

# USER MANUAL

## Z-KEY-MBUS

## R-KEY-MBUS

M-BUS (METER BUS) TO MODBUS (TCP-IP / RTU) GATEWAYS



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ORIGINAL INSTRUCTIONS

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## Document revisions

| DATE       | REVISION | NOTES                                                                                                                                                                                                                                                                                                      | AUTHOR |
|------------|----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|
| 05/09/2022 | 0        | First revision<br>Aligned with firmware 109 revision                                                                                                                                                                                                                                                       | MM     |
| 13/03/2023 | 1        | Aligned the chapter "MAPPING OF THE TAG AREA (HOLDING REGISTERS)" with the firmware 110 revision.                                                                                                                                                                                                          | MM     |
| 20/03/2025 | 2        | Aligned with firmware 118 revision                                                                                                                                                                                                                                                                         | MM     |
| 02/07/2025 | 3        | Aligned with firmware 127 revision                                                                                                                                                                                                                                                                         | MM     |
| 04/03/2026 | 4        | Aligned with firmware 133 revision                                                                                                                                                                                                                                                                         | MM     |
| 02/04/2026 | 5        | Added information on supported protocols<br>Updated the web server images<br>Added a chapter on adding an offline M-BUS<br>Added a chapter on hardware revision and firmware updates<br>Removed references to the USB port<br>Added information to the "Status" section of the web server<br>Various fixes | MM     |
| 24/08/2026 | 6        | Added the 'CERTIFICATE SETUP' section.<br>General manual revision.                                                                                                                                                                                                                                         | AC     |

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## 1. INTRODUCTION



### **WARNING!**

THIS USER MANUAL EXTENDS THE INFORMATION FROM THE INSTALLATION MANUAL TO THE CONFIGURATION OF THE DEVICE. USE THE INSTALLATION MANUAL FOR MORE INFORMATION.



### **WARNING!**

IN ANY CASE, SENECA S.R.L. OR ITS SUPPLIERS WILL NOT BE RESPONSIBLE FOR THE LOSS OF DATA/REVENUE OR CONSEQUENTIAL OR INCIDENTAL DAMAGES DUE TO NEGLIGENCE OR BAD/IMPROPER MANAGEMENT OF THE DEVICE, EVEN IF SENECA IS WELL AWARE OF THESE POSSIBLE DAMAGES.

SENECA, ITS SUBSIDIARIES, AFFILIATES, GROUP COMPANIES, SUPPLIERS AND DISTRIBUTORS DO NOT GUARANTEE THAT THE FUNCTIONS FULLY MEET THE CUSTOMER'S EXPECTATIONS OR THAT THE DEVICE, FIRMWARE AND SOFTWARE SHOULD HAVE NO ERRORS OR OPERATE CONTINUOUSLY.



### **WARNING!**

**BUTTON PS1 IS NOT USED AT THE MOMENT IN THE Z-KEY-MBUS INSTRUMENT.**

### 1.1. DESCRIPTION

The Z-KEY-MBUS / R-KEY-MBUS products autonomously read (they are Meter Bus masters) the registers of the Meter Bus slave devices (M-BUS, max 25 slaves) and make them available for access via the serial ports, or via the Ethernet port.

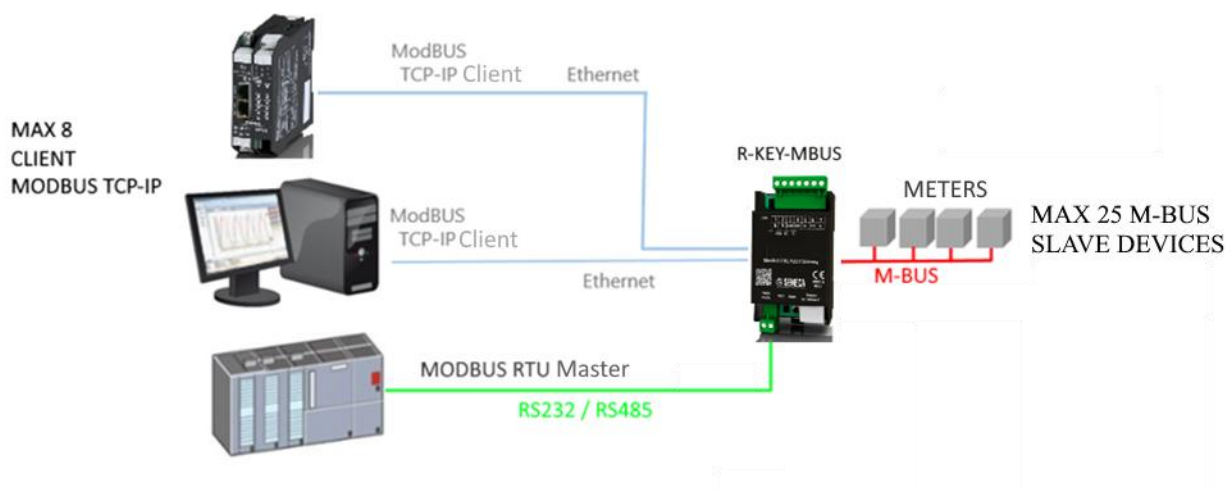
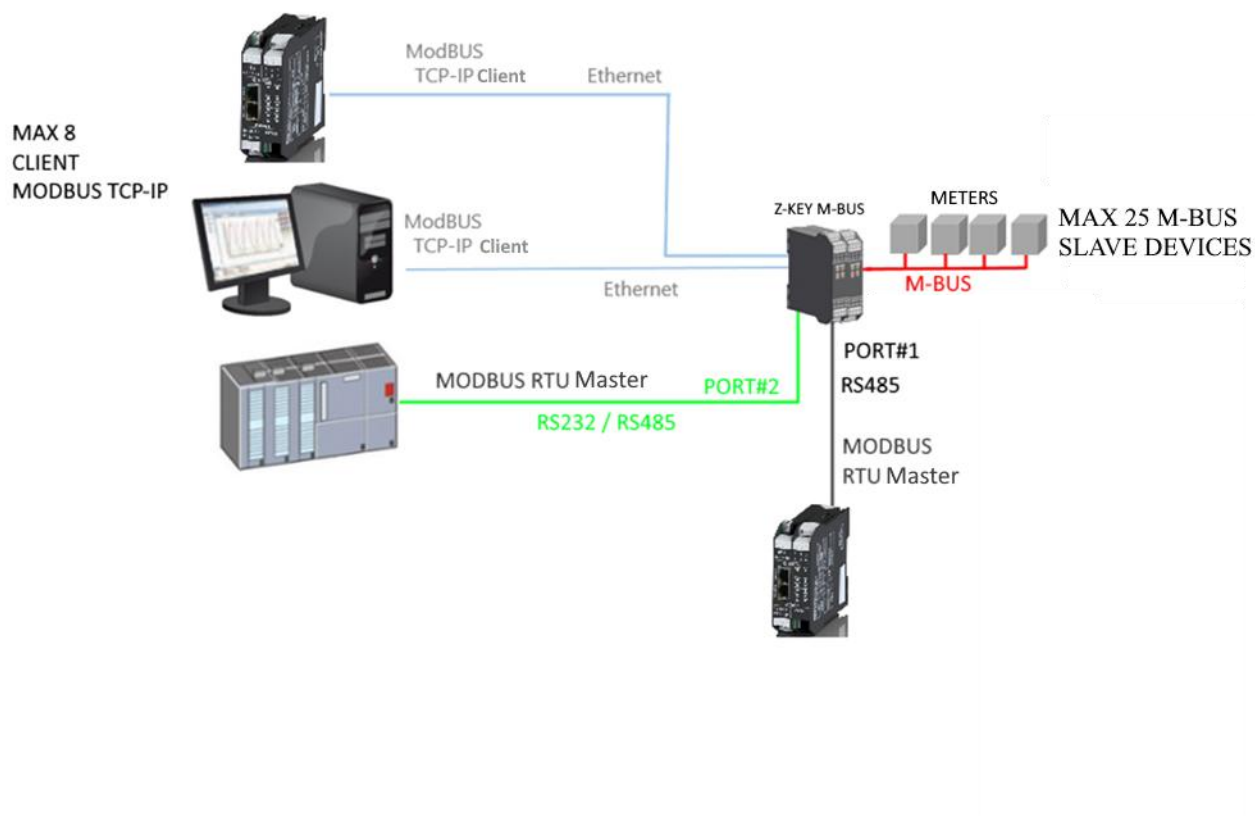
At the serial ports the Meter Bus bus values can be accessed via the Modbus Master protocol (the Modbus RTU Slave protocol is implemented in the KEY device).

