USER MANUAL

Z-KEY MBUS

R-KEY MBUS

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

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ORIGINAL INSTRUCTIONS

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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
02/04/2026	5	Added information on supported protocols Updated the web server images Added a chapter on adding an offline MBUS Added a chapter on hardware revision and firmware updates Removed references to the USB port Added information to the “Status” section of the web server Various fixes	MM

TABLE OF CONTENTS

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.

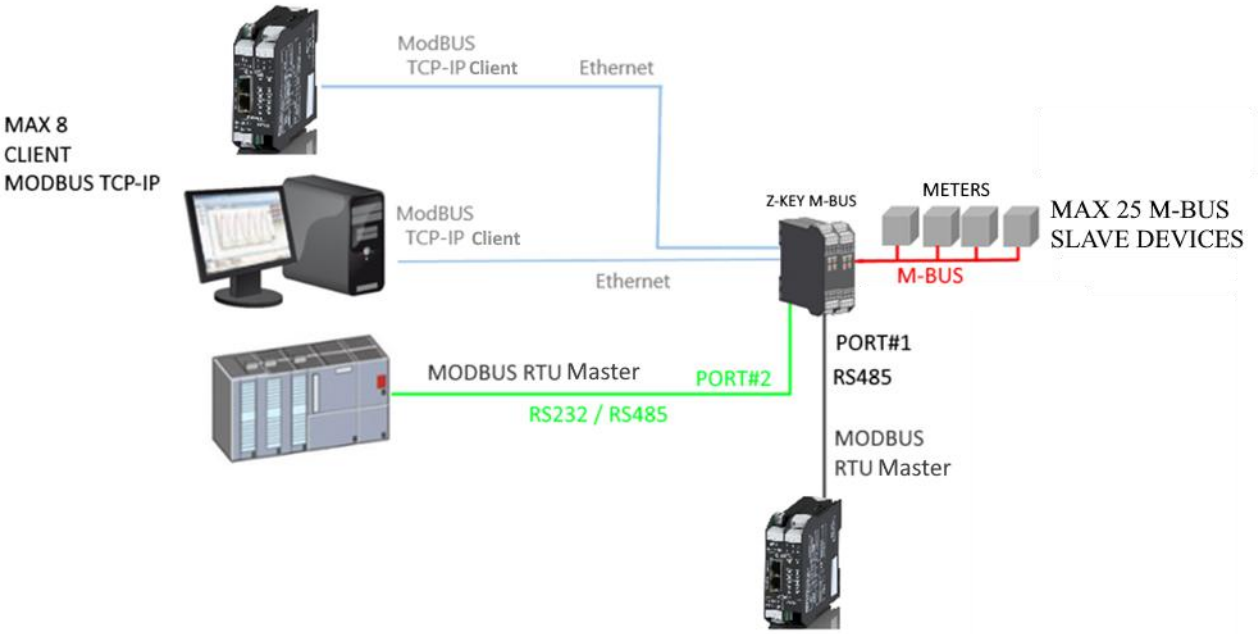
ATTENTION!

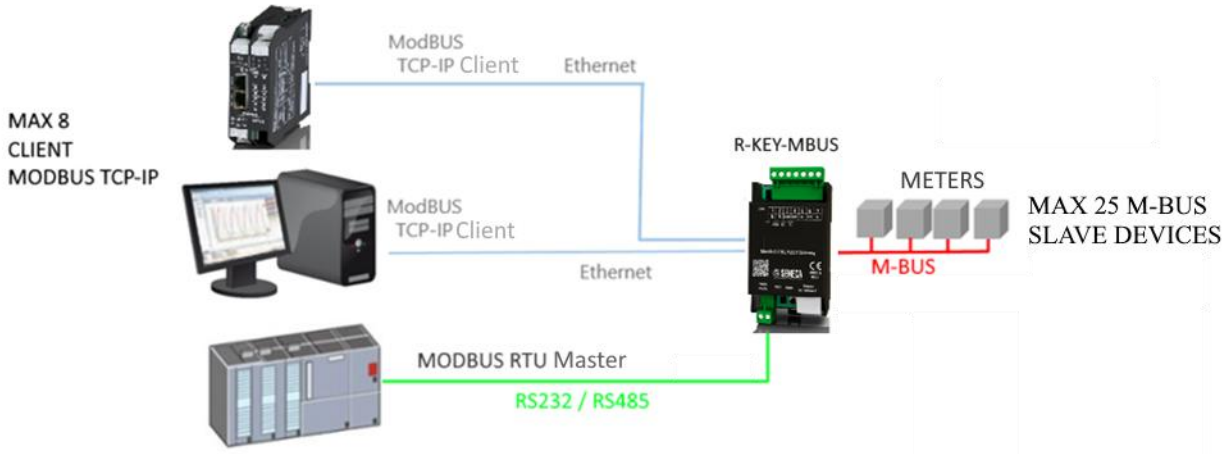
Button PS1 is not used at the moment in the Z-KEY-MBUS instrument.

