USER MANUAL

Z-GPRS2-SEAL

Z-LOGGER-SEAL

Z-GPRS2-SEAL

Multi-protocol Datalogger/RTU with GSM/GPRS modem and embedded I/O

Z-LOGGER

Multi-protocol Datalogger/RTU with embedded I/O

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Date	Version	Changes
23/04/14	1	First Revision
15/05/14	2	Modified the remote firmware and configuration update file names. Added new SMS commands. Added the Syslog “week rotation”. Added chapters: Fw update, Configuration update and Troubleshooting.
21/05/14	3	Changed chapters Local and remote firmware and configuration update. Added chapter Extended Phonebook
31/10/14	4	Changed update remote FW/CFG/PHONEBOOK chapters Added Modbus TCP-IP Server commands Changed USB drivers chapter (now are signed)
10/02/15	5	http post available only with a GPRS connection

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Seneca **Z-GPRS2 / Z-LOGGER**

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-GPRS2.

The use of Z-GPRS2 in data roaming (for example, abroad with an Italian SIM card) may generate unexpected costs. Contact your telephone provider for further information.

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CAUTION!

-Contact your telephone service provider for GSM and GPRS service costs especially when using Z-GPRS2 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-GPRS2.

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

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

-For GPRS 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 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.

-Check the data quantity sent via GPRS and SMS before using Z-GPRS2.

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 GPRS transaction.

1. CHARACTERISTICS

1.1. Z-GPRS2 Model characteristics

Z-GPRS2 is a multi-protocol programmable datalogger/RTU with GSM/GPRS modem and embedded IO.

- ***Supply voltage 11..40 Vdc; 19..28 Vac max 6.5 W***
- ***2 AAA 1.2 V, NiMh rechargeable backup batteries***
- ***GSM/GPRS Quad-Band modem***
- ***500 Vac insulation between remaining circuit power***
- ***Quick installation on DIN 46277 guide***
- ***Status indication LED: digital inputs, digital outputs, Ethernet, GSM, RS485, Power, microSD***
- ***NR 4 digital inputs***
- ***NR 2 16-bit voltage/current programmable analog inputs***
- ***NR 2 relay digital outputs***
- ***10/100 Mbps frontal Ethernet RJ45***
- ***NR 2 RS484 ports***
- ***1 type B miniUSB port for settings***
- ***MicroSD support (microSD or microSDHC max 32 Gb)***
- ***NR4 32 bits max 30 Hz totalizers***
- ***NR4 32 bits max 30 Hz resettable counters***
- ***Possibility of expanding the number of I/O via Modbus TCP-IP or Modbus RTU***
- ***Maximum number of channels on datalogger: 128 (of which 100 via Modbus RTU/TCP-IP)***
- ***Supported system protocols via GSM: SMS, voice calls (zero cost command)***
- ***Supported system protocols via GPRS: FTP client, SMTP client, SMTPS client***
- ***Supported system protocols via Ethernet port: FTP client, FTP server*, SMTP client, ModBUS TCP-IP Server***
- ***Protocol on RS485: Modbus RTU Master***
- ***Webserver* via Ethernet port***
- ***128 KB RAM memory***
- ***Memory expansion up to 32 GigaBytes with micro SD***
- ***32 bits ARM processor***
- ***Real Time multitasking operating system***
- ***Firmware update via USB / microSD/or by remote connection***

= Ethernet services cannot be used simultaneously

1.2. Z-LOGGER Model characteristics

Z-LOGGER is a multi-protocol programmable datalogger/RTU with embedded IO.

- ***Supply voltage 11..40 Vdc; 19..28 Vac max 6.5 W***
- ***NR 2 AAA 1.2 V, NiMh rechargeable backup batteries***
- ***500 Vac insulation between remaining circuit power***
- ***Quick installation on DIN 46277 guide***
- ***Status indication LED: digital inputs, digital outputs, Ethernet, RS485, Power, microSD***
- ***NR 4 digital inputs***
- ***NR 2 16-bit voltage/current programmable analog inputs***
- ***NR 2 clean contact relay digital outputs***
- ***10/100 Mbps frontal Ethernet RJ45***
- ***NR 2 RS484 ports***
- ***1 type B miniUSB port for settings***
- ***MicroSD support (microSD or microSDHC max 32 Gb)***
- ***NR4 32 bits max 30 Hz totalizers***
- ***NR4 32 bits max 30 Hz resettable counters***
- ***Possibility of expanding the number of digital or analog I/O via Modbus TCP-IP or Modbus RTU***
- ***Maximum number of channels on datalogger: 128 (of which 100 via Modbus RTU/TCP-IP)***
- ***Supported system protocols via Ethernet port: FTP client, FTP server*, SMTP client, ModBUS TCP-IP Server***
- ***System protocol on RS485: Modbus RTU Master***
- ***Webserver* via Ethernet port***
- ***128 KB RAM memory***
- ***Memory expansion up to 32 GB with micro SD***
- ***32 bits ARM processor***
- ***Real Time multitasking operating system***
- ***Firmware update via USB / microSD or by remote connection***

- ****= Ethernet services cannot be used simultaneously***

1.3. Technical Specifications

1.4. Digital Inputs

Channels number	***4***

Input type	*PNP, NPN configurable.*
Voltage supply	*12 Vdc*
Current supply	*20 mA*
Maximum frequency	*30 Hz*
Current consumption	*3 mA*

1.5. Digital outputs

Channels number	*2*
Output type	*Relay*
Maximum Voltage	*250 Vac*
Maximum Current	*2 A*

1.6. Analog Inputs

Channels number	*2*
Input type	*Current / Voltage configurable*
Voltage input	*0..30V accuracy 0,1% FS*
Current input	*0..20 mA accuracy 0,1% FS*
Input protection	*yes, 12Vdc or 25mA*
Resolution	*16 bits*

1.7. Communication Ports

RS 485 #1	*Port #1, on IDC10 connector*
RS 485 #2	*Port #2, terminals M10/M11/M12*
Ethernet	*10/100 Mbit, RJ45 with autoswitch*
USB mini B	*Mini B*

1.8. Storage units

Internal Flash	*2 Mbytes for configuration and for logger Buffer*
MicroSD	*microSD and microSDHC, max 32 GB (supplied with 1, 2 or 4GBytes microSD)*

1.9. Power supply

Voltage	*11...40 Vdc; 19…28 Vac*
Power consumption	*6,5 W*

1.10. Environmental conditions

Temperature	*From -10 to +40 °C*
Humidity	*30..90% to 40 °C non condensing*
Storage temperature	*From -20 to +45 °C < 6 months*
Protection rating	*IP20*

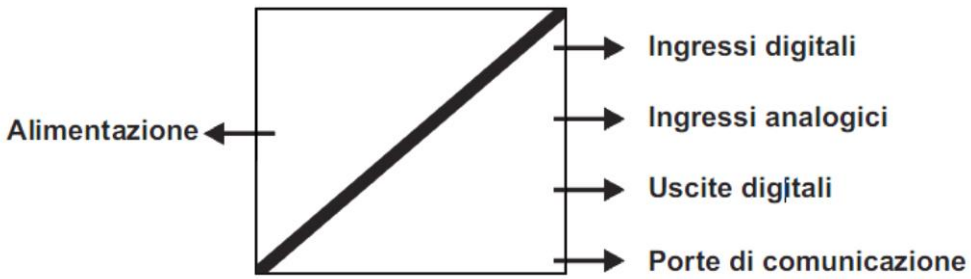
1.11. Regulations

EN61000-6-4/2002-10	***Electromagnetic emission, industrial environment.***
EN61000-6-2/2006-10	***Electromagnetic immunity, industrial environment.***
EN 301 511 (only Z-GPRS2)	***Harmonized standard for mobile stations in the GSM 900 and 1800 bands.***
EN 301 489-1 (only Z-GPRS2)	***ElectroMagnetic Compatibility standard for radio equipment and services.***
EN 301 489-7 (only Z-GPRS2)	***Specific (EMC) conditions for mobile radio equipment (GSM 900 and 1800).***
EN 60950	***Safety of information Technology Equipment.***

1.12. Case specifications

Dimensions and weight	***100 x 111 x 35 mm, 280 g***
Material	Black PBT

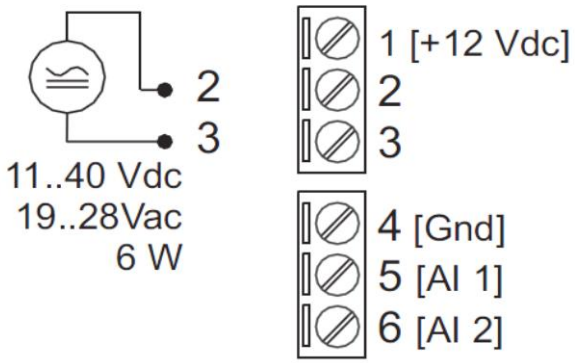
1.13. Insulation

500 Vac	

2. CONNECTIONS

2.1. Power supply connections

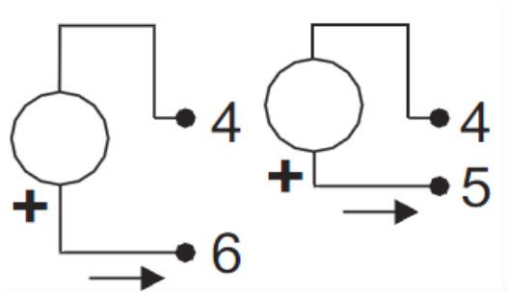
You can supply DC or AC power to terminals 2-3, in the case of DC power supply is not necessary to distinguish between the "+" from the "-" cable:



2.2. Analog input connections

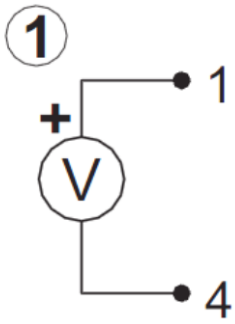
The analog input 1 voltage / current is connected to terminal 4 (- sign for the voltage, the current exit) and 6 (+ sign to the voltage, the current incoming).

The analog input 2 voltage / current is connected to terminal 4 (- sign for the voltage, the current exit) and 5 (+ sign to the voltage, the current incoming).



2.3. Auxiliary voltage connections

The device can provide from 12 to 15 VDC (max 40mA) to an external sensor connected to terminals 1 (+) and 4 (-):



2.4. Serial communication RS485 ports connections

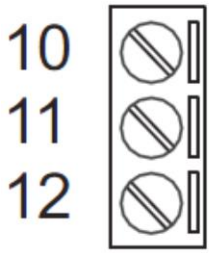
The RS485 port # 1 is connected to the bottom connector "IDC10" for connecting to the Z-BUS Seneca.

WARNING!

In order to use the Z-BUS connector RS485 as you need to move SW2 to "rear IDC10 connector is 485":

	SW2 ■ = ON
	Rear IDC10 connector, CANopen (not supported)
■	***Rear IDC10 connector, RS485***

The RS485 #2 port is connected to terminal 10-11-12:



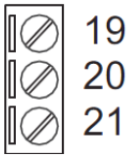
10 = GND RS485#2

11 = A RS485#2

12 = B RS485#2

2.5. Digital outputs connections

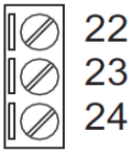
The output relay is connected between terminals 19-20-21:



19 = Normally open relay #1

21 = Shared relay #1

22 = Normally close relay #1



22 = Normally open relay #2

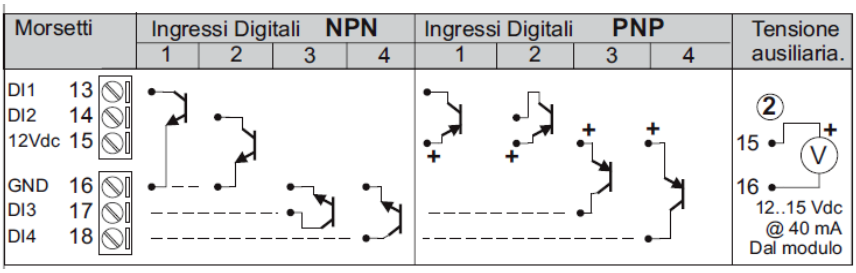
23 = Shared relay #2

24 = Normally close relay #2

2.6. Digital inputs connections

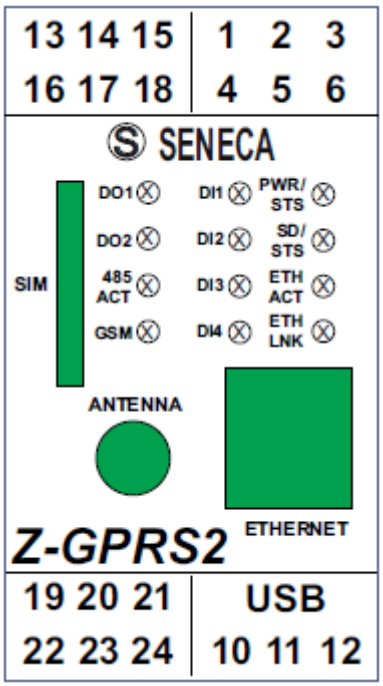
It's possible to provide power to an external sensor by terminals 15-16 (max 40mA) .

The inputs can be configured in NPN or PNP mode, see below:



3. SIGNAL LEDS

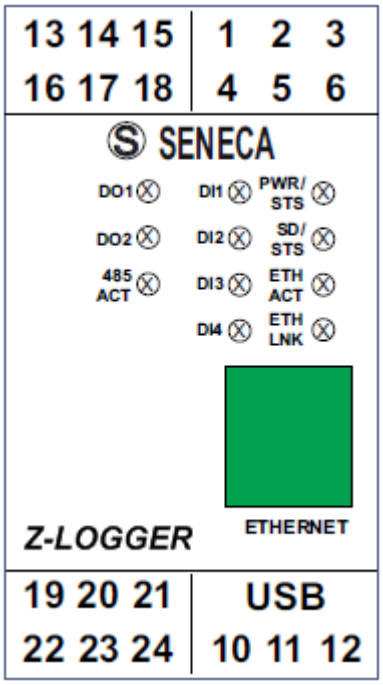
3.1. Z-GPRS2 leds



LED	STATUS	MEANING
DO1	ON	Digital output, relay energised
	OFF	Digital output, relay not energised
DO2	ON	Digital output, relay energised
	OFF	Digital output, relay not energised
PWR/ STS	ON	Z-GPRS2 on but log stopped
	OFF	Awaiting Boot
	SLOW FLASH (3 sec ON and 0.5 OFF)	Log on, normal operations
	MEDIUM FLASH (0.3 sec ON and 0.3 sec OFF)	Backup battery powered, log off
	FAST FLASH (0.2 sec ON and 0.2 sec OFF)	Battery charge low, shutting down.

GSM	SLOW FLASH (about 3 sec)	Registered on GSM/GPRS network
	FAST FLASHING (about 0.5 sec)	Searching GSM/GPRS network
DI1	ON	Digital Input FOUND
	OFF	NO digital input
DI2	ON	Digital Input FOUND
	OFF	NO digital input
DI3	ON	Digital Input FOUND
	OFF	NO digital input
DI4	ON	Digital Input FOUND
	OFF	NO digital input
SD/STS	FLASHING	Access to microSD card
485 ACT	FLASHING	Activity on RS485
ETH LNK	FLASHING	Connection on RJ45 on
ETH TRF	FLASHING	Packet transit on Ethernet port

3.2. Z-Logger leds



LED	STATUS	MEANING
DO1	ON	Digital output, relay energised
	OFF	Digital output, relay not energised
DO2	ON	Digital output, relay energised
	OFF	Digital output, relay not energised
PWR/ STS	ON	Z-LOGGER is on but the log is stopped
	OFF	Awaiting Boot
	SLOW FLASH (3 sec ON and 0.5 OFF)	Log on, normal operations
	MEDIUM FLASH (0.3 sec ON and 0.3 sec OFF)	Backup battery powered, log off
	FAST FLASH (0.2 sec ON and 0.2 sec OFF)	Battery charge low, shutting down.
DI1	ON	Digital Input FOUND
	OFF	NO digital input
DI2	ON	Digital Input FOUND
	OFF	NO digital input
DI3	ON	Digital Input FOUND
	OFF	NO digital input
DI4	ON	Digital Input FOUND
	OFF	NO digital input
SD/STS	FLASHING	Access to microSD card
485 ACT	FLASHING	Activity on RS485
ETH LNK	FLASHING	Connection on RJ45 on
ETH TRF	FLASHING	Packet transit on Ethernet port

For further information, see the Z-GPRS2/Z-logger installation manual available for free download at www.seneca.it in the Z-GPRS2 / Z-Logger section.

4. DEVICES OVERVIEW

Z-GPRS2/Z-Logger is equipped with 4 counters and 4 totalizers. Up to a maximum of 30 Hz signals can be acquired, 4 digital inputs, 2 analog inputs and 2 relay digital outputs.

Z-GPRS2 I/O and remote Modbus RTU or Modbus TCP-IP registers can be logged and sent as a file in csv format (comma separated values, microsoft excel™ compatible) via ftp or email and saved on microSD. Z-GPRS2 can also send the last row of the log file via SMS.

Up to 11774 log rows can be saved in the internal flash memory (not to be confused with the microSD card), If all 100 TAG modbus is activated 2943 log rows can be saved on internal flash. At the end of available space, Z-GPRS2/Z-Logger overwrites the oldest rows in the memory. Counter/totalizer inputs and analog inputs can be scaled. The scaled values will be saved in the log.

4 different alarm thresholds are available for each of the two analog inputs.

An SMS (only for Z-GPRS2) or EMAIL can be sent with a settable text when this alarm trips (max 31 characters). An Http post to a server can be also used (only with GPRS connection).

Other types of alarms concern counters, totalizers, digital input increases, power outage, plumbing leaks and the hour counter in addition to other alarms that depend on the type of application.

Timers and calendar timers are available to run cyclic or acyclic actions.

Z-GPRS2 recognises and runs a series of commands also via SMS. A set of "FAST" commands can also be set. These commands can be linked to the text in SMS 0, 1 up to 15.

Z-GPRS2/Z-LOGGER can send log files via FTP, via E-MAIL or via http post (only with GPRS connection). These files can also be saved on microSD or microSDHC.

All configurations are possible via the SEAL software, available for free download at www.seneca.it in the download or Z-GPRS2-SEAL / Z-LOGGER-SEAL section.

Z-GPRS2 and Z-Logger includes an address book used to send alarms or logs.

Some typical applications such as string current control on photovoltaic systems, etc. can also be managed.

A system file (syslog) with events, alarms, errors and commands received can also be logged. Every Monday at 00:00 the actual syslog is resetted but first the file is renamed for backup purpose into the microSD.

5. SWITCH ON, SWITCH OFF AND FORCED SWITCH OFF OF Z-GPRS2/Z-LOGGER

Z-GPRS2 and Z- Logger are equipped with back-up batteries to perform programmable actions in case of blackout.

Switch ON Z-GPRS2/Z-logger :

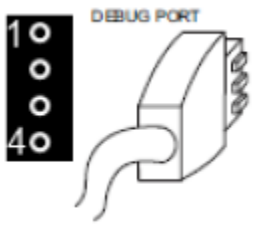
1) Supply power to Z-GPRS2/Z-Logger via screw terminal or via BUS IDC10
2) If you need it, connect the USB port to a PC

Switch OFF Z-GPRS2/Z-logger :

1) Unplug the USB port
2) Unplug the Power supply (from terminal or from BUS IDC10)
3) The board performs the planned operations in the event of a blackout and then shuts down automatically. The procedure can take from 5 seconds to a maximum of 10 minutes.
For more information about the backup batteries , refer to the batteries chapter.

Forced the Switch OFF of Z-GPRS2/Z-logger :

To obtain a fast forced shutdown of Z-GPRS2/Z-Logger, short pins 1 and 4 of the debug port (for example with a screwdriver or a piece of cable).
The operation turn off the device immediately without waiting for the execution of any action programmed in the event of a blackout.



WARNING!
THE FORCED SWITCH OFF PROCEDURE COULD CORRUPT THE MICROSD IF THE DEVICE WAS WRITING ON IT. TO AVOID MICROSD DATA CORRUPTION BEFORE THIS PROCEDURE UNMOUNT THE MICORSD WITH THE SEAL SOFTWARE.

WARNING!
THE FORCED SHUT DOWN PROCEDURE CAN SEND ALL THE LOG INTO THE INTERNAL FLASH AT SWITCH ON.

6. SUPPORTED SIM CARDS (Z-GPRS2 ONLY)

Z-GPRS2 supports 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 Z-GPRS2 receive a ring an action can be made.

For "top-up" SIM CARDS Z-GPRS2 can manage residual credit requesting the amount from the telephone service provider.

CAUTION!

-Before inserting the SIM CARD in Z-GPRS2, CANCEL ALL MESSAGES ON THE CARD USING A MOBILE PHONE.

-Before inserting the SIM CARD in Z-GPRS2, CANCEL ALL ADDRESS BOOK CONTACTS ON THE CARD USING A MOBILE PHONE.

-UMTS SIM CARDS are NOT supported.

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

7. GSM SIGNAL (Z-GPRS2 ONLY)

The Z-GPRS2 GSM signal level can be found via SEAL software (in the “test“ section).

To view the GSM signal level, the SIM CARD supplied by the telephone service provider to be used must be inserted (signal may change radically based on the selected provider).

The 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 the 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 = SUFFICIENT 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 for Z-GPRS2 to reach the minimum signal level in most situations.

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

CAUTION!

-Insert the SIM card only with Z-GPRS2 off.

-Before inserting the SIM card in Z-GPRS2, 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 Z-GPRS2 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-GPRS2.

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

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

-For GPRS 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 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.

-Check the data quantity sent via GPRS and SMS before using Z-GPRS2.

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 GPRS transaction.

8. BACKUP BATTERY

Z-GPRS2 / Z-Logger are equipped with rechargeable battery. In the event of a blackout, the card runs the following algorithm:

1) Ends sending data
2) Sends any alarms tied to the blackout
3) Runs any actions tied to the blackout
4) Closes all files opened on microSD
5) The card turns off

If data is not being sent, Z-GPRS2/Z-logger take between 5 and 10 seconds to turn off in the event of blackout.

CAUTION!

Z-GPRS2/Z-LOGGER IS SUPPLIED WITHOUT CHARGED BATTERIES. CHARGE THE BATTERIES BY CHARGING Z-GPRS2/Z-LOGGER FOR AT LEAST 48H BEFORE USE.

WHEN Z-GPRS2/Z-LOGGER IS BATTERY POWERED, THE DIGITAL INPUTS STOP WORKING. THEY MUST BE EXTERNALLY POWERED TO CONTINUE THEIR OPERATIONS IN THE EVENT OF BLACKOUT.

ANALOG INPUTS AND DIGITAL OUTPUTS, ON THE OTHER HAND, CONTINUE TO OPERATE NORMALLY UNTIL THE CARD TURNS OFF.

9. USB DRIVER INSTALLATION ON MICROSOFT WINDOWS™ OPERATING SYSTEMS

To set up the Seneca Z-GPRS2 and Z-Logger devices, use SEAL software.

Both software packages are free for download at www.seneca.it.

The setup software also includes drivers for connection on USB.

CAUTION!

For the first installation only, before connecting Z-GPRS2 or Z-Logger to the USB port, make sure that SEAL software is installed.

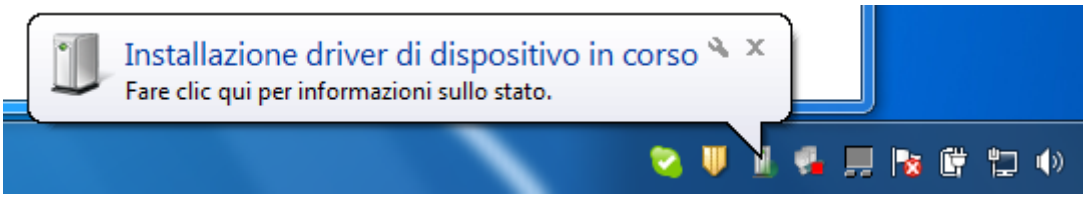
9.1. Installing the USB driver on Windows XP™, Windows Vista™ , Windows 7™, Windows 8™ and Windows 8.1™

1) Install SEAL on a PC

2) When finished, confirm driver installation by clicking "Install driver software":

When the driver is installed the system is ready for connection with Z-GPRS2/Z-Logger.

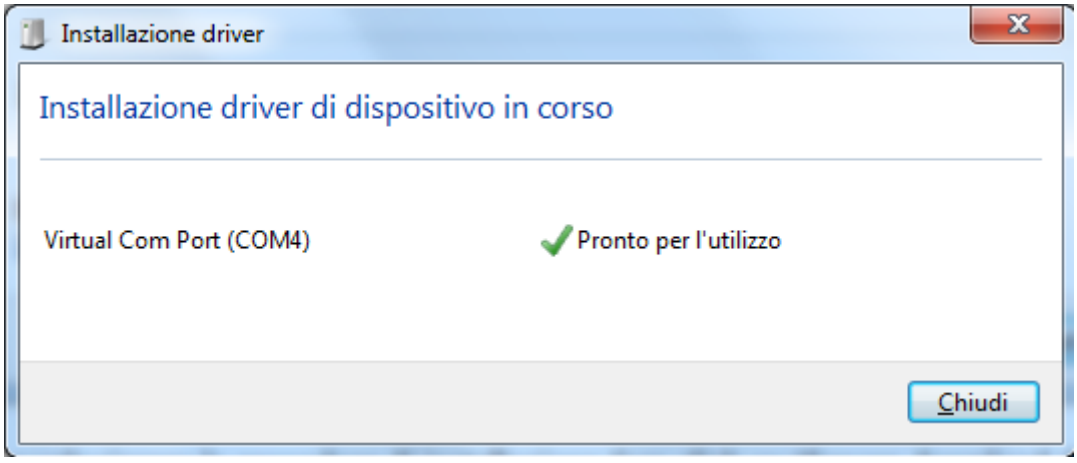
3) When finished, connect Z-GPRS2 or Z-Logger to a PC using a miniUSB cable (see chapter)



Click on the device driver installation icon

4) The PC searches for the driver

For faster installation, click "Ignore driver download from Windows Update" (otherwise the operation may take over 5 minutes).



5) ***MiniUSB connection can now be used***

10. SEAL (SEneca Advanced Language)

Seal is a programming environment for Z-GPRS2/Z-Logger SEAL version, there is also a “Easy” version of Z-GPRS2/Z-Logger for more information refear to www.seneca.it website.

CAUTION!

For a full support of SEAL the microSD card must be inserted!

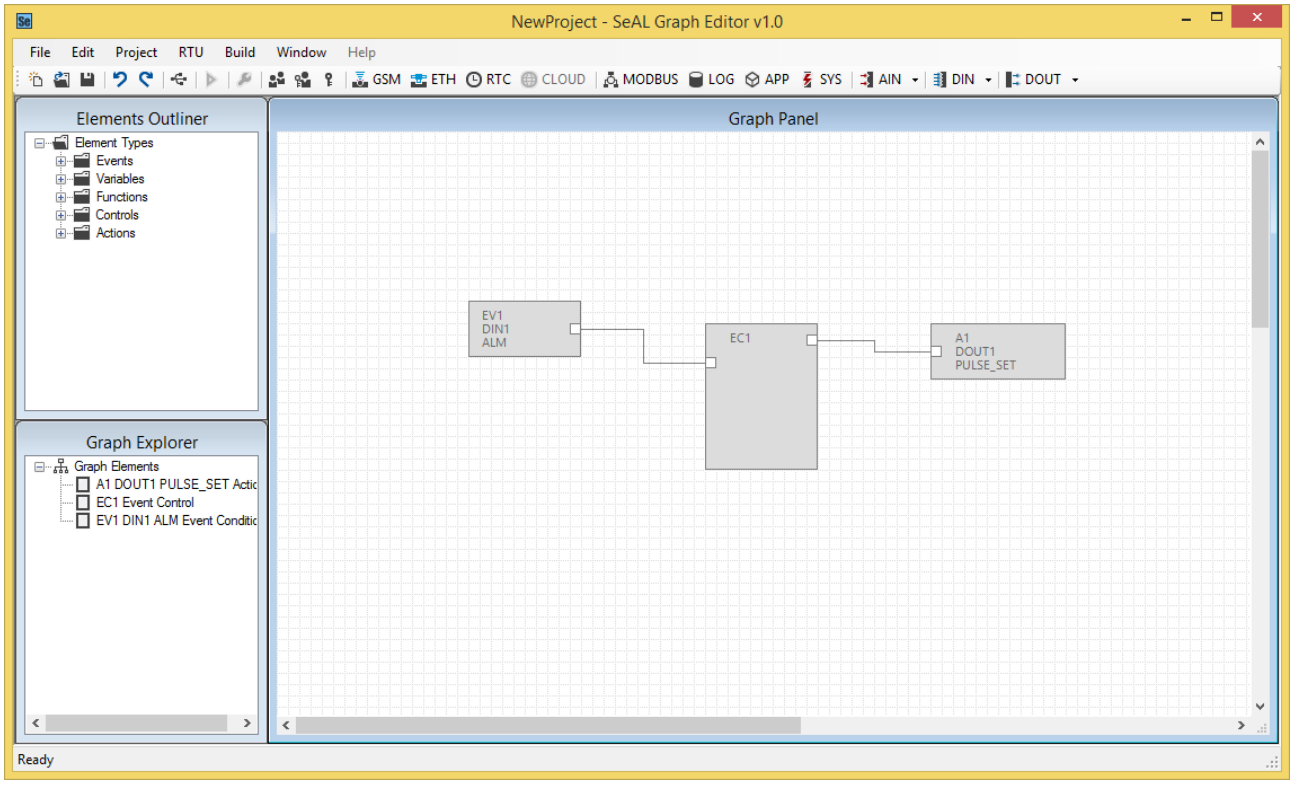
10.1. SEAL Overview

The Seal interface is composed by 3 windows:

The element outliner window

The graph explorer window

The Graph Panel window



The Element Outliner window contains the database of blocks that are used into the Graph Panel window to build a program.

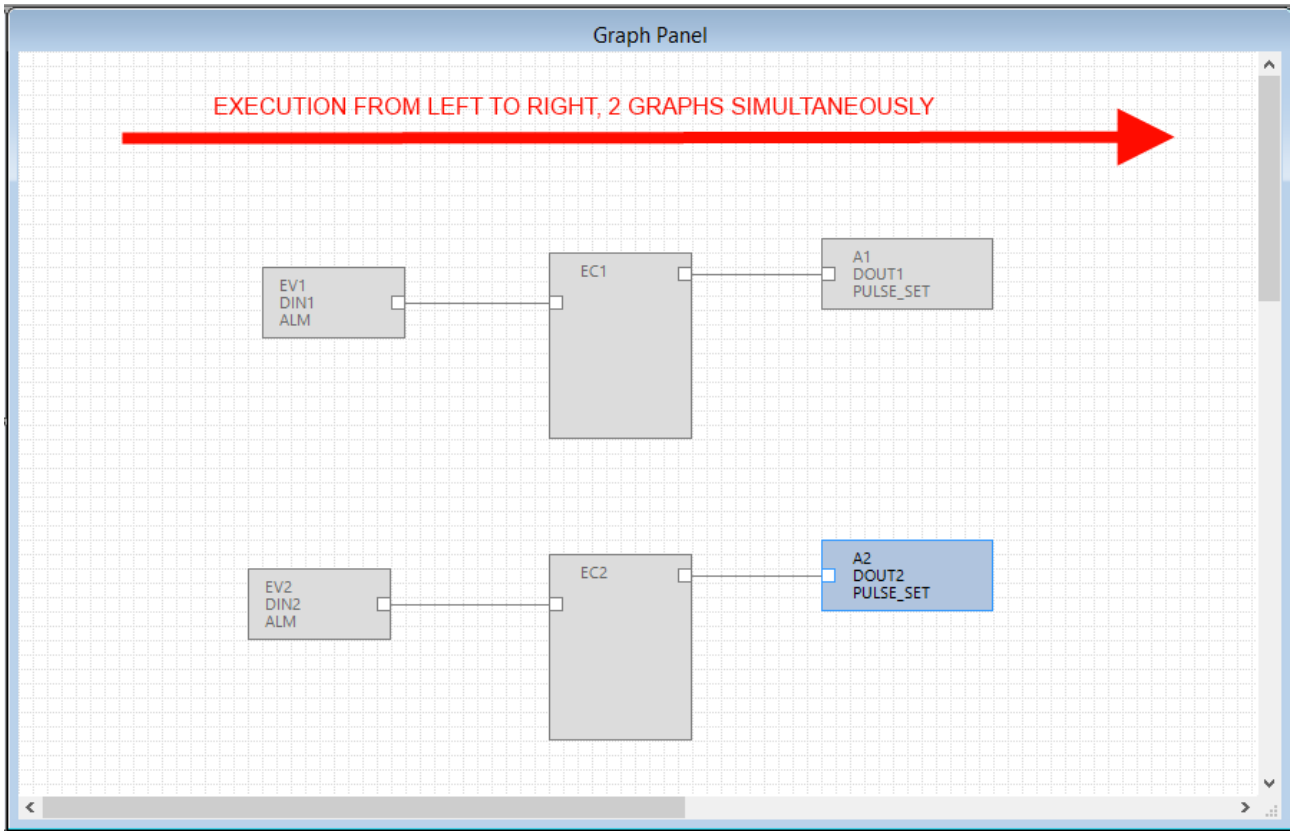
Into SEAL, ***a program is a set of connected blocks that do actions***.

The Graph Explorer contain object linked to the blocks that are in the Graph Panel. The graph explorer can be used to select the blocks without search in the Graph Panel.

The Graph Panel is the heart of SEAL, in this window users can build the ***program*** by drag and drop blocks from the element outliner window to the Graph Panel window.

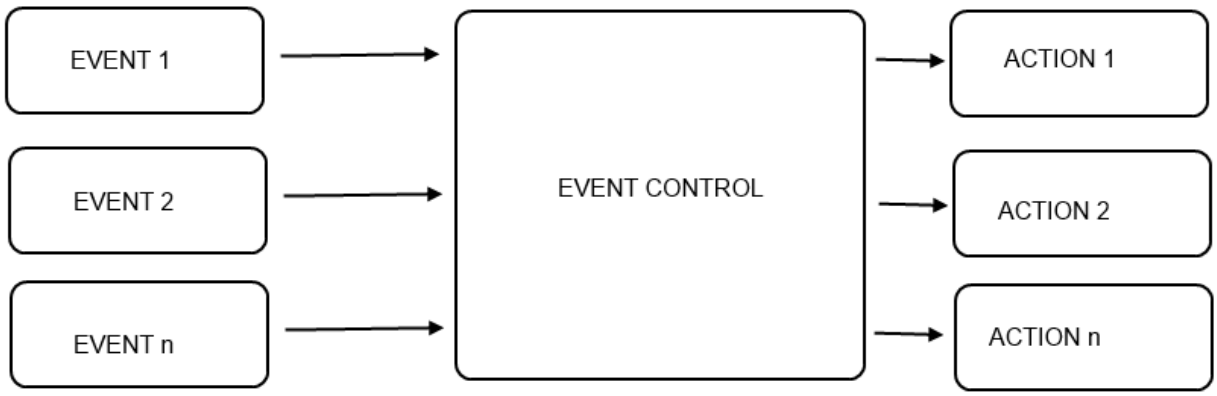
10.2. Program Execution in the Graph Panel

The execution of the program is from left to right, if there is more than one graph all the lines are executed simultaneously:



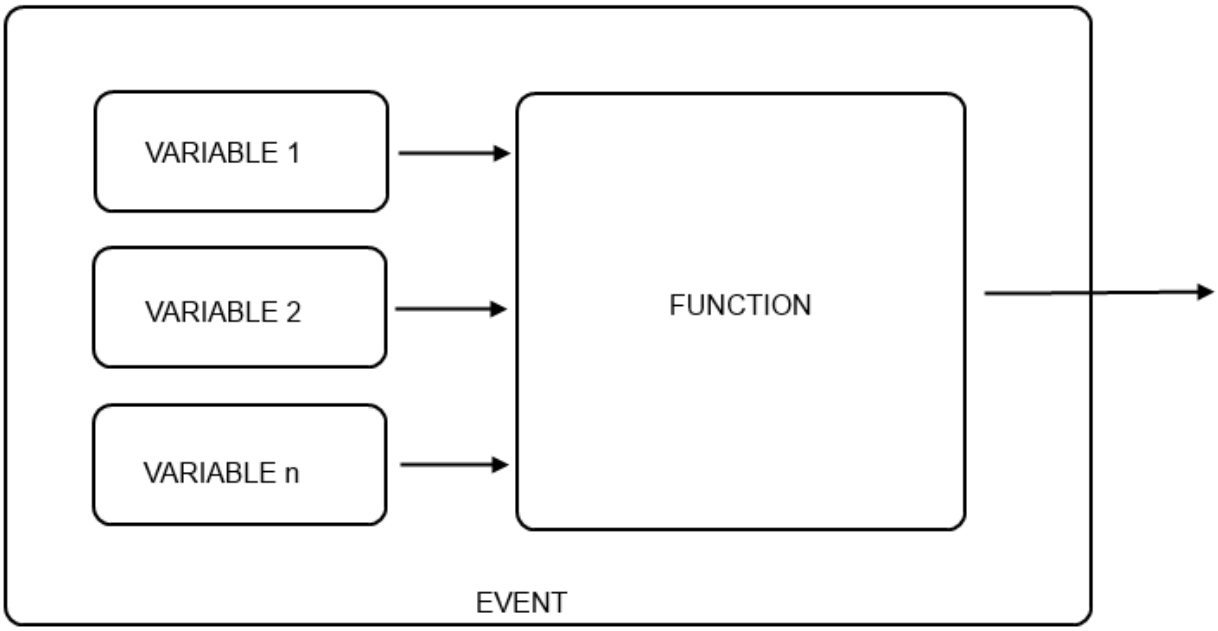
10.3. How SEAL works

SEAL works with the “from event to action” approach, this image will explain the concept:

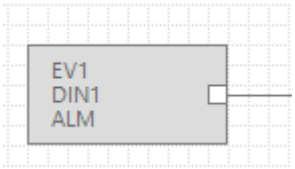


One or more ***events*** must be connected to an ***event control***, this block performs the logic and select the right ***action*** output.

An Event can be created by a single block (for example a Digital input event) or by more than one blocks using variables and functions:

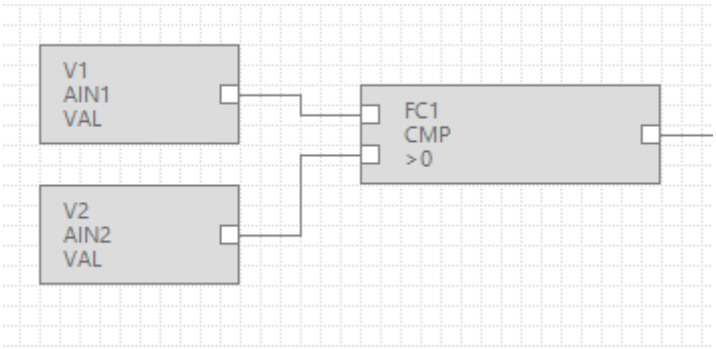


In SEAL a single event block is for example a Digital input alarm event:



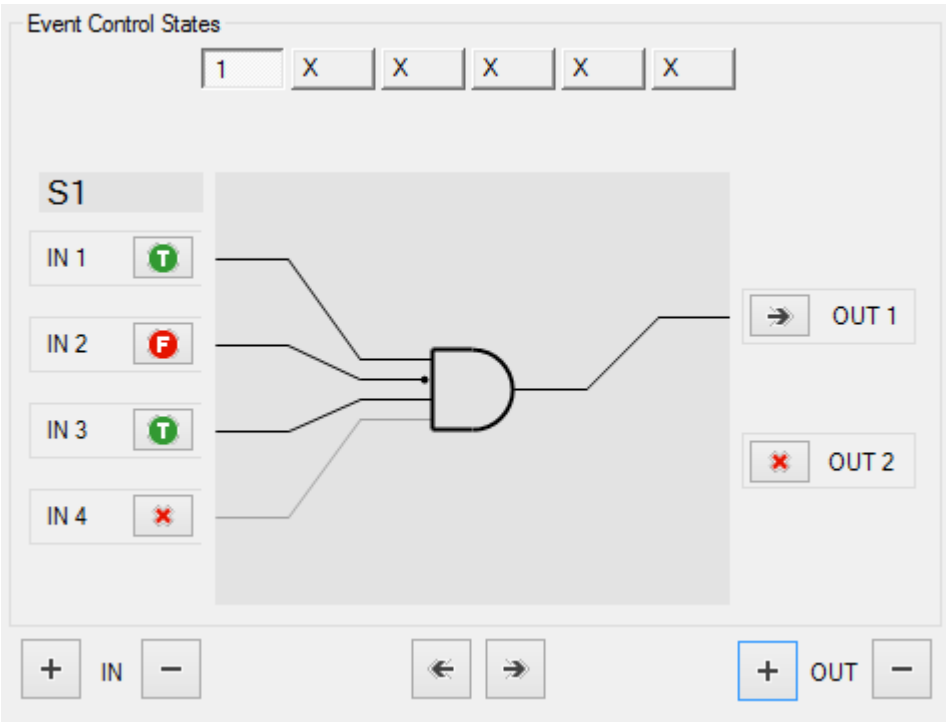
Where the event output becomes True if for example the digital input is high.

