USER MANUAL

Z-GPRS3, Z-UMTS, Z-LOGGER3, Z-LTE, Z-LTE-WW

Multi-protocol Datalogger, RTU, with Ethernet, modem 2G/3G/4G, GNSS and embedded I/O

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Date	Version	Changes
05/03/2020	1.18	Fix GNSS Z-LTE-WW info
21/06/2021	25	Corrected ModBUS register table
05/07/2021	26	Proofreading English texts, Added frequency bands for SIM7600G modem
10/01/2022	28	Aggiunti comandi SMS impostazioni ingressi analogici e impostazioni GPS

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Seneca **Z-GPRS3, Z-UMTS, Z-LOGGER3, Z-LTE-WW**

PRELIMINARY INFORMATION

CAUTION!

Contact your telephone provider for information on GSM and GPRS service costs. It is best to quantify log and SMS costs before setting up and installing Z-GPRS3, Z-UMTS OR Z-LOGGER3.

The use of Z-GPRS3 / Z-UMTS / Z-LTE-WW in data roaming (for example, abroad with an Italian SIM card) may generate unexpected costs. Contact your telephone provider for further information.

IN NO CASE MAY SENECA OR ITS SUPPLIERS BE HELD LIABLE FOR ANY INCOMING DATA OR PROFIT LOSSES DUE TO INDIRECT, CONSEQUENTIAL OR INCIDENTAL CAUSES (INCLUDING NEGLIGENCE) CONNECTED WITH THE USE OR INABILITY TO USE Z-GPRS3, Z-UMTS, Z-LOGGER3, Z-LTE-WW EVEN IF SENECA WAS INFORMED OF THE POTENTIAL OF THESE DAMAGES.

SENECA, ITS SUBSIDIARIES OR AFFILIATES OR GROUP PARTNERS OR DISTRIBUTORS AND SENECA DEALERS DO NOT GUARANTEE THAT THE FUNCTIONS FAITHFULLY MEET THE EXPECTATIONS AND THAT Z-GPRS3, Z-UMTS, Z-LOGGER3, Z-LTE-WW THEIR FIRMWARE AND SOFTWARE ARE FREE OF ERRORS OR FUNCTION UNINTERRUPTEDLY.

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CAUTION!

-Contact your telephone service provider for GSM and GPRS service costs especially when using Z-GPRS3, Z-UMTS, Z-LTE-WW with a sim issued by a country other than the one in which it is used (international roaming).

-It is best to estimate telephone costs before setting up Z-GPRS3, Z-UMTS and Z-LTE-WW.

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

-Internet send/receive costs can be tied to Kbytes sent/received, a monthly ceiling included in a package or internet connection time. Contact your telephone service provider for further information.

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-For internet connections whose costs is associated with connection time, please remember that communications are active for an amount of time that depends on the number of log rows to be sent. Typically, a 2 Kbyte data log takes about 10-15 seconds (in GPRS mode) to be sent in addition to the time necessary to establish the connection (from 5 to 30 seconds) and the time due to any server login attempts.

-When use PPP the internet connection is ALWAYS ON

-Check the data quantity sent via internet and SMS before using Z-GPRS3, Z-UMTS, Z-LTE-WW.

Please remember that mobile phone service providers also consider the entire communication that permits file transmission (and thus data transmission overhead, the number of connection attempts, etc.) and not just the dimensions as data traffic in each transaction.

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1. CHARACTERISTICS

1.1. RTU Models characteristics

- *Internal UPS for up to 1h works without external power*
- *MODEM:*

Z-Logger3:	*No modem*
Z-GPRS3:	*GSM/GPRS quad-band 850/900/1800/1900 MHz* *DL max: 85.6 Kbps, UL max: 42.8 Kbps* *Coding scheme CS-1, CS-2, CS-3, CS-4* *Class 4 (2W) at GSM 850 and EGSM 900* *Class 2 (1W) at DCS 1800 and PCS 1900* *GPRS multi slot class 10*
Z-UMTS:	*HSPA+/UMTS dual-band 900/2100 MHz (standard)* *HSPA+/UMTS tri-band 850/1900/2100 MHz (optional)* *GSM/GPRS/EDGE quad-band 850/900/1800/1900 MHz* *GPRS: UL 85.6 kbit/s; DL 85.6 kbit/s* *EDGE: UL 236.8 kbit/s; DL 236.8 kbit/s* *WCDMA PS: UL 384 kbit/s; DL 384 kbit/s* *HSPA+: UL 5.76 Mbit/s; DL 21.6 Mbit/s*
Z-UMTS HW2:	*Worldwide UMTS/HSDPA+ and GSM/GPRS/EDGE coverage* *800/850/900/1900/2100MHz @UMTS 850/900/1800/1900MHz @GSM* *HSDPA: Max.14.4Mbps (DL)* *HSUPA: Max.5.76Mbps (UL)* *WCDMA: Max.384Kbps (DL)/Max.384Kbps (UL)* *EDGE: Max.236.8Kbps (DL)/Max.236.8Kbps (UL)* *GPRS: Max. 85.6Kbps (DL)/ Max. 85.6Kbps (UL)*
Z-LTE:	*4G/LTE Model (Europa, Africa, Middle Est, Korea, Thailandia, India) Contattare Seneca per altre nazioni. GSM / GPRS/ EDGE Dual-band: 1800 / 900 Mhz* *UMTS / HSPA+, Tri-band: WCDMA 2100 / 850 / 900 Mhz* *4G LTE Band 6- Band: 2100/1800/850/2600/900/800 MHz* *Certificazioni: CE/GCF/Vodafone (Europa), KC/SKT/KT/LGU+ (Korea)*
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*

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1.2. Technical specifications and electrical connections:

The information regarding technical specifications, electrical connections and functionality of the LEDs can be found in the installation manual for each product. To consult the installation manual use link below:

- ***Z-LOGGER3:*** **https://www.seneca.it/products/z-logger3/doc/installation_manualEN**
- ***Z-GPRS3:*** **https://www.seneca.it/products/z-gprs3/doc/installation_manualEN**
- ***Z-UMTS / Z-UMTS HW2:*** **https://www.seneca.it/products/z-umts/doc/installation_manualEN**
- ***Z-LTE / Z-LTE-WW:*** **https://www.seneca.it/products/z-lte/doc/installation_manualEN**

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2. DEVICES OVERVIEW

Z-GPRS3, Z-LOGGER3, Z-UMTS and Z-LTE-WW are equipped with 4 counters and 4 totalizers up to a maximum of 30 Hz. Moreover dataloggers has 4 digital inputs, 2 analog inputs and 2 relay digital outputs on board

Z-UMTS HW2 and Z-LTE, Z-LTE-WW are also equipped with a GNSS positional system.

A maximum of 100 External TAGs (Modbus RTU and/or Modbus TCP) plus the internal TAGs (Embedded IO and signals) can be logged.

Logs are sent in csv format (comma separated values, microsoft excel™ compatible) via ftp, email or microSD card.

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

Z-GPRS3, Z-UMTS and Z-LTE, Z-LTE-WW can also send the last row of the log file via SMS.

An internal UPS is also available, in UPS mode the RTUs will works for about 1h without external power.

All configurations are possible via the SEAL software, available for free download at www.seneca.it in the Z-GPRS3 / Z-UMTS / Z-LOGGER3 / Z-LTE / Z-LTE-WW section.
SEAL is a graphical environment that allow you to configure the datalogger and to create simple automation without knowing any programming language.

For more info refers to the SEAL help, SEAL is available for free download at address:

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

Others manuals, quickstart and examples on SEAL are availables on the Z-UMTS/Z-GPRS3/Z-LOGGER3 /Z-LTE, Z-LTE-WW sections on website.

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3. SWITCH ON, AND SWITCH OFF THE RTU

RTUs are equipped with back-up batteries (internal UPS) to perform programmable actions in case of blackout.

Switch ON:

1) Supply the RTU via screw terminals or via BUS IDC10

2) The Board will boot-up (led PWR will flash)

Switch OFF:

1) Unplug the Power supply (from terminal or from BUS IDC10)
2) The board is powered by internal UPS

3) Press the button PS1 until the led PWR will flash fast.

4) Release the button, the board will power off.

4. SUPPORTED SIM CARDS (ONLY Z-GPRS3 / Z-UMTS / Z-LTE / Z-LTE-WW)

Z-GPRS3 / Z-UTMS / Z-LTE / Z-LTE-WW support the following types of SIM CARDS:

- Top-up voice SIM CARD
- Subscription voice SIM CARD
- Data transmission only SIM CARD

"Zero cost" operations can be run only on voice type SIM CARDS, if the RTU receive a ring an action can be performed.

For "top-up" SIM CARDS RTU can manage residual credit requesting the amount from the telephone service provider.

CAUTION!

-Before inserting the SIM CARD, CANCEL ALL MESSAGES IN THE CARD USING A MOBILE PHONE.