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, 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 webserver 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).

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

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 MBUS master protocol and interface with wired MBUS slave meters, in accordance with the “wired MBUS” protocol defined by:

EN 13757-2 (physical layer/data link layer)
EN 13757-3 (application layer / data structure)

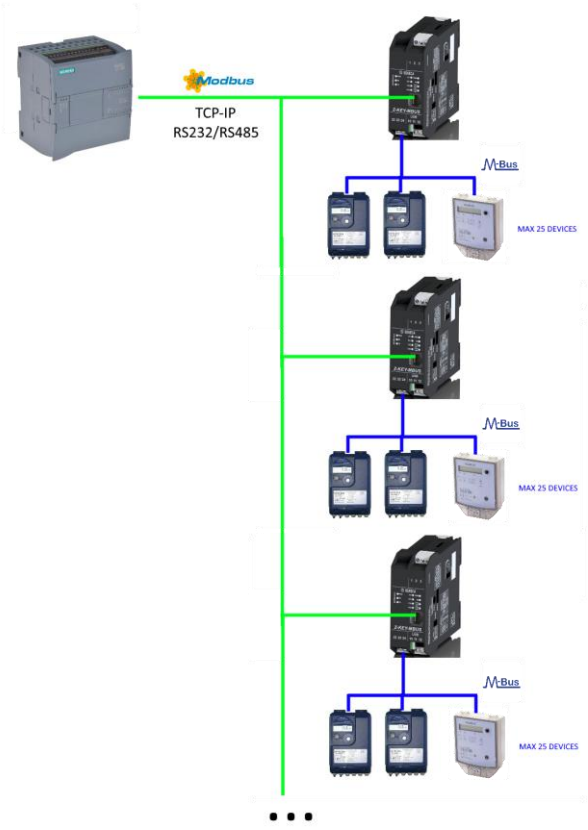
5. APPLICATION FIELDS

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:

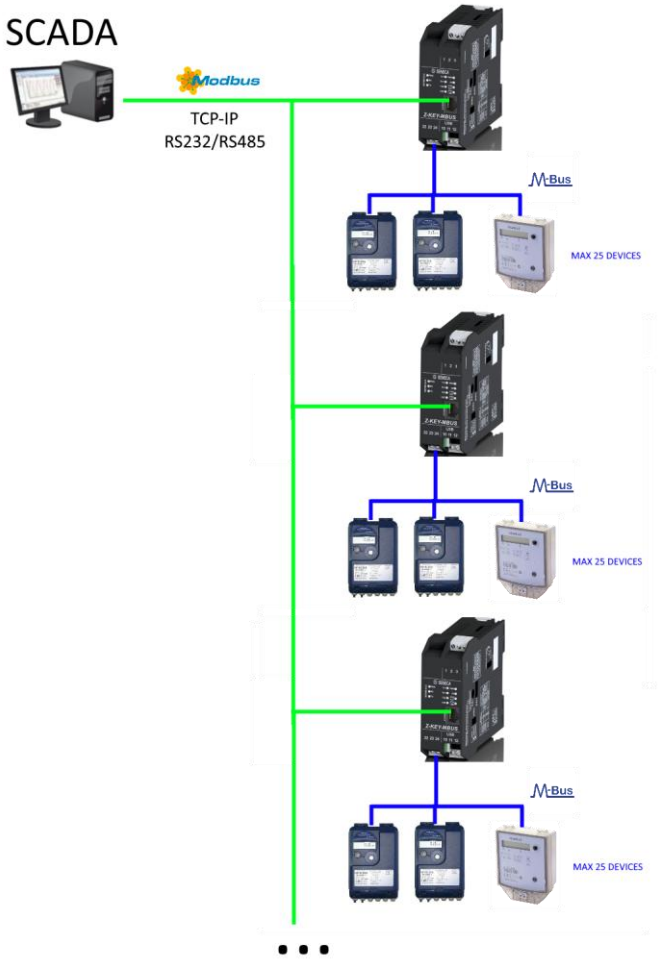


5.2. CONNECTION WITH A SCADA (PC)

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 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.

