USER MANUAL

Z-LTE-WW

Multi-protocol data logger, RTU, with Ethernet, 4G modem, GNSS and integrated I/O

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06/03/2020	1.18	First Italian language version, aligned to English rev. no. 118
10/03/2020	1.19	Preliminary information translation fix
26/05/2020	1.20	Modbus registers for Z-UMTS/Z-LTE, Z-LTE-WW fix chapter 17.2
03/08/2020	21	Revision number change Added SMS command "SET PULSEn.CLOSE"
26/10/2020	22	Replaced Z-LTE, Z-LTE-WW product with Z-LTE, Z-LTE-WW
27/01/2021	23	Corrected websites for downloading installation manuals (p. 9)
21/06/2021	25	Corrected ModBUS address table
05/07/2021	26	Corrected English text; added frequency bands for SIM7600G modem
10/01/2022	28	Added SMS commands for analogue input settings and GPS settings
22/07/2025	29	Added changes for Red DA regulations (from firmware 6.0.2) Deleted GPRS and UMTS models

Contents

Z-LTE-WW, Z-LOGGER3

PRELIMINARY INFORMATION

ATTENTION!

Contact your phone provider for information on GSM and GPRS service costs. It is recommended to estimate log and SMS costs before setting up and installing Z-LTE-WW.

Using Z-LTE-WW while data roaming (e.g. abroad with an Italian SIM card) may lead to unexpected costs. Contact your phone provider for more information.

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ATTENTION!

- Contact your telephone service provider for GSM and GPRS service costs, especially when using Z-LTE-WW with a SIM card issued by a country other than the one in which it is used (international roaming).

- It is recommended to estimate telephone costs before setting up Z-LTE.

- The cost of each SMS is set by the telephone service provider.

- Costs for sending/receiving over the Internet may be related to the Kbytes sent/received, to a monthly cap as part of a bundle, or to the Internet connection time. Contact your telephone service provider for more information.

- For Internet connections where costs depend on connection time, please note that communications occur for a period of time that depends on the number of log lines to be sent. Typically, a 2 Kbyte data log takes about 10 to 15 seconds (in GPRS mode) to be sent, in addition to the time needed to establish the connection (5 to 30 seconds) and the time required for any login attempts to the server.

- When using PPP, the Internet connection is ALWAYS active

- Check the amount of data sent via internet and SMS before using Z-LTE-WW.

Remember that mobile service providers also take into account the entire communication allowing the transmission of files (and thus the transmission of header data, the number of connection attempts, etc.).

1. GENERAL SPECIFICATIONS

1.1. UPS and Modem Features

- ***Internal UPS operates without external power supply for up to 1h***

Z-LTE-WW:	***Worldwide coverage Model 4G/LTE LTE-FDD: B1/B2/B3/B4/B5/B7/B8/B12/B13 B18/ B19/B20/B25/B26/B28 LTE-TDD: B38/B39/B40/ B41 - WCDMA: B1/B2/B4/B5/B6/B8/B19 GSM: B2/B3/B5/B***
Z-LTE-WW (B3x /C3x):	***LTE-TDD B34/B38/B39/B40/B41 LTE-FDD: B1/B2/B3/B4/B5/B7/B8/B12/B13 B18/ B19/B20/B25/B26/B28/B66 UMTS/HSPA+ B1/B2/B4/B5/B6/B8/B19 GSM/GPRS/EDGE 850/900/1800/1900MHz***

1.2. *Technical specifications and electrical connections:*

Information regarding technical specifications, electrical connections and LED functions can be found in the installation manual for each product. For the installation manual, please use the link ***Z-LTE-WW:*** https://www.seneca.it/prodotti/z-lte/doc/installation_manualIT

2. DEVICE OVERVIEW

Z-LTE-WW and Z-LOGGER3 are equipped with 4 meters and 4 totalisers. Signals with a maximum frequency of 30 Hz, 4 digital inputs, 2 analogue inputs and 2 digital relay outputs can be acquired.

Z-LTE-WW products are also equipped with a GNSS positioning system.

A maximum of 100 external TAGs (Modbus RTU and/or Modbus TCP) plus internal TAGs (IO and embedded signals) can be registered.

Logs are sent in .csv format (comma separated values, compatible with Microsoft Excel™) via FTP, email or microSD card.

HTTP REST functions or MQTT protocols can also be used for sending logs, alarms and send/receive commands.

Z-LTE-WW can also send the last line of the log file via SMS.

An internal UPS is also available. In UPS mode the RTUs will run for about 1h without external power supply.

All configurations are possible via the SEAL software, which can be downloaded free of charge from www.seneca.it in the Z-LTE-WW section.
SEAL is a GUI that allows you to configure the data logger and create simple automation without knowing any programming language.

For more information see SEAL Help. SEAL can be downloaded for free at:

http://www.seneca.it/en/linee-di-prodotto/software/seal/

More manuals, quickstarts and examples on SEAL are available in the Z-LTE-WW sections of the website.

3. SWITCHING THE RTU ON AND OFF

RTUs are equipped with internal UPS batteries to perform programmable actions in the event of a blackout.

Start-up:

1) Power the RTU via the terminal or via IDC10 BUS

2) The board will start up (the PWR LED will flash)

Switching off:

1) Disconnect power supply (from terminal or IDC10 BUS)

2) The board is now powered by the internal UPS

3) Press the PS1 side button until the PWR LED flashes quickly.

4) Release the button; the board will switch off.

4. SUPPORTED SIM CARDS (Z-LTE-WW)

Z-LTE-WW supports the following SIM card types:

Voice-only SIM card

Data-only SIM card

Voice + Data SIM card

Zero-cost operations can only be performed on voice-only SIM cards; if the RTU receives a ring from an enabled number, an action can be performed.

To top-up the SIM cards, the remaining credit can be requested from the telephone service provider (a website is usually available to check remaining credit).

ATTENTION!

- Before inserting the SIM CARD, DELETE ALL MESSAGES ON THE SIM BY USING A MOBILE PHONE.

- Before inserting the SIM CARD, DELETE ALL CONTACTS ON THE SIM CARD USING A MOBILE PHONE.

- The product has been tested with leading international SIM card suppliers. However, it is not guaranteed to work with all operators.

5. GSM SIGNAL (Z-LTE-WW ONLY)

The GSM signal level is available via the SEAL software (in the 'test' section), on the webserver, or in the LEDs.

To display the GSM signal level, the SIM card must be inserted (the signal can change radically depending on the provider selected).

In the log file, the range is expressed in dBm, where -115 dBm is the minimum and -52 dBm is the maximum.

You can refer to this table:

GSM signal	GSM signal [dBm]
0 (MINIMUM)	-115
1	-106
2	-97
3	-88
4	-79
5	-70
6	-61
7 (MAXIMUM)	-52

Where 0 is the minimum, and 7 is the maximum.

For proper FTP or email log operations, the minimum field level required is 2/7 (remember that the signal often fluctuates).

For SMS operations only, the minimum required field level is 2/7.

Please refer to the following table for signal levels:

SIGNAL LEVEL 0 = NO SIGNAL (INSUFFICIENT)

SIGNAL LEVEL 1 = INSUFFICIENT SIGNAL (NOT RELIABLE FOR SMS AND GPRS)

SIGNAL LEVEL 2 = MINIMUM SIGNAL (MINIMUM SIGNAL FOR SMS AND GPRS)

SIGNAL LEVEL 3 = RELIABLE SIGNAL (RELIABLE FOR SMS AND GPRS)

SIGNAL LEVEL 4 = GOOD SIGNAL

SIGNAL LEVEL 5 = VERY GOOD SIGNAL

SIGNAL LEVEL 6 = OPTIMAL SIGNAL

SIGNAL LEVEL 7 = EXCELLENT SIGNAL

To increase the GSM signal level, Seneca provides various GSM antenna models to achieve the minimum signal level in most situations.

Visit www.seneca.it, refer to the general catalogue, or contact Seneca srl for further information.

ATTENTION!

-Insert the SIM card only with the RTU switched off.

- Before inserting the SIM card, delete all SMS messages on it using a mobile phone

- Wait at least 5 minutes for the GSM signal to be read correctly.

ATTENTION!

- Contact your telephone service provider for GSM and GPRS service costs, especially when using the RTU with a SIM card issued by a country other than the one in which it is used (international roaming).

6. INTERNAL UPS

RTUs are equipped with a rechargeable battery pack.

In the event of a blackout, the card can be configured to:

A) Operation for up to 1 hour without external power supply.

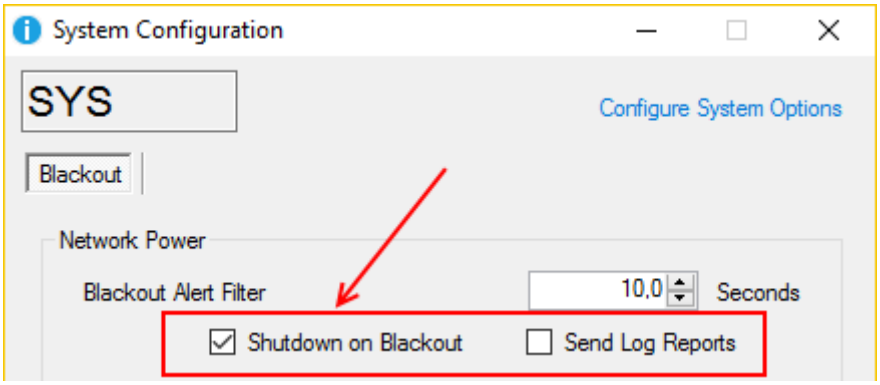
When the batteries are about to be out of charge (after about 1h of uninterrupted UPS operation), the RTU performs the following algorithm:

1) Stops sending data
2) Closes all open files on microSD
3) Switches off

B) When there is no power supply, it switches off.

C) Without external power supply, the board sends the current log data and then shuts down.

In SEAL this behaviour can be changed in System Configuration SYS :



ATTENTION!
RTUs are supplied with BATTERIES that are NOT CHARGED.

TO CHARGE THE UPS' BATTERIES, THE RTU MUST BE POWERED FOR AT LEAST 48H BEFORE USE.

ATTENTION!
THE BATTERIES CAN BE RECHARGED UP TO MAXIMUM 300 TIMES.

ATTENTION!

IN CASE OF DAILY BACKUP, TO SAVE BATTERY POWER, USE THE CONFIGURATION WITH SHUTDOWN IN CASE OF BACKUP (CASE C)

7. THE ADDRESS BOOK

For security reasons, Z-LTE-WW accept SMS commands or audio calls only from numbers included in the address book.

The address book consists of a maximum of 10 telephone numbers + 10 email addresses.

Groups of numbers/emails can be used for sending alarms/logs to a limited number of users.

For more information, please refer to the online SEAL Help.

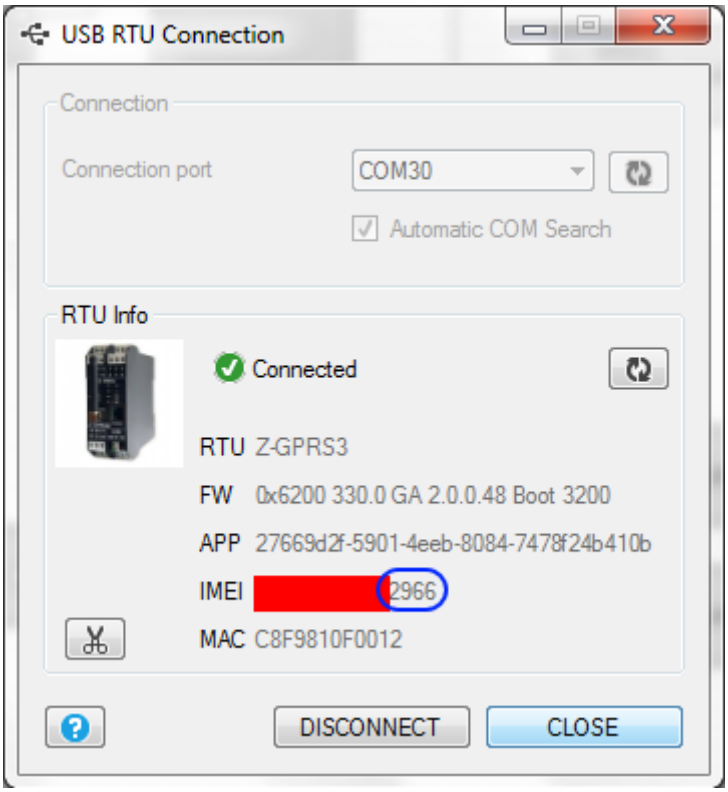
7.1. SENDING AN SMS COMMAND WITH PASSWORD (Z-LTE-WW)

An SMS command can be accepted even if the phone number is not in the address book.