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

-UMTS SIM CARDS are supported only by the Z-UMTS/Z-LTE / Z-LTE-WW product.

-The Product was tested with leading international provider SIM CARDS. However, operations are not guaranteed with all providers.

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5. GSM SIGNAL (ONLY Z-GPRS3 / Z-UMTS / Z-LTE / Z-LTE-WW)

The GSM signal level can be found via SEAL software (in the “test“ section) or through Webserver.

To view the GSM signal level, the SIM CARD must be inserted (signal may change radically based on the selected provider).

In log file GSM field is expressed in DBm where -115 dBm it’s the minimum, -52 dBm it’s the maximum.

This table can be used:

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 it’s the minimum, and 7 it’s maximum.

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

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

Refer to the following table for signal values:

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

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

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

CAUTION!

-Insert the SIM card only with RTU off.

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

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

CAUTION!

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

6. INTERNAL UPS

The RTUs are equipped with rechargeable battery.

In the event of a blackout the board can be configured for:

A) Will work for up to 1h without external power.

When the voltage batteries are not sufficient RTU will runs the following algorithm:

1) End sending data
2) Close all files opened on microSD
3) Turn off

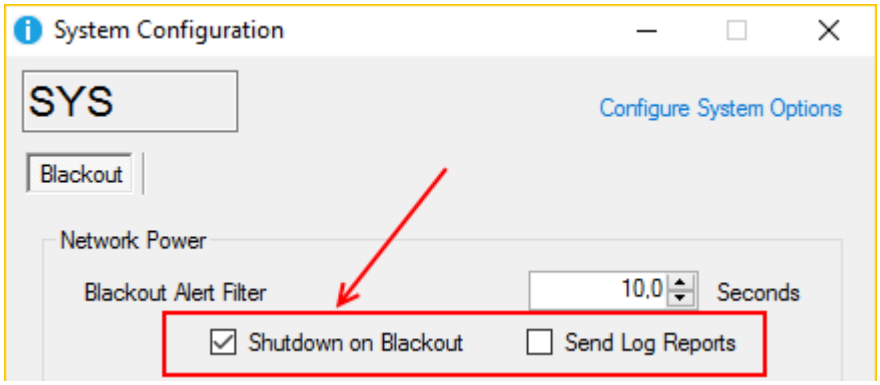
B) It will shutdown without external power.

C) Without external power the board will send log data and then shutdown

In SEAL this behavior can be decided in System Configuration 

:

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CAUTION!
RTUs ARE SUPPLIED WITHOUT CHARGED BATTERIES.

CHARGE THE BATTERIES FOR AT LEAST 48H BEFORE USE

CAUTION!
THE BATTERIES CAN BE RECHARGED FOR A MAXIMUM OF ABOUT 300 TIMES.

CAUTION!

TO CONSERVE BATTERY QUALITY, IN CASE OF DAILY BACKUP, USE THE CONFIGURATION WITH POWER-OFF WHEN BACKUP

7. ADDRESS BOOK

For security reason Z-GPRS3 / Z-UMTS / Z-LTE / Z-LTE-WW accept SMS command or audio call only from numbers present in the Address Book.

The address book is composed of a maximum of 8 telephone numbers / emails.

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

For more info refers to the SEAL Help on line.

7.1. SENDING A SMS COMMAND USING PASSWORD (ONLY Z-GPRS3 / Z-UMTS / Z-LTE / Z-LTE-WW)

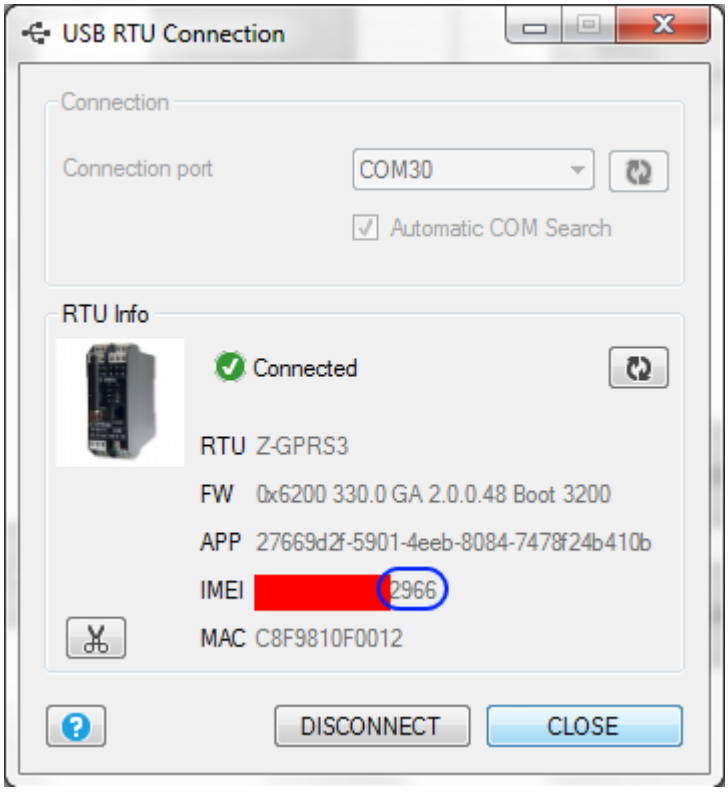
A SMS command can be accepted also if the telephone number isn't in the address book.

For obtain this feature you must insert, before the SMS command, a password.

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The password is different for every RTUs and is obtained from the last 4 digits of the modem IMEI.

For obtain the password you must connect the RTU with SEAL:



So sending the SMS command:

“2966 NET”

The RTU will respond also if the telephone number isn’t in the address book.

7.2. MICROSD CARD PHONE BOOK (ONLY Z-GPRS3 / Z-UMTS / Z-LTE / Z-LTE-WW)

It’ s possible to expand the internal phone book using a file in the microSD card.

You can add a maximum of 1000 telephone numbers but this numbers are enabled for ringing (and so execute a ring command programmed).

For editing the MicroSD card phone book refers to the SEAL Help on line.

8. ACQUIRING AND SENDING LOG DATA

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When the logger is activated the RTU save data into an internal Flash, then send it to email server, ftp server, http server or save them on MicroSD card.

When the internal Flash space is full the oldest data will be overwritten (circular buffer).

The files are in standard csv text format (windows excel ™ compatible).

There are 3 types of logs:

The Event Logger**, **The Data logger and the Data logger on Trigger

The internal flash stores at maximum of 8192 rows for the Event Logger, a new row will overwrite the oldest (circular buffer).

The number of rows that the Data Logger can store in the internal flash depends from the TAGs size (16, 32 or 64 bits) and the number of tags.

Activating all the embedded tags the maximum number of rows that can be stored in the internal flash is 16384, a new row will overwrite the oldest (circular buffer).

Activating all the embedded tags and all 100 Extended Tags at 32bit the maximum number of rows that can be stored in the internal flash is 16384/8=2048, a new row will overwrite the oldest (circular buffer).

8.1. THE EVENT LOGGER

The event logger works defining Events (Digital input/output Events, Blackout, Analog Alarms etc…) with the SEAL software configuration.

When an event is created a new row text (with the Timestamp) is inserted into the log, the event choosen must be configured with the SEAL software.

The event logger can be sent a minimum of 1 time for day if files are sent to FTP, E-MAIL or microSD card.

NOTE:

If no events are generated, the Event logger file will be composed of only 1 row with the text :

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

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8.1.1. Sending event logger file to an FTP server

The RTUs are compatible with ftp server configured in passive mode.

If server connection is lost the RTU will accumulate the data and when connection returns all data is sent up to align to actual acquisition.

An event log can include also the diagnostic, for example:

INDEX	LEVEL	TIMESTAMP	SOURCE	MESSAGE
119	ERR	01/06/2016 14:11	SYS	FTP Connect 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 Connect Error
124	WARN	02/06/2016 06:40	SYS	PING Timeout
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 state for example):

INDEX	LEVEL	TIMESTAMP	SOURCE	MESSAGE
674	INFO	25/06/2016 00:18:23	SEC2	INPUT 2 ALARM ON!
675	INFO	25/06/2016 00:18:23	SEC2	INPUT 2 ALARM END!
676	INFO	25/06/2016 00:18:24	SEC2	INPUT 2 ALARM ON!
677	INFO	25/06/2016 00:18:25	SEC2	INPUT 2 ALARM END!
678	INFO	25/06/2016 00:18:25	SEC1	INPUT 1 ALARM ON!
679	INFO	25/06/2016 00:18:26	SEC1	INPUT 1 ALARM END!
680	INFO	25/06/2016 00:18:26	SEC1	INPUT 1 ALARM ON!
681	INFO	25/06/2016 00:18:26	SEC1	INPUT 1 ALARM END!
682	INFO	25/06/2016 00:18:28	SEC2	INPUT 2 ALARM ON!
683	INFO	25/06/2016 00:18:28	SEC2	INPUT 2 ALARM END!