A multi-blocks event can be (Analog IN1-Analog IN2) > 0:



In the example the event output becomes True if Analog Input 1 > Analog Input 2.

The ***Event Control*** select the right output action if the input conditions are verified:

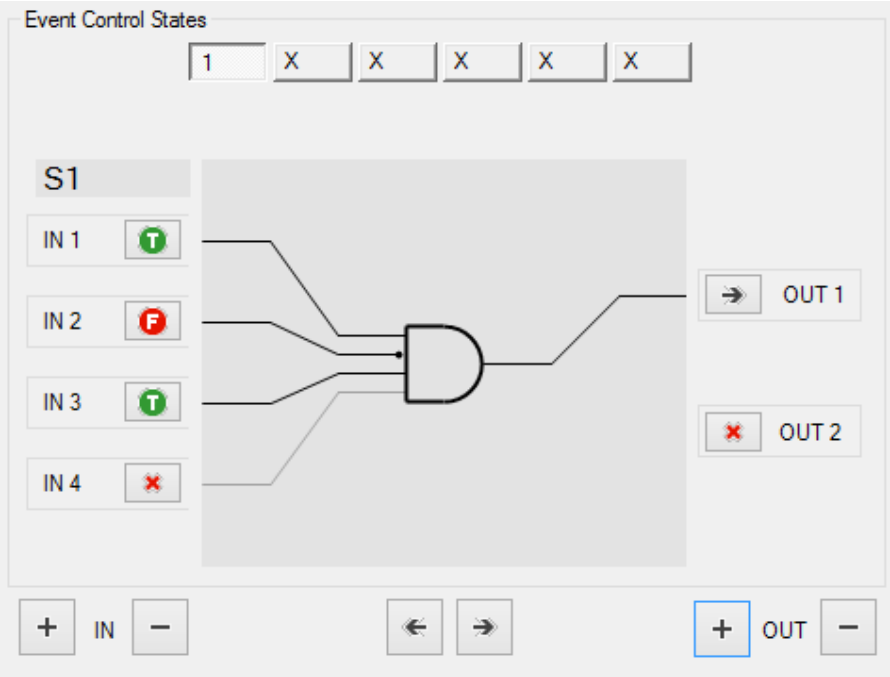


In this example if IN1=True, IN2=False and IN3=True, the Action connected to the OUT1 is executed.

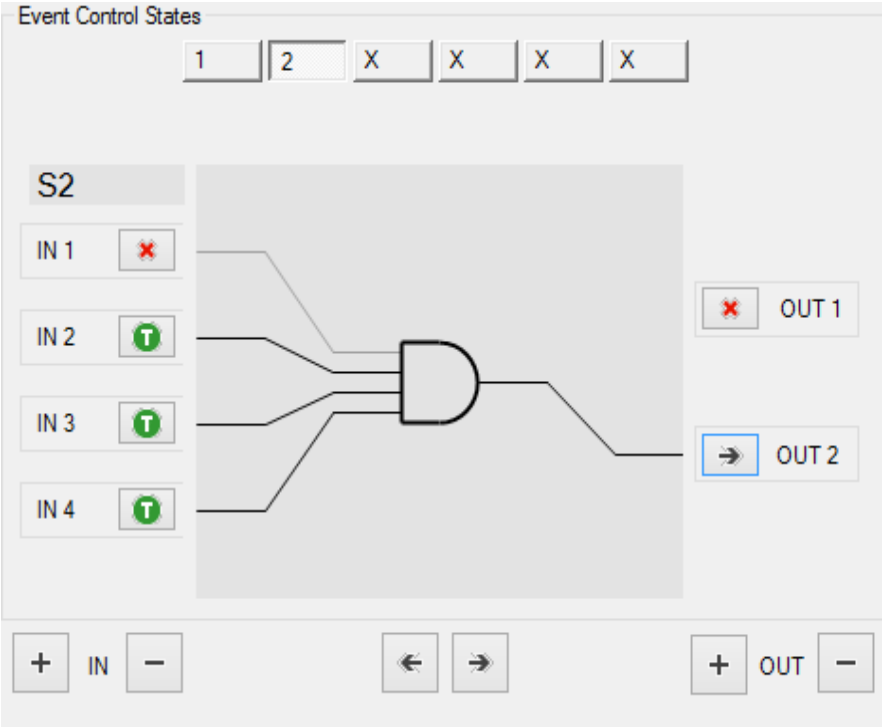
Every Event Control block can evaluate a maximum of 6 inputs and 6 outputs.

Every Event Control block can route up to 6 different input-output routes:

Route 1:



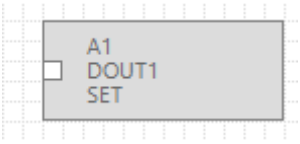
Route 2:



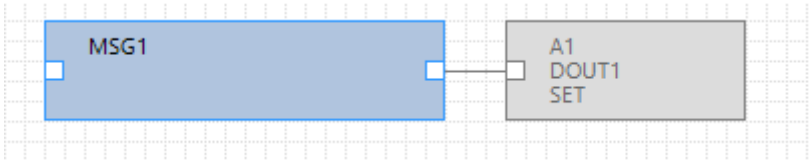
Etc…

Actions can be performed for example on the digital ouputs or on the Modbus, for example:

A “Set Output 1” action block:



Or can be a multiple block action, for example send a message and set dout1:



11. The SEAL menu bar

The SEAL menu bar is composed by the following items:

File

Edit

Project

RTU

Build

Window

Help

11.1. Menu File

New will create a new SEAL project.

Load will open an existing project from a “.seal” file.

Save will save the current project to a “.seal” file.

Save as will create a copy of the current to project to a new file.

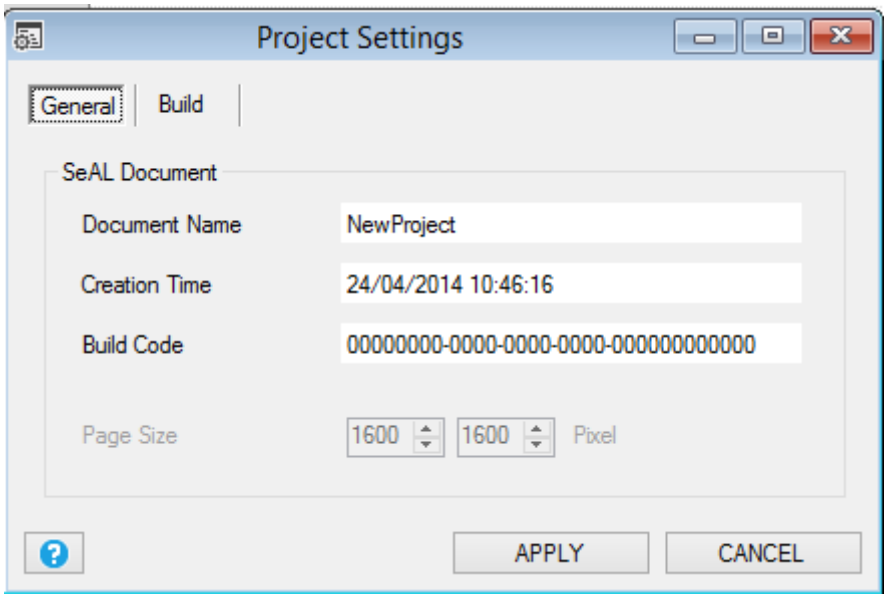
Quit will quit from SEAL.

11.2. Menu Edit

Undo This undoes the most recent action in the Graph Panel
Redo This redoes the most recent action that you've undone in the Graph Panel, if any.

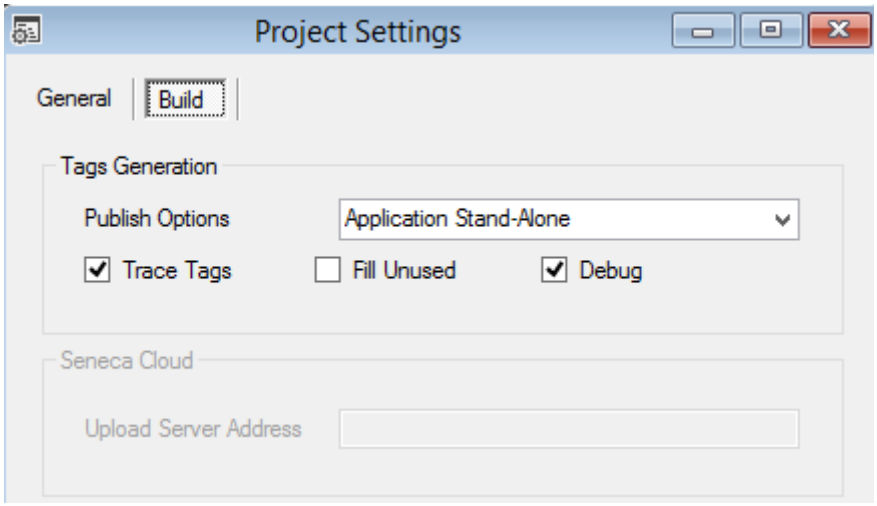
11.3. Menu Project Project Settings

General



Reports the information related the actual settings.

Build



Publish Options: Select how SEAL must compile the project, consider that:

1) The Configuration contains only the connection parameters
2) The Program contains all the SEAL program but not the connection parameters (so if you send to a remote RTU there is no possibility to put the RTU offline by a configuration error)
3) The Application contains the configuration and the program.

select from:

Application Stand-Alone: Create a compiled project with connection configuration and program (create all).

Program Stand-Alone: Create a compiled project with only program.

Cloud Application (Configuration+Program): For future use.

Cloud Program: For future use.

Cloud Application: For future use.

Tarce Tags: If checked show in the Log window the compiled values

Fill unused: If checked compile all the registers (also not used), if not checked compile only the used registers (so the "sent to RTU" phase is faster).

Debug: If checked enable the advanced debug tools.

11.4. Groups, Profiles and Users

The RTU Z-Gprs2 and Z-Logger have an advanced user access management.

The main idea is that an user can have or not the following capabilities:

1) Send SMS commands to the RTU.
2) Receive SMS/E-mail with a notification log.
3) Receive SMS/E-mail of a specific notification alert.
4) Receive SMS/E-mail of all the notification alerts.

These capabilities are represented by a User Group or by one Special User Profile (administrator).
There are 3 default user groups with the following capabilities:

Default User Groups	***Capability 1)***	***Capability 2)***	***Capability 3)***	***Capability 4)***
Manager	Yes	No	No	No
Logs	No	Yes	No	No

Alerts	No	No	Yes	No

There is also one default special user profiles (not a User Group) that has all the capabilities:

Default User Profiles	***Capability 1)***	***Capability 2)***	***Capability 3)***	***Capability 4)***
Administrator	Yes	Yes	Yes	Yes
Manager	Yes	No	No	No

For example we need to obtain this policy:

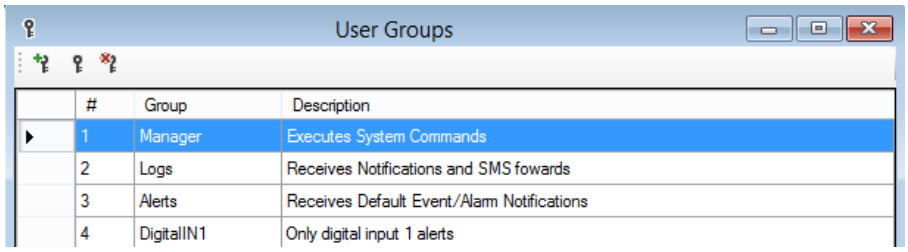
USER BETTY
Must receive the digital input 1 SMS notification alerts
Must receive the E-mail log notifications

USER BILL
Must send SMS commands
Must receive the digital input 2 SMS notification alerts

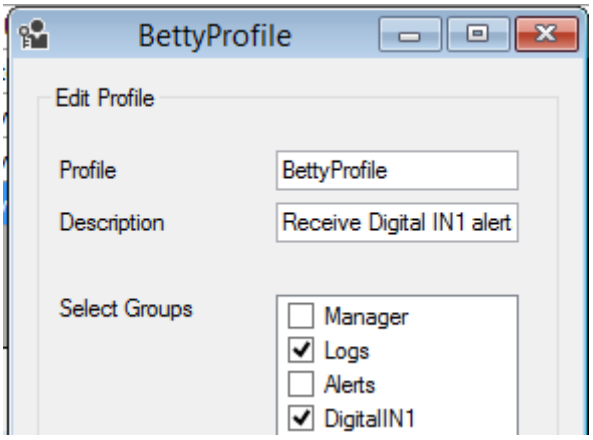
USER PAUL
Must receive the E-mail log notifications

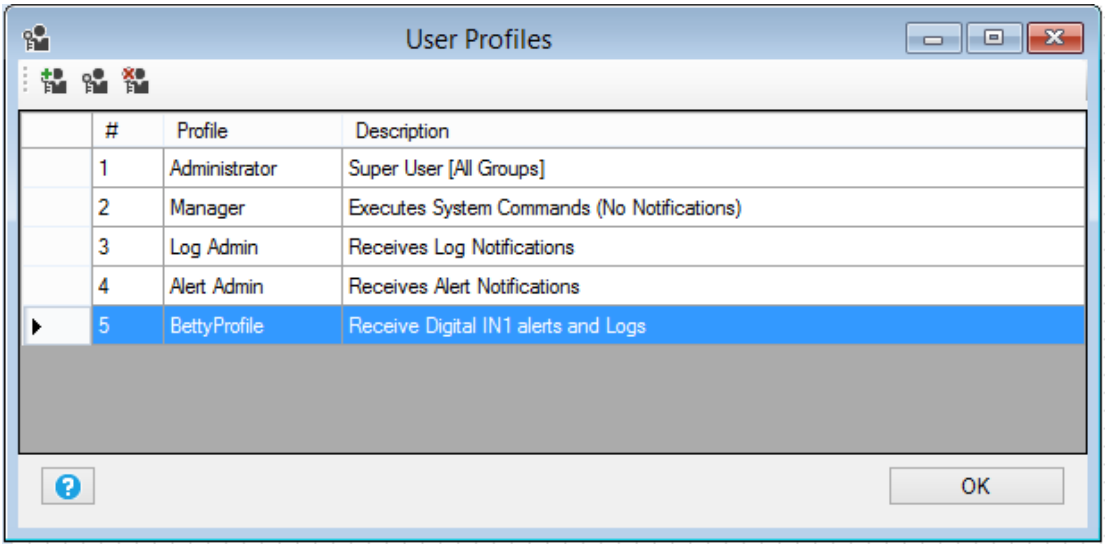
USER ANTONY
Must send SMS commands
Must receive all the SMS notification alerts
Must receive the E-mail log notifications

Betty must receive only the digital input 1 SMS notification alerts so we need to create a custom group (DigitalIN1):

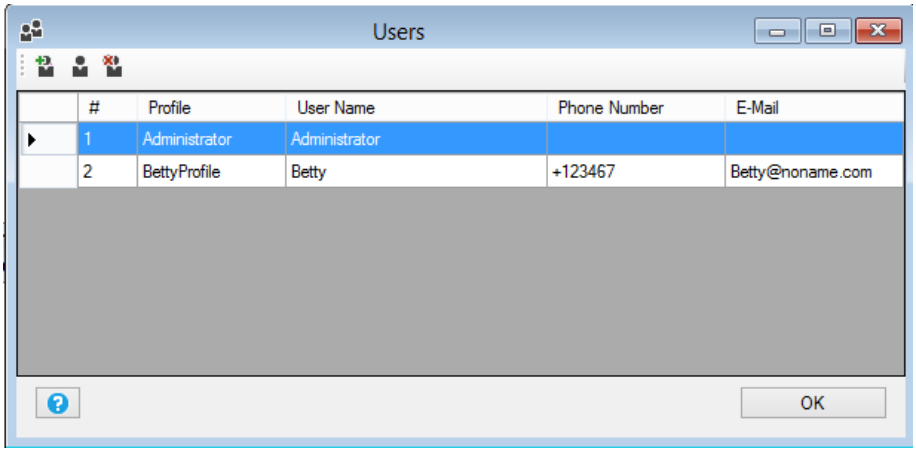


Now we need to create a new user profile (BettyProfile) that include the custom group DigitalIN1 and the Logs group:

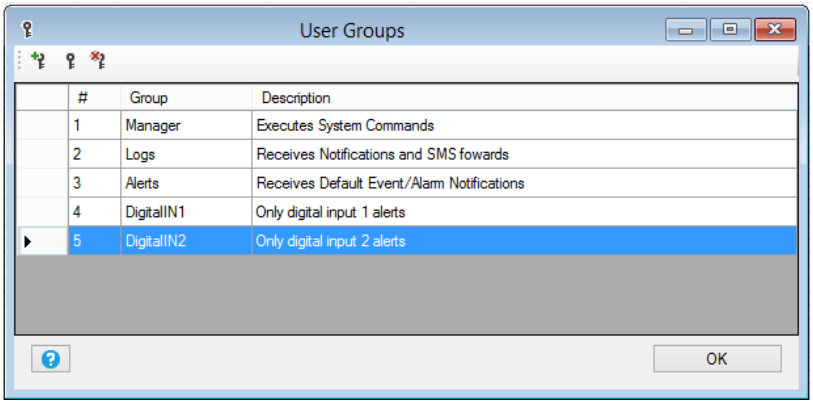




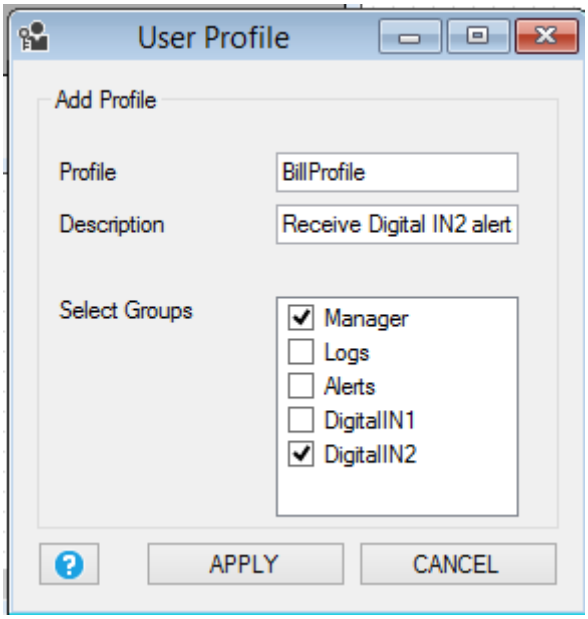
And then we add the Betty user with the new BettyProfile:

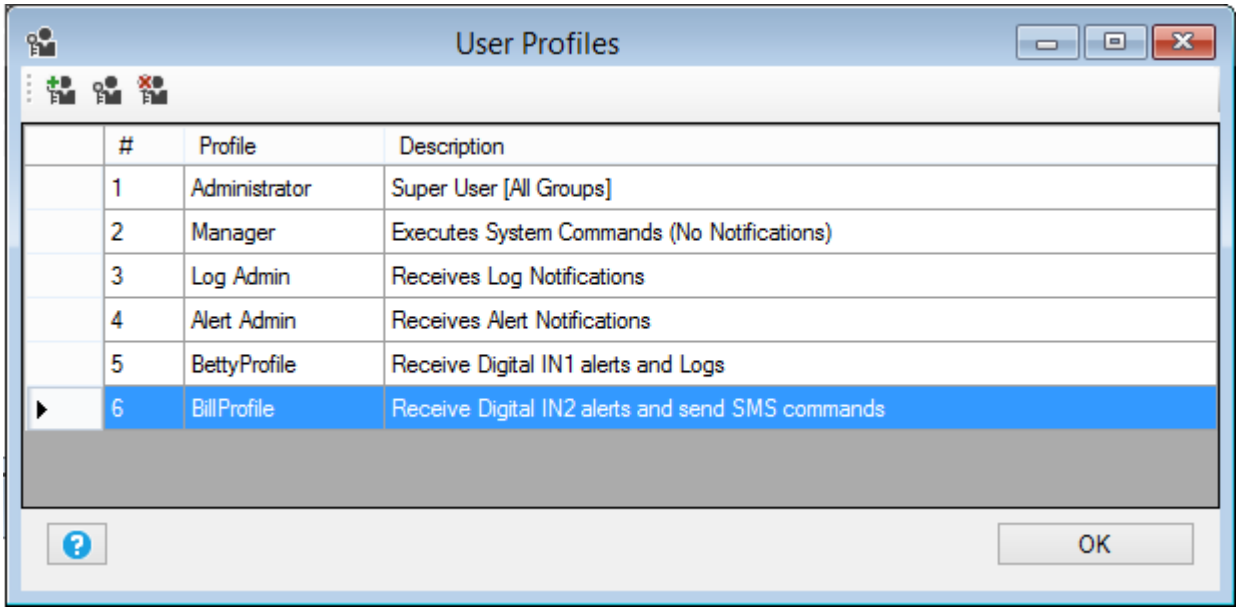


Bill must send SMS commands so must include the group manager, must also receive digital input 2 alerts so we need to create a custom group (DigitalIN2):

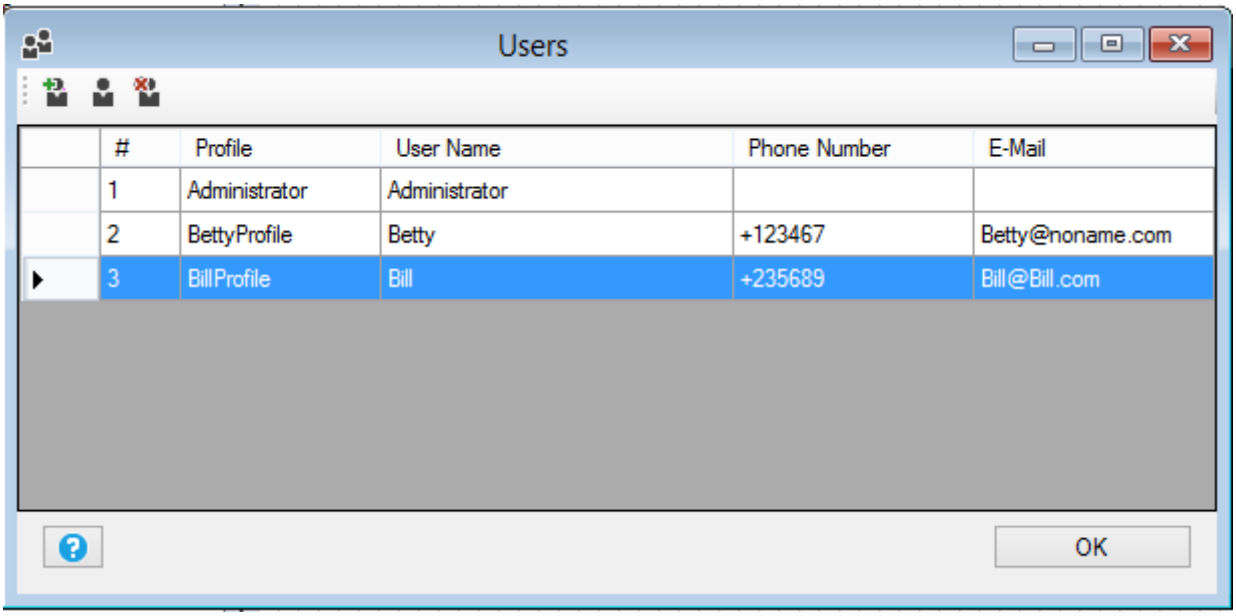


So we must create the custom User Profile (BillProfile):

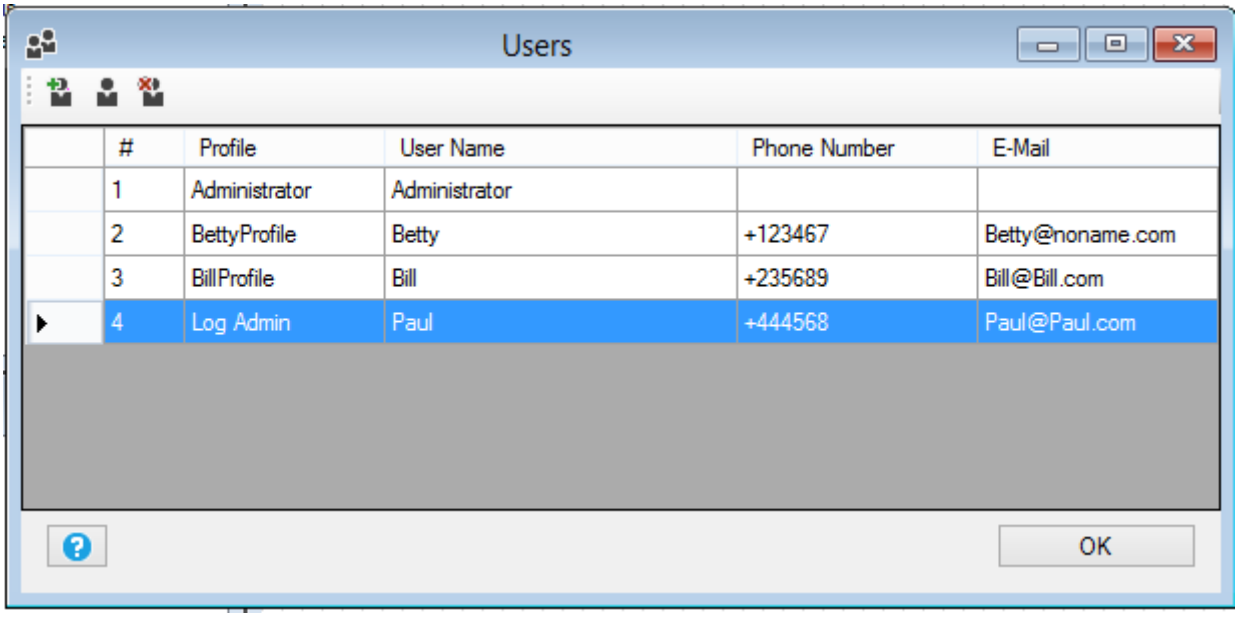




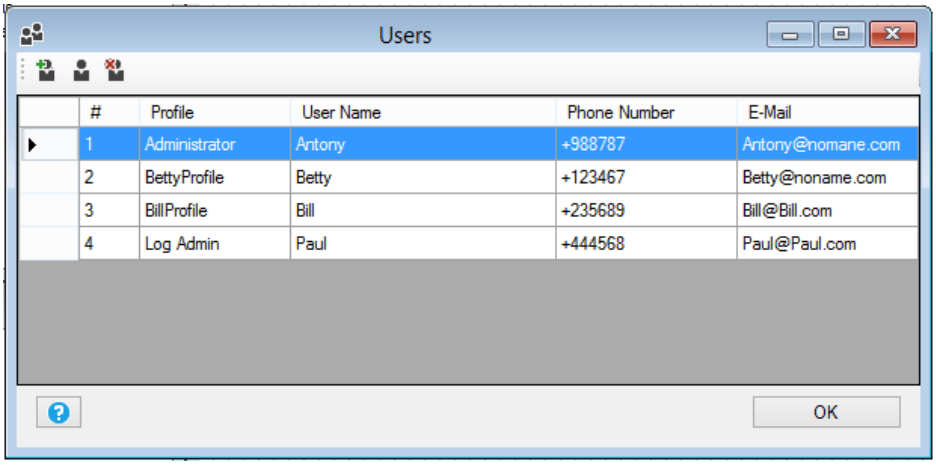
And then we add the Bill user with the new BillProfile:



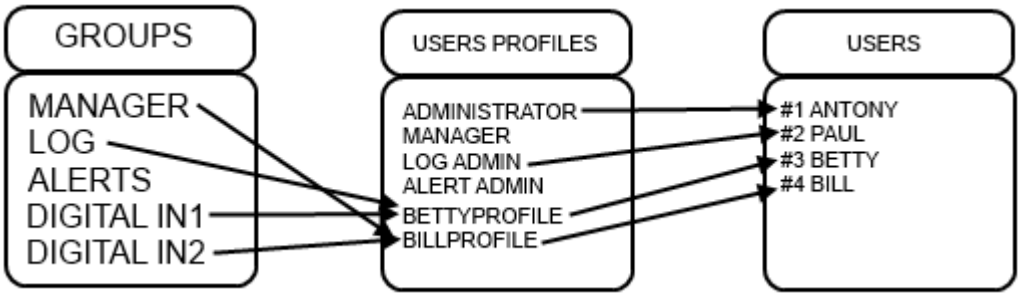
Paul must receive only log notifications so he must directly use the default log admin user profile:



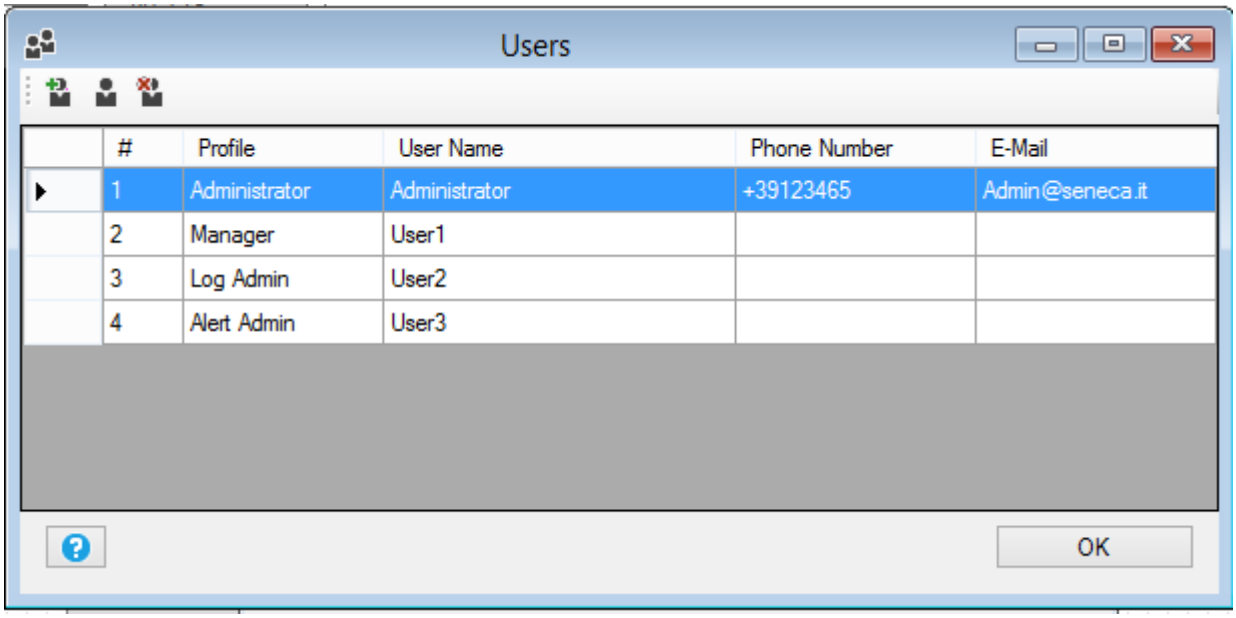
Antony must use the Administrator special user profile because he must receive all the SMS notification alerts. So we modify the Administrator Profile:



The relations are summarized here:



11.5. Menu Project: Users



Z-GPRS2/Z-Logger SEAL can manage a Phone numbers and E-mails address book.

The maximum numbers of Users is 8 (note that an extended address book is also available for the “ring command” action, this extended address book support up to 1000 different users).

For create a new user use the icon, for delete a user use the icon.

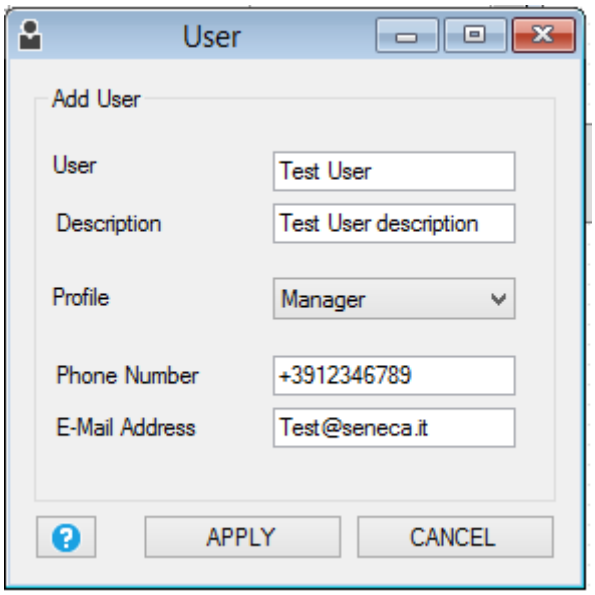
For modify a user configuration use the icon.

CAUTION!

Commands SMS or call from user that are not present into the users phonebook have no effect. It’s also possible to configure the Z-GPRS2 SEAL to resend this SMS to the Administrator profile.

11.6. Menu Project: User – Add User

The icons and will open the following window:



User is the User description name

Description is a text description for the user

Profile Select the profile to assign to the user, you can select the profiles Admin, Manager, Log Admin, Alert Admin or a custom profile.

Phone number if the RTU have a modem GSM/GPRS this is the user telephone number (used for calls or SMS)

E-MAIL address this is the user E-MAIL address (used for alert notifications or/and log notifications)

11.7. Menu Project: User Groups

There are 3 default user group with the following capabilities:

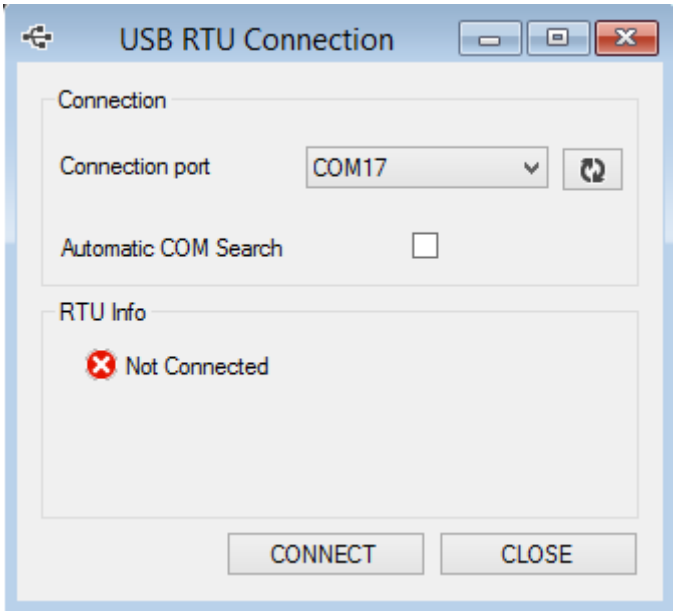
Default User Groups	***Can send SMS commands***	***Can receive log notifications***	***Can receive specific alert notifications***
Manager	Yes	No	No
Logs	No	Yes	No

Alerts	No	No	Yes

Also custom user groups can be created (but the capabilities that they have are only the specific alert notifications.

A user profile must include at least one group, the user capabilities are determinate by the user groups that are present in his user profile.

11.8. Menu RTU: Connection



Connection port is the serial port connected to the PC, select the right Z-GPRS2/Z-logger virtual com port, note that you must first connect the Z-GPRS2/Z-Logger and then after.

Press the icon to refresh the serial ports after a connection.

Automatic COM Search performs an automatic search for Z-GPRS2/Z-Logger on all the attached serial COM.

Rtu info Displays the information about the RTU name, firmware version, MAC address, Modem IMEI address and Application identification code.

Connect Starts for searching Z-GPRS2/Z-Logger.

Close Close the window.

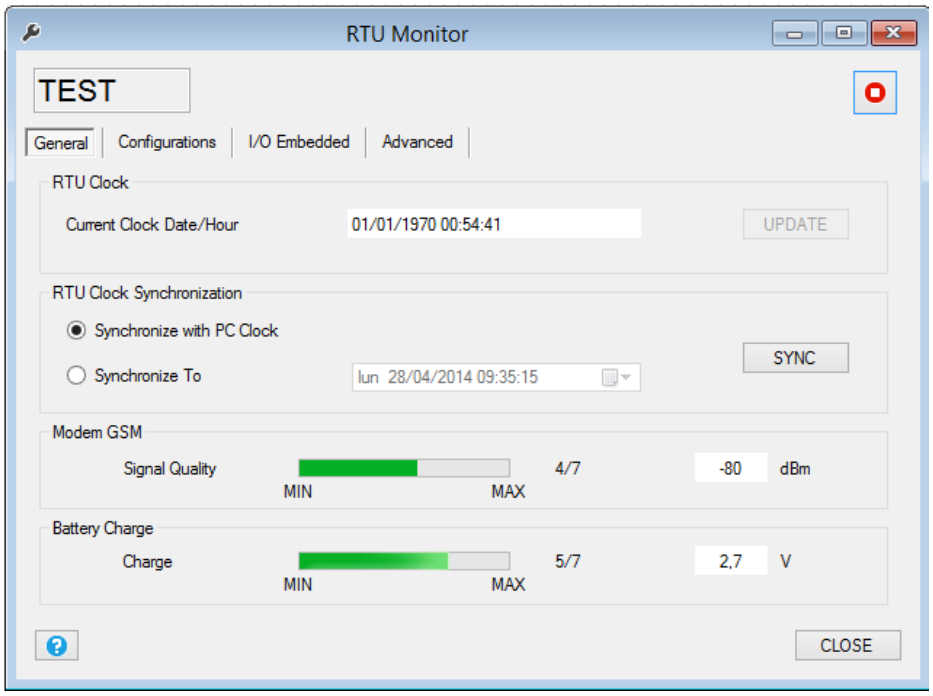
11.9. Menu RTU Test Monitor

To start the real time data viewer you must be connect with the Z-GPRS2/Z-Logger and press the play button.

Press the stop button to stop acquiring real time data.

Now you can view real time data.

General



RTU Clock will show the actual RTU time/data.

RTU Clock Synchronization is used for synchronize the clock with the PC clock or to a custom time/data. Press the "SYNC" button to start the synchronization process.

Modem GSM will show the actual GSM/GPRS signal quality filed. The 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 the maximum.

For correct ftp or email log operations the minimum required field level is 2/7 (please remember that the 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 = SUFFICIENT 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

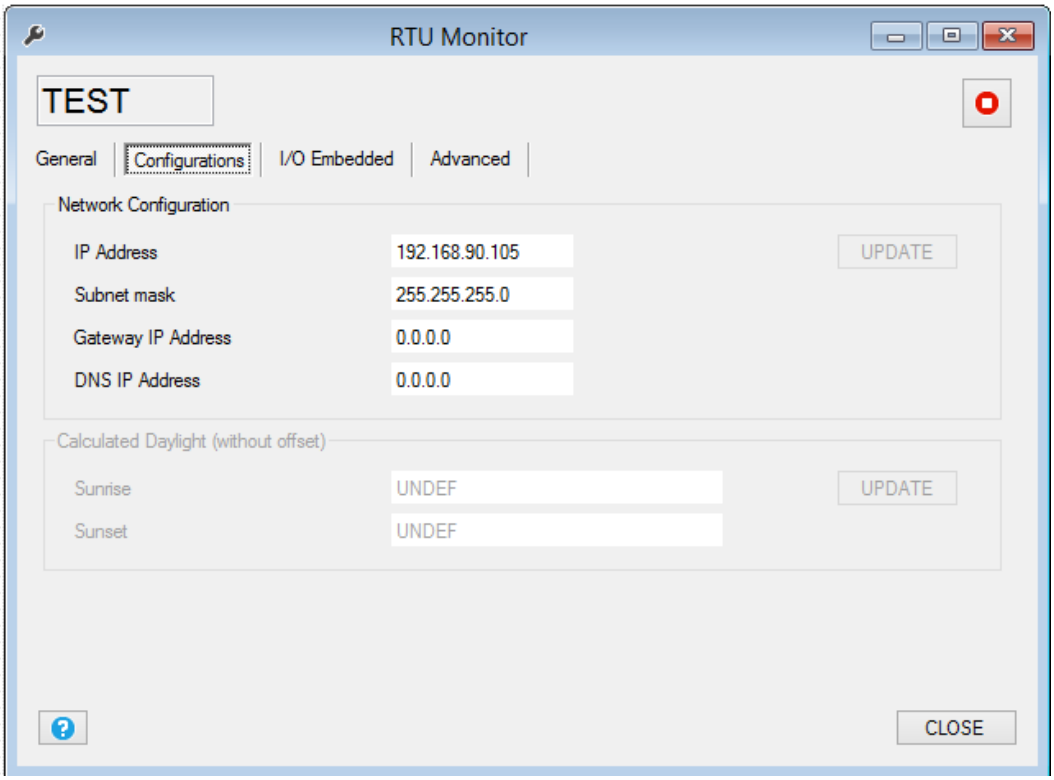
SIGNAL LEVEL 7 = EXCELLENT SIGNAL

To increase the GSM signal level, Seneca provides various GSM antenna models for Z-GPRS2 to reach the minimum signal level in most situations.