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 WEBSERVER

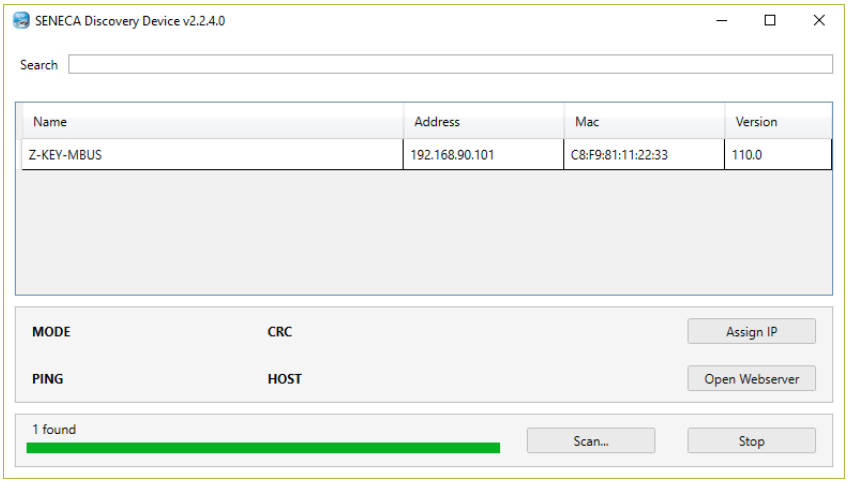
STEP 1: POWER AND CONNECT THE ETHERNET PORT

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

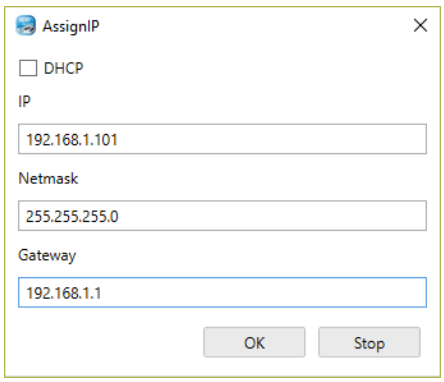
Run the software and press the "SCAN" button: the software will search for the Ethernet devices in the network. Locate the Z/R-KEY-MBUS device (factory default address 192.168.90.101):



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 Webserver” 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

10. WEBSERVER DEVICE CONFIGURATION

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

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

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).

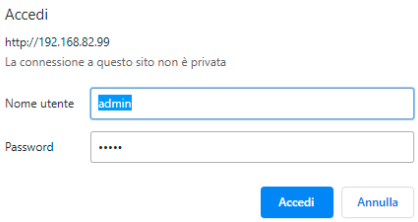
On first access the username and password will be requested.

The default values are:

Username: admin Password: admin

ATTENTION!

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



ATTENTION!

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

10.2. 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.