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The Event Logger filename is:

RTUNAME_msgyyyyMMddhhmmss.csv

Where:

RTUNAME is the name of the RTU

yyyy is the year sent file

MM is the month sent file

dd is the day sent file

hh are the hours sent file

mm are the minutes sent file

ss are the seconds sent file

So the filename for example can be:

ZGPRS3TEST_msg20160606000057.csv

8.1.2. Sending event logger file to an EMAIL server

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

Z-GPRS3 / Z-UMTS /Z-LTE / Z-LTE-WW are compatible also with SMTPS server with TLS 1.2 encryption (for example GMAIL™) but only with GPRS connection NOT always ON (PPP must be off)

An example of SMTP server that works without encryption is MailServer for windows™, for more info: https://www.hmailserver.com/.

See the application note for installing and use hMailServer on a windows™ machine.

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

A typical mail sent has a text in the body with the timestamp and the log file in attachment.

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An event log can include also the diagnostic, for example:

INDEX	LEVEL	TIMESTAMP	SOURCE	MESSAGE
119	ERR	01/06/2016 14:11	SYS	FTP Connect 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 Connect Error
124	WARN	02/06/2016 06:40	SYS	PING Timeout
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 state for example):

INDEX	LEVEL	TIMESTAMP	SOURCE	MESSAGE
674	INFO	25/06/2016 00:18:23	SEC2	INPUT 2 ALARM ON!
675	INFO	25/06/2016 00:18:23	SEC2	INPUT 2 ALARM END!
676	INFO	25/06/2016 00:18:24	SEC2	INPUT 2 ALARM ON!
677	INFO	25/06/2016 00:18:25	SEC2	INPUT 2 ALARM END!
678	INFO	25/06/2016 00:18:25	SEC1	INPUT 1 ALARM ON!
679	INFO	25/06/2016 00:18:26	SEC1	INPUT 1 ALARM END!
680	INFO	25/06/2016 00:18:26	SEC1	INPUT 1 ALARM ON!
681	INFO	25/06/2016 00:18:26	SEC1	INPUT 1 ALARM END!
682	INFO	25/06/2016 00:18:28	SEC2	INPUT 2 ALARM ON!
683	INFO	25/06/2016 00:18:28	SEC2	INPUT 2 ALARM END!

The Event Logger filename is:

RTUNAME_msgyyyyMMddhhmmss.csv

Where:

RTUNAME is the name of the RTU

yyyy is the year at the send file

MM is the mounth at the send file

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dd is the day at the send file

hh are the hours at the send file

mm are the minutes at the send file

ss are the seconds at the send file

So the filename for example can be:

ZGPRS3TEST_msg20160606000057.csv

8.1.3. Saving event logger file to the microSD card

RTUs are compatible only with microSD card formatted in FAT32 (FAT16 filesystem is not recommended).

The event log files are stored into the /SYS directory.

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

Exxxxxxx.csv

Where xxxxxxx is an incremental number.

8.2. THE DATA LOGGER AND THE DATA LOGGER ON TRIGGER

The data logger works defining a Data acquisition time (sample time).

The minimum sample time is 1 minute.

The board can send data in two ways:

1) Notification
2) Report

The Notification sends data every sample time (minimum = 1 minute), the file will have only 1 row data. This row can be sent to SMS, EMAIL or HTTP POST.

The Report sends data every report time (for sample time = 1 minute and report time = 5 minutes then the report is made of 5 rows data).

The data logger on trigger works defining one or more event trigger actions, when the event trigger action is true a row acquisition is made.
If no event trigger actions are performed, no Notifications or Reports are sent.

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NOTE:

For http POST function only the Notification data can be used so only one row will be sent at a time.

8.2.1. Sending data logger file to a FTP server

The RTU is compatible with ftp server configured into passive mode.

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

A typical Data logger file when is open 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 when the acquisition is made.

The others values are TAG name and variables declared by the user in the SEAL configuration.

The Data Logger on Trigger file when is open 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

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A New column named “Trigger” is the Trigger Source that generated the log line.

For example line indexed 9 is generated from the “B” trigger (DIN2 HIGH).

Line indexed 10 is generated from “A” and “B” trigger at the same time (DIN1 and DIN2 HIGH).

Note that the RTU directly calculates Average/Minimum/Maximum of an embedded analog input.

The Data Logger filename is:

RTUNAME_logyyyyMMddhhmmss.csv

Where:

RTUNAME is the name of the RTU

yyyy is the year of the first row data

MM is the month of the first row data

dd is the day of the first row data

hh are the hours of the first row data

mm are the minutes of the first row data

ss are the seconds of the first row data

So the filename of the first example can be:

ZGPRS3TEST_log20160605143600.csv

8.2.2. Sending data logger and data logger on trigger data to an E-MAIL server

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

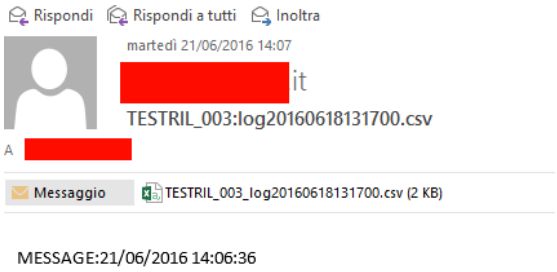
Z-GPRS3 / Z-UMTS / Z-LTE / Z-LTE-WW are compatible also with SMTPS server with SSL encryption (for example GMAIL™) but only with GPRS/UMTS+ connection NOT always ON (PPP must be off).

An example of SMTP server that can works without encryprion is hMailServer for windows™ , for more info: 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 is sent up to align to actual acquisition.

A typical mail sent has a text in the body with the timestamp and the log file in attachment:

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A typical Data logger file when is open 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 when the acquisition is made.

The others values are the TAG name and variables declared by the user in the SEAL configuration.

The Data Logger on Trigger file when is open 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

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A New column named Trigger is the Trigger Source that generated the log line.

For example the line indexed 9 is generated from the “B” trigger (DIN2 HIGH).

The line indexed 10 is generated from “A” and “B” trigger at the same time (DIN1 and DIN2 HIGH).

Note that the RTU directly calculates Average/Minimum/Maximum of an embedded analog input.

If the Data Logger file is sent to an ftp server or by email the filename is:

RTUNAME_logyyyyMMddhhmmss.csv

Where:

RTUNAME is the name of the RTU

yyyy is the year of the first row data

MM is the month of the first row data

dd is the day of the first row data

hh are the hours of the first row data

mm are the minutes of the first row data

ss are the seconds of the first row data

So the filename of the example can be:

ZGPRS3TEST_log20160605143600.csv

8.2.1. Sending data logger and data logger on trigger data to an HTTP server

Data logger Logs are sent using the Notification (connection is made every sample time).

The standard used for send data is the JSON.

For more info refers to the SENECA HTTP PROTOCOL user manual (must be required to service@seneca.it).

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8.2.1. Saving data logger data to the microSD card

Z-GPRS3 / Z-LOGGER3 / Z-UMTS / Z-LTE / Z-LTE-WW are compatible only with microSD card formatted in FAT32 (FAT16 filesystem is not recommended).

The log files are stored into the /LOG directory.

If the log report must be sent more frequently than daily, the RTU will create a directory for every days, for example:

ROOT

--LOG

--20160618

--20160619

--20160620

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

Lxxxxxxx.csv

Where xxxxxxx is an incremental number.

9. Sending data to an MQTT broker

Data can be sent in real time using JSON to a MQTT broker.

For more info about MQTT see:

http://mqtt.org/

For more info about the MQTT implementation refers to the SENECA MQTT PROTOCOL user manual (must be required to service@seneca.it).

10. HOW MANY LOGS IN A SINGLE MICROSD?

A microSD is pre-formatted FAT32 with allocation unit that depends from the constructor.

The number of logs data that can be stored in a microSD card depends from the microSD and the allocation unit size.

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Using a classic microSD of 4GBytes formatted with a file allocation of 32768 bytes, the number of allocation are about:

4 000 000 000 / 32768 = about 122070 allocation units

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

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

Writing to a microSD every 1 minute, in this case the microSD will be full in:

122070 / 3600 files for day = about 34 days

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

In a dos shell “cmd” type:

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

Where “x” is the microSD drive letter

You will obtain an allocation unit of 1024 bytes so the number of allocation units is:

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

Saving a file every 15 minutes will create a file of about 10K so use 10 allocation unit:

3906250/(10 allocation units*96 file for day) = about 4096 days => about 11 years

And saving every 1 minute:

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

The minimum unit size are typically:

512 Bytes for 2GB microSD

1024 Bytes for 4GB microSD

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11. ACTIONS AND MESSAGES

The SEAL software configurator can manage Actions, and Messages.