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

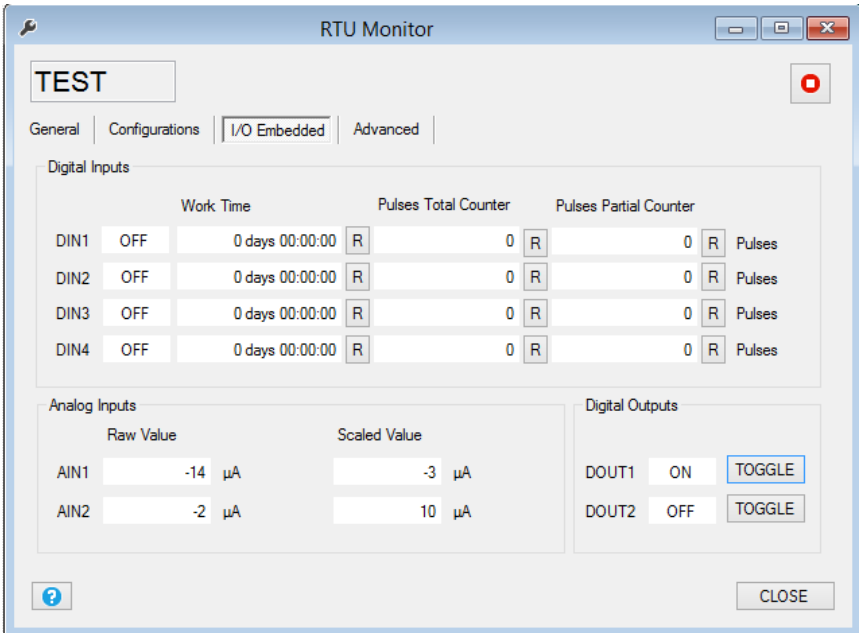
Battery Charge will show the actual battery charge, if the value it's below 2/7 you must wait at least 24h for a full recharge before use Z-GPRS2/Z-Logger power backup.

Configurations



In this section you can see the IP Address configuration and the Calculated Sunrise and Sunset time (if they are configured).

I/O embedded

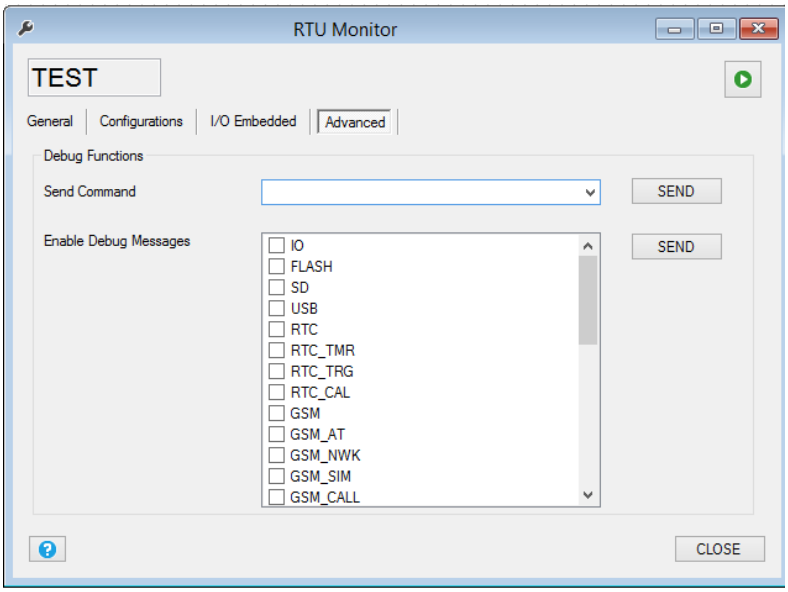


Digital Inputs show the Digital input state ON/OFF, the work time input. Also are presents the Total and Partial counters (raw values not scaled).

Analog Inputs show the Raw and the scaled Analog input 1 and 2 values.

Digital Outputs show the digital out 1 and 2 actual value, you can force a digital ouput value using the “Toggle” button.

Advanced



The advanced section can be used for send commands to the RTU, the commands are:

Reset RTU : perform a RTU reset.

Unmount SD: when the microSD card is unmounted can be extracted and insert to an external reader.

Stop log: the logger will be stopped.

Start log: the logger will start.

Dump Logs to SD: will copy all data in the internal flash memory to the microSD.

Reset Logs: will erase all the internal flash memory logs.

Send TEST Email Message: will send a test e-mail to the administrators.

Send TEST FTP File: will send a test file to the configured FTP and directory.

Restart Modem GSM: will reset the GSM modem.

Stop Master Modbus: will stop to acquire data log from Modbus RTU / Modbus TCP-IP

Start Master Modbus: will restart to acquire data log from Modbus RTU / Modbus TCP-IP

Firmware Download from FTP Server: will download and then update the actual firmware from the configured FTP server and directory, if the firmware revision is the same in use, the firmware update will not be executed. Note that a firmware update can delate the actual configuration, at startup the firmware will search for a new setup file. The firmware file name must be “fwupdt.bin”, the setup file must be “fwupdt.tag”.

Setup Download from FTP Server: will force to download and use the SEAL configuration and program that are to be used with a firmware update. The Setup configuration for security reason don't contain the connection parameters (use the Application file for a full configuration). The setup file must be "setup.tag".

Application Download from FTP Server: will force to download and use a full SEAL configuration and program. the setup file must be "setup.tag".

Phonebook Download from FTP Server: will force to update the extended ring action address book. Use the "convert phonebook csv" item from the RTU menu for convert an address book csv file. The file name must be "data.bin".

Firmware Update from SD: will force to update the firmware from the microSD card root. The file name must be "fw.bin"

Setup Update from SD: will force to use the SEAL configuration and program to be used with a firmware update that is in the microSD root. The Setup configuration for security reason don't contain the connection parameters (use the Application file for a full configuration). The setup file must be "setup.tag".

Application Update from SD: will force to use the SEAL configuration and program to be used with a firmware update that is in the microSD root. The Setup configuration for security reason don't contain the connection parameters (use the Application file for a full configuration). The setup file must be "setup.tag".

Phonebook Update from SD: will force to update the extended ring action address book that is in the microSD root. Use the "convert phonebook csv" item from the RTU menu for convert an address book csv file. The file name must be "data.bin".

Test RING: will force a ring call to the first administrator.

Test Fast Command: will execute the selected fast command.

***Enable Debug Messages*:** is used for activate the Debug serial port, selecting what the port must outputs.

11.10. Menu RTU: FW Update

This item is used for update the firmware by the USB connection. Make sure that the file that you are using is a correct Z-GPRS2/Z-Logger .bin firmware.

Caution!

If you update the RTU with an error firmware the Z-GPRS2/Z-Logger will stop to work and they will be damaged! Seneca warranty don't cover the effects of an update by an error firmware file.

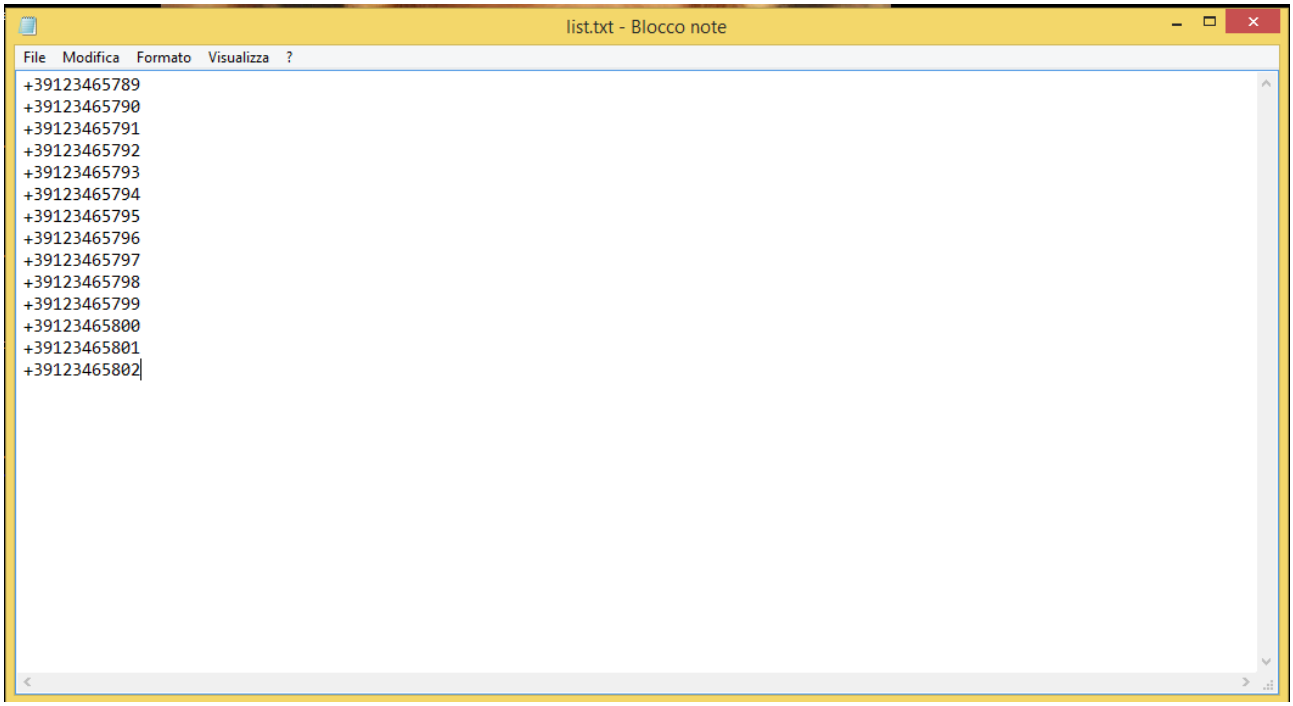
11.11. Menu RTU: Open project from RTU

With this menu item the project will be open from the connected Z-GPRS2/Z-Logger, note that if the project isn't present in the actual PC you will not be able to open the project.

11.12. Menu RTU: Convert Phonebook CSV

This item will convert a text file .csv file to a .bin file ready for use for the extended phonebook.

The extended Phonebook consist in a list of phone numbers (max 1000 numbers) that will be able to activate the ring command configured. The .csv list file must be like this (note the country code in every number), an enter between the numbers must be entered:

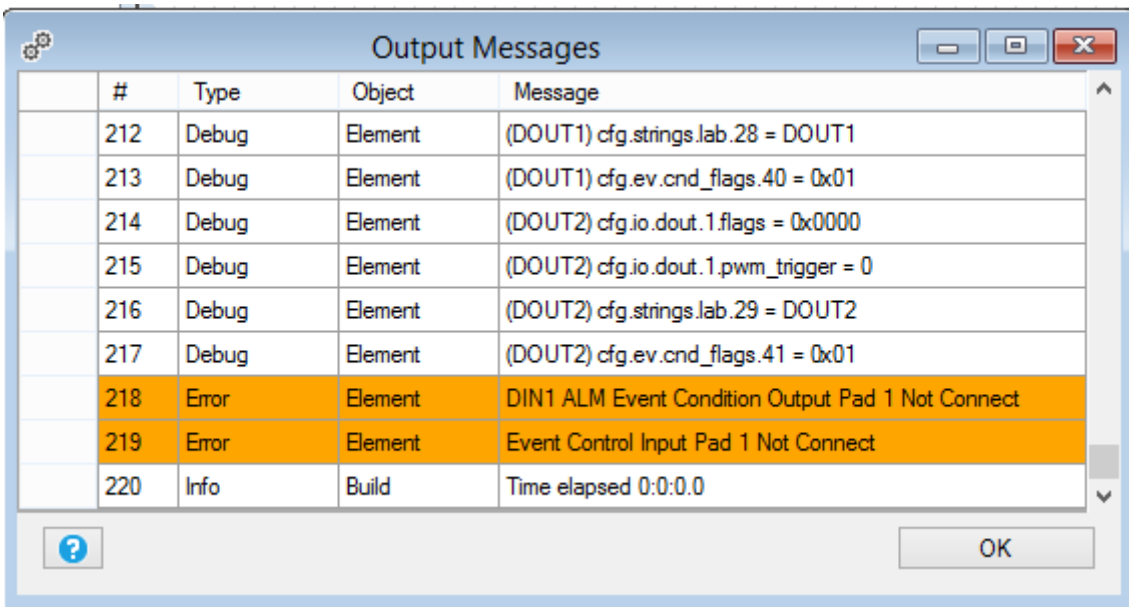


For more info refer to chapter 23.

11.13. Menu Build: Generate

This item will compile the actual project, if no errors are detected a build ok message will be displayed.

If errors are detected an error message will be displayed and in the Ouput Messages a description of the errors will be underlined:



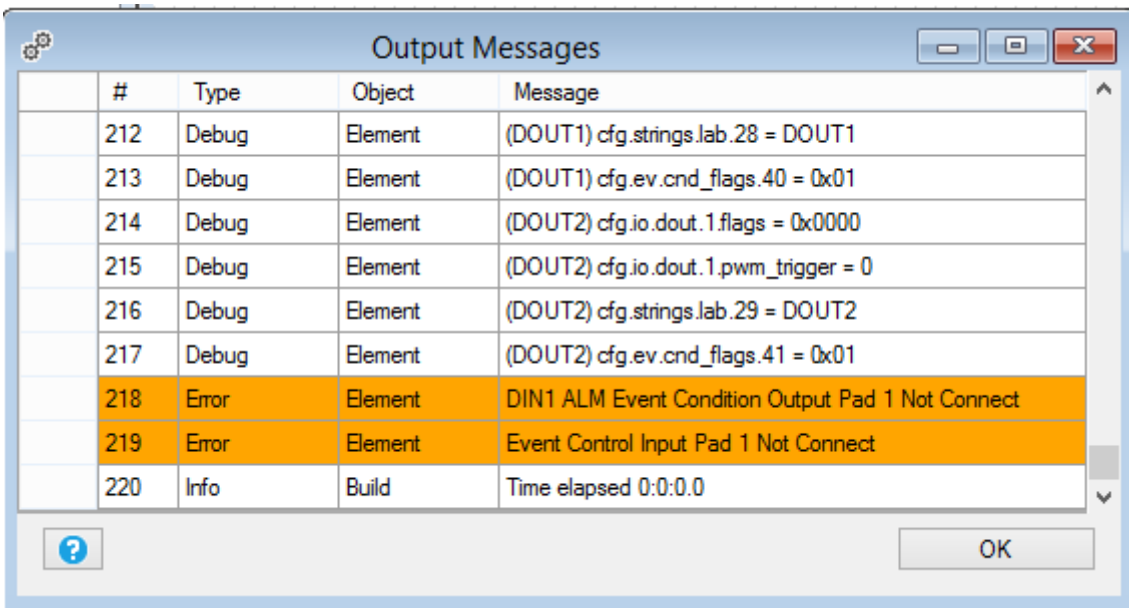
If the build process fail it's not possible to send the project to the RTU.

11.14. Menu Build: Generate and send to RTU

This item will build and then send the project to the RTU.

if no errors are detected a build ok message will be displayed.

If errors are detected an error message will be displayed and in the Ouput Messages a description of the errors will be underlined:

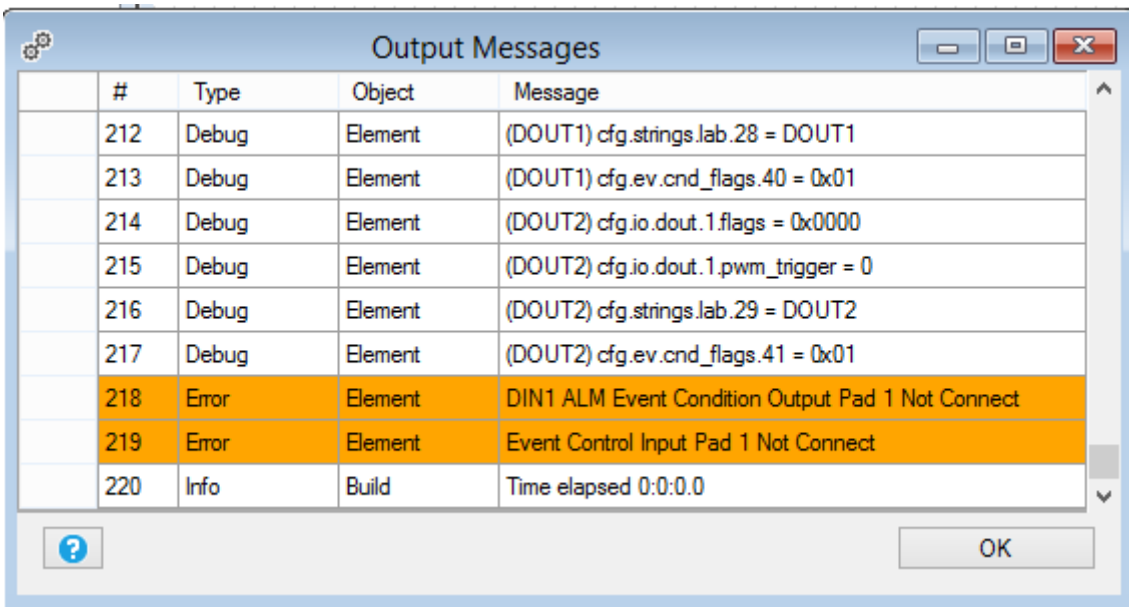


If the build process fail it's not possible to send the project to the RTU.

11.15. Menu Window: Build Output

This item will show the Output Message window:

If in the build process errors are detected, the errors description will be underlined in the Output Messages window:

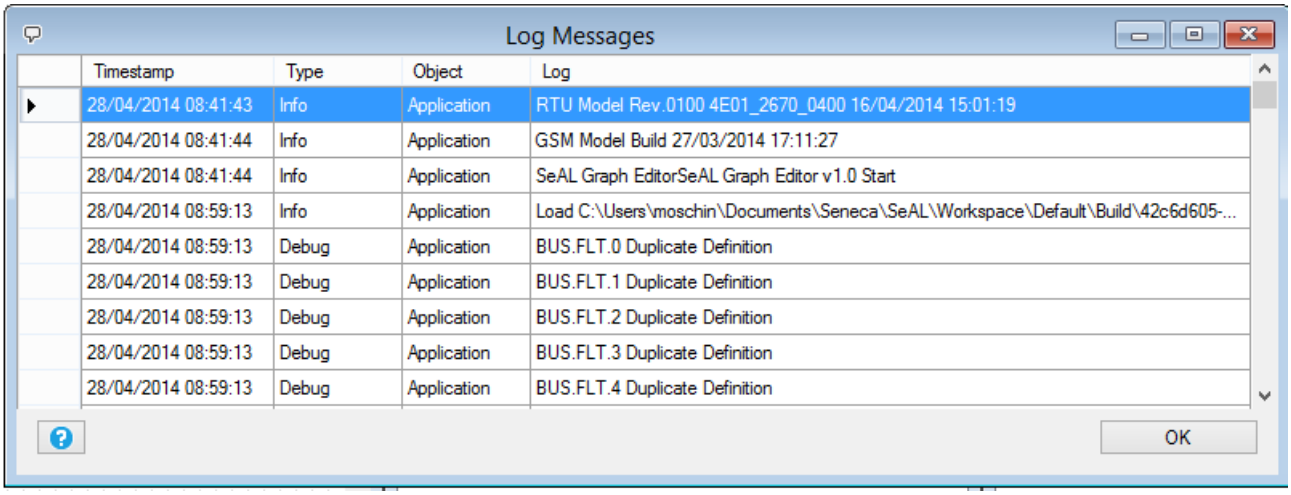


11.16. Menu Window: Edit Form

This item will bring on top the edit window that is open.

11.17. Menu Window: Logs

All the software activity is logged in a file, you can view the data in the Logs window:



11.18. Menu Window: Default Layout

The default Layout configure the SEAL windows in the default layout.

11.19. Menu Window: Tile Horizontal

The Tile Horizontal configure the SEAL windows in the Tile Horizontal layout.

11.20. Menu Window: Tile Vertical

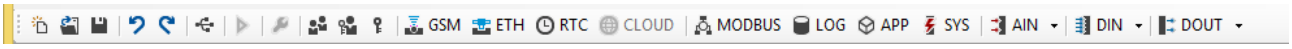
The Tile Vertical configure the SEAL windows in the Tile Vertical layout.

11.21. Menu help

This item will open this document file.

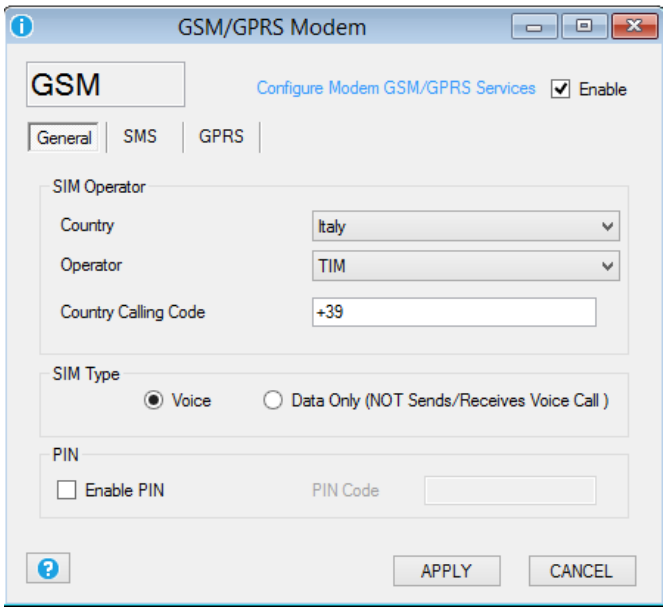
12. The SEAL Icon Menu

The SEAL icon menu is a collection of the most useful setup window:



12.1. GSM/GPRS Modem

General



This window will configure the GSM/GPRS modem (only for model Z-GPRS2).

Country Select the SIM country from the database.

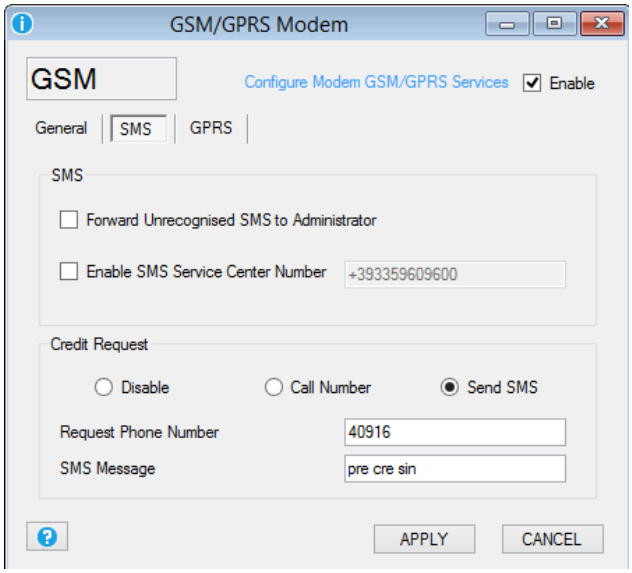
Operator Select the SIM mobile operator from the database or use the Custom operator.

Country Calling Code Select the right country code, note that you must add the "+" character too.

SIM Type Select if you are using a only data SIM or a voice/data sim, a only data SIM cannot make ring.

PIN Select the Pin for protect the SIM card access, use a mobile phone for enable/disable the SIM PIN code.

SMS



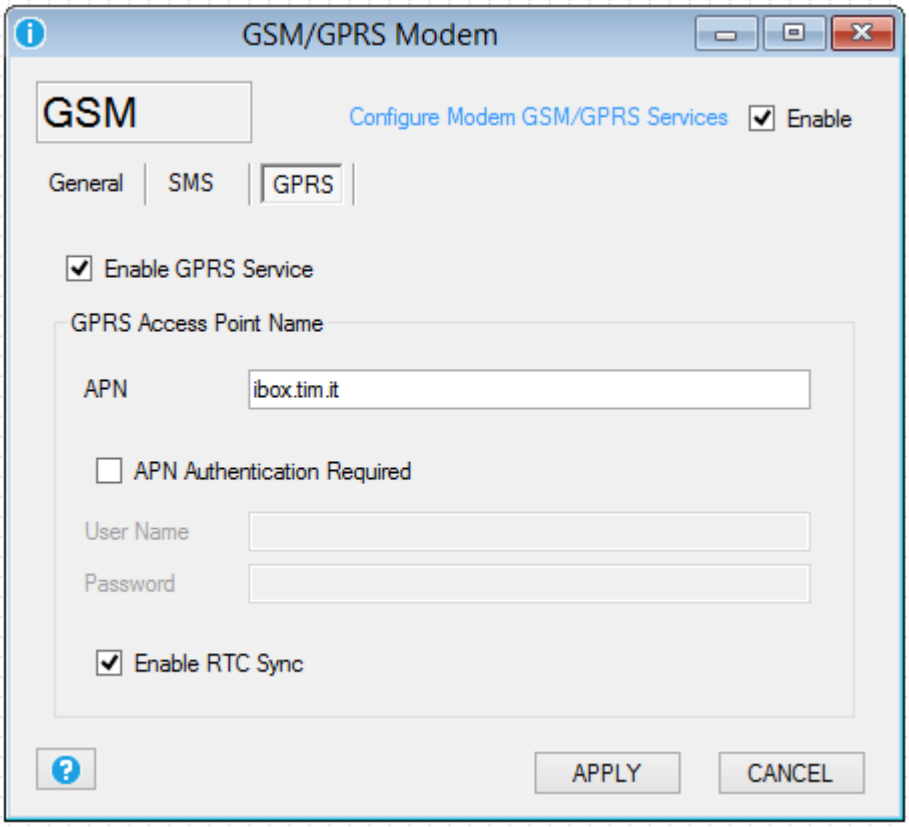
This window will configure the modem SMS functions:

Forward Unrecognized SMS to Administrator: if checked every SMS with unknown number will be forwarded to the first of the administrators. Use this function for forward mobile operator messages too.

Enable SMS Service Center Number: if checked force the SMS service center instead of the service center registered into the SIM.

Credit request: this function can be used for rechargeable SIM remaining credit. Contact the mobile operator for info about obtaining the remaining credit, options are: call a number (ring to a specific number) or send an SMS with a specified text. Note that this functions works only with rechargeable SIM.

GSM/GPRS Modem: GPRS



Enable GPRS Service: if checked activate the GPRS internet connection.

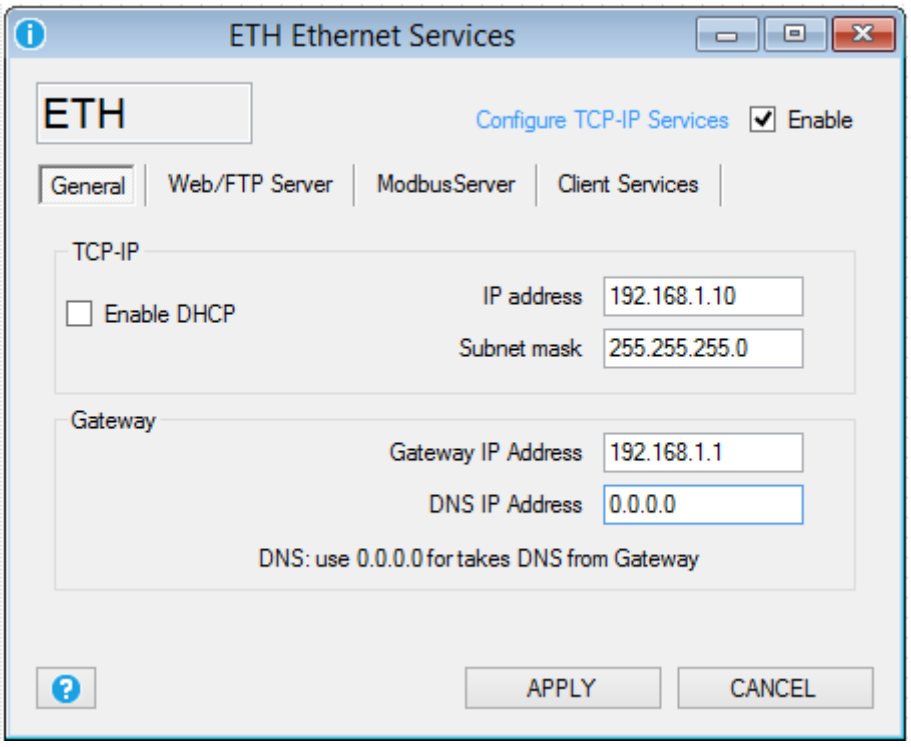
APN: Select the Mobile operator Access Point Name server for internet connection, contact your mobile operator for more information.

APN Authentication Required: Select if the APN needs or not a user name and password for access

Enable RTC Sync: Enable the Data/hour synchronization by the GPRS connection.

12.2. Ethernet Services

General



Enable DHCP: If checked enable the Dynamic Host Configuration Protocol, the IP address, and the Subnet mask are obtained automatically from the DHCP server (often the router/gateway).

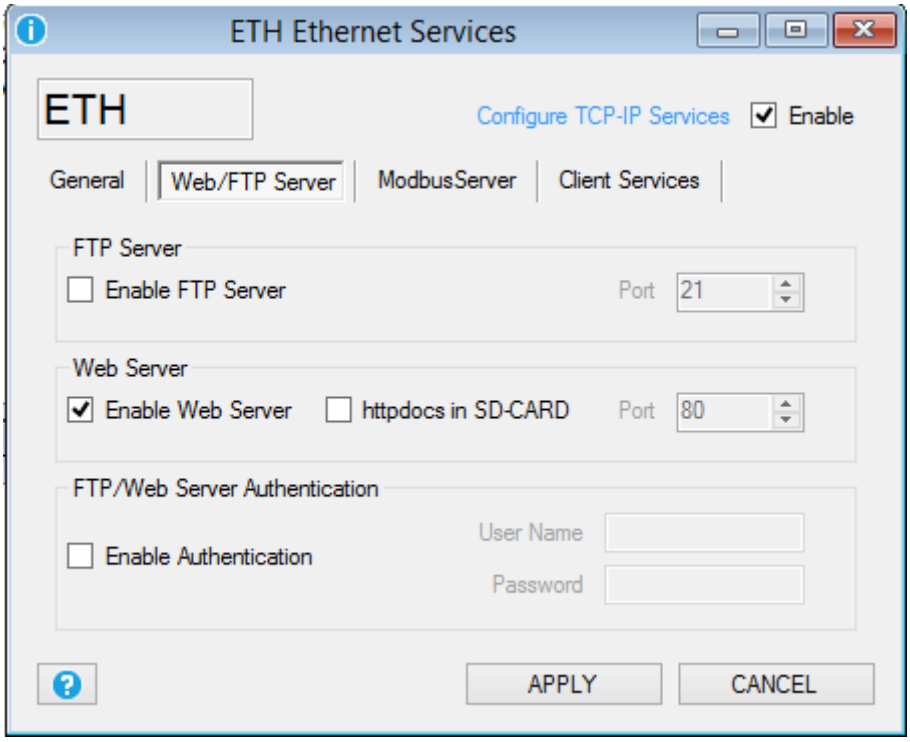
I***P Address:*** Enter the static IP address.

Subnet mask: Enter the Subnet Mask***.***

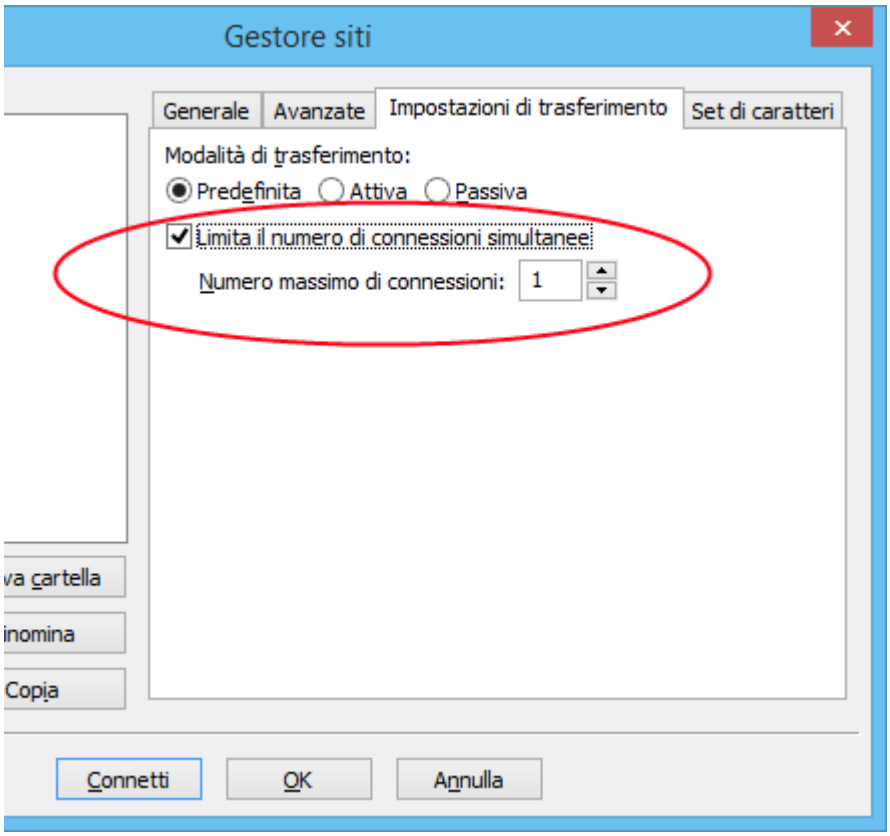
Gateway IP Address: Enter the Gateway/Router IP address for accessing to internet.

DNS IP Address: Enter the Domain Name Server, use 0.0.0.0 for takes the DNS address automatically from the Gateway/Router.

Web/FTP Server

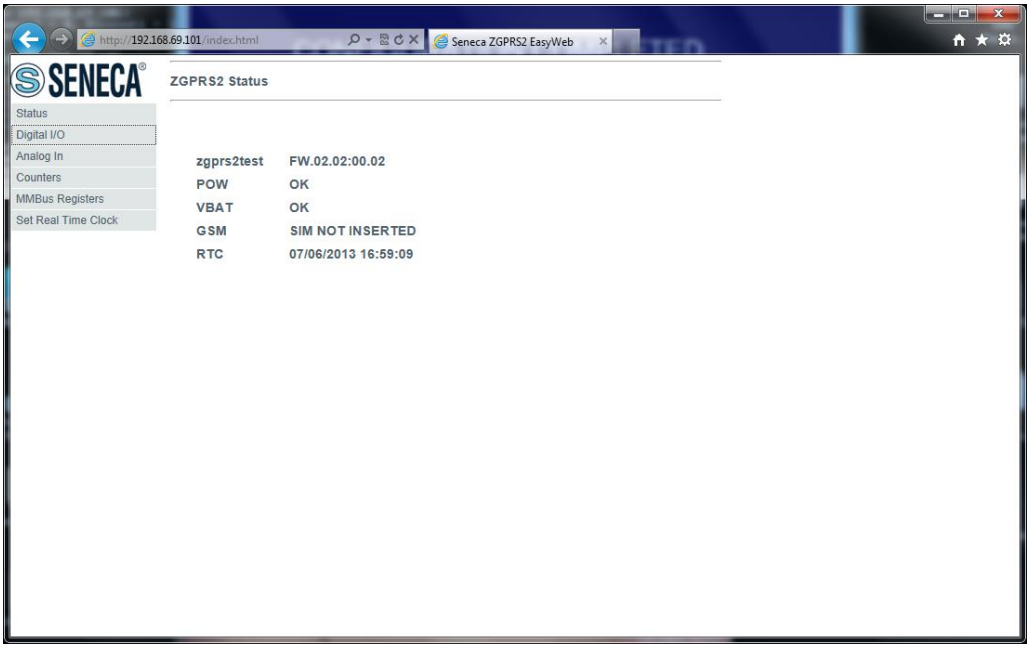


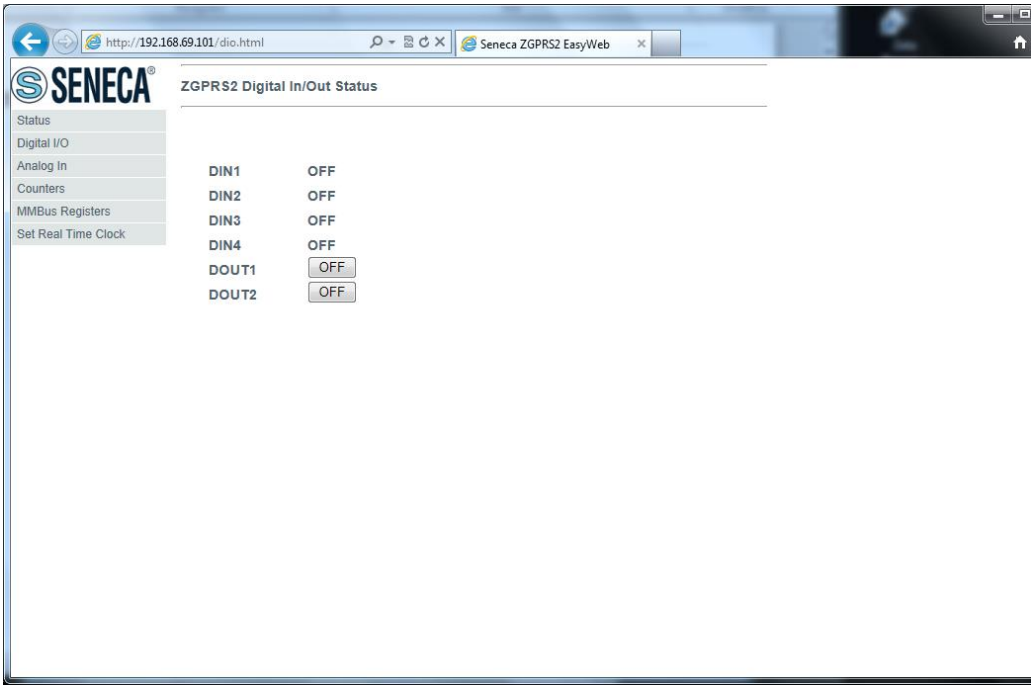
FTP Server: If checked enable the internal FTP server, the FTP server file system is the microSD card so you can acquire the log files directly from the FTP server. For use an FTP client remember to force the "only one connection" option, for example in filezilla ftp client:

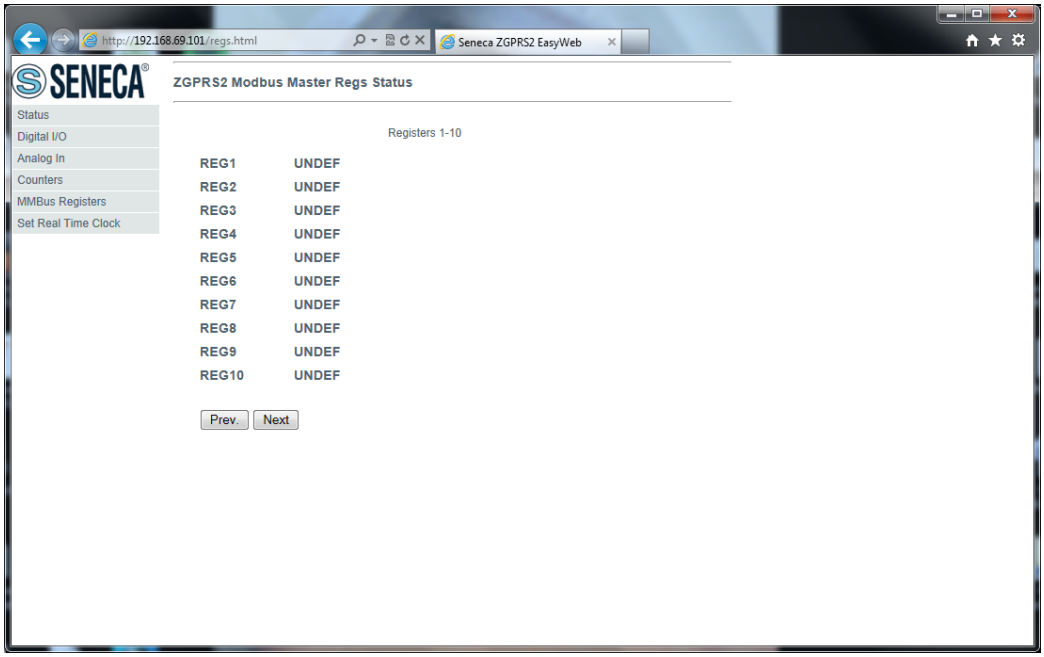


Also the FTP port can be configured (default 21).