The Ethernet port can be accessed via the Modbus TCP-IP Client protocol (the Modbus TCP-IP server protocol is implemented in the KEY device).

Seneca devices can be connected to a maximum of 25 M-BUS slave devices and can manage up to 500 M-BUS variables (tags) (since an M-BUS variable can occupy up to 4 Modbus registers, the device makes available up to 2000 Modbus registers (to which 32 Modbus diagnostic registers must be added)).

To configure the device, the integrated web server can be used without the need for external software.

Below are the connection configurations working simultaneously for both models:



## 2. **HARDWARE REVISION OF THE DEVICE**

As part of its commitment to continuous improvement, Seneca regularly updates and refines the hardware of its devices. You can find the hardware revision of a product on the label located on the side of the device.

An example of a label for the “R-KEY-LT” product is as follows:



The label also shows the firmware version installed on the device (in this case 2010) at the time of sale; the hardware version (in this case) is E00.

To improve performance or extend functionality, Seneca recommends always updating the firmware to the latest available version (see the product section on the website [www.seneca.it](http://www.seneca.it)).

## 3. **FIRMWARE UPDATE**

In order to improve, add or optimise the product's features, Seneca releases updated firmware in the device section of the website [www.seneca.it](http://www.seneca.it)

The firmware update is carried out using the Seneca tools or via the web server.



### **WARNING!**

**TO AVOID DAMAGING THE DEVICE, DO NOT DISCONNECT THE POWER SUPPLY WHILE THE FIRMWARE IS BEING UPDATED.**



### **WARNING!**

**BEFORE UPDATING THE FIRMWARE, SAVE YOUR CURRENT SETTINGS, AS THE UPDATE MAY RESET THE DEVICE TO ITS FACTORY SETTINGS OR RESULT IN THE LOSS OF CERTAIN SETTINGS.**



### **WARNING!**

**COMPATIBILITY IS NOT GUARANTEED WHEN IMPORTING A CONFIGURATION CREATED USING OLDER FIRMWARE.**

## 4. M-BUS PROTOCOL SUPPORTED

The devices in the KEY-MBUS series implement the M-BUS master protocol and interface with wired M-BUS slave meters, in accordance with the “wired M-BUS” protocol defined by:

EN 13757-2 (physical layer/data link layer)

EN 13757-3 (application layer / data structure)

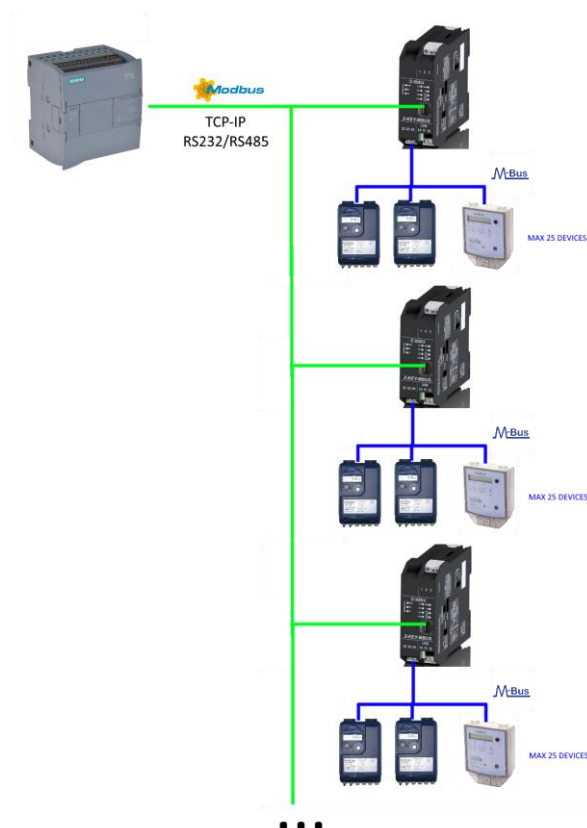
## 5. APPLICATION FIELDS

### 5.1. CONNECTION WITH A PLC

The most classic sphere of application is the Z/R-KEY-MBUS connection with a PLC, in this case it is sufficient for the PLC to support one of the following protocols:

- MODBUS RTU Master (via RS232 or RS485)
- MODBUS TCP-IP Client (via Ethernet)

The following example is related to Z-KEY-MBUS but is interchangeable with R-KEY-MBUS:



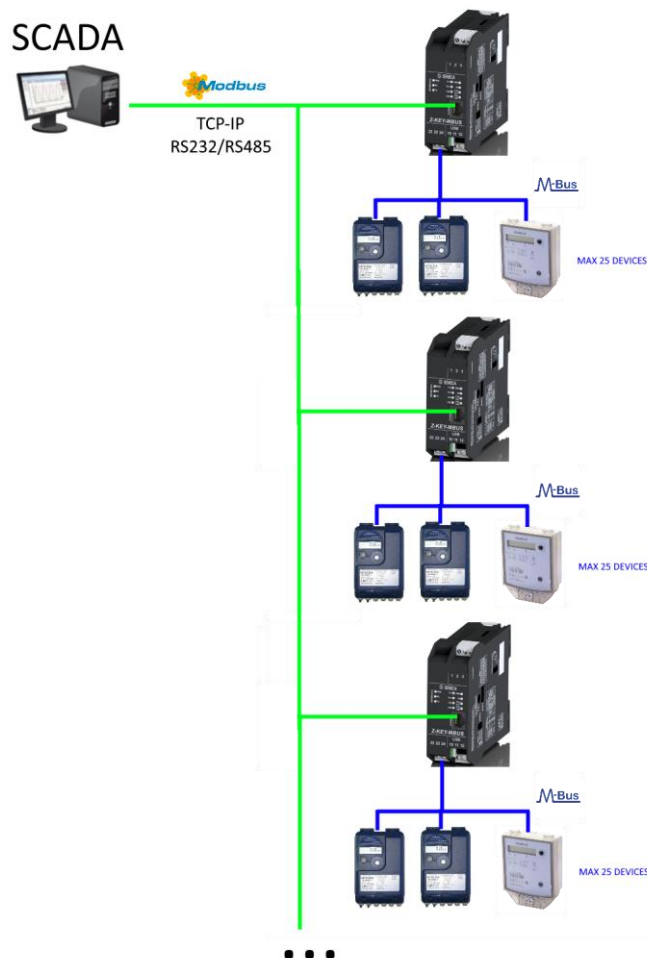
## 5.2. CONNECTION WITH A SCADA (PC)

To connect a PC with a SCADA system to the Z/R-KEY-MBUS gateway, the SCADA must support at least one of the following protocols:

- MODBUS RTU Master (via RS232 or RS485)
- MODBUS TCP-IP Client (via Ethernet)

Practically all SCADAs support these protocols.

Virtually there are no limits to the number of Z/R-KEY-MBUS gateways that can be connected to a SCADA:



## 6. **ETHERNET PORT**

The factory configuration of the Ethernet port is:

STATIC IP: 192.168.90.101  
SUBNET MASK: 255.255.0.0  
GATEWAY: 192.168.90.1

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

If you want to connect multiple devices on the same network, you need to change the IP address configuration using the Web server or the Seneca Discovery software.



### **WARNING!**

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

If the addressing mode with DHCP is activated and an IP address is not received within 2 minutes, the device will set an error IP address such as:

169.254.x.y

Where x.y are the last two values of the MAC ADDRESS.

## 7. **USB PORT (Z-KEY-MBUS MODEL ONLY)**

The device is equipped with a USB port for connection to a PC using the Modbus RTU protocol.

The USB port settings are fixed and cannot be changed by the user:

Modbus RTU Slave protocol

Baud Rate 38400

Modbus address 1

Data bit 8

Stop bit 1

Parity None

## 8. **INSTALLING MULTIPLE DEVICES ON A NETWORK USING THE "DHCP FAIL ADDRESS".**

When the Gateway is configured with DHCP enabled but does not receive a configuration from the DHCP server within 2 minutes, it assumes a fallback address.

This fallback address is 169.254.x.y, where x.y are the last two digits of the MAC address.

In this way, if DHCP is enforced on all devices, they can still be connected to the network even if there is no active DHCP server.

Once the fail device address has been activated (the corresponding LED stops flashing), you can launch the "Seneca Discovery Device" software and assign your preferred IP address to all devices.