To do so, a password must be entered before the SMS command.

The password is different for each RTU and is derived from the last 4 digits of the modem's IMEI.

To obtain the password, connect the RTU with SEAL:



Send an SMS command, for example:

"2966 NET"

The RTU answers even if the phone number is not present in the address book.

7.2. EXTENDED ADDRESS BOOK ON MICROSD CARD (Z-LTE-WW ONLY)

You can expand the internal address book using a file on the microSD card.

A maximum of 1000 telephone numbers can be added. These numbers are only enabled to execute a ring command.

To edit the contact list on the MicroSD card, please refer to the online SEAL Help.

8. ACQUISITION AND TRANSMISSION OF LOG DATA

When the logger is activated, RTU save data are saved in an internal flash memory; they can then be sent to the mail server, FTP server, HTTP server, MQTT broker or MicroSD card.

When the internal flash memory is full, the oldest data is overwritten (circular buffer).

Files are in standard .csv text format (Windows Excel™ compatible).

There are 3 types of logs:

event log, ***data log and log on trigger***

The internal flash memory stores a maximum of 8192 lines for the event log. A new line will overwrite the oldest one (circular buffer).

The number of lines the data logger can store in the internal flash memory depends on the tag size (16, 32 or 64 bit) and the number of tags.

By activating all embedded tags, the maximum number of lines that can be stored in the internal flash memory is 16384. A new line will overwrite the oldest one (circular buffer).

Activating all embedded tags and all 100 extended tags (assuming they're all 32 bit) the maximum number of lines that can be stored is 16384/8=2048. A new line will overwrite the oldest one (circular buffer).

8.1. THE EVENT LOG

The event log works by defining Events (Digital Input/Output Events, Blackouts, Analogue Alarms, etc.) through SEAL software configuration.

When an event is created, a new line of text (with the Timestamp) is entered in the log. The event must be configured through SEAL software.

The event log can be sent at least once a day via FTP, e-mail or microSD card.

NOTE:

If no events are generated, the Event logger file will consist of only 1 line with text such as:

INDEX	LEVEL	TIMESTAMP	SOURCE	MESSAGE
140	INFO	06/06/2016 00:00	SYS	OK: No message

8.1.1. Sending an event log file to an FTP server

ATTENTION! For security reasons, sending logs via unencrypted FTP is only allowed locally

RTUs are compatible with the FTP server configured in passive or active mode.

If the connection with the server is lost, the RTU will accumulate the data; when the connection is restored, all data will be sent to align with the actual acquisition.

An event logger can also include diagnostics, for example:

INDEX	LEVEL	TIMESTAMP	SOURCE	MESSAGE
119	ERR	01/06/2016 14:11	SYS	FTP connection error
120	ERR	01/06/2016 20:34	PRT1	Bus disconnected
121	ERR	01/06/2016 23:05	PRT1	Bus disconnected
122	ERR	02/06/2016 05:37	PRT1	Bus disconnected
123	ERR	02/06/2016 06:39	SYS	FTP connection error
124	CAUTION	02/06/2016 06:40	SYS	Timeout PING
125	ERR	02/06/2016 13:14	PRT1	Bus disconnected
126	ERR	02/06/2016 16:46	PRT1	Bus disconnected
127	ERR	02/06/2016 19:48	PRT1	Bus disconnected
128	ERR	02/06/2016 21:26	PRT1	Bus disconnected

For events (Digital1 and Digital2 alarm status, for example):

INDEX	LEVEL	TIMESTAMP	SOURCE	MESSAGE
674	INFO	25/06/2016 00:18	SEC2	INPUT 2 ALARM ACTIVE!
675	INFO	25/06/2016 00:18	SEC2	INPUT 2 END ALARM!
676	INFO	25/06/2016 00:18	SEC2	INPUT 2 ALARM ACTIVE!
677	INFO	25/06/2016 00:18	SEC2	INPUT 2 END ALARM!
678	INFO	25/06/2016 00:18	SEC1	INPUT 1 ALARM ACTIVE!
679	INFO	25/06/2016 00:18	SEC1	INPUT 1 END ALARM!
680	INFO	25/06/2016 00:18	SEC1	INPUT 1 ALARM ACTIVE!
681	INFO	25/06/2016 00:18	SEC1	INPUT 1 END ALARM!

682	INFO	25/06/2016 00:18	SEC2	INPUT 2 ALARM ACTIVE!
683	INFO	25/06/2016 00:18	SEC2	INPUT 2 END ALARM!

The event log file name is:

RTUNAME_msgyyyyyMMMddhhmmss.csv

Where:

RTUNAME is the name of the RTU

yyyy is the year of the sending

MM is the month of the sending

dd is the day of the sending

hh are the hours of the sending

mm are the minutes of the sending

ss are the seconds of the sending

for example:

ZGPRS3TEST_msg20160606000057.csv

8.1.2. Sending the event logger file to an EMAIL server

RTUs are only compatible with SMTP servers without encryption using the Ethernet or GPRS Always ON (PPP) connection.

Z-LTE-WW are also compatible with SMTPS servers with encryption up to TLS 1.2 (e.g. Gmail™) but only with the PPP connection switched off.

An example of an SMTP server that works without encryption is hMailServer for Windows™. For more information, see:

https://www.hmailserver.com/

See application notes for installing and using hMailServer on a Windows™ machine on the Seneca website (RTU section).

If the connection with the server is lost, the RTU will accumulate the data and when the connection is returned, all data will be sent to align with the actual acquisition.

A typical email has text in the body with the timestamp and log file attached.

An event logger can also include diagnostics, for example:

INDEX	LEVEL	TIMESTAMP	SOURCE	MESSAGE
119	ERR	01/06/2016 14:11	SYS	FTP connection error
120	ERR	01/06/2016 20:34	PRT1	Bus disconnected
121	ERR	01/06/2016 23:05	PRT1	Bus disconnected
122	ERR	02/06/2016 05:37	PRT1	Bus disconnected
123	ERR	02/06/2016 06:39	SYS	FTP connection error
124	CAUTION	02/06/2016 06:40	SYS	Timeout PING
125	ERR	02/06/2016 13:14	PRT1	Bus disconnected
126	ERR	02/06/2016 16:46	PRT1	Bus disconnected
127	ERR	02/06/2016 19:48	PRT1	Bus disconnected
128	ERR	02/06/2016 21:26	PRT1	Bus disconnected

For events (Digital1 and Digital2 alarm status, for example):

INDEX	LEVEL	TIMESTAMP	SOURCE	MESSAGE
674	INFO	25/06/2016 00:18	SEC2	INPUT 2 ALARM ACTIVE!
675	INFO	25/06/2016 00:18	SEC2	INPUT 2 END ALARM!
676	INFO	25/06/2016 00:18	SEC2	INPUT 2 ALARM ACTIVE!
677	INFO	25/06/2016 00:18	SEC2	INPUT 2 END ALARM!
678	INFO	25/06/2016 00:18	SEC1	INPUT 1 ALARM ACTIVE!
679	INFO	25/06/2016 00:18	SEC1	INPUT 1 END ALARM!
680	INFO	25/06/2016 00:18	SEC1	INPUT 1 ALARM ACTIVE!
681	INFO	25/06/2016 00:18	SEC1	INPUT 1 END ALARM!
682	INFO	25/06/2016 00:18	SEC2	INPUT 2 ALARM ACTIVE!
683	INFO	25/06/2016 00:18	SEC2	INPUT 2 END ALARM!

The event recorder file name is:

RTUNAME_msgyyyyyMMMddhhmmss.csv

Where:

RTUNAME is the name of the RTU

yyyy is the year of the submission file

MM is support for the submission file

dd is the day of the submission file

hh are the hours to the send file

mm are the minutes of the submission file

ss are the seconds of the send file

The name of the file could be, for example:

ZGPRS3TEST_msg20160606000057.csv

8.1.3. Saving the event log file on the microSD card

RTUs are only compatible with microSD cards formatted in FAT32 (the FAT16 filesystem is not recommended). Therefore, the SD card needs to be formatted in FAT32 format.

Event log files are stored in the /SYS directory.

The file name is different from the name sent to FTP / EMAIL and is

Exxxxxxxxx.csv

Where xxxxxxx is an incremental number.

8.2. DATA LOGGER AND DATA LOGGER ON TRIGGER

The data logger works by defining a data acquisition time (sampling time).

The minimum sampling time is 1 minute.

The card can send data in three ways:

1) Notify
2) Report
3) Trigger

The notification sends the data every time a sample is acquired (minimum = 1 minute), the file will have only 1 line of data. This line can be sent via SMS EMAIL, HTTP, POST or MQTT.

The Report sends the data every time the report time is up (e.g. if the sampling time is 1 minute and the report time = 5 minutes, a report consisting of 5 lines of data will be sent every 5 minutes).

The data logger on trigger works by defining one or more event trigger actions. When the trigger action is true, a line capture is performed.
The maximum acquisition frequency of a trigger is a few seconds.

If no event trigger actions are performed, no notifications or reports are sent.

NOTE:

For the http POST function, only notification data can be used, so that only one line is sent at a time.

8.2.1. Sending data logger files to an FTP server

The RTU is compatible with the FTP server configured in passive or active mode.

If the connection with the server is lost, the RTU will accumulate the data; when the connection is restored, all data will be sent to align with the actual acquisition.

A typical Data logger file, when opened with Excel™, is:

INDEX	TYPE	TIMESTAMP	DIN1	DIN2	DIN3	DIN4	DOUT1	DOUT2	VBAT	POW	VAL1	AVG1	MIN1	MAX1
51764	LOG	05/06/2016 14:36	0	0	0	0	0	0	1	1	43	43	42	44
51765	LOG	05/06/2016 14:37	0	0	0	0	0	0	1	1	43	43	43	44
51766	LOG	05/06/2016 14:38	0	0	0	0	0	0	1	1	43	43	42	44
51767	LOG	05/06/2016 14:39	0	0	0	0	0	0	1	1	43	43	42	44
51768	LOG	05/06/2016 14:40	0	0	0	0	0	0	1	1	43	43	42	44

Where:

INDEX is a progressive acquisition number.

LOG is a constant text.

TIMESTAMP is the time at which the acquisition was made.

The other values are the TAG name and the variables entered by the user in the SEAL configuration.