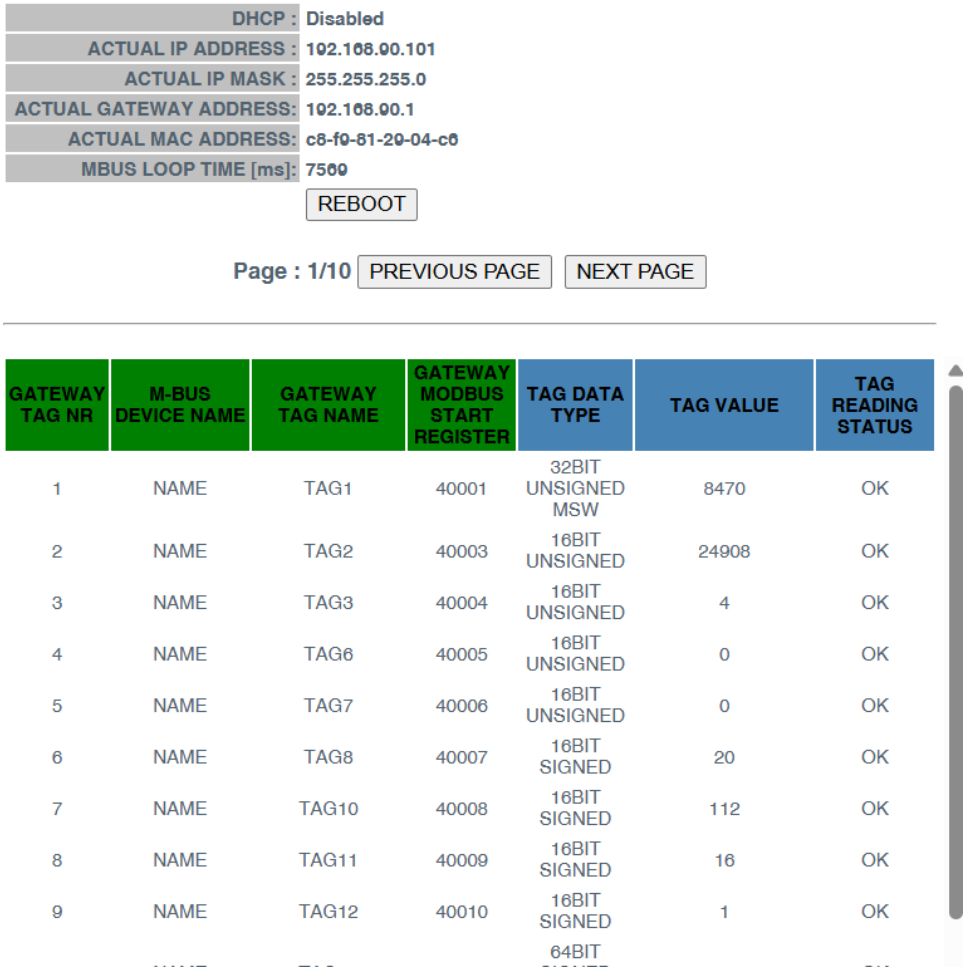
Setup Tag
It is the section that allows adding/modifying the tags (that is the variables) of the M-bus devices connected to the gateway.

Firmware Update

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

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 :	102.168.00.101
ACTUAL IP MASK :	255.255.255.0
ACTUAL GATEWAY ADDRESS:	102.168.00.1
ACTUAL MAC ADDRESS:	c8-f0-81-20-04-c6
MBUS LOOP TIME [ms]:	7500

REBOOT

Page : 1/10 PREVIOUS PAGE 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.

DHCP

Indicates whether DHCP is enabled or not

ACTUAL IP ADDRESS

Shows the current IP address

ACTUAL GATEWAY ADDRESS

Shows the current gateway address

ACTUAL MAC ADDRESS
Displays the current MAC address

MBUS LOOP TIME[ms]
This indicates the time of the last data acquisition cycle for all configured meters. It takes into account any pause time configured in the "SETUP" section and any retry attempts (which can also be configured in the "SETUP" section).

GATEWAY TAG NR
This represents the number of the configured tag

M-BUS DEVICE NAME
Represents the name associated with the meter

GATEWAY TAG NAME
This is the name given to the TAG

GATEWAY MODBUS START REGISTER
Specifies the starting Modbus register from which the TAG from the M-BUS can be read. These registers can be accessed via Modbus Serial or Modbus TCP/IP

TAG DATA TYPE
This represents the data type of the tag in Modbus registers (it may not correspond to the M-BUS data type)

TAG VALUE
Represents the numerical value of the TAG

TAG READING STATUS
It represents the status of the latest acquisition from the M-BUS bus. It can be "OK" if the TAG was successfully acquired, or "FAIL" if the TAG was not acquired (request timeout).

10.4. "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 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.

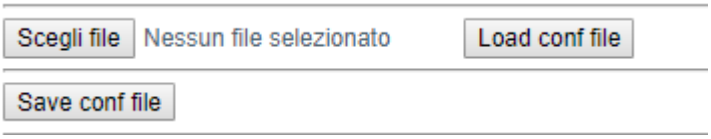
10.4.1. SAVING A CONFIGURATION ON A FILE

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



⚠ 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

WARNING!

