require for ftp access)*

***IP CHANGE FROM DISCOVERY***

*Used to Set if a user is allowed to change IP configuration from the software "Seneca Discovery Device"*

***WARNING!***

***REMEMBER ALWAYS TO CONFIGURE THE WEBSERVER AND FTP AUTHENTICATION USER NAME AND PASSWORD FOR RESTRICT THE ACCESS TO THE FTP AND THE WEBSERVER. IF YOU LEAVE THE TWO PARAMETERS TEXT BOXES BLANK NO AUTHENTICATION IT'S REQUIRED FOR ACCESS.***

***WARNING!***

***WHEN USE THE MODBUS BRIDGE MODE, REMEMBER THAT ALL THE MODBUS SLAVES MUST HAVE A DIFFERENT ADDRESS!***

***CAUTION!***

***If you are using Internet explorer 9 (or newer) you must enable the compatibility mode (see the arrow below):***





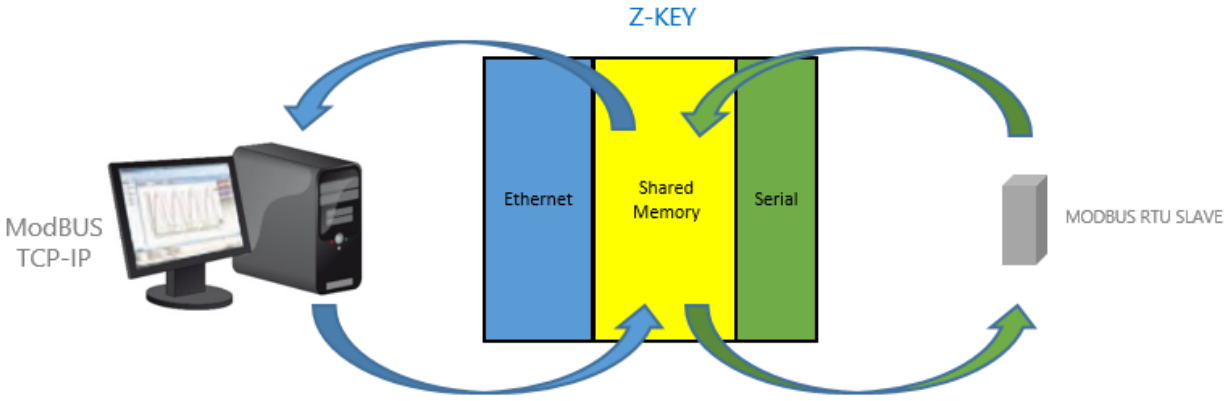

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

# 13. Gateway With Shared Memory

Into a Modbus Bus bus it's essential to read as fast as possible the registers from the various Modbus Slave devices.

The Z-KEY / Z-KEY WIFI can be configured with up to 500 tag (1 tag = 1 variable that can be composed by one or two Modbus registers), these values are stored into a shared memory that can be accessed from Ethernet /Wifi and/or from Serials.

The Shared Memory is refreshed as fast as possible by the serial communication, so when a register is required from the Ethernet port, the values are read directly from the Shared memory without the needed of waiting the Slave response time:




Another benefit is that the Shared memory can be accessed also from the web using the Z-KEY / Z-KEY WIFI embedded webserver.

Multiple Slaves can also be converted into a unique Modbus address, this makes much easier to develop software from the ethernet side.

PLCs can also benefit the access to a unique slave address for use with the standard Modbus TCP-IP libraries (linked to a unique modbus address).

A unique slave address is needful when there is a big slaves number, in this case using Z-KEY in gateway mode will reduce drastically the bus polling time and the number of slaves can grow using more than one Z-KEY.

From the revision firmware 4100_108 the gateway can automatically optimize the Modbus request by using a multiple register request. With this optimization the bus speed increases drastically.

From the revision firmware 4100_114 are also supported TAGs from Modbus TCP-IP Servers (up to 10 Modbus TCP-IP servers are supported).



Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

From the revision firmware 4100_119 when a Modbus RTU device has generated a timeout error for speed up the acquisition loop the device is quarantined for a configurable time.

From the Z-KEY revision firmware 4100_300 and for Z-KEY WIFI the Tags can be also published to a HTTP server (for example using the Seneca Cloud Box).

### 13.1. Gateway with shared memory Modbus TCP-IP / Modbus RTU (Port 1 and Port 2 Modbus Master)

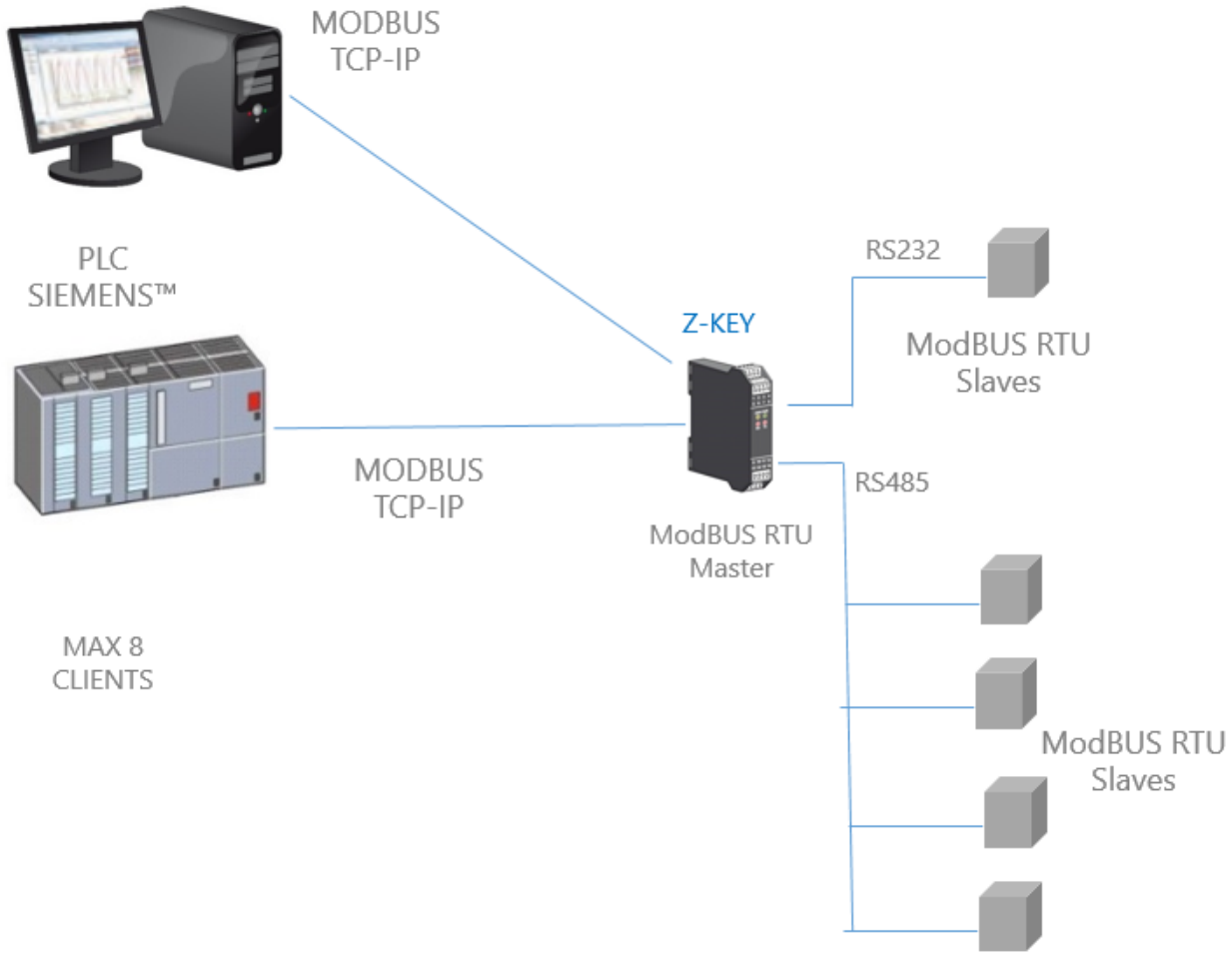
In this scenario a Modbus TCP-IP master is connected with ethernet or wifi to Z-KEY / Z-KEY WIFI, one or more Modbus RTU slaves (for example the Z-PC Seneca Series) are connected to the RS232/RS485 serial ports.

The Z-Key / Z-KEY WIFI configured in Gateway is used for optimizing the Network performance and Modbus TCP-IP PLC software. Also PLCs like Siemens™ can be connected with Modbus RTU slaves by using the free standard Modbus TCP-IP library without the need of a customization.

A typical LAN connection is represented into this figure:



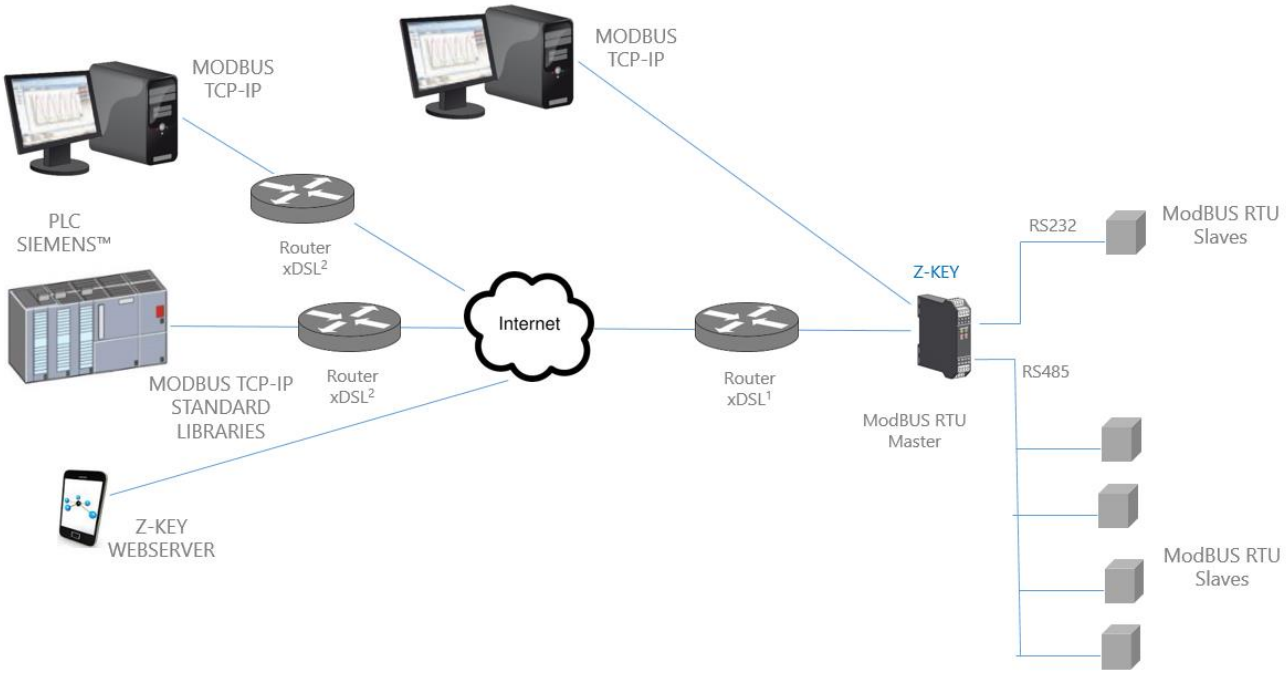
Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000




Also a remote communication through internet with multiple clients is possible, with the gateway configuration the tags are visible through the internal webserver:



Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000




For internet communication the Routers connected to the Z-KEY / Z-KEY WIFI must have a static ip address (or a DDNS service activated).

A Maximum of 8 simultaneous Modbus TCP-IP clients is supported.

### *13.2. Gateway with shared memory Modbus TCP-IP / Modbus RTU (1 port Master and 1 port Slave)*

In this scenario a Modbus TCP-IP master is connected with ethernet or WIFI to Z-KEY / Z-KEY WIFI, one PLC with only the Modbus Master protocol is connected to the Z-KEY Modbus slave port. By this port the Modbus RTU Slaves (connected to the Z-KEY Modbus Master port) values are available for the PLC.

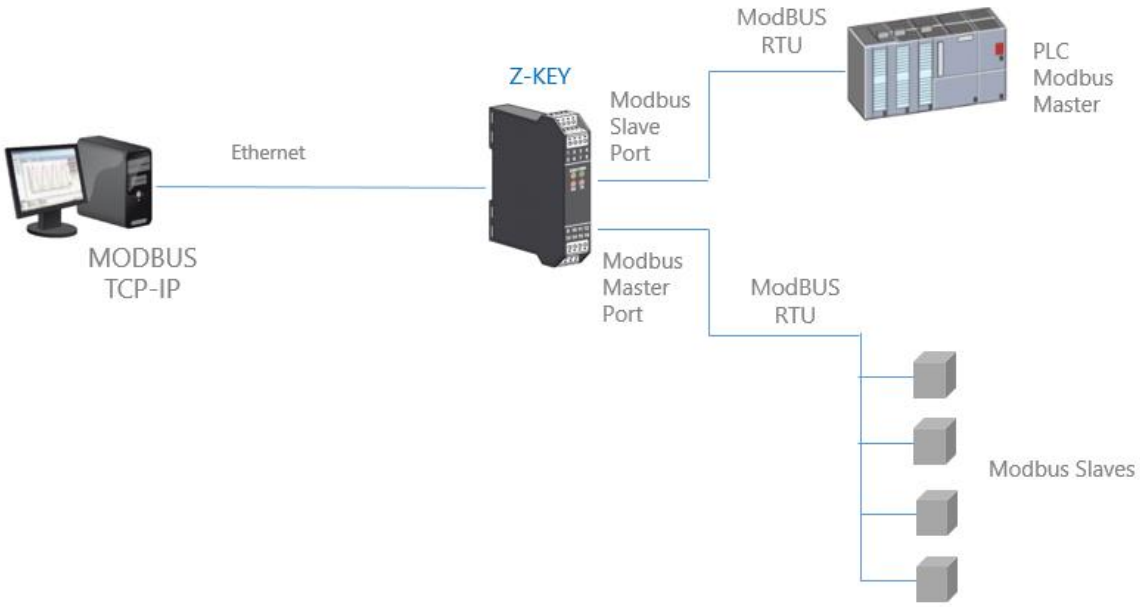
Also the PLC can write to the Modbus Slaves registers.

Through the ethernet the Registers written from the Z-KEY Modbus Slave Port or read from the the Modbus Slave Port are available.