The Data logger file on Trigger, when opened with Excel™, is:

INDEX	TYPE	TRIGGER	TIMESTAMP	POW	VBAT	DIN1	DIN2	DIN3	DIN4	DOUT1	DOUT2	VAL1	AVG1	MIN1	MAX1
1	ASYNC	A-------	05/12/2016 16:11	1	1	1	0	0	0	0	0	-4	-3	-5	-3
2	ASYNC	A-------	05/12/2016 16:11	1	1	1	0	0	0	0	0	-5	-3	-5	-3
3	ASYNC	A-------	05/12/2016 16:11	1	1	1	0	0	0	0	0	-5	-3	-5	-3
4	ASYNC	-B------	05/12/2016 16:11	1	1	0	1	0	0	0	0	-4	-3	-5	-3
5	ASYNC	-B------	05/12/2016 16:11	1	1	0	1	0	0	0	0	-4	-3	-5	-3
6	ASYNC	-B------	05/12/2016 16:11	1	1	0	1	0	0	0	0	-4	-3	-5	-3
7	ASYNC	-B------	05/12/2016 16:11	1	1	0	1	0	0	0	0	-4	-3	-5	-3
8	ASYNC	-B------	05/12/2016 16:11	1	1	0	1	0	0	0	0	-4	-3	-5	-3

9	ASYNC	-B------	05/12/2016 16:11	1	1	0	1	0	0	0	0	-4	-3	-5	-3
10	ASYNC	AB------	05/12/2016 16:11	1	1	1	1	0	0	0	0	-4	-3	-5	-3

A new column called Trigger is the origin of the trigger that generated the log line.

For example, index line 9 is generated by trigger "B" (e.g. associated with event DIN2 HIGH in the SEAL configuration software).

Indexed line 10 is generated simultaneously by trigger "A" and "B" (DIN1 and DIN2 HIGH).

Note that the RTU directly calculates the average/minimum/maximum of an embedded analogue input (however, it is also possible to calculate it on any bus-acquired analogue input).

The file name of the Data Logger is:

RTUNAME_logyyyyyMMMddhhmmss.csv

Where:

RTUNAME is the name of the RTU

yyyy is the year of the data of the first line in the file

MM is the month of the data of the first line in the file

dd is the day of the data of the first line in the file

hh are the hours of the data of the first line in the file

mm are the minutes of the data of the first line in the file

ss are the seconds of the data of the first line in the file

The name of the file in the first example, then, could be:

ZGPRS3TEST_log20160605143600.csv

8.2.2. Sending data and logs on trigger to an e-mail server

RTUs are only compatible with SMTP servers without encryption using Ethernet or GPRS/UMTS+ Always ON (PPP) connection.

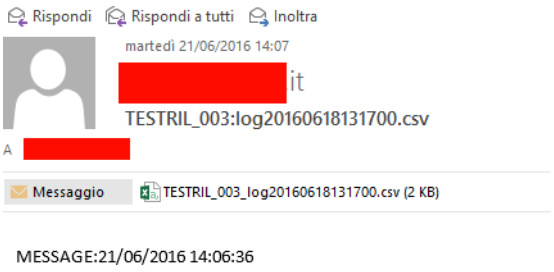
Z-LTE-WW are also compatible with SMTPS servers with SSL encryption (e.g. Gmail™) but only with GPRS/UMTS+ connection NOT always ON (PPP must be switched off).

An example of an SMTP server that works without encryption is hMailServer for Windows™. For more information, see:

https://www.hmailserver.com/

If the connection with the server is lost, the RTU will accumulate the data and when the connection is returned, all data will be sent to align with the actual acquisition.

A typical sent email has text in the body with the timestamp and log file attached:



A typical Data logger file, when opened with Excel™, is:

INDEX	TYPE	TIMESTAMP	DIN1	DIN2	DIN3	DIN4	DOUT1	DOUT2	VBAT	POW	VAL1	AVG1	MIN1	MAX1
51764	LOG	05/06/2016 14:36	0	0	0	0	0	0	1	1	43	43	42	44
51765	LOG	05/06/2016 14:37	0	0	0	0	0	0	1	1	43	43	43	44
51766	LOG	05/06/2016 14:38	0	0	0	0	0	0	1	1	43	43	42	44
51767	LOG	05/06/2016 14:39	0	0	0	0	0	0	1	1	43	43	42	44
51768	LOG	05/06/2016 14:40	0	0	0	0	0	0	1	1	43	43	42	44

Where:

INDEX is a progressive acquisition number.

LOG is a constant text.

TIMESTAMP is the real-time clock at the time of acquisition.

The other values are the TAG name and the variables entered by the user in the SEAL configuration.

The Data logger file on Trigger, when opened with Excel™, is:

INDEX	TYPE	TRIGGER	TIMESTAMP	POW	VBAT	DIN1	DIN2	DIN3	DIN4	DOUT1	DOUT2	VAL1	AVG1	MIN1	MAX1
1	ASYNC	A-------	05/12/2016 16:11	1	1	1	0	0	0	0	0	-4	-3	-5	-3
2	ASYNC	A-------	05/12/2016 16:11	1	1	1	0	0	0	0	0	-5	-3	-5	-3
3	ASYNC	A-------	05/12/2016 16:11	1	1	1	0	0	0	0	0	-5	-3	-5	-3
4	ASYNC	-B------	05/12/2016 16:11	1	1	0	1	0	0	0	0	-4	-3	-5	-3
5	ASYNC	-B------	05/12/2016 16:11	1	1	0	1	0	0	0	0	-4	-3	-5	-3
6	ASYNC	-B------	05/12/2016 16:11	1	1	0	1	0	0	0	0	-4	-3	-5	-3
7	ASYNC	-B------	05/12/2016 16:11	1	1	0	1	0	0	0	0	-4	-3	-5	-3
8	ASYNC	-B------	05/12/2016 16:11	1	1	0	1	0	0	0	0	-4	-3	-5	-3

9	ASYNC	-B------	05/12/2016 16:11	1	1	0	1	0	0	0	0	-4	-3	-5	-3
10	ASYNC	AB------	05/12/2016 16:11	1	1	1	1	0	0	0	0	-4	-3	-5	-3

A new column called Trigger is the origin of the trigger that generated the log line.

For example, index line 9 is generated by trigger "B" (configured as DIN2 HIGH on the SEAL software).

Index line 10 is generated simultaneously by trigger "A" and "B" (DIN1 and DIN2 HIGH).

Note that the RTU calculates directly the average/minimum/maximum of an embedded analogue input.

If the Data Logger file is sent to an FTP server or via email, the file name is:

RTUNAME_logyyyyyMMddhhmmss.csv

Where:

RTUNAME is the name of the RTU

yyyy is the year of the data of the first line in the file

MM is the month of the data of the first line in the file

dd is the day of the data of the first line in the file

hh are the hours of the data of the first line in the file

mm are the minutes of the data of the first line in the file

ss are the seconds of the data of the first line in the file

So the file name in the example can be:

ZGPRS3TEST_log20160605143600.csv

8.2.1. Sending the data log and log on trigger to an HTTP server

Data logger logs are sent using Notify (connection is made each time sampling is performed).

The standard used for sending data is JSON.

For more information, please refer to the SENECA HTTP PROTOCOL user manual (this can be requested by emailing: service@seneca.it).

8.2.1. Saving log data on the microSD card

Z-LTE-WW are only compatible with microSD cards formatted in FAT32 (FAT16 filesystem is not recommended).

Log files are stored in the /LOG directory.

If the log report is to be sent more frequently than daily, the RTU will create a directory for each day, for example:

ROOT

--LOG

--20160618

--20160619

--20160620

The file name is different from the name sent to FTP / EMAIL and is

Lxxxxxxxxx.csv

Where xxxxxxx is an incremental number.

9. Sending data to an MQTT broker

The data can be sent in real time in JSON format to an MQTT broker.

For more information on MQTT see:

http://mqtt.org/

For more information on the MQTT implementation please refer to the

SENECA MQTT PROTOCOL user manual (must be requested from service@seneca.it).

10. HOW MANY LOGS IN A SINGLE MICROSD?

A microSD is pre-formatted in FAT32 with an allocation unit that depends on the manufacturer and/or its size (e.g. microSDs > 8GB are usually formatted in EXT FAT).

The number of log data that can be stored on a microSD card depends on the microSD and the size of the allocation unit.

Using a classic 4GB microSD formatted with a file allocation of 32768 bytes, the number of allocations is around 32768 bytes:

4 000 000 000 000 / 32768 = approximately 122070 allocation units

Typically the RTU can save data on a microSD every 15 minutes, in this case the microSD will be filled in:

122070/96 files per day = about 1272 days = about 3.5 years

By writing to a microSD card every 1 minute, in this case the microSD card will be filled in:

122070/3600 files per day = approximately 34 days

If you need to increase the number of logs that can be stored, you need to format the microSD to the minimum size of the allocation unit.

In a "cmd" dos shell:

format x: /FS:FAT32 /A:1024 /Q

Where “x” is the letter of the microSD unit

You will get an allocation unit of 1024 bytes, so the number of allocation units now is:

4 000 000 000 000 / 1024 = approximately 3906250 allocation units.

Saving a file every 15 minutes creates a file of about 10K so it will use about 10 allocation units:

3906250 / (10 allocation units * 96 files per day) = approximately 4096 days => approximately 11 years

Consequently, if saving every 1 minute:

3906250/3600 files per day = about 1085 days => about 3 years

The minimum size of the unit is generally:

512 bytes for 2GB microSD

1024 bytes for 4GB microSD

11. ACTIONS AND MESSAGES

The SEAL software configurator can manage Actions and Messages.

11.1. ACTIONS

Actions are commands that must be executed by the RTU when an event is TRUE or FALSE.

Examples of actions are: writing to a ModBUS register, switching digital output 1, resetting a totalizer, etc...

11.2. TEXT AND AUDIO MESSAGES

Messages are texts that must be sent by the RTU when an event is TRUE or FALSE.

You can send a message to: EMAIL, SMS, AUDIO CALL, HTTP POST and MQTT broker

Examples of messages are: sending text alarm "Input 1 high ALARM!" when analogue input 1 is above 15 mA.

Audio messages are located in the /AUDIO directories. Some preset audio messages are pre-loaded with SEAL but can be modified.

12. SENDING AUDIO COMMANDS (DTMF) TO Z-LTE-WW

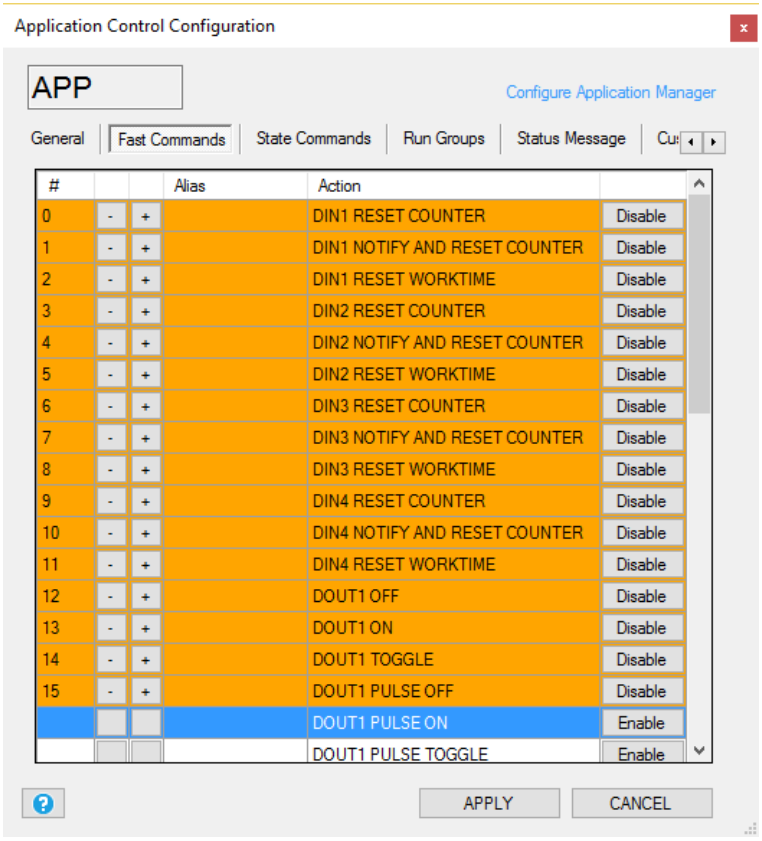
Z-LTE-WW can receive audio calls to execute commands via DTMF codes.