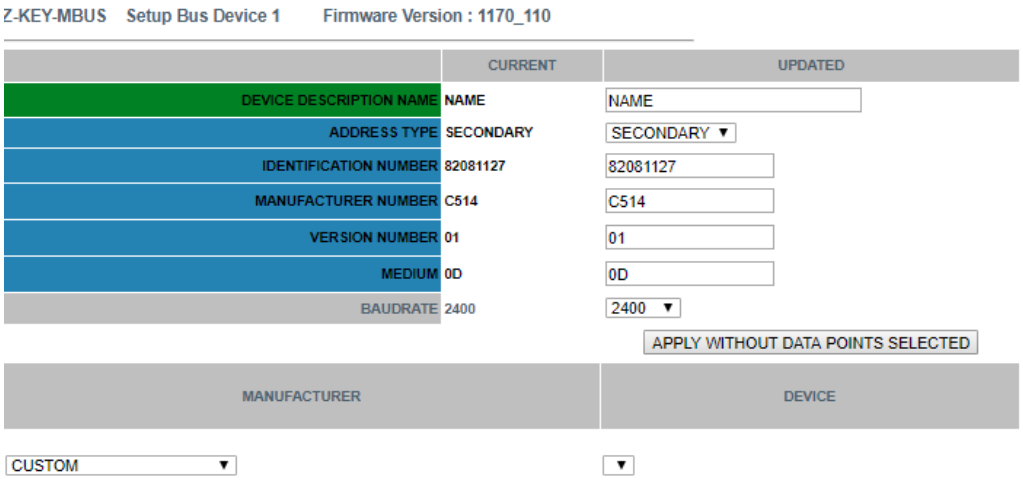
COMPATIBILITY IS NOT GUARANTEED WHEN IMPORTING A CONFIGURATION CREATED USING OLDER FIRMWARE

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.

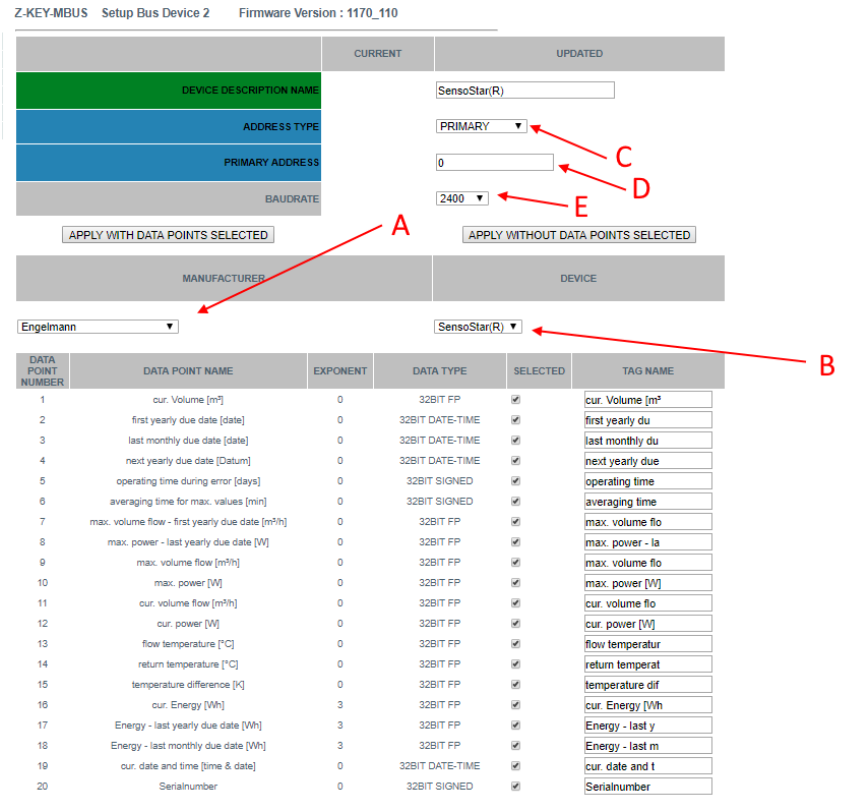
10.5.1. REPLACEMENT OF AN M-BUS DEVICE

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:



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.



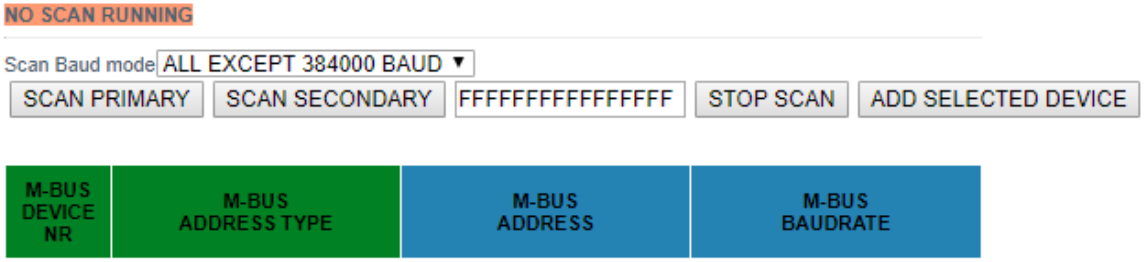
A = Select the brand of the device to insert
A = Select the model of the device to insert
C = Select if the device must be interrogated via primary or secondary address
D = Device address
E = Device Baud rate

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.