A typical LAN connection is represented into this figure:



Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

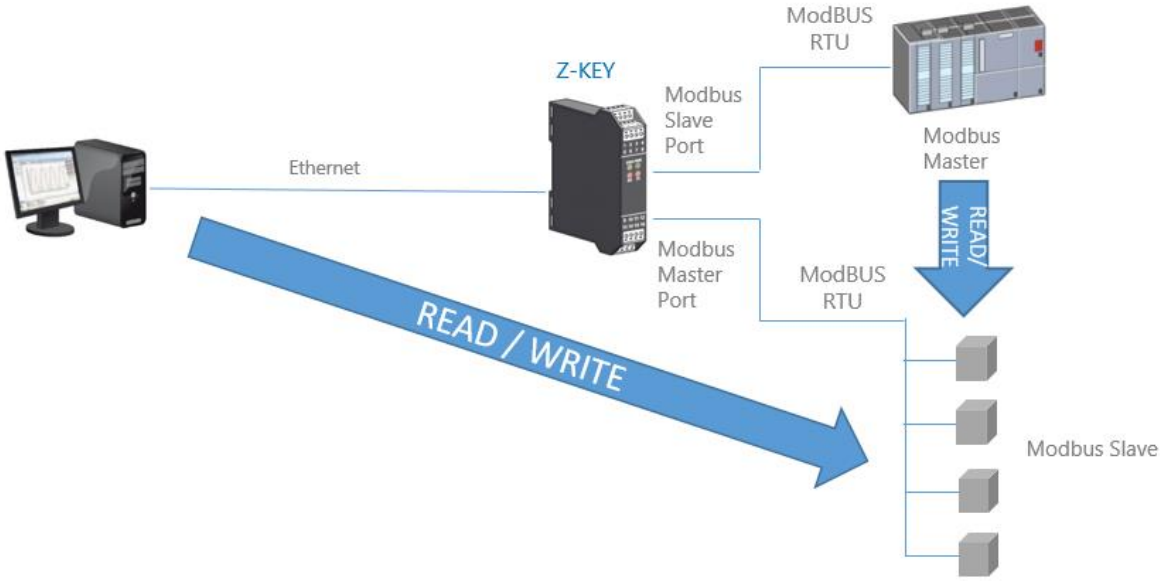



### *13.2.1. How it works*

A lot of PLCs have the limitation that only the Modbus Master protocol is implemented. When values from the Modbus Slaves must be read/write from the PLC and also from a SCADA/Datalogger, the Z-KEY / Z-KEY WIFI can be configured with one serial port in modbus slave (connected to the PLC modbus master port) and the other in modbus master (connected to the modbus slaves).



Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000




This feature is possible using the internal Z-KEY shared memory.

The PLC Modbus Master and the Ethernet client(s) writes/reads the Z-KEY shared memory registers, the Z-KEY maintain refreshed the shared memory with the Modbus Slaves.

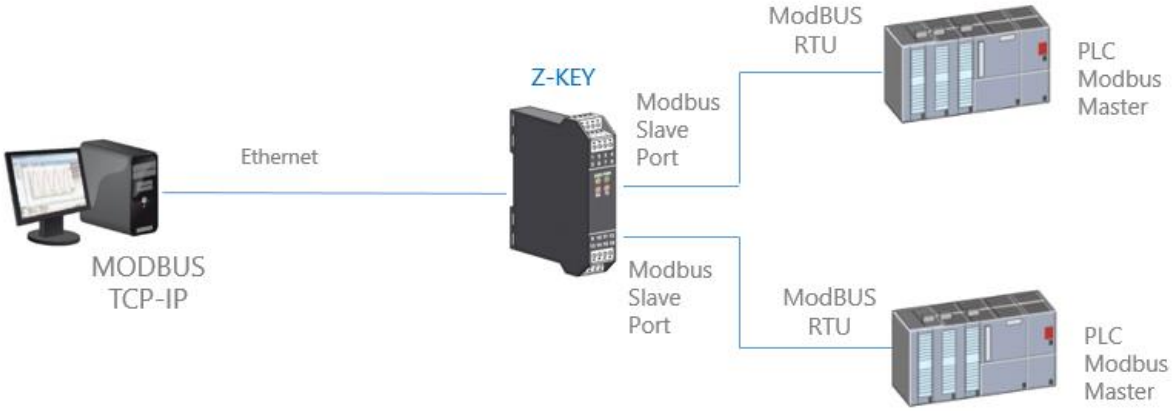
### *13.3. Gateway with shared memory Modbus TCP-IP / Modbus RTU (2 port Slaves)*

In this scenario a Modbus TCP-IP master is connected with ethernet to Z-KEY, Two PLCs with only the Modbus Master protocol are connected to the Z-KEY Modbus slave ports. By this ports the PLC can communicate with each other.

A typical LAN connection is represented into this figure:



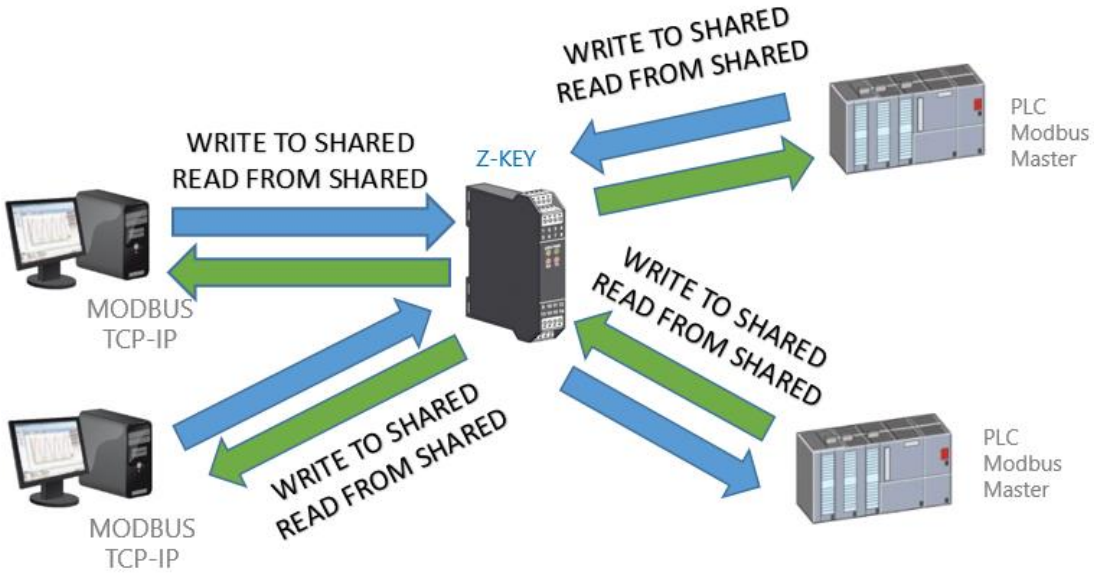
Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000




### *13.3.1. How it works*

A lot of PLCs have the limitation that only the Modbus Master protocol is implemented. When values from the Modbus Slaves must be shared with another PLC/SCADA/DATALOGGER etc.. the Z-KEY can be configured in Gateway mode with the 2 ports in Modbus Slave.

In this way the two PLCs and the Ethernet Clients can freely write/read the Z-KEY Shadow memory for data sharing:



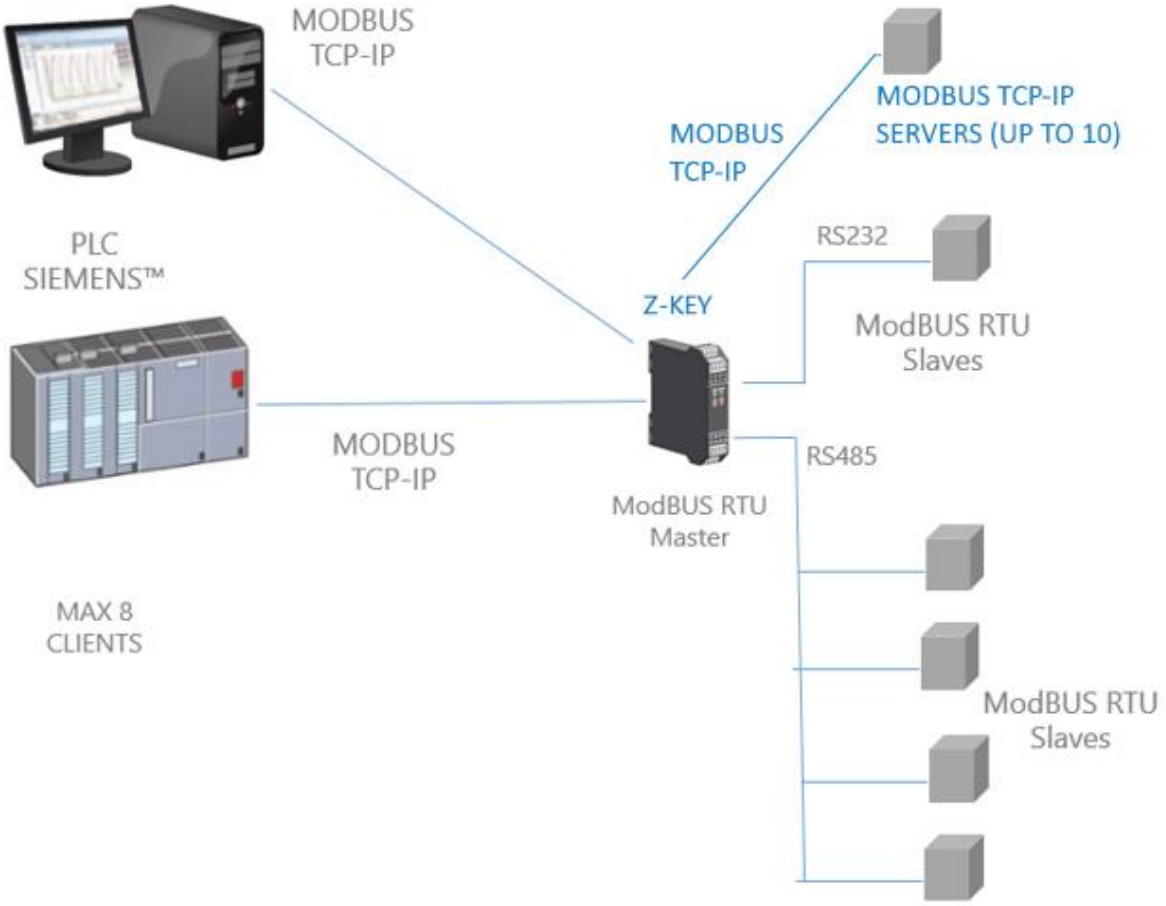



Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

***The Z-KEY shared memory can be freely read and written from Ethernet or/and from the serial ports. The Shared memory registers must be defined before with the setup TAG section.***

## *13.4. Gateway with shared memory Modbus TCP-IP / Modbus MIX RTU-TCP-IP*

From firmware revision 114 Z-KEY in Gateway Mode can also be connected to up to 10 Modbus TCP-IP Server:



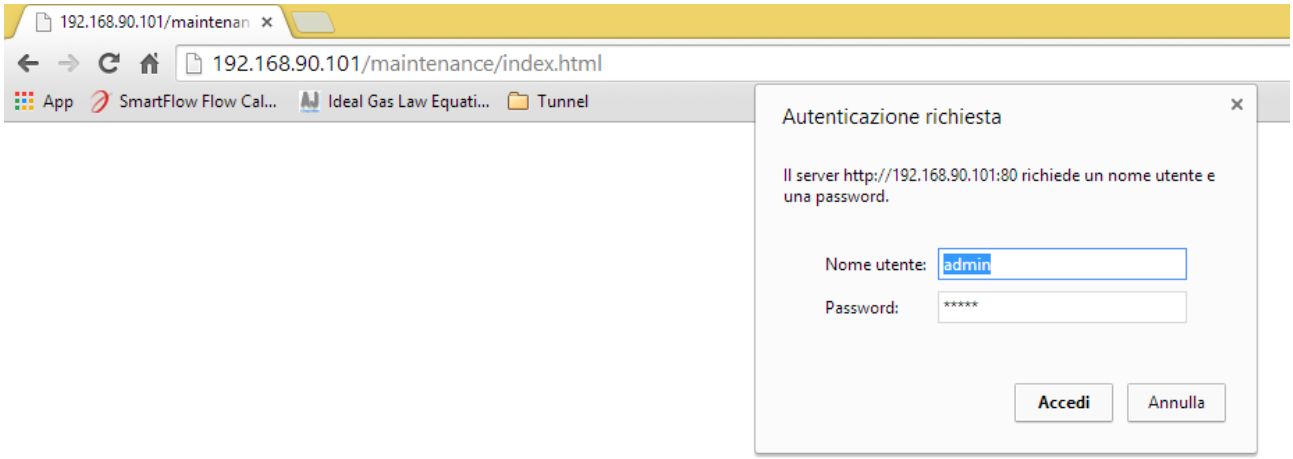

Up to 10 Modbus TCP-IP Servers are supported.
The Modbus TCP-IP servers can be mixed between ethernet or Wifi.



Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

## 13.5. Modbus Gateway with shared memory configuration

Connect to the webserver by entering the ip address, by default:




http://192.168.90.101

Enter the user name and password, by default:

User: admin

Password: admin

Now the Webserver can be used for configuring the Z-KEY module, all parameters are visible clicking on “Setup” button to the left of the screen.

On the first column represents the parameter name, the second column (current) it’s the current parameter value. The last column can be used for changing the current configuration.

When a configuration it’s made you must confirm with “APPLY”, then the new configuration became operative.

If you need to reset to the default parameters click on “FACTORY DEFAULT” button.

In this page you can save and load a previous configuration (a configuration is made of Configuration and Tags configuration).

The parameters are explained below:

***DHCP***

*Disable: A static Ip address is used*

*Enable: The IP address, the IP-Mask and the Gateway address are obtained from the DHCP server.*



Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

*The Z-KEY IP address can be read from the USB port with the Easy Setup test configuration, or with the Seneca Discovery utility (see the Z-KEY section on seneca web site for download).*

***STATIC IP ADDRESS***

*Static IP address when DHCP is Disable*

***STATIC IP MASK***

*mask when DHCP is Disable*

***STATIC GATEWAY***

*Gateway address when DHCP is Disable*

***WORKING MODE***

Select the Modbus Gateway port1 and port2 Master working mode.

***RESPONSE MODE***

Select which type of response do you want when a Modbus slave don't respond to a modbus request. You can select from

Last value read (the value is freezed to the last value read)

Exception (Z-KEY exception response)

Max (the value is filled with the highest possible value)

Min (the value is filled with the lowest possible value)

Zero (the value is filled with 0)

***TCP/IP PORT***

*TCP-IP port for Modbus TCP-IP Server protocol (Max 8 clients)*

***PORT #n PROTOCOL***



Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

*Select between Modbus RTU or ASCII serial protocol*

***PORT #n BAUDRATE***

*Used to Set the port baudrate*

***PORT #n BITS***

*Used to Set the number of bits for the serial communication.*

***PORT #n PARITY***

*Used to Set the port parity (None, Odd or even)*

***PORT #n STOP BITS***

*Used to Set the port parity (1 or 2; note that if the parity is set, only 1 bit can be used)*

***PORT #n TIMEOUT***

*Used to Set the timeout on Modbus Master mode before making a new call*

***PORT #n DELAY BETWEEN POLLS***

*Used to Set the delay between two Modbus Master request*

***PORT #n WRITING RETRIES***

*Used to Set the retries to write a Modbus register into the Modbus Master mode*

***PORT #n MAX WRITE NUM***

*Used to Set the maximum number of registers that can be written with the Modbus function "Write Multiple Registers" or "Write Multiple Coils".*

***PORT #n MAX READ NUM***



Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

*Used to Set the maximum number of registers that can be read with the Modbus function "Read Multiple Registers" or "Read Multiple Coils".*

***WEB SERVER PORT***

*Used to Set the TCP-IP port for the Webserver*

***WEB SERVER AUTHENTICATION USER NAME***

*Used to Set the User Name for accessing the Webserver (if User Name and Password are leave empty no authentication is require for webserver access)*

***WEB SERVER AUTHENTICATION USER PASSWORD***

*Used to Set the Password for accessing the Webserver (if User Name and Password are leave empty no authentication is require for webserver access)*

***DIAGNOSTIC REGISTER MAPPING***

*Used for Set what type of registers from Holding or Input to use for publish the diagnostic registers*

***DIAGNOSTIC REGISTER START ADDRESS***

*Used for Set the start address for the diagnostic registers (default 9000 -> 49001 in case of holding registers or 39001 in case of input registers)*

***PORT #n AFTER FAIL DELAY***

Used to Set the number of seconds to pause the queries of a device. This pause time is used after the device has not answered for 3 consecutive times.