## 9. **STEP BY STEP GUIDE FOR THE FIRST ACCESS TO THE WEB SERVER**

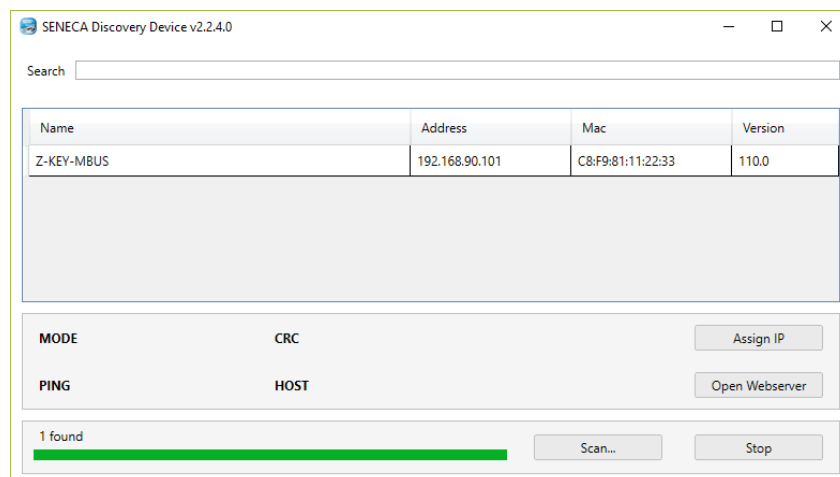
### **STEP 1: POWER AND CONNECT THE ETHERNET PORT**

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

Download (from the Seneca website in the Z/R-KEY-MBUS section) the Seneca Discovery Device software.

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

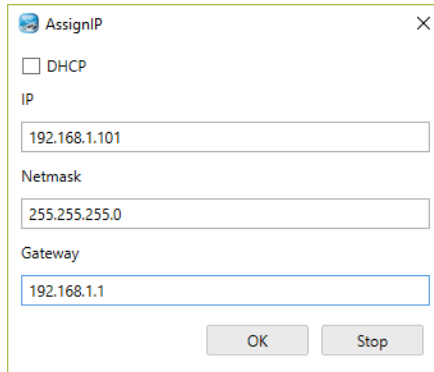
Run the software and press the "SCAN" button: the software will search for the Ethernet devices in the network. Locate the Z/R-KEY-MBUS device (factory default address 192.168.90.101):



The software works at Ethernet Layer 2 level and it is therefore not necessary to have an Ethernet configuration compatible with the device you are looking for.

**STEP 4 CHANGE OF IP ADDRESS**

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



A screenshot of a web-based configuration window titled "AssignIP". It contains a checkbox for "DHCP" which is unchecked. Below it are three text input fields: "IP" with the value "192.168.1.101", "Netmask" with the value "255.255.255.0", and "Gateway" with the value "192.168.1.1". At the bottom right are two buttons: "OK" and "Stop".

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

**STEP 5 ACCESS TO THE CONFIGURATION WEB SERVER**

Wait for the device to restart and press the “Open Web server” button.

ENTER your access credentials:

user: admin

password: admin

**WARNING!**

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

**MOZILLA FIREFOX AND GOOGLE CHROME.**

**THEREFORE, THE OPERATION WITH OTHER BROWSERS IS NOT GUARANTEED.**

## 10. WEB SERVER DEVICE CONFIGURATION

For further information on the access to the web server of a new device, please refer to chapter 9.



### **WARNING!**

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

**MOZILLA FIREFOX AND GOOGLE CHROME.**

**THEREFORE, THE OPERATION WITH OTHER BROWSERS IS NOT GUARANTEED.**

### 10.1. ACCESS TO THE WEB SERVER

Access to the web server takes place using a web browser and entering the IP address of the device.

To find out the IP address of the device, use the "search" function of the "Seneca Discovery Device" software (see chapter 9).

On first access the username and password will be requested.

The default values are:

Username: admin      Password: admin



### **WARNING!**

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

Accedi  
http://192.168.82.99  
La connessione a questo sito non è privata

Nome utente

Password



### **WARNING!**

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

## 10.2. WEB SERVER SECTIONS

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



### **Status**

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

### **Setup**

It is the section that allows the device basic configuration.

### **M-Bus Devices**

It is the section that allows adding/modifying the M-bus devices connected to the gateway.

### **Scan M-Bus**

It is the section that allows scanning and automatically adding the M-bus devices to the gateway.

### **Setup Tag**

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

### **Certificate Setup**

This section allows the user to upload or delete a certificate and/or the device's private key. Up to 5 client certificates are supported. The format used is PEM.

### **Firmware Update**

This section allows the user to upload or delete a certificate and/or the device's private key. Up to 5 client certificates are supported. The format used is PEM.

## 10.3. “STATUS” SECTION

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

DHCP : Disabled

ACTUAL IP ADDRESS : 102.168.90.101

ACTUAL IP MASK : 255.255.255.0

ACTUAL GATEWAY ADDRESS: 102.168.90.1

ACTUAL MAC ADDRESS: c8-f9-81-20-04-c0

MBUS LOOP TIME [ms]: 7500

REBOOT

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NEXT PAGE

| GATEWAY TAG NR | M-BUS DEVICE NAME | GATEWAY TAG NAME | GATEWAY MODBUS START REGISTER | TAG DATA TYPE      | TAG VALUE | TAG READING STATUS |
|----------------|-------------------|------------------|-------------------------------|--------------------|-----------|--------------------|
| 1              | NAME              | TAG1             | 40001                         | 32BIT UNSIGNED MSW | 8470      | OK                 |
| 2              | NAME              | TAG2             | 40003                         | 16BIT UNSIGNED     | 24908     | OK                 |
| 3              | NAME              | TAG3             | 40004                         | 16BIT UNSIGNED     | 4         | OK                 |
| 4              | NAME              | TAG6             | 40005                         | 16BIT UNSIGNED     | 0         | OK                 |
| 5              | NAME              | TAG7             | 40006                         | 16BIT UNSIGNED     | 0         | OK                 |
| 6              | NAME              | TAG8             | 40007                         | 16BIT SIGNED       | 20        | OK                 |
| 7              | NAME              | TAG10            | 40008                         | 16BIT SIGNED       | 112       | OK                 |
| 8              | NAME              | TAG11            | 40009                         | 16BIT SIGNED       | 16        | OK                 |
| 9              | NAME              | TAG12            | 40010                         | 16BIT SIGNED       | 1         | OK                 |
|                |                   |                  |                               | 64BIT              |           |                    |

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

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

#### 10.4. “SETUP” SECTION

***DHCP (default: Disabled)***

Sets the DHCP client to get an IP address automatically.

***STATIC IP (default: 192.168.90.101)***

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

***STATIC IP MASK (default: 255.255.255.0)***

Sets the mask for the IP network.

***STATIC GATEWAY (default: 192.168.90.1)***

Sets the gateway address.

***RESPONSE MODE WHEN RESOURCE IN FAIL (default: EXCEPTION)***

Selects what answer to give if the M-BUS meter connected does not answer the requests. It is possible to choose between:

Exception: The response to the modbus request of the tag in fail will be an exception.

Last Value Read: The response to the modbus request of the tag in fail will be the last valid value.

Max: The response to the tag modbus request will be the maximum value that can be represented by the type of data.

Min: The response to the tag modbus request will be the minimum value that can be represented by the type of data.

Zero: The response to the tag modbus request will be 0.

***TCP-IP PORT (default: 502)***

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

***M-BUS TIMEOUT [ms] (default 10000 ms)***

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

***M-BUS CYCLE PAUSE [s] (default 5 s)***

Sets the waiting time after completing a round of requests on all M-BUS devices.

***M-BUS READING RETRIES (default 3)***

Sets the number of requests retries before considering a tag in fail.

***WEB SERVER PORT (default: 80)***

Set the communication port for the web server.

***WEB SERVER AUTHENTICATION USERNAME (default: admin)***

Sets the username to access the web server.

**WEB SERVER AUTHENTICATION USER PASSWORD (default: admin)**

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

**WEB SERVER HTTPS (default: disabled)**

Enables or disables the web server over the HTTPS protocol

**IP CHANGE FROM DISCOVERY (default: Enabled)**

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

**PORT #1 SLAVE MODBUS ADDRESS (default: 1)**

Selects the Modbus slave station address of COM #1 port (on IDC10 connector for Z-KEY-MBUS, on terminal for R-KEY-MBUS).

**PORT #1 BAUDRATE (default: 38400 baud)**

Selects the communication speed of COM #1 serial port (on IDC10 connector for Z-KEY-MBUS, on terminal for R-KEY-MBUS).

**PORT #1 PARITY (default: None)**

Selects the parity for the COM #1 serial communication port (on IDC10 connector for Z-KEY-MBUS, on terminal for R-KEY-MBUS).

**PORT #1 STOP BIT (default: 1)**

Sets the number of stop bits for the COM #1 serial communication port (on IDC10 connector for Z-KEY-MBUS, on terminal for R-KEY-MBUS).