Web Server: If checked enable the Web server, with the Web server is possible to view the real time values of the embedded IO and the Modbus RTU/TCP-IP IO:







HttpDocs in SDCARD: If checked load the webserver html custom pages from the SDcard. The html file must be in /httpdocs and the start pages must be “index.html”.

Enable Authentication: If checked you must enter a password for accessing the Web server and the FTP Server. Seneca recommend always to enable the authentication for Web and FTP server.

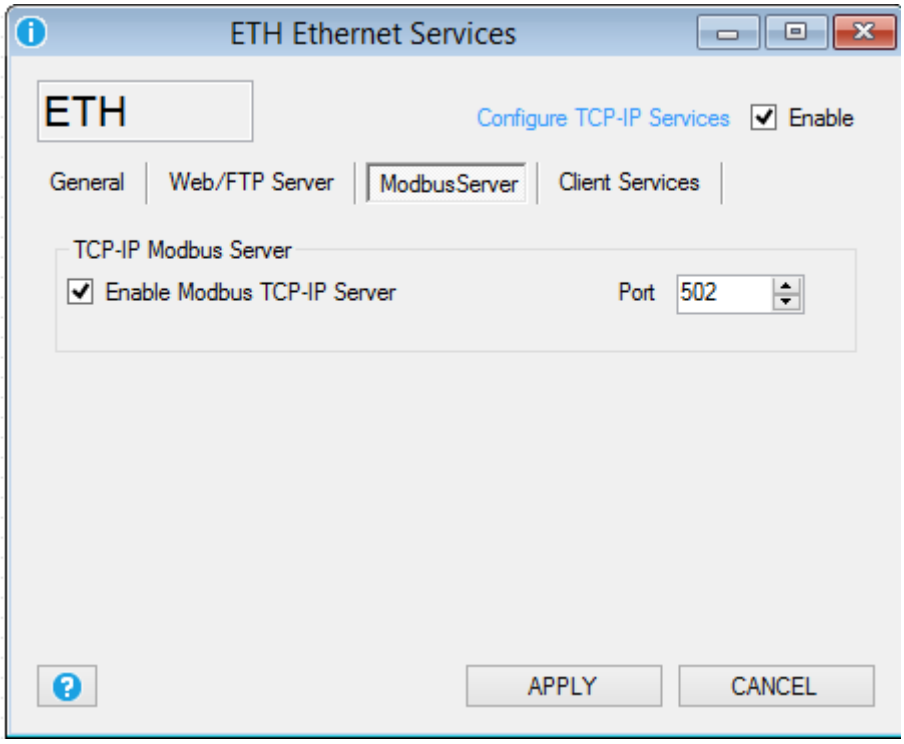
CAUTION!

The FTP Server, Web server and Modbus server can only be used through the ethernet connection (not with the GPRS).

CAUTION!

You can only configure or the FTP Server or the Web server simultaneously.

Modbus Server



Enable Modbus TCP-IP Server: if checked enable the Modbus TCP-IP server, so it's possible to read the real time values of variables directly from a SCADA or an external display, PC etc...

The registers address are all holding registers, the first register (register 0) is the 40001.

MSW is for "Most Significant Word"

MSB is for "Most Significant Bit"

LSW is for "Least Significant World"

LSB is for "Least Significant Bit"

0x is an Hexadecimal Value

MODBUS ADDRESS	***REGISTERS***
40008	DIGITAL INPUTS BIT 0 = INPUT 1 (Least significant bit) BIT 1 = INPUT 2

	BIT 2 = INPUT 3 BIT 3 = INPUT 4
40009	DIGITAL OUTPUT (Read Only) BIT 0 = OUTPUT1 (Least significant bit) BIT 1 = OUTPUT2
49001 0x0020 49002 0x0010 49003 0x0200	WRITEABLE ONLY IN ONE MULTIPLE WRITE: COMMAND FOR OPEN OUT 1
49001 0x0020 49002 0x0020 49003 0x0200	WRITEABLE ONLY IN ONE MULTIPLE WRITE: COMMAND FOR CLOSE OUT 1
49001 0x0020 49002 0x1000 49003 0x0200	WRITEABLE ONLY IN ONE MULTIPLE WRITE: COMMAND FOR OPEN OUT 2
49001 0x0020 49002 0x2000 49003 0x0200	WRITEABLE ONLY IN ONE MULTIPLE WRITE: COMMAND FOR CLOSE OUT 2
40131	ANALOG INPUT 1 (signed 16 bits)
40145	ANALOG INPUT 2 (signed 16 bits)
LSW 49405 MSW 49406	PARTIAL COUNTER 1 (WITHOUT SCALE) (unsigned 32bits)
LSW 49409 MSW 49410	PARTIAL COUNTER 2 (WITHOUT SCALE) (unsigned 32bits)
LSW 49413 MSW 49414	PARTIAL COUNTER 3 (WITHOUT SCALE) (unsigned 32bits)
LSW 49417	PARTIAL COUNTER 4 (WITHOUT SCALE) (unsigned 32bits)

MSW 49418	
LSW 49407 MSW 49408	COUNTER 1 (WITHOUT SCALE) (unsigned 32bits)
LSW 49411 MSW 49412	COUNTER 2 (WITHOUT SCALE) (unsigned 32bits)
LSW 49415 MSW 49416	COUNTER 3 (WITHOUT SCALE) (unsigned 32bits)
LSW 49419 MSW 49420	COUNTER 4 (WITHOUT SCALE) (unsigned 32bits)
40158	GSM LEVEL (dBm)
40128	V BATTERY (min 2200, max 2800)
40008	BIT 7 = 1 POWER SOURCE OK BIT 7 = 0 POWER SOURCE DOWN
48003	START SHARED MEMORY FOR MODBUS LOG
…	…
48202	STOP SHARED MEMORY FOR MODBUS LOG

All Datalogger real-time values logged by Modbus TCP-IP and Modbus RTU can be accessed via modbus.

The format is created as follows: Logged registers are placed in the format one after the other without leaving empty registers.

If, for example, the following registers are being logged:

Register 1: 16 bit unsigned

Register 2: 32 bit unsigned

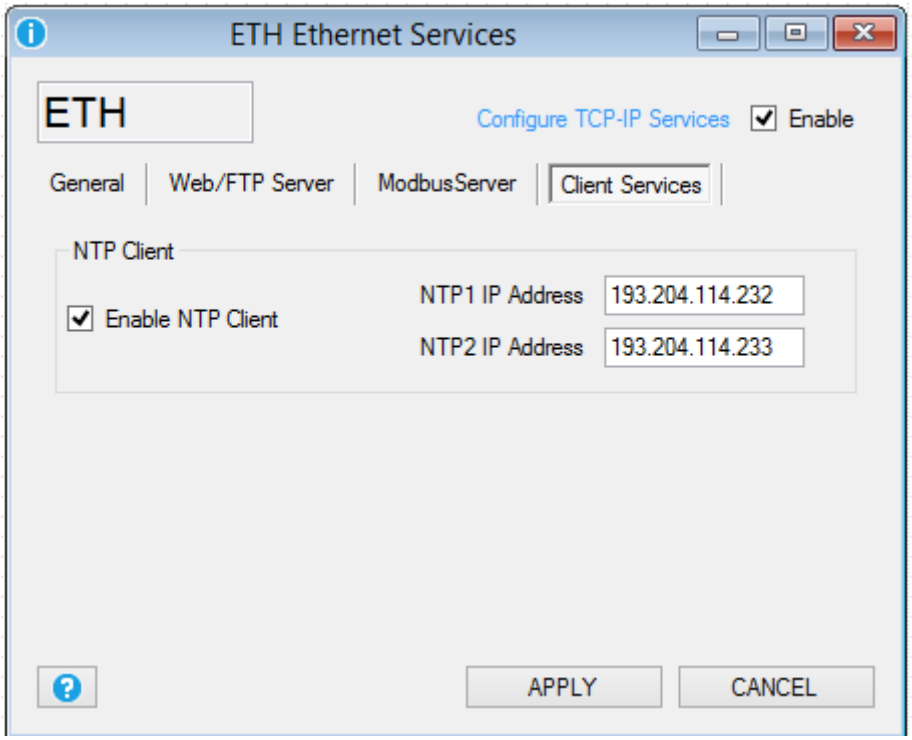
Register 3: Floating point single precision

Register 4: 16 bit signed

The obtained format is the following:

Modbus address	***Register***
48003	Register 1
48004	Register 2 MSW
48005	Register 2 LSW
48006	Register 3 MSW
48007	Register 3 LSW
48008	Register 4

Client Services



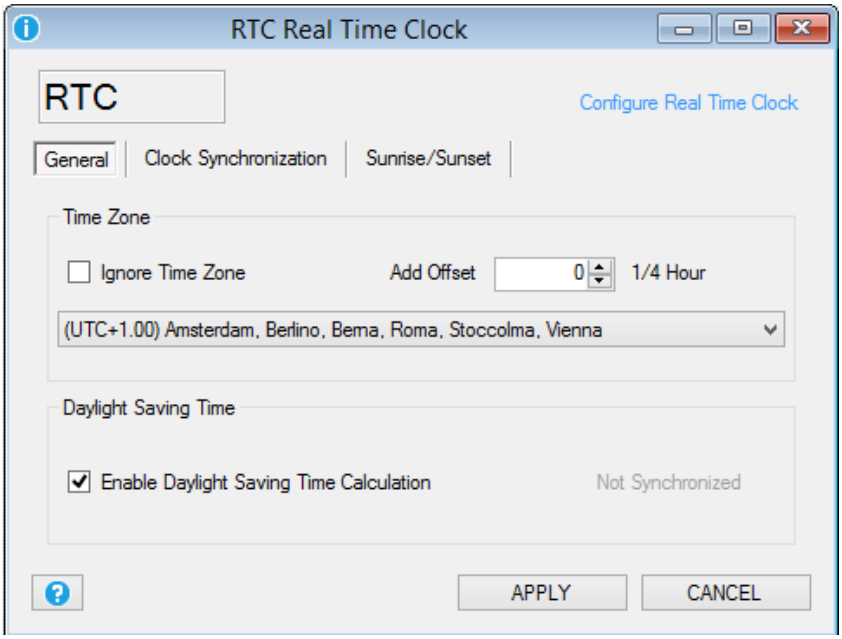
Enable NTP Client: If checked enable the Network Time Protocol used for synchronize the RTU Date/Time.

The list of major NTP server is the follower:

NTP IP Address	***DESCRIPTION***
193.204.114.232	ntp1.ien.it (default)
193.204.114.233	ntp2.ien.it (default)
217.147.223.78	europe.pool.ntp.org
140.130.175.9	asia.pool.ntp.org
203.23.237.200	oceania.pool.ntp.org
66.250.45.2	north-america.pool.ntp.org
146.164.53.65	south-america.pool.ntp.org
196.25.1.9	africa.pool.ntp.org

12.3. Real Time Clock

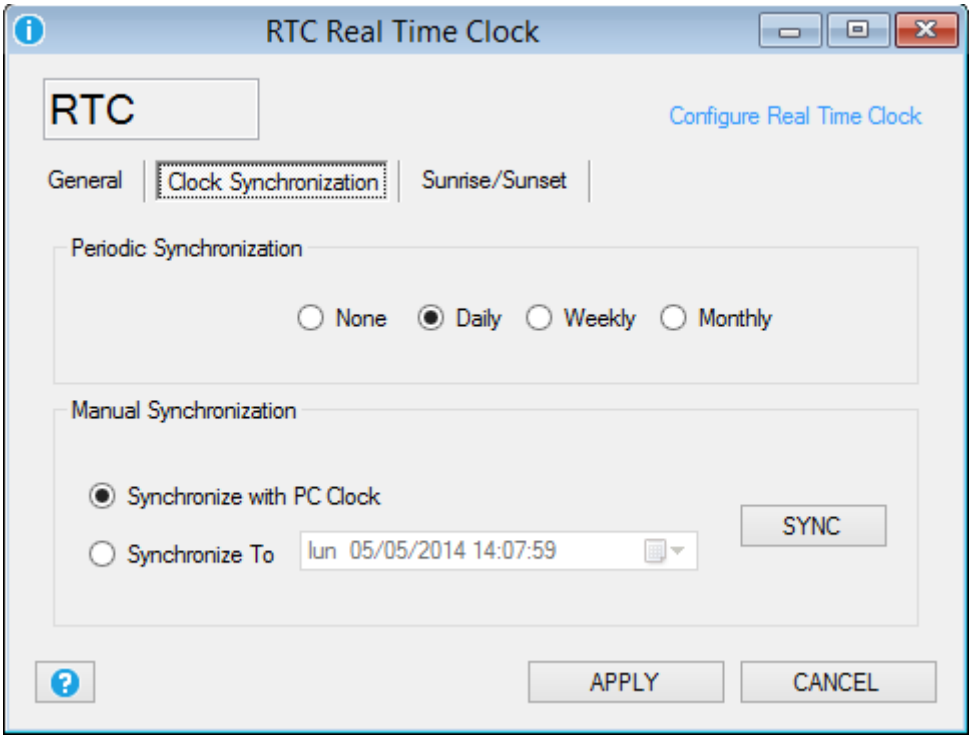
General



TIME ZONE: configure the RTU installation timezone, it's possible to ignore timezone for set a custom Date/Hour with SEAL software or set the right timezone. If you are using the Network Time Protocol (NTP) from Ethernet or the GPRS for synchronize data/hour you must configure the right Timezone because the server hour is UTC (Universal Time Coordinating). The UTC and GMT (Greenwich Medium Time) can be defined as equal.

ENABLE DAYLIGHT SAVING TIME: enable the automatic calculation of the Daylight Saving Time (NTP servers do not use the daylight saving time).

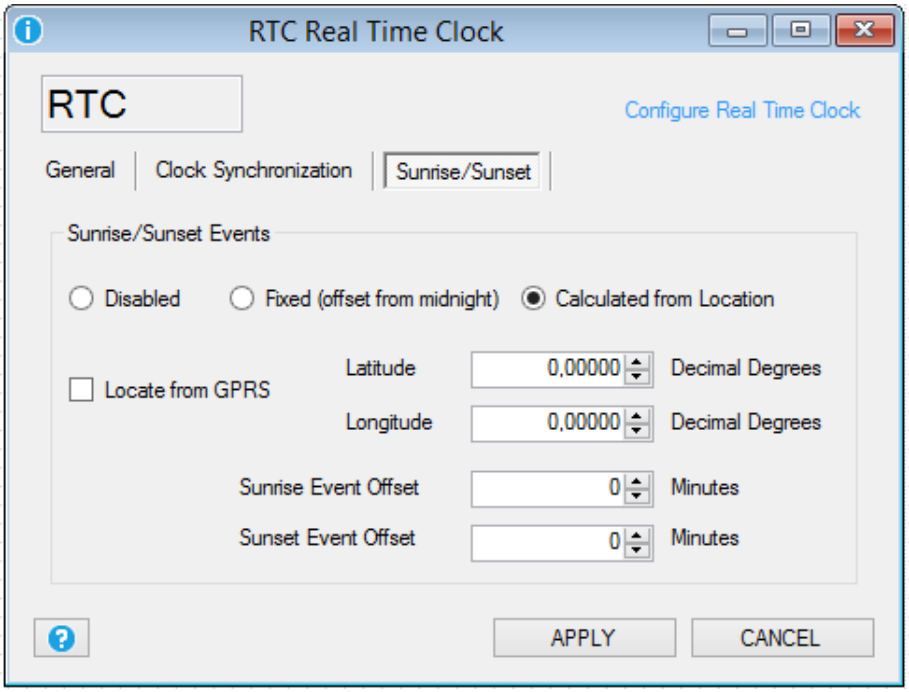
Clock synchronization



Periodic Synchronization: Select the synchronization time for the Ethernet Network Time Protocol or GPRS automatic synchronization

Manual Synchronization: Select to synchronize manually using the PC Date/Hour or to a custom Date/Hour, then press the SYNC button to actualize. Note that this operation is available only if the RTU is connected to SEAL.

Sunrise and Sunset



With a sophisticated algorithm, the RTU can calculate the Sunrise and Sunset events from the GPS coordinates and from the Date/Hour. So it's possible to use the events for turn on/off a lamp, stop the datalogger etc..

It' possible to fix an offset from midnight or calculate the events from the GPS coordinates.

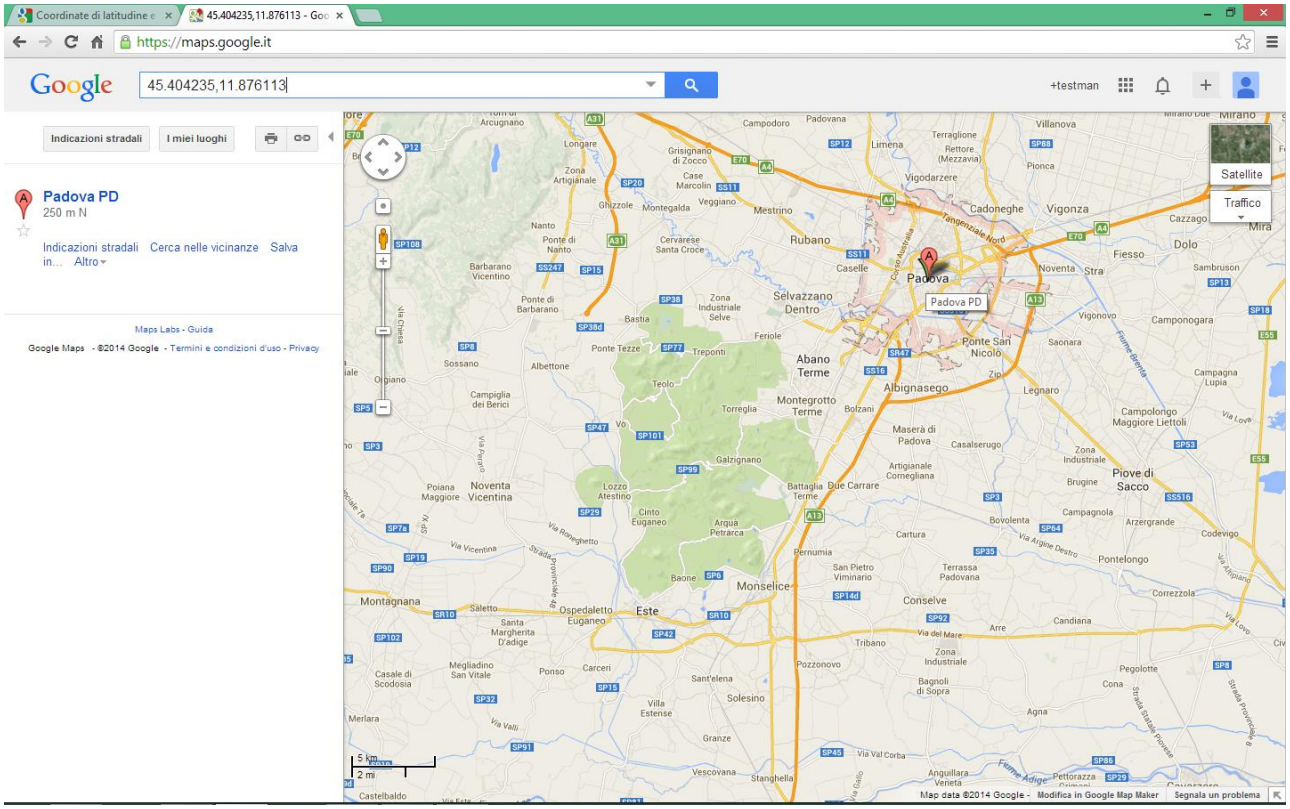
If you select to calculate the sunrise/sunset from GPS you can select to insert the Latitude/Longitude directly or using the GPRS network (Locate from GPRS).

The ***Locate from GPRS*** option use the coordinates from the GPRS antenna for obtaining the longitude/latitude. If you don't use the GPRS you must enter manually the Latitude/Longitude. For obtaining the right coordinates in decimal degrees connect to:

http://maps.google.it

Select the place where you want to install the RTU then press the right mouse button and select "what's here?"

In the example:



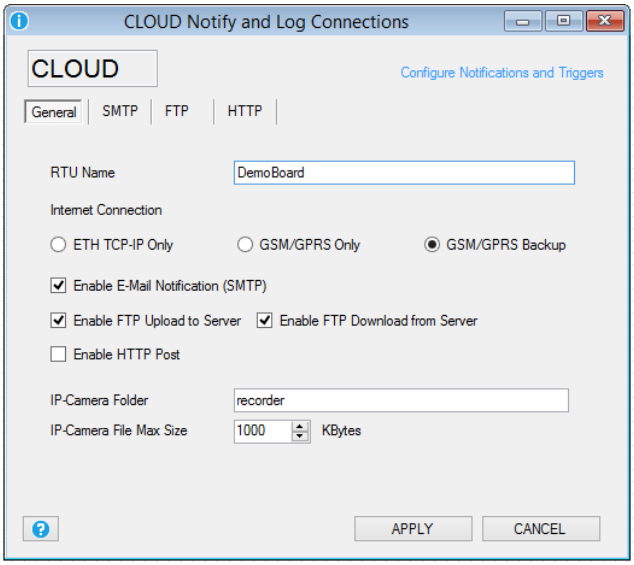
latitude 45.404235 decimal degree

longitude 11.876113 decimal degree

You can add an offset (in minutes) to the Sunrise/Sunset action too.

12.4. Cloud

General



RTU Name: Enter the RTU Name, this name is also the prefix of the .csv log file name.

If your RTU Name is for example DemoBoard the csv log files will be like:

log_DemoBoard_20140404101513.csv

Internet Connection: Enter the connection port used for internet. You can use only the Ethernet, only the GPRS or the Ethernet with backup on GPRS.

Enable E-MAIL Notification: If checked send log notifications and alert notifications to one or more e-mails.

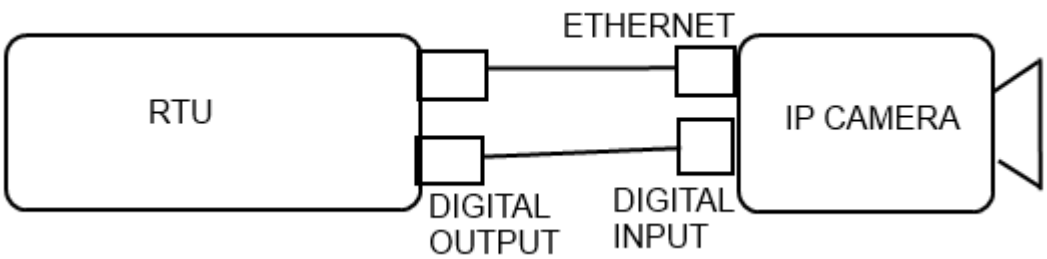
Enable FTP Upload to Server: If checked send log notifications to the FTP server "Upload Folder".

Enable FTP Download from Server: If checked enable the RTU Firmware and Configuration remote upload capability from the FTP server "Download Folder".

Enable HTTP post: If checked send the log notifications and alert notifications to an HTTP server with a standard JSON format (available only with a GPRS connection).

You can connect an IP camera to the RTU for video or photo acquisition.

You must use a camera with a digital input for take a snapshot and an FTP client for write to the RTU FTP server.

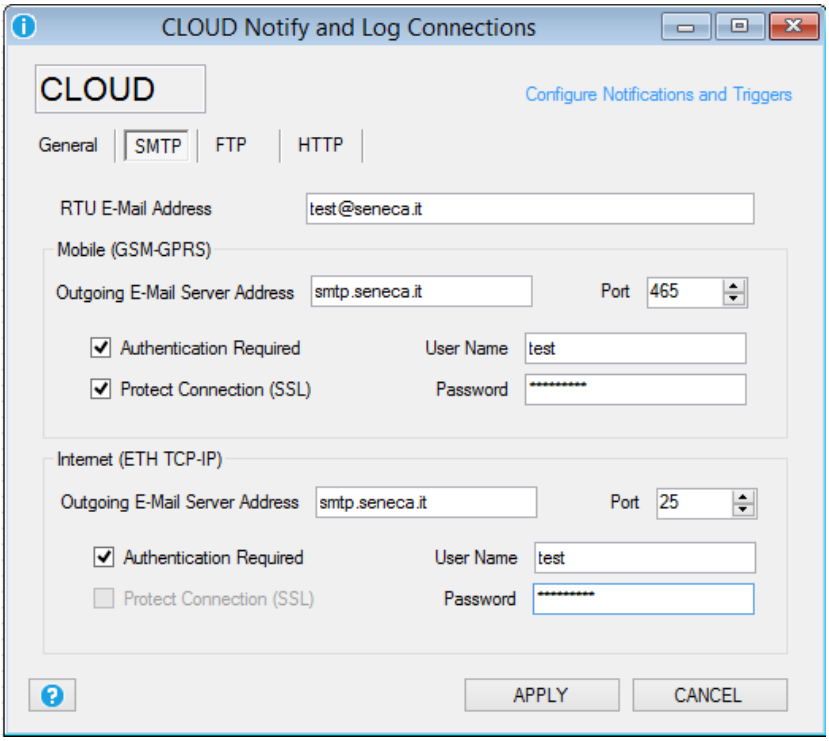


IP Camera Folder: Configure the RTU FTP Server where the IP camera will put videos and/or snapshots. When a new file is written in this folder the RTU will send the data from the Log notification channel configured (Ethernet or GPRS) to the profiles that includes the logs group. When a file is correctly sent the RTU will delete it from the local ftp.

IP Camera Max File size: Configure the single max file size to send in the Camera Folder, if a file is over the max file size will not be sent (but will not be deleted from the local ftp).

SMTP

Configure the Simple Mail Transfer Protocol if you have chosen to send log notifications or alert notification through the E-mail channel:

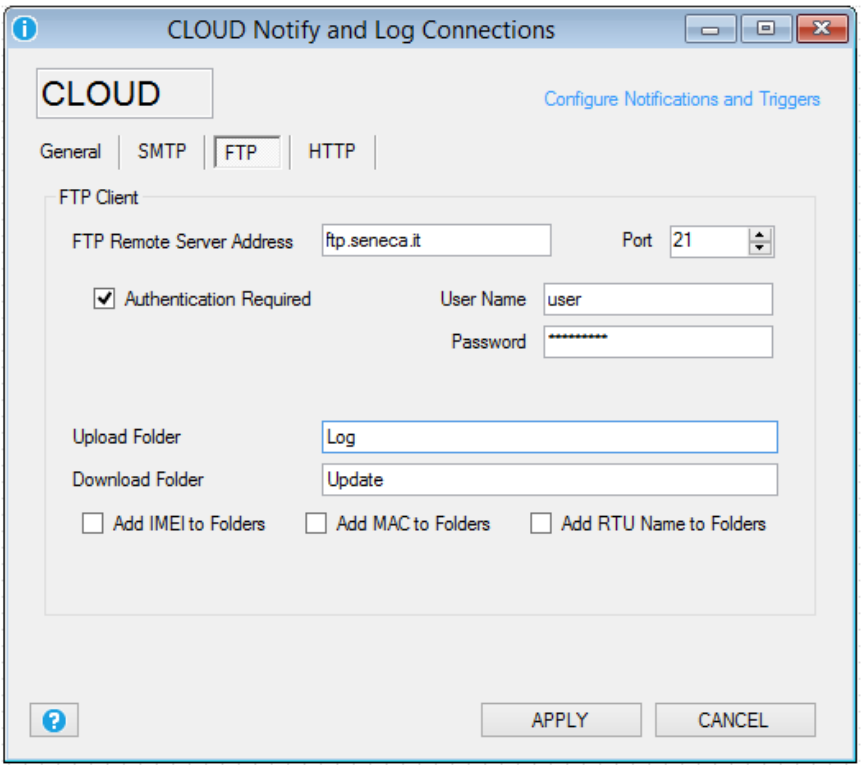


RTU E-Mail Address: is the sender RTU e-mail

Mobile (GSM-GPRS): configure the GSM/GPRS E-Mail sender channel, this channel support also the SSL protect connection for send email (for example) with a GMAIL sender. Typically a SMTP port is 25 and SSL protect port is 465.

Ethernet: configure the Ethernet E-Mail sender channel, this channel doesn't support the SSL protect connection for send email (for example) with a GMAIL sender. Typically a SMTP port is 25.

FTP



FTP Remote server Address: Enter the remote FTP server ip address or name.

Authentication required: Enter if is required a User Name and Password for access to the FTP Server.

The RTU support the configuration change and the firmware update from remote.

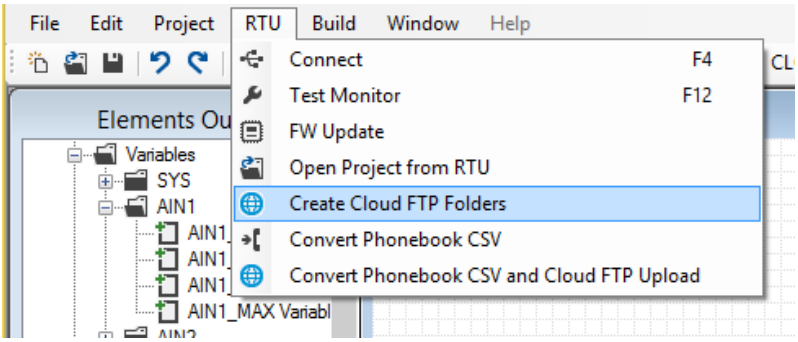
For this feature you must configure a folder (the upload folder) where the RTU will download firmware updates or Configurations.

Upload Folder: Enter the Folder where the RTU send the log notifications.

Download Folder: *Enter the Folder where the RTU can download a firmware update ("fwupdt.bin") and/or a SEAL Configuration file ("setup.tag" or "fwupdt.tag").*

Automatic creation of the Upload and Download folders to the remote FTP server:

SEAL can create automatically the FTP folders to the remote FTP server by selecting:



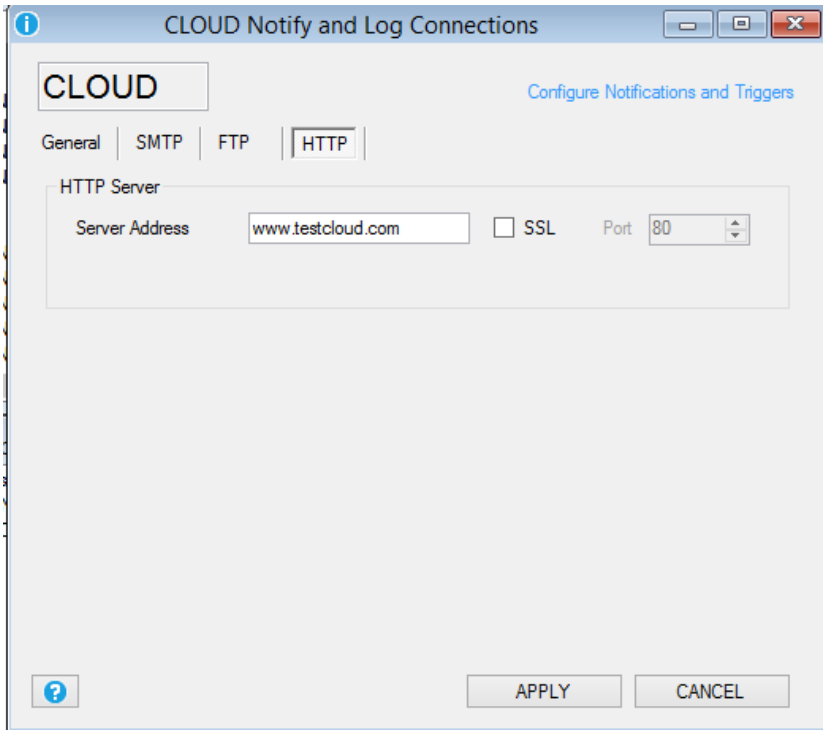
Add IMEI to folder: If checked will add the Mobile IMEI address to the Upload/Download folder.

Add MAC to folder: If checked will add the Ethernet MAC address to the Upload/Download folder.

Add RTU Name to folder: If checked will add the RTU Name to the Upload/Download folder.

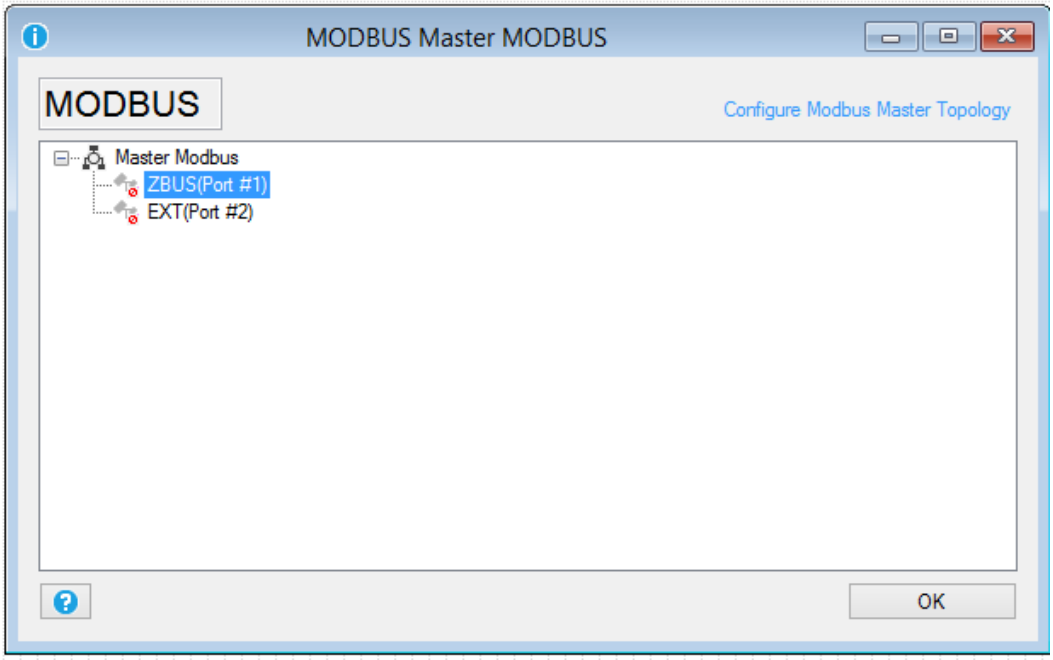
Only IMEI+RTU_Name or MAC+RTU_Name can be selected simultaneously.

HTTP (only with GPRS connection)



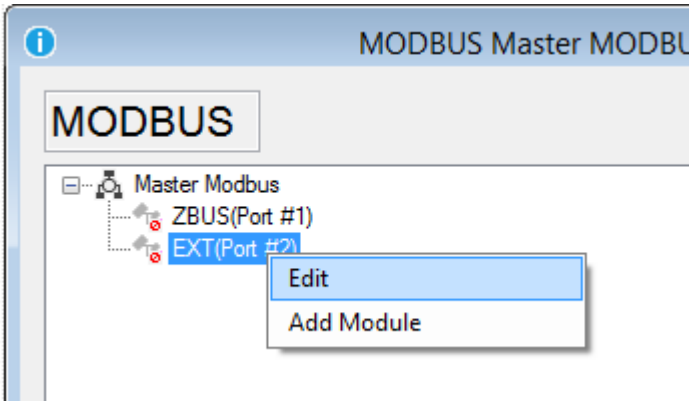
Server Address: configure the HTTP post server name or IP address (available only for GPRS connection).

12.5. Modbus RTU and Modbus TCP-IP Master Window

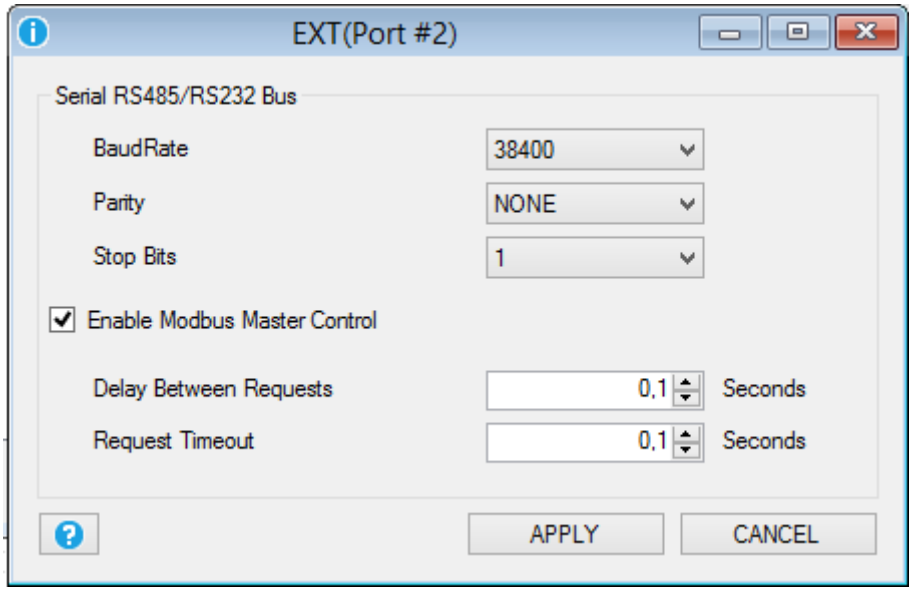


Configure the external IO connected to the Modbus RTU Port #1 and Port#2, also the Modbus TCP-IP client can be configured here. Up to 100 Modbus RTU/TCP-IP TAGs can be configured.

Press with the right button mouse over the serial port that you want to configure and select Edit:



Now the serial configuration will appear:



Select the Buad Rate, the parity and the stop bits agree to the connected modbus RTU slaves devices.

Enable Modbus Master Control: If checked enable the Modbus master poll.

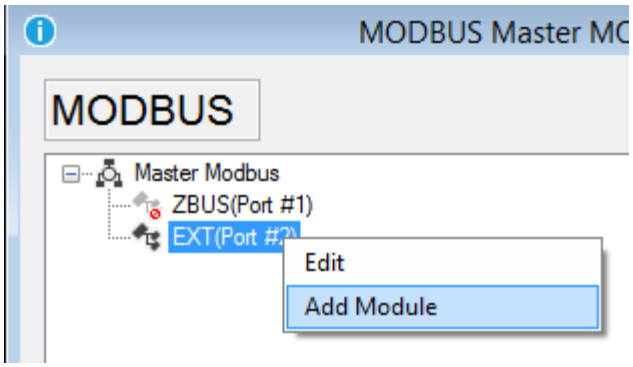
Delay Between Requests: Select the delay between two register requests.

Request Timeout: Select how many time to wait before pass to the next register***.***

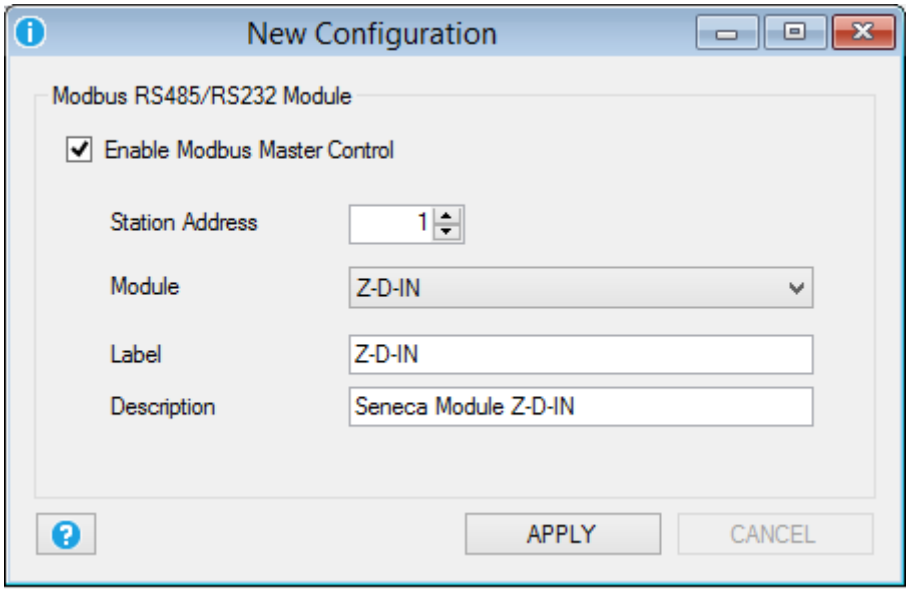
Press ***APPLY*** to apply changes***.***

Now select the serial port is configured and the symbol is replaced by the symbol.