***MODBUS TCP-IP CLIENT***

Enable or not the Modbus TCP-IP client loop in addition to the serial master, Z-KEY can connect to a maximum of 10 Modbus TCP-IP servers.

***MODBUS TCP-IP SERVER #n***

Enable or not the connection with the Modbus TCP-IP #n

***SERVER #n TCP-IP PORT***



Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

Used to Set the TCP-IP server #n port

***SERVER #n TCP-IP ADDRESS***

Used to Set the TCP-IP server #n address

***MODBUS TCP-IP CLIENT TIMEOUT***

Used to Set the TCP-IP connect timeout for the Modbus TCP-IP client task.

***FTP SERVER PORT***

*Used to Set the TCP-IP port for the FTP Server*

***FTP SERVER AUTHENTICATION USER NAME***

*Used to Set the User Name for accessing the FTP Server (if User Name and Password are leave empty no authentication is require for webserver access)*

***FTP SERVER AUTHENTICATION USER PASSWORD***

*Used to Set the Password for accessing the FTP server (if User Name and Password are leave empty no authentication is require for ftp access)*

***IP CHANGE FROM DISCOVERY***

*Used to Set if a user is allowed to change IP configuration from the software "Seneca Discovery Device"*

### *13.5.1. Modbus Gateway with shared memory HTTP POST configuration*

Data Tags can be sent to a HTTP Server (for example the Seneca Cloudbox), the following configuration items must be set:

***SEND DATA TO HTTP SERVER MODE***

*Used to enable or not the HTTP data send to cloudbox server (or a compatible http server).*

***SAMPLE TIME FOR HTTP POST***

*Select the tags sending time to the http server*



Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

***DNS SERVER***

*Select the Domain Name Service server for resolve the HTTP server name*

***NTP SERVER***

*Select the Network Time Protocol Server used for synchronize the Tags time*

***HTTP SERVER***

*Select the HTTP server name or ip*

***HTTP SERVER PORT***

*Select the HTTP server port*

***HTTP SERVER CGI PATH***

*Select the HTTP CGI Path*

***WARNING!***

***REMEMBER ALWAYS TO CONFIGURE THE WEBSERVER AND FTP AUTHENTICATION USER NAME AND PASSWORD FOR RESTRICT THE ACCESS TO THE FTP AND THE WEBSERVER. IF YOU LEAVE THE TWO PARAMETERS TEXT BOXES BLANK NO AUTHENTICATION IT'S REQUIRED FOR ACCESS.***

## 13.6. Simplified Tags Diagnostic

The tags diagnostic is available only in Modbus Gateway with shared memory mode.
The tags diagnostic is viewable also from Modbus RTU/ Modbus TCP.
The Diagnostic Address is configurable the default Start Modbus Register is 49001 (offset 9000).

Each bit represent a tag with the following means:

1 = TAG OK
0 = TAG FAIL

The least significative bit is the tag nr 1 status
The next is the tag nr 2 status and so on…



Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

For example:

49001 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 1
49002 0 0 0 0 0 0 0 0 0 0 0 0 1 1 1 1

Means: TAG 1, TAG 4, TAG17, TAG 18 , TAG 19, TAG 20 OK, others in FAIL.
At startup all the tags are in fail status (all to 0).

### *13.7. Extended Tags Diagnostic*

The tags diagnostic is available only in Modbus Gateway with shared memory mode.
When a tag is in error state is possible to have more info abou this tag using the extended diagnostic.
The extended diagnostic reserve 1 byte for 1 tag (so, because 500 tags is the limit, there are 500 bytes = 250 Modbus registers for the extended diagnostic).
This diagnostic is located at the end of the simplified diagnostic (default start address 49033, offset 32).
Each Modbus Register contain 2 tags, for example:

49033 TAG02_TAG01
49034 TAG04_TAG03
…
49282 TAG500_TAG499
49283 LAST_LOOP_TIME_COM1 [x1 ms]
49284 LAST_LOOP_TIME_COM2 [x1 ms]

The byte means is:

0 TAG OK
1 TIMEOUT: The tag response is a timeout but is polled again
2 DELAYED: Too much fails, the tag polling is delayed (the tag will be polled after the “Fail delay” configured)
3 EXCEPTION: Modbus exception response but is polled again
4 CRC ERROR: Modbus CRC exception response but is polled again

For example:

49033 0x0000
49034 0x0002

Means that:
TAG 1 and 2 are OK
TAG 03 is in Delayed status (2)
TAG 4 is OK

LAST_LOOP_TIME_COMx is a register that holds the last serial loop time x10 ms so, for example:

49283 25
49284 42



Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

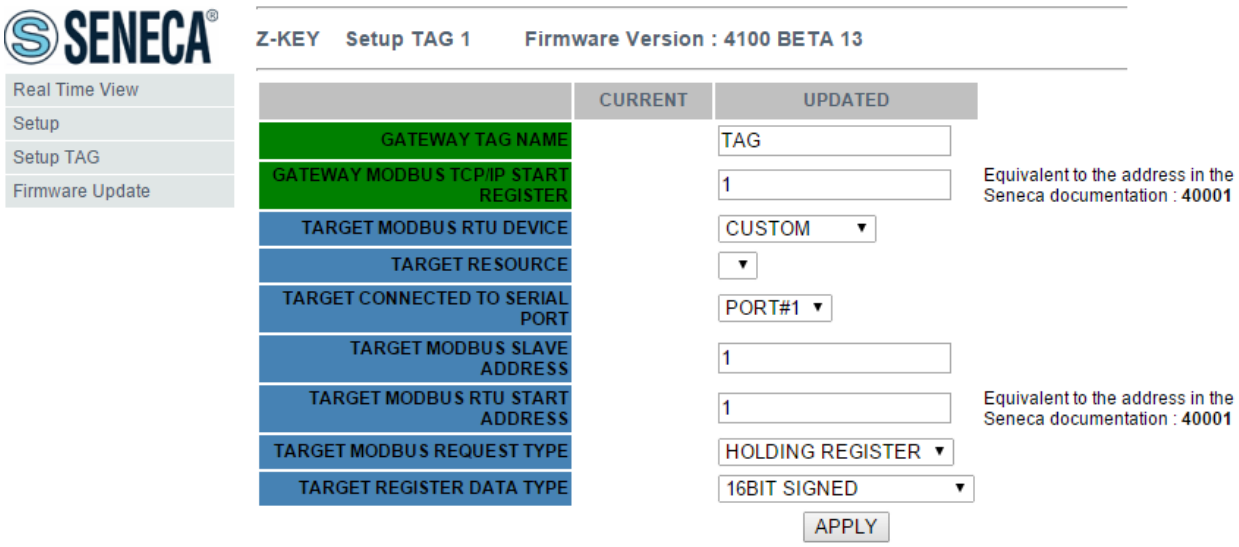
Means that the COM1 loop was 250ms, COM2 loop was 420ms

## 13.8. Modbus Gateway Tags Setup, export and import

The Z-KEY in Modbus Gateway mode needs to configure the Tags to put into the internal shared memory.

From the Webserver click on “Setup TAGs” button to the left menu:

Now you can ADD, Modify, Delete or move one tag. When you modify or add a tag a new page appear:




***Gateway Tag Name***

Set the Tag name to show in the Webserver realtime view.

***Gateway Modbus TCP-IP Start Register***

Set the address where the tag is placed in shared memory for access from Modbus TCP-IP.

***Target Modbus RTU Device***

Select the Modbus RTU slave model from the Seneca database or select “custom” if you don’t use a Seneca Modbus RTU slave.

***Target Resource***



Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

If you are using a Seneca Modbus RTU Slave select the resource name from the Seneca database.

***Target Connected to serial port***

Select at which Z-KEY serial port is connected the modbus rtu slave device.

***Target Modbus RTU Slave Station Address***

Select the Device Modbus Station Address (also named Modbus node address).

***Target Modbus RTU start register***

Select the Modbus RTU slave start register TAG

***Modbus Request Type***

Select the Modbus Register Request type from:

Coil

Discrete Input

Holding Register

Input Register

***Data Type***

Select the TAG variable type from:

16 BITS UNSIGNED:  1 modbus register, from 0 to 65535

16 BITS SIGNED:  1 modbus register, from -32768 to +32767

32 BITS UNSIGNED MSW : 2 modbus registers with the lower address Modbus  register that hold the Most Significant Word, from 0 to 4294967295

32 BITS UNSIGNED LSW : 2 modbus registers with the lower address Modbus  register that hold the Less Significant Word, from 0 to 4294967295

32 BITS SIGNED MSW : 2 modbus registers with the lower address Modbus  register that hold the Most Significant Word, from  -2147483648 to +2147483647



Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

32 BITS SIGNED LSW : 2 modbus registers with the lower address Modbus register that hold the Less Significant Word, from -2147483648 to +2147483647

FLOAT MSW : 2 modbus registers with the lower address Modbus register that hold the Most Significant Word, Floating point single precision (IEEE 758-2008)

FLOAT LSW : 2 modbus registers with the lower address Modbus register that hold the Less Significant Word, Floating point single precision (IEEE 758-2008)

BIT : 1 Boolean coil or Discrete input register

*this field is automatically filled if you have select a Seneca Device into the "Device" field.*

***WARNING!***

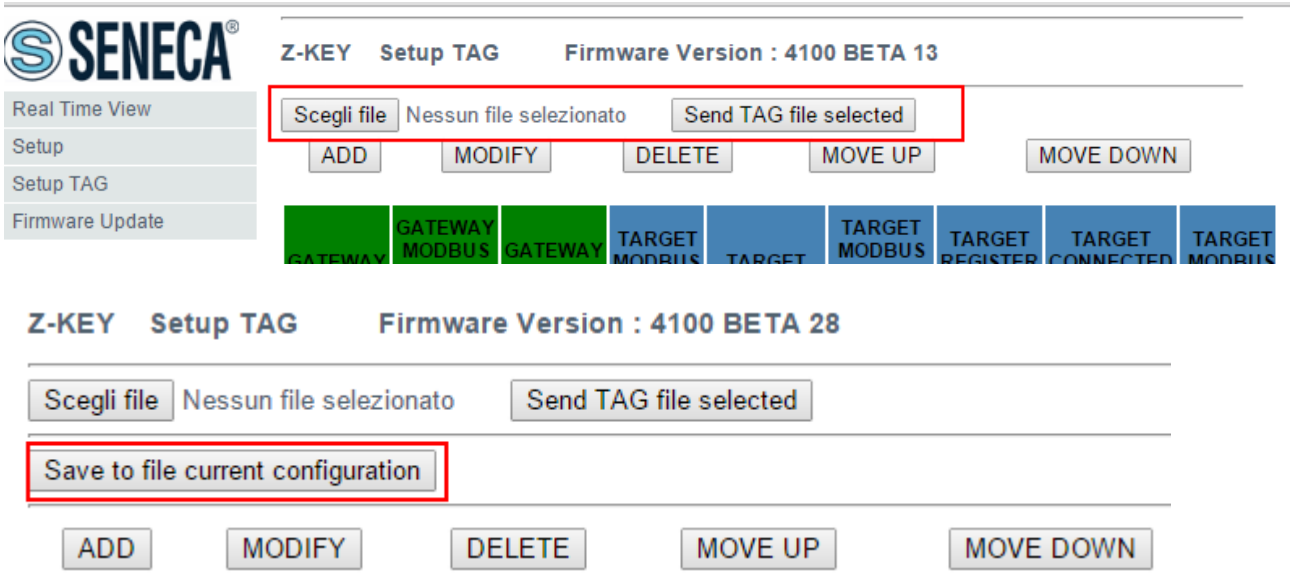
***All 32 bits values are stored into 2 consecutive registers, for example:***

***TAG Totalizer 1 in unsigned 32 bits MSW type is stored into registers 40016 and 40017:***

***The most significant word is the register 40016, the less significant word is the 40017.***

***So the 32bits value is obtained by the following relation:*** $Totalizer1=Reg(40017)+(Reg(40016)\times 2^{16})=Reg(40017)+(Reg(40016)\times 65536)$

The Tags setup can be imported/exported from/to a ".cgi" file:







Note that a .cgi file can be also imported/exported from/to the Z-KEY Excel template.

## 13.9. Modbus Gateway Real Time view



Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

Where the TAG are setup it's possible to view in real time the communication from the webserver.

The real time view will show the TCP-IP configuration and the TAGS info.

The Tags info include: The TAG Name, the Gateway TAG Modbus Address, the Tag value and the TAG status
OK = OK TAG status
FAIL_TO = Timeout Reading the TAG
DELAYED = Too much fails, the tag polling is delayed (the tag will be polled after the "Fail delay" configured)
EXC = Modbus exception response

## *13.10. Using the Microsoft Excel ™ template for Tags setup*

Preparing the Tag configuration can be a frustrating operation if it's made with the webserver so a Microsoft Excel™ Template is available for create a .bin file to import to the Z-KEY.

This operation drastically speed up the TAG configuration.

