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

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.
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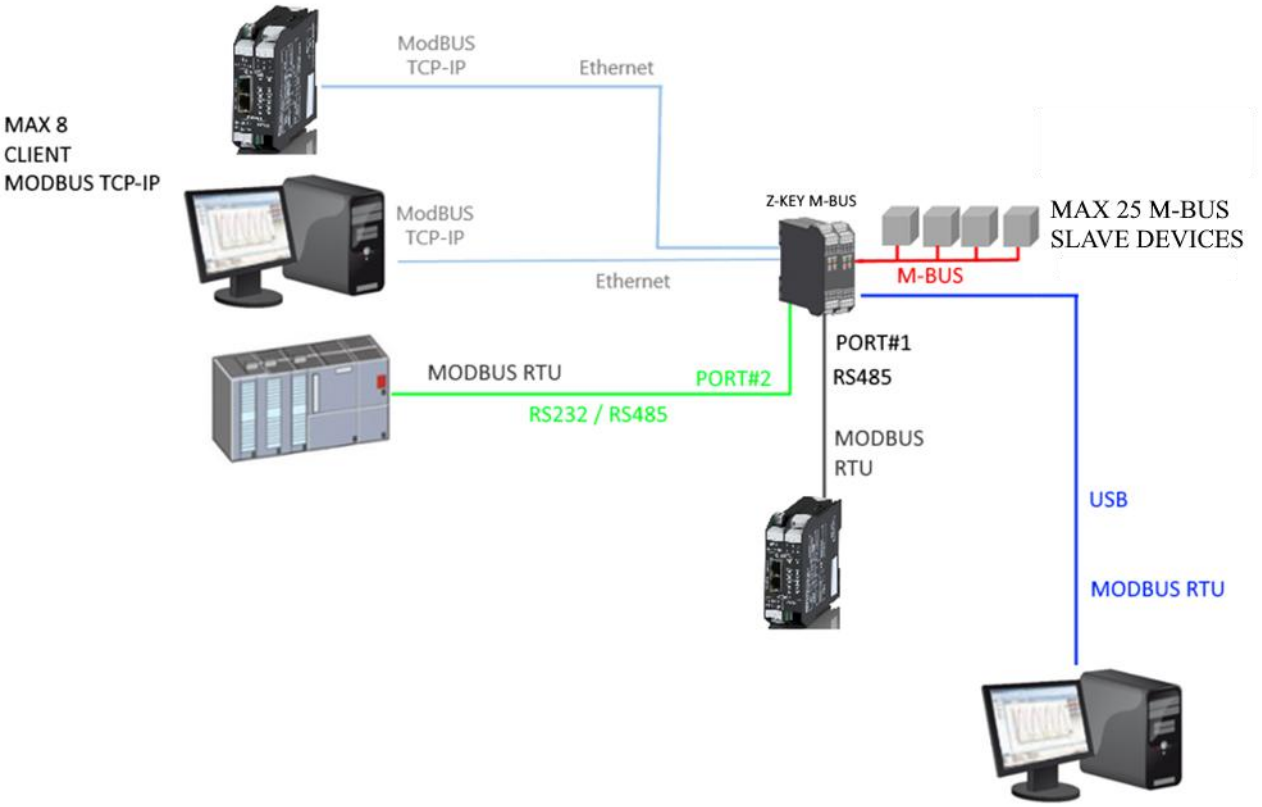
ATTENTION!