**PORT #2 SLAVE MODBUS ADDRESS (default: 1) (Z-KEY-MBUS ONLY)**

Selects the Modbus slave station address of the COM #2 port (on terminal).

**PORT #2 BAUDRATE (default: 38400 baud) (Z-KEY-MBUS ONLY)**

Selects the communication speed of the COM #2 serial port (on terminal)

**PORT #2 PARITY (default: None) (Z-KEY-MBUS ONLY)**

Sets the parity for the COM #2 serial communication port (on terminal).

**PORT #2 STOP BIT (default: 1) (Z-KEY-MBUS ONLY)**

Sets the number of stop bits for the COM #2 serial communication port (on terminal).

**MODBUS SERVER TLS (default: disabled)**

Enable or disable the Modbus TCP protocol with TLS.

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

#### 10.4.1. **SAVING A CONFIGURATION ON A FILE**

A configuration that includes:

CONFIGURATION

M-BUS DEVICE

TAG

It can be saved to a file this way:

Go to the “Setup” section, select the file to save, press the “Save config” button

|                |                         |                |
|----------------|-------------------------|----------------|
| Scegli file    | Nessun file selezionato | Load conf file |
| Save conf file |                         |                |



#### **WARNING!**

**BEFORE UPDATING THE FIRMWARE, SAVE YOUR CURRENT SETTINGS, AS THE UPDATE MAY RESET THE DEVICE TO ITS FACTORY SETTINGS OR RESULT IN THE LOSS OF CERTAIN SETTINGS.**

## 10.4.2. IMPORTING A CONFIGURATION FROM A FILE

A configuration that includes:

CONFIGURATION

M-BUS DEVICE

TAG

It can be imported from a file this way:

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

Scegli file
Nessun file selezionato
Load conf file

Save conf file

|                          |                   |
|--------------------------|-------------------|
| DHCP :                   | Enabled           |
| ACTUAL IP ADDRESS :      | 192.168.82.2      |
| ACTUAL IP MASK :         | 255.255.255.0     |
| ACTUAL GATEWAY ADDRESS : | 192.168.82.1      |
| ACTUAL MAC ADDRESS :     | c8-f9-81-11-22-33 |
| MBUS LOOP TIME [ms]:     | 33868             |

REBOOT

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| GATEWAY<br>TAG NR | GATEWAY<br>TAG NAME | GATEWAY<br>MODBUS<br>START<br>REGISTER | TAG DATA<br>TYPE     | TAG VALUE   | TAG<br>READING<br>STATUS |
|-------------------|---------------------|----------------------------------------|----------------------|-------------|--------------------------|
| 1                 | FLOW_TEMP           | 40001                                  | 32BIT<br>REAL<br>MSW | -327.000000 | OK                       |
| 2                 | RETURN_TEMP         | 40003                                  | 32BIT<br>REAL<br>MSW | -327.000000 | OK                       |
| 3                 | VOLUME1             | 40005                                  | 32BIT<br>REAL<br>MSW | 1000.000000 | OK                       |
| 4                 | VOLUME2             | 40007                                  | 32BIT<br>REAL<br>MSW | 256.000000  | OK                       |



### WARNING!

**COMPATIBILITY IS NOT GUARANTEED WHEN IMPORTING A CONFIGURATION CREATED USING OLDER FIRMWARE.**

## 10.5. “M-BUS DEVICES” SECTION

This section shows the M-BUS devices inserted in the gateway.

It is possible to delete all the tags related to a device by deleting the device from the list of devices.

### 10.5.1. REPLACEMENT OF AN M-BUS DEVICE

If a meter needs to be replaced (for example, if it breaks), there is no need to rescan the bus; simply change the primary or secondary address to the new one by pressing the “MODIFY” button:

Z-KEY-MBUS Setup Bus Device 1 Firmware Version : 1170\_110

|                         | CURRENT   | UPDATED                                |
|-------------------------|-----------|----------------------------------------|
| DEVICE DESCRIPTION NAME | NAME      | <input type="text" value="NAME"/>      |
| ADDRESS TYPE            | SECONDARY | <input type="text" value="SECONDARY"/> |
| IDENTIFICATION NUMBER   | 82081127  | <input type="text" value="82081127"/>  |
| MANUFACTURER NUMBER     | C514      | <input type="text" value="C514"/>      |
| VERSION NUMBER          | 01        | <input type="text" value="01"/>        |
| MEDIUM                  | 0D        | <input type="text" value="0D"/>        |
| BAUDRATE                | 2400      | <input type="text" value="2400"/>      |

| MANUFACTURER                        | DEVICE               |
|-------------------------------------|----------------------|
| <input type="text" value="CUSTOM"/> | <input type="text"/> |

## 10.5.2. MANUAL ADDITION OF AN M-BUS DEVICE

By means of the "ADD" button, instead, it is possible to access the addition of an M-BUS device in manual mode. Z/R-KEY-MBUS has a database growing continuously with the devices of the main brands.

Z-KEY-MBUS Setup Bus Device 2 Firmware Version : 1170\_110

| CURRENT                         |              | UPDATED                            |  |
|---------------------------------|--------------|------------------------------------|--|
| DEVICE DESCRIPTION NAME         | SensoStar(R) |                                    |  |
| ADDRESS TYPE                    | PRIMARY      |                                    |  |
| PRIMARY ADDRESS                 | 0            |                                    |  |
| BAUDRATE                        | 2400         |                                    |  |
| APPLY WITH DATA POINTS SELECTED |              | APPLY WITHOUT DATA POINTS SELECTED |  |

| MANUFACTURER | DEVICE       |
|--------------|--------------|
| Engelmann    | SensoStar(R) |

| DATA POINT NUMBER | DATA POINT NAME                                 | EXPONENT | DATA TYPE       | SELECTED                            | TAG NAME          |
|-------------------|-------------------------------------------------|----------|-----------------|-------------------------------------|-------------------|
| 1                 | cur. Volume [m³]                                | 0        | 32BIT FP        | <input checked="" type="checkbox"/> | cur. Volume [m³]  |
| 2                 | first yearly due date [date]                    | 0        | 32BIT DATE-TIME | <input checked="" type="checkbox"/> | first yearly du   |
| 3                 | last monthly due date [date]                    | 0        | 32BIT DATE-TIME | <input checked="" type="checkbox"/> | last monthly du   |
| 4                 | next yearly due date [Datum]                    | 0        | 32BIT DATE-TIME | <input checked="" type="checkbox"/> | next yearly due   |
| 5                 | operating time during error [days]              | 0        | 32BIT SIGNED    | <input checked="" type="checkbox"/> | operating time    |
| 6                 | averaging time for max. values [min]            | 0        | 32BIT SIGNED    | <input checked="" type="checkbox"/> | averaging time    |
| 7                 | max. volume flow - first yearly due date [m³/h] | 0        | 32BIT FP        | <input checked="" type="checkbox"/> | max. volume flo   |
| 8                 | max. power - last yearly due date [W]           | 0        | 32BIT FP        | <input checked="" type="checkbox"/> | max. power - la   |
| 9                 | max. volume flow [m³/h]                         | 0        | 32BIT FP        | <input checked="" type="checkbox"/> | max. volume flo   |
| 10                | max. power [W]                                  | 0        | 32BIT FP        | <input checked="" type="checkbox"/> | max. power [W]    |
| 11                | cur. volume flow [m³/h]                         | 0        | 32BIT FP        | <input checked="" type="checkbox"/> | cur. volume flo   |
| 12                | cur. power [W]                                  | 0        | 32BIT FP        | <input checked="" type="checkbox"/> | cur. power [W]    |
| 13                | flow temperature [°C]                           | 0        | 32BIT FP        | <input checked="" type="checkbox"/> | flow temperatur   |
| 14                | return temperature [°C]                         | 0        | 32BIT FP        | <input checked="" type="checkbox"/> | return temperatur |
| 15                | temperature difference [K]                      | 0        | 32BIT FP        | <input checked="" type="checkbox"/> | temperature dif   |
| 16                | cur. Energy [Wh]                                | 3        | 32BIT FP        | <input checked="" type="checkbox"/> | cur. Energy [Wh]  |
| 17                | Energy - last yearly due date [Wh]              | 3        | 32BIT FP        | <input checked="" type="checkbox"/> | Energy - last y   |
| 18                | Energy - last monthly due date [Wh]             | 3        | 32BIT FP        | <input checked="" type="checkbox"/> | Energy - last m   |
| 19                | cur. date and time [time & date]                | 0        | 32BIT DATE-TIME | <input checked="" type="checkbox"/> | cur. date and t   |
| 20                | Serialnumber                                    | 0        | 32BIT SIGNED    | <input checked="" type="checkbox"/> | Serialnumber      |

A = Select the brand of the device to insert

A = Select the model of the device to insert

C = Select if the device must be interrogated via primary or secondary address

D = Device address

E = Device Baud rate

If you only want to insert the device without the tags, press the "APPLY WITHOUT DATA POINTS SELECTED" button

If you only want to insert both the device and the selected tags, press the "APPLY WITH DATA POINTS SELECTED" button

## 10.6. “SCAN M-BUS” SECTION

### 10.6.1. SCANNING THE M-BUS

In the SCAN M-BUS section it is possible to automatically scan the bus.

**NO SCAN RUNNING**

Scan Baud mode: **ALL EXCEPT 384000 BAUD** ▼

| M-BUS<br>DEVICE<br>NR | M-BUS<br>ADDRESS TYPE | M-BUS<br>ADDRESS | M-BUS<br>BAUDRATE |
|-----------------------|-----------------------|------------------|-------------------|
|-----------------------|-----------------------|------------------|-------------------|

If you do not know the primary address nor the baudrate of the M-BUS devices, we recommend you perform a secondary scan at all baud rates (it may take several minutes).

If a priori it is known that there are no conflicts of primary address it is possible to carry out a scan by primary address.

As devices are found they appear on the screen, for example:

| M-BUS<br>DEVICE<br>NR | M-BUS<br>ADDRESS TYPE | M-BUS<br>ADDRESS | M-BUS<br>BAUDRATE |
|-----------------------|-----------------------|------------------|-------------------|
| 1                     | SECONDARY             | 00008431614C0402 | 2400              |
| 2                     | SECONDARY             | 00008432614C0402 | 2400              |
| 3                     | SECONDARY             | 00008434614C0402 | 2400              |
| 4                     | SECONDARY             | 00008435614C0402 | 2400              |
| 5                     | SECONDARY             | 00008436614C0402 | 2400              |
| 6                     | SECONDARY             | 00008441614C0402 | 2400              |
| 7                     | SECONDARY             | 00008444614C0402 | 2400              |
| 8                     | SECONDARY             | 00008446614C0402 | 2400              |
| 9                     | SECONDARY             | 00008449614C0402 | 2400              |
| 10                    | SECONDARY             | 00008454614C0402 | 2400              |
| 11                    | SECONDARY             | 00008458614C0402 | 2400              |

The scan remains saved in the flash memory of the device until a new scan is requested.

When scanning using the primary address, it is also possible to send a command to the meter to change the primary address by pressing the “CHANGE ADDRESS” button:

|                          |                                                                                                                                                                                                                                   |  |  |  |
|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|
| <b>STATUS</b>            | NO SCAN RUNNING                                                                                                                                                                                                                   |  |  |  |
| <b>SETUP</b>             | Scan Baud mode: <b>ALL EXCEPT 384000 BAUD</b> ▼                                                                                                                                                                                   |  |  |  |
| <b>M-BUS DEVICES</b>     | <input type="button" value="SCAN PRIMARY"/> <input type="button" value="SCAN SECONDARY"/> <input type="text" value="FFFFFFFFFFFFFF"/> <input type="button" value="STOP SCAN"/> <input type="button" value="ADD SELECTED DEVICE"/> |  |  |  |
| <b>SCAN M-BUS</b>        |                                                                                                                                                                                                                                   |  |  |  |
| <b>SETUP TAG</b>         |                                                                                                                                                                                                                                   |  |  |  |
| <b>CERTIFICATE SETUP</b> |                                                                                                                                                                                                                                   |  |  |  |
| <b>FIRMWARE UPDATE</b>   |                                                                                                                                                                                                                                   |  |  |  |

| M-BUS<br>DEVICE<br>NR | M-BUS<br>ADDRESS TYPE | M-BUS<br>ADDRESS | M-BUS<br>BAUDRATE |                                               |
|-----------------------|-----------------------|------------------|-------------------|-----------------------------------------------|
| 1                     | PRIMARY               | 1                | 2400              | <input type="button" value="CHANGE ADDRESS"/> |
| 2                     | PRIMARY               | 2                | 2400              | <input type="button" value="CHANGE ADDRESS"/> |
| 3                     | PRIMARY               | 3                | 2400              | <input type="button" value="CHANGE ADDRESS"/> |

## 10.6.2. ADDITION OF AN M-BUS DEVICE AND YOUR TAGS

Once the bus has been scanned, it can be added to the list of M-BUS devices by selecting it from the list and pressing the "Add Selected Device" button:

**Z-KEY-MBUS**   **Scan Status Bus**   **Firmware Version : 1170\_110**

---

**SCAN ENDED AT 19200 BAUDRATE**

---

Scan Baud mode: **2400 BAUD** ▼

| M-BUS<br>DEVICE<br>NR | M-BUS<br>ADDRESS TYPE | M-BUS<br>ADDRESS | M-BUS<br>BAUDRATE |
|-----------------------|-----------------------|------------------|-------------------|
| 1                     | SECONDARY             | 82081127C514010D | 2400              |

At this point you can choose which device tags to add to the Z/R-KEY-MBUS device:



**R-KEY-MBUS-HW-B Add Device : FOUND DEVICE**

STATUS  
SETUP  
**M-BUS DEVICES**  
SCAN M-BUS  
SETUP TAG  
CERTIFICATE SETUP  
FIRMWARE UPDATE

UPDATED

DEVICE DESCRIPTION NAME

ADDRESS TYPE

SECONDARY ▼

IDENTIFICATION NUMBER

00008434

MANUFACTURER NUMBER

614C

VERSION NUMBER

04

MEDIUM

02

BAUDRATE

2400

ADD DEVICE WITH DATA POINTS SELECTED

| DATA POINT NUMBER | TYPE                             | VALUE NOT SCALED (VALUE SCALED) | CONVERT TO DATA TYPE | SELECTED                            | TAG NAME |
|-------------------|----------------------------------|---------------------------------|----------------------|-------------------------------------|----------|
| 0                 | Identification Number            | 8434                            | 32BIT UNSIGNED MSW ▼ | <input checked="" type="checkbox"/> | TAG1     |
| 1                 | Manufacturer Number              | SCA                             | 16BIT UNSIGNED ▼     | <input checked="" type="checkbox"/> | TAG2     |
| 2                 | Version                          | 4                               | 16BIT UNSIGNED ▼     | <input type="checkbox"/>            | TAG3     |
| 3                 | Medium                           | Electricity                     | 16BIT UNSIGNED ▼     | <input type="checkbox"/>            | TAG4     |
| 4                 | Access Number                    | 1                               | 16BIT UNSIGNED ▼     | <input type="checkbox"/>            | TAG5     |
| 5                 | Status [HEX]                     | 00                              | 16BIT UNSIGNED ▼     | <input type="checkbox"/>            | TAG6     |
| 6                 | Signature [HEX]                  | 0000                            | 16BIT UNSIGNED ▼     | <input type="checkbox"/>            | TAG7     |
| 7                 | ▶ Manufacturer specific (U0S0T0) | 1                               | 16BIT SIGNED ▼       | <input type="checkbox"/>            | TAG8     |
| 8                 | ▶ Manufacturer specific (U0S0T0) | 1                               | 16BIT SIGNED ▼       | <input type="checkbox"/>            | TAG9     |
| 9                 | ▶ A (U0S0T0)                     | 1                               | 16BIT SIGNED ▼       | <input type="checkbox"/>            | TAG10    |
| 10                | ▶ Manufacturer specific (U0S0T0) | 1                               | 16BIT SIGNED ▼       | <input type="checkbox"/>            | TAG11    |
| 11                | ▶ Manufacturer specific (U0S0T0) | 0                               | 16BIT SIGNED ▼       | <input type="checkbox"/>            | TAG12    |
| 12                | ▶ Manufacturer specific (U0S0T0) | 1                               | 16BIT SIGNED ▼       | <input type="checkbox"/>            | TAG13    |
| 13                | ▶ Manufacturer specific (U0S0T0) | 894292975616                    | 64BIT SIGNED MSW ▼   | <input type="checkbox"/>            | TAG14    |
| 14                | ▶ Energy (1e-1 Wh) (U0S0T1)      | 0<br>(0)                        | 64BIT SIGNED MSW ▼   | <input type="checkbox"/>            | TAG15    |

## DATA POINT NUMBER

Represents the number of the variable in the datagram

## TYPE

Represents the type of the variable, the parameters are also available:

### Storage number

Indicates the identification number of the memory location in which the data is stored. If a counter has multiple values of the same type (for example, multiple registers), the **storage number** is used to differentiate them.

### Tariff

Indicates the tariff number associated with the value. It can be used when a meter records consumption with multiple tariff bands (for example, differentiated day/night tariffs). A tariff equal to 0 generally indicates that there is no tariff differentiation.

**Unit**

Specifies the unit of measurement in which the value transmitted by the device is expressed (for example, litres, m<sup>3</sup>, kWh, etc.).

**Data Field**

It is the field that directly contains the numerical value of the measurement taken (for example: energy consumption, water volume, temperature, etc.).

It can include different data formats, for example numeric (integer or decimal), date and time (timestamp), or special values (for example, error or status code).

**Function Field**

Specifies the type of measured value and how it was detected, for example:

- Instantaneous value: instantaneous value detected at a given moment.
- Maximum / Minimum: maximum or minimum values recorded.
- Accumulated value: value accumulated over time (for instance: total energy consumed).

**DIF (Data Information Field)**

This is a mandatory field that describes the size, format and structure of the transmitted data (for example: length in bytes, integer or real, date-time, presence of additional fields such as DIFE). Specifies whether additional fields (DIFE extensions) need to be read.

**VIF (Value Information Field)**

It is a mandatory field that defines the physical type of the data and the associated unit of measurement.

For example: volume (litres), energy (kWh), temperature (°C), pressure, etc.

If the description is not enough, additional extensions are used (VIFE).

**DIFE (Data Information Field Extension)**

This is an optional field used when additional information is needed that is not directly included in the DIF. It can contain additional details such as Storage number, Tariff, historical memory indication (previous period), etc.

**VIFE (Value Information Field Extension)**

Optional field that expands the meaning of the VIF by providing additional and detailed information.

It is used to further describe the unit of measurement or specify scale factors or precision of the measured data, when the basic VIF is not sufficient.

**VALUE NOT SCALED (VALUE SCALED)**

It represents the numerical value assumed by the variable at the time of scanning (unscaled) and its scaled value according to the configured unit of measurement. For example, if the measurement is in Wh\*E-2, it is converted to Wh (the scaled value will be displayed in round brackets).

## CONVERT TO DATA TYPE

Represents the data type to which the variable in the Modbus registers must be converted

## SELECT

Selects which variable to import into the modbus registers

## TAG NAME

It is the mnemonic of the variable



## WARNING!

**IF NO TAG IS SELECTED, THE SYSTEM WOULD ADD TO THE LIST ONLY THE M-BUS DEVICE.**

Now press the "ADD DEVICE WITH DATA POINT SELECTED" button, at which point the tags and the device are automatically added to the Z/R-KEY-MBUS list.

To verify the addition of the M-BUS device you are automatically returned to the M-BUS DEVICES section:

| Z-KEY-MBUS                         |                         | Setup Bus                                    | Firmware Version : 1170_110              |                   |
|------------------------------------|-------------------------|----------------------------------------------|------------------------------------------|-------------------|
| <input type="button" value="ADD"/> |                         | <input type="button" value="MODIFY"/>        | <input type="button" value="DELETE"/>    |                   |
| Page : 1/10                        |                         | <input type="button" value="PREVIOUS PAGE"/> | <input type="button" value="NEXT PAGE"/> |                   |
| M-BUS<br>DEVICE<br>NR              | M-BUS<br>DEVICE<br>NAME | M-BUS<br>ADDRESS<br>TYPE                     | M-BUS<br>ADDRESS                         | M-BUS<br>BAUDRATE |
| 1                                  | NAME                    | SECONDARY                                    | 82081127-C514-01-0D                      | 2400              |

Added tags can be seen in the instant view (Status section) and/or in the Tag Setup section.

## 10.7. "TAG SETUP" SECTION

In this section it is possible to modify the tags manually:

PRESS "CTRL" KEY TO SELECT MORE ROWS  
 MODBUS ADDRESS ARE 1-BASED (1=40001/30001...)  
 HOVER TO THE INPUT BOX TO SEE EQUIVALENT SENECA ADDRESS

| GATEWAY TAG NR | GATEWAY MODBUS START REGISTER | GATEWAY TAG NAME | TARGET M-BUS DEVICE | TARGET M-BUS RECORD INDEX | TARGET REGISTER DATA TYPE | TARGET SCALING MODE | TARGET SCALE GAIN | TARGET SCALE OFFSET |
|----------------|-------------------------------|------------------|---------------------|---------------------------|---------------------------|---------------------|-------------------|---------------------|
| 1              | 10                            | TAG131           | NAME31              | ID NUM                    | 32BIT UNSIGNED MSW        | DISABLED            | 0.0               | 0.0                 |
| 2              | 12                            | TAG331           | NAME31              | VERSION                   | 16BIT UNSIGNED            | DISABLED            | 0.0               | 0.0                 |
| 3              | 13                            | TAG531           | NAME31              | ACCESS NO.                | 16BIT UNSIGNED            | DISABLED            | 0.0               | 0.0                 |
| 4              | 14                            | TAG81            | NAME31              | RECORD 1                  | 32BIT SIGNED MSW          | DISABLED            | 0.0               | 0.0                 |
| 5              | 16                            | TAG931           | NAME31              | RECORD 2                  | 32BIT SIGNED MSW          | DISABLED            | 0.0               | 0.0                 |
| 6              | 18                            | TAG1431          | NAME31              | RECORD 7                  | 32BIT SIGNED MSW          | DISABLED            | 0.0               | 0.0                 |
| 7              | 20                            | ErrFlags         | Supercal+531        | RECORD 1                  | 32BIT REAL MSW            | DISABLED            | 1.000             | 0.000               |
| 8              | 22                            | ActDurationErr   | Supercal+531        | RECORD 2                  | 32BIT SIGNED MSW          | DISABLED            | 0.0               | 0.0                 |
| 9              | 24                            | Timepoint        | Supercal+531        | RECORD 3                  | DATE/TIME                 | DISABLED            | 0.0               | 0.0                 |
| 10             | 26                            | En_Wh            | Supercal+531        | RECORD 4                  | 32BIT REAL MSW            | DISABLED            | 1.000             | 0.000               |
| 11             | 28                            | Vol_m3           | Supercal+531        | RECORD 5                  | 32BIT REAL MSW            | DISABLED            | 1.000             | 0.000               |
| 12             | 30                            | En_Wh%20_t1      | Supercal+531        | RECORD 6                  | 32BIT REAL MSW            | DISABLED            | 1.000             | 0.000               |
| 13             | 32                            | Vol_m3_t1        | Supercal+531        | RECORD 7                  | 32BIT REAL MSW            | DISABLED            | 0.000             | 0.000               |
| 14             | 34                            | IdNum_dev1       | Supercal+531        | RECORD 8                  | 32BIT REAL MSW            | DISABLED            | 0.000             | 0.000               |
| 15             | 36                            | Vol_m3_dev1      | Supercal+531        | RECORD 9                  | 32BIT REAL MSW            | DISABLED            | 0.000             | 0.000               |

***It is possible to delete all the tags related to a device by deleting the device itself from the list in the M-BUS Devices section.***

With the "ADD" button it is possible to add a new tag related to an M-BUS device.

The "CLONE" button allows you to clone and edit a previous tag.

The "DELETE" button allows you to delete a tag.

The MOVE UP/DOWN button allows you to move the tag's position.

### **GATEWAY TAG NR**

This is the number of set tags

### **GATEWAY MODBUS START REGISTER ADDRESS**

It is the address of the starting modbus register in the modbus registers with the convention 1-BASED (1=40001/30001, 2 = 40002/30002, 3 = 40003/30003...)

### **GATEWAY TAG NAME**

It is the mnemonic of the variable

### **TARGET M-BUS DEVICE**

It is the M-BUS device to which the variable is associated

### **TARGET REGISTER DATA TYPE**

It is the data type of the modbus register associated with the M-BUS variable

## TARGET SCALING MODE

If enabled, it allows you to scale the variable with a GAIN and an OFFSET.

The scaling obtained is of the type:

$$\text{Variable Scalata} = (\text{Variable} * \text{GAIN}) + \text{OFFSET}$$

So, if you wanted to divide the variable by 1000, just set:

GAIN = 0,001

OFFSET = 0



## WARNING!

**SCALING WILL ONLY TAKE EFFECT IF THE "TARGET REGISTER DATA TYPE" IS REAL.**

## TARGET SCALE GAIN

Represents the Gain of the scaling

## TARGET SCALE OFFSET

Represents the offset of the scaling

## 10.8. "CERTIFICATE SETUP" SECTION

This section allows the user to upload or delete a certificate and/or the device's private key. Up to 5 client certificates are supported. The format used is PEM.

|                                                                               |                                                                     |
|-------------------------------------------------------------------------------|---------------------------------------------------------------------|
| CA CERTIFICATE :                                                              |                                                                     |
| NOT PRESENT                                                                   |                                                                     |
| <input type="button" value="Scegli file"/> Nessun file selezionato            | <input type="button" value="Send new CA certificate selected"/>     |
| <input type="button" value="CLEAR CA CERTIFICATE"/>                           |                                                                     |
| SERVER HTTPS/MODBUS TLS CERTIFICATE :                                         |                                                                     |
| NOT PRESENT                                                                   |                                                                     |
| <input type="button" value="Scegli file"/> Nessun file selezionato            | <input type="button" value="Send new server certificate selected"/> |
| <input type="button" value="CLEAR SERVER MODBUS HTTPS/TLS CERTIFICATE"/>      |                                                                     |
| SERVER HTTPS/MODBUS TLS PRIVATE KEY :                                         |                                                                     |
| NOT PRESENT                                                                   |                                                                     |
| <input type="button" value="Scegli file"/> Nessun file selezionato            | <input type="button" value="Send new server private key selected"/> |
| <input type="button" value="CLEAR HTTPS/MODBUS TLS CERTIFICATE PRIVATE KEY"/> |                                                                     |

## 10.9. “FIRMWARE UPDATE” SECTION

### 10.9.1. FIRMWARE UPDATE

In order to improve, add, optimize the functions of the product, Seneca releases firmware updates on the device section on the [www.seneca.it](http://www.seneca.it) website

Then select the new firmware file and press the "Update firmware" button

|             |                         |                                   |
|-------------|-------------------------|-----------------------------------|
| Scegli file | Nessun file selezionato | Send new firmware update selected |
|-------------|-------------------------|-----------------------------------|

**IMPORTANT NOTICE:** *before starting the firmware update, it's safe to save the current device configuration.*



## WARNING!

**BEFORE STARTING THE FIRMWARE UPDATE, IT'S SAFE TO SAVE THE CURRENT DEVICE CONFIGURATION.**



## WARNING!

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

## 11. ADDITION OF AN M-BUS METER IN OFFLINE MODE

On the M-BUS DEVICES page, you can add an M-BUS meter from the internal database, allowing you to set up a configuration even when you are not physically on site.  
The database contains the main meters from leading manufacturers; please contact Seneca to add a device to the database.

| CURRENT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |         | UPDATED                                                                                                                           |  |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|-----------------------------------------------------------------------------------------------------------------------------------|--|
| DEVICE DESCRIPTION NAME                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | DEVICE  |                                                                                                                                   |  |
| ADDRESS TYPE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | PRIMARY |                                                                                                                                   |  |
| PRIMARY ADDRESS                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 1       |                                                                                                                                   |  |
| BAUDRATE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 300     |                                                                                                                                   |  |
| APPLY WITH DATA POINTS SELECTED                                                                                                                                                                                                                                                                                                                                                                                                                                                             |         | APPLY WITHOUT DATA POINTS SELECTED                                                                                                |  |
| MANUFACTURER                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |         | DEVICE                                                                                                                            |  |
| <div> <div>CUSTOM</div> <div>CUSTOM</div> <div>ABB</div> <div>Actaris / Allmess</div> <div>aquametro</div> <div>Brunata</div> <div>Danfoss</div> <div>Elster Kromschroeder GmbH</div> <div>Elvaco</div> <div>Engelmann / Maddalena</div> <div>Hydrometer</div> <div>Ista</div> <div>Kamstrup</div> <div>Landis and Gyr / Siemens</div> <div>Metrima</div> <div>Sensus</div> <div>Schrack (EMH)</div> <div>Sontex</div> <div>Schinzell</div> <div>Trillquist</div> <div>Viteira</div> </div> |         | <div> <div></div> <div>A POINT NAME</div> <div>EXPONENT</div> <div>DATA TYPE</div> <div>SELECTED</div> <div>TAG NAME</div> </div> |  |



## WARNING!

**THE VARIABLES OF A METER CAN BE CONFIGURED (USUALLY USING EXTERNAL SOFTWARE);  
THE M-BUS SERIES DATABASE LISTS THE MOST COMMONLY USED ONES.**

## 12. SUPPORTED MODBUS COMMUNICATION PROTOCOLS

The Modbus communication protocols supported are:

- Modbus RTU Slave (from #1 and #2 serial ports where available)
- Modbus TCP-IP Server (from the Ethernet port) 8 simultaneous clients max.

For more information on these protocols, see the website:

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

## 12.1. SUPPORTED MODBUS FUNCTION CODES

The following Modbus functions are supported:

- Read Holding Register (function 3)
- Write Single Register (function 6)



## **WARNING!**

**ALL 32-BIT VALUES ARE CONTAINED IN 2 CONSECUTIVE REGISTERS.**

## 13. MODBUS REGISTER MAPPING

Z/R-KEY-MBUS provides two different data areas accessible via Modbus RTU / Modbus TCP-IP protocols: The TAG area and the Diagnostic area.

In the Tag area, the values coming from the M-BUS are contained, in the diagnostic area the fail/ok statuses of the tags are contained:

|                                        |                       |
|----------------------------------------|-----------------------|
| REGISTER 40001 (4x 0001) (offset 0)    | TAG AREA START        |
| ...                                    | ...                   |
| ...                                    | ...                   |
| REGISTER 41001 (4x 1001) (offset 1000) | TAG AREA END          |
| REGISTER 41002 (4x 1002) (offset 1001) | Reserved Area start   |
| ...                                    | ...                   |
| REGISTER 49000 (4x 9000) (offset 8999) | Reserved Area end     |
| REGISTER 49001 (4x 9001) (offset 9000) | DIAGNOSTIC AREA START |
| ...                                    | ...                   |
| REGISTER 49032 (4x 9032) (offset 9031) | DIAGNOSTIC AREA END   |

### 13.1. MAPPING OF THE TAG AREA (HOLDING REGISTERS)

Measurement variables from M-BUS are converted into tags accessible from the Modbus bus. The Seneca product will add the new tags in the area as new M-BUS devices or new tags are entered.

Each variable coming from M-BUS can occupy 1 or more Modbus registers depending on the type of conversion that is carried out (for further details see the following table):

| <b>TYPE OF M-BUS DATA</b>                         | <b>CONVERSION<br/>MODBUS RTU/TCP-IP<br/>(AUTOMATIC)</b> | <b>NUMBER OF MODBUS<br/>REGISTERS OCCUPIED</b> |
|---------------------------------------------------|---------------------------------------------------------|------------------------------------------------|
| SIGNED 8-BIT INTEGER                              | SIGNED 16-BIT INTEGER                                   | 1                                              |
| SIGNED 16-BIT INTEGER                             | SIGNED 16-BIT INTEGER                                   | 1                                              |
| SIGNED 32-BIT INTEGER                             | SIGNED 32-BIT INTEGER                                   | 2                                              |
| SIGNED 48-BIT INTEGER                             | REAL 32 BIT (MSW FIRST)                                 | 2                                              |
| SIGNED 64-BIT INTEGER                             | REAL 32 BIT (MSW FIRST)                                 | 2                                              |
| FLOATING POINT 32 BIT                             | REAL 32 BIT (MSW FIRST)                                 | 2                                              |
| DATE / HOUR                                       | 32-BIT DATE/TIME TYPE                                   | 2                                              |
| BCD (BINARY CODED DECIMAL)<br>FROM 2 TO 4 FIGURES | 16-BIT UNSIGNED INTEGER                                 | 1                                              |
| BCD (BINARY CODED DECIMAL)<br>8 FIGURES           | 32-BIT UNSIGNED INTEGER                                 | 2                                              |
| BCD (BINARY CODED DECIMAL)<br>12 FIGURES          | 64-BIT UNSIGNED INTEGER                                 | 4                                              |

**ATTENTION!**

**WHEN CONVERTING TO A 32-BIT FLOATING POINT DATA TYPE, PRECISION LOSSES MAY OCCUR. THIS CONVERSION, IN FACT, CAN LEAD TO DIFFERENCES BETWEEN THE READINGS ON THE M-BUS DEVICE AND THOSE CONVERTED ON MODBUS.**

The Modbus register for which the tag is found and the type of data is automatically calculated by Z/R-KEY-MBUS, it is however possible to modify it in the "Setup Tag" section:

Z-KEY-MBUS Setup TAG Firmware Version : 1170\_110

ADD MODIFY DELETE

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| GATEWAY TAG NR | GATEWAY MODBUS START REGISTER | GATEWAY TAG NAME | TARGET M-BUS DEVICE | TARGET M-BUS RECORD INDEX | TARGET M-BUS DATA TYPE |
|----------------|-------------------------------|------------------|---------------------|---------------------------|------------------------|
| 1              | 40001                         | FLOW_TEMP        | NAME                | 12                        | 32BIT REAL MSW         |
| 2              | 40003                         | RETURN_TEMP      | NAME                | 13                        | 32BIT REAL MSW         |
| 3              | 40005                         | VOLUME1          | NAME                | 17                        | 32BIT REAL MSW         |
| 4              | 40007                         | VOLUME2          | NAME                | 19                        | 32BIT REAL MSW         |