The template can be freely downloaded from the Seneca website into the Z-KEY section.

| | A | B | C | D | E | F | G | H | I | J | K | L | M |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | MODBUS TCP/IP | | | SERIAL MODBUS RTU | | | | Export CGI file... | | SENECA | | |
| 2 | TAG NR | GATEWAY TAG NAME | GATEWAY MODBUS TCP/IP REGISTER ADDRESS | TARGET MODBUS RTU REGISTER TYPE | TARGET MODBUS RTU DATA TYPE | TARGET CONNECTED TO SERIAL PORT NR | TARGET MODBUS RTU START REGISTER | TARGET MODBUS RTU SLAVE ADDRESS | Import CGI file... | | SENECA Z-KEY TAGS TEMPLATE FOR GATEWAY MODE. E | | |
| 3 | 1 | TAG1 | 1 | HOLDING REGISTER | UINT16 | #1 | 3 | 2 | | | | | |
| 4 | 2 | TAG2 | 2 | HOLDING REGISTER | UINT16 | #1 | 4 | 2 | | | | | |
| 5 | 3 | TAG3 | 3 | HOLDING REGISTER | UINT16 | #1 | 5 | 2 | | | | | |
| 6 | 4 | TAG4 | 5 | HOLDING REGISTER | UINT16 | #1 | 6 | 2 | | | | | |
| 7 | 5 | TAG5 | 7 | HOLDING REGISTER | UINT16 | #1 | 7 | 2 | | | | | |
| 8 | 6 | TAG6 | 8 | HOLDING REGISTER | UINT16 | #1 | 8 | 2 | | | | | |
| 9 | 7 | TAG7 | 9 | HOLDING REGISTER | UINT16 | #1 | 9 | 2 | | | | | |
| 10 | 8 | TAG8 | 10 | HOLDING REGISTER | UINT16 | #1 | 10 | 2 | | | | | |
| 11 | 9 | TAG9 | 1 | COIL | BIT | #1 | 1 | 3 | | | | | |
| 12 | 10 | TAG10 | 2 | COIL | BIT | #1 | 2 | 3 | | | | | |
| 13 | 11 | TAG11 | 3 | COIL | BIT | #1 | 3 | 3 | | | | | |
| 14 | 12 | TAG12 | 4 | COIL | BIT | #1 | 4 | 3 | | | | | |
| 15 | 13 | TAG13 | 5 | COIL | BIT | #1 | 5 | 3 | | | | | |
| 16 | 14 | TAG14 | 6 | COIL | BIT | #1 | 6 | 3 | | | | | |
| 17 | 15 | TAG15 | 7 | COIL | BIT | #1 | 7 | 3 | | | | | |
| 18 | 16 | TAG16 | 8 | COIL | BIT | #1 | 8 | 3 | | | | | |
| 19 | 17 | TAG17 | 14 | HOLDING REGISTER | INT16 | #1 | 13 | 4 | | | | | |
| 20 | 18 | TAG18 | 15 | HOLDING REGISTER | INT16 | #1 | 14 | 4 | | | | | |
| 21 | 19 | TAG19 | 16 | HOLDING REGISTER | INT16 | #1 | 15 | 4 | | | | | |
| 22 | 20 | TAG20 | 17 | HOLDING REGISTER | INT16 | #1 | 16 | 4 | | | | | |
| 23 | 21 | TAG21 | 1 | DISCRETE INPUT | BIT | #1 | 1 | 5 | | | | | |
| 24 | 22 | TAG22 | 2 | DISCRETE INPUT | BIT | #1 | 2 | 5 | | | | | |
| 25 | 23 | TAG23 | 3 | DISCRETE INPUT | BIT | #1 | 3 | 5 | | | | | |

***TAG NR***
The tag index from 1 to 500

***Gateway Tag Name***
Enter the Tag mnemonic name

***Gateway Modbus TCP-IP Register Address***



LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

Enter the TAG register address that will be accessed from TCP-IP (also from serial port if slave mode is configured). For Seneca Modbus Standard address 1 holding register is equivalent to 40001, address 2 to 40002 etc… .

***Target Modus RTU REGISTER TYPE***

Select the register type from the combobox list

***Target Modus RTU DATA TYPE***

Select the target modbus rtu register type

***Target Connected to serial port NR***

Select the serial port where the slave modbus is connected to

***Target Modbus RTU Start Register***

Enter the Modbus Slave start register (if holding register 1=40001 etc…)

***Target Modbus RTU Slave Address***

Enter the Modbus RTU Slave Station address

The setup can be exported from Excel to a .cgi file (for to be imported in the webserver) or imported from a .cgi file (exported from the webserver).

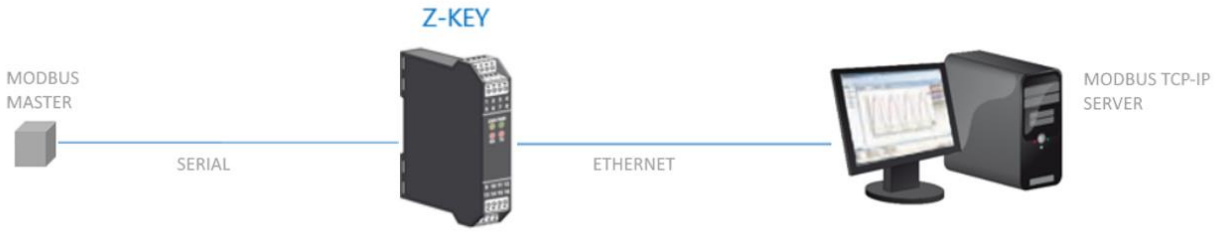


Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

# 14. Gateway Serial to Ethernet

In this scenario a Modbus serial master must be connect to one or multiple Modbus TCP-IP servers.

The Modbus serial master is connected with the serial port to the Z-KEY / Z-KEY WIFI, one or more Modbus TCP-IP servers are connected to the ethernet / Wifi  port:

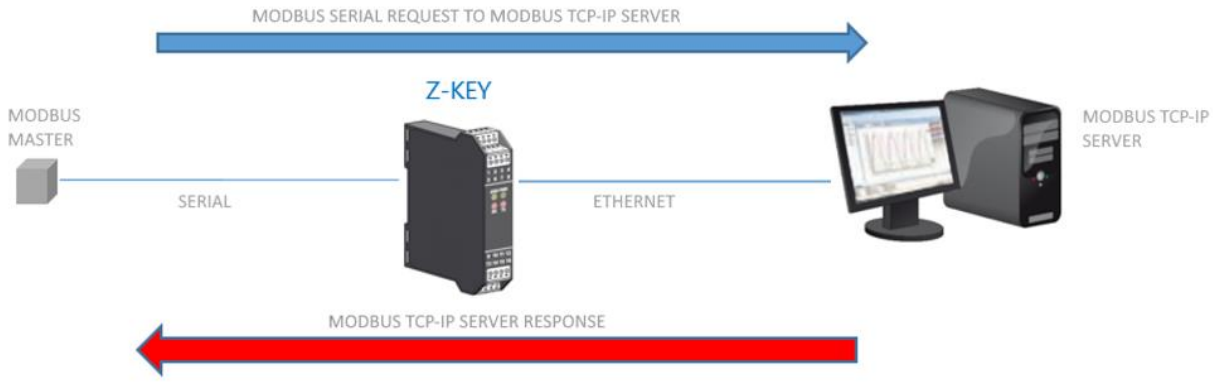



## 14.1.1. HOW IT WORKS

The Modbus serial to ethernet is the simplest way to create a communication between a serial master Modbus device and one or more Modbus Ethernet TCP-IP server.

There is no need to configure which registers must be requested because the conversion from serial to ethernet is executed in real time.

Only the serial configuration must be made (baud rate, parity etc…) and the server modbus station address range (because one server can manage multiple station addresses).




The Master serial Modbus request a register from the RS232/RS485 port, then the Z-KEY / Z-KEY WIFI convert the request to the Modbus TCP-IP server, the Modbus TCP-IP server response is also retranslated in Modbus serial to the Master.



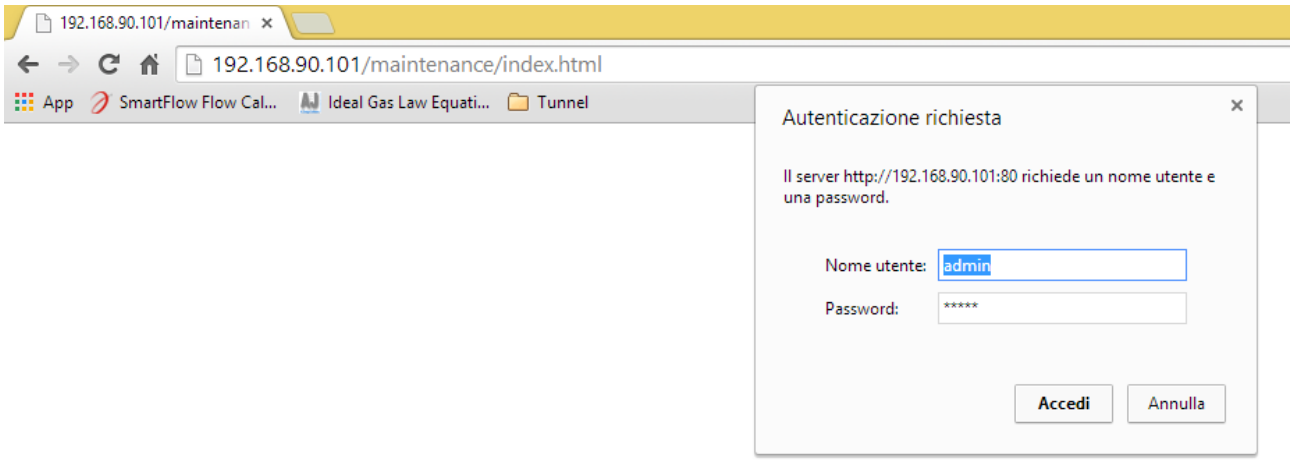
Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

**WARNING!**

**It's not possible to connect more than one Modbus server using the same station address**

## 14.1. Modbus Gateway Serial to Ethernet Webserver configuration

Connect to the webserver by entering the ip address, by default:




http://192.168.90.101

Enter the user name and password, by default:

User: admin

Password: admin

Now the Webserver can be used for configuring the Z-KEY / Z-KEY WIFI module, all parameters are visible clicking on "Setup" button to the left of the screen.

On the first column represents the parameter name, the second column (current) it's the current parameter value. The last column can be used for changing the current configuration.

When a configuration it's made you must confirm with "APPLY", then the new configuration became operative.

If you need to reset to the default parameters click on "FACTORY DEFAULT" button.

The parameters are explained below:

***DHCP***



Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

*Disable: A static Ip address is used*

*Enable: The IP address, the IP-Mask and the Gateway address are obtained from the DHCP server.*

*The Z-KEY IP address can be read from the USB port with the Easy Setup test configuration, or with the Seneca Discovery utility (see the Z-KEY section on seneca web site for download).*

***STATIC IP ADDRESS***

*Static IP address when DHCP is Disable*

***STATIC IP MASK***

*mask when DHCP is Disable*

***STATIC GATEWAY***

*Gateway address when DHCP is Disable*

***WORKING MODE***

Select the Modbus Gateway working mode, then you can select which serial port use.

Modbus Gateway on port#1: the packets are routed only to serial port 1 (no packets are routed to serial port 2)

Modbus Gateway on port#2: the packets are routed only to serial port 2 (no packets are routed to serial port 1)

Modbus Gateway on port#1 and port#2: the packets are routed to serial port1 and serial port2 (***Note that in this case all the slaves modbus addresses must be different!***)

***TCP/IP PORT***

*TCP-IP port for Modbus TCP-IP Server protocol (Max 8 clients)*

***PORT #n PROTOCOL***

*Select between Modbus RTU or ASCII serial protocol*



Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

***PORT #n BAUDRATE***

*Used to Set the port baudrate*

***PORT #n BITS***

*Used to Set the number of bits for the serial communication.*

***PORT #n PARITY***

*Used to Set the port parity (None, Odd or even)*

***PORT #n STOP BITS***

*Used to Set the port parity (1 or 2; note that if the parity is set, only 1 bit can be used)*

***PORT #n TIMEOUT***

*Used to Set the timeout on Modbus Master mode before making a new call*

***WEB SERVER PORT***

*Used to Set the TCP-IP port for the Webserver*

***WEB SERVER AUTHENTICATION USER NAME***

*Used to Set the User Name for accessing the Webserver (if User Name and Password are leave empty no authentication is require for webserver access)*

***WEB SERVER AUTHENTICATION USER PASSWORD***

*Used to Set the Password for accessing the Webserver (if User Name and Password are leave empty no authentication is require for webserver access)*

***FTP SERVER PORT***

*Used to Set the TCP-IP port for the FTP Server*



Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

***FTP SERVER AUTHENTICATION USER NAME***

*Used to Set the User Name for accessing the FTP Server (if User Name and Password are leave empty no authentication is require for webserver access)*

***FTP SERVER AUTHENTICATION USER PASSWORD***

*Used to Set the Password for accessing the FTP server (if User Name and Password are leave empty no authentication is require for ftp access)*

***IP CHANGE FROM DISCOVERY***

*Used to Set if a user is allowed to change IP configuration from the software "Seneca Discovery Device"*

***MODBUS TCP-IP SERVER PORT #1..10***

*Used to Set the Modbus TCP-IP Server port (up to 10 Modbus TCP-IP server supported)*

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

*Used to Set the Modbus TCP-IP Server IP address (up to 10 Modbus TCP-IP server supported)*

***SERVER #1..10 START SLAVE ADDRESS / STOP LAVE ADDRESS***

*Used to connect more than one Modbus TCP-IP server to the serial Master Modbus,*

*If the request is in the range (start-stop slave address) then the packet is sent to the appropriate server:*

*For example:*

*In this configuration:*

*server#1 has a slave range start = 1 and last = 10*

*server#2 has a slave range start = 11 and last =20*

*if the serial master requests the slave address 1 then the packet is sent to server#1*

*if the serial master requests the slave address 15 then the packet is sent to server#2*

***WARNING!***



Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

***REMEMBER ALWAYS TO CONFIGURE THE WEBSERVER AND FTP AUTHENTICATION USER NAME AND PASSWORD FOR RESTRICT THE ACCESS TO THE FTP AND THE WEBSERVER. IF YOU LEAVE THE TWO PARAMETERS TEXT BOXES BLANK NO AUTHENTICATION IT'S REQUIRED FOR ACCESS.***

***WARNING!***

***WHEN USE THE MODBUS BRIDGE MODE, REMEMBER THAT ALL THE MODBUS SLAVES MUST HAVE A DIFFERENT ADDRESS!***

***CAUTION!***

***If you are using Internet explorer 9 (or newer) you must enable the compatibility mode (see the arrow below):***

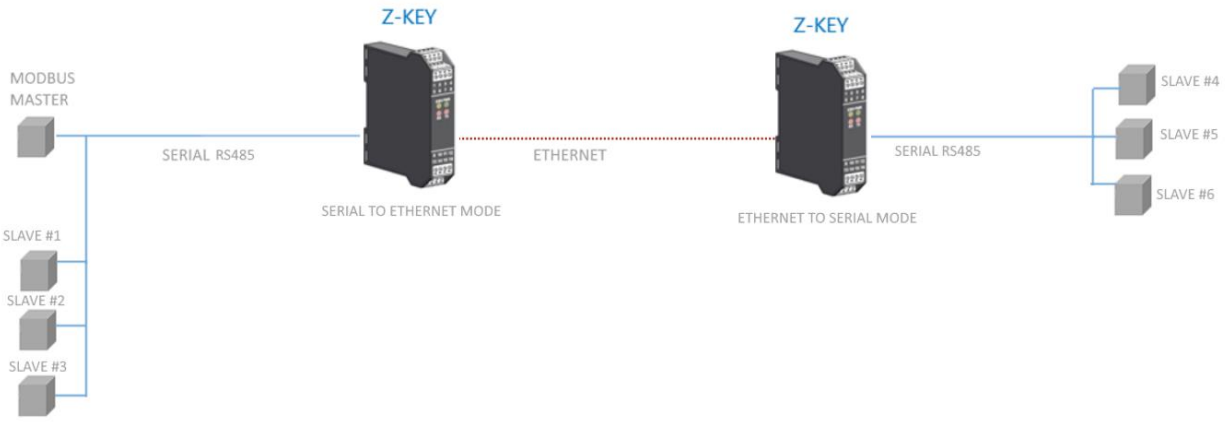





Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

# 15. EXTEND RS485 OVER ETHERNET: MODBUS SERIAL TO ETHERNET AND THEN ETHERNET TO SERIAL

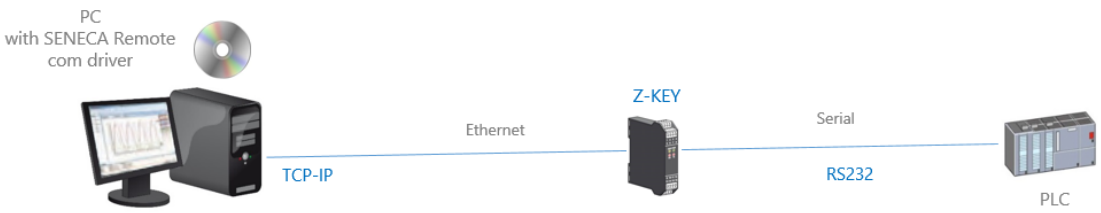
For example we need to extend the RS485 using the ethernet or Wifi infrastructure, for obtain this feature you need at least two Z-KEY / Z-KEY WIFI devices: one configured in Gateway Serial to Ethernet mode and the other configured in Gateway Ethernet to Serial mode:




Up to 10 R-KEY-LT devices can be used in ethernet to serial mode (10 Modbus TCP-IP server).