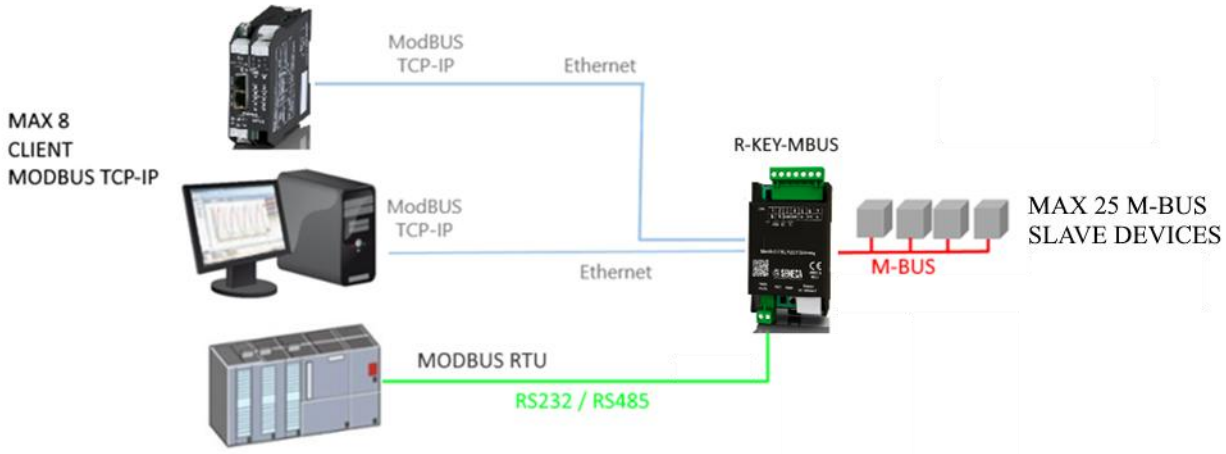
Button PS1 is not used at the moment in the Z-KEY-MBUS instrument.

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:





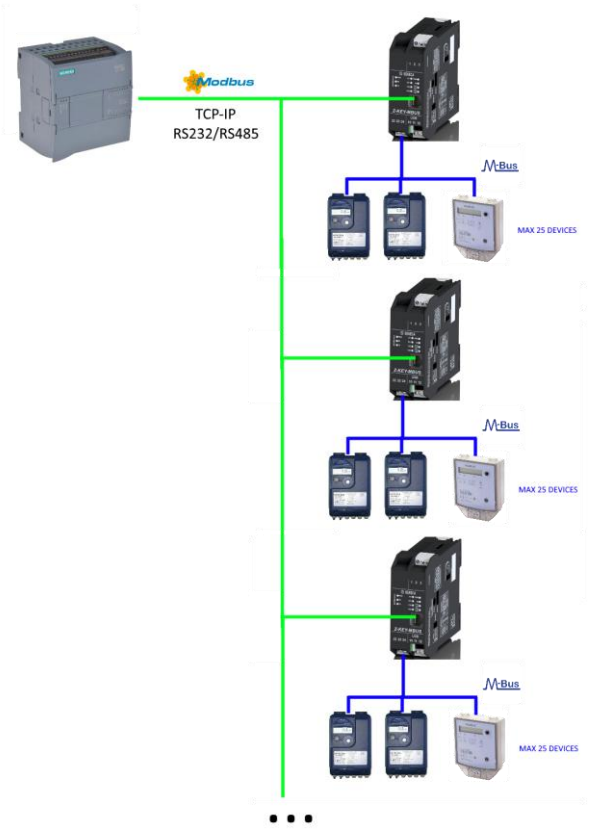
2. APPLICATION FIELDS

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:

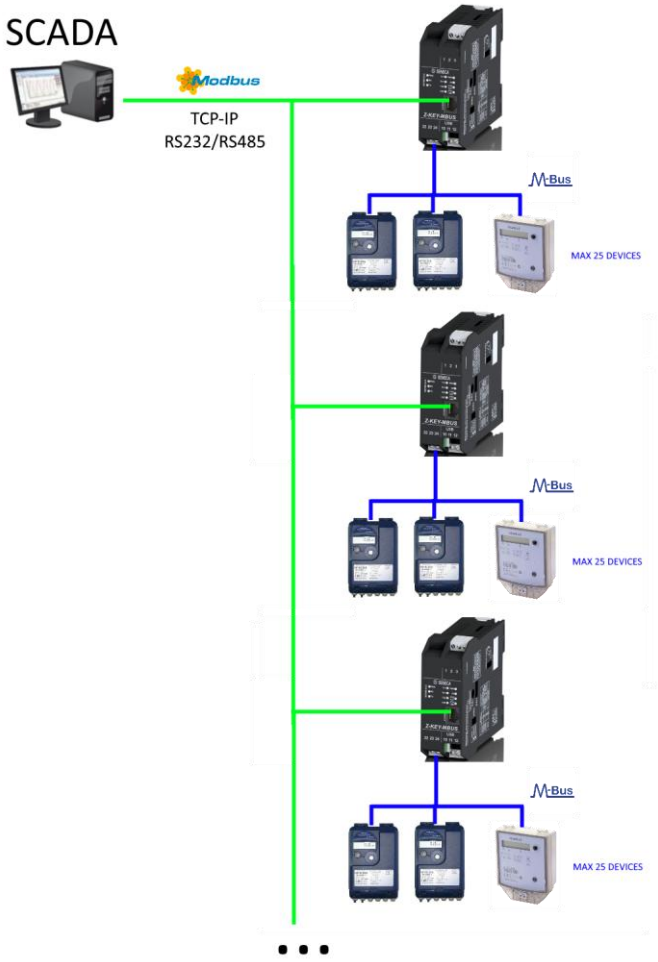


2.2. CONNECTION WITH A SCADA

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

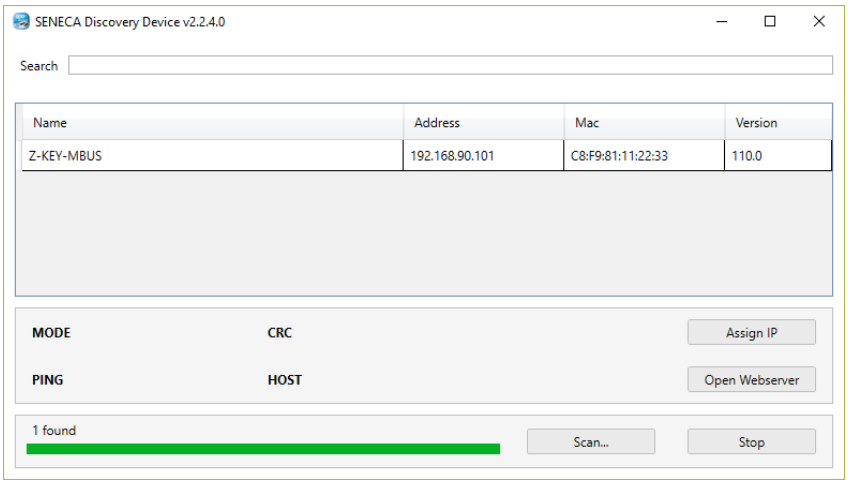
STEP 1: POWER AND CONNECT THE ETHERNET PORT

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

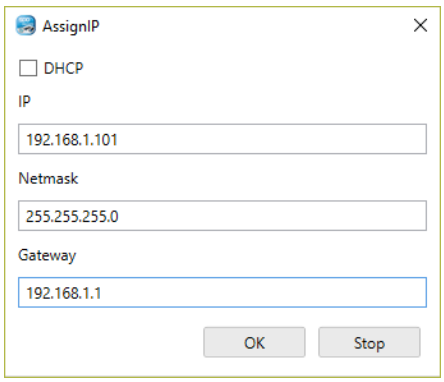
Run the software and press the "SCAN" button: the software will search for the Ethernet devices in the network. Locate the Z/R-KEY-MBUS device (factory default address 192.168.90.101):



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 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

5. WEBSERVER DEVICE CONFIGURATION

For further information on the access to the webserver 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

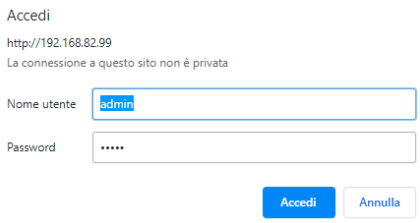
Access to the web server takes place using a web browser and entering the IP address of the device.
To find out the IP address of the device, use the "search" function of the "Seneca Discovery Device" software (see chapter 4).

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.



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.