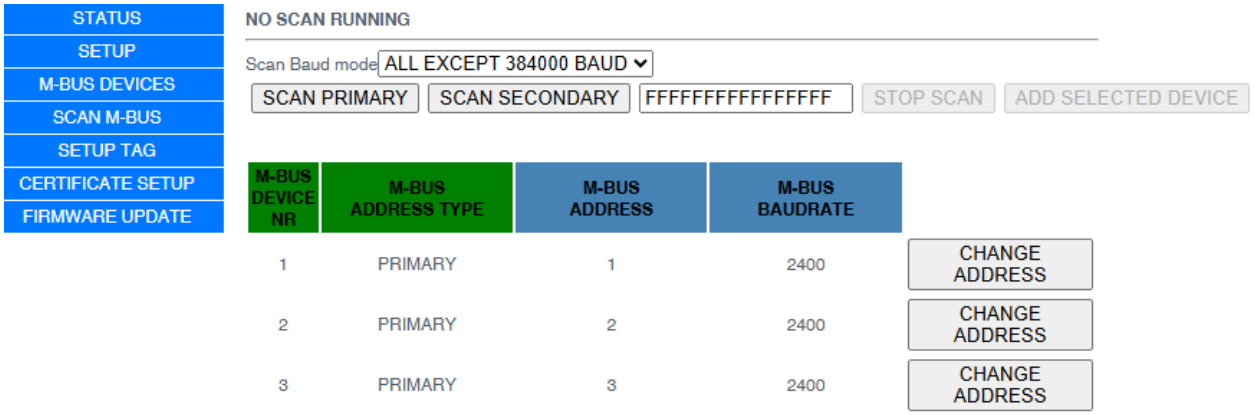
If you do not know the primary address nor the baudrate of the M-BUS devices, we recommend you perform a secondary scan at all baud rates (it may take several minutes).
If a priori it is known that there are no conflicts of primary address it is possible to carry out a scan by primary address.

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

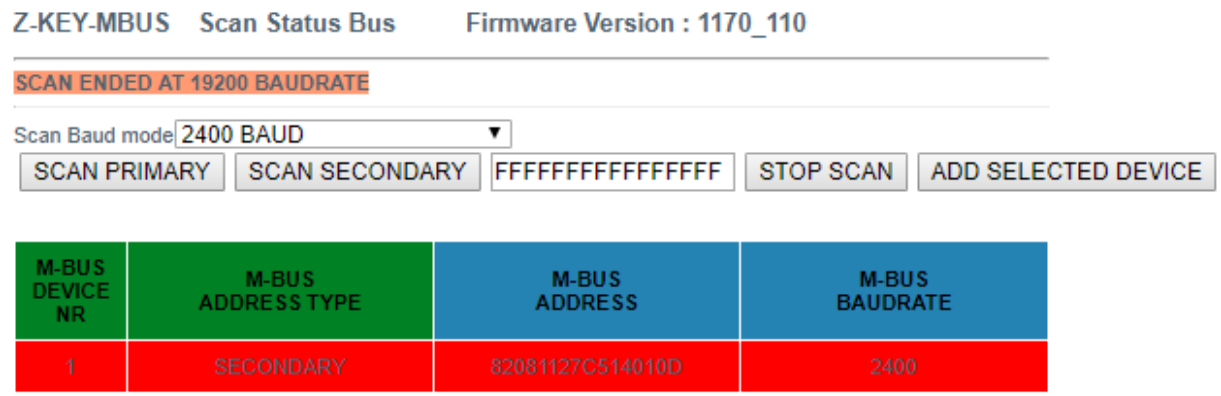
The scan remains saved in the flash memory of the device until a new scan is requested.