When an RTU is called, it responds with the audio file on the SD card:

/AUDIO/80.pcm

Now the RTU can execute FAST COMMANDS 0 to 15 by simply entering the command number and then confirming with the "*" key; use the "#" key to cancel.

FAST COMMANDS are editable via SEAL from the APP -> fast command icon, for example:



13. THE WEBSERVER

The Webserver can be accessed via Ethernet or PPP modem connection.

There are 2 webservers:

A maintenance Webserver and a customised Webserver.

ATTENTION!

The webserver must be enabled by the SEAL software (by default the webserver is OFF).

NOTE!

The webserver must be enabled by the SEAL software (by default the webserver is OFF).

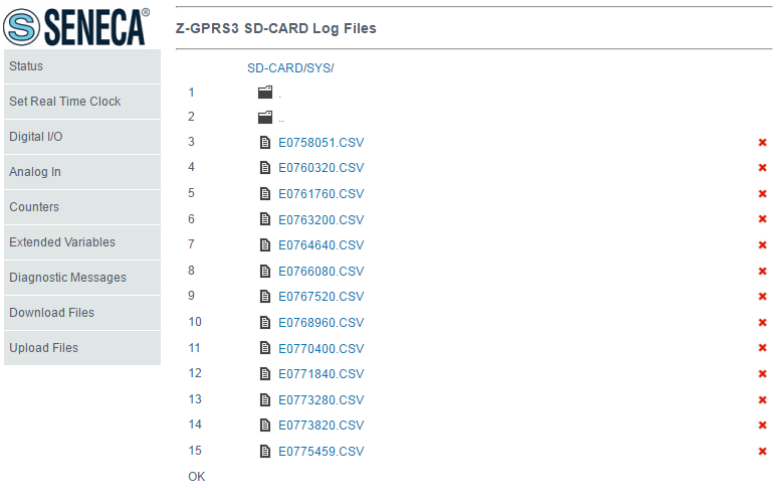
13.1. MAINTENANCE WEBSERVER

The maintenance webserver can be used for maintenance and debugging purposes, and can be accessed from a browser (with a default IP address):

http://192.168.1.101/maintenance/index.html

192.168.1.101 must be replaced with the Ethernet IP address or the Modem IP address.

With the webserver it is possible to download all log files that are stored on the SD card:



By clicking on it, an individual log file can be downloaded or deleted.

For debugging purposes, all external/internal TAG values can be seen in real time in the "Extended Variables"/"Status"/"Digital IO"/"Analog IN"/"Counters" sections.

The "Diagnostic Messages" section displays the last 16 diagnostic messages.

The "Upload file" section can be used for sending a new configuration or firmware to the RTU.

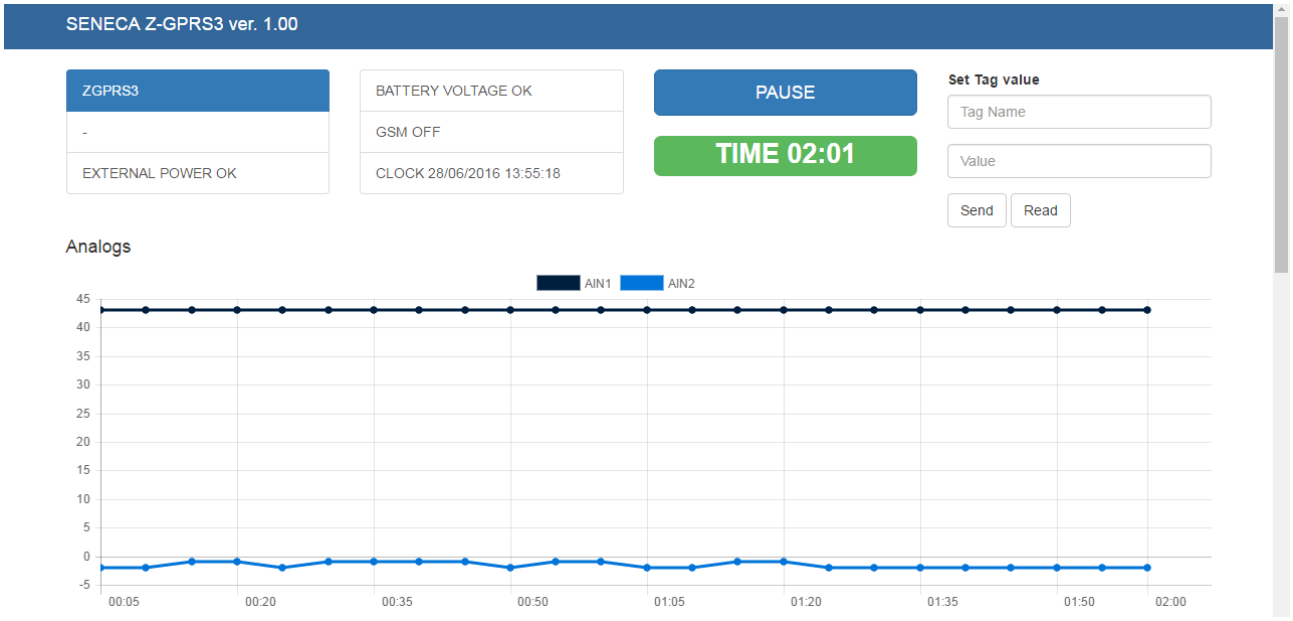
13.2. CUSTOMISED WEBSERVER

The customised webserver is located on the microSD card provided (/WEB directory).

To access this webserver, type in a browser (with default IP address):

http://192.168.1.101/index.html

192.168.1.101 must be replaced with the Ethernet IP address or the PPP Modem IP address.



For example, it is possible to write directly onto an external ModBUS tag by entering a tag name and its new value in the top right-hand corner.

An example of a real-time graph is also provided:

14. SEAL (SEneca Advanced Language)

Seal is a programming environment for the Seneca RTU. For more information please refer to the SEAL manual and help.

You can download the latest version of the Seal software from:

http://www.seneca.it/en/linee-di-prodotto/software/seal/

For more information, install SEAL and go to the online help.

ATTENTION!

For full SEAL support, the microSD card must be inserted into the RTU!

14.1. SEAL *3*

SEAL 3 supports Z-LTE-WW models compatible with the new RED DA directive.

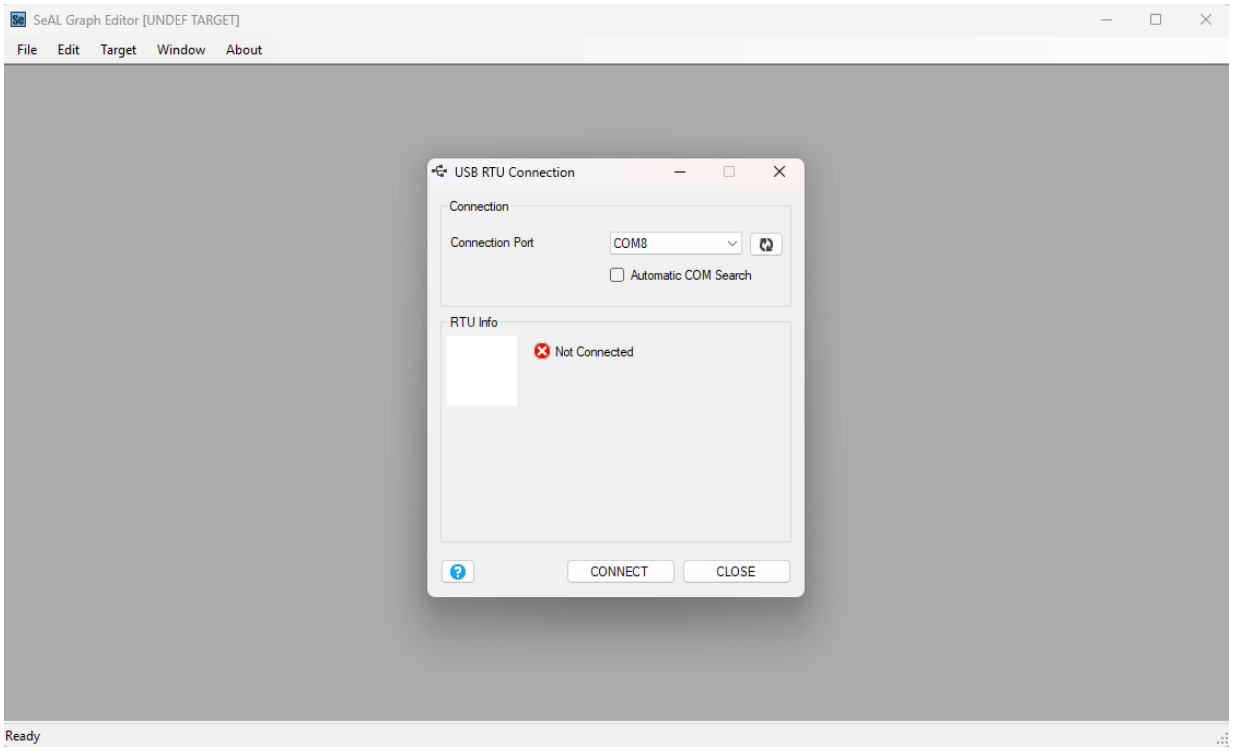
Z-LTE-WW models supporting the new RED DA directive are those with hardware revision "E", "F" or higher and firmware revision 6.0.0 or higher.

14.2. *SENDING AND READING A Z-LTE-WW CONFIGURATION WITH SUPPORT FOR THE NEW RED DA DIRECTIVE*

When accessing a blank device for the first time, a key is requested which will be saved in both the PC and the Z-LTE-WW device, this key will be REQUIRED to re-read the loaded configuration.

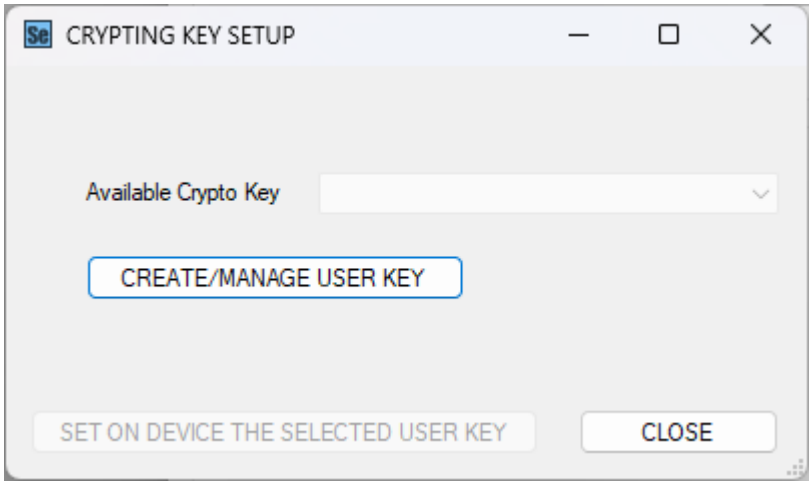
If the key is lost, the device can be accessed again only by returning it to the factory settings (but you will lose the loaded SEAL program and its configurations).