Now we can add the slave modules connected to the port, press the right button mouse on the selected serial port and select Add Module:



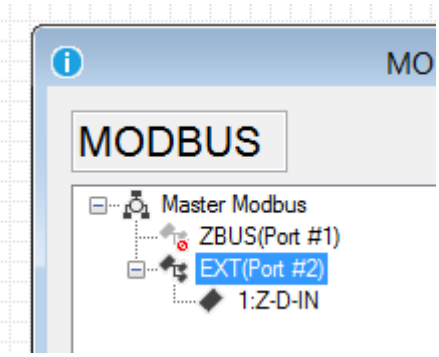
Now the slave module configuration window will appear:



Select the slave station address and the Module name from the Seneca module database. If your slave is not in the database select "***custom***" for customize a slave module.

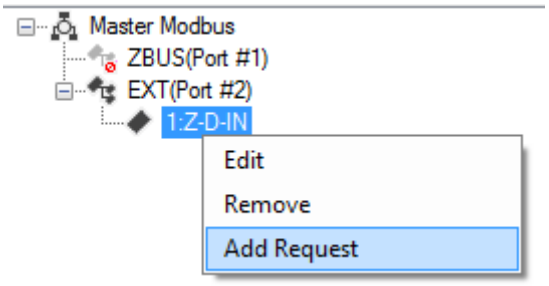
Now push "***Apply***".

Now on the serial port #2 a Modbus RTU slave module Z-D-IN is configured:

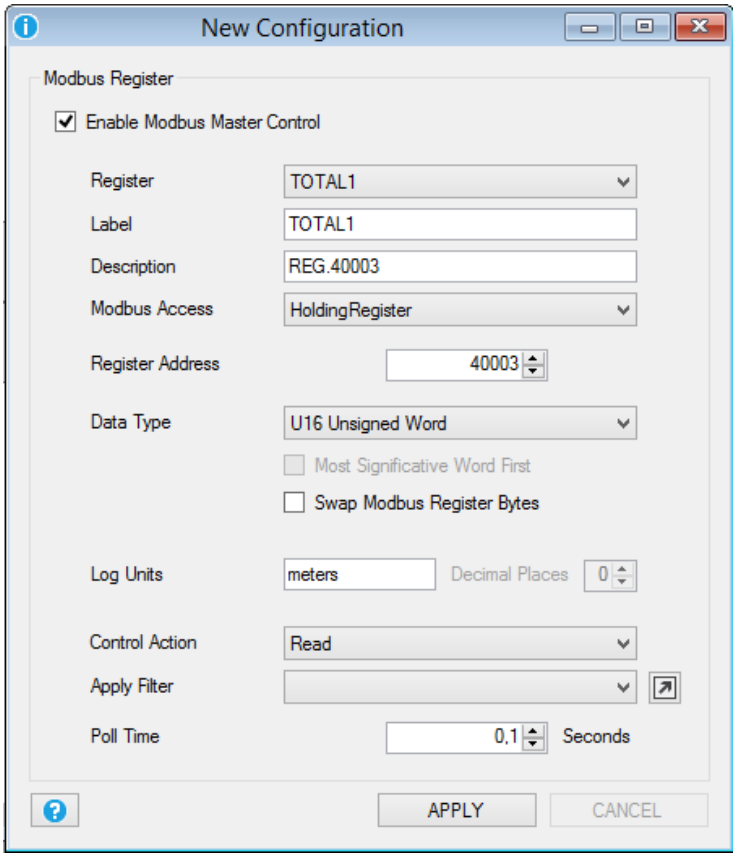


Now we must add the registers (TAG) that we want to log or use for alerts:

Press the right mouse button on the Z-D-IN module and select "Add Request":



Now the registers window will appear:

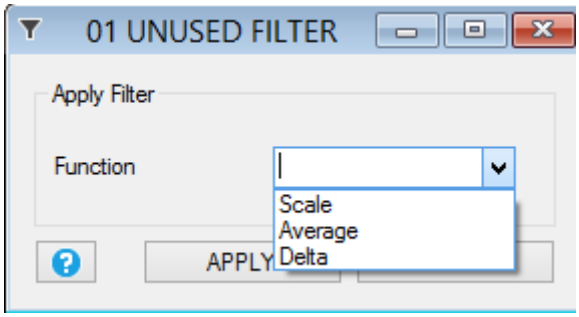


Select the register from the slave module database (all the others items will be automatically adjusted).

Select the Log Units, the Control Action (register only in Read, or Write) and if you want to add a custom filter to the register.

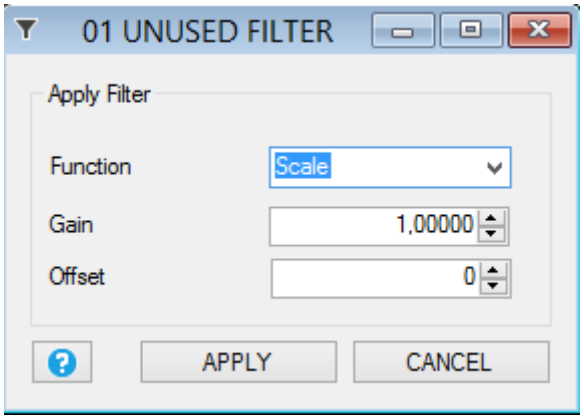
You can select up to 16 different ***filters*** to apply to a Modbus Value.

Select one of the 16 filters and then push on icon to open the Filters window:



Three type of filters are available:

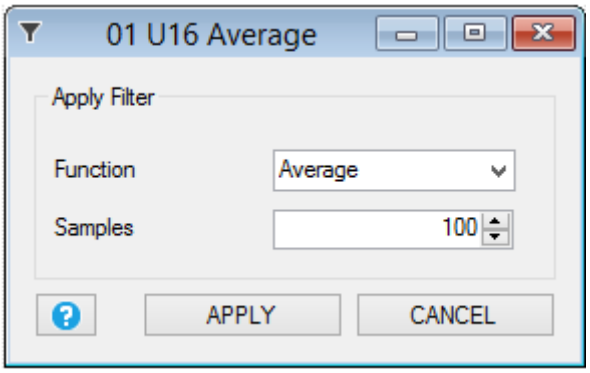
Scale:



The scale filter is used for apply a scale factor to the Modbus value, the filter result is obtained by the relation:

$$Filter\ Output = (Modbus\ Value \times Gain) + Offset$$

Average:

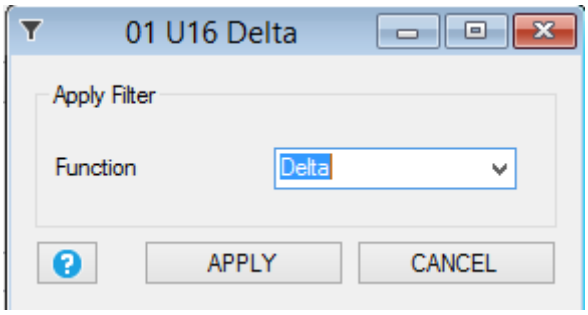


The average filter is used for obtaining a moving average on the selected numbers of samples.

The filter result is obtained by the relation:

$$Filter\ Output = \frac{(\sum_{n=0}^{Samples\ NR} Modbus\ Value_n)}{Samples\ NR}$$

Delta:



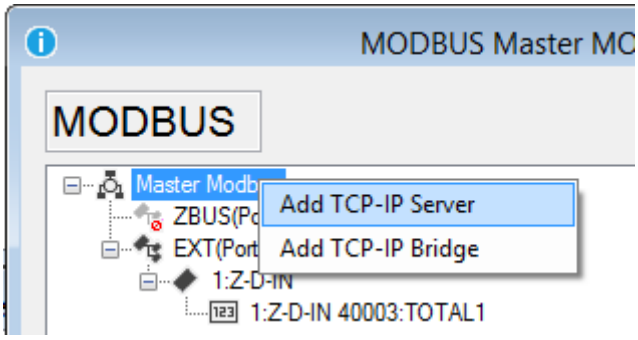
The delta filter is used for obtaining the difference between two consecutive Modbus Value read.

The filter result is obtained by the relation:

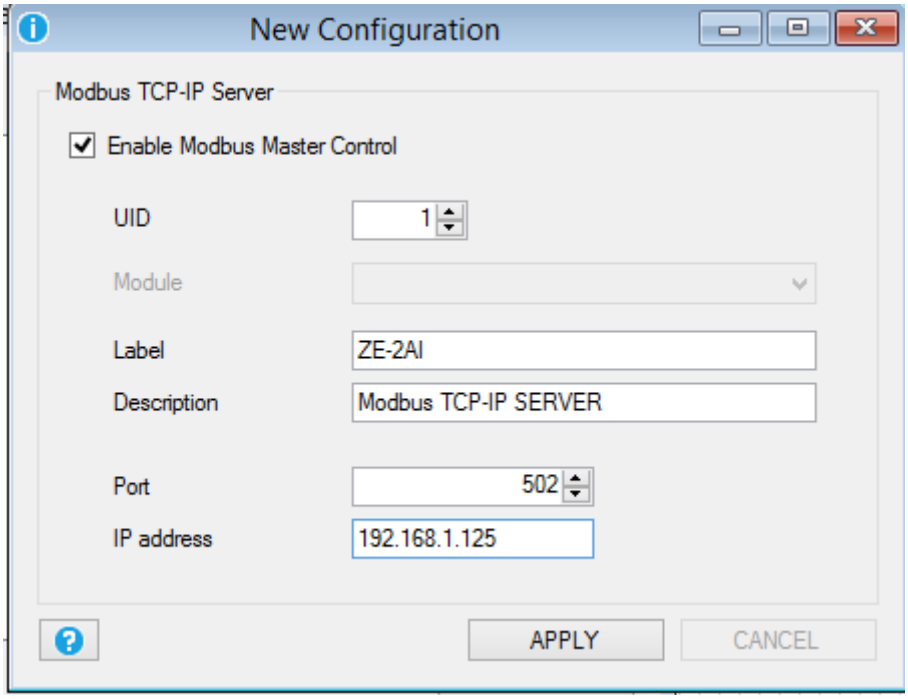
$$Filter\ Output = Modbus\ Value_n - Modbus\ Value_{n-1}$$

Poll Time: is the Register Polling time (request time or refresh time).

For adding a ***Modbus TCP-IP node*** you must select the icon Master Modbus and press the right button mouse, then select Add TCP-IP Server:



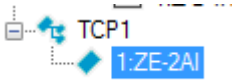
The Modbus TCP-IP Server window will appear:



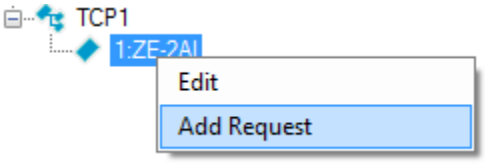
Select the Modbus TCP-IP Server ***UID*** (unit id or node id), then enter a Modbus Server label.

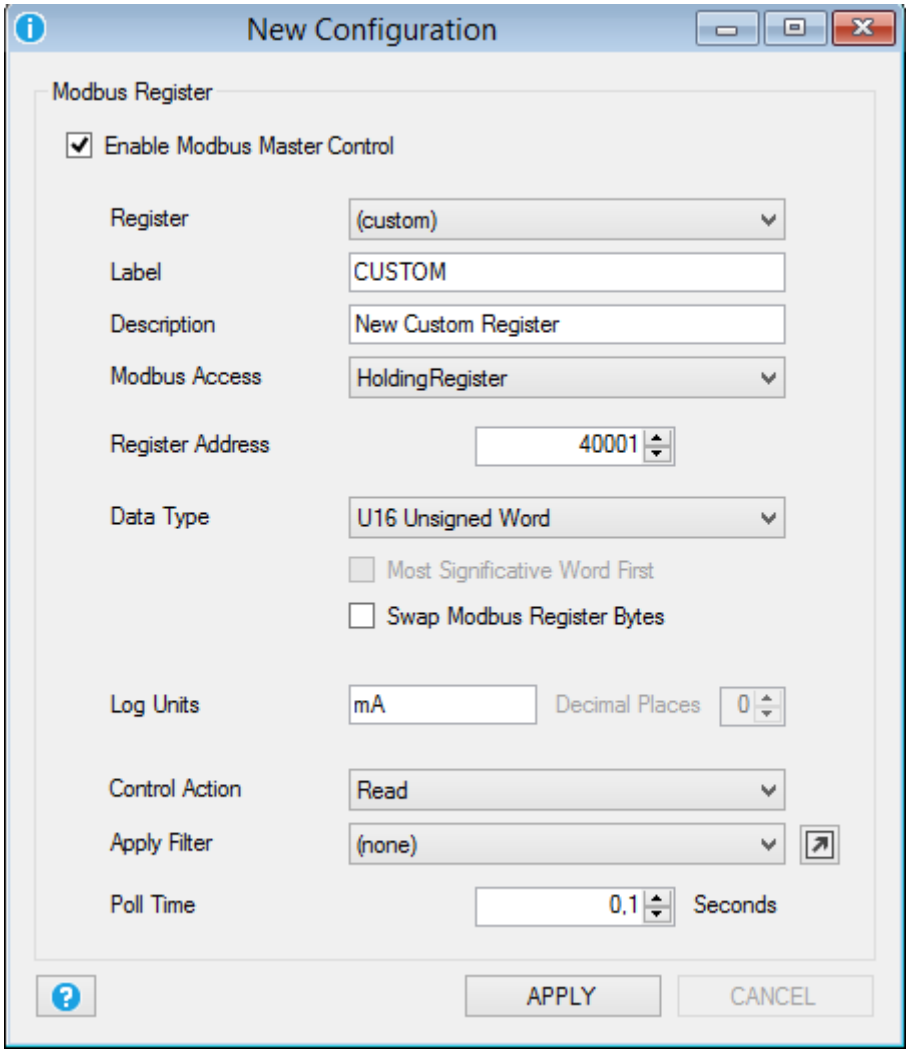
You must setup also the TCP-IP port (default for Modbus TCP-IP is 502) and the Modbsu TCP-IP Server IP address.

Now the new Modbus TCP-IP Server is added:



Now we must add the Registers to read from the server, so select the Modbus TCP-IP Server and press the right button mouse and select Add Request:



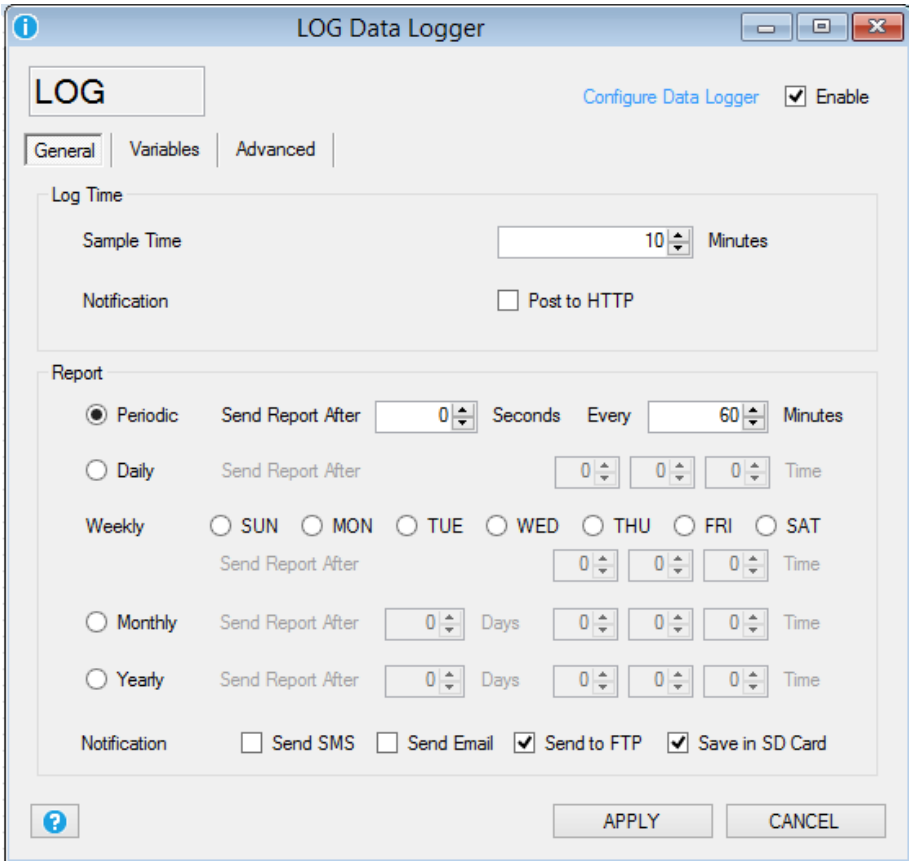


Now the registers window will appear:

Select Register “Custom”, the Modbus Access (Modbus function) to use and the Data Type. The others items are the same of the Modbus serial RTU setup.

12.6. Data Logger Window

General



The Data Logger configuration can setup which TAG must be logged, how often acquire and how often send data to the cloud.

Sample Time: is how often all the TAGs must be logged.

Post to Http: if checked send data to the http server every time there is a new log available (available only on GPRS connection).

Periodic Report: if selected send data to cloud every selected minutes.

Daily Report: if selected send data to cloud every day at the selected hour.

Weekly: if selected send data to cloud each day/days selected at the selected hour.

Monthly: if selected send data to cloud every selected day of the month at selected hour.

Yearly: if selected send data to cloud the selected day of the year at selected hour.

NOTE

All counters inputs are sampled approximately every 5 ms, filtered at 15 ms.

All analog inputs are always sampled every 50 ms.

When the analog input avearge, maximum or minimum TAG are selected, the values are calculated in the Sample Time at the speed of 50 ms, so the RTU can log analog events >50ms.

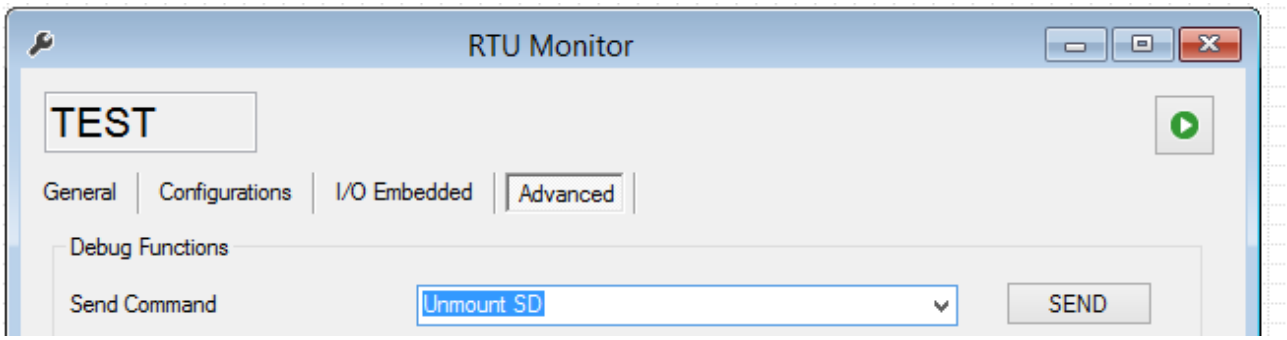
Notification: Select how the notification data must be send to the cloud: SMS, E-mail or FTP.

You can also save a backup of the csv file to the microSD card (the RTU will save the files to the /log directory). This files can be extracted activating the internal RTU FTP server or extracting the microSD card.

The Log notification to SMS only send the last log value.

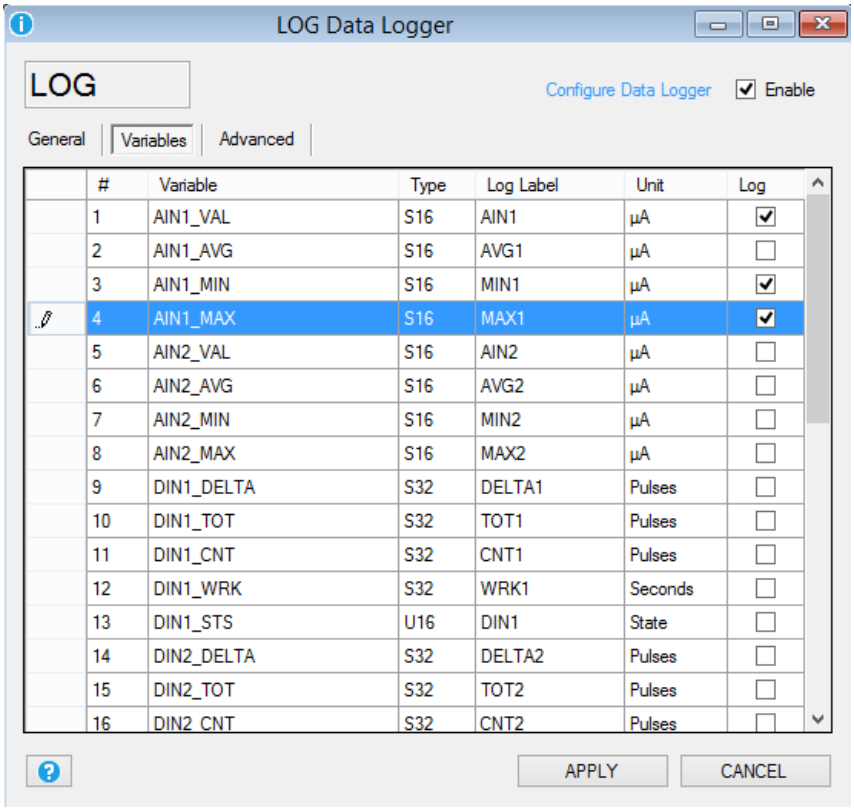
CAUTION!

Before extract the microSD you must Unmount-it or the stored data can be unusable!

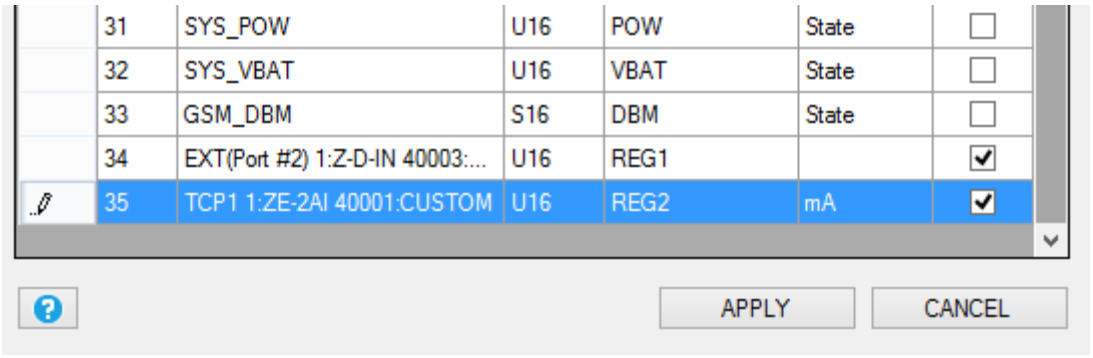


Variables

In this window you can select which TAGs must be logged, the TAGs can be from embedded or from external (Mobdus) I/O.



Select the TAGs that you want to log by flagging the Log column, Double click on the “Log label” column for changing the variable label. The Modbus Tags are at the end of the window:



Note that if you have applied a filter to the modbus value only the filter output value will be logged.

A brief embedded I/O variable description is:

Analog Inputs

AINx_VAL is the analog input x value sampled.

AINx_AVG is the analog input x average value calculated in the sample time, the analog input acquisition speed is 50 ms.

AINx_MIN is the analog input x minimum value calculated in the sample time, the analog input acquisition speed is 50 ms.

AINx_MAX is the analog input x maximum value calculated in the sample time, the analog input acquisition speed is 50 ms.

Digital Inputs

DINx_DELTA is the counter x difference between the last sampled value and the actual sample.

DINx_TOT is the total counter x sampled value.

DINx_CNT is the partial counter x sampled value.

DINx_WRK is the input x work time sampled (how many time the input is been ON or OFF).

DINx_STS is the digital input x sampled status value (1=ON or 0=OFF).

Digital outputs

DOUTx_STS is the digital output x sampled status value (1=ON or 0=OFF)

Misc:

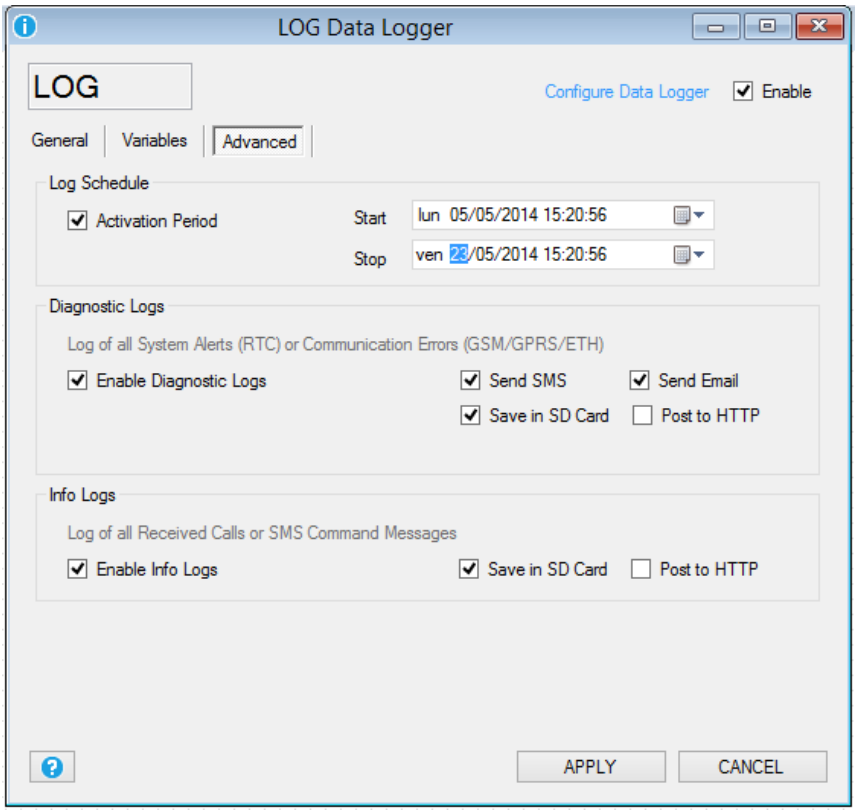
SYS_POW is the main power status (1= main power ok, 0 = main power down)

SYS_VBAT is the battery charge status (1 = battery charge ok, 0 = battery charge low)

GSM_DBM is the GSM value in dBm, the field value can be obtained by the following table:

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

Advanced



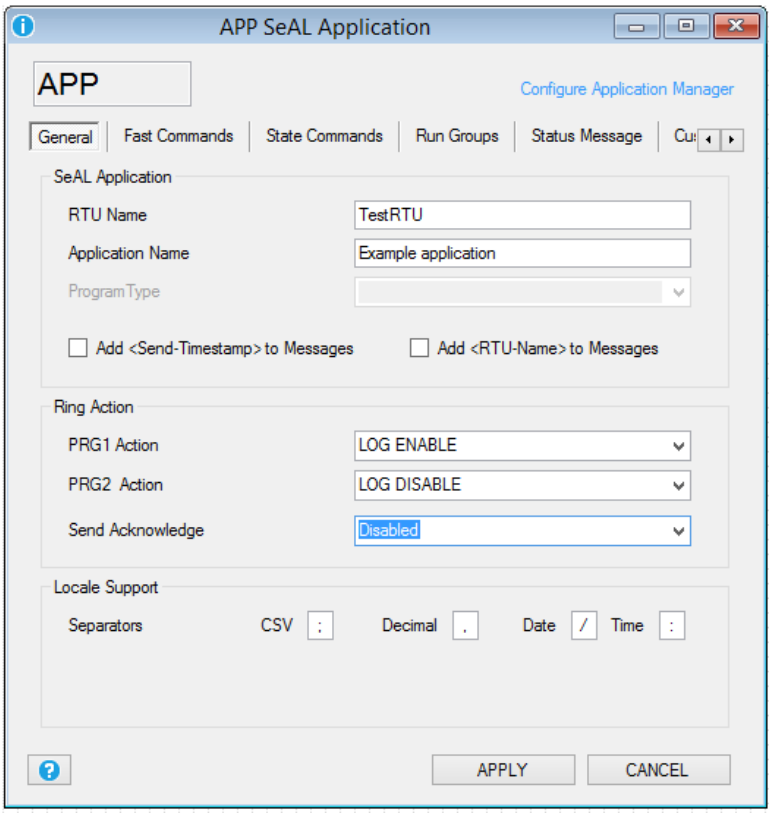
Activation Period: If checked enable the start date and a stop date of the datalogger, if disabled the datalogger is always on.

Enable Diagnostic Logs: If checked enable the logging of all the RTU status (Errors, Firmware update status, Remote configuration update etc…). Select also how the notification can be sent to the cloud (SMS, E-mail or by a GPRS connection a Post to an HTTP server). Also select if you want to log all the diagnostics to the microSD (the log file is syslog.csv into the microSD root).

Enable Info Logs: If checked enable the logging of all the RTU command received. Select if you want to log all the info to the microSD (the log file is syslog.csv into the microSD root) or you can also send a post to the HTTP server (GPRS connection only).

12.7. Application Window

General



RTU Name: Insert the RTU name

Application Name: Insert the application name

Add Timestamp to Messages: If checked add the Timestamp to the SMS or E-MAIL alert notifications. If the SMS is another RTU (machine to machine communication) you must uncheck this item.

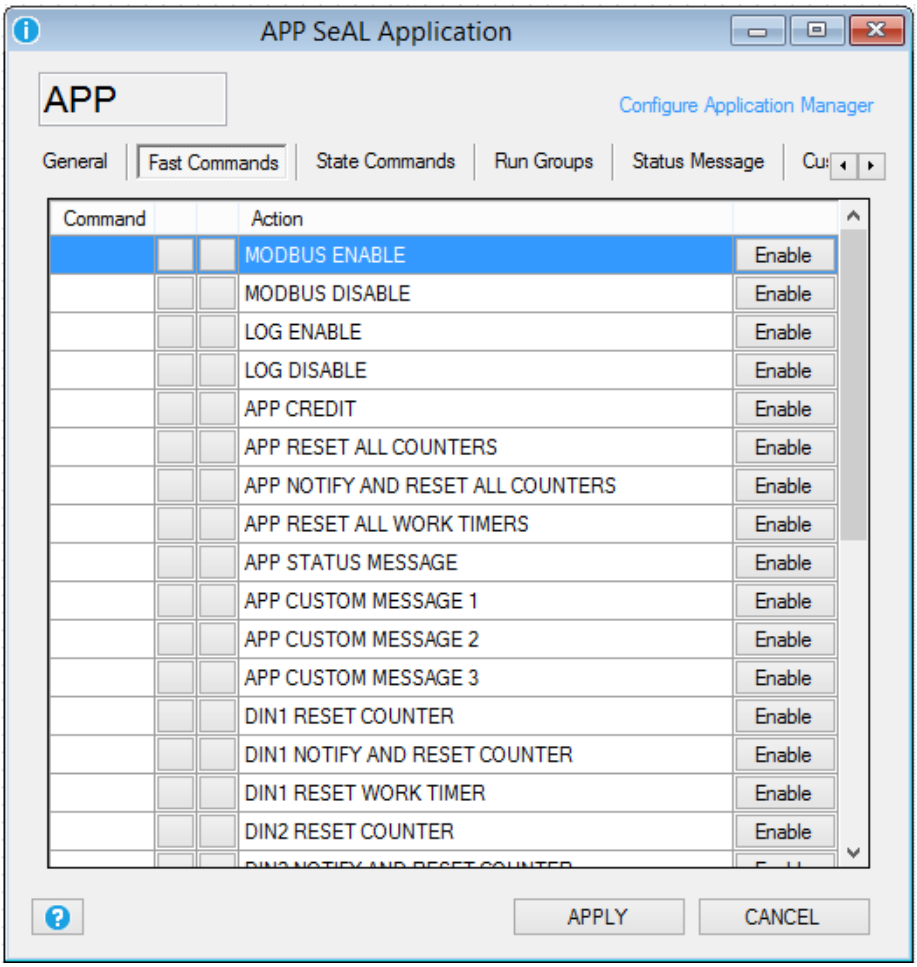
Add RTU Name to Messages: If checked add the RTU name to the SMS or E-MAIL alert notifications. If the SMS is another RTU (machine to machine communication) you must uncheck this item.

Ring Action: Select the PRG1 and PRG2 action to execute when a ring from an authorized user is received from the RTU. Select also if the RTU must send an acknowledge when the commands are executed. This feature can be used for obtain a "zero cost" command.

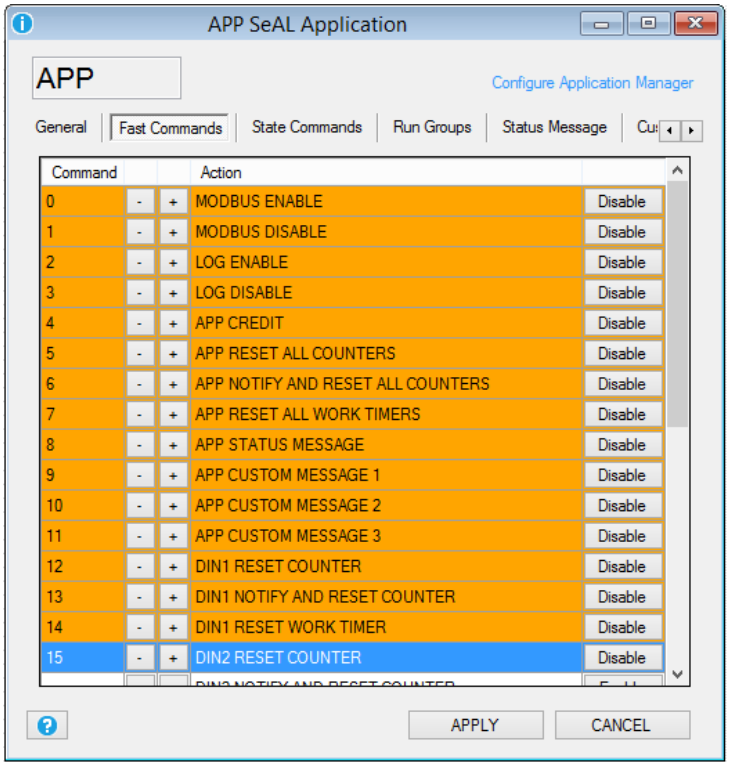
Separators: Select the separators used into the log csv file: CSV separator (default ";"), Decimal separator (default ","), Date separator (default "/"), Time separator (default ":").

Fast SMS Commands

In this window you can configure at least 16 custom fast commands , each command can be associated to a short SMS text from "0" to "15".



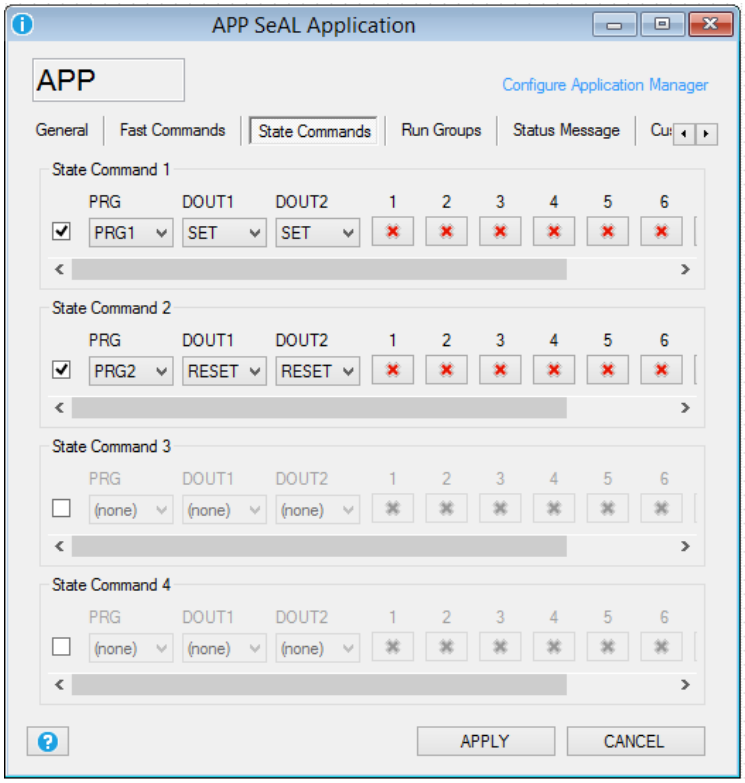
Select the “Enable” button for selecting the Command to enable from the commands database:



No you can select the SMS text with the icons.

State Commands

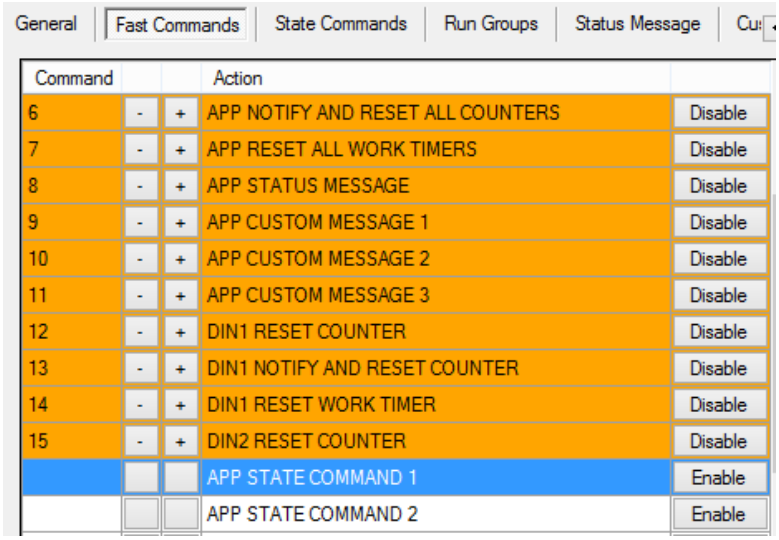
This window can be used for customizing the State command 1 to state command 4:



Select the PRG1 or PRG2 command (defined in the General section) or/and the Digital Out function.

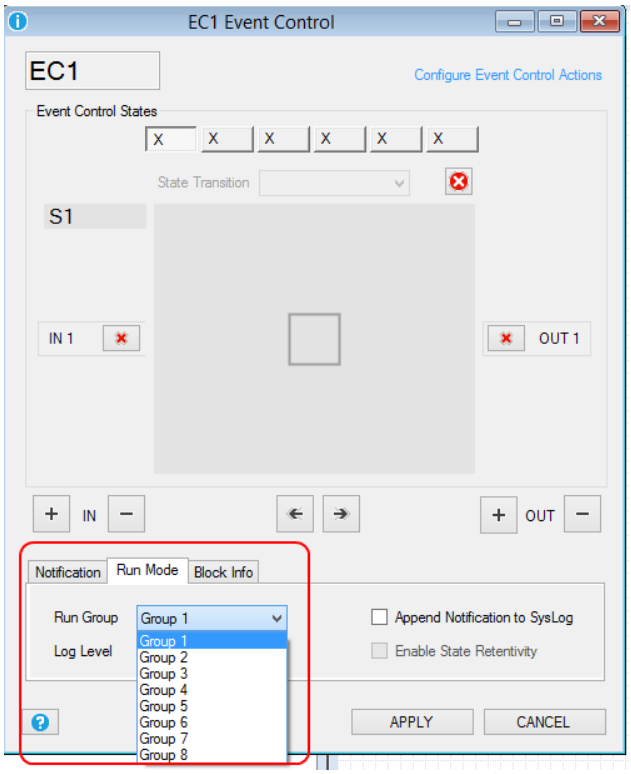
Select also the Run groups that you want to activate or not.