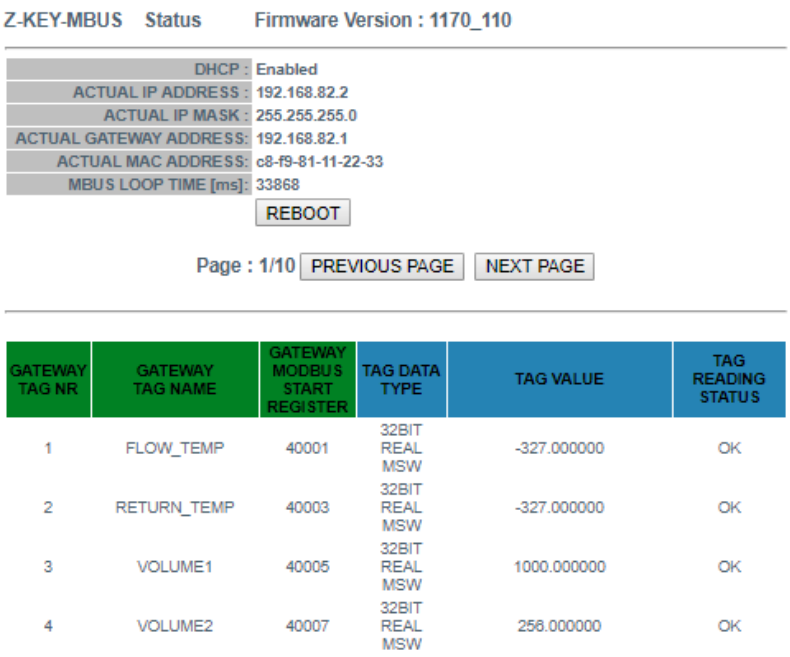
Scan M-Bus
It is the section that allows scanning and automatically adding the M-bus devices to the gateway.

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

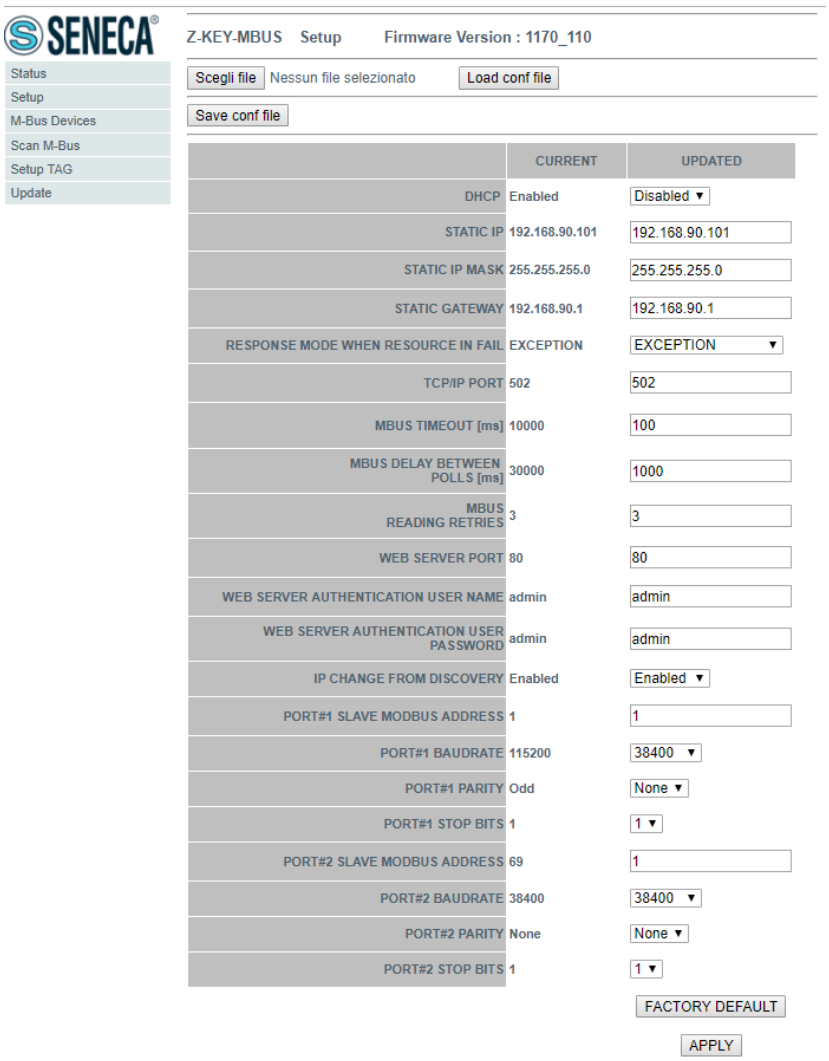
In the status section, it is possible to view the tag values in real time together with their fail/ok status:



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 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 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 PORT (default: 80)
Sets the communication port for the web server.