To connect, click on Menu -> Target -> Connect and select the COM port relative to the USB port:

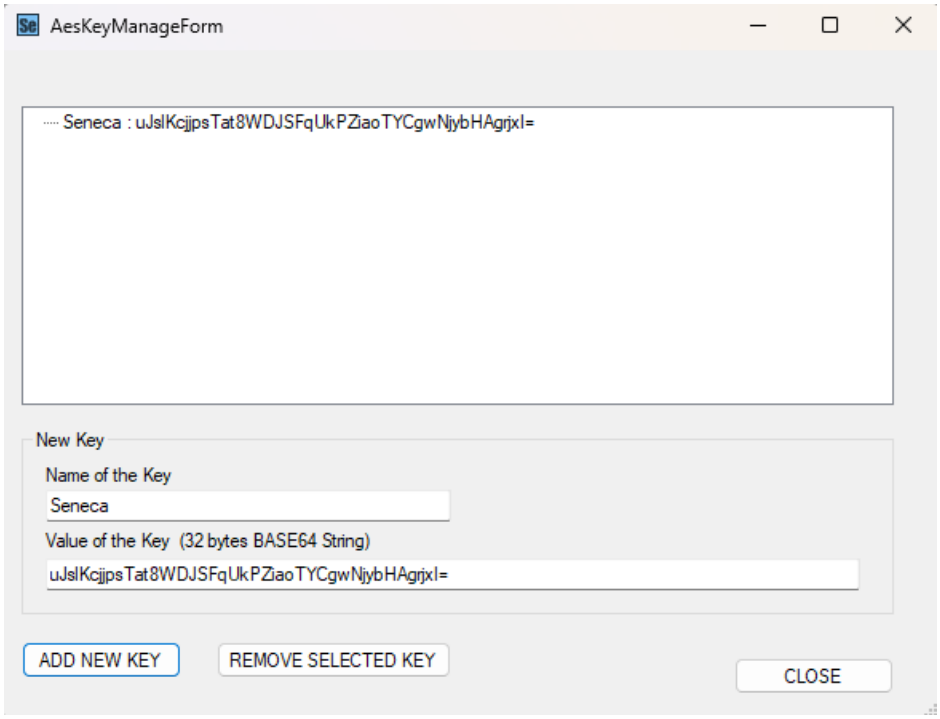


Click on "Connect":

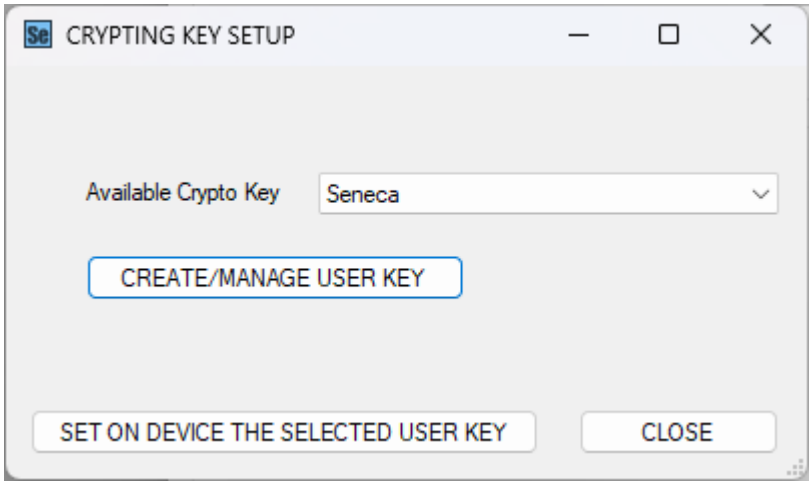
You will be able to select the key that will be used to encrypt the device:



Click on the "CREATE/MANAGE USER KEY" button and create a key:



The newly created key ("Seneca" in the example) appears in the list of keys:



Now click on "SET ON DEVICE THE SELECTED USER KEY".

At this point, the key is sent to the Z-KEY-WW device and from now on the device is encrypted using the new key.

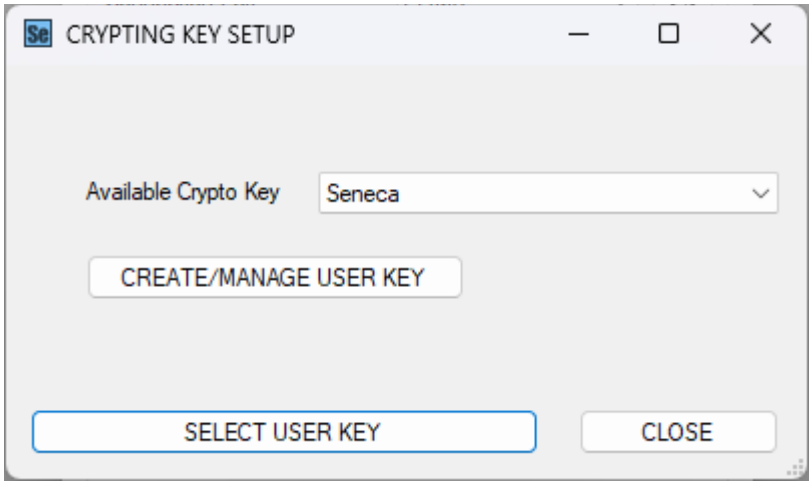
ATTENTION! After 5 failed attempts to access the device with an incorrect key, the device must be restarted.

ATTENTION!

1h after switching on the device, the USB port is automatically disabled.

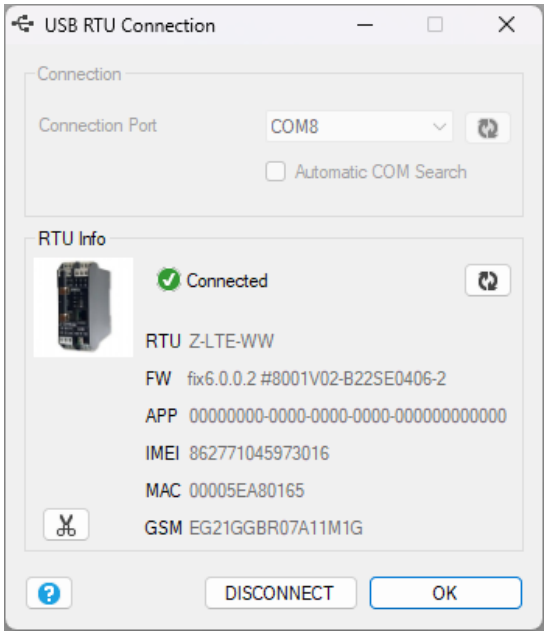
To read a configuration:

Click on Connect



Select the key you used to encrypt the device (Seneca in this case) and click on "SELECT USER KEY".

If the COM port and password are correct, the connection will be established:



15. FIRMWARE UPDATE

To add new functions, the system includes firmware upgrade options.

There are several ways to update the firmware:

Via Webserver: Go to "Upload File" section to update the firmware

Via USB: a full update takes approximately 8 minutes. The device must be connected to a PC with the SEAL software installed.

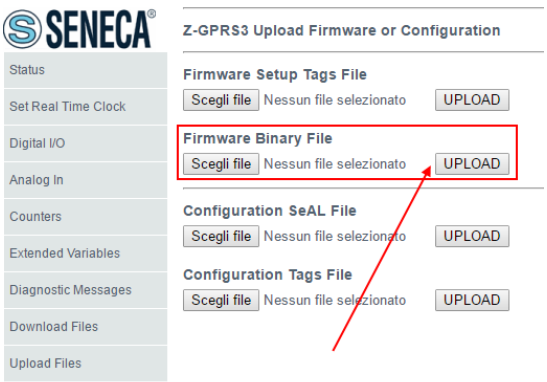
Via microSD card: a complete update takes about 20 seconds. A microSD adapter for PC is necessary (many mobile phones can also read / write microSDs).

Via server FTP: When the RTU cannot be accessed directly (SIM behind a NAT), the firmware update can be performed by sending an SMS or HTTP command; then the update file is downloaded directly by the RTU from an FTP server.

Via Server HTTP: When the RTU cannot be accessed directly (SIM behind a NAT), the firmware update can be performed by sending an HTTP command; then the update file is downloaded directly by the RTU from the HTTP server.

15.1. Firmware update via Webserver

1) Download and install the latest SEAL software from the Seneca website (the latest firmware can be found in C:\Program Files \Seneca\SeAL).
2) Access the RTU webserver at:
   http://ipaddress/maintenance/index.html
   where "ipaddress" is the modem address or Ethernet IP address.
3) Go to "Upload File" section.



4) Under "Firmware Binary File" select the file "fw.bin" from the last firmware folder; then click on "UPLOAD".
5) The RTU will reboot with the new firmware.

15.2. Firmware update via microSD card

The firmware can be updated via a microSD card formatted with the FAT16 or FAT32 filesystem (the microSD cards supplied are usually already formatted in this way).

To update the firmware, proceed as follows:

1. Copy the file called 'fw.bin' containing the firmware onto a microSD card. The file must be copied to the root folder of the microSD card.
2. With RTU OFF, insert the microSD card into the slot
3. Switch on the RTU.
4. The SD/STS led starts flashing at 1-second intervals for approximately 20 seconds. The new firmware is written to the flash memory during this phase.
5. When finished, the SD/STS led starts flashing rapidly.
6. At this point, remove the microSD card.
7. The green PWR LED starts flashing quickly (several times per second); at this stage, the module is copying the firmware from the flash memory to the microprocessor flash memory.
8. When finished, the module turns off and on again automatically

The firmware update can be checked on connection with SEAL or on the Webserver.

ATTENTION!

- Before updating the firmware, copy the current configuration.

- Once the firmware is updated, the previous configuration can be deleted, so the RTU must be reconfigured.

16. REMOTE UPDATE OF SEAL PROGRAM AND CONFIGURATION

16.1. UPDATING THE SEAL PROGRAM AND SEAL CONFIGURATION FROM THE WEBSERVER

You can update a SEAL program and/or configuration from the RTU Webserver.

To update a new program and configuration, the procedure is as follows:

1) In SEAL, create a new program or change parameter configuration
2) Go to Build -> Generate
3) Seal will create 3 files: .seal, .debug, .tag
4) Connect to the webserver at:
   http://ipaddress/maintenance/index.html
   where 'ipaddress' is the PPP modem or Ethernet IP address.
5) Go to "Upload File" section.

6) Under "Configuration Tag Files" select the file "setup.tag" and click on "UPLOAD".
7) The RTU will restart with the new SEAL Program/Configuration

ATTENTION!

When using this function with the remote RTU ensure that the connection parameters are correct before loading the new SEAL program/configuration, or you won't be able to access the RTU!

16.2. UPLOAD A BACKUP OF THE PROJECT TO THE RTU

You can create a backup file for the SEAL program (.seal file) for the archive and upload it to the RTU.

To do so, the procedure is as follows:

1) Connect to the webserver at:
   http://ipaddress/maintenance/index.html
   where 'ipaddress' is the PPP modem or Ethernet IP address.
2) Go to "Upload File" section.

3) Under "Configuration SEAL File" select the file ".seal" and then click on "UPLOAD".
4) The RTU will save the .seal file on the SD card

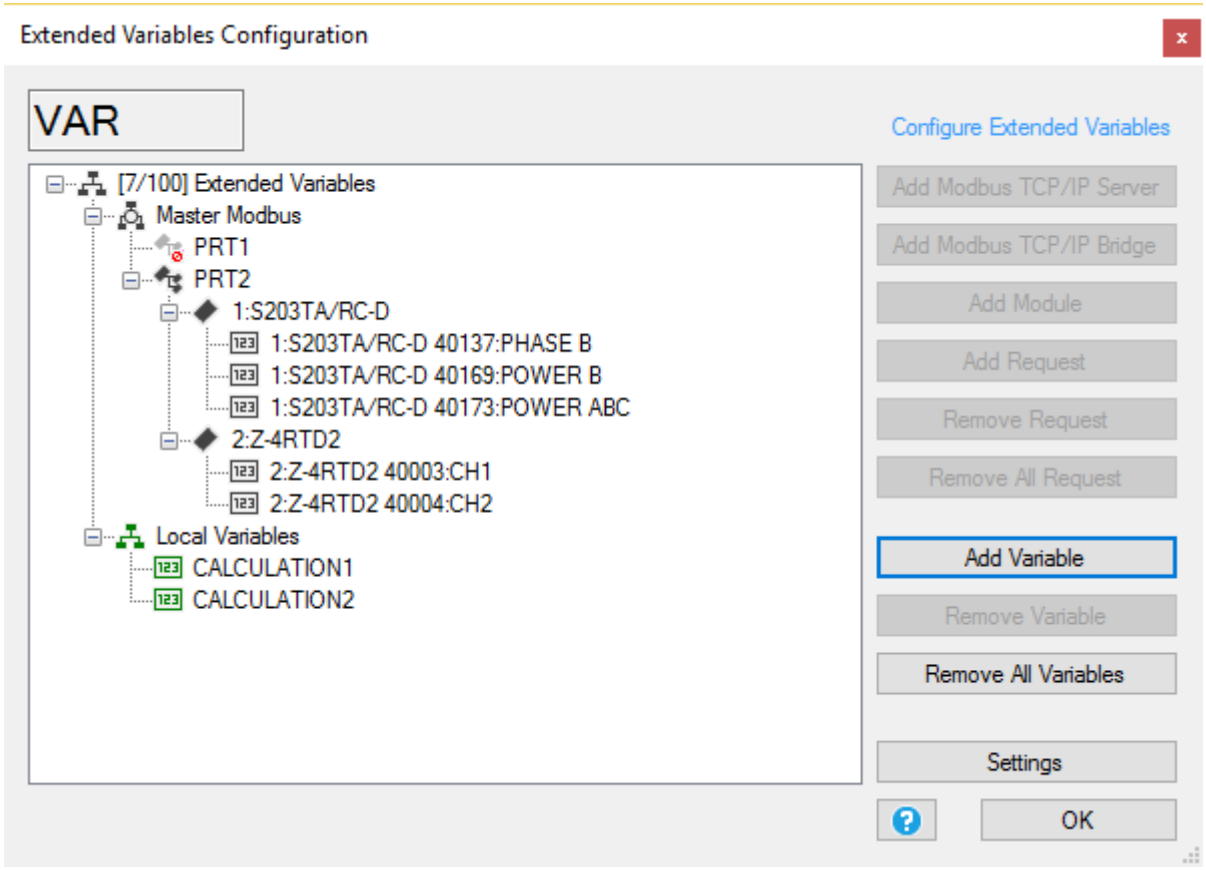
ATTENTION!
When a '.seal' file is loaded, the RTU does not change the current program/configuration. This operation is for backup purposes only. To modify the program/configuration you need to upload the "setup.tag" file (see chapter16.1)

17. MODBUS TCP-IP SERVER AND MODBUS RTU SLAVE

RTUs can activate a Modbus TCP-IP Server and a Modbus RTU Slave (on serial ports) so Embedded and Modbus I/Os can be accessed by external units.

The server accepts up to 2 clients from an Ethernet or Modem connection (only if PPP is active).

The addresses of external variables are positioned by the SEAL compiler so that, after compilation, the addresses can be displayed:



	277	Notice	Build	Slave Address PHASE B:PRT2 1:S203TA/RC-D 40137:PHASE B Mapped to 41003
	278	Notice	Build	Slave Address POWER B:PRT2 1:S203TA/RC-D 40169:POWER B Mapped to 41005
	279	Notice	Build	Slave Address POWER ABC:PRT2 1:S203TA/RC-D 40173:POWER ABC Mapped to 41007
	280	Notice	Build	Slave Address CH1:PRT2 2:Z-4RTD2 40003:CH1 Mapped to 41009
	281	Notice	Build	Slave Address CH2:PRT2 2:Z-4RTD2 40004:CH2 Mapped to 41010
	282	Notice	Build	Slave Address CALCULATION1:CALCULATION1 Mapped to 41011
	283	Notice	Build	Slave Address CALCULATION2:CALCULATION2 Mapped to 41012
	284	Info	Build	Time elapsed 0:0:0.5

17.1. MODBUS ADDRESS TABLE (Z-LOGGER3)

ADDRESS	*OFFSET*	*TAG*	*TYPE OF REGISTRATION*	*RO/RW*	*INFO*
40001	0	ID MACHINE	UNSIGNED 16	RO	INTERNAL CODE
40002	1	FIRMWARE CODE	UNSIGNED 16	RO	INTERNAL CODE
40003	2	MAJOR FIRMWARE REVISION	UNSIGNED 16	RO	(EXAMPLE 204 = 2.04)
40004	3	MINOR FIRMWARE REVISION	UNSIGNED 16	RO	In decimal format KMMBB Where: K=4= Bugfix release K=3= New Release MM = MINOR REVISION BB = Building Example: Value = 40110 4 = Bugfix release 01 = Minor revision 1 10 = Build 10
40008	7	DIGITAL INPUTS AND SIGNALS	BIT	RO	Digital inputs Bit 0 = INPUT1 VALUE Bit 1 = INPUT2 VALUE Bit2 = INPUT3 VALUE Bit 3 = INPUT4 VALUE Bit7 = EXTERNAL POWER Bit8 = GOOD BATTERY
40009	8	DIGITAL OUTPUTS	BIT	RO	Bit 14 = DIGITAL OUTPUT 1 Bit 15 = DIGITAL OUTPUT 2
40015	14	YEAR (CLOCK SETTINGS)	SIGNED 16 BIT	RO	Year
40016	15	MONTH (CLOCK SETTINGS)	UNSIGNED 8 BIT	RO	Bit from 0 to 7 (LSB)
40017	16	DAY (CLOCK SETTINGS)	UNSIGNED 8 BIT	RO	Bit from 0 to 7 (LSB)
40017	16	HOUR (CLOCK SETTINGS)	UNSIGNED 8 BIT	RO	Bit from 8 to 15 (MSB)
40018	17	MINUTES: (CLOCK SETTINGS)	UNSIGNED 8 BIT	RO	Bit from 0 to 7 (LSB)
40018	17	SECONDS (CLOCK SETTINGS)	UNSIGNED 8 BIT	RO	Bit from 8 to 15 (MSB)
40023	22	Totaliser value 1 LSW	UNSIGNED 16 BIT	RO	Less significant 16 bit
40024	23	Totaliser value 1 MSW	UNSIGNED 16 BIT	RO	Most significant 16 bit
40025	24	Meter value 1 LSW	UNSIGNED 16 BIT	RO	Less significant 16 bit

40026	25	Meter value 1 MSW	UNSIGNED 16 BIT	RO	Most significant 16 bit
40039	38	Working time 1 LSW	UNSIGNED 16 BIT	RO	Value in [Seconds] Less significant 16 bit
40040	39	Working time 1 MSW	UNSIGNED 16 BIT	RO	Value in [Seconds] Most significant 16 bit
40049	48	Totaliser value 2 LSW	UNSIGNED 16 BIT	RO	Less significant 16 bit
40050	49	Totaliser value 2 MSW	UNSIGNED 16 BIT	RO	Most significant 16 bit
40051	50	Meter value 2 LSW	UNSIGNED 16 BIT	RO	Less significant 16 bit
40052	51	Meter value 2 MSW	UNSIGNED 16 BIT	RO	Most significant 16 bit
40065	64	Working time 2 LSW	UNSIGNED 16 BIT	RO	Value in [Seconds] Less significant 16 bit
40066	65	Working time 2 MSW	UNSIGNED 16 BIT	RO	Value in [Seconds] Most significant 16 bit
40075	74	Totaliser value 3 LSW	UNSIGNED 16 BIT	RO	Less significant 16 bit
40076	75	Totaliser value 3 MSW	UNSIGNED 16 BIT	RO	Most significant 16 bit
40077	76	Meter value 3 LSW	UNSIGNED 16 BIT	RO	Less significant 16 bit
40078	77	Meter value 3 MSW	UNSIGNED 16 BIT	RO	Most significant 16 bit
40091	90	Working time 3 LSW	UNSIGNED 16 BIT	RO	Value in [Seconds] Less significant 16 bit
40092	91	Working time 3 MSW	UNSIGNED 16 BIT	RO	Value in [Seconds]. Most significant 16 bit
40101	100	Totaliser value 4 LSW	UNSIGNED 16 BIT	RO	Less significant 16 bit
40102	101	Totaliser value 4 MSW	UNSIGNED 16 BIT	RO	Most significant 16 bit
40103	102	Meter value 4 LSW	UNSIGNED 16 BIT	RO	Less significant 16 bit
40104	103	Meter value 4 MSW	UNSIGNED 16 BIT	RO	Most significant 16 bit
40117	116	Working time 4 LSW	UNSIGNED 16 BIT	RO	Value in [Seconds] Less significant 16 bit
40118	117	Working time 4 MSW	UNSIGNED 16 BIT	RO	Value in [Seconds] Most significant 16 bit
40128	127	Battery voltage	UNSIGNED 16 BIT	RO	[mV]
40130	129	Analog input 1	SIGNED 16 BIT	RO	Value in [mA] or [V]
40131	130	Scaled analogue input 1	SIGNED 16 BIT	RO	Customised scale value

40144	143	Analog input 2	SIGNED 16 BIT	RO	Value in [mA] or [V]
40145	144	Scaled analogue input 2	SIGNED 16 BIT	RO	Customised scale value
40158	157	GSM FIELD	SIGNED 16 BIT	RO	Value in [dBm]
41003 …41203	1002 …1202	Tags of external variables	-	RW	Use the compilation output window for the location of the tag address
49001	9000	COMMAND	UNSIGNED 16 BIT	RW	Command log (see Table with supported commands)

17.2. MODBUS ADDRESS TABLE (Z-LTE-WW)

ADDRESS	*OFFSET*	*TAG*	*TYPE OF REGISTRATION*	*RO/RW*	*INFO*
40001	0	ID MACHINE	UNSIGNED 16	RO	INTERNAL CODE
40002	1	FIRMWARE CODE	UNSIGNED 16	RO	INTERNAL CODE
40003	2	MAJOR FIRMWARE REVISION	UNSIGNED 16	RO	(EXAMPLE 204 = 2.04)
40004	3	MINOR FIRMWARE REVISION	UNSIGNED 16	RO	In decimal format KMMBB Where: K=4= Bugfix release K=3= New Release MM = MINOR REVISION BB = Building Example: Value = 40110 4 = Bugfix release 01 = Minor revision 1 10 = Build 10
40008	7	DIGITAL INPUTS AND SIGNALS	BIT	RO	Digital inputs Bit 0 = INPUT1 VALUE Bit 1 = INPUT2 VALUE Bit 2 = INPUT3 VALUE Bit 3 = INPUT4 VALUE Bit 7 = EXTERNAL POWER Bit 8 = GOOD BATTERY
40009	8	DIGITAL OUTPUTS	BIT	RO	Bit 14 = DIGITAL OUTPUT 1 Bit 15 = DIGITAL OUTPUT 2
40015	14	YEAR (CLOCK SETTINGS)	SIGNED 16 BIT	RO	Year