# 16. Remote Serial Com Port

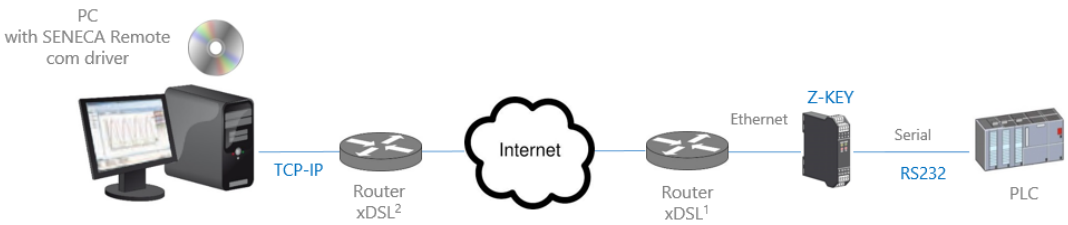
In this scenario a Serial device must be connected to a PC but the device is too far away from the PC.
The Z-Key can be used for extend the serial port using the ethernet connection:




Also a connection through internet can be made (typically for remote maintenance of machines, PLC etc…):



Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000




For internet communication the Router connected to the Z-KEY must have a static ip address.

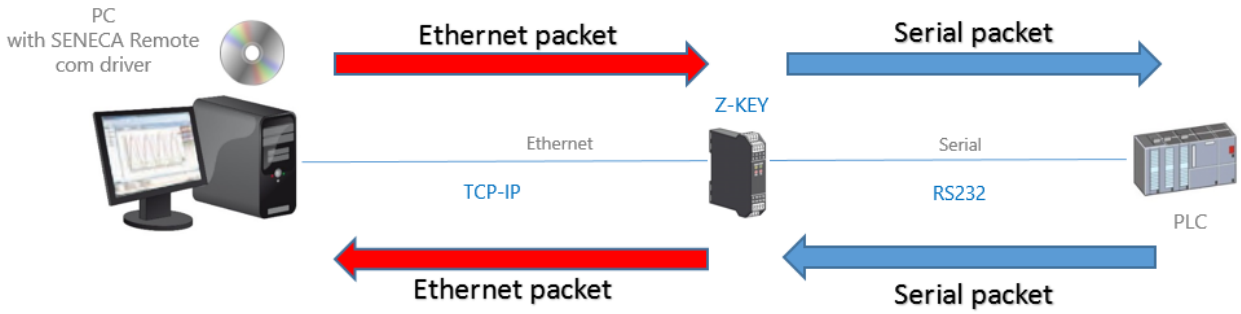
***NOTE:***
***Z-KEY, in Remote serial com port mode, supports one PC connection at a time.***

***NOTE:***
***For using the ZModem serial protocol with Z-KEY through internet, remember to activate the protocol crash recovery option.***

## 16.1. How it works

If a PC program has only the serial port support but you need to exit from the ethernet you can install the Serial to Ethernet driver freely supplied by Seneca.

With this driver installed a couple of virtual serial port is created, using these serial ports from a pc software the serial traffic will pass through ethernet. After that the Z-KEY will convert the ethernet traffic to serial through the real serial port, also Z-KEY will reconvert to ethernet the serial communication responses.

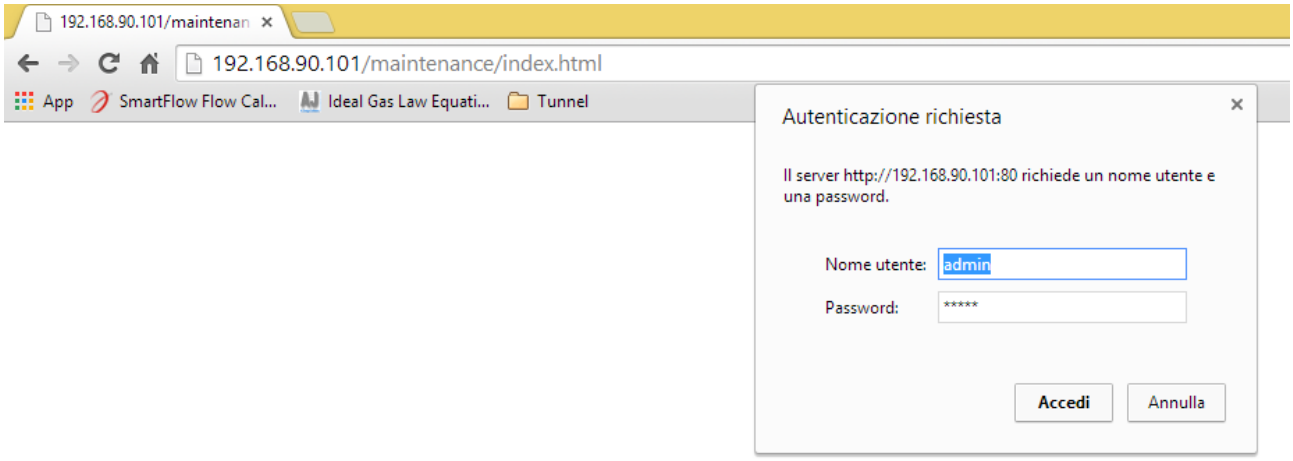



## 16.2. Remote Serial Com Port Webserver configuration

Connect to the webserver by entering the ip address, by default:



Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000




http://192.168.90.101/maintenance/index.html

Enter the user name and password, by default:

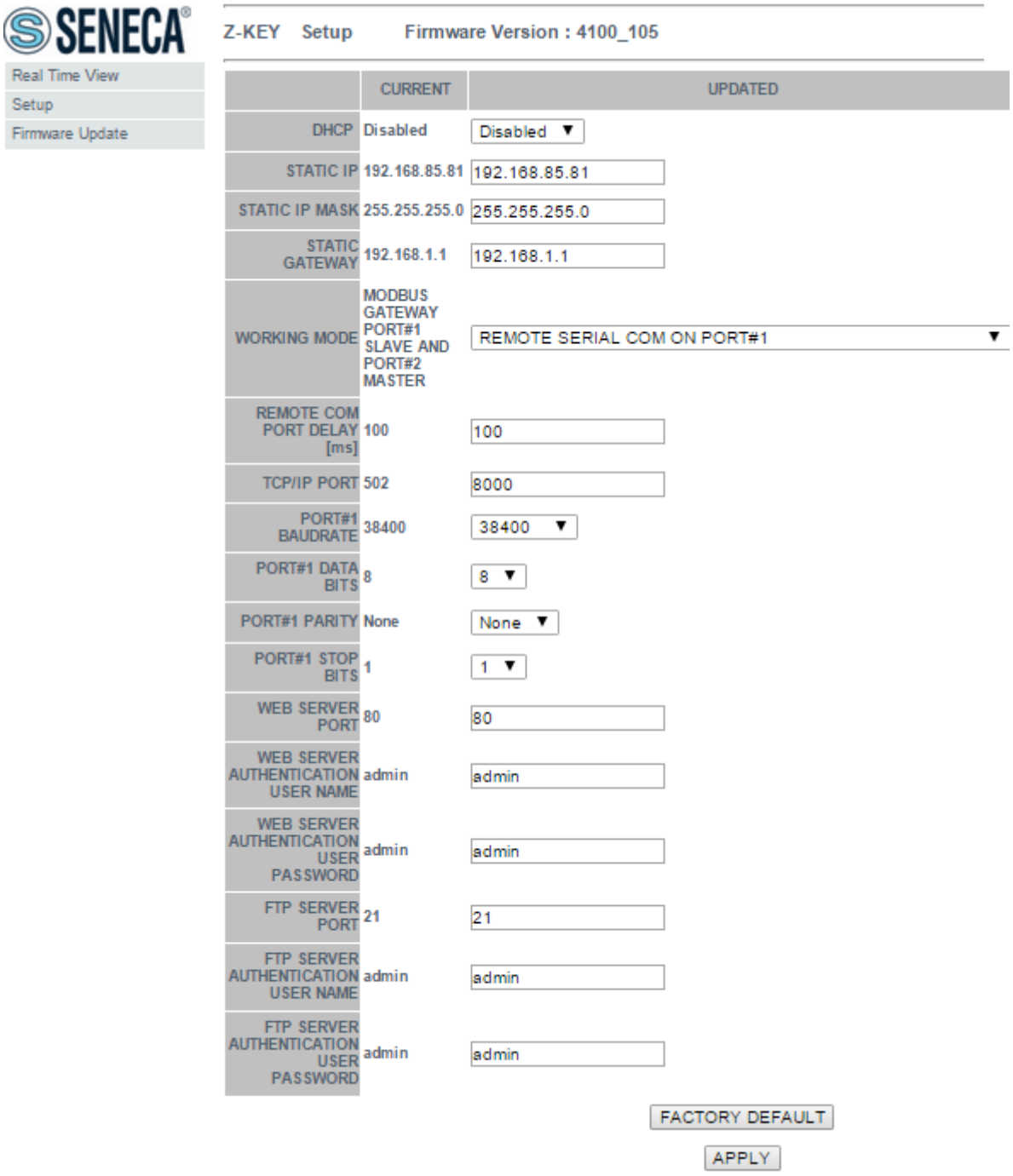
User: admin

Password: admin

Now the Webserver can be used for configuring the Z-KEY module, all parameters are visible clicking on “Setup” button to the left of the screen:



Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000




The first column represents the parameter name, the second column (current) it's the current parameter value. The last column can be used for changing the current configuration.

When a configuration it's made you must confirm with "APPLY", then the new configuration became operative.

If you need to reset to the default parameters click on "FACTORY DEFAULT" button.

The parameters are explained below:



Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

***DHCP***

*Disable: A static Ip address is used*

*Enable: The IP address, the IP-Mask and the Gateway address are obtained from the DHCP server.*

*The Z-KEY IP address can be read from the USB port with the Easy Setup test configuration, or with the Seneca Discovery utility (see the Z-KEY section on seneca web site for download).*

***STATIC IP ADDRESS***

*Static IP address when DHCP is Disable*

***STATIC IP MASK***

*mask when DHCP is Disable*

***STATIC GATEWAY***

*Gateway address when DHCP is Disable*

***WORKING MODE***

Select the Remote COM Port working mode, select which serial port to use (remember that only port #2 can be configured in RS232 mode).

***TCP/IP PORT***

*TCP-IP port for Remote com port mode (default port 8000)*

***REMOTE COM PORT DELAY***

*Enter the silence time after which the serial packet is sent to the Ethernet. Can be that this value must be adjusted for your specific application if you encounter communication errors.*

***PORT #n BAUDRATE***

*Used to Set the port baudrate*



Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

***PORT #n BITS***

*Used to Set the number of bits for the serial communication.*

***PORT #n PARITY***

*Used to Set the port parity (None, Odd or even)*

***PORT #n RS485 STOP BITS***

*Used to Set the port parity (1 or 2; note that if the parity is set, only 1 bit can be used)*

***WEB SERVER PORT***

*Used to Set the TCP-IP port for the Webserver*

***WEB SERVER AUTHENTICATION USER NAME***

*Used to Set the User Name for accessing the Webserver (if User Name and Password are leave empty no authentication is require for webserver access)*

***WEB SERVER AUTHENTICATION USER PASSWORD***

*Used to Set the Password for accessing the Webserver (if User Name and Password are leave empty no authentication is require for webserver access)*

***FTP SERVER PORT***

*Used to Set the TCP-IP port for the FTP Server*

***FTP SERVER AUTHENTICATION USER NAME***

*Used to Set the User Name for accessing the FTP Server (if User Name and Password are leave empty no authentication is require for webserver access)*

***FTP SERVER AUTHENTICATION USER PASSWORD***



Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

*Used to Set the Password for accessing the FTP server (if User Name and Password are leave empty no authentication is require for ftp access)*

***WARNING!***

***REMEMBER ALWAYS TO CONFIGURE THE WEBSERVER AND FTP AUTHENTICATION USER NAME AND PASSWORD FOR RESTRICT THE ACCESS TO THE FTP AND THE WEBSERVER. IF YOU LEAVE THE TWO PARAMETERS TEXT BOXES BLANK NO AUTHENTICATION IT'S REQUIRED FOR ACCESS.***

***CAUTION!***

***If you are using Internet explorer 9 (or newer) you must enable the compatibility mode (see the arrow below):***




## 16.3. Seneca Serial to Ethernet Connect

For using Z-KEY in remote serial com port mode you need to install in a PC the Seneca Serial to Ethernet Connect software.

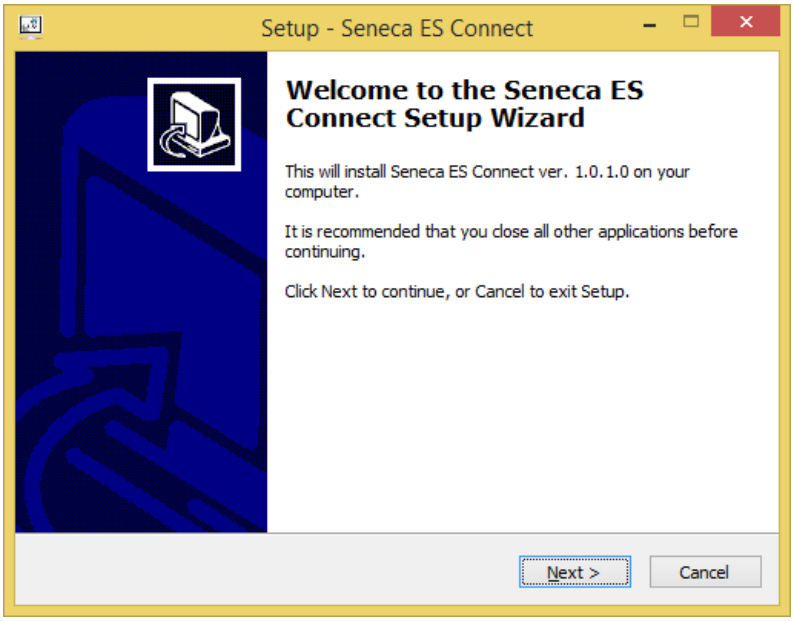
### 16.3.1. Installing Seneca Serial to Ethernet Connect driver

Seneca Ethernet to Serial Connect runs on windows vista™, windows 7™, windows 8.1™ and windows 10™.