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).

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

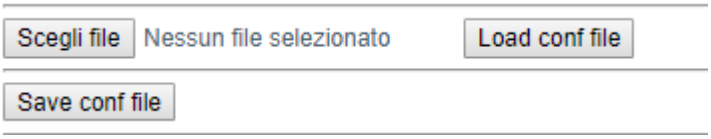
5.4.1. SAVING A CONFIGURATION ON A FILE

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



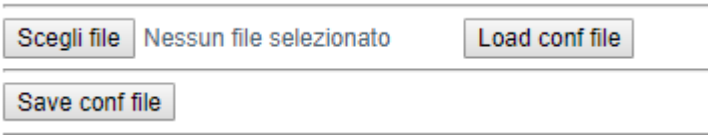
5.4.2. IMPORTING A CONFIGURATION FROM A FILE

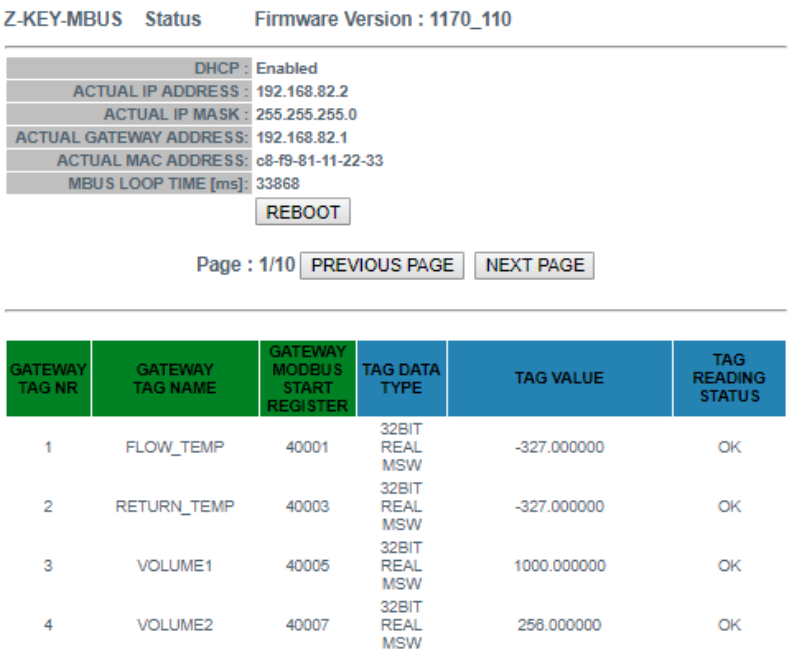
A configuration that includes:

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





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

REBOOT

Page : 1/10 PREVIOUS PAGE NEXT PAGE

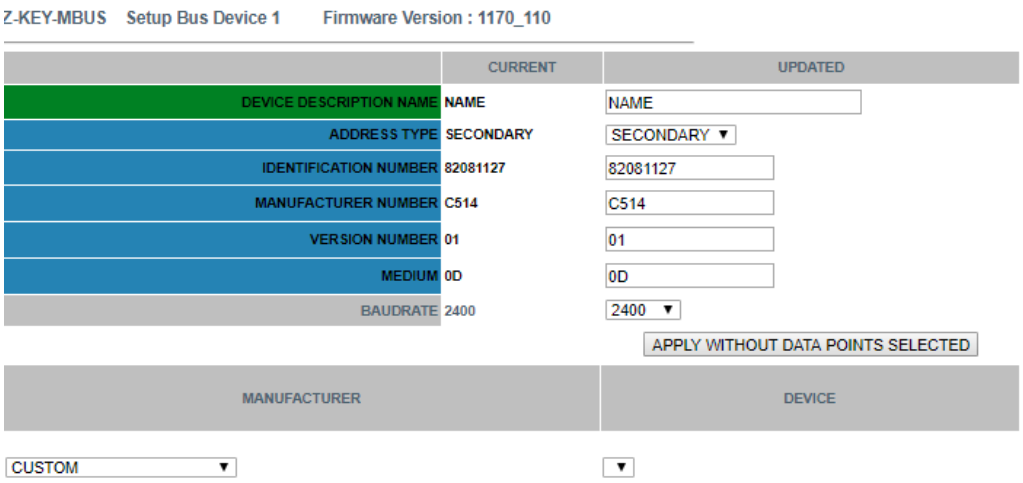
GATEWAY TAG NR	GATEWAY TAG NAME	GATEWAY MODBUS START REGISTER	TAG DATA TYPE	TAG VALUE	TAG READING STATUS
1	FLOW_TEMP	40001	32BIT REAL MSW	-327.000000	OK
2	RETURN_TEMP	40003	32BIT REAL MSW	-327.000000	OK
3	VOLUME1	40005	32BIT REAL MSW	1000.000000	OK
4	VOLUME2	40007	32BIT REAL MSW	256.000000	OK