11.1. ACTIONS

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

Example of actions are: writing to a ModBUS register, Toggle the digital output 1, reset a totalizer etc…

11.2. TEXT AND AUDIO MESSAGES

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

A Messages can be sent to: EMAILS, SMS, AUDIO CALL and HTTP POST

Example of messages are: sending a text alarm “Input 1 high ALARM!” when the analog input 1 is higher than 15 mA.

Audio messages are located into the /AUDIO directories, a preset of audio messages are loaded with seal but it can be edited.

12. SENDING AUDIO (DTMF) COMMANDS TO Z-GPRS3 / Z-UMTS / Z-LTE / Z-LTE-WW

Z-GPRS3 / Z-UMTS / Z-LTE / Z-LTE-WW can receive audio calls for executing commands using DTMF code.

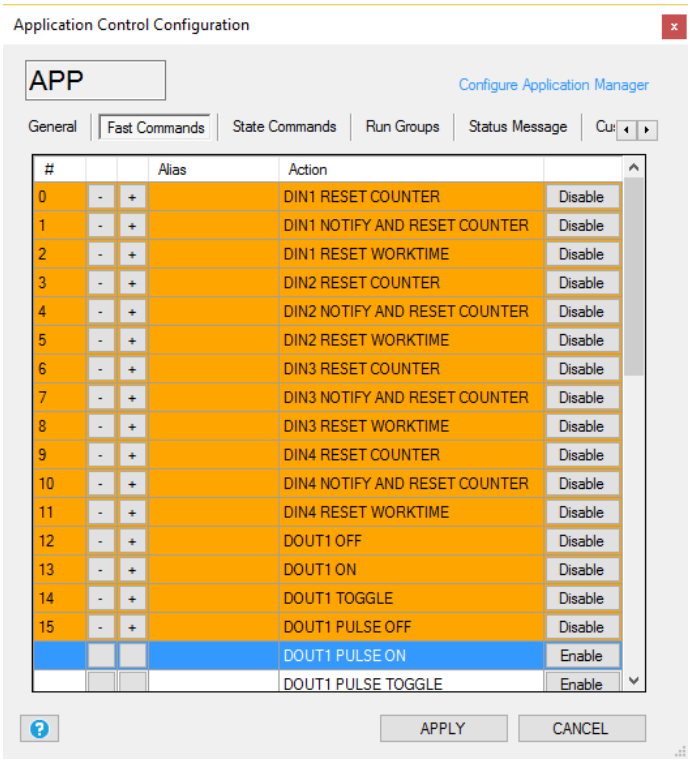
When a RTU is called the audio file in SD card:

/AUDIO/80.pcm

Now the RTU can execute the FAST COMMANDS from 0 to 15 simply typing the command number and then confirm with the “*”, use “#” for cancel.

The FAST COMMANDS are editable from SEAL in the APP icon -> Fast command, for example:

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13. THE WEBSERVER

The Webserver is reachable from the Ethernet or from the Modem PPP connection.

There are 2 different webserver:

A Maintenance Webserver and a Custom Webserver.

CAUTION!

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

13.1. MAINTENANCE WEBSERVER

NOTE

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

The maintenance webserver can be used for maintenance and debug purposes, for accessing this webserver type in a browser (with default ip address):

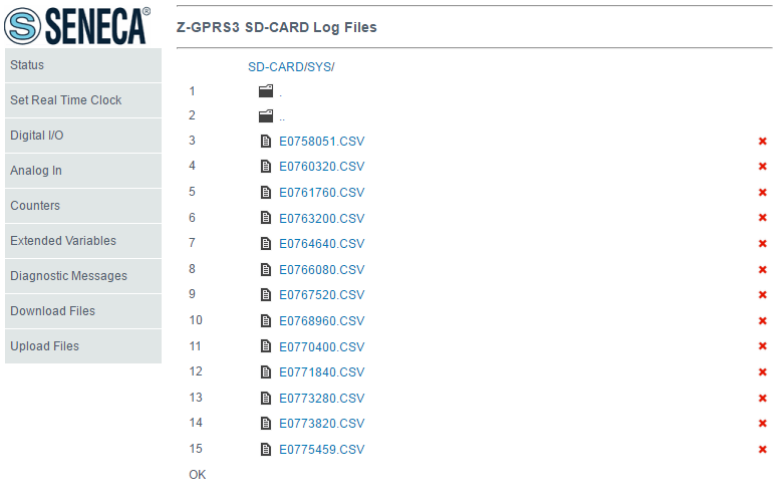
http://192.168.1.101/maintenance/index.html

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

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With the webserver is possible to download all the log files that stored in SD card:





By clicking on the file is possible to download or delete a single log file.

For debug you can see in real time all the external/internal TAGs values in the “Extended Variables”/ “Status” / “Digital IO” / “Analog IN” / “Counters” sections.

The last 16 Diagnostic Messages can be viewed in the “Diagnostic Messages” section.

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

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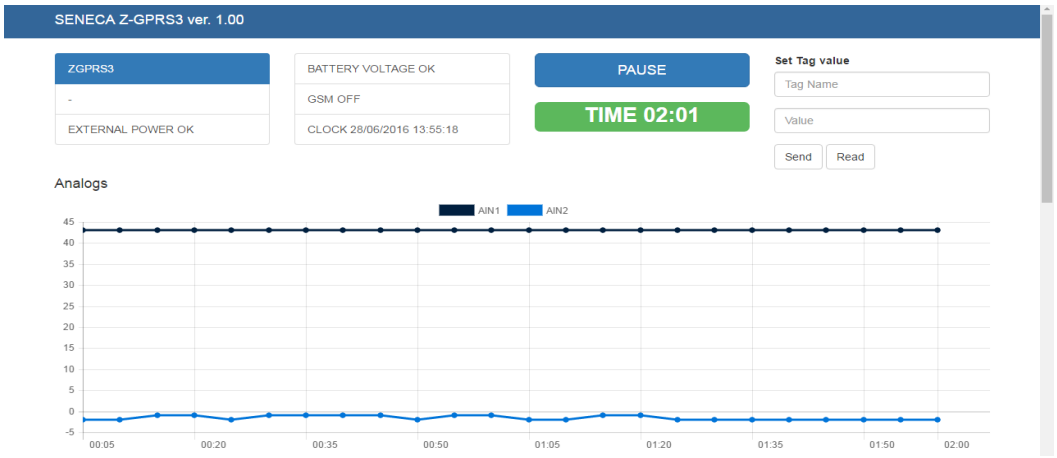
13.2. CUSTOM WEBSERVER

The custom webserver is located in the provided microSD card (/WEB directory).

For accessing 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 or the Modem PPP IP address.



For example is possible to write directly to an external ModBUS tag entering in upper right corner a tag name and the new value.

An example of real time graph is also provided:



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14. SEAL (Seneca Advanced Language)

Seal is a programming tool for the Seneca RTU, for more info refers to SEAL help.

The last Seal software version can be downloaded here:

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

For more info install SEAL and use help on line.

CAUTION!

For Seal full support functionality the microSD card must be inserted!

15. FIRMWARE UPDATE

In order to include new functions, system includes firmware update options.

Various different update modes are available for firmware upgrade:

Via Webserver: Connect to the section “Upload File” for updating firmware

Via USB: A complete update takes about 8 minutes. The device must be connected to a PC with SEAL software installed.

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

Via FTP Server: When the RTU is not reachable directly, the firmware update can be made by sending a SMS or a HTTP command, then the updated file is download directly to the RTU from a FTP server.

Via HTTP Server: When the RTU is not reachable directly, the firmware update can be made by sending a a HTTP command, then the updated file is download directly to the RTU from the HTTP server.

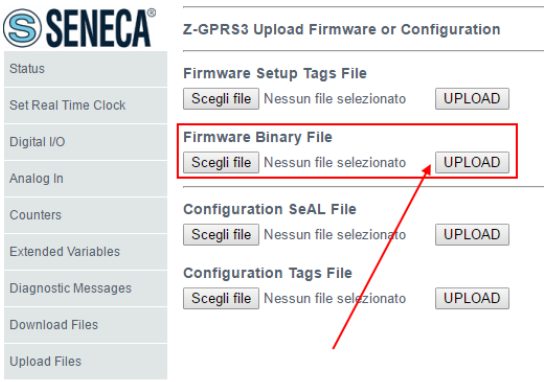
15.1. Firmware update by Webserver

1) Download and Install the last SEAL software from Seneca Website (the last firmware is located in C:\Program Files\Seneca\SeAL\devices).
2) Connect webserver RTU at:
   http://ipaddress/maintenance/index.html

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where “ipaddress” is the PPP modem or Ethernet IP address.

3) Go to the “Upload File” section.



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

15.2. Firmware update by microSD card

Firmware can be updated via microSD card formatted with the FAT16 or FAT32 filesystem (purchased microSD cards are usually already formatted this way).

Proceed as follows to update firmware:

1. Copy the file called “fw.bin” containing the firmware to a microSD card, The file must be copied to the main microSD folder.
2. With the RTU OFF, insert the microSD card in its slot
3. Turn ON the RTU.
4. The SD/STS led starts to flash at 1 second intervals for about 20 seconds. The new firmware is written in flash memory during this phase.
5. When it finished, the SD/STS led starts to flash fast
6. At this point, remove the microSD
7. The green PWR led starts to flash fast (several times a second); in this phase the module is copying firmware to the microprocessor flash.
8. When it finished, the module automatically turns off and back on

The firmware update can be checked:

-Connecting the module to SEAL software, the firmware version has changed.

CAUTION!

-BEFORE UPDATING firmware, copy the current configuration.

-Once the firmware is updated, the previous setup may be deleted so RTU must be re-configured.

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16. SEAL PROGRAM AND SEAL CONFIGURATION REMOTE UPDATE

16.1. SEAL PROGRAM AND SEAL CONFIGURATION UPDATE FROM WEBSERVER

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

For update program and configuration, follow this procedure:

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



6) Under “Configuration Tags File” select file *.tag file and then click “UPLOAD”
7) The RTU will restart with the new SEAL Program/Configuration

CAUTION!

When use this feature with Remote RTU be sure that the connection parameters are correct before upload the new SEAL Program/Configuration or the RTU will be unreachable!

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16.2. UPLOAD A PROJECT BACKUP TO THE RTU

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

In order to do that follow the procedure:

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



3) Under “Configuration SEAL File” select the “.seal” file and then click “UPLOAD”
4) The RTU will store the .seal file to the SD card

CAUTION!

When a “.seal” file is uploaded the RTU will not change the actual program/configuration.

This operation is only for backup purpose, for changing the program/configuration you must upload the .tag file (see chapter 16.1)

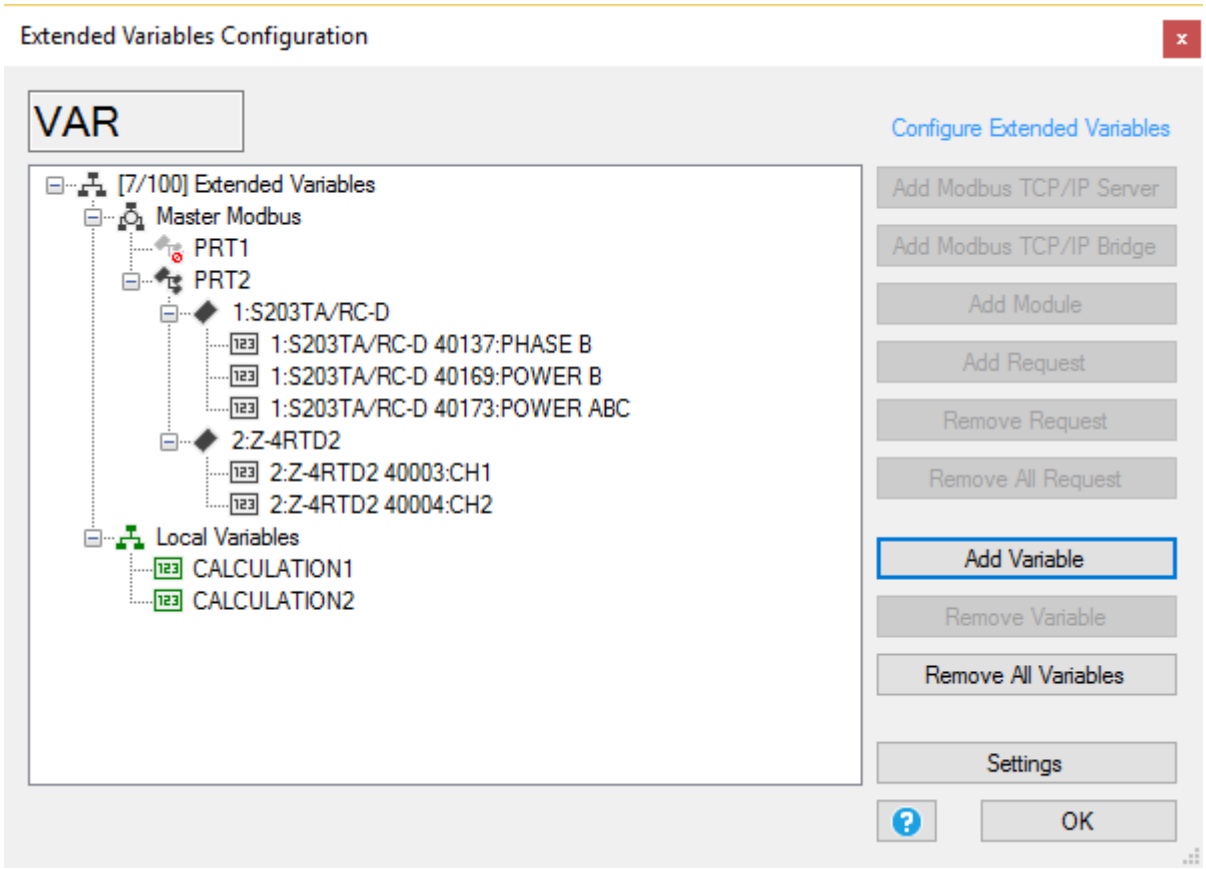
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17. MODBUS TCP-IP SERVER AND MODBUS RTU SLAVE

The RTUs can activate a Modbus TCP-IP Server and a Modbus RTU Slave (on serial ports) for accessing the Embedded and Modbus I/O.

Server accepts up to 2 clients from Ethernet or Modem (PPP) connection.

The external variables addresses are placed by the SEAL compiler so, after compiling, the addresses can be shown:



	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

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17.1. MODBUS ADDRESSES TABLE (Z-GPRS3/Z-LOGGER3/Z-UMTS)

ADDRRESS	*OFFSET*	*TAG*	*REGISTER TYPE*	*RO/RW*	*INFO*
40001	0	MACHINE ID	UNSIGNED 16	READ ONLY	INTERNAL CODE
40002	1	FIRMWARE CODE	UNSIGNED 16	READ ONLY	INTERNAL CODE
40003	2	FIRMWARE MAJOR REVISION	UNSIGNED 16	READ ONLY	(EXAMPLE 204 = 2.04)
40004	3	FIRMWARE MINOR REVISION	UNSIGNED 16	READ ONLY	In decimal format KMMBB Where: K=4= Bugfix Release K=3= New Release MM = Minor Revision BB = Build Example: Value = 40110 4 = Bugfix Release 01 = Minor revision 1 10 = Build 10
40008	7	DIGITAL INPUTS AND SIGNALS	BIT	READ ONLY	Digital Inputs Bit 0 = INPUT1 VALUE Bit 1 = INPUT2 VALUE Bit 2 = INPUT3 VALUE Bit 3 = INPUT4 VALUE Bit 7 = EXTERNAL POWER Bit 8 = BATTERY GOOD
40009	8	DIGITAL OUTPUTS	BIT	READ ONLY	Bit 14 = DIGITAL OUTPUT 1 VALUE Bit 15 = DIGITAL OUTPUT 2 VALUE
40015	14	CLOCK YEAR	SIGNED 16 BITS	READ ONLY	Year
40016	15	CLOCK MONTH	UNSIGNED 8 BITS	READ ONLY	Bit from 0 to 7 (LSB)
40017	16	CLOCK DAY	UNSIGNED 8 BITS	READ ONLY	Bit from 0 to 7 (LSB)
40017	16	CLOCK HOURS	UNSIGNED 8 BITS	READ ONLY	Bit from 8 to 15 (MSB)
40018	17	CLOCK MINUTES	UNSIGNED 8 BITS	READ ONLY	Bit from 0 to 7 (LSB)
40018	17	CLOCK SECONDS	UNSIGNED 8 BITS	READ ONLY	Bit from 8 to 15 (MSB)
40023	22	Totalizer value 1 LSW	UNSIGNED 16 BITS	READ ONLY	Less significant 16 bits
40024	23	Totalizer value 1 MSW	UNSIGNED 16 BITS	READ ONLY	Most significant 16 bits
40025	24	Counter value 1 LSW	UNSIGNED 16 BITS	READ ONLY	Less significant 16 bits
40026	25	Counter value 1 MSW	UNSIGNED 16 BITS	READ ONLY	Most significant 16 bits
40039	38	Worktime 1 LSW	UNSIGNED 16 BITS	READ ONLY	Value in [Seconds] Less significant 16 bits

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40040	39	Worktime 1 MSW	UNSIGNED 16 BITS	READ ONLY	Value in [Seconds] Most significant 16 bits
40049	48	Totalizer value 2 LSW	UNSIGNED 16 BITS	READ ONLY	Less significant 16 bits
40050	49	Totalizer value 2 MSW	UNSIGNED 16 BITS	READ ONLY	Most significant 16 bits
40051	50	Counter value 2 LSW	UNSIGNED 16 BITS	READ ONLY	Less significant 16 bits
40052	51	Counter value 2 MSW	UNSIGNED 16 BITS	READ ONLY	Most significant 16 bits
40065	64	Worktime 2 LSW	UNSIGNED 16 BITS	READ ONLY	Value in [Seconds] Less significant 16 bits
40066	65	Worktime 2 MSW	UNSIGNED 16 BITS	READ ONLY	Value in [Seconds] Most significant 16 bits
40075	74	Totalizer value 3 LSW	UNSIGNED 16 BITS	READ ONLY	Less significant 16 bits
40076	75	Totalizer value 3 MSW	UNSIGNED 16 BITS	READ ONLY	Most significant 16 bits
40077	76	Counter value 3 LSW	UNSIGNED 16 BITS	READ ONLY	Less significant 16 bits
40078	77	Counter value 3 MSW	UNSIGNED 16 BITS	READ ONLY	Most significant 16 bits
40091	90	Worktime 3 LSW	UNSIGNED 16 BITS	READ ONLY	Value in [Seconds] Less significant 16 bits
40092	91	Worktime 3 MSW	UNSIGNED 16 BITS	READ ONLY	Value in [Seconds] Most significant 16 bits
40101	100	Totalizer value 4 LSW	UNSIGNED 16 BITS	READ ONLY	Less significant 16 bits
40102	101	Totalizer value 4 MSW	UNSIGNED 16 BITS	READ ONLY	Most significant 16 bits
40103	102	Counter value 4 LSW	UNSIGNED 16 BITS	READ ONLY	Less significant 16 bits
40104	103	Counter value 4 MSW	UNSIGNED 16 BITS	READ ONLY	Most significant 16 bits
40117	116	Worktime 4 LSW	UNSIGNED 16 BITS	READ ONLY	Value in [Seconds] Less significant 16 bits
40118	117	Worktime 4 MSW	UNSIGNED 16 BITS	READ ONLY	Value in [Seconds] Most significant 16 bits
40128	127	Battery Voltage	UNSIGNED 16 BITS	READ ONLY	[mV]
40130	129	Analog input 1	SIGNED 16 BITS	READ ONLY	Value in [mA] or [V]
40131	130	Scaled Analog Input 1	SIGNED 16 BITS	READ ONLY	Custom scaled value
40144	143	Analog input 2	SIGNED 16 BITS	READ ONLY	Value in [mA] or [V]
40145	144	Scaled Analog Input 2	SIGNED 16 BITS	READ ONLY	Custom scaled value
40158	157	GSM Field	SIGNED 16 BITS	READ ONLY	Value in [dBm]

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41003 … 41203	1002 … 1202	External Variables Tags	-	READ/WRITE	Use the compile output window for Tags address position
49001	9000	COMMAND	UNSIGNED 16 BITS	READ/WRITE	Command Register (see Table with supported commands)

17.2. MODBUS ADDRESSES TABLE (Z-UMTS HW2 from firmware 3.0.3 / Z-LTE / Z-LTE-WW)

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

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40025	24	Counter value 1 LSW	UNSIGNED 16 BITS	READ ONLY	Less significant 16 bits
40026	25	Counter value 1 MSW	UNSIGNED 16 BITS	READ ONLY	Most significant 16 bits
40039	38	Worktime 1 LSW	UNSIGNED 16 BITS	READ ONLY	Value in [Seconds] Less significant 16 bits
40040	39	Worktime 1 MSW	UNSIGNED 16 BITS	READ ONLY	Value in [Seconds] Most significant 16 bits
40049	48	Totalizer value 2 LSW	UNSIGNED 16 BITS	READ ONLY	Less significant 16 bits
40050	49	Totalizer value 2 MSW	UNSIGNED 16 BITS	READ ONLY	Most significant 16 bits
40051	50	Counter value 2 LSW	UNSIGNED 16 BITS	READ ONLY	Less significant 16 bits
40052	51	Counter value 2 MSW	UNSIGNED 16 BITS	READ ONLY	Most significant 16 bits
40065	64	Worktime 2 LSW	UNSIGNED 16 BITS	READ ONLY	Value in [Seconds] Less significant 16 bits
40066	65	Worktime 2 MSW	UNSIGNED 16 BITS	READ ONLY	Value in [Seconds] Most significant 16 bits
40075	74	Totalizer value 3 LSW	UNSIGNED 16 BITS	READ ONLY	Less significant 16 bits
40076	75	Totalizer value 3 MSW	UNSIGNED 16 BITS	READ ONLY	Most significant 16 bits
40077	76	Counter value 3 LSW	UNSIGNED 16 BITS	READ ONLY	Less significant 16 bits
40078	77	Counter value 3 MSW	UNSIGNED 16 BITS	READ ONLY	Most significant 16 bits
40091	90	Worktime 3 LSW	UNSIGNED 16 BITS	READ ONLY	Value in [Seconds] Less significant 16 bits
40092	91	Worktime 3 MSW	UNSIGNED 16 BITS	READ ONLY	Value in [Seconds] Most significant 16 bits
40101	100	Totalizer value 4 LSW	UNSIGNED 16 BITS	READ ONLY	Less significant 16 bits
40102	101	Totalizer value 4 MSW	UNSIGNED 16 BITS	READ ONLY	Most significant 16 bits
40103	102	Counter value 4 LSW	UNSIGNED 16 BITS	READ ONLY	Less significant 16 bits
40104	103	Counter value 4 MSW	UNSIGNED 16 BITS	READ ONLY	Most significant 16 bits
40117	116	Worktime 4 LSW	UNSIGNED 16 BITS	READ ONLY	Value in [Seconds] Less significant 16 bits
40118	117	Worktime 4 MSW	UNSIGNED 16 BITS	READ ONLY	Value in [Seconds] Most significant 16 bits
40128	127	Battery Voltage	UNSIGNED 16 BITS	READ ONLY	[mV]
40130	129	Analog input 1	SIGNED 16 BITS	READ ONLY	Value in [mA] or [V]

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40131	130	Scaled Analog Input 1	SIGNED 16 BITS	READ ONLY	Custom scaled value
40144	143	Analog input 2	SIGNED 16 BITS	READ ONLY	Value in [mA] or [V]
40145	144	Scaled Analog Input 2	SIGNED 16 BITS	READ ONLY	Custom scaled value
40158	157	GSM Field	SIGNED 16 BITS	READ ONLY	Value in [dBm]
40215	214	GNSS Flags	UNSIGNED 16 BITS	READ ONLY	Flags for GNSS
40216	215	SNR/GNSS Satellites	UNSIGNED 8 BITS + UNSIGNED 8 BITS	READ ONLY	SNR (MSB) / Number of satellites(LSB)
40217-40218	216-217	LATITUDE	FLOAT 32	READ ONLY	Latitude
40219-40220	218-219	LONGITUDE	FLOAT 32	READ ONLY	Longitude
40221-40222	220-221	SPEED	FLOAT 32	READ ONLY	Speed
40223-40224	222-223	DISTANCE	FLOAT 32	READ ONLY	DISTANCE FROM CENTER
41003 … 41203	1002 … 1202	External Variables Tags	-	READ/WRITE	Use the compile output window for the address location of tags
49001	9000	COMMAND	UNSIGNED 16 BITS	READ/WRITE	Command Register (see Table with supported commands)
49439	9438	Output working time 1 [Seconds] LSW	UNSIGNED 16 BIT	RO	Less significant 16 bits
49440	9439	Output working time 1 [Seconds] MSW	UNSIGNED 16 BIT	RO	Most significant 16 bits
49441	9440	Output working time 2 [Seconds] LSW	UNSIGNED 16 BIT	RO	Less significant 16 bits
49442	9441	Output working time 2 [Seconds] MSW	UNSIGNED 16 BIT	RO	Most significant 16 bits

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17.3. SUPPORTED COMMANDS FROM MODBUS

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

The holding register COMMAND is at address 49001 (holding register 9000 0 based)

COMMAND	***VALUE (decimal)***
RESET RTU	1
UNMOUNT SD CARD	7
STOP DATALOGGER	18
START DATALOGGER	17
COPY ALL LOGS FROM INTERNAL FLASH TO microSD CARD	19
RESET LOG SESSION	20
ERASE ALL LOG FROM INTERNAL FLASH	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 REMOTE FTP SERVER	112
DOWNLOAD AND UPDATE FIRMWARE AND SETUP FROM REMOTE FTP SERVER	113
DOWNLOAD AND UPDATE SETUP FROM REMOTE FTP SERVER	114
DOWNLOAD AND UPDATE PHONEBOOK FROM FTP SERVER	83
UPDATE FIRMWARE FROM SD	116
UPDATE SETUP FROM SD	117
UPDATE PHONEBOOK FROM SD	118
EXECUTE RING COMMAND	33
EXECUTE FAST COMMAND 0	48
EXECUTE FAST COMMAND 1	49
EXECUTE FAST COMMAND 2	50
EXECUTE FAST COMMAND 3	51