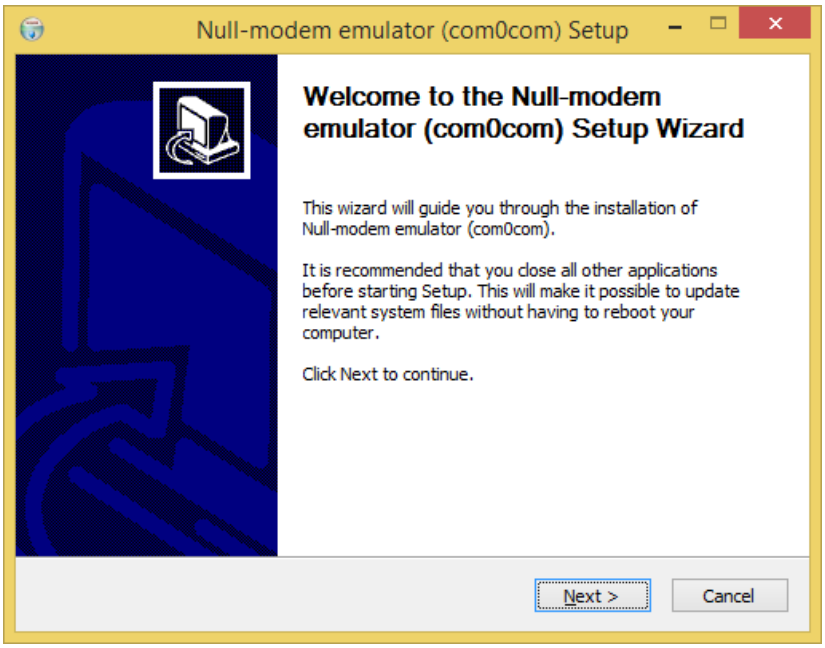
Double click the installer:



Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000



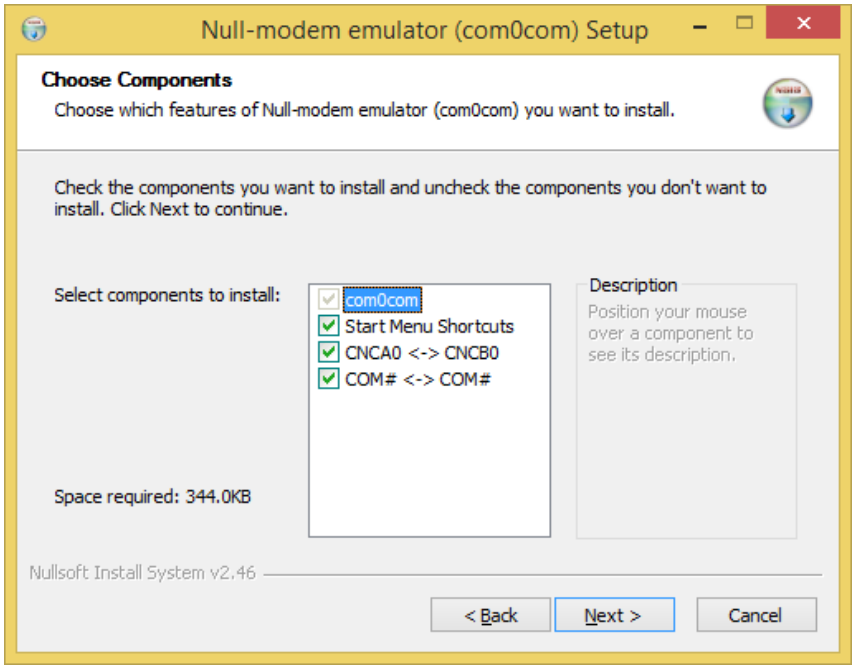

After that the com0com driver will be installed:




Select the CNCA0<->CNCB0 and the COM#<->COM# virtual port names:



Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000



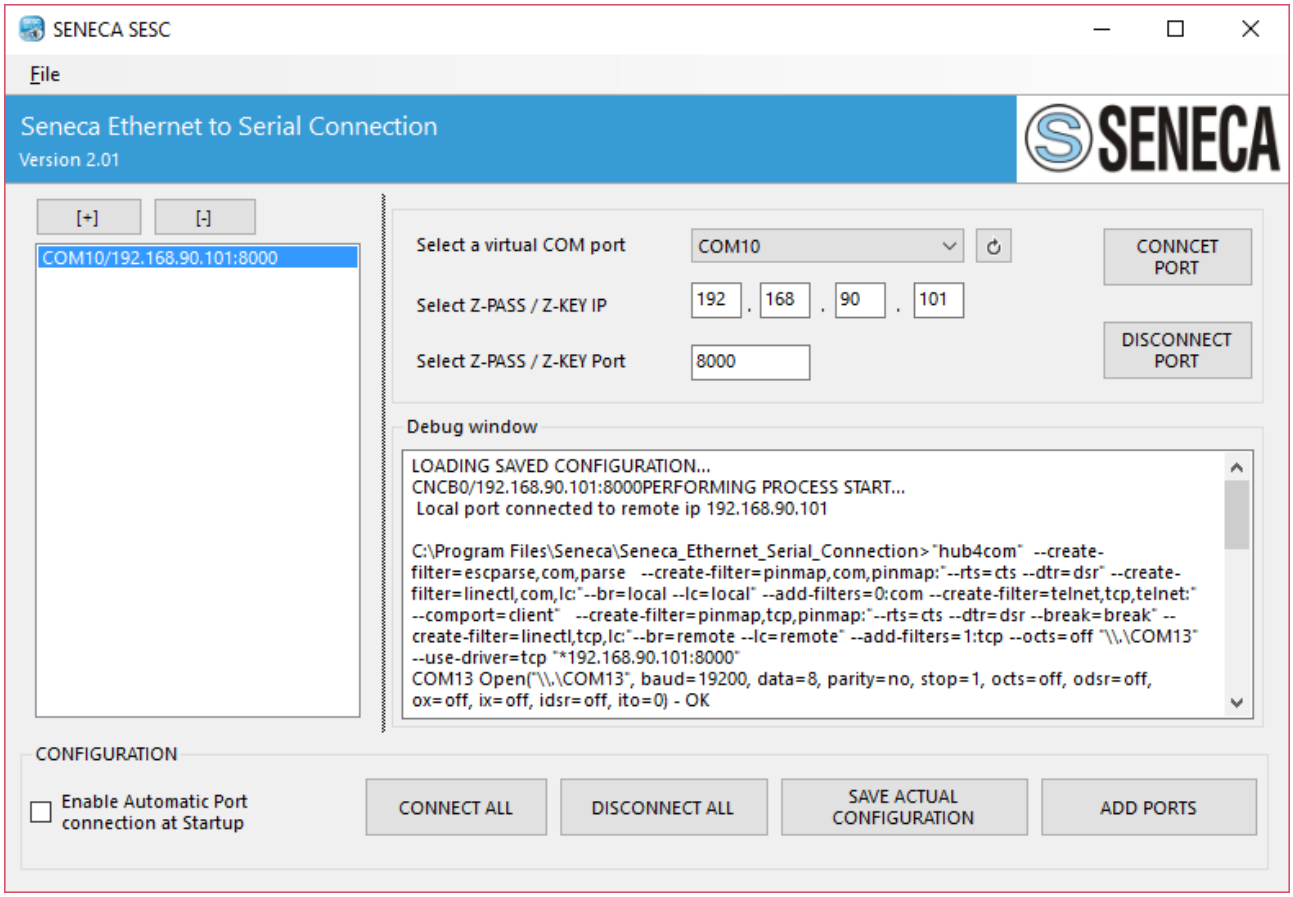

Now Click on Finish

### *16.3.2. Select the Com port for Seneca Serial to Ethernet Connect*

We connect the COM10 to the Seneca ES Connector:

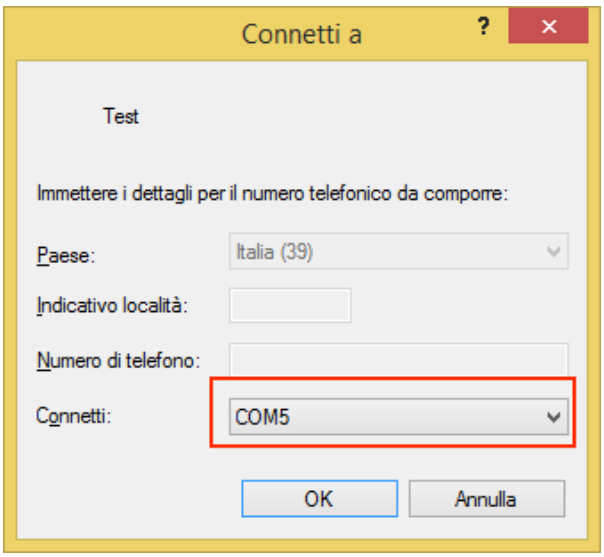


Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000




Note that Seneca SESC can connect more than one serial device at the same time (but you need more than one Z-KEY).

Now use the same COM5 (for example in a terminal software):

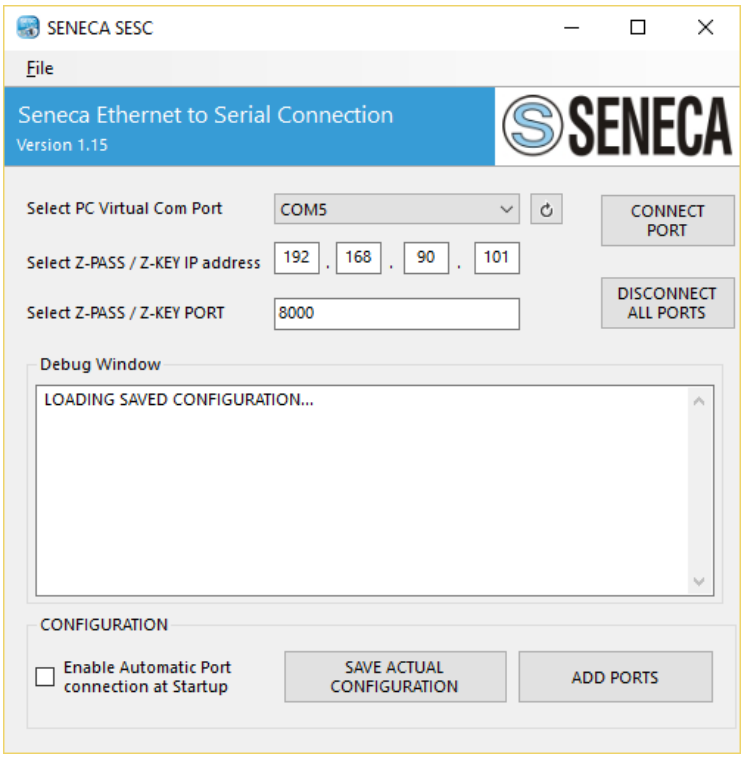



The COM5 is now connected to Z-KEY by the TCP port 8000:



Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

### 16.3.3. Configuring Seneca Serial to Ethernet Connect




- *Select the Virtual COM Port*
- *Select the Z-KEY IP address (default 192.168.90.101).*
- *Select the TCP-IP port (default 8000).*

Then click on “Connect PORT”.

If you need to connect another serial com to another Z-KEY configure the new com port and the new IP addess then click on “Connect Port”.

For disconnect all Ports click on “Disconnect All Ports”.

For automatically connect the PC at startup save the configuration and enable the “Automatic Port Connection at Startup” flag.

### 16.3.4. Debugging the Connection

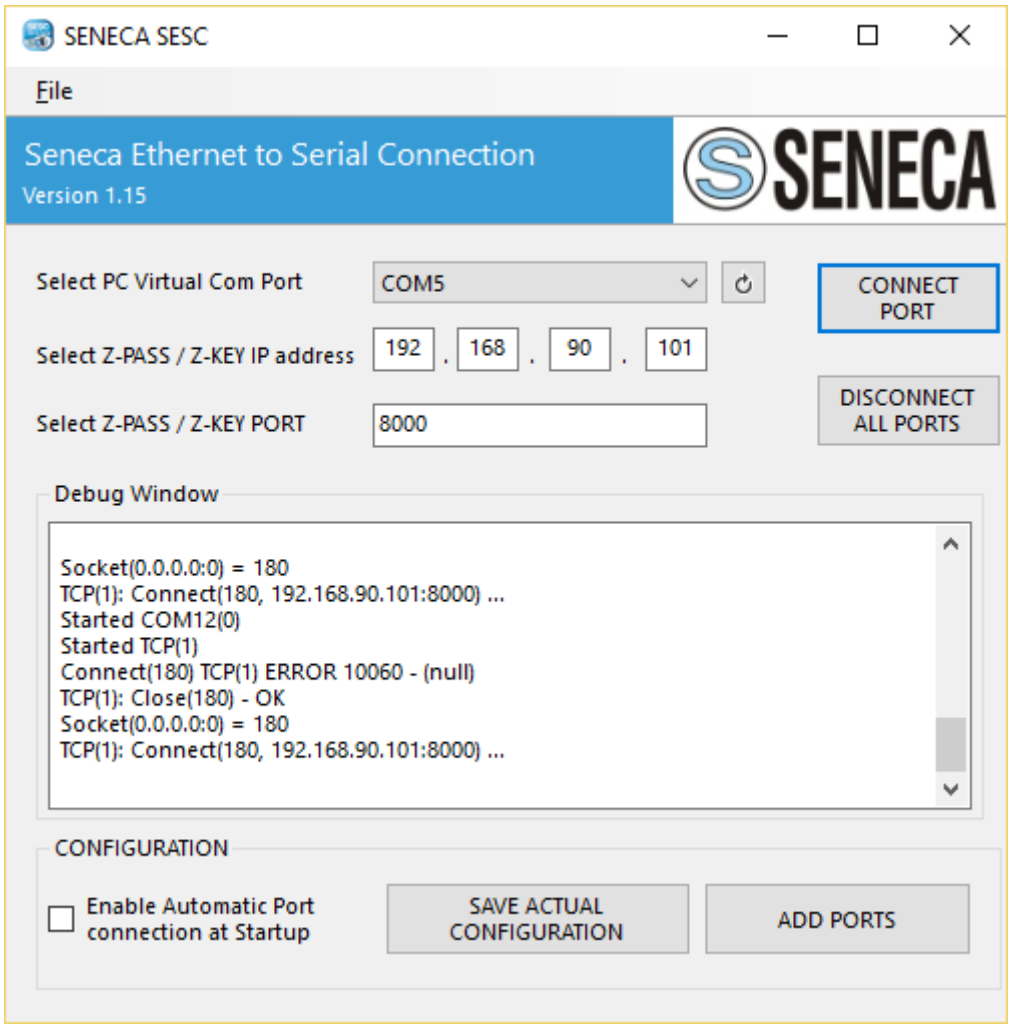
Before click on “Connect Port” you can select to open a Debug Window for verify the connection configuration:

Then click on “Connect Port”:



Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

If you see “Connect Error” like here:




Check the configuration (Z-KEY ip address and port).