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:

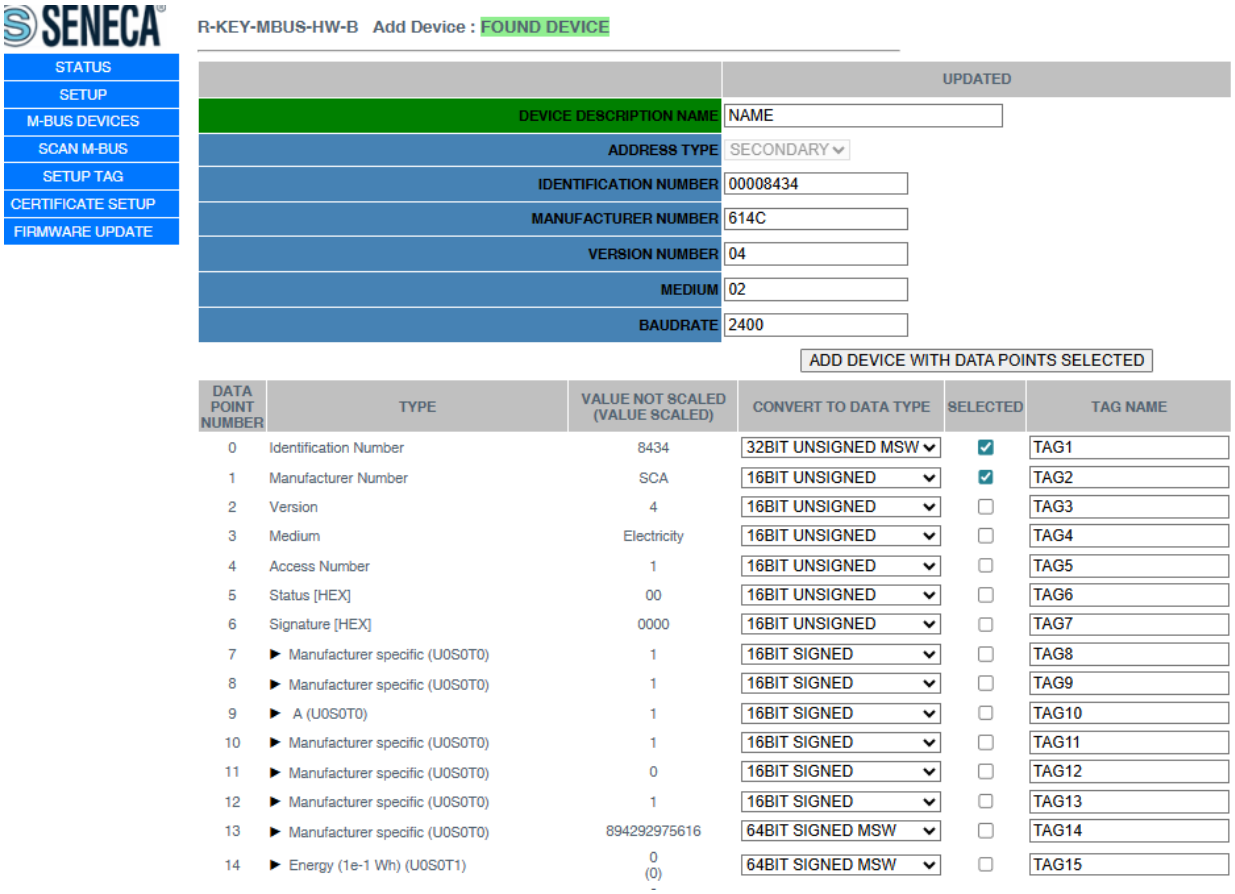


10.6.2. ADDITION OF AN M-BUS DEVICE AND YOUR TAGS

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:



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



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

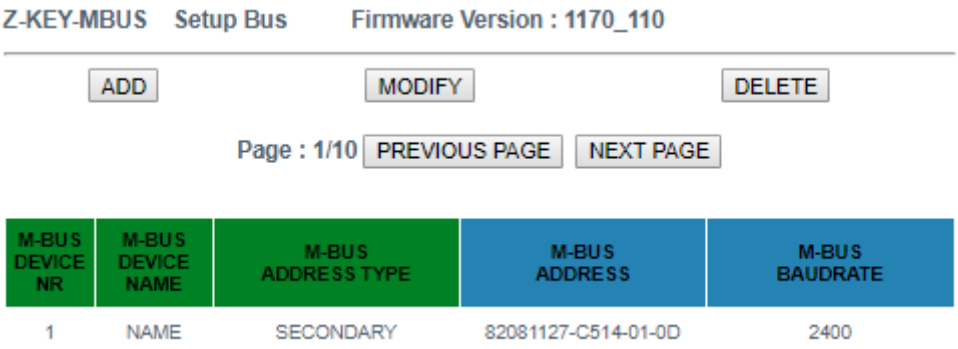
SELECT
Selects which variable to import into the modbus registers