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

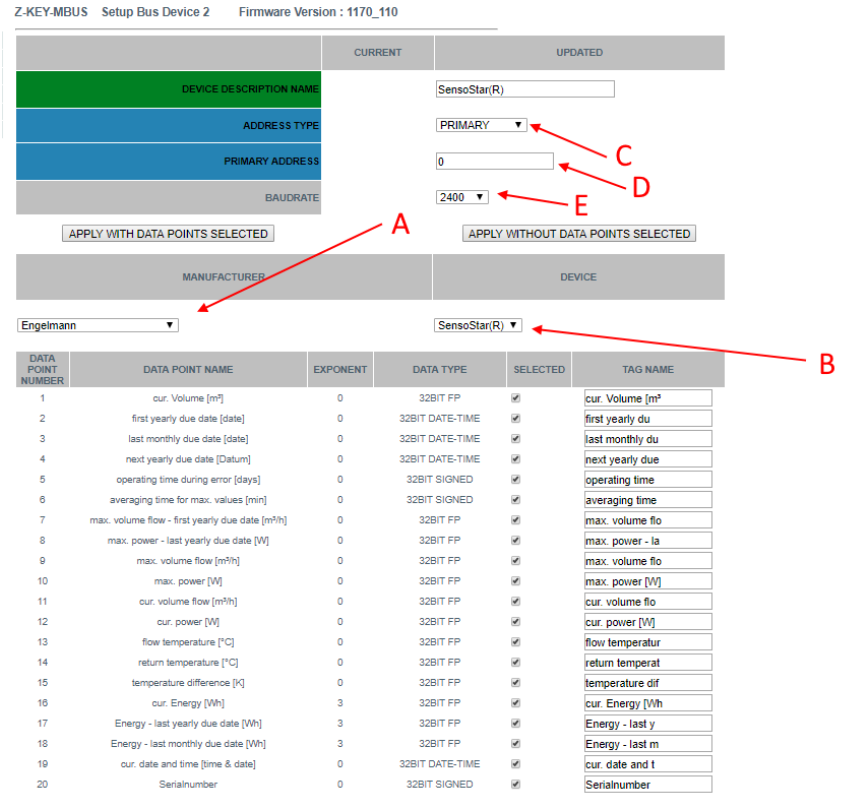
	CURRENT	UPDATED
DEVICE DESCRIPTION NAME	NAME	NAME
ADDRESS TYPE	SECONDARY	SECONDARY ▼
IDENTIFICATION NUMBER	82081127	82081127
MANUFACTURER NUMBER	C514	C514
VERSION NUMBER	01	01
MEDIUM	0D	0D
BAUDRATE	2400	2400 ▼

APPLY WITHOUT DATA POINTS SELECTED

MANUFACTURER	DEVICE
CUSTOM ▼	▼

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.



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

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.