When you enable the app state commands you'll find into the Fast Commands section:

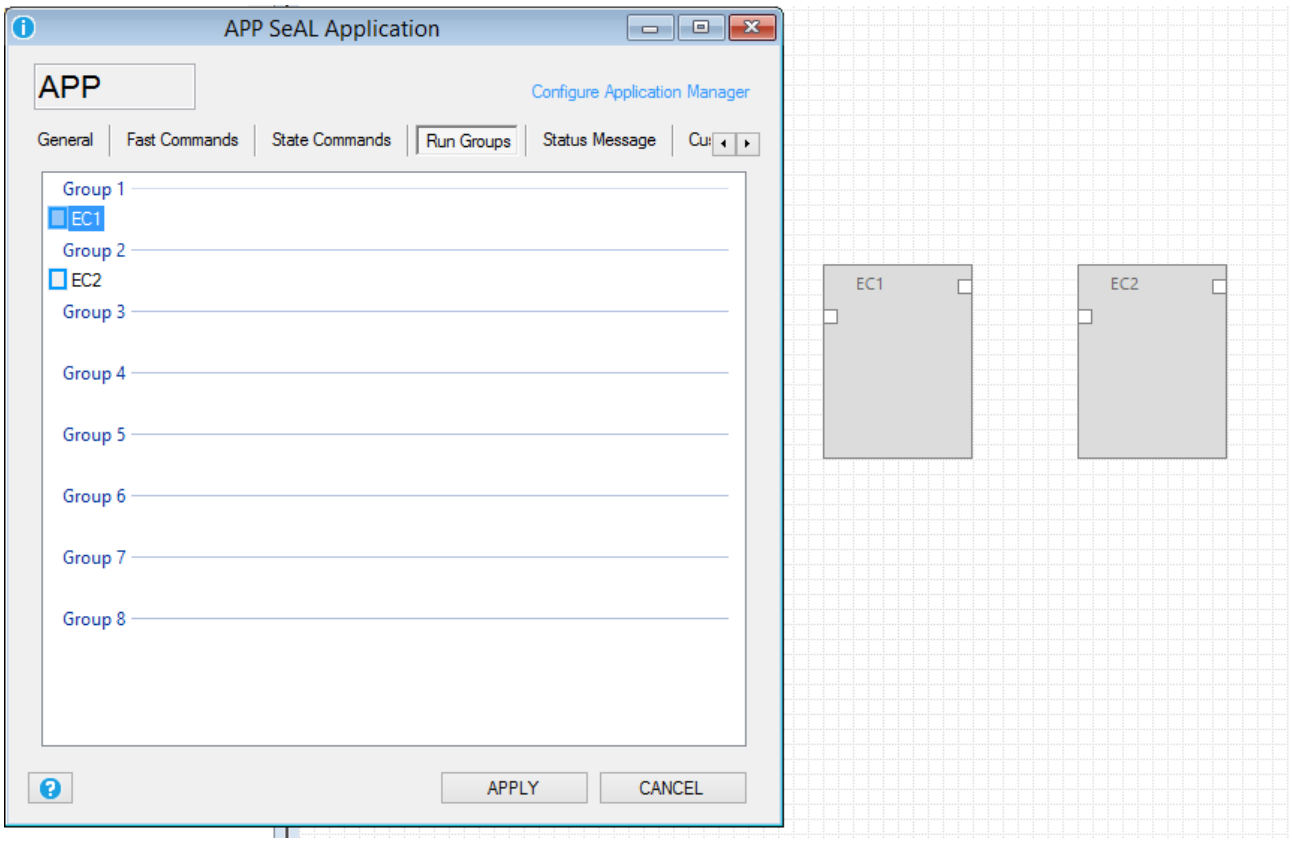


Run Groups

When you drag and drop one or more event controls in the graph panel you can select the run group associated:

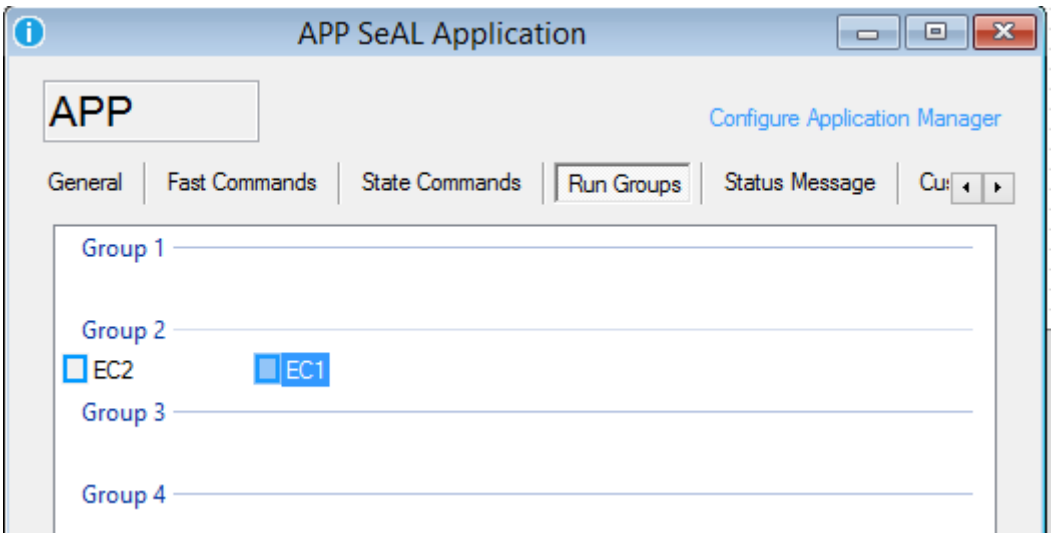


After that you'll find the run group configuration in the Run Group section:



In this example EC1 is configured in the run group1, EC2 in the run group2.

You can change the run group directly from the Run Groups window by drag and drop the icon to the Group 2:

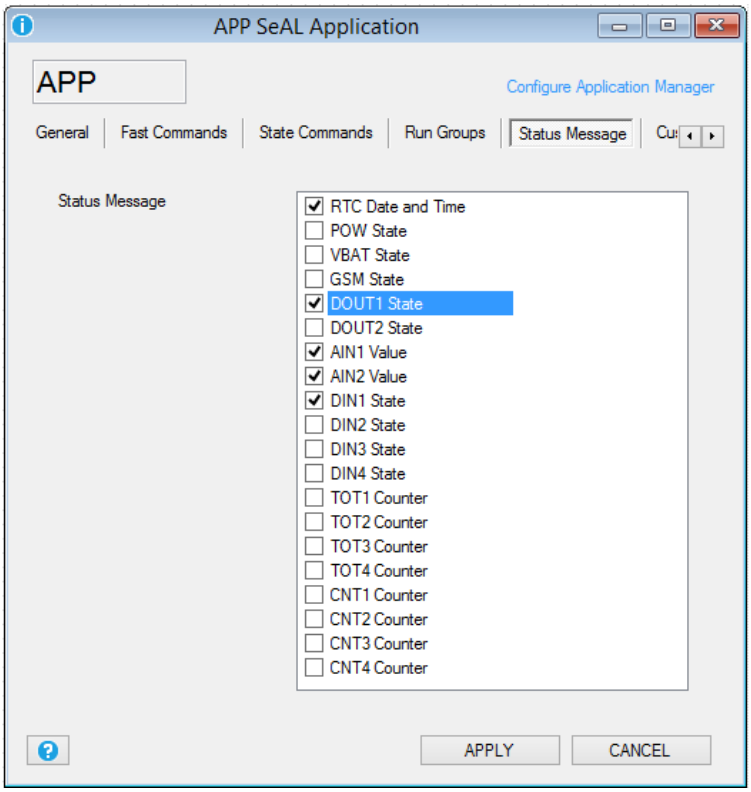


So EC1 and EC2 now are in the same rungroup.

Rungroups can be enabled/disabled by the state commands window.

Status Message

In this window you can select which tags must be sent in the status message:

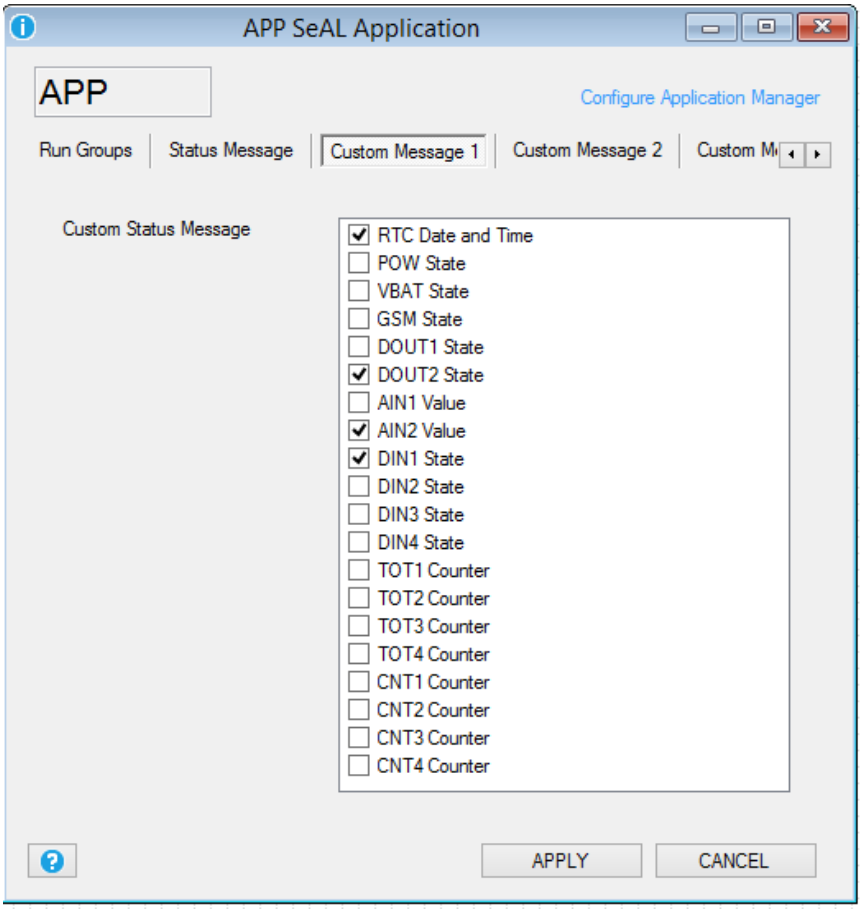


CAUTION!

The status message can be sent also by SMS so you must consider that the SMS text limit is 160 chars.

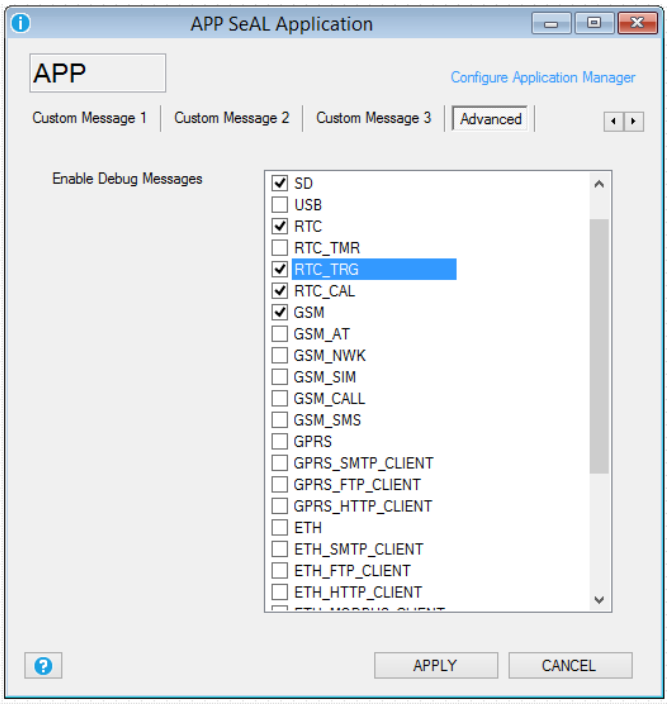
Custom Message1..3

In this window you can select the TAGs for custom message 1, custom message 2 and custom message 3.



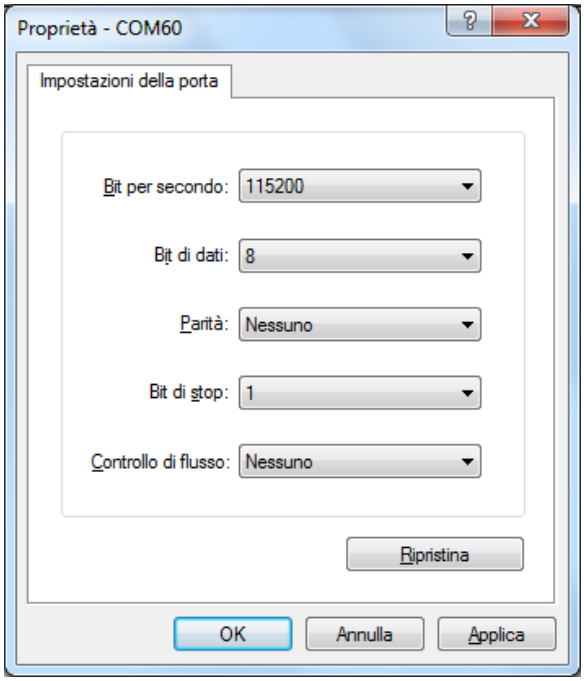
Advanced

In this window you can select witch section enable/disable into the debug log. The debug log is obtained by the Debug serial port.



Using the debug port, you can view and save to a file a log of operations performed by the RTU.
To connect to the debug port you must use the USB adapter "Easy USB", buy-it directly on the site Seneca (www.seneca.it) or contact Seneca for more info:

The connection to the PC is performed by a terminal software (for example HyperTerminal) with the following configurations:



12.8. System Management Configuration Window

Blackout

The RTU include a battery for UPS mode, so the RTU can send an alert on main power fail.

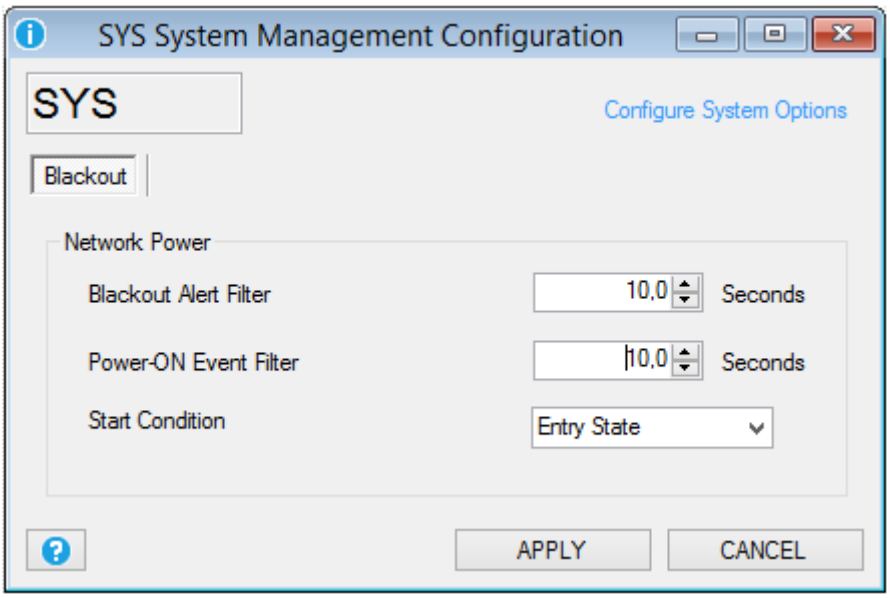
After a Blackout the RTU will:

-If configured send alerts

-If configured close the microSD file log

-switch off automatically

When the main power return to work correctly the RTU will switch on automatically.



Blackout Alert Filter: Select for how much seconds the main power must continuously be down before the RTU send an alert of blackout.

Power-ON Event Filter: Select for how much seconds the main power must continuously be up before the RTU send an alert of blackout off. Use this function also for send an alert when the RTU is powered on.

Start Condition: Select the start state and/or the alert mode:

Ignore state: the alert is activated on condition change state

Entry state: the alert is activated on state (so there is no need of a change state)

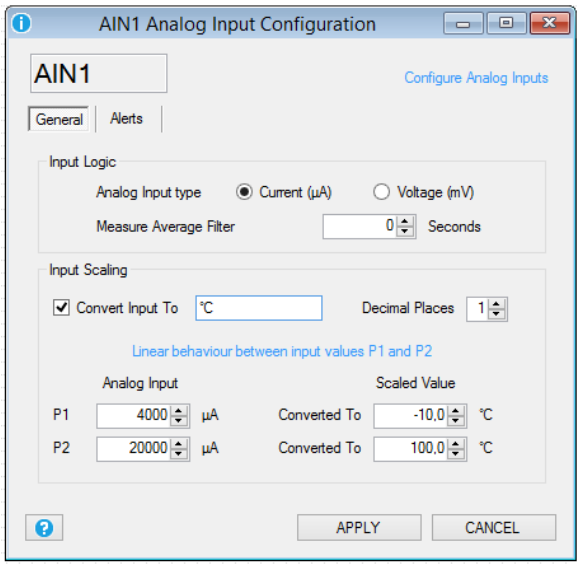
False: At startup the RTU alert is on False state so if the alert source was True the alert is activated, otherwise if at startup the alert source was False the alert is activated only at a following alert source change state.

True: At startup the RTU alert is on True state so if the alert source was True the alert is activated only at a following alert source change state, otherwise if at startup the alert source was False the alert is activated.

12.9. Analog Input Configuration Window

General

This window configure the embedded RTU analog inputs channels.



Analog Input Type: Select the analog input type from current (from 0 to 20 mA) or voltage (from 0 to 30 V).

Measure Average Filter: Select the filter applied to the analog input, a moving average is used for a best input stability.

Input Scaling: Scale directly the value obtained by the external sensor connected to the analog input.

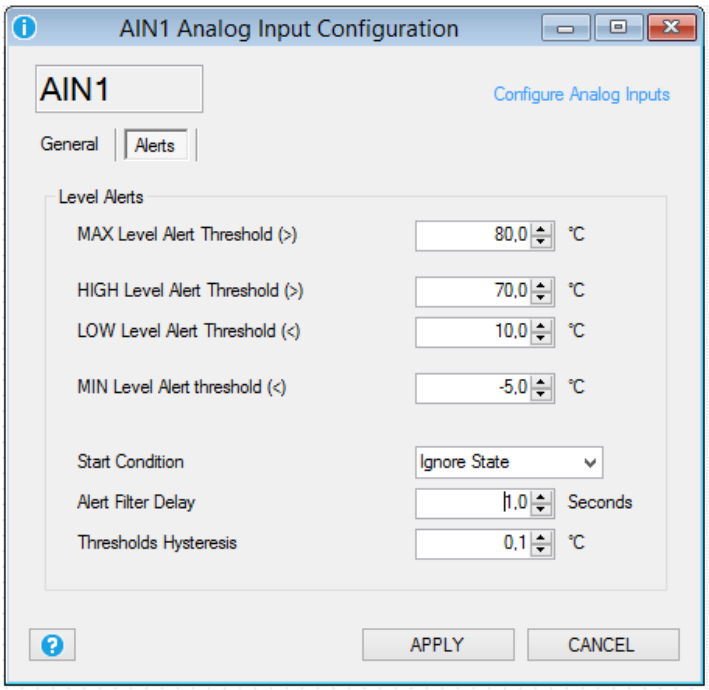
In the example above you can see how to scale a linear temperature input sensor from 4 ÷ 20mA to -10°C ÷ +100°C.

CAUTION!

If the Input scaling is activated, the datalogger will log the scaled input value and not the raw (mA or V) input. Also the alerts values are referred to the scaled value.

Alerts

In this window you can select the analog input alerts thresholds, each input has 4 different threshold: Minimum, Low, High and Maximum. Note that the threshold are referred to the scaled value (in this example is °C):



Maximum Level Alert Threshold: The alert is activated if the analog input is > Max Level configured.

High Level Alert Threshold: The alert is activated if the analog input is > High Level configured.

Low Level Alert Threshold: The alert is activated if the analog input is < Low Level configured.

Minimum Level Alert Threshold: The alert is activated if the analog input is < Min Level configured.

Start Condition: Select the start state and/or the alert mode:

Ignore state: the alert is activated on alert condition change state.

Entry state: the alert is activated on state (so there is no need of a change state).

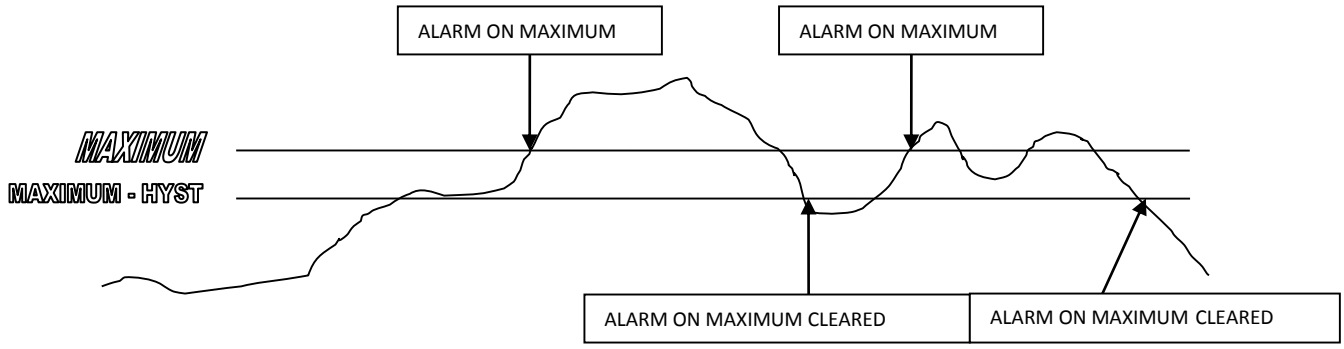
False: At startup the RTU alert is on False state so if the alert source was True the alert is activated, otherwise if at startup the alert source was False the alert is activated only at a following alert source change state.

True: At startup the RTU alert is on True state so if the alert source was True the alert is activated only at a following alert source change state, otherwise if at startup the alert source was False the alert is activated.

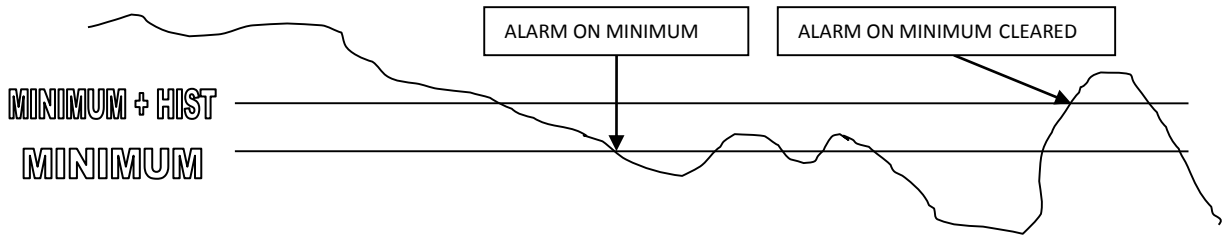
Alert Filter Delay: Select for how much seconds the analog input must continuously be in alert before the RTU alert is activated.

Threshold Hysteresis: Configure a hysteresis filter for the analog input. If the threshold is Maximum or High the alarm is activated when the analog input is > threshold but the alarm rearm is obtained when at the

analog input is < (Threshold-Hysteresis).

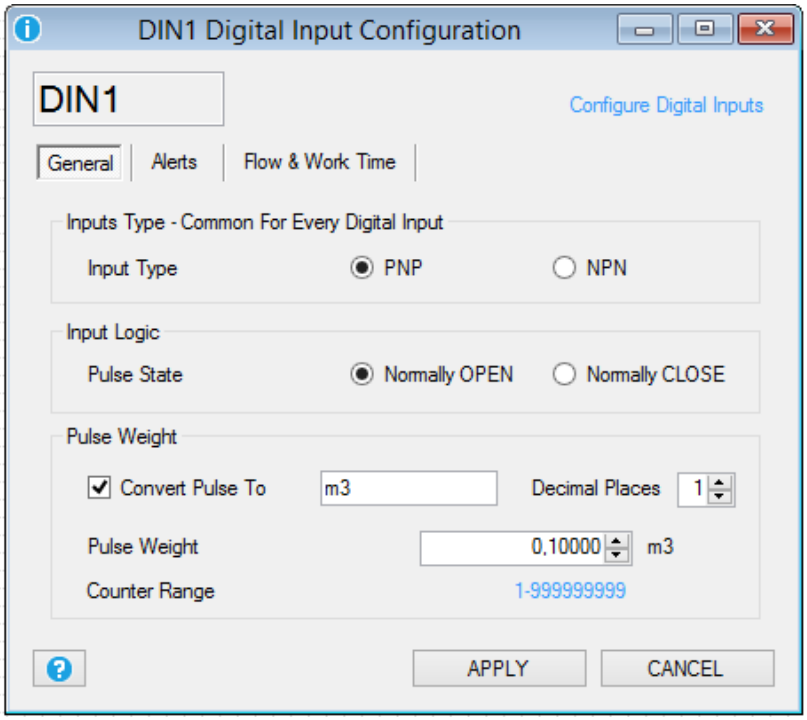


If the threshold is Minimum or Low the alarm is activated when the analog input is < threshold but the alarm rearm is obtained when at the analog input is > (Threshold+Hysteresis).



12.10. Digital Input Configuration Window

General



Input Type: Select the digital inputs type.

When PNP is selected, the the digital input is ON when the digital input is at +12Vdc, the digital input is OFF when the digital input is at GND.

When NPN is selected, the the digital input is ON when the digital input is at GND, the digital input is OFF when the digital input is at +12Vdc.

CAUTION!

Selection of PNP or NPN mode of one input will copy the selection to all the digital inputs.

Input Logic: Select if the input is normally open or normally close.

Pulse weight: If Checked you can setup the weight of one pulse of the partial counter and the counter. This function is useful for obtain the unit measure desired from the external senor. In the example one pulse value is set to 0.1 m^3. Note that when the partial counter or the counter reach the 999999999.0 the next pulse obtain the overflow to 0.0.

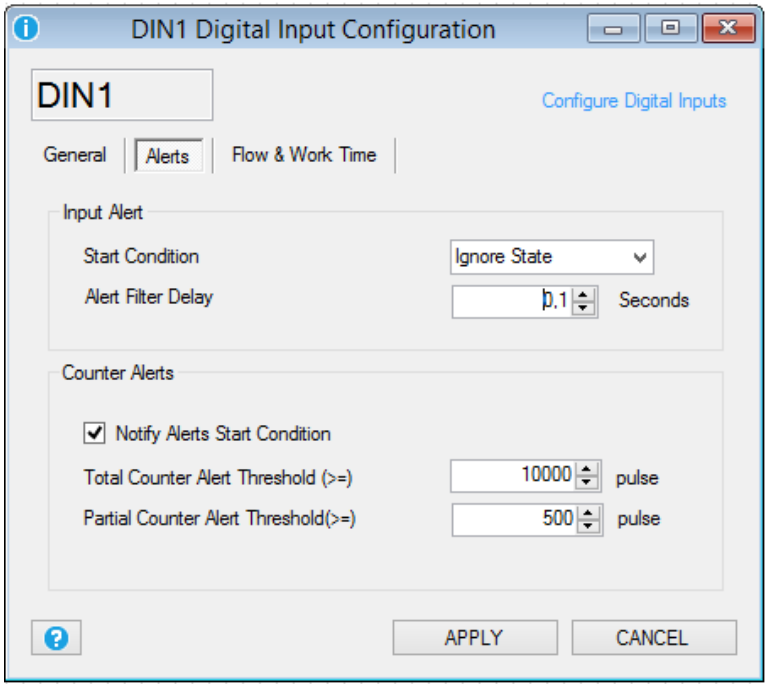
NOTE

The partial counters and the counters values are always saved in not volatile memory.

12.11. Digital Input Configuration Window

Alerts

In this window you can configure the input and the counter alerts.



Start Condition: Select the start state and/or the alert mode:

Ignore state: the alert is activated on input change state.

Entry state: the alert is activated on input state.

False: At startup the input alert is off so there is no need of a subsequent input change state because the alert is activated. For example if you have set the input alerts on state ON and at startup the input is ON the alert will be activated at startup.

True: At startup the input alert is on so there is a need of a subsequent input change state because the alert is activated. For example if you have set the input alerts on state ON and at startup the input is ON the alert will not be activated at startup.

Alert Filter Delay: Select for how much seconds the digital input must continuously be in alert state before the alert is activated.

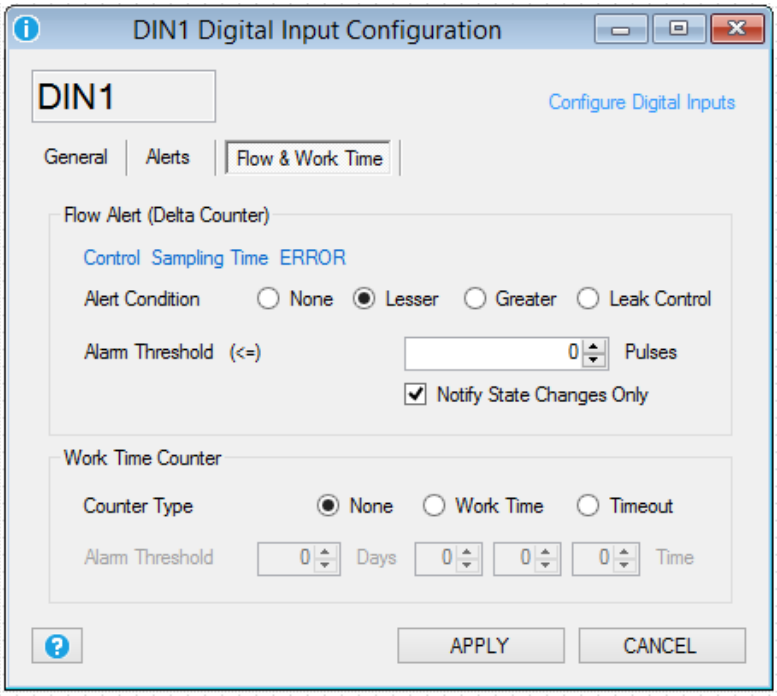
Notify alerts start condition: If Checked and if previously a counter alerts was activated, at every startup the alerts will be activated too.

Total counter alert threshold: Select the total counter alert pulse value (eventually scaled by the pulse weight).

Partial counter alert threshold: Select the total counter alert pulse value (eventually scaled by the pulse weight).

Flow and Work Time

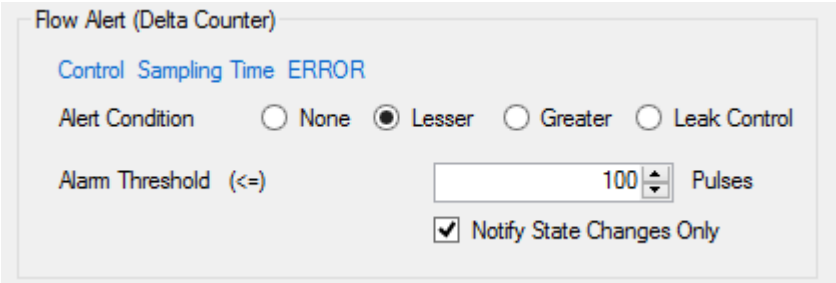
In this window you can setup alerts on delta counters or on work time counters.



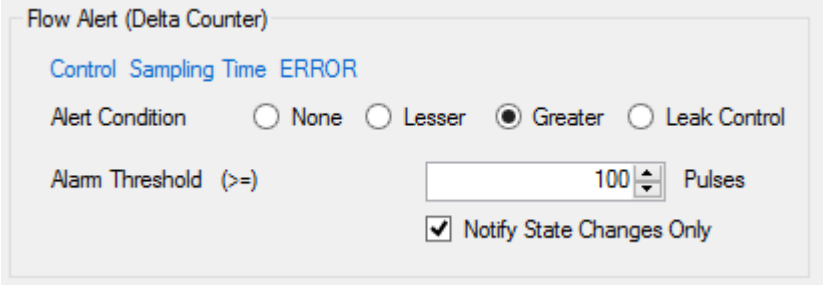
Delta Alert condition: Select alert condition related to the delta variables.

None the alert on Delta disabled.

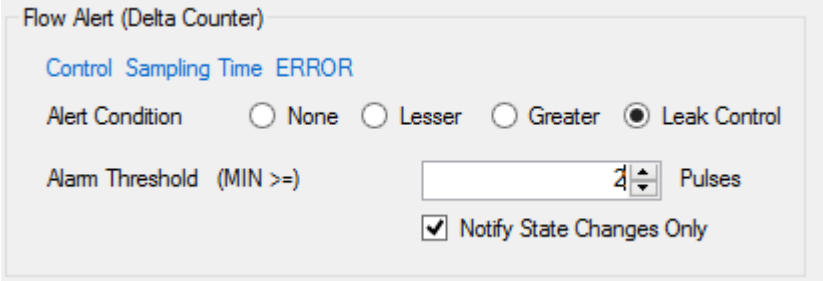
Lesser the alert is activated if the delta is lesser than threshold:



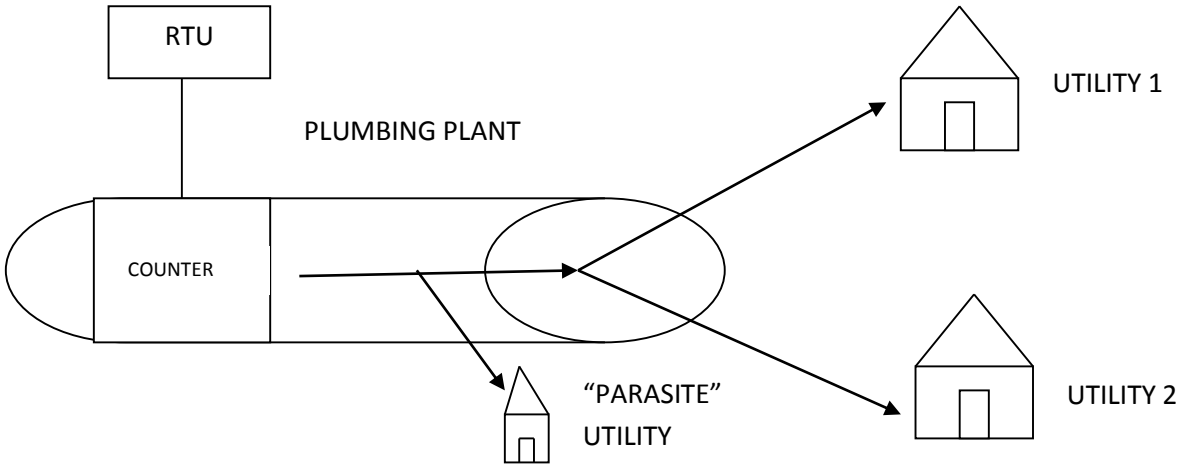
Greater the alert is activated if the delta is greater than threshold:



Leak Control the alert is activated if in the report period time the minimum of the delta sample is lesser than threshold. The Leak control can be used for pipes leak control: there must be a sample period where the consumption must be near to 0:



For example, considering a plumbing plant that supplies 2 utilities. Statistically, during one day (report time T = 24 hours) the admitted flow must be <0.1 m3/h (maximum admitted flow Q=0.1 m3/h) for at least one of the 10 minute t (sample time t= 10 minutes).



If this is not the case it means that there is a "parasite" utility in addition to the 2 utilities that continuously subtracts liquid (especially at night it is improbable that the utilities use water on all the 10 minute intervals).

Notify State changes only : If checked and there are multiple delta variables samples that satisfy the alert condition only the first active the alert. If not checked every delta samples that satisfy the alert condition will activate the alert.

Counter Type: Select from

None Counters alerts are disabled

Work Time Select for obtaining how long the selected digital input was to 1. When the digital input return to 0 the work time will reset.

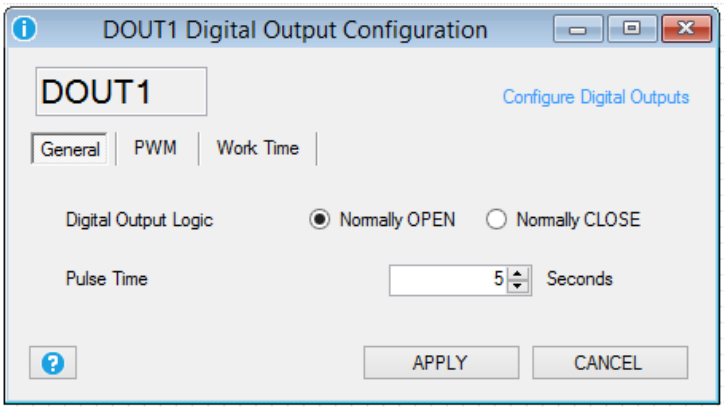
Timeout Select for obtaining how long the selected digital input was to 1. When the digital input return to 0 the work time will stop but don't reset. This alert is useful for scheduled maintenance.

Alarm Threshold is the time threshold used for the alert.

12.12. Digital Output Configuration Window

General

In this window you can setup the embedded digital outputs.



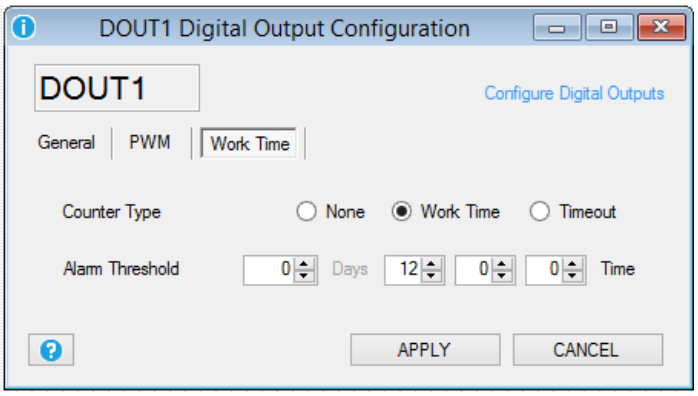
Digital Output Logic: Select the Normally Open or Normally Close output logic.

NOTE

The Normally Open/Close logic can also be set by the terminal screw.

Pulse Time: Select the pulse duration for the digital output pulse actions.

Work Time



None Counters alerts are disabled

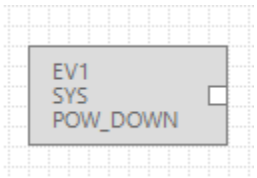
Work Time Select for obtaining how long the selected digital output was to state ON. When the digital input return to OFF the work time will reset.

Timeout Select for obtaining how long the selected digital input was to ON. When the digital input return to OFF the work time will stop but don't reset. This alert is useful for scheduled maintenance.

Alarm Threshold is the time threshold used for the alert.

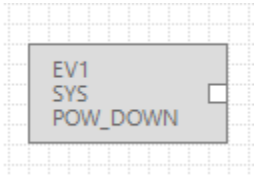
13. EVENT BLOCKS

13.1. Event Block SYS_POW_DOWN: System Management Power Down



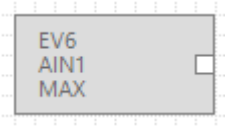
The SYS_POW_DOWN event block output is TRUE if the main power is down, is False if the main power is good.

13.2. Event Block SYS_LOW_BAT: System Management Battery Control



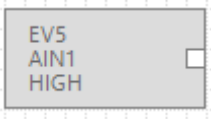
The SYS_LOW_BAT event block output is TRUE if the internal battery is not charged, is False if the internal battery is charged.

13.3. Event Block AIN_MAX: Analog Input Maximum Threshold Event



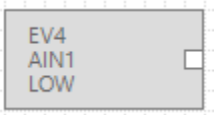
The Event Block AIN_MAX output is TRUE if the analog maximum threshold configured is exceeded, otherwise is FALSE.

13.4. Event Block AIN_HIGH: Analog Input High Threshold Event



The Event Block AIN_HIGH output is TRUE if the analog high threshold configured is exceeded, otherwise is FALSE.

13.5. Event Block AIN_LOW: Analog Input Low Threshold Event

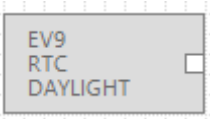


The Event Block AIN_LOW output is TRUE if the analog low threshold configured is exceeded, otherwise is FALSE.

13.6. Event Block AIN_LOW: Analog Input Low Threshold Event

The Event Block AIN_MIN output is TRUE if the analog minimum threshold configured is exceeded, otherwise is FALSE.

13.7. Event Block RTC_DAYLIGHT: Daylight Event



The Event Block RTC_DAYLIGHT output is TRUE after the sunrise and is FALSE at sunset.

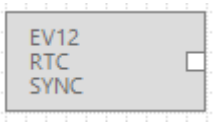
13.8. Event Block RTC_DAWN: Sunrise Event

The Event Block RTC_DAWN output emit a pulse at sunrise. The output pulse go from FALSE to TRUE then return to FALSE.

13.9. Event Block RTC_DUSK: Sunset Event

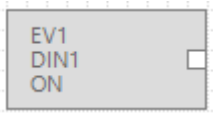
The Event Block RTC_DUSK output emit a pulse at sunset. The output pulse go from FALSE to TRUE then return to FALSE.

13.10. Event Block RTC_SYNC: Time Synchronization Error Event



The Event Block RTC_SYNC output emit a pulse if there is a time synchronization error (by GPRS or by ethernet channels). The output pulse go from FALSE to TRUE then return to FALSE.

13.11. Event Block DIN_ON: Not filtered Digital Input ON Event



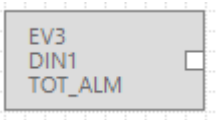
The Event Block DIN_ON output is TRUE if the digital input is in alert state, otherwise is FALSE.

In this Event Block the Alert filter delay is always 0 (not filtered).