40016	15	MONTH (CLOCK SETTINGS)	UNSIGNED 8 BIT	RO	Bit from 0 to 7 (LSB)
40017	16	DAY (CLOCK SETTINGS)	UNSIGNED 8 BIT	RO	Bit from 0 to 7 (LSB)
40017	16	HOUR (CLOCK SETTINGS)	UNSIGNED 8 BIT	RO	Bit from 8 to 15 (MSB)
40018	17	MINUTES: (CLOCK SETTINGS)	UNSIGNED 8 BIT	RO	Bit from 0 to 7 (LSB)
40018	17	SECONDS (CLOCK SETTINGS)	UNSIGNED 8 BIT	RO	Bit from 8 to 15 (MSB)
40023	22	Totaliser value 1 LSW	UNSIGNED 16 BIT	RO	Less significant 16 bit
40024	23	Totaliser value 1 MSW	UNSIGNED 16 BIT	RO	Most significant 16 bit
40025	24	Meter value 1 LSW	UNSIGNED 16 BIT	RO	Less significant 16 bit
40026	25	Meter value 1 MSW	UNSIGNED 16 BIT	RO	Most significant 16 bit
40039	38	Working time 1 LSW	UNSIGNED 16 BIT	RO	Value in [Seconds] Less significant 16 bit
40040	39	Working time 1 MSW	UNSIGNED 16 BIT	RO	Value in [Seconds] Most significant 16 bit
40049	48	Totaliser value 2 LSW	UNSIGNED 16 BIT	RO	Less significant 16 bit
40050	49	Totaliser value 2 MSW	UNSIGNED 16 BIT	RO	Most significant 16 bit
40051	50	Meter value 2 LSW	UNSIGNED 16 BIT	RO	Less significant 16 bit
40052	51	Meter value 2 MSW	UNSIGNED 16 BIT	RO	Most significant 16 bit
40065	64	Working time 2 LSW	UNSIGNED 16 BIT	RO	Value in [Seconds] Less significant 16 bit
40066	65	Working time 2 RSU	UNSIGNED 16 BIT	RO	Value in [Seconds] Most significant 16 bit
40075	74	Totaliser value 3 LSW	UNSIGNED 16 BIT	RO	Less significant 16 bit
40076	75	Totaliser value 3 MSW	UNSIGNED 16 BIT	RO	Most significant 16 bit
40077	76	Meter value 3 LSW	UNSIGNED 16 BIT	RO	Less significant 16 bit
40078	77	Meter value 3 MSW	UNSIGNED 16 BIT	RO	Most significant 16 bit
40091	90	Working time 3 LSW	UNSIGNED 16 BIT	RO	Value in [Seconds] Less significant 16 bit

40092	91	Working time 3 MSW	UNSIGNED 16 BIT	RO	Value in [Seconds] Most significant 16 bit
40101	100	Totaliser value 4 LSW	UNSIGNED 16 BIT	RO	Less significant 16 bit
40102	101	Totaliser value 4 MSW	UNSIGNED 16 BIT	RO	Most significant 16 bit
40103	102	Meter value 4 LSW	UNSIGNED 16 BIT	RO	Less significant 16 bit
40104	103	Meter value 4 MSW	UNSIGNED 16 BIT	RO	Most significant 16 bit
40117	116	Working time 4 LSW	UNSIGNED 16 BIT	RO	Value in [Seconds] Less significant 16 bit
40118	117	Working time 4 RSU	UNSIGNED 16 BIT	RO	Value in [Seconds] Most significant 16 bit
40128	127	Battery voltage	UNSIGNED 16 BIT	RO	[mV]
40130	129	Analog input 1	SIGNED 16 BIT	RO	Value in [mA] or [V]
40131	130	Scaled analogue input 1	SIGNED 16 BIT	RO	Customised scale value
40144	143	Analog input 2	SIGNED 16 BIT	RO	Value in [mA] or [V]
40145	144	Scaled analogue input 2	SIGNED 16 BIT	RO	Customised scale value
40158	157	GSM FIELD	SIGNED 16 BIT	RO	Value in [dBm]
40215	214	Flag GNSS	UNSIGNED 16 BIT	RO	GNSS flags
40216	215	SNR/GNSS satellites	UNSIGNED 8 BIT + UNSIGNED 8 BIT	RO	SNR (MSB) / Number of Satellites (LSB)
40217-40218	216-217	LATITUDE	FLOAT 32	RO	Latitude
40219-40220	218-219	LONGITUDE	FLOAT 32	RO	Longitude
40221-40222	220-221	SPEED	FLOAT 32	RO	Speed
40223-40224	222-223	DISTANCE	FLOAT 32	RO	DISTANCE FROM CENTRE
41003 …41203	1002 …1202	Tags of external variables	-	RW	Use the compilation output window for the location of the tag address
49001	9000	COMMAND	UNSIGNED 16 BIT	RW	Command log (see Table with supported commands)
49439	9438	Working time output 1 [Seconds] LSW	UNSIGNED 16 BIT	RO	Less significant 16 bit

49440	9439	Working time output 1 [Seconds] MSW	UNSIGNED 16 BIT	RO	Most significant 16 bit
49441	9440	Working time output 2 [Seconds] LSW	UNSIGNED 16 BIT	RO	Less significant 16 bit
49442	9441	Working time output 2 [Seconds] MSW	UNSIGNED 16 BIT	RO	Most significant 16 bit

17.3. COMMANDS SUPPORTED BY MODBUS

If you have enabled the Modbus TCP-IP server via an Ethernet connection or the Modbus Slave RTU from a serial port, you can send commands to the RTUs.

The COMMAND register is located at holding address 49001 (holding register 9000)

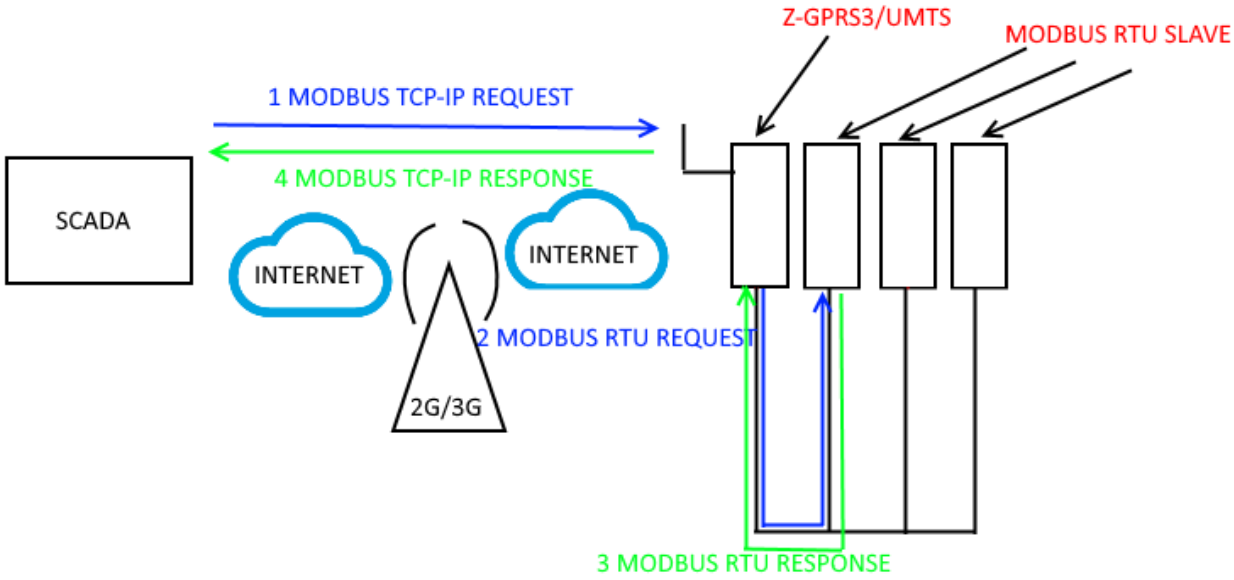
COMMAND	***VALUE (decimal)***
RESET RTU	1
REMOVE THE SD CARD	7
STOP DATALOGGER	18
START DATALOGGER	17
COPY ALL RECORDS FROM INTERNAL FLASH MEMORY TO microSD CARD	19
RESET THE LOG SESSION	20
DELETE ALL LOGS FROM THE INTERNAL FLASH MEMORY	16
FORCE MODEM RESET	65
STOP MODBUS TCP-IP AND MODBUS RTU LOG	98
START MODBUS TCP-IP AND MODBUS RTU LOG	97
DOWNLOAD AND UPDATE FIRMWARE FROM THE REMOTE FTP SERVER	112
DOWNLOAD AND UPDATE FIRMWARE AND CONFIGURATION FROM THE REMOTE FTP SERVER	113
DOWNLOAD AND UPDATE THE CONFIGURATION FROM THE REMOTE FTP SERVER	114
DOWNLOAD AND UPDATE THE ADDRESS BOOK FROM THE FTP SERVER	83
UPDATE FIRMWARE FROM SD CARD	116
UPDATE CONFIGURATION FROM SD CARD	117
UPDATE ADDRESS BOOK FROM SD	118
PERFORM THE RING COMMAND	33
EXECUTE QUICK COMMAND 0	48

EXECUTE QUICK COMMAND 1	49
EXECUTE QUICK COMMAND 2	50
EXECUTE QUICK COMMAND 3	51
EXECUTE QUICK COMMAND 4	52
EXECUTE QUICK COMMAND 5	53
EXECUTE QUICK COMMAND 6	54
EXECUTE QUICK COMMAND 7	55
EXECUTE QUICK COMMAND 8	56
EXECUTE QUICK COMMAND 9	57
EXECUTE QUICK COMMAND 10	58
EXECUTE QUICK COMMAND 11	59
EXECUTE QUICK COMMAND 12	60
EXECUTE QUICK COMMAND 13	61
EXECUTE QUICK COMMAND 14	62
EXECUTE QUICK COMMAND 15	63
CLOSE DIGITAL OUTPUT1	Multiple register writing: write 32 in register 49001 write 32 in register 49002 write 512 in register 49003
OPEN DIGITAL OUTPUT1	Multiple register writing: write 32 in register 49001 write 16 in register 49002 write 512 in register 49003
CLOSE DIGITAL OUTPUT2	Multiple register writing: write 32 in register 49001 write 8192 in register 49002 write 512 in register 49003
OPEN DIGITAL OUTPUT2	Multiple register writing: write 32 in register 49001 write 4096 in register 49002 write 512 in register 49003

18. MODBUS TCP-IP TO RTU PASSTHROUGH

The devices can be used to convert the Modbus TCP-IP protocol to Modbus RTU via Ethernet or 4G connection in real time.

For example, it is possible to connect a SCADA system in Modbus TCP-IP to directly acquire Modbus I/O and Modbus RTU slaves:



1 The SCADA system makes a Modbus TCP-IP request

2 The RTU converts the Modbus TCP-IP request to Modbus RTU

3 The Modbus RTU Slave creates a reply

4 The RTU converts the Modbus RTU response to Modbus TCP-IP SCADA

19. DYNAMIC DNS (DDNS) (Z-LTE-WW only)

Dynamic DNS (DDNS or DynDNS) is a method of automatically linking a name server with a dynamic IP.

For example, the RTU webserver can be accessed with:

http://senecazumts.ddns.net/index.html

It is based on the fact that in a modem connection, the IP may change but the name is always the same.

The Modbus TCP-IP RTU server can also be accessed, e.g. by configuring:

Station name: senecazumts.ddns.net

Port: 502

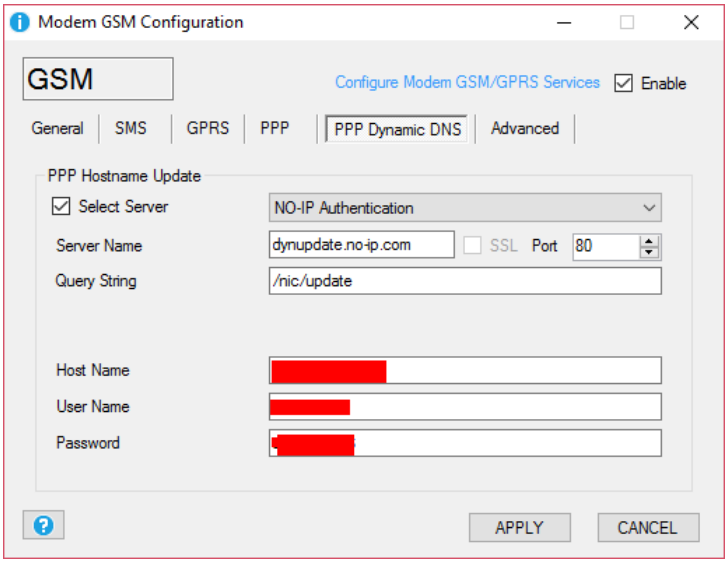
Z-LTE-WW supports the following DDNS:

NoIP.com

DDNS.org

DDNS.it

An example configuration is (PPP must be active):



20. SUPPORTED SMS COMMANDS (Z-LTE-WW only)

20.1. List of supported SMS commands

The RTU allows commands to be executed if the SMS sender number is enabled (or if it is preceded by the password).