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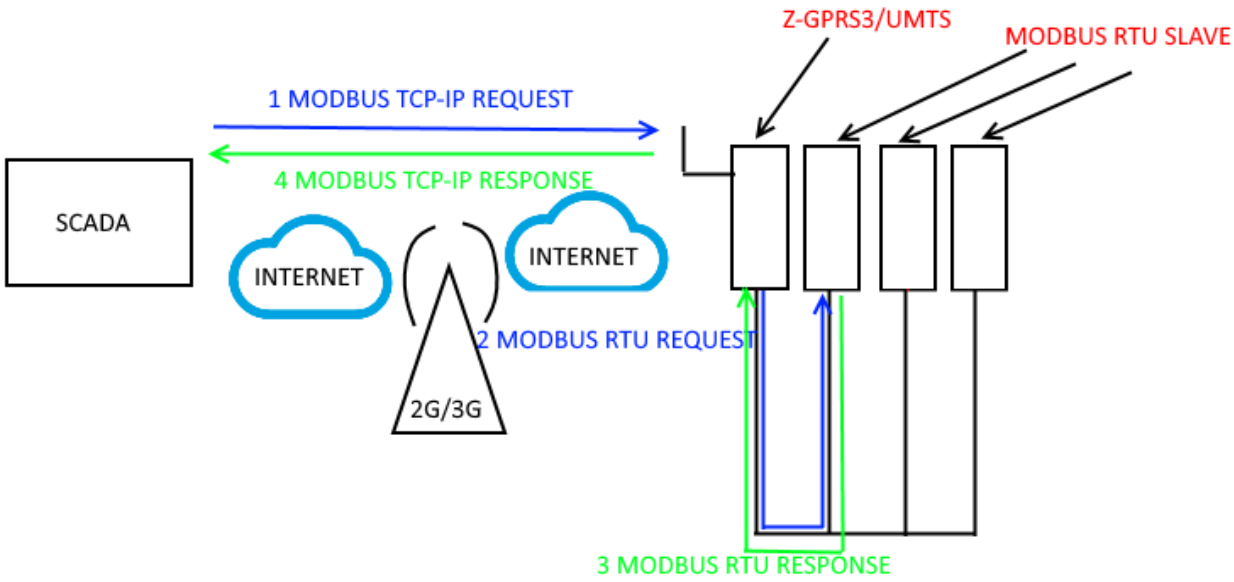
EXECUTE FAST COMMAND 4	52
EXECUTE FAST COMMAND 5	53
EXECUTE FAST COMMAND 6	54
EXECUTE FAST COMMAND 7	55
EXECUTE FAST COMMAND 8	56
EXECUTE FAST COMMAND 9	57
EXECUTE FAST COMMAND 10	58
EXECUTE FAST COMMAND 11	59
EXECUTE FAST COMMAND 12	60
EXECUTE FAST COMMAND 13	61
EXECUTE FAST COMMAND 14	62
EXECUTE FAST COMMAND 15	63
CLOSE DIGITAL OUTPUT1	Write with Write Multiple Register: write 32 in register 49001 write 32 in register 49002 write 512 in register 49003
OPEN DIGITAL OUTPUT1	Write with Write Multiple Register: write 32 in register 49001 write 16 in register 49002 write 512 in register 49003
CLOSE DIGITAL OUTPUT2	Write with Write Multiple Register: write 32 in register 49001 write 8192 in register 49002 write 512 in register 49003
OPEN DIGITAL OUTPUT2	write 32 in register 49001 write 4096 in register 49002 write 512 in register 49003

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18. MODBUS TCP-IP TO RTU PASSTHROUGH

The devices can be used for convert in real time the protocol Modbus TCP-IP to Modbus RTU from Ethernet or 2G/3G connection.

For example is possible to connect a SCADA through Modbus TCP-IP acquire directly the Modbus RTU I/O slaves registers:



1 The SCADA start with a Modbus TCP-IP Request

2 The RTU Converts the Modbus TCP-IP Request into the Modbus RTU Slave

3 The Slave Modbus RTU responses

4 The RTU Converts the Modbus RTU Response to the Modbus TCP-IP SCADA

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19. DYNAMIC DNS (DDNS) (Z-GPRS3 / Z-UMTS / Z-LTE / Z-LTE-WW only)

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

For example is possible to access the RTU webserver with:

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

The IP can change but name is always the same.

Also the RTU Modbus TCP-IP server can be reached, for example configuring in the SCADA in this way:

Station name: senecazumts.ddns.net

Port: 502

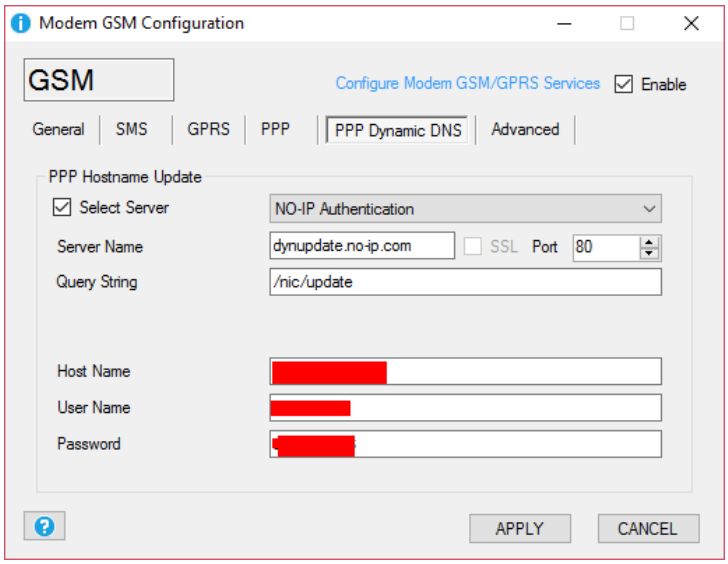
Z-UMTS/Z-GPRS3/Z-LTE / Z-LTE-WW supports the following DDNS:

NoIP.com

DDNS.org

DDNS.it

A configuration example is (note that PPP must be configured):



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20. SUPPORTED SMS COMMANDS (Z-GPRS3 / Z-UMTS / Z-LTE / Z-LTE-WW only)

20.1. List of Supported SMS Commands

The RTU lets you run commands if the SMS sender phone number is enabled.

Command list:

SMS COMMANDS FOR DIGITAL INPUTS/COUNTERS/TOTALIZERS	
GET DIN	*Status from all counters*
GET DINn	*All nth input counter status*
GET DINn.TOT	*All nth input totalizers status*
GET DINn.CNT	*All nth input counters status*
RESET DIN	*Reset all counters*
RESET CNTn	*Reset the nth counter*

SMS COMMANDS FOR DIGITAL INPUTS/COUNTERS/TOTALIZERS	
GET DIN	*Status from all counters*
GET DINn	*All nth input counter status*
GET DINn.TOT	*All nth input totalizers status*
GET DINn.CNT	*All nth input counters status*
RESET DIN	*Reset all counters*
RESET CNTn	*Reset the nth counter*

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SMS COMMANDS FOR READ/WRITE EXTENDED VARIABLES	
GET TAG <VARIABLE_LABEL>	*Returns by SMS the value of the extended variable named <VARIABLE_LABEL>* *For example:* *GET TAG PIPPO* *Returns the PIPPO extended variable value*
SET TAG <VARIABLE_LABEL> <VALUE>	*Write <VALUE> to the external variable named <VARIABLE_LABEL>* *For example:* *SET TAG PIPPO 345* *Write 345 to the PIPPO extended variable*

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

SMS COMMANDS FOR ADDRESS BOOKS	
SET PHONE +nnnnnnn	Add number +nnnnnn to address book as administrator
RESET PHONE +nnnnnnn	Remove number +nnnnnn from the address book
SET EMAIL nnn@nnn.nnn	Add email nnn@nnn.nnn to address book as administrator
RESET EMAIL nnn@nnn.nnn	Delete email nnn@nnn.nnn from the address book

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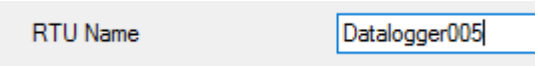
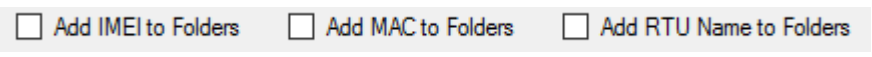
SMS COMMANDS FOR ANALOGUE INPUTS	
SET AIN#.MIN <MIN>	*Set MIN threshold on analogue input 1 or 2*
SET AIN#.LOW <LOW>	*Set LOW threshold on analogue input 1 or 2*
SET AIN#.HIGH <HIGH>	*Set HIGH threshold on analogue input 1 or 2*
SET AIN#.MAX <MAX>	*Set MAX threshold (analogue input 1 or 2)*
SET AIN#.DELAY <TIME_ON_OFF>	*Set time filter on threshold activation for analogue input 1 0 2*