### *16.3.5. Changing the COM port number*

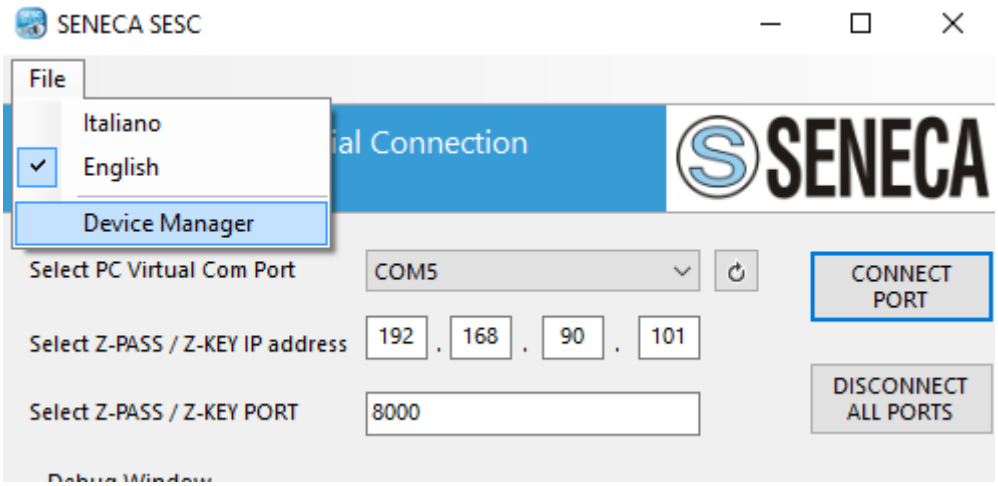
Old software can use only a little range of COM ports, so you may need to change the virtual COM number.

In Our case the COM pair created is COM4 / COM5 but we want to change to COM2 / COM3:

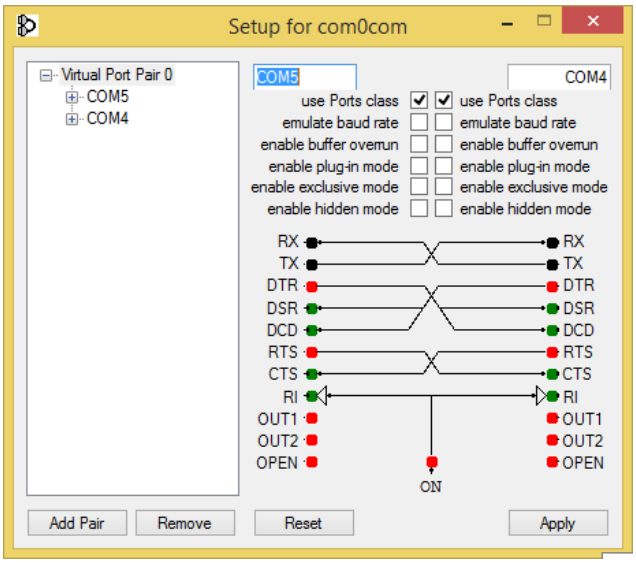
Click on “Device Manager” Button:



Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000



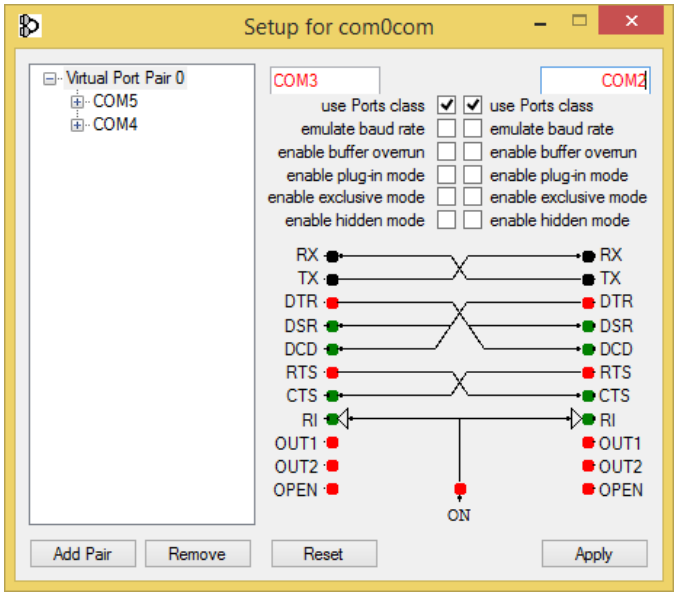

The com0com setup window will open:



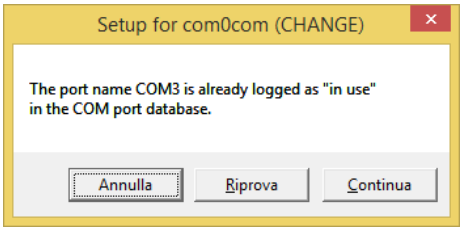

Now change COM5 to COM3 and COM4 to COM2 Then click “Apply”:



Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

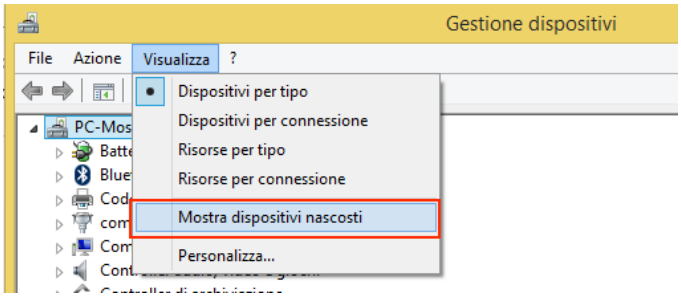



Sometimes the COM can be marked as “in use”:




If you need to use this COM number Click on “Continue”, then go to the device manager.

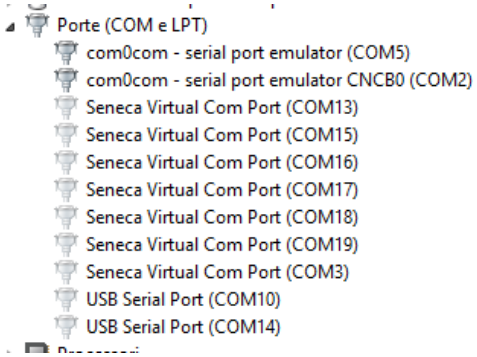
We must uncheck the “in use” flag by uninstalling the port. Because the port now is not connected click on “Show hidden peripherals”:




Now all the Ports that are not in use are displayed in transparent (also our COM3):



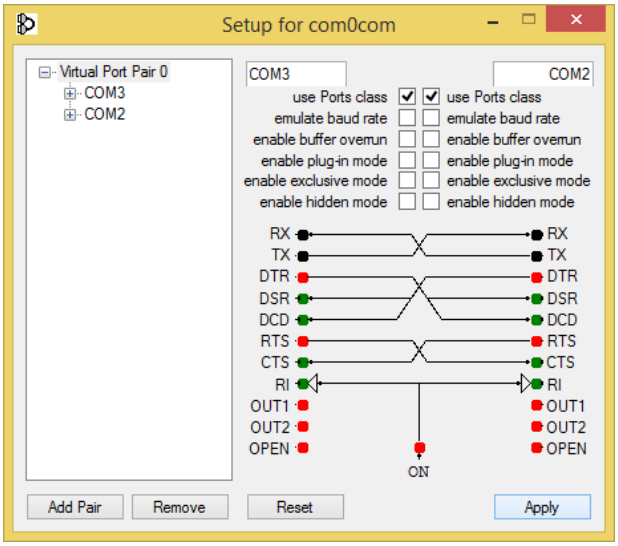
Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000



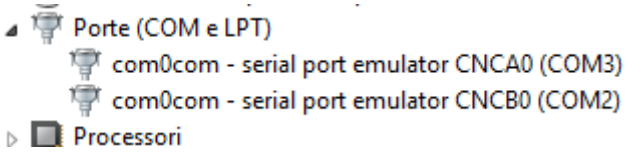

Now select the COM3 port and click on “Uninstall”:




Now the COM3 is free and we can use it on the com0com setup:




Then Click on “Apply”, Now the COM3, COM2 pair is created:

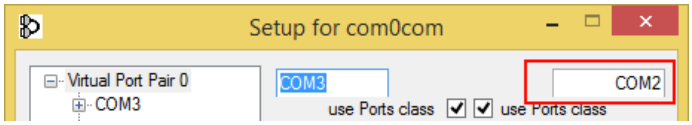



***WARNING!***

***Seneca to ethernet connector use always the right port in the com0com Setup (in our case COM2)***



Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

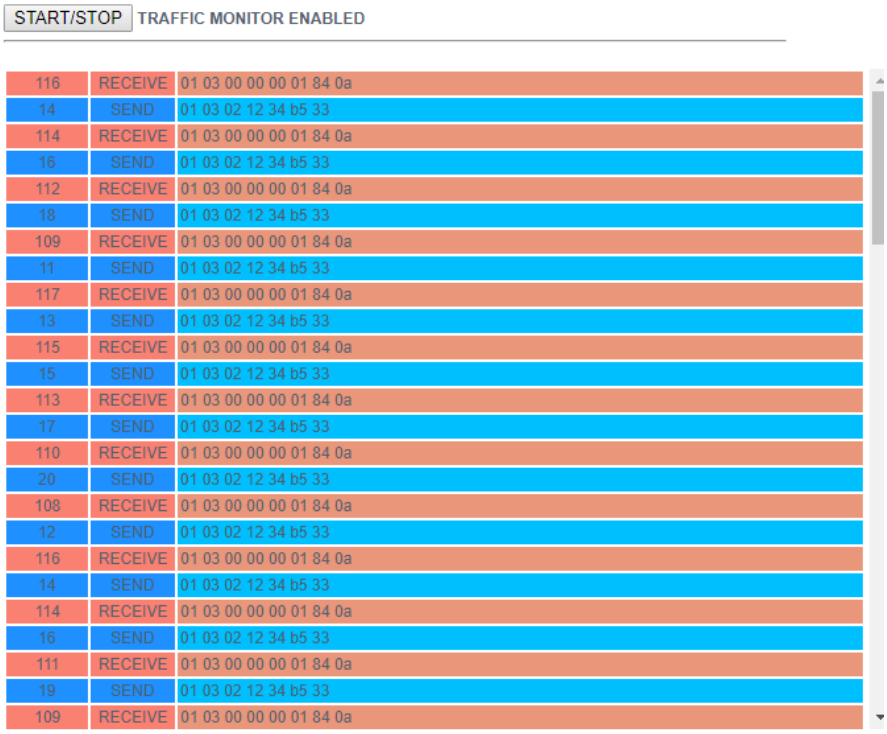





Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

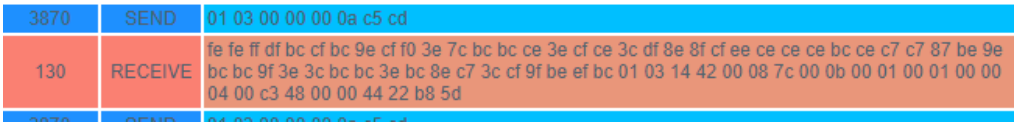
# 17. TRAFFIC MONITOR (NOT FOR "REMOTE SERIAL COM" MODE)

The Traffic Monitor page shows the serial packets that Z-KEY / Z-KEY WIFI is receiving and transmitting for line debug purpose:




The first column is the delay in milliseconds from the last packet, the second column is the packet verse (received from or transmitted to), the last column is the packet content in hexadecimal format. Only the modbus stream is displayed (stripped of the TCP-IP layer).

The traffic monitor shows all the received packets from the serial line, for example this is a serial slave with a Modbus wrong response:




The traffic monitor will display also bad packet in yellow (for example a serial master with incorrect baud rate):



Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

| | | |
|---|---|---|
| 16 | SEND | 01 03 02 12 34 b5 33 |
| 988 | RECEIVE | 01 03 00 00 00 01 84 0a |
| 12 | SEND | 01 03 02 12 34 b5 33 |
| 20990 | INVALID RECEIVE | 20 e0 20 e0 20 e0 20 e0 |
| 14994 | INVALID RECEIVE | 20 e0 20 e0 20 e0 20 e0 |
| 14100 | INVALID RECEIVE | 20 e0 20 e0 20 e0 20 e0 |
| 14897 | INVALID RECEIVE | 20 e0 20 e0 20 e0 20 e0 |



Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

# 18. INSTALLING MULTIPLE Z-KEY / Z-KEY WIFI IN A NETWORK USING THE "DHCP FAIL MODE"

From firmware revision 119, Z-KEY configured with the DHCP can switch to a unique fail ip address after 30 seconds without a DHCP server response.

This fail address is

169.254.x.y

where x.y are numbers obtained from the unique MAC address.

In this way if you force to DHCP all the devices you can install it to the network also if there isn't a DHCP server active.

After 30 seconds from power up you can launch the tool "Seneca Discovery Device" and force the IP address that you prefer to all the devices.

# 19. THE CUSTOM WEBSERVER

A custom webserver can be loaded into a microSD card, copy the html pages to the /web directory.

From firmware revision 119 or newer you can lunch the custom webserver by typing:

***http://192.168.90.101/sd/index.html***

***where 192.168.90.101 is the default ip address.***

Demo templates can be freely downloaded from:

http://www.seneca.it/products/z-key



Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

# 20. ACCESSING THE Z-KEY / Z-KEY WIFI FROM INTERNET

Using a static public ip address it's possible to configure the router for accessing Z-KEY from internet.