List of commands:

SMS COMMANDS FOR DIGITAL INPUTS / METERS / TOTALIZERS	
GET DIN	*Status of all meters*
GET DINn	*All input meters statuses*
GET DINn.TOT	*Status of all totalizers in the nth input*
GET DINn.CNT	*Status of all meters in the nth input*
RESET DIN	*Reset all meters*
RESET CNTn	*Reset the nth meter*

SMS COMMANDS FOR DIGITAL INPUTS / METERS / TOTALIZERS	
GET DIN	*Status of all meters*
GET DINn	*All input meters statuses*
GET DINn.TOT	*Status of all totalizers in the nth input*
GET DINn.CNT	*Status of all meters in the nth input*
RESET DIN	*Reset all meters*
RESET CNTn	*Reset the nth meter*

SMS COMMANDS FOR READING/WRITING EXTENDED VARIABLES	
GET TAG < VARIABLE_LABEL>	*Returns via SMS the value of the extended variable, named <VARIABLE_LABEL>.* *For example:* *GET TAG PIPPO* *Returns the value of the extended variable PIPPO*
SET TAG < VARIABLE_LABEL> <VALUE>	*Write <VALUE> to the external variable named < VARIABLE_LABEL>.* *For example:* *SET TAG PIPPO 345* *Writes 345 on the PIPPO tag*

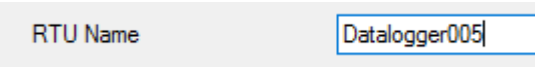
SMS COMMANDS FOR DIGITAL OUTPUTS	
SET DOUTn.OPEN	*Opens the nth digital output*
SET DOUTn.CLOSE	*Closes the nth digital output*
SET TOGGLEn	*Activates the nth digital output*
SET PULSEn.OPEN	*Opens the nth timed output*
SET PULSEn.CLOSE	*Closes the nth timed output*

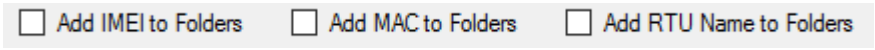
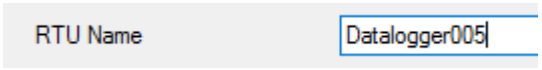
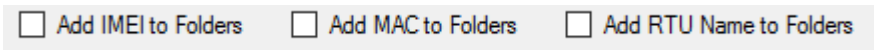
SMS COMMANDS FOR ADDRESS BOOKS	
SET PHONE +nnnnnnnnn	Add the number + nnnnnn to the address book as an administrator
RESET PHONE +nnnnnnnnn	Remove the number + nnnnnn from the address book
SET EMAIL nnn@nnn.nnn	Add the email nnn@nnn.nnn to the address book as an administrator
RESET EMAIL nnn@nnn.nnn	Deletes the e-mail nnn@nnn.nnn from the address book

SMS COMMANDS FOR ANALOGUE INPUTS	
SET AIN#.MIN <MIN>	*Sets MIN threshold on analogue input 1 or 2*
SET AIN#.LOW <LOW>	*Sets LOW threshold on analogue input 1 or 2*
SET AIN#.HIGH <HIGH>	*Sets HIGH threshold on analogue input 1 or 2*
SET AIN#.MAX <MAX>	*Sets MAX threshold on analogue input 1 or 2*
SET AIN#.DELAY <TIME_ON_OFF>	*Sets time filter on threshold activation for analogue input 1 or 2*

SMS COMMANDS FOR GPS SETTINGS **(ONLY FOR Z-LTE, Z-LTE-WW, Z-UMTS DEVICES**	
GPS GOOGLE	Location on Google Maps
GPS.POS	Location (latitude and longitude)
SET GPS <RADIUS>[<SPEED>]	Sets radius / speed of virtual fence
SET GPS.LOCK	Locks origin
SET GPS.UNLOCK	Unlocks origin
SET GPS.ORG[<LAT>][<LON>]	(Sets origin with LAT and LON)
SET GPS.ORG	Sets current origin position of virtual fence

OTHER SMS COMMANDS	
CREDIT	*Returns remaining credit (only for rechargeable SIM cards)*
STATUS	*Returns the variables set by the configuration software. All available variables can be included. If the SMS exceeds 160 characters, it will be truncated (shown by three dots '...' at the end of the SMS).*
SET GSM.APN apn_name user password	*Set the APN with the APN name, user and password. For example, set vodafone APN that does not require user name and password:* *SET GSM.APN web.omnitel.it*
SET GSM.FTP path name_ip port user password	*Set FTP connection settings:* *path to the FTP server folder where the files are sent* *Address_ip IP address or FTP server name* *server FTP gateway port* *server FTP user login user name* *password server FTP login password* *for example:* *SET /prova/ 192.168.180.33 21 pippo pluto pippo*
SET GSM.SMTP name_ip port GSM.SMTP name_ip user password	*set SMTP server connection settings to send emails* *Address_ip IP address or FTP server name* *server smtp gateway port* *server FTP user login user name* *password server smtp login password* *for example:* *SET GSM.SMTP out.alice.it 25 pippo pluto*
ENTER AIN	*Returns the two analogue input values*
EMAIL TEST	*Forces an e-mail with an attachment to the first administrator listed in the address book*
FTP TEST	*Forces a text file sent to be sent to the currently set ftp server*

EMAIL TAG	*Sends the value indicated by "TAG" to the first email contact* *EMAIL AIN sends an email with the value of the 2 analog inputs* *EMAIL AIN1 sends an email with the value of analog input 1* *EMAIL AIN2 sends an email with the value of the analog input 2* *EMAIL DIN sends an email with the value of the digital inputs* *EMAIL DIN1 sends an email with the value of digital input 1* *EMAIL DIN2 sends an email with the value of digital input 2* *EMAIL DIN3 sends an email with the value of digital input 3* *EMAIL DIN4 sends an email with the value of digital input 4* *EMAIL TEMP sends an email with the internal temperature sensor value*
EMAIL SYSLOG	*Sends the syslog.csv log file of the last week on microSD via e-mail (to the first administrator address in the address book)*
FTP SYSLOG	*Sends the syslog.csv log file of the last week on the microSD via FTP server*
UPLOAD LOG	*Creates a dump of the internal log flash memory in the microSD card in the file "logdump.csv", then sends this file to the actual upload channel (e-mail or FTP).*
DOWNLOAD FW	*The RTU will download the firmware file "RTUNAME_fwupdt.bin" from the FTP download folder (where RTUNAME is the name entered in the "Cloud" SEAL section). Then (if the release is different from the installed one) a firmware update will be performed.* *for example:*  *The firmware file must be:* *"Datalogger005_fwupdt.bin".* *Please note that if you have flagged one of the following in the 'Cloud' SEAL section:*

	 *The firmware file must only be "fwupdt.bin".*
DOWNLOAD SETUP	*The RTU will download the configuration file "RTUNAME_ setup.tag" from the FTP download folder (where RTUNAME is the name entered in the "Cloud" SEAL section).* *For example:*  *The configuration file must be:* *"Datalogger005_setup.tag"* *Please note that if you have flagged one of the following in the 'Cloud' SEAL section:*  *The name of the setup file must only be "setup.tag".*
DOWNLOAD FW-SETUP	*The RTU will download from the FTP download folder the firmware and setup file as well. Then (if the release is different from the one installed) the firmware and configuration will be updated.* *The firmware name must be:* *"fwupdt.bin"* *The setup name must be:* *"fwupdt.tag"*
DOWNLOAD DATA	*The RTU will download the "data.bin" file with the extended address book (up to 1000 users) from the FTP download folder. The extended address book will be updated.*
RESET	*The RTU restarts*
NET	*The RTU will send the IP address of the modem and the Ethernet port*
GSM IMSI	*Returns the IMSI code of the mobile operator (International Mobile Subscriber Identity)*
GSM ICCID	*Returns the ICCID code of the SIM (Integrated Circuit Card IDentifier)*

GSM IMEI	*Returns the IMEI identification code of the modem (International Mobile Equipment Identity)*

NOTE

If the command is not recognised by the RTU, an error SMS will be sent:

"COMMAND NOT RECOGNIZED"

The RTU can be configured to send a confirmation (SMS or ring) when the command is successfully completed.

ATTENTION!

When a command is successfully completed, a ring can only be generated when a voice SIM is used (data SIMs do not allow the voice call service).

21. RESTORE DEVICE TO FACTORY SETTINGS

To restore the device to default settings, the procedure is as follows (the loaded SEAL program will also be deleted):

5) Switch off the board
6) Set ALL dip switches to "ON".
7) Switch on the board
8) The PWR led will flash until factory mode is exited
9) Switch off the board
10) Set ALL dip switches to "OFF".
11) Switch on the board
12) The device is now in factory mode

22. TROUBLESHOOTING

PROBLEM	*SOLUTION*
Sending the SMS command: e-mail test no email reaches the administrator's email address	- Make sure that the set APN matches that of the mobile service provider, and check whether access requires authorisation. See: {0> http://wiki.apnchanger.org/Main_Page<}0{> http://wiki.apnchanger.org/Main_Page -Make sure the GSM signal is over 2/7 - email ended up in SPAM -The SMTP server supports SSL protection and the gateway was not correctly set
Using the configuration software in the "Configuration Test" section when launching the command: COMMAND EMAIL TEST no email reaches the administrator's email address	***If sending the Log via Ethernet, Seneca recommends using a proprietary SMTP server.*** - email ended up in SPAM directory - The SMTP server only supports SSL security. SSL/TLS protection cannot be enabled in the Ethernet port or PPP modem connection
Sending the SMS command: FTP TEST no ftp file reaches the set ftp server	- The FTP server folder does not exist. First create the folder on the FTP server. - Make sure the IP address of the FTP server is correct - Make sure the user name/password to access the FTP server are correct
Using the configuration software in the "Configuration Test" section when launching the command: FTP TEST no ftp file reaches the set ftp server	- The folder where you created the file does not exist on the FTP server; create the folder on the FTP server first - Check the IP/name of the FTP server is correct - Check the IP/name of the FTP server is correct - Make sure that the user name/password to access the FTP server are correct
GSM signal is always 0/7	- The inserted SIM card is not recognised. Clean or replace the SIM card - The SIM PIN is enabled. Insert the SIM into a mobile phone and deactivate the PIN, or enable it and enter the PIN code in the configuration software
The GSM signal is too low	- Wait at least 10 minutes after switching on the device before reading the GSM value

	- Try a SIM card from another mobile operator - Move RTU installation - Use an optional external antenna: for more information, contact Seneca or visit the devices section at www.seneca.it.
The SIM's remaining credit is not sent	- Check the method used to receive the remaining credit from the mobile service provider (ring, SMS, SMS request). - The SIM is not prepaid, but plan-based
Z-LTE-WW worked correctly for a few days/months but has stopped sending SMS and logs.	- No SIM credit. Top up the SIM card. - The SIM card has expired. Replace it or contact your mobile operator.
You receive "NTP error".	Clock synchronisation is active. Via Ethernet, this is done via NTP (network time protocol), but the NTP server cannot be contacted: - Make sure UDP port 123 is open in the router in case you are using an Ethernet cable connection - Check the configured NTP server address
The device is not able to send email or FTP files over the Internet via the Ethernet port, but a PC connected to the same LAN can do so.	- Try changing router/modem - Update router/modem firmware - Keep the following ports open on the router: UDP/TCP 25 UDP/TCP 21 UDP 123