13.12. Event Block DIN_ALM: Filtered Digital Input Event

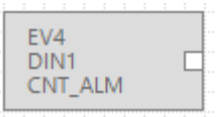
The Event Block DIN_ALM output is TRUE if the digital input is in alert state, otherwise is FALSE.

13.13. Event Block DIN_TOT_ALM: Total Counter Event



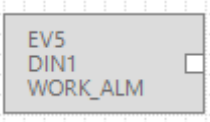
The Event Block DIN_TOT_ALM output is TRUE if the total counter threshold is in alert state, otherwise is FALSE.

13.14. Event Block DIN_CNT_ALM: Partial Counter Event



The Event Block DIN_CNT_ALM output is TRUE if the partial counter threshold is in alert state, otherwise is FALSE.

13.15. Event Block DIN_WORK_ALM: Work Time Event

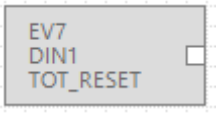


The Event Block DIN_WORK_ALM output is TRUE if the work time is in alert state, otherwise is FALSE.

13.16. Event Block DIN_DELTA_ALM: Delta Counter Event

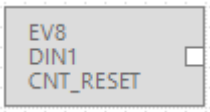
The Event Block DIN_DELTA_ALM output is TRUE if the delta counter is in alert state, otherwise is FALSE.

13.17. Event Block DIN_TOT_RESET: Total Counter Reset Event



The Event Block DIN_TOT_RESET output is TRUE if the total counter reset action is detected, otherwise is FALSE.

13.18. Event Block DIN_CNT_RESET: Partial Counter Reset Event



The Event Block DIN_CNT_RESET output is TRUE if the partial counter reset action is detected, otherwise is FALSE.

14. VARIABLE BLOCKS

14.1. Variable Block SYS_POW: Main Power Variable

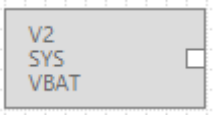
The Variable Block SYS_POW output is TRUE if the SYS_POW data logger variable is 1, otherwise is FALSE.

The SYS_POW variable in the datalogger is 1 if the main power is ok, 0 if the main power is down.

CAUTION!

The block only works if the variable is checked into the Data Logger Variables window, the variable refresh time is the datalogger sample time.

14.2. Variable Block SYS_VBAT: Main Power Variable



The Variable Block SYS_VBAT output is TRUE if the SYS_VBAT data logger variable is 1, otherwise is FALSE.

The SYS_VBAT variable in the datalogger is 1 if the battery is charged, 0 if the battery is discharged.

CAUTION!

The Block only works if the variable is checked into the Data Logger Variables window, the variable refresh time is the datalogger sample time.

14.3. Variable Block AIN_VAL : Analog Input Datalogger Sampled Value

The Variable Block AIN_VAL output value is the copy of the AIN_VAL datalogger value.

CAUTION!

The Block only works if the variable is checked into the Data Logger Variables window, the variable refresh time is the datalogger sample time.

14.4. Variable Block AIN_AVG : Analog Input Datalogger Average Value

The Variable Block AIN_AVG output value is the copy of the AIN_AVG datalogger value.

Into the datalogger the average is calculated into the sample time and the acquisition speed is fixed at 50 ms.

CAUTION!

The Block only works if the variable is checked into the Data Logger Variables window, the variable refresh time is the datalogger sample time.

14.5. Variable Block AIN_MIN : Analog Input Datalogger Minimum Value

The Variable Block AIN_MIN output value is the copy of the AIN_MIN datalogger value.

The minimum is calculated into the sample time, the acquisition speed is fixed at 50 ms.

CAUTION!

The Block only works if the variable is checked into the Data Logger Variables window, the variable refresh time is the datalogger sample time.

14.6. Variable Block AIN_MAX : Analog Input Datalogger Maximum Value

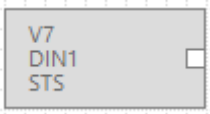
The Variable Block AIN_MAX output value is the copy of the AIN_MAX datalogger value.

The maximum is calculated into the sample time, the acquisition speed is fixed at 50 ms.

CAUTION!

The Block only works if the variable is checked into the Data Logger Variables window, the variable refresh time is the datalogger sample time.

14.7. Variable Block DIN_STS: Digital Input Value Sampled Variable



The Variable Block DIN_STS output is a copy if the DIN_STS data logger variable (boolean value).

CAUTION!

The Block only works if the variable is checked into the Data Logger Variables window, the variable refresh time is the datalogger sample time.

14.8. Variable Block DIN_TOT: Total Counter Value Sampled Variable

The Variable Block DIN_TOT output is a copy if the DIN_TOT data logger variable sampled value.

CAUTION!

The Block only works if the variable is checked into the Data Logger Variables window, the variable refresh time is the datalogger sample time.

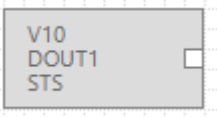
14.9. Variable Block DIN_CNT: Partial Counter Value Sampled Variable

The Variable Block DIN_CNT output is a copy if the DIN_CNT data logger variable sampled value.

CAUTION!

The Block only works if the variable is checked into the Data Logger Variables window, the variable refresh time is the datalogger sample time.

14.10. Variable Block DOUT_STS: Digital Output Value Sampled Variable

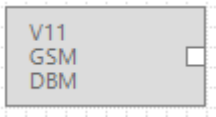


The Variable Block DOUT_STS output is a copy of the DOUT_STS data logger variable sampled value.

CAUTION!

The Block only works if the variable is checked into the Data Logger Variables window, the variable refresh time is the datalogger sample time.

14.11. Variable Block GSM_DBM: GSM signal field Value Sampled Variable



The Variable Block GSM_DBM output is a copy of the GSM_DBM data logger variable sampled value.

The GSM value is expressed in dBm, the field value can be obtained by the following table:

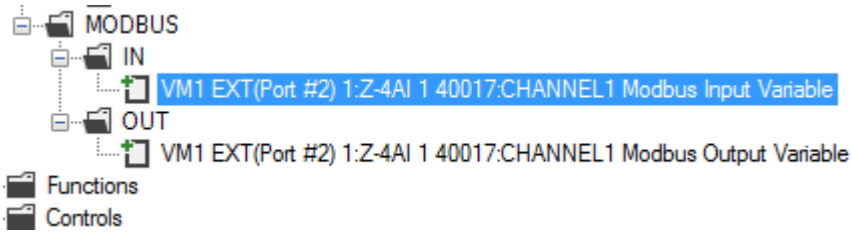
GSM Signal	GSM signal [dBm]
0 (MINIMUM)	-115
1	-106
2	-97
3	-88
4	-79
5	-70
6	-61
7 (MAXIMUM)	-52

CAUTION!

The Block only works if the variable is checked into the Data Logger Variables window, the variable refresh time is the datalogger sample time.

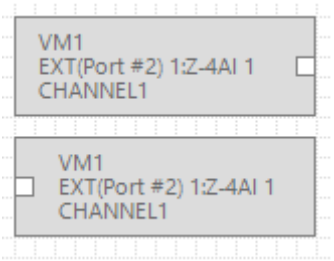
14.12. Variable Block MODBUS IN/OUT: Modbus Value Variable

When into the datalogger a modbus register is checked the IN/OUT variables will be refreshed:



The Input Variable block has an output value that is the copy of the modbus datalogger variable.

The Output Variable block has an input value that can be passed to the modbus datalogger variable.

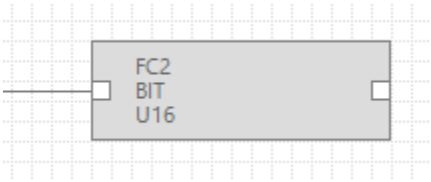


CAUTION!

The Block only works if the variable is checked into the Data Logger Variables window, the variable refresh time is the datalogger sample time.

15. BLOCKS FUNCTIONS

15.1. Function Block BIT: STATE BITS TEST FUNCTION



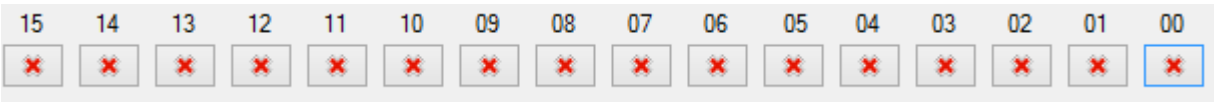
This block perform a bit test to the input variable connected.

The output boolean (True/False) value is obtained by the relation:

OUTPUT = TRUE ***IF (INPUT & BIT_MASK) is different from 0***

OUTPUT = FALSE ***IF (INPUT & BIT_MASK) is equal to 0***

For create the BIT_MASK click on the block:



Where:

= don't care, this bit is not tested

= this bit must be True (1)

= this bit must be False (0)

For example if you want to test if the second bits of the input variable is 1 you can prepare the BIT_MASK:

So, if the input value is (in binary) 1001 0101 0010 1010

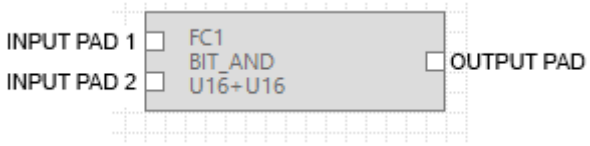
The Output function is TRUE because the second bit is 1.

Similarly you can test if the NR 0, 1, 2 and 4 bits are 1 but the 3,5 and 6 are 0 use this BIT_MASK:

So, if the input is (in binary) 1001 0101 0001 0111 the output function is TRUE

But if the input is (in binary) 1001 0101 0001 0110 the output function is FALSE

15.2. Function Block BIT_AND: AND REGISTERS STATE BITS TEST FUNCTION



This block perform a bit test between the two inputs variables connected, only if the test is true for input1 and for input2 the output is true.

The output boolean (True/False) value is obtained by the relation:

OUTPUT = (INPUT1 & BIT_MASK1) AND (INPUT2 & BIT_MASK2)

Where & is the boolean and bit to bit operator, AND is the boolean and operator.

For create the BIT_MASK click on the block:

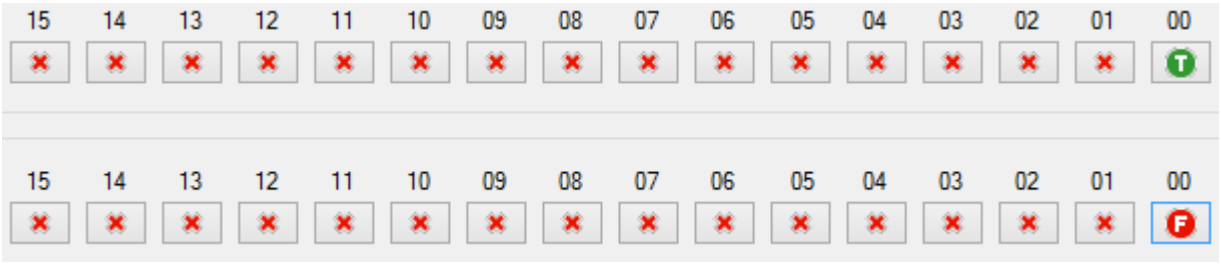
Where:

= don’t care, this bit is not tested

= this bit must be True (1)

= this bit must be False (0)

For example if you want to test if the first bits of the input variable1 is 1 and the first bit of the input variable2 IS 0 you can prepare the BIT_MASK1 and BIT_MASK2 like this:



So, if the input1 value is (in binary) 1001 0101 0010 1001

And

the input1 value is (in binary) 0001 0101 0010 1000

The Output function is TRUE because both the test are true.

Similarly you can test INPUT1 if the NR 0, 1, 2 and 4 bits of the are 1 but the 3,5 and 6 are 0 and INPUT2 if the NR 0,5,8 are 1 using BIT_MASK1 and BIT_MASK2:

So, if the input1 is (in binary) 1001 0101 0001 0111

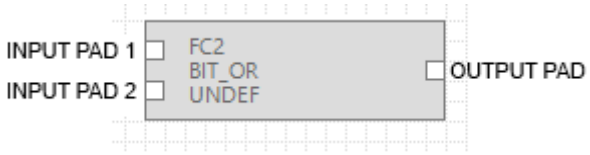
and

the input2 is (in binary) 1111 0001 0110 0001

the output function is TRUE

But if just the input1 is (in binary) 1001 0101 0001 0110 or input2 is (in binary) 0000 0000 0000 0000 the output function is FALSE.

15.3. Function Block BIT_AND: OR REGISTERS STATE BITS TEST FUNCTION



This block perform a bit test between the two inputs variables connected, if the test is true for at least one input the output is true.

The output boolean (True/False) value is obtained by the relation:

OUTPUT = (INPUT1 & BIT_MASK1) OR (INPUT2 & BIT_MASK2)

Where & is the boolean and bit to bit operator, OR is the boolean OR operator.

For create the BIT_MASK click on the block:

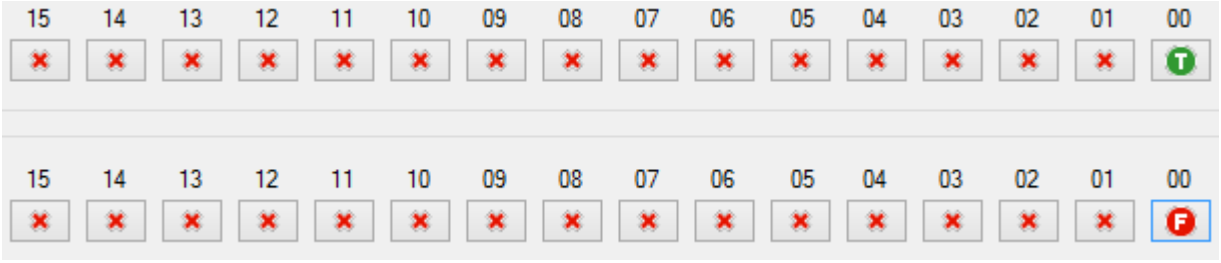
Where:

= don't care, this bit is not tested

= this bit must be True (1)

= this bit must be False (0)

For example if you want to test if the first bits of the input variable1 is 1 or if the first bit of the input variable2 IS 0 you can prepare the BIT_MASK1 and BIT_MASK2 like this:



So, if the input1 value is (in binary) 1001 0101 0010 1001

Or

the input1 value is (in binary) 0001 0101 0010 1000

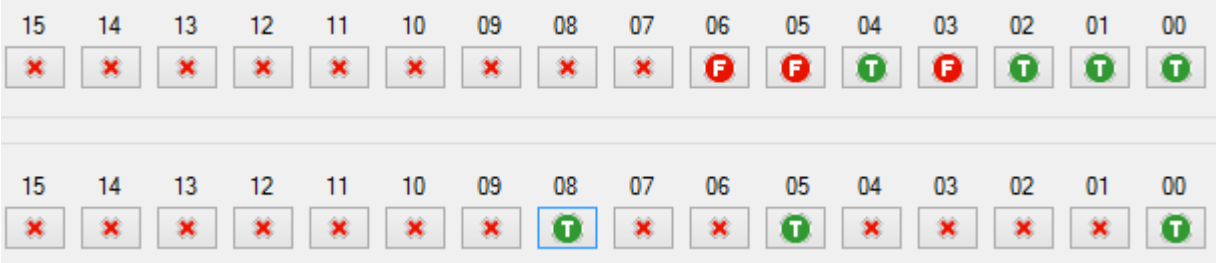
The Output function is TRUE because both the test are true.

Similarly you can test if INPUT1 has NR 0, 1, 2 and 4 bits at 1 but the 3,5 and 6 at 0

Or

if INPUT2 has the NR 0,5,8 bits at 1

using BIT_MASK1 and BIT_MASK2:



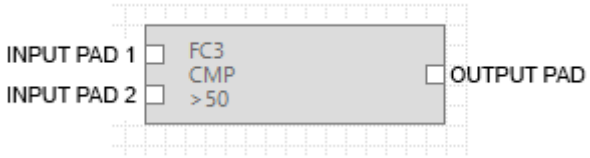
So, if the input1 is for example (in binary) 1001 0101 0001 0111

or

if the input2 is for example (in binary) 1111 0001 0110 0001

the output function is TRUE.

15.4. Function Block CMP: ANALOG DIFFERENCE COMPARE FUNCTION

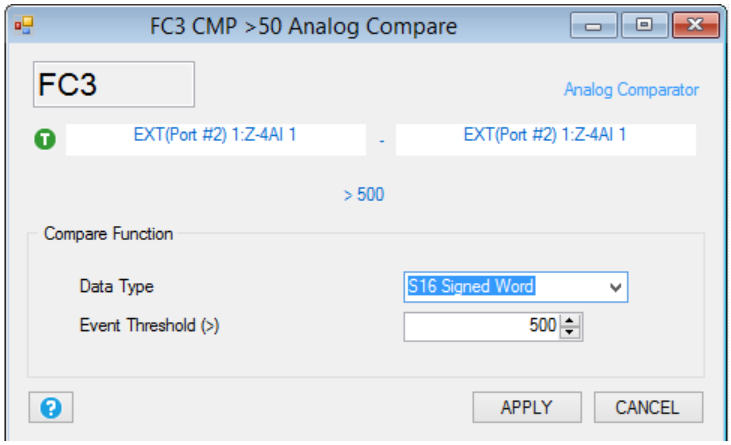


This block perform the analog difference between input1 and input2 and then compare it with the threshold.

The output boolean (True/False) value is obtained by the relation:

OUTPUT = TRUE ***IF (INPUT1 -INPUT2) > THRESHOLD***

OUTPUT = FALSE ***IF (INPUT1-INPUT2) <= THRESHOLD***

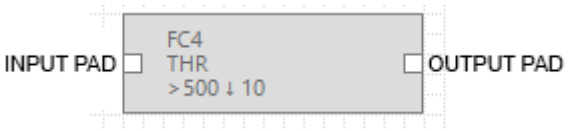


Data Type: select the input1 and input2 data type from:

Integer Signed 16 Bits , Integer Signed 32 Bits or Floating point 32 Bits.

Event Threshold: select the compare threshold value.

15.5. Function Block THR: ANALOG THRESHOLD COMPARE WITH HYSTERESIS FUNCTION



This block perform the analog compare function between the input and the configured threshold, also a hysteresis can be configured.

The output boolean (True/False) value is obtained by the relation:

If the compare “>” is selected:

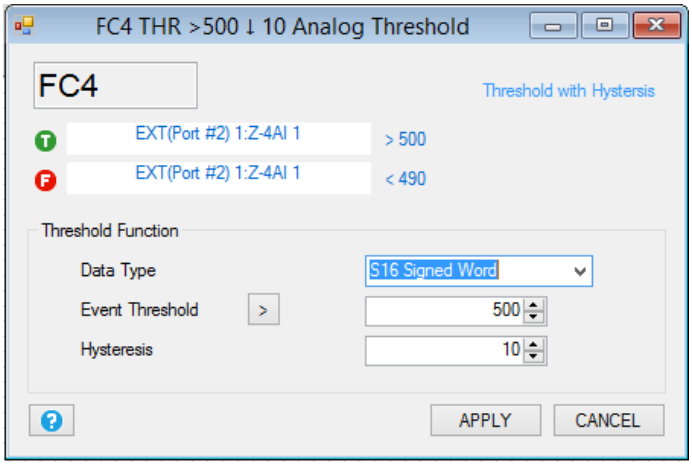
OUTPUT = TRUE IF (INPUT > THRESHOLD)

OUTPUT = FALSE IF (INPUT < THRESHOLD-HYSTERESIS)

If the compare “<” is selected:

OUTPUT = TRUE IF (INPUT < THRESHOLD)

OUTPUT = FALSE IF (INPUT > THRESHOLD+HYSTERESIS)



Data Type: select the input data type from Integer Signed 16 Bits , Integer Signed 32 Bits or Floating point 32 Bits.

Event Threshold: Select if the event is “>” or “<” and the threshold value.

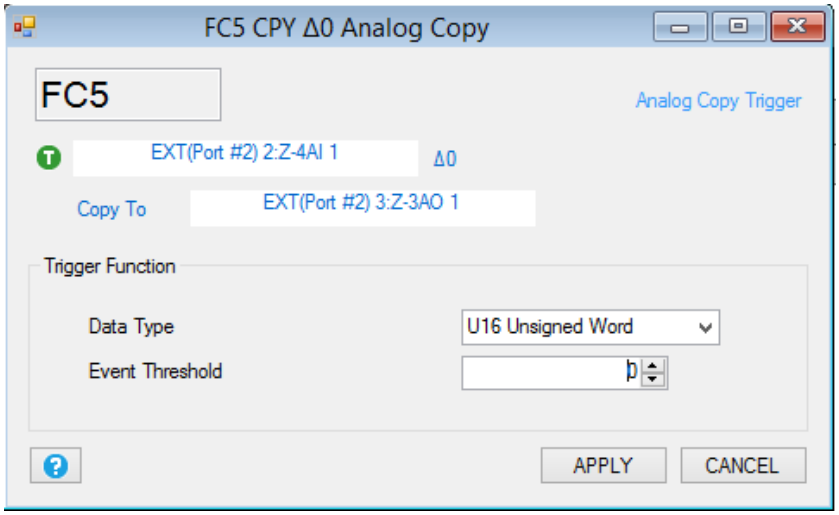
Hysteresis: Select the hysteresis value for the True to False output transition.

15.6. Function Block CPY: ANALOG VARIABLE COPY TO ANOTHER VARIABLE WITH TRIGGER FUNCTION

This block function copies the analog variable value from the INPUT to the analog variable connected to OUTPUT PAD 2.

A difference (Delta trigger) value between the last copied value can be configured for when executing the copy.

The OUTPUT PAD 1 report a pulse event (from False to True then return false) related when the copy is executed.



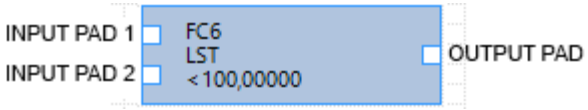
Data Type: Select the input and output data type from Integer Signed 16 Bits , Integer Signed 32 Bits or Floating point 32 Bits.

Event Threshold: Select the when the input value must be copied to the output 2, the copy will be executed only if:

(last input copied value – actual input value) > Event threshold

If you want to always copy the variable then select Event threshold = 0.

15.7. Function Block LST: SCALED ANALOG INPUTS LESS THAN COMPARE FUNCTION

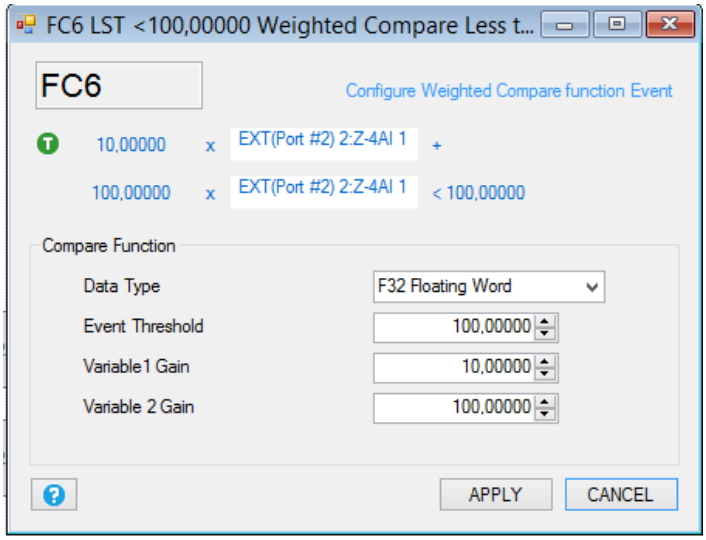


This block function applies a scale factors to the inputs and then compare if the sum value is < than a threshold.

The output boolean (True/False) value is obtained by the relation:

OUTPUT= TRUE ***IF ((INPUT1 x GAIN1)+(INPUT2 x GAIN2)) < THRESHOLD***

OUTPUT=FALSE ***IF ((INPUT1 x GAIN1)+(INPUT2 x GAIN2)) >= THRESHOLD***



Data Type: Fixed to floating point 32 bits.

Event Threshold: Insert the Threshold compare value.

Variable 1 GAIN: Insert the INPUT1 multiplication constant value also the sign "+" or "-".

Variable 2 GAIN: Insert the INPUT2 multiplication constant value also the sign "+" or "-".

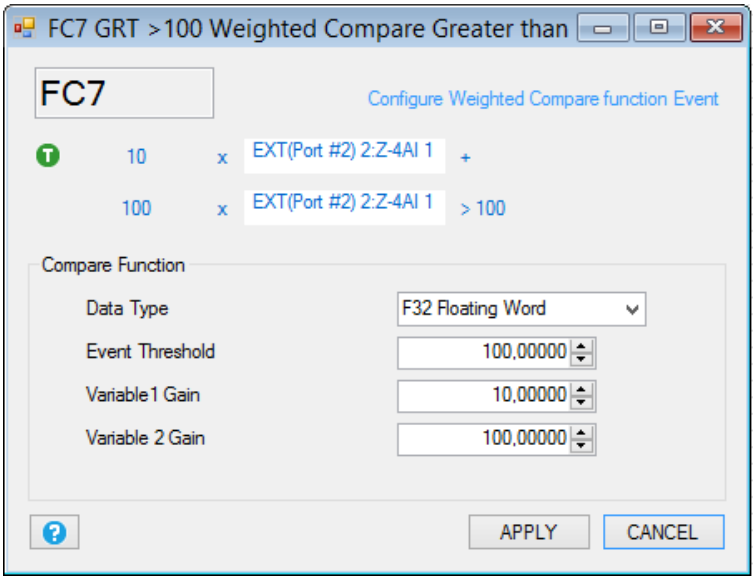
15.8. Function Block GRT: SCALED ANALOG INPUTS GREATER THAN COMPARE FUNCTION

This block function applies a scale factors to the inputs and then compare if the sum value is > than a threshold.

The output boolean (True/False) value is obtained by the relation:

OUTPUT= TRUE ***IF ((INPUT1 x GAIN1)+(INPUT2 x GAIN2)) > THRESHOLD***

OUTPUT=FALSE ***IF ((INPUT1 x GAIN1)+(INPUT2 x GAIN2)) <= THRESHOLD***



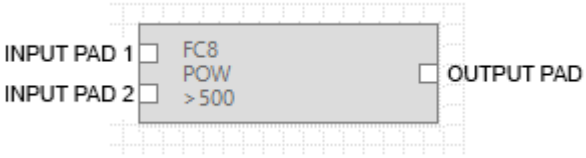
Data Type: Fixed to floating point 32 bits.

Event Threshold: Insert the Threshold compare value.

Variable 1 GAIN: Insert the INPUT1 multiplication constant value also the sign "+" or "-".

Variable 2 GAIN: Insert the INPUT2 multiplication constant value also the sign "+" or "-".

15.9. Function Block POW: ANALOG INPUTS MULTIPLICATION GREATER THAN COMPARE FUNCTION

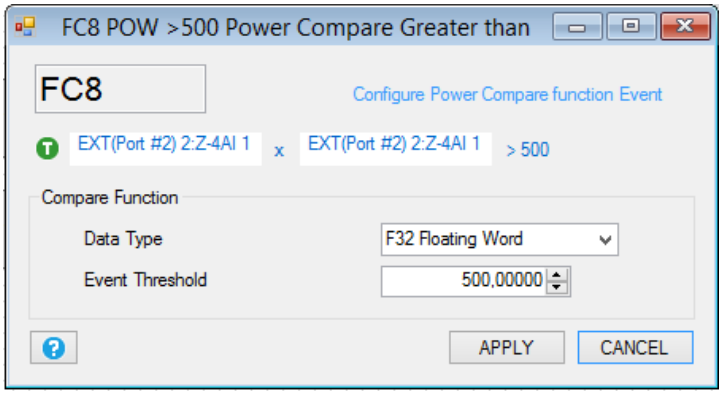


This block perform a multiplication between the variable input 1 and the variable input 2, than compare the result with a threshold.

The output boolean (True/False) value is obtained by the relation:

OUTPUT= TRUE ***IF (INPUT1 x INPUT2) > THRESHOLD***

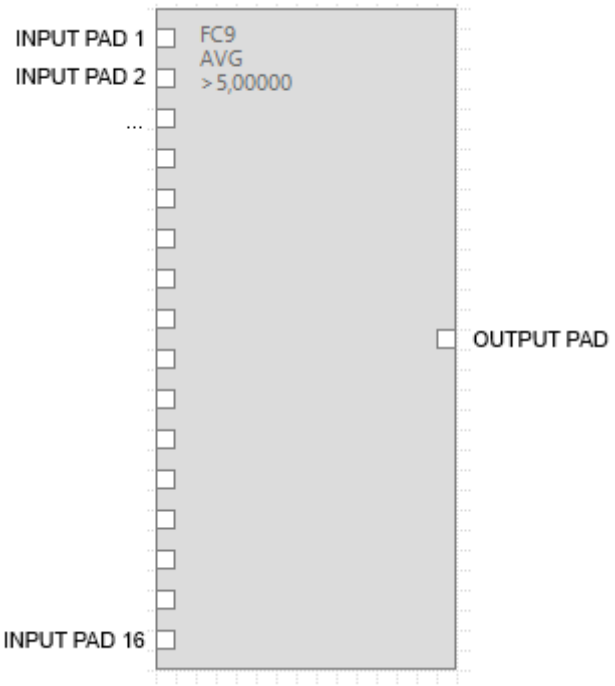
OUTPUT= FALSE ***IF (INPUT1 x INPUT2) < THRESHOLD***



Data Type: Fixed to floating point 32 bits.

Event Threshold: Insert the Threshold compare value.

15.10. Function Block AVG: ANALOG AVERAGE GREATER THAN COMPARE FUNCTION

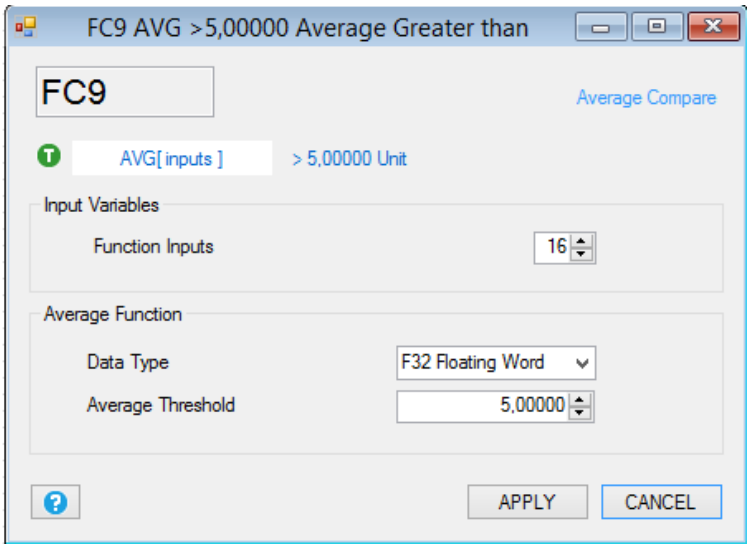


This block function calculate an average of all the inputs, than compare this average with a threshold.

The output boolean (True/False) value is obtained by the relation:

OUTPUT= TRUE IF AVERAGE(IN1+IN2+…+IN16) > THRESHOLD

OUTPUT= FALSE ***IF AVERAGE(IN1+IN2+…+IN16) <= THRESHOLD***

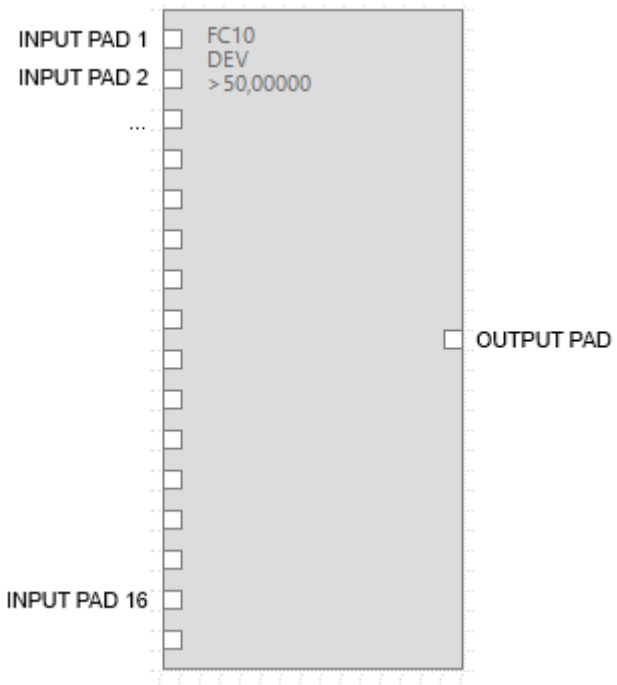


Function Inputs: Select the input pad numbers (from 2 to 16). Note that you can't leave unconnected an input pad.

Data Type: Fixed to floating point 32 bits.

Event Threshold: Insert the Threshold compare value.

15.11. Function Block DEV: ANALOG AVERAGE ABSOLUTE DIFFERENCE GREATER THAN COMPARE FUNCTION

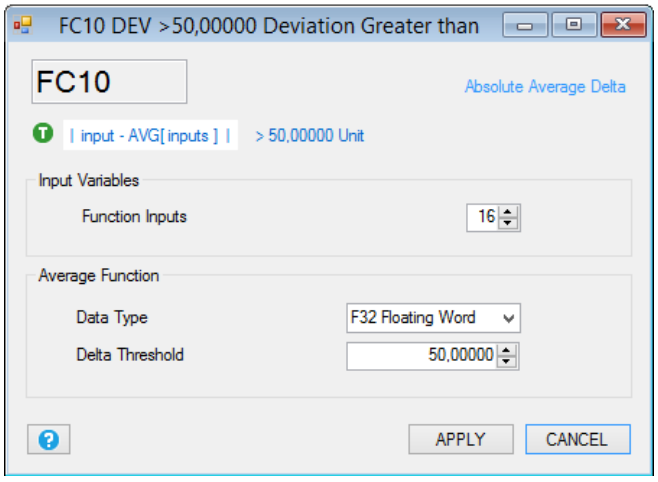


This block function calculate the absolute difference between an input and the average of all the inputs, than compare all this values with a threshold, if at least one of these compares is true the output is true too.

The output boolean (True/False) value is obtained by the relation:

OUTPUT= TRUE ***IF |IN1-AVG| > THRESHOLD OR |IN2-AVG| > THRESHOLD OR … |IN16-AVG|>THRESHOLD***

OUTPUT= FALSE ***IF |IN1-AVG| <= THRESHOLD AND |IN2-AVG| <= THRESHOLD AND … |IN16-AVG|<=THRESHOLD***

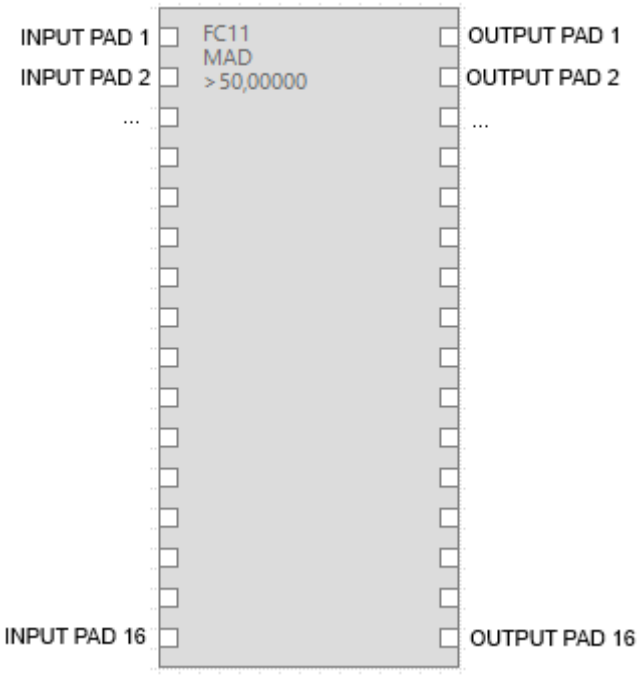


Function Inputs: Select the input pad numbers (from 2 to 16). Note that you can't leave unconnected an input pad.

Data Type: Fixed to floating point 32 bits.

Event Threshold: Insert the Threshold compare value.

15.12. Function Block MAD: ANALOG AVERAGE ABSOLUTE DIFFERENCE COMPARE WITH CHANNEL DETECT FUNCTION

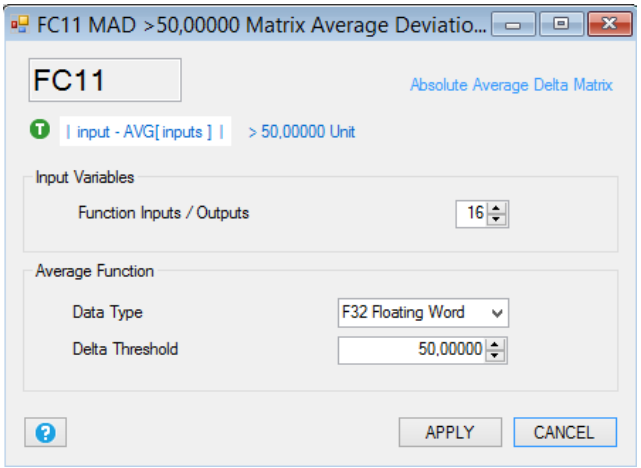


This block function calculate the absolute difference between each input and the average of all the inputs, than compare each of these values with a threshold. The compare output is emit to each output pad (input 1 compare to output 1, input 2 compare to output 2 and so on).

Each output boolean (True/False) value is obtained by the relation:

OUTPUTx= TRUE ***IF |INx-AVG| > THRESHOLD***

OUTPUTx= FALSE ***IF |INx-AVG| <= THRESHOLD***



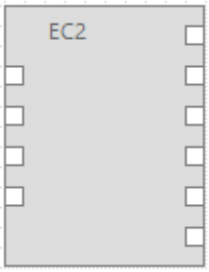
Function Inputs/Outputs: Select the input/output pad numbers (from 2 to 16). Note that you can't leave unconnected an input pad.

Data Type: Fixed to floating point 32 bits.

Event Threshold: Insert the Threshold compare value.

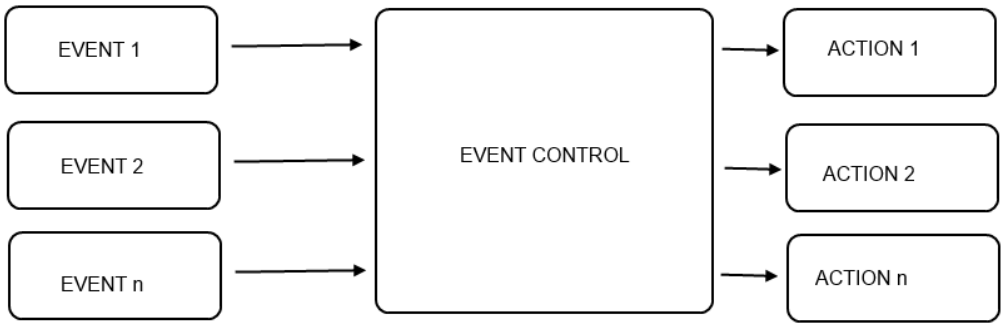
16. BLOCKS CONTROLS

16.1. Control Block EC: EVENT LOGIC CONTROL



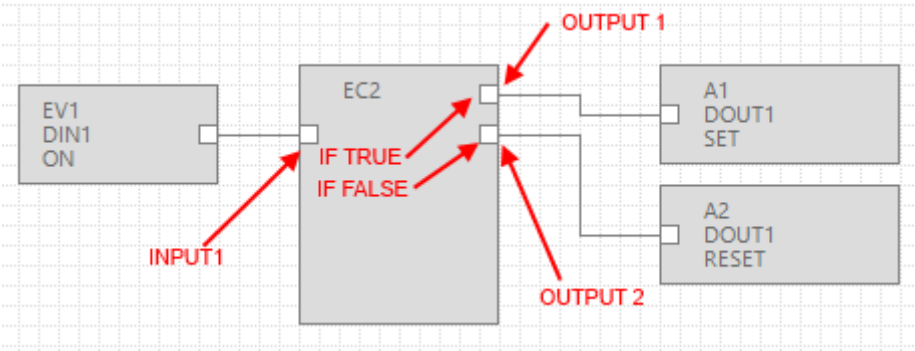
This block is the logic heart of the SEAL program, in the Graph Panel can contain up to 32 EC blocks.

The EC Control block can have up to 4 boolean inputs and up to 6 boolean outputs.



The EC inputs accept boolean events, each event control output must be connected to an action.