The types of data converted automatically are:

| <b>16-BIT SIGNED INTEGER DATA TYPE</b>      |                 |
|---------------------------------------------|-----------------|
| RANGE                                       | -32768 / +32767 |
| NUMBER OF HOLDING REGISTER MODBUS REGISTERS | 1               |

| <b>16-BIT UNSIGNED INTEGER DATA TYPE</b>    |            |
|---------------------------------------------|------------|
| RANGE                                       | 0 / +65535 |
| NUMBER OF HOLDING REGISTER MODBUS REGISTERS | 1          |

| <b>32-BIT SIGNED INTEGER DATA TYPE</b>      |                           |
|---------------------------------------------|---------------------------|
| RANGE                                       | -2147483648 / +2147483647 |
| NUMBER OF HOLDING REGISTER MODBUS REGISTERS | 2                         |

Occupying 2 modbus registers, the data is represented as follows:

|              |                        |
|--------------|------------------------|
| REGISTER n   | Most significant part  |
| REGISTER n+1 | Least significant part |

| <b>32-BIT UNSIGNED INTEGER DATA TYPE</b>          |                 |
|---------------------------------------------------|-----------------|
| RANGE                                             | 0 / +4294967295 |
| NUMBER OF HOLDING<br>REGISTER MODBUS<br>REGISTERS | 2               |

Occupying 2 modbus registers, the data is represented as follows:

|              |                        |
|--------------|------------------------|
| REGISTER n   | Most significant part  |
| REGISTER n+1 | Least significant part |

| <b>64-BIT UNSIGNED INTEGER DATA TYPE</b>          |                           |
|---------------------------------------------------|---------------------------|
| RANGE                                             | 0 / +18446744073709551615 |
| NUMBER OF HOLDING<br>REGISTER MODBUS<br>REGISTERS | 4                         |

Occupying 4 modbus registers, the data is represented as follows:

|              |                        |
|--------------|------------------------|
| REGISTER n   | Most significant part  |
| REGISTER n+1 | Most significant part  |
| REGISTER n+2 | Least significant part |
| REGISTER n+3 | Least significant part |

| <b>REAL 32-BIT MSW DATA TYPE (FLOATING POINT IEEE-754)</b> |                                  |
|------------------------------------------------------------|----------------------------------|
| RANGE                                                      | 1.175495e-38 /<br>3.40282346e+38 |
| NUMBER OF HOLDING<br>REGISTER MODBUS<br>REGISTERS          | 2                                |

Occupying 2 modbus registers, the data is represented as follows:

|                      |                        |
|----------------------|------------------------|
| ADDRESS REGISTER n   | Most significant part  |
| ADDRESS REGISTER n+1 | Least significant part |

For further information on the type of 32-bit Real data, refer to the following website:

[https://en.wikipedia.org/wiki/IEEE\\_754](https://en.wikipedia.org/wiki/IEEE_754)

For online conversion tools, refer to the website:

<https://www.h-schmidt.net/FloatConverter/IEEE754.html>

| <b>DATE/TIME DATA TYPE</b>                        |                                  |
|---------------------------------------------------|----------------------------------|
| RANGE                                             | 01/01/2000<br>/ 31 December 2127 |
| NUMBER OF HOLDING<br>REGISTER MODBUS<br>REGISTERS | 2                                |

| ADDRESS<br>REGISTER<br>n   | BIT<br>16 | BIT<br>15 | BIT<br>14 | BIT<br>13 | BIT<br>12 | BIT<br>11 | BIT<br>10 | BIT<br>9 | BIT<br>8 | BIT<br>7 | BIT<br>6 | BIT<br>5 | BIT<br>4 | BIT<br>3 | BIT<br>2 | BIT<br>1 |
|----------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
|                            | HOURS     |           |           |           |           |           |           |          | MINUTES: |          |          |          |          |          |          |          |
| ADDRESS<br>REGISTER<br>n+1 | BIT<br>16 | BIT<br>15 | BIT<br>14 | BIT<br>13 | BIT<br>12 | BIT<br>11 | BIT<br>10 | BIT<br>9 | BIT<br>8 | BIT<br>7 | BIT<br>6 | BIT<br>5 | BIT<br>4 | BIT<br>3 | BIT<br>2 | BIT<br>1 |
|                            | YEAR      |           |           |           |           |           |           |          | MONTH    |          |          |          | DAY      |          |          |          |

It is possible to change the type of data selected automatically by Z/R-KEY-MBUS in the "TAG Setup" section. In particular it is possible, for instance, to change the data type from Real 32 BIT MSW to LSW (Reverse Real):

| <b>REAL 32-BIT LSW DATA TYPE (FLOATING POINT IEEE-754)</b> |                                  |
|------------------------------------------------------------|----------------------------------|
| RANGE                                                      | 1.175495e-38 /<br>3.40282346e+38 |
| NUMBER OF HOLDING<br>REGISTER MODBUS<br>REGISTERS          | 2                                |

Occupying 2 modbus registers, the data is represented as follows:

|                      |                        |
|----------------------|------------------------|
| ADDRESS REGISTER n   | Least significant part |
| ADDRESS REGISTER n+1 | Most significant part  |

## 13.2. MAPPING OF THE DIAGNOSTIC AREA (HOLDING REGISTERS)

A diagnostic bit is available in the holding registers for each tag.

For example, in the 16-bits register 49001 (offset 9000) the statuses of the first 16 tags are contained in this way:

| <b>BIT</b><br><b>16</b> | <b>BIT</b><br><b>15</b> | <b>BIT</b><br><b>14</b> | <b>BIT</b><br><b>13</b> | <b>BIT</b><br><b>12</b> | <b>BIT</b><br><b>11</b> | <b>BIT</b><br><b>10</b> | <b>BIT</b><br><b>9</b> | <b>BIT</b><br><b>8</b> | <b>BIT</b><br><b>7</b> | <b>BIT</b><br><b>6</b> | <b>BIT</b><br><b>5</b> | <b>BIT</b><br><b>4</b> | <b>BIT</b><br><b>3</b> | <b>BIT</b><br><b>2</b> | <b>BIT</b><br><b>1</b> |
|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|
| TAG<br>16               | TAG<br>15               | TAG<br>14               | TAG<br>13               | TAG<br>12               | TAG<br>11               | TAG<br>10               | TAG<br>9               | TAG<br>8               | TAG<br>7               | TAG<br>6               | TAG<br>5               | TAG<br>4               | TAG<br>3               | TAG<br>2               | TAG<br>1               |

Where the meaning of the bit is the following:

Bit = 0 M-BUS TAG READ TIMEOUT

Bit = 1 M-BUS TAG READ TIMEOUT

| <b>ADDRESS</b> | <b>ADDRESS<br/>(4x)</b> | <b>OFFSET</b> | <b>REGISTER</b>         | <b>W/R</b> | <b>REGISTER TYPE</b> |
|----------------|-------------------------|---------------|-------------------------|------------|----------------------|
| 49001          | 4x9001                  | 9000          | DIAGNOSTIC TAG 1..16    | RO         | UNSIGNED 16 BIT      |
| 49002          | 4x9002                  | 9001          | DIAGNOSTIC TAG 17..32   | RO         | UNSIGNED 16 BIT      |
| ...            | ...                     | ...           | ...                     | ...        | ...                  |
| 49031          | 4x9031                  | 9031          | DIAGNOSTIC TAG 481..496 | RO         | UNSIGNED 16 BIT      |
| 49032          | 4x9032                  | 9032          | DIAGNOSTIC TAG 497..500 | RO         | UNSIGNED 16 BIT      |

## 14. RESETTNG TO FACTORY CONFIGURATION

To restore the device to factory settings (for example, if you lose your web server login credentials):

Static IP 192.168.90.101

user: admin password: admin

Follow these steps:

Turn off the device

1) Turn all SW1 dip switches ON:



- 2) Turn on the device
- 3) Wait at least 15 seconds
- 4) Set all SW1 dip switches to "OFF":



- 5) Switch off the device.

When the device is switched on again, it will start with its factory configuration.



## **WARNING!**

**IN SOME HARDWARE REVISIONS, THERE ARE 4 DIP SWITCHES ON SW1; IN THIS CASE, DIP SWITCHES 3 AND 4 MUST ALWAYS BE SET TO "OFF".**