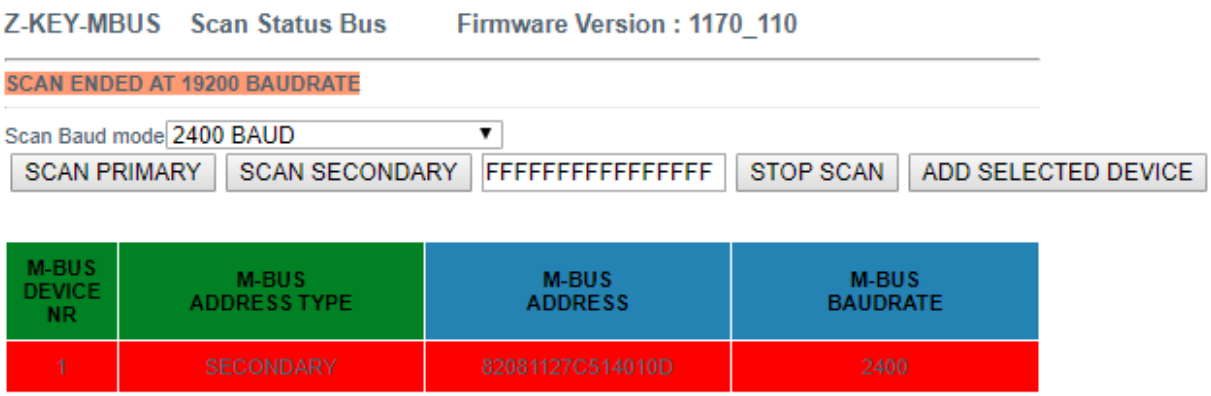
As devices are found they appear on the screen, for example:

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

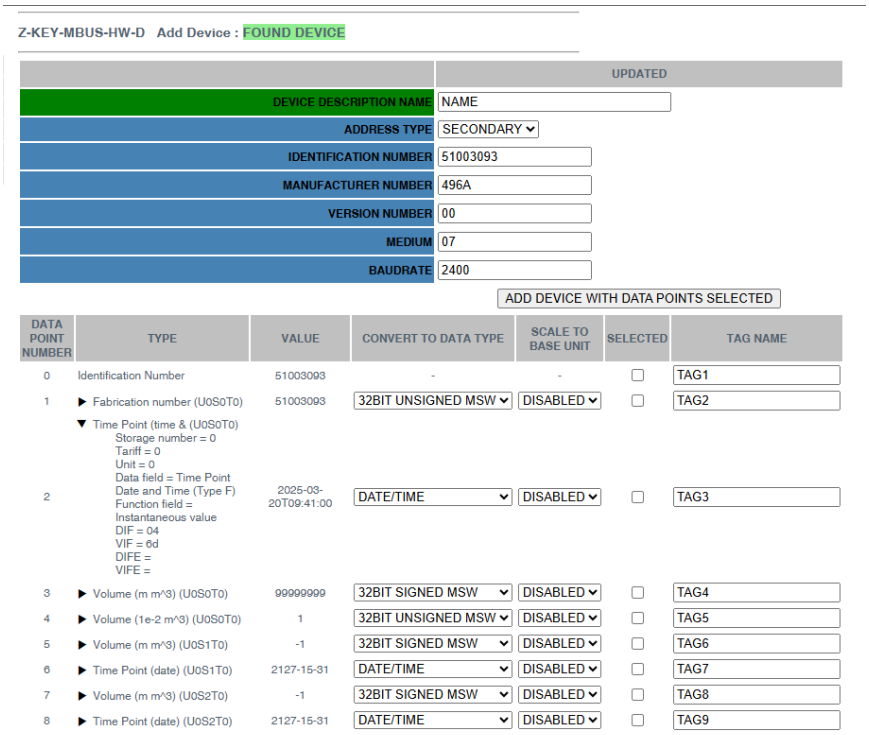
The scan remains saved in the flash memory of the device until a new scan is requested.

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:



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
Represents the numeric value that the variable took at the time of the scan

CONVERT TO DATA TYPE
Represents the data type to which the variable in the Modbus registers must be converted

SCALE TO BASE UNIT
If enabled, it scales the measurement in the base unit of measurement (for example if the measurement is in Wh*E-2 it is converted to Wh)