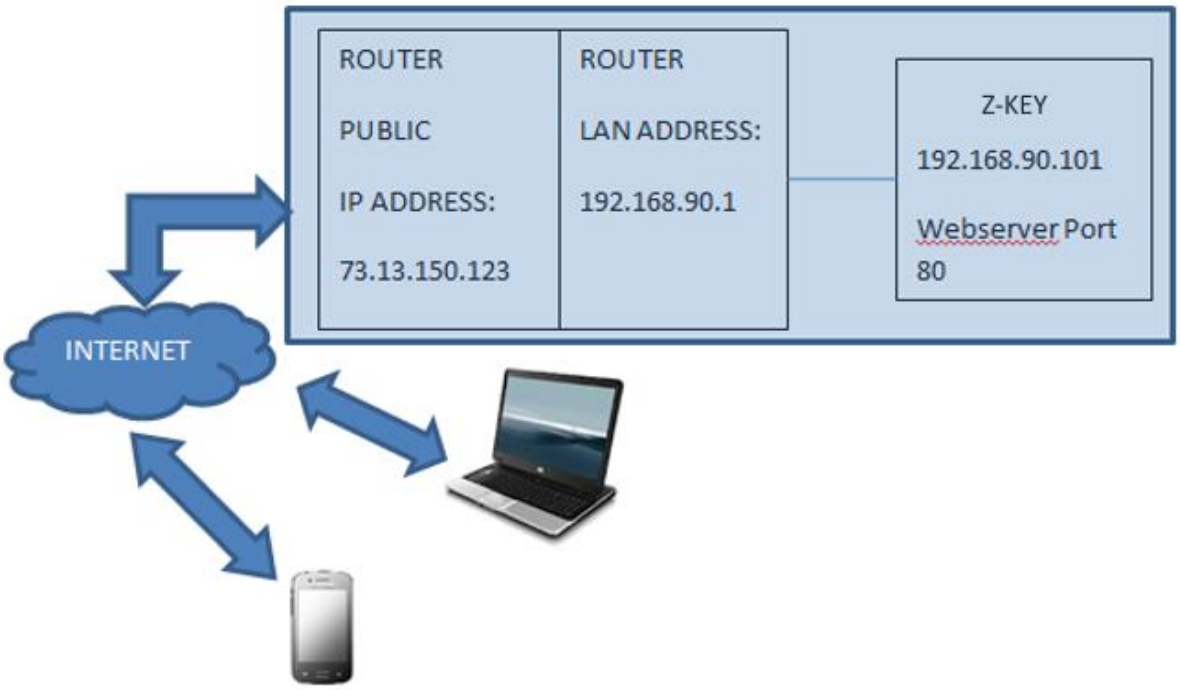
This operation it's known as "Virtual server "or "Port forwarding" refers to your Router documentation for more info.

The Ip address of your internet connection must have a static public ip address, if your public ip address isn't static you can obtain-it by using a Dynamic DNS like Dyndns (http://dyn.com/).

Take a look to this example:

The Router IP address is 192.168.1.1 and the Z-KEY device address is 192.168.1.101 with the Webserver on port 80.

For example the Router Public IP address is 73.13.150.123.




Now we must open the port 80 on the router and forwarding it to the IP 192.168.90.101:

So the configuration on the router must be:

| IP ADDRESS | PRIVATE PORT | PUBLIC PORT | PROTOCOL |
|---|---|---|---|
| 192.168.1.101 | 80 | 8080 | UDP/TCP |



Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

With this Virtual Server entry, all Internet traffic on Port 8080 with ip address 73.13.150.123 will be redirected to Z-KEY webserver on port 80 at IP Address 192.168.1.101.

So for accessing to the Z-KEY Webserver using a browser you must enter

http://73.13.150.123/maintenance/index.html:8080

A similar configuration can be used for Modbus TCP-IP access:

| IP ADDRESS | PRIVATE PORT | PUBLIC PORT | PROTOCOL |
|---|---|---|---|
| 192.168.1.101 | 502 | 502 | UDP/TCP |



Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

# 21. THE KIT-USB

The KIT-USB can be obtained from Seneca (can be bought also from the E-commerce Website www.seneca.it )

The kit contain:

- *A CD with the Easy Setup software (that contain the USB drivers)*
- *A standard mini USB Cable*
- *A standard micro USB Cable*

The Easy Setup software can also be freely downloaded from the website: www.seneca.it

# 22. THE RS232 DB9 CABLE

The RS232 DB9 CABLE can be obtained from Seneca (can be bought also from the E-commerce Website www.seneca.it ) for connection between Z-KEY to a DB9 RS232 device.



Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

# 23. WINDOWS USB DRIVERS INSTALLATION

The drivers are compatible with the following operating systems:

Windows xp (32 bits)

Windows xp (64 bits)

Windows 7 (32 bits)

Windows 7 (64 bits)

Windows 8 (32 bits) (*)

Windows 8 (64 bits) (*)

Windows 8.1 (32 bits) (*)

Windows 8.1 (64 bits) (*)

Windows 10 (32 bits) (*)

Windows 10 (64 bits) (*)

(*) = From software Easy Setup revision 3.53 or newer.

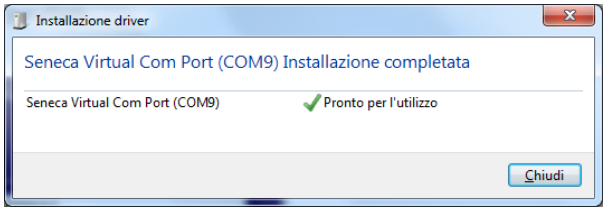
For installing the USB drivers follow this procedure:

- *Install the Easy Setup software from the USB KIT CD (see chapter 21) or from the Seneca website*
- *At the end of the installation confirm the USB drivers installation, click on "install the driver software":*
- *Power up the Z-KEY and connect the USB to the PC, the new hardware it's detected:*






Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000




Now the device it's connected to the PC.

The operation is performed only the first time that you connect the device.



Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

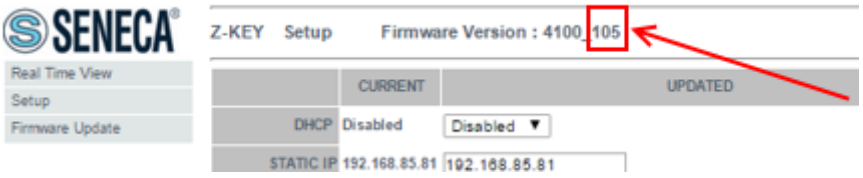
# 24. Firmware Update

Z-Key support the firmware update from webserver, FTP server and microSD card.

Last firmware can be downloaded from:

http://www.seneca.it/products/z-key

You can verify the new firmware revision in the webserver upper corner (in the example the revision is 105):




## 24.1. Firmware Update from Webserver

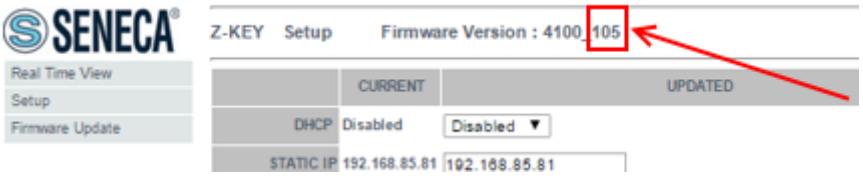
For update the Z-KEY firmware go to the Firmware Update section on the Webserver, select the firmware then click on “Send new firmware update selected”.

At the end of the file transfer the Z-KEY will switch ON all the red leds and start to program the firmware to the internal flash (takes about 30 seconds). At the end the Z-KEY will reboot with the new firmware.

***WARNING!***

***Don’t power down the Z-KEY when the update firmware procedure is started!***

You can verify the new firmware revision in the webserver upper corner (in the example the revision is 105):




## 24.2. Firmware Update from FTP server

For update the Z-KEY firmware from FTP server you must insert a microSD card formatted with fat16 or fat32 filesystem.

Copy the file “zkey.bin” with the new firmware to the root.



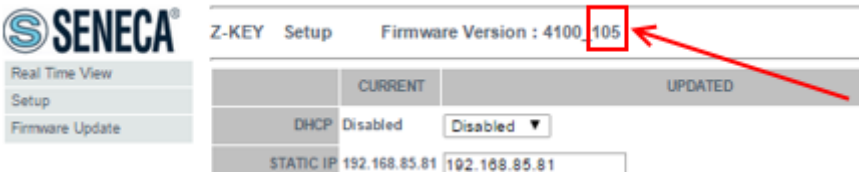
Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

At the end of the file transfer the Z-KEY will switch ON all the red leds and start to program the firmware to the internal flash (takes about 30 seconds). At the end the Z-KEY will reboot with the new firmware.

***WARNING!***

***Don't power down the Z-KEY when the update firmware procedure is started!***

You can verify the new firmware revision in the webserver upper corner (in the example the revision is 105):

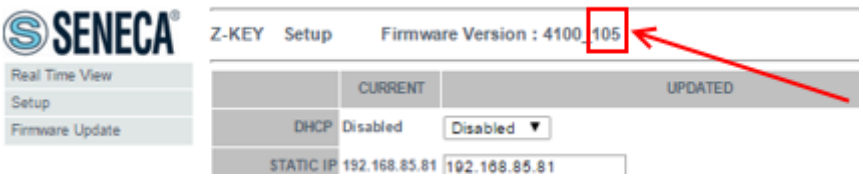



### 24.3. Firmware Update from microSD card

For updating the firmware from the microSD card follow the procedure:

- *Switch OFF Z-KEY*
- *Copy in the microSD root the "zkey.bin" firmware file*
- *Insert the microSD card in the Z-KEY*
- *Switch ON Z-KEY*
- *Now the Z-KEY will switch ON all the red leds and starts to program the firmware to the internal flash (takes about 30 seconds). At the end, the Z-KEY will reboot with the new firmware.*
- *The file "zkey.bin" will be automatically deleted from the microSD card*

You can verify the new firmware revision in the webserver upper corner (in the example the revision is 105):




## 25. Seneca Discovery Device

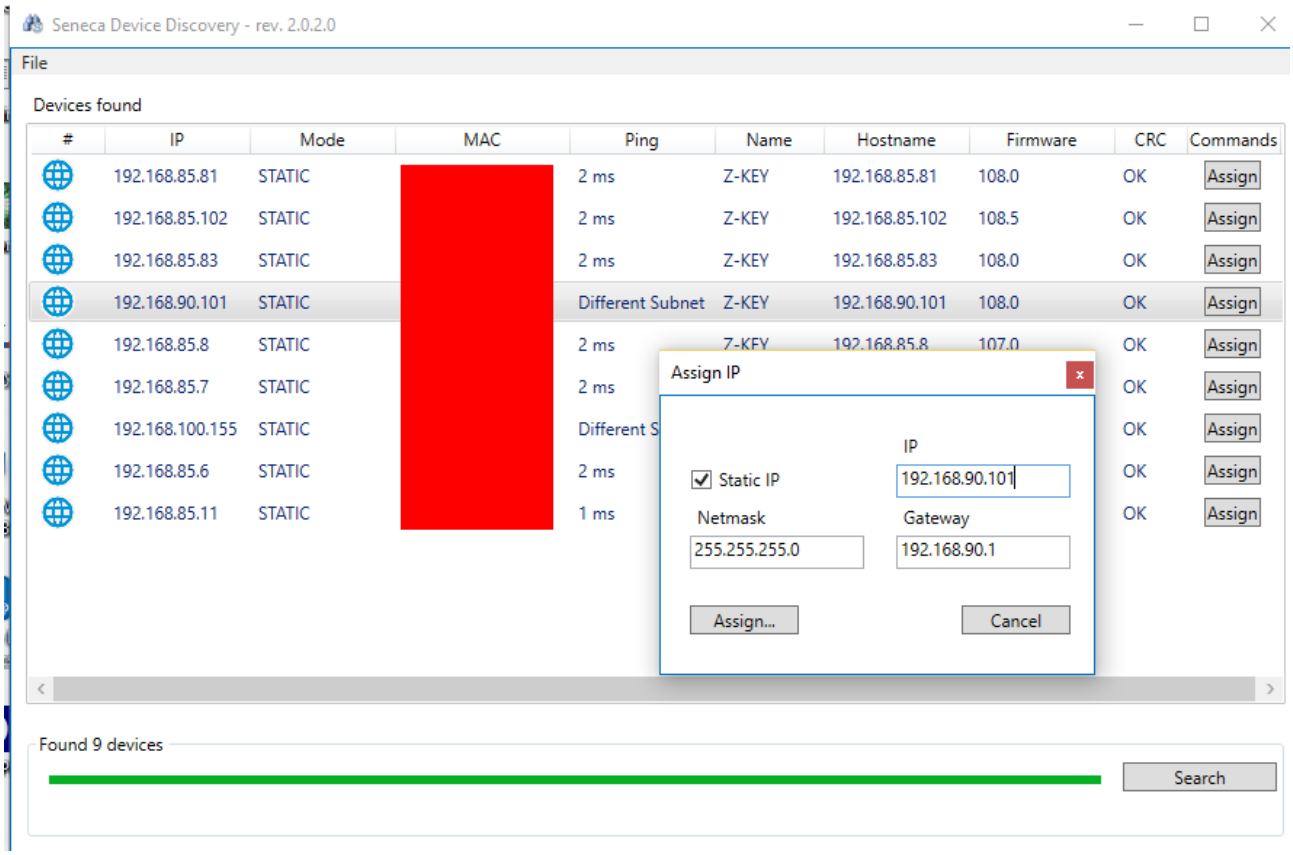
The Seneca Discovery Device Tool is available for free from:

http://www.seneca.it/products/z-key



Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

With this Tool you can search Z-KEY devices (and others Seneca Device) and change the actual IP configuration also if your PC has a different subnet.




***WARNING!***

***For Security Reasons you can disable the IP change functionality from the Webserver "Setup" page.***

## 26. Easy Setup APP for Android

Using an OTG Cable and an Android Device With OTG capability you can use Easy Setup App for change the IP configuration directly from the USB connector.

For more info go to the ANDROID APP ON Google play and search for the "Seneca Easy Setup APP" icon .

The OTG Cable can be buy directly from www.seneca.it :



CU-A-MICRO-OTG

*Micro USB OTG adapter cable - USB Type A Female.*



Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

# 27. CGI (common gateway interface) command

When Z-KEY is configured in Gateway mode it's possible to read tags values using CGI (Common Gateway Interface) line commands.

The cgi syntax is (where 192.168.90.101 is the Z-KEY ip address and N is the TAG page to read):

http://192.168.90.101/index.cgi?page=N

N can be from 1 to 10, every page contain 50 tag values.

For example for obtain the first 50 tags the cgi can be:

http://192.168.90.101/index.cgi?page=1

the response is:

NAME: RTU name

FW: Firmware revision

DHCP: activated or not

IP: Actual IP address

NET: Network mask

GW: Gateway address.

MAC: MAC address.

MODE_NR: the actual mode:

0 = "MODBUS BRIDGE ON PORT#1"

1 ="MODBUS BRIDGE ON PORT#2",

2 = "MODBUS BRIDGE ON PORT#1 AND PORT#2"

3 = "MODBUS GATEWAY PORT#1 AND PORT#2 MASTER"

4 = "MODBUS GATEWAY PORT#1 MASTER AND PORT#2 SLAVE"

5 = "MODBUS GATEWAY PORT#1 SLAVE AND PORT#2 MASTER"

6 = "MODBUS GATEWAY PORT#1 AND PORT#2 SLAVE"

7 = "REMOTE SERIAL COM ON PORT#1"

8 = "REMOTE SERIAL COM ON PORT#2"

ELEMENTS NUMBER: Tags number in this call.



Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

After this begin the Tag values:

TAGNAME: Tag name

TAGADDRESS: Tag Modbus address

TAGFORMAT: Data format

TAGVALUE: Tag value

TAGSTATUS: FAIL or OK

For example a response is:

Z-KEY

4100

Disabled

192.168.85.104

255.255.255.0

192.168.85.1

c8-f9-81-0c-00-26

3

50

TAG1

40001

UINT16

50

OK

TAG2

40002

UINT16

1000



Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

OK

TAG3

40003

UINT16

50

OK

TAG4

40005

UINT16

0

OK

TAG5

40007

UINT16

40

FAIL

TAG6

40008

UINT16

0

OK

[...]

40057

FP LSW

0.000000

FAIL



Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000