SMS COMMANDS FOR GPS SETTINGS ***(FOR Z-LTE, Z-LTE-WW, Z-UMTS INSTRUMENTS ONLY)***	
GPS GOOGLE	Location on Google Maps
GPS.POS	Location (latitude and longitude)
SET GPS <RADIUS>[<SPEED>]	Set virtual fence radius / speed
SET GPS.LOCK	Lock origin
SET GPS.UNLOCK	Unlock origin
SET GPS.ORG[<LAT>][<LON>]	Origin setting with LAT and LON
SET GPS.ORG	Setting the current virtual fence origin position

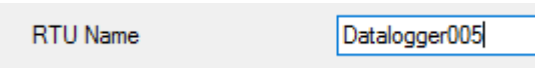
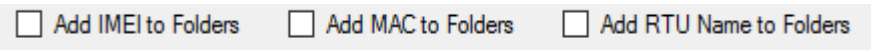
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VARIOUS SMS COMMANDS	
CREDIT	Returns residual credit (for top-up SIM CARD only)
STATUS	Returns the variables set by setup software. All available variables can be included. If the SMS text exceeds 160 characters, it will be truncated (three dots "…" 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 the FTP server folder where files are sent name_ip IP address or FTP server name port FTP server gateway user FTP server login user name password FTP server login password for example: SET /prova/ 192.168.180.33 21 pippo pluto
SET GSM.SMTP name_ip port user password	*set SMTP server connection settings to send emails* *name_ip IP address or FTP server name* *port smtp server gateway* *user FTP server login user name* *password smtp server login password* *for example:* *SET GSM.SMTP out.alice.it 25 pippo pluto*
GET AIN	*Returns the two analog input values*
EMAIL TEST	*Forces an email sent with an attachment to the first administrator in the email address book*
FTP TEST	*Forces a text file sent to the currently set ftp server*

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EMAIL TAG	*Sends the value indicated by "TAG" to the first email contact* *EMAIL AIN sends an email with the 2 analogue values* *EMAIL AIN1 sends an email with the analogue 1 value* *EMAIL AIN2 sends an email with the analogue 2 value* *EMAIL DIN sends an email with the digital input values* *EMAIL DIN1 sends an email with the digital 1 input value* *EMAIL DIN2 sends an email with the digital 2 input value* *EMAIL DIN3 sends an email with the digital input 3 value* *EMAIL DIN4 sends an email with the digital input 4 value* *EMAIL TEMP sends an email with the internal temperature sensor value*
EMAIL SYSLOG	*Send the last week syslog.csv log file on microSD via email (first administrator address in the address book)*
FTP SYSLOG	*Send the last week syslog.csv log file in the microSD via FTP*
UPLOAD LOG	*Create a dump of the actual internal flash log into the microSD logdump.csv, then send this file to the actual upload channel (E-MAIL or FTP).*
DOWNLOAD FW	*The RTU will download from the FTP download folder the "RTUNAME_fwupdt.bin" firmware file (where RTUNAME is the name inserted in the "Cloud" SEAL section) Then (if the release il different from the installed) a firmware update is done.* *for example:*  *The firmware file must be:* *"Datalogger005_fwupdt.bin"* *Note that if in the "Cloud" SEAL section you have flagged one of the followed flags:* 

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	The firmware file must be only "fwupdt.bin"
DOWNLOAD SETUP	*The RTU will download from the FTP download folder the "RTUNAME_ setup.tag" setup file (where RTUNAME is the name inserted in the "Cloud" SEAL section) Then a configuration update is done.* *For example:*  *The setup file must be:* *"Datalogger005_setup.tag"* *Note that if in the "Cloud" SEAL section you have flagged one of the followed flags:*  *The setup file name must be only "setup.tag"*
DOWNLOAD FW-SETUP	*The RTU will download from the FTP download folder the firmware AND the setup file. Then (if the release is different from the installed) the firmware and the configuration are updated.* *The firmware name must be:* *"fwupdt.bin"* *The setup name must be:* *"fwupdt.tag"*
DOWNLOAD DATA	*The RTU will download from the FTP download folder the "data.bin" with the extended ring action phonebook (up to 1000 users). Then the extended phonebook is updated.*
RESET	*Reset the RTU*
NET	*RTU will send actual Ethernet and modem PPP IP address*
GSM IMSI	*Return the mobile operator IMSI code (International Mobile Subscriber Identity)*
GSM ICCID	*Return the SIM ICCID code (Integrated Circuit Card IDentifier)*
GSM IMEI	*Return the Modem IMEI identification code (International Mobile Equipment Identity)*

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NOTE

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

"COMMAND NOT RECOGNIZED"

You can configure the RTU to send a confirmation (SMS or ring) when the command is successfully completed.

CAUTION!

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

21. EMERGENCY MODE

It's possible to disable the SEAL program execution setting ALL dip switches to ON at boot-up.

This emergency mode is useful if a SEAL program does not allow to connect to SEAL (for example because the board will reboot continuously).

In emergency mode the SEAL program is not executed and the datalogger is stopped.

To enter in the emergency mode please follow these steps:

1) Power Down Board
2) Put ALL the dip switches to "ON"
3) Power ON Board
4) PWR led will flash until you exit from the emergency mode
5) Now you can connect to SEAL and send a new program

For exit from the emergency mode:

1) Power Down Board
2) Put ALL the dip switches to "OFF"
3) Power ON Board
4) Now the SEAL program is in execution

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22. Z-GPRS3 POWER ESTIMATE FOR USE WITH SOLAR PANELS

The following table is obtained using a Modbus TCP-IP client connection with the Modbus TCP-IP Z-GPRS3 server using the GPRS connection.

Test condition:

-internet connection is always ON

-Outputs OFF

-No Ethernet connected

-No 12VDC (Screw 1) connected

VOLTAGE	GSM SIGNAL	MODBUS REQUEST EVERY	MODBUS REGISTERS REQUEST	TYPICAL AVERAGE POWER
12V DC	-56 dBm (7/7)	60 seconds	10	1,49 W
12V DC	-86 dBm (3/7)	60 seconds	10	1,5 W
12V DC	-86 dBm (3/7)	Continuous	10	1,9 W

23. TROUBLESHOOTING

PROBLEM	***SOLUTION***
Sending the SMS command: email test no email reaches the administrator's email address	-Make sure the set APN corresponds to the mobile service provider's and whether access requires authorisation. See: http://wiki.apnchanger.org/Main_Page -Make sure the GSM signal is over 2/7 -The email ended up in SPAM -The SMTP server supports SSL protection and the gateway was not correctly set
Using the configuration software in the "Test configuration" section when you launch the command: TEST E-MAIL COMMAND	***If you send Log via Ethernet, Seneca recommended to use an owner SMTP server.*** -The email is in the SPAM directory -The SMTP server supports only SSL security, in the ethernet port or Modem PPP connection you can not enable SSL protection

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no e-mail arrives at the administrator e-mail address	
Sending the SMS command: ftp test no ftp file reaches the set ftp server	-The FTP server folder does not exist. Create the folder on the ftp server first. -Make sure the ftp server IP address/name are correct -Make sure the ftp server login user name/password are correct
Using the configuration software in the "Test configuration" section when you launch the command TEST FTP no ftp file arrives in the configured ftp server	-The folder on the FTP server on which you created the file does not exist, first create the folder in the ftp server -Check the IP correctness / name of the FTP server -Make sure that the username / password to access the ftp server are correct
The GSM signal is always 0/7 and the GSM led continues to flash fast	-The inserted SIM is not recognised. Clean or replace the SIM -The SIM PIN is enabled. Insert the SIM in a mobile phone and disable the PIN or enable it and insert the PIN code in the setup software
The GSM signal is too low	-Wait at least 10 minutes from turning on the device before reading the GSM value -Try using another mobile service provider's SIM -Move the RTU installation -Use an optional external antenna: for further information, contact Seneca or visit the device section at www.seneca.it.
Residual credit is not sent for the SIM	-Check the method used to receive residual credit from the mobile service provider (ring or SMS, SMS request text). -The SIM is not top-up but subscription
Z-GPRS3 / Z-UMTS / Z-LTE / Z-LTE-WW worked correctly for a few days/months but stopped sending SMS and logs.	-No SIM credit. Top-up the SIM card. -The SIM card expired, replace the SIM card or contact your mobile phone provider.

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You get the "NTP error"	The clock synchronization is activated, via ethernet this is done via NTP (network time protocol), but you can not contact the NTP server: -Make sure that the UDP port 123 is open -Check the configured NTP server address
The device is unable to send emails or ftp files on the Internet through the Ethernet port but a PC connected to the same LAN can send emails and ftp files.	-Try to change Router/Modem -Update the Router/Modem Firmware -Keep open on the router the ports: UDP/TCP 25 UDP/TCP 21 UDP 123

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