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:



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:

ADD | CLONE | DELETE | MOVE UP | MOVE DOWN

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:

$$\boldsymbol{Variabile\ Scalata = (Variabile * GAIN) + OFFSET}$$

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

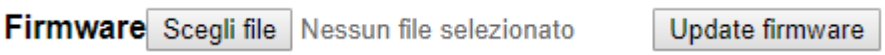
TARGET SCALE OFFSET
Represents the offset of the scaling

10.8. "FIRMWARE UPDATE" SECTION

10.8.1. 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

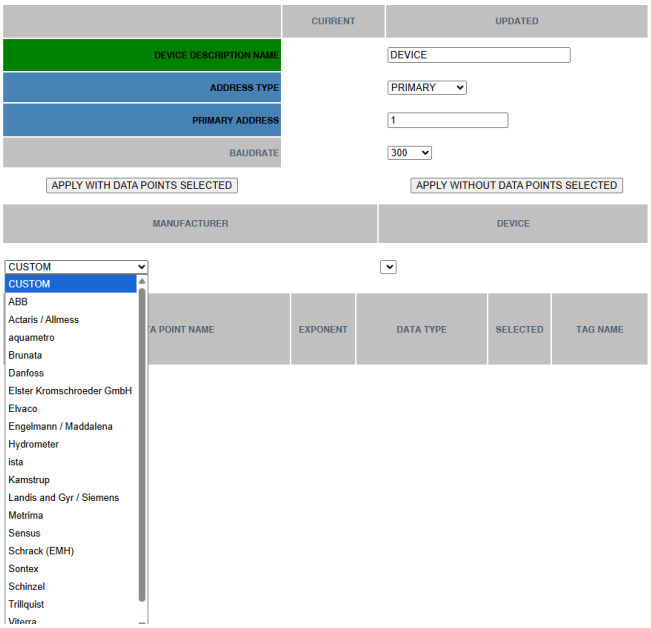


ATTENTION!

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

11. AGGIUNTA DI M-BUS METER IN MODALITA' OFFLINE

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.



WARNING!

THE VARIABLES OF A METER CAN BE CONFIGURED (USUALLY USING EXTERNAL SOFTWARE); THE MBUS 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)

ATTENTION!

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):

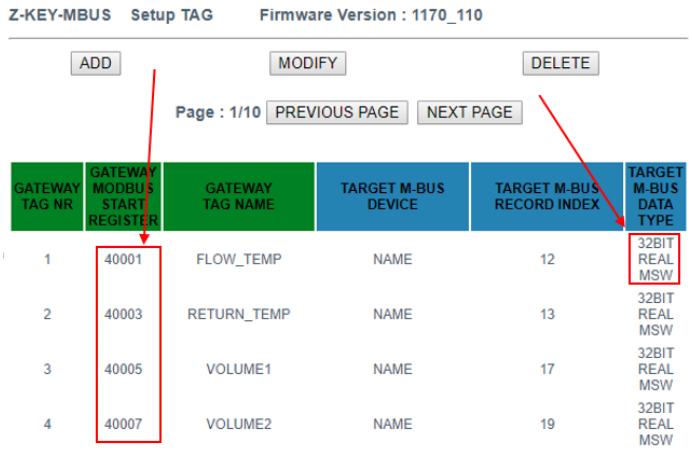
TYPE OF M-BUS DATA	*CONVERSION MODBUS RTU/TCP-IP (AUTOMATIC)*	*NUMBER OF MODBUS REGISTERS OCCUPIED*
SIGNED 8-BIT INTEGER	SIGNED 16-BIT INTEGER	1
SIGNED 16-BIT INTEGER	SIGNED 16-BIT INTEGER	1
SIGNED 32-BIT INTEGER	SIGNED 32-BIT INTEGER	2
SIGNED 48-BIT INTEGER	REAL 32 BIT (MSW FIRST)	2
SIGNED 64-BIT INTEGER	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:



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

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:

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

14. RESETTING 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.

ATTENTION!

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"