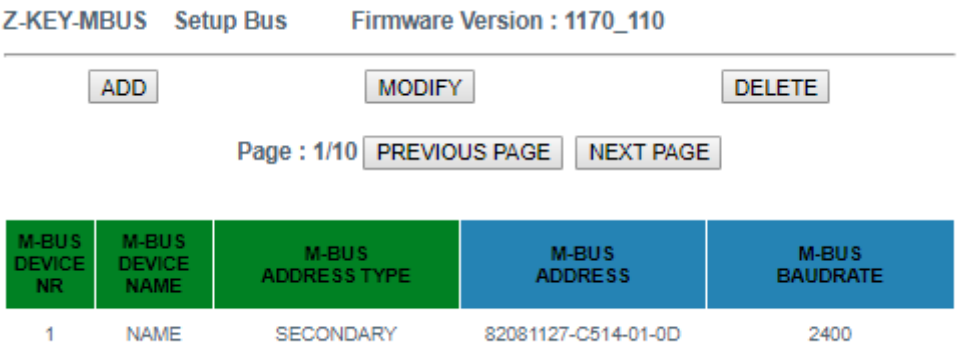
SELECT
Selects which variable to import into the modbus registers

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.

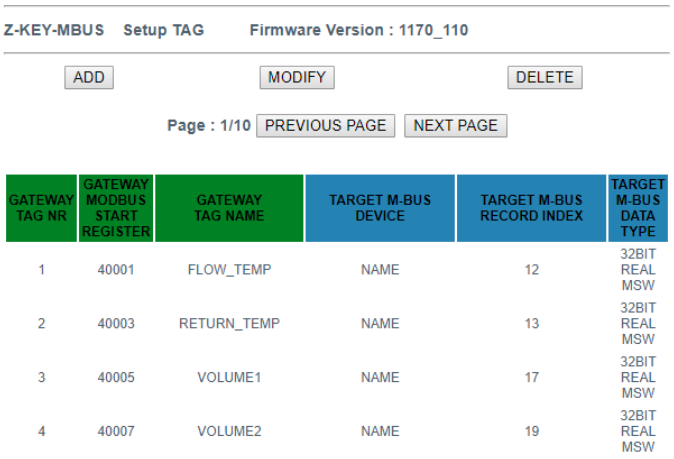
Now press the "ADD DEVICE WITH DATA POINT SELECTED" button, at which point the tags and the device are automatically added to the Z/R-KEY-MBUS list.
To verify the addition of the M-BUS device you are automatically returned to the M-BUS DEVICES section:



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

5.7. "TAG SETUP" SECTION

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



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

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) etc..1

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:

$$Variabile\ Scalata = (Variabile * GAIN) + OFFSET$$

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

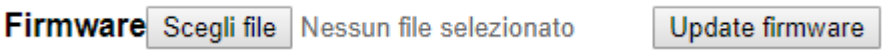
TARGET SCALE OFFSET
Represents the offset of the scaling

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



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)

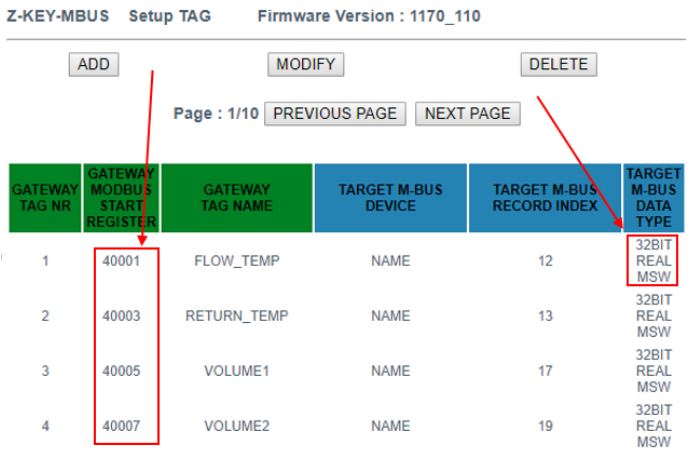
Measurement variables from M-BUS are converted into tags accessible from the Modbus bus. The Seneca product will add the new tags in the area as new M-BUS devices or new tags are entered.
Each variable coming from M-BUS can occupy 1 or more Modbus registers depending on the type of conversion that is 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:



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

If the credentials to access the webserver are lost, it is always possible to return the device to its factory conditions:
Static IP 192.168.90.101
user: admin password: admin

this way:

Turn off the device

1) Turn all SW1 dip switches ON:

2) Turn on the device
3) Wait at least 10 seconds
4) Turn off the device
5) Turn all SW1 dip switches OFF:

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