For example you can connect a digital input alarm event DIN1_ON to the EC block input and the output 1 to a SET DOUT1 action and the output 2 to a RESET DOUT1 action:



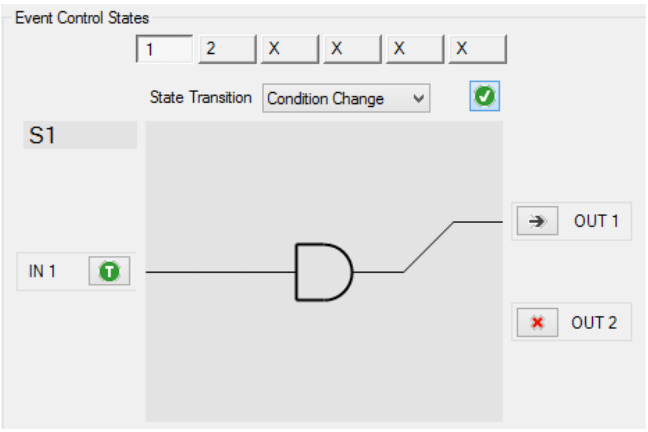
The internal EC logic could be:

IF (INPUT1 = TRUE) Then Execute Action Output 1

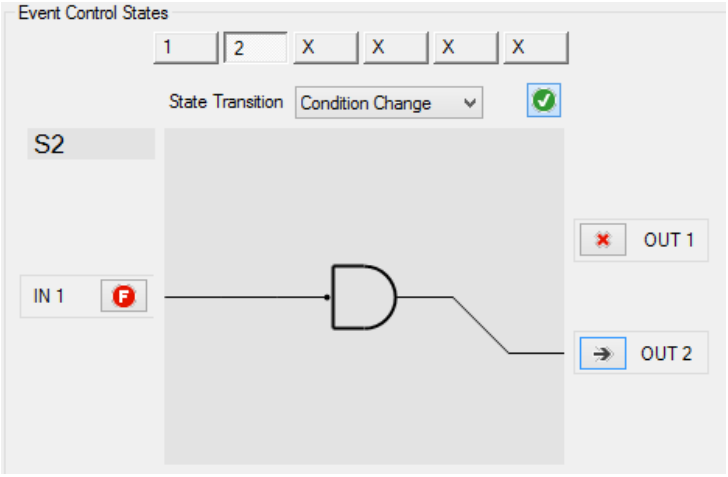
IF (INPUT1 = FALSE) Then Execute Action Output 2

The EC configuration for obtain the above logic is:

The "IF (INPUT1 = TRUE) Then Execute Action Output 1" can be created in the State 1 (S1):



And the "IF (INPUT1 = FALSE) Then Execute Action Output 2" can be create din the State 2 (S2):



We have obtained that if the input1 is high the output1 is sets; if the input2 is low the output2 is resets.

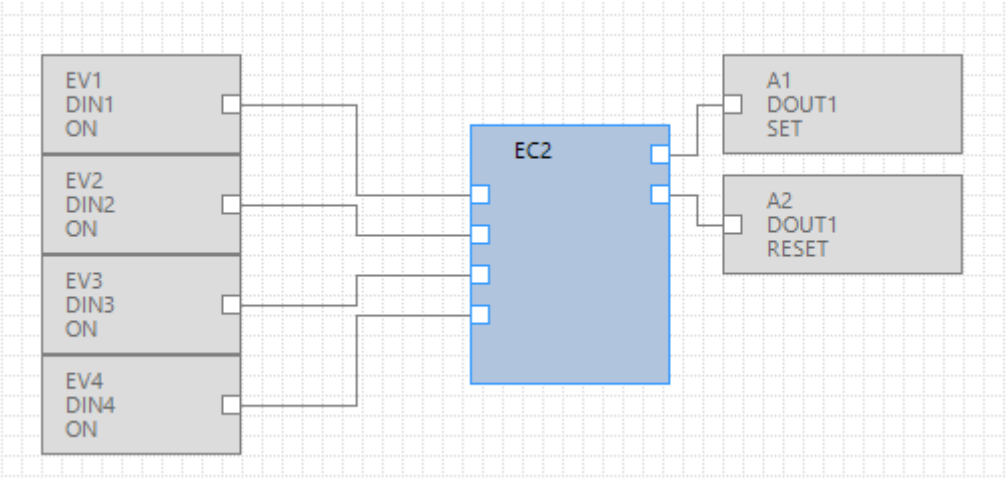
The maximum number of Control States is 6 (from S1 to S6).

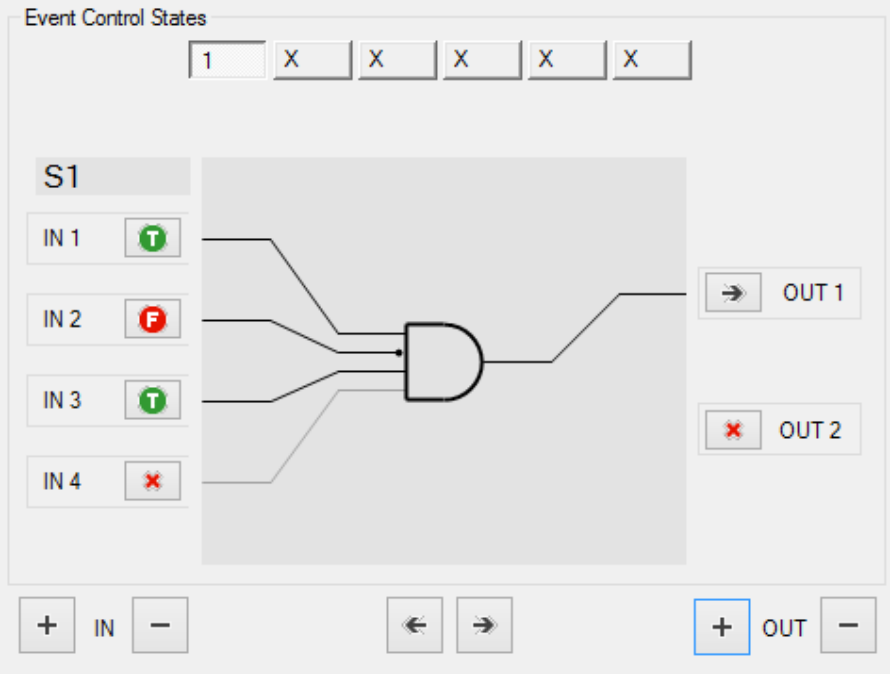
If in the EC there are more than one input, the state conditions are put in boolean AND.

The boolean AND operator put the output TRUE only if are TRUE all the inputs:

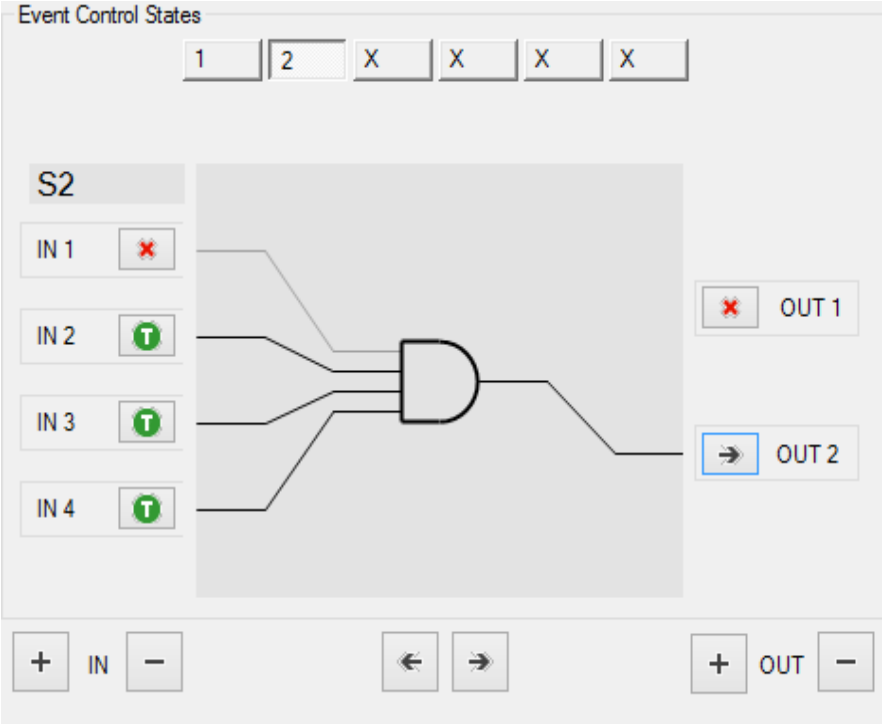
IF [(IN1 CONDITION) AND (IN2 CONDITION) AND … AND (IN4 CONDITION)] THEN EXECUTE OUTPUT N

For example if we want to set the output1 if the Digital input 1 and 3 are True but the digital input 2 is false:



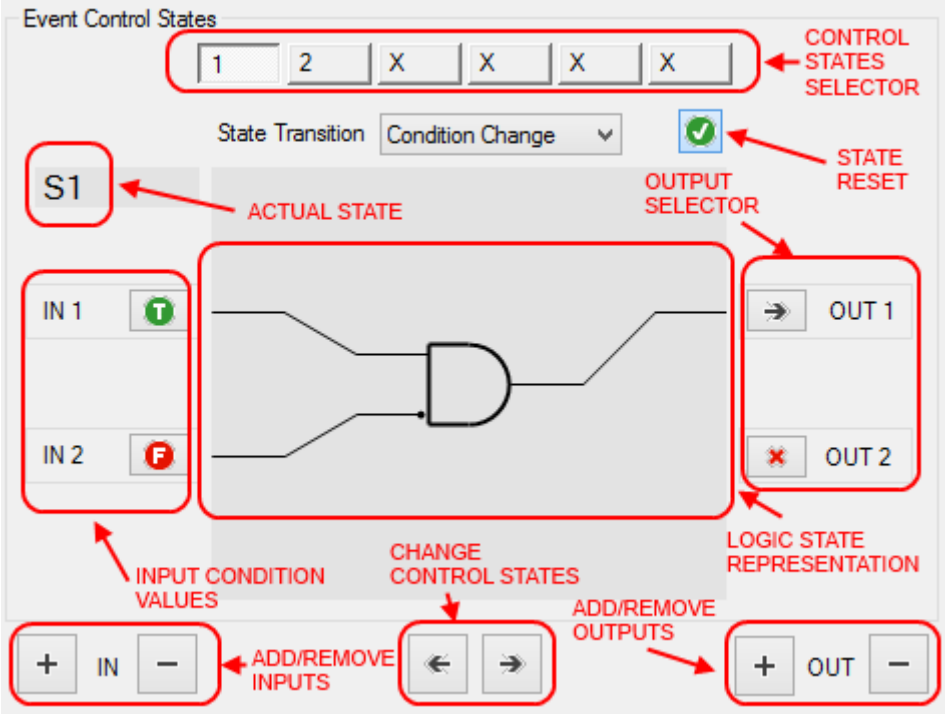


Then if the Digital input 2, 3 and 4 must be True for obtain a digital output 1 reset:



Note that we have used the icon for obtain a “don’t care” input evaluation.

16.2. Control Block EC setup configuration



Event control states: Click for select the actual state from 1 to 6 (S1 to S6).

Change Control State: Click for pass to next/previous state from 1 to 6 (S1 to S6)

State Reset: Press the state reset button for clean the actual state logic configuration

Actual State: Show the actual state from S1 to S6

Input Condition Values: Are the inputs values that active the actual state logic configuration.

Select from:

= don't care, this input is not evaluated

= this input must be True (1)

= this input must be False (0)

Logic state Representation: It's a logic electrical representation, the input condition enters into an AND port, the result value is connected to one of the outputs. Only one output can be connected in one State.

Output Selector: Chose to which output the AND port output must be connected.

Add/Remove Inputs: Add/Remove EC inputs from 1 to 4.

Add/Remove Outputs: Add/Remove EC inputs from 1 to 6.

State Transition: Select how the event control execute input/output relation:

Condition change (default): The Control State Output action is executed one time, then the Event Control remain paused into the current state. The inputs are not evaluated until the inputs don't changes.

Manual Re-Arm: The Control State Output action is executed one time, then the Event Control remain paused into the current state until a command SMS or an action will re-arm the event control. The inputs are not evaluated until the inputs don't changes.

Timed Hold-Off: The Control State Output action is executed one time, then the Event Control remain paused into the current state until the configured ***hold off time*** is passed. Only after the hold off time the inputs are evaluated again.

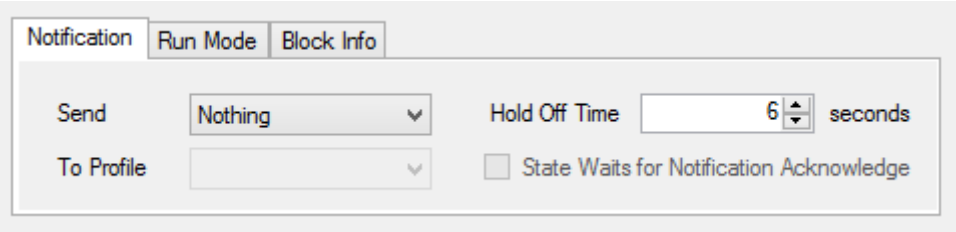
Timed Repeat: The Control State Output action is executed one time, then the Event Control remain paused into the current state until the configured ***hold off time*** is passed. After the hold off time the event control inputs evaluation is executed another time without the need of an inputs changes.

Manual Repeat: The Control State Output action is executed one time, then the Event Control remain paused into the current state until a command SMS or an action will repeat the event control inputs evaluation, without the need of an inputs changes.

Auto Repeat: The Control State Output action is executed one time, then the Event Control remain paused into the current state until the inputs don't changes. If there is a disable/enable EC event the output action state is performed also if the inputs are not changed.

Ignore State: The Control State Output action is executed one time but then the Event Control don't remain paused into the current state. The inputs are not evaluated until the inputs don't changes.

Notification: Select if the action connected to the output must be a notification. The options are:



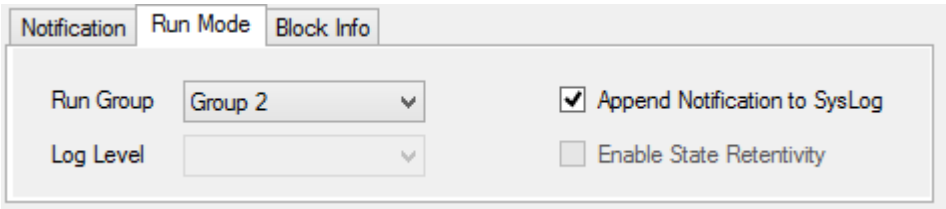
Send: Nothing (don't send notify), SMS (send SMS with the text configured into the Notify Message block), E-MAIL (send E-MAIL with the text configured into the Notify Message block), SMS+E-MAIL (send SMS and E-MAIL with the text configured into the Notify Message block), Http (Send an Http post through GPRS to the server with the text configured into the Notify Message block), SMS+Cloud (Send through GPRS an Http post to the server and SMS with the text configured into the Notify Message block).

Hold Off Time: Time used for the Timed hold off and Timed Repeat State transition function.

To Profile: Select at which profile send the notification (administrators are always enabled).

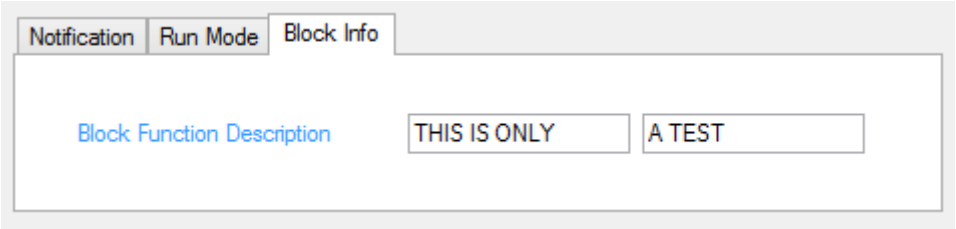
State waits for notification acknowledge: Before changing state the EC waits the send notification acknowledge.

Run Mode: Select the EC run mode



Run Group: Select wich rungroup is associated to the EC (from Group 1 to Group 8)

Append Notification to syslog: Add to the file syslog.csv the notification event.

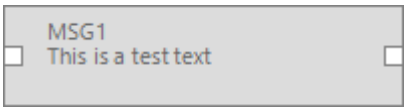


Block info, Function Block Description: Add a brief block description that will appear to the block.

16.3. Control Block MSG: Event notify Message

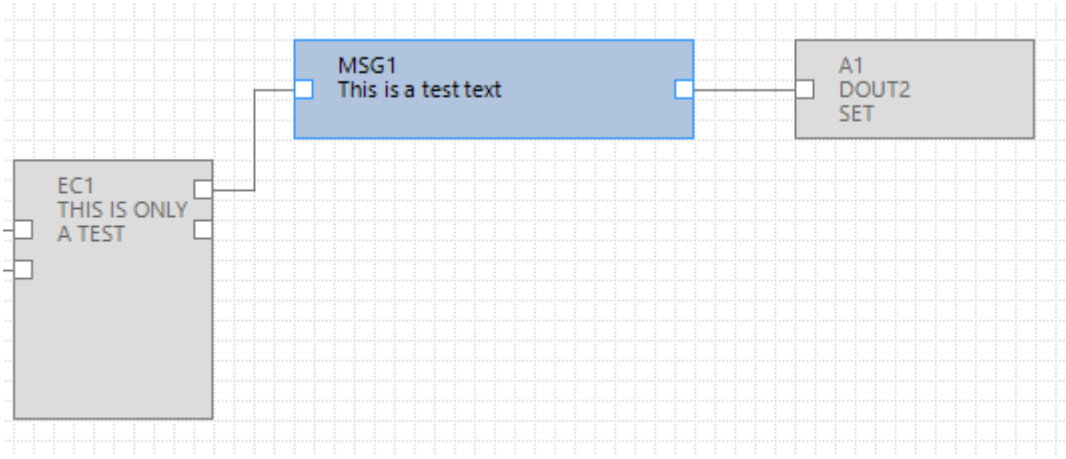
Use this block like an action connected to an EC output.

Insert the text alert for SMS, EMAIL and Http post notifications.

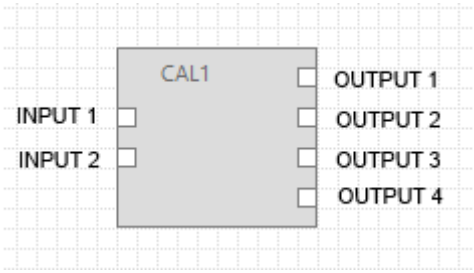


Note that you can use the block output to connect an action using only one EC output:

For example:



16.4. Control Block CAL: Calendar Block Control



The calendar block is used for execute 2 differents actions (one of set en another of reset) at a determinate hour/day of week.

The block support up to 2 program (PRG), it's possible to change from PRG1 to PRG2 with a SMS.

The default program is PRG1.

INPUT1 is the disable pin

INPUT2 is the enable pin

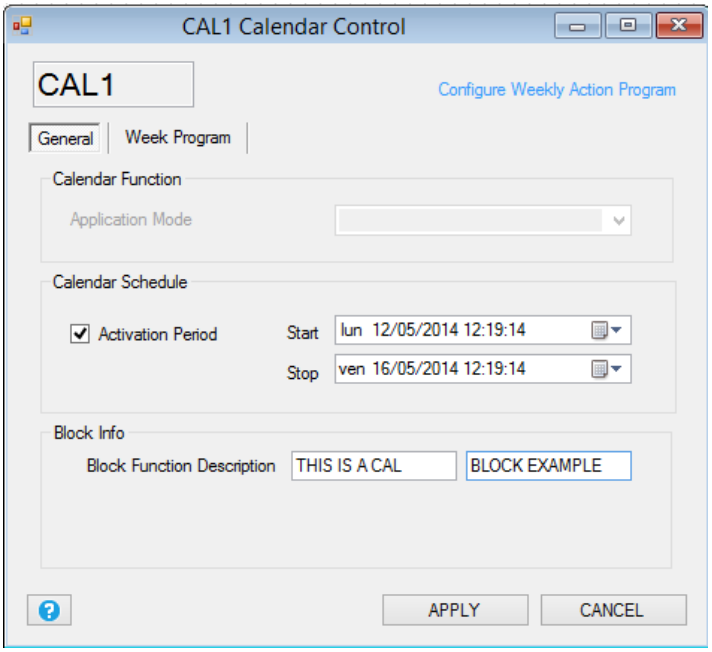
OUTPUT1 is the PRG1 RESET action

OUTPUT2 is the PRG1 SET action

OUTPUT3 is the PRG2 RESET action

OUTPUT4 is the PRG2 SET action

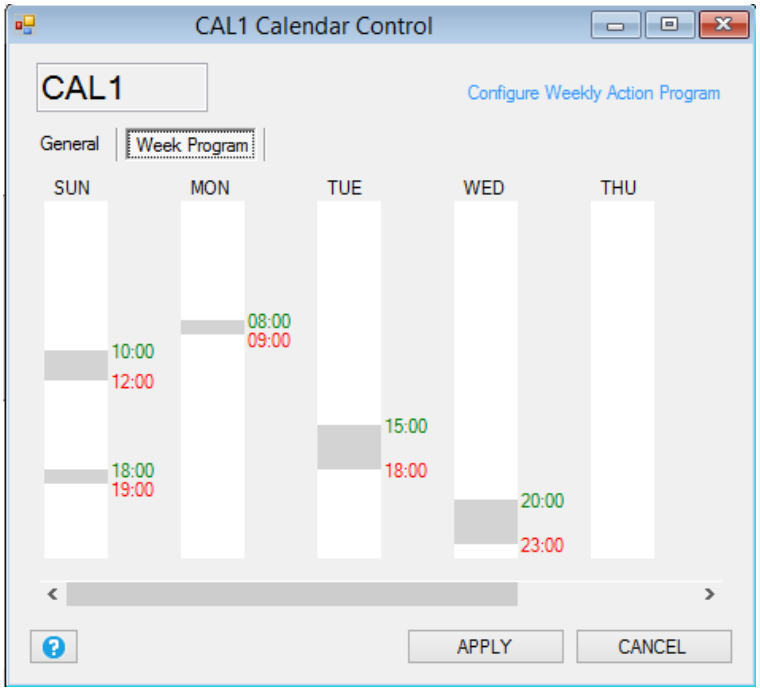
General



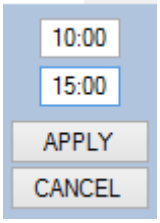
Calendar Schedule: select the enable date/hour and the disable date/hour block.

Block Info: Add a brief block description that will appear to the block.

Week Program

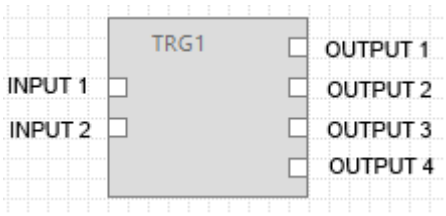


Select the day of week by pushing the right mouse button on it then select the set and reset hour:



The first hour (10:00) is the hour when the Set action bill be executed, the second (15:00) is the hour when the Reset action bill be executed.

16.5. Control Block TRG: Timed Trigger Block Control



The Timed trigger block is used for execute one action every trigger time (periodic trigger time) and/or every N trigger time (cycle trigger time).

The block support up to 2 program (PRG), it's possible to change from PRG1 to PRG2 with a SMS.

The default program is PRG1.

INPUT1 is the disable pin.

INPUT2 is the enable pin.

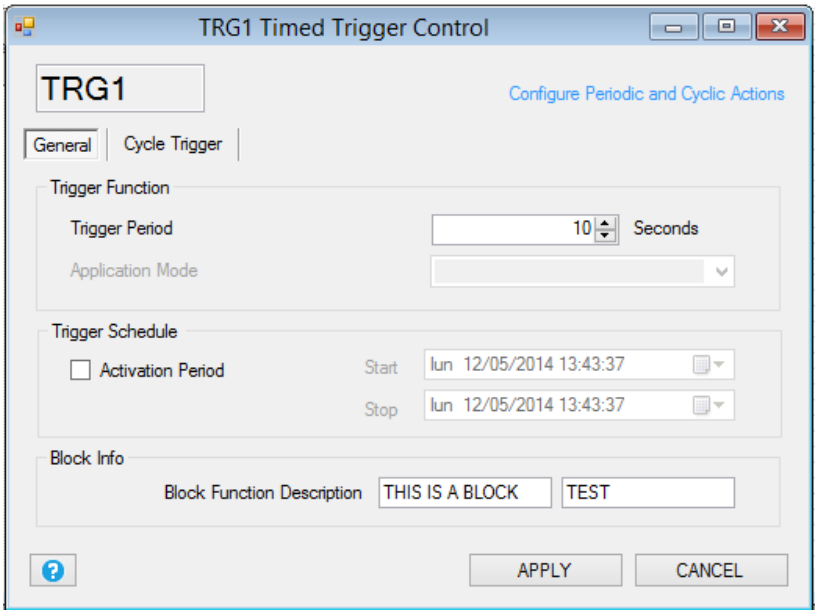
OUTPUT1 is the PRG1 periodic trigger action.

OUTPUT2 is the PRG1 cycle trigger action.

OUTPUT1 is the PRG2 periodic trigger action.

OUTPUT2 is the PRG2 cycle trigger action.

General



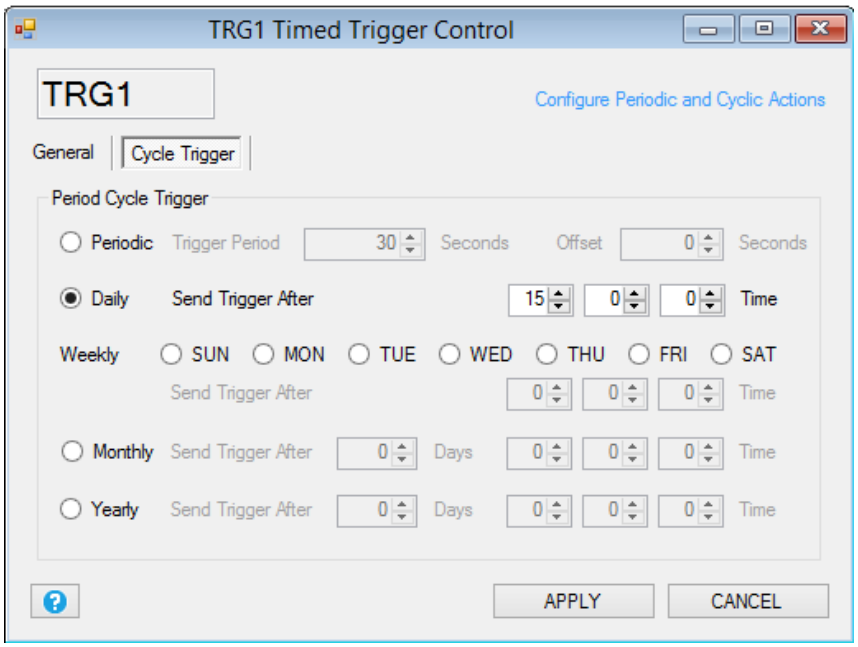
Trigger Function

Trigger Schedule: select the enable date/hour and the disable date/hour block.

Trigger Period: select how often execute the Trigger action.

Block Info: Add a brief block description that will appear to the block.

Cycle trigger



Period Cycle Trigger: select how often execute the cycle trigger action.

Periodic: execute every selected seconds.

Daily: execute every day at a selected hour.

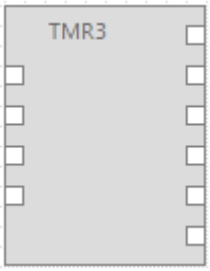
Weekly: execute at the selected day of week.

Monthly: execute at the selected day of month.

Yearly: select at the selected day of year.

16.6. Control Block TMR: Timer Control Block Control

This block perform actions related to the start (ON)/stop (OFF) action after a timeout delay. It's also possible to reset or pause the timeout.



INPUT1 Reset the timeout ON and OFF Counter Timers values.

INPUT2 Execute the OFF action and start the OFF Counter Timer.

INPUT3 Execute the ON action and start the ON Counter Timer.

INPUT4 Pause the start and stop Counter Timers.

OUTPUT1 OFF action.

OUTPUT1 ON action.

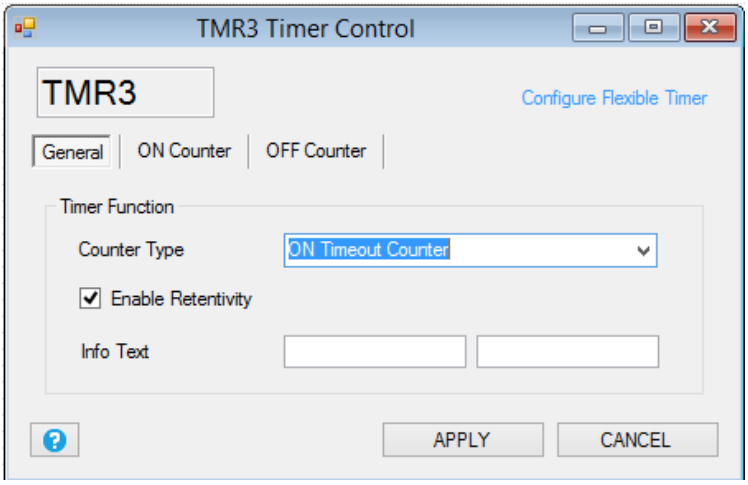
OUTPUT1 Timeout OFF Action.

OUTPUT1 Timeout ON Action.

OUTPUT1 Event OFF.

OUTPUT1 Event ON.

General

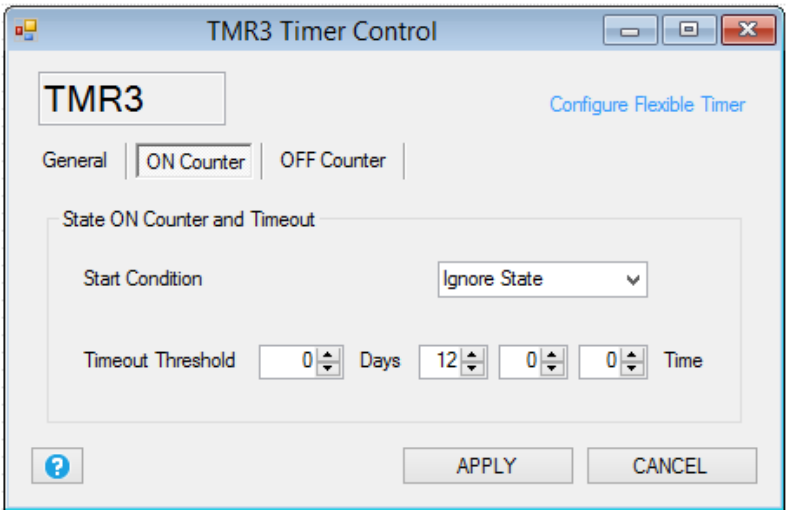


Counter Type: select from ON timeout counter (use only the ON action and the ON timeout), OFF timeout counter (use only the OFF action and the OFF timeout), ON/OFF use ON and OFF timeout counters, ON WorkTime (use only the OFF action and the OFF timeout), OFF WorkTime (use only the OFF action and the OFF timeout),), ON/OFF Worktime use ON and OFF timeout counters.

The worktime counters are not resetted by the START action so you need to use the Reset input for a counters reset.

Enable Retentivity: Save the counters values to a not volatile memory.

ON COUNTER



Select the start condition:

Start Condition

Select the start state and/or the alert mode:

Ignore state: the alert is activated on alert condition change state.

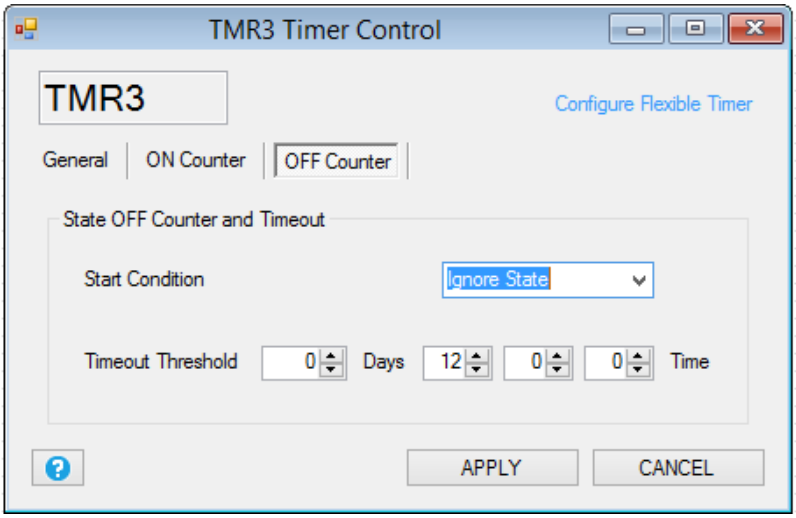
Entry state: the alert is activated on state (so there is no need of a change state).

False: At startup the RTU alert is on False state so if the alert source was True the alert is activated, otherwise if at startup the alert source was False the alert is activated only at a following alert source change state.

True: At startup the RTU alert is on True state so if the alert source was True the alert is activated only at a following alert source change state, otherwise if at startup the alert source was False the alert is activated.

Timeout Threshold: Select the Threshold alert value.

OFF COUNTER



Select the start condition:

Start Condition

Select the start state and/or the alert mode:

Ignore state: the alert is activated on alert condition change state.

Entry state: the alert is activated on state (so there is no need of a change state).

False: At startup the RTU alert is on False state so if the alert source was True the alert is activated, otherwise if at startup the alert source was False the alert is activated only at a following alert source change state.

True: At startup the RTU alert is on True state so if the alert source was True the alert is activated only at a following alert source change state, otherwise if at startup the alert source was False the alert is activated.

Timeout Threshold: Select the Threshold alert value.

17. BLOCKS ACTIONS DOUTS

17.1. Action Block DOUTS RESET: Reset digitals output 1 and output 2 action

This action performs the digital output 1 and digital output 2 reset action.

OUTPUT CONFIGURATION	*RESET ACTION*
NORMALLY OPEN	THE OUTPUT WILL OPEN
NORMALLY CLOSE	THE OUTPUT WILL COSE

17.2. Action Block DOUTS SET: Set digitals output 1 and output 2 action

This action performs the digital output 1 and digital output 2 set action.

OUTPUT CONFIGURATION	*SET ACTION*
NORMALLY OPEN	THE OUTPUT WILL CLOSE
NORMALLY CLOSE	THE OUTPUT WILL OPEN

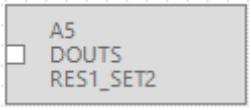
17.3. Action Block DOUTS TOGGLE: Toggle digitals output 1 and output 2 action

This action performs the digital output 1 and digital output 2 toggle action.

OUTPUT STATE	*TOGGLE ACTION*

THE OUTPUT IS OPEN	THE OUTPUT WILL CLOSE
THE OUTPUT IS CLOSE	THE OUTPUT WILL OPEN

17.4. Action Block DOUTS RES1_SET2: Reset digital output 1 and Set digital output 2 action

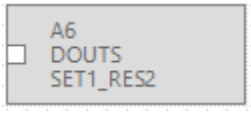


This action performs the digital output 1 reset and the digital output 2 set action.

OUTPUT CONFIGURATION	***RESET ACTION***
NORMALLY OPEN	THE OUTPUT WILL OPEN
NORMALLY CLOSE	THE OUTPUT WILL COSE

OUTPUT CONFIGURATION	***SET ACTION***
NORMALLY OPEN	THE OUTPUT WILL CLOSE
NORMALLY CLOSE	THE OUTPUT WILL OPEN

17.5. Action Block DOUTS SET1_RES2: Set digital output 1 and Reset digital output 2 action



This action performs the digital output 1 set and the digital output 2 reset action.

OUTPUT CONFIGURATION	***RESET ACTION***

NORMALLY OPEN	THE OUTPUT WILL OPEN
NORMALLY CLOSE	THE OUTPUT WILL COSE

OUTPUT CONFIGURATION	***SET ACTION***
NORMALLY OPEN	THE OUTPUT WILL CLOSE
NORMALLY CLOSE	THE OUTPUT WILL OPEN

17.6. Action Block DOUT RESET: Reset digital output action

This action performs the digital output reset action.

OUTPUT CONFIGURATION	***RESET ACTION***
NORMALLY OPEN	THE OUTPUT WILL OPEN
NORMALLY CLOSE	THE OUTPUT WILL COSE

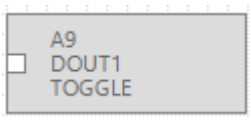
17.7. Action Block DOUT SET: Set digital output action

This action performs the digital output set action.

OUTPUT CONFIGURATION	***SET ACTION***
NORMALLY OPEN	THE OUTPUT WILL CLOSE

NORMALLY CLOSE	THE OUTPUT WILL OPEN

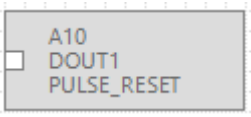
17.8. Action Block DOUT TOGGLE: Toggle digital output action



This action performs the digital output toggle action.

OUTPUT STATE	*TOGGLE ACTION*
THE OUTPUT IS OPEN	THE OUTPUT WILL CLOSE
THE OUTPUT IS CLOSE	THE OUTPUT WILL OPEN

17.9. Action Block PULSE_RESET: Pulse Reset output action

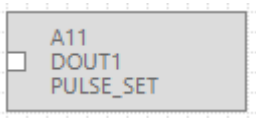


This action performs a digital ouput pulse to RESET then return to SET.

The pulse duration is setup by the Pulse Time value.

OUTPUT CONFIGURATION	*PULSE RESET ACTION*
NORMALLY OPEN	THE OUTPUT WILL GO TO OPEN AND THEN RETURN TO CLOSE
NORMALLY CLOSE	THE OUTPUT WILL GO TO CLOSE AND THEN RETURN TO OPEN

17.10. Action Block PULSE_SET: Pulse Set output action



This action performs a digital output pulse to SET then return to RESET.

The pulse duration is setup by the Pulse Time value.

OUTPUT CONFIGURATION	***PULSE SET ACTION***
NORMALLY OPEN	THE OUTPUT WILL GO TO CLOSE AND THEN RETURN TO OPEN
NORMALLY CLOSE	THE OUTPUT WILL GO TO OPEN AND THEN RETURN TO CLOSE

17.11. Action Block PULSE_TOGGLE: Pulse Toggle output action

This action performs a digital output pulse TOGGLE action.

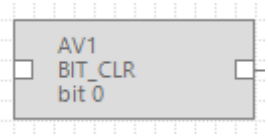
The pulse duration is setup by the Pulse Time value.

OUTPUT STATE	***PULSE TOGGLE ACTION***
THE OUTPUT IS OPEN	THE OUTPUT WILL CLOSE AND THEN WILL RETURN OPEN

THE OUTPUT IS CLOSE	THE OUTPUT WILL OPEN AND THEN WILL RETURN CLOSE

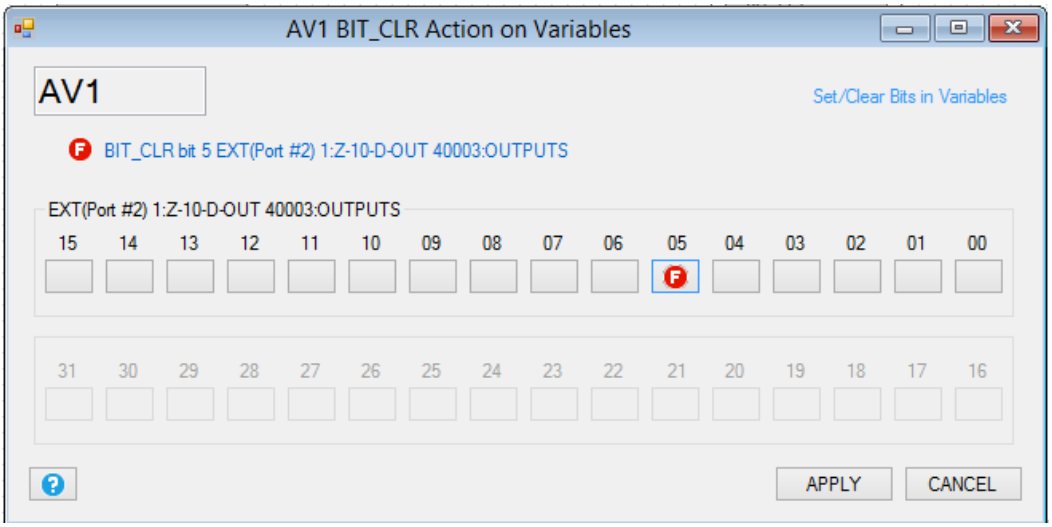
18. BLOCKS ACTIONS MODBUS

18.1. Action Block BIT_CLR: Modbus Register Bit Clear action

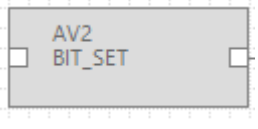


This block performs a Modbus Register bit clear action.

Select which bit must be set to zero with the mask:

