

USER MANUAL

Z-KEY MBUS

R-KEY MBUS

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



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Document revisions

| DATE | REVISION | NOTES | AUTHOR |
|------------|----------|---|--------|
| 05/09/2022 | 0 | First revision 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 |

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1. INTRODUCTION

 **ATTENTION!**

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

 **ATTENTION!**

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

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

 **ATTENTION!**

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, the USB port (Z-KEY-MBUS only) or via the Ethernet port.

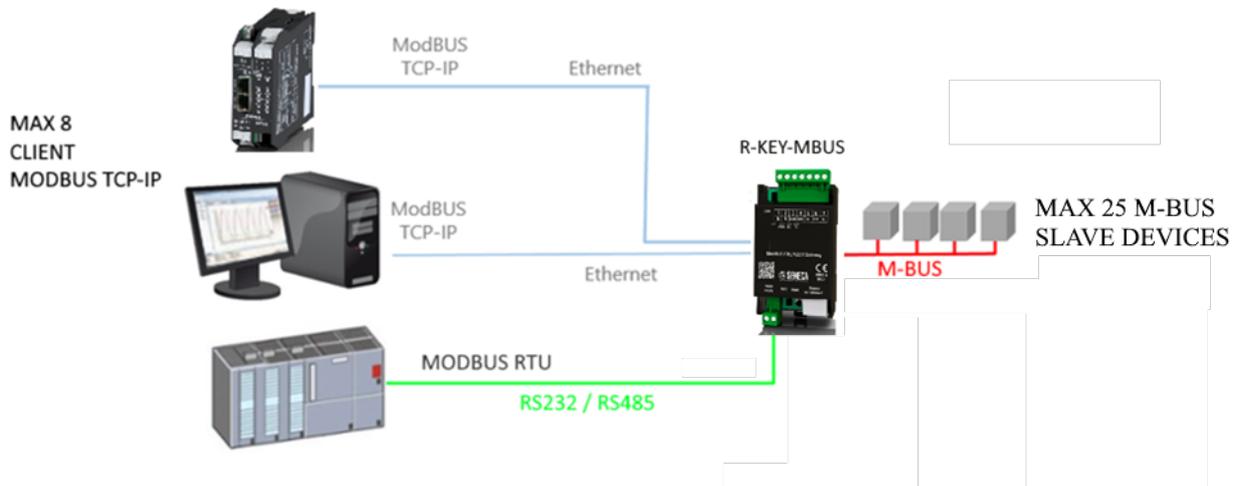
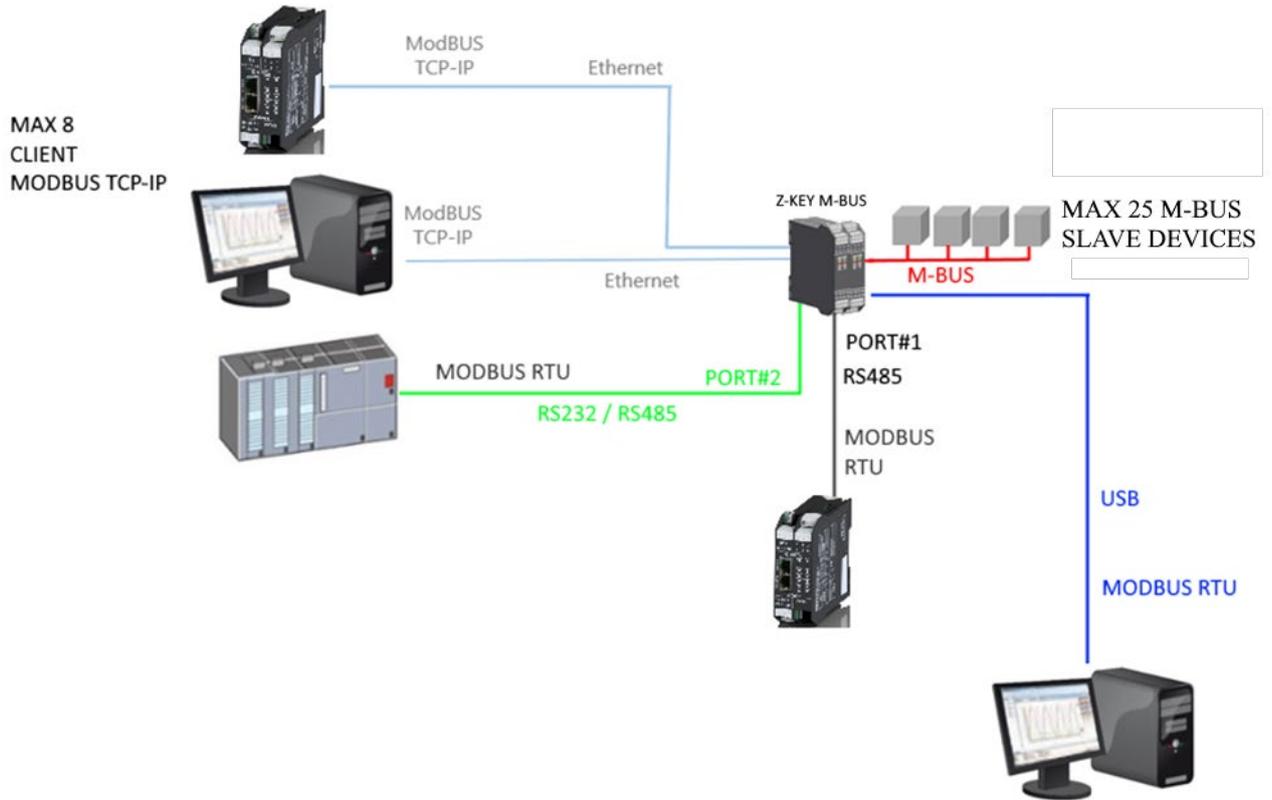
At the serial/USB ports the Meter Bus bus values can be accessed via the Modbus Master protocol (the Modbus RTU Slave protocol is implemented in the KEY device).

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 webserver can be used without the need for external software.

Below are the connection configurations working simultaneously for both models:



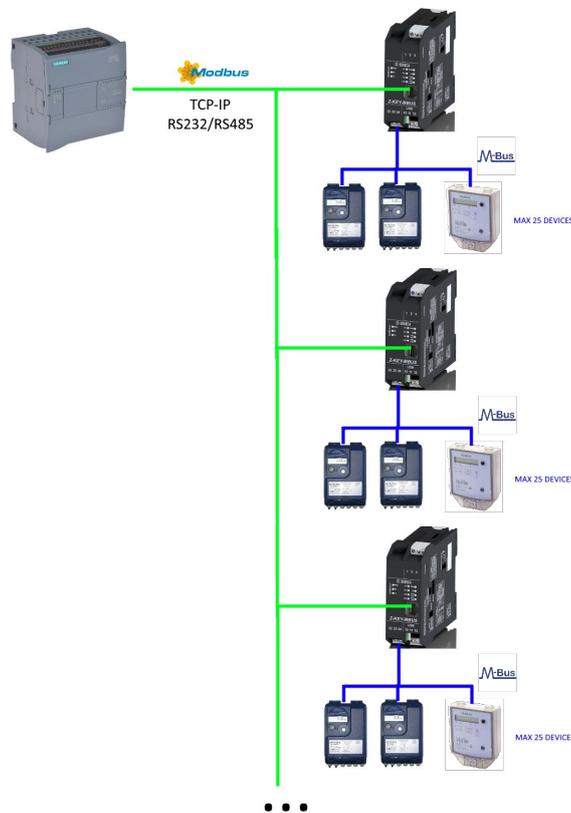
2. APPLICATION FIELDS

2.1. 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:



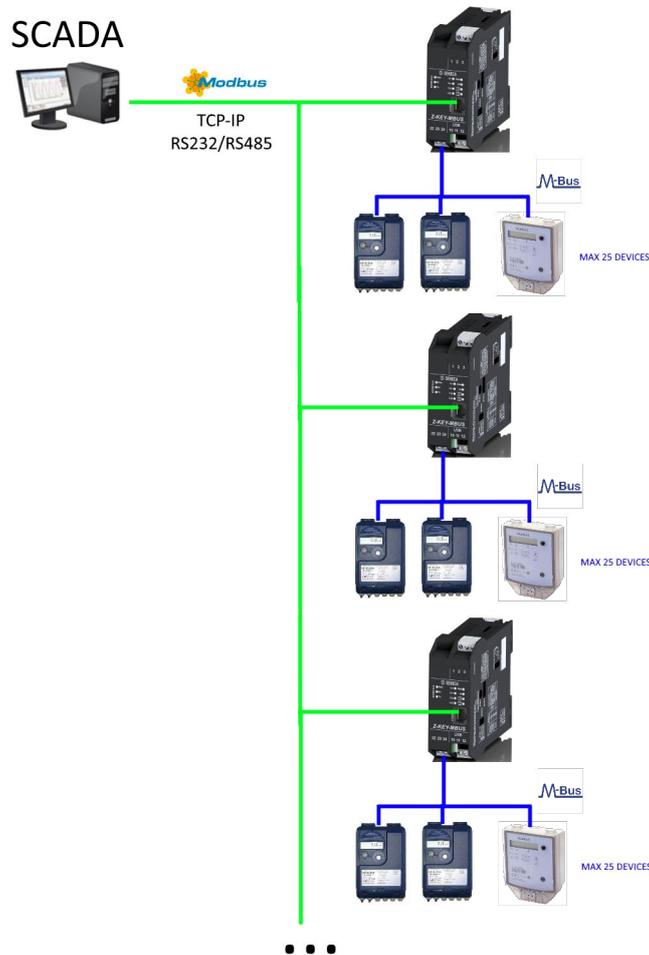
2.2. CONNECTION WITH A SCADA

To connect a SCADA 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:



3. 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 Webserver or the Seneca Discovery software.

ATTENTION!

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

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.

4. **STEP BY STEP GUIDE FOR THE FIRST ACCESS TO THE WEBSERVER**

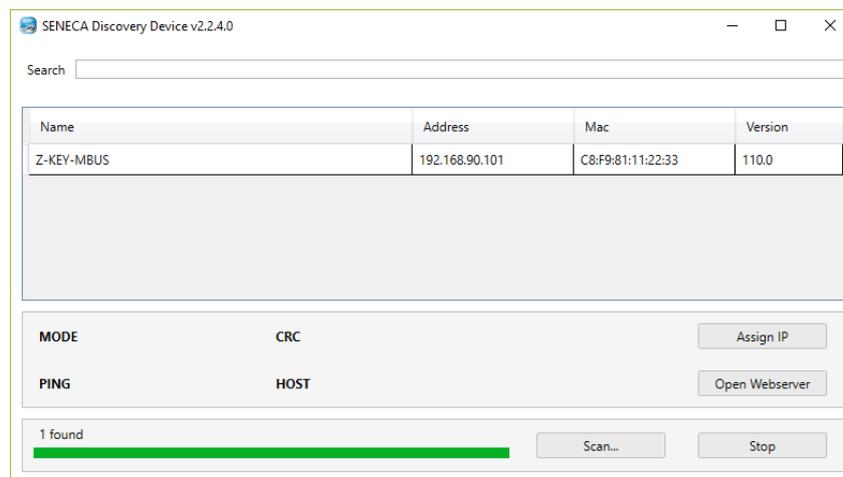
STEP 1: POWER AND CONNECT THE ETHERNET PORT

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

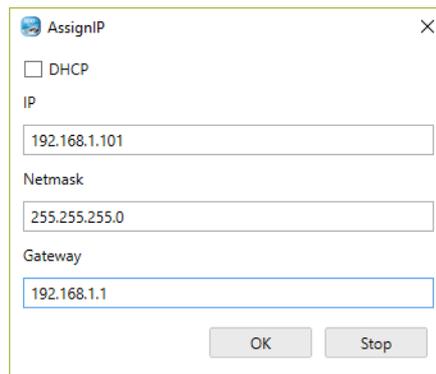
Run the software and press the “SCAN” button: the software will search for the Ethernet devices in the network. Locate the Z/R-KEY-MBUS device (factory default address 192.168.90.101):



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:



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

STEP 5 ACCESS TO THE CONFIGURATION WEBSERVER

Wait for the device to restart and press the "Open Webservice" button.

ENTER your access credentials:

user: admin

password: admin

ATTENTION!

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

5. WEBSERVER DEVICE CONFIGURATION

For further information on the access to the webservice of a new device, please refer to chapter 4.

ATTENTION!

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

5.1. 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 4).

On first access the username and password will be requested.

The default values are:

Username: admin Password: admin

ATTENTION!

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

ATTENTION!

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

5.2. WEBSERVER SECTIONS

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



Status

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

Setup

It is the section that allows the device basic configuration.

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.

Firmware Update

It is the section that allows updating the firmware and database for the manual addition of the M-BUS meters.

5.3. "STATUS" SECTION

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

Z-KEY-MBUS Status Firmware Version : 1170_110

| | |
|--------------------------|-------------------|
| 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 |

Page : 1/10

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

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.

5.4. "SETUP" SECTION

DHCP (ETH) (default: Disabled)

Sets the DHCP client to get an IP address automatically.

STATIC IP (default: 192.168.90.101)

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

STATIC IP MASK (default: 255.255.255.0)

Sets the mask for the IP network.

STATIC GATEWAY (default: 192.168.90.1)

Sets the gateway address.

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.

MBUS TIMEOUT [ms] (default 10000 ms)

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

MBUS CYCLE PAUSE [s] (default 5 s)

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

MBUS READING RETRIES (default 3)

Sets the number of request 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 webserver.

WEB SERVER PASSWORD (default: admin)

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

WEB SERVER HTTPS (default: disabled)

Abilita o no il server web su protocollo https

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 #2BAUDRATE (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 webserver.

5.4.1. 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 |
|----------------|

5.4.2. 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

Z-KEY-MBUS Status Firmware Version : 1170_110

| | |
|------------------------|-------------------|
| 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 |

Page : 1/10

| GATEWAY TAG NR | GATEWAY TAG NAME | GATEWAY MODBUS START REGISTER | TAG DATA TYPE | TAG VALUE | TAG READING STATUS |
|----------------|------------------|-------------------------------|----------------|-------------|--------------------|
| 1 | FLOW_TEMP | 4001 | 32BIT REAL MSW | -327.000000 | OK |
| 2 | RETURN_TEMP | 4003 | 32BIT REAL MSW | -327.000000 | OK |
| 3 | VOLUME1 | 4005 | 32BIT REAL MSW | 1000.000000 | OK |
| 4 | VOLUME2 | 4007 | 32BIT REAL MSW | 256.000000 | OK |

5.5. "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.

5.5.1. REPLACEMENT OF AN M-BUS DEVICE

It is also possible to change the address (for example in case of replacement) using 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" value=""/> |

5.5.2. 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) | <input type="text" value=""/> |
| ADDRESS TYPE | PRIMARY | <input type="text" value=""/> |
| PRIMARY ADDRESS | 0 | <input type="text" value=""/> |
| BAUDRATE | 2400 | <input type="text" value=""/> |

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

5.6. "SCAN M-BUS" SECTION

5.6.1. 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 DEVICE NR | M-BUS ADDRESS TYPE | M-BUS ADDRESS | M-BUS 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 DEVICE NR | M-BUS ADDRESS TYPE | M-BUS ADDRESS | M-BUS 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.

5.6.2. 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 DEVICE NR | M-BUS ADDRESS TYPE | M-BUS ADDRESS | M-BUS 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 | | UPDATED |
| SETUP | | |
| M-BUS DEVICES | DEVICE DESCRIPTION NAME | NAME |
| SCAN M-BUS | ADDRESS TYPE | SECONDARY |
| SETUP TAG | IDENTIFICATION NUMBER | 00008434 |
| CERTIFICATE SETUP | MANUFACTURER NUMBER | 614C |
| FIRMWARE UPDATE | VERSION NUMBER | 04 |
| | MEDIUM | 02 |
| | BAUDRATE | 2400 |

| 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 (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, m³, 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



ATTENTION!

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:

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| M-BUS DEVICE NR | M-BUS DEVICE NAME | M-BUS ADDRESS TYPE | M-BUS ADDRESS | M-BUS 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.

5.7. "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 MBUS device to which the variable is associated

TARGET REGISTER DATA TYPE

It is the data type of the modbus register associated with the MeterBUS 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

**ATTENTION!**

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

5.8. "FIRMWARE UPDATE" SECTION**5.8.1. 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 website

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

Firmware Nessun file selezionato

**ATTENTION!**

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

5.8.2. DATABASE UPDATE

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

The Database is used when a new M-BUS device is entered in manual mode.

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

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

6. SUPPORTED MODBUS COMMUNICATION PROTOCOLS

The Modbus communication protocols supported are:

- Modbus RTU Slave (from #1 and #2 serial ports and from the USB port)
- 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>.

6.1. SUPPORTED MODBUS FUNCTION CODES

The following Modbus functions are supported:

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



ATTENTION!

All 32-bit values are contained in 2 consecutive registers

7. 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 |

7.1. 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):

| TYPE OF M-BUS DATA | CONVERSION MODBUS RTU/TCP-IP (AUTOMATIC) | NUMBER OF MODBUS REGISTERS OCCUPIED |
|---|---|--|
| 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) FROM 2 TO 4 FIGURES | 16-BIT UNSIGNED INTEGER | 1 |
| BCD (BINARY CODED DECIMAL) 8 FIGURES | 32-BIT UNSIGNED INTEGER | 2 |
| BCD (BINARY CODED DECIMAL) 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:

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

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

| 32-BIT SIGNED INTEGER DATA TYPE | |
|---|---------------------------|
| 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 |

| 32-BIT UNSIGNED INTEGER DATA TYPE | |
|---|-----------------|
| RANGE | 0 / +4294967295 |
| 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 |

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

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

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

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

For online conversion tools, refer to the website:

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

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

| | | | | | | | | | | | | | | | | |
|-------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| ADDRESS REGISTER n | BIT 16 | BIT 15 | BIT 14 | BIT 13 | BIT 12 | BIT 11 | BIT 10 | BIT 9 | BIT 8 | BIT 7 | BIT 6 | BIT 5 | BIT 4 | BIT 3 | BIT 2 | BIT 1 |
| | HOURS | | | | | | | | MINUTES: | | | | | | | |
| ADDRESS REGISTER n+1 | BIT 16 | BIT 15 | BIT 14 | BIT 13 | BIT 12 | BIT 11 | BIT 10 | BIT 9 | BIT 8 | BIT 7 | BIT 6 | BIT 5 | BIT 4 | BIT 3 | BIT 2 | BIT 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):

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

7.2. 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:

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

Where the meaning of the bit is the following:

Bit = 0 M-BUS TAG READ TIMEOUT

Bit = 1 M-BUS TAG READ TIMEOUT

| ADDRESS | ADDRESS (4x) | OFFSET | REGISTER | W/R | REGISTER TYPE |
|---------|--------------|--------|-----------------------|-----|-----------------|
| 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 |

8. RESETTING TO FACTORY CONFIGURATION

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

Static IP 192.168.90.101

user: admin password: admin

in this way:

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.

ATTENTION!

In some models there are 4 dip switches, in this case dip switches 3 and 4 must ALWAYS be kept in the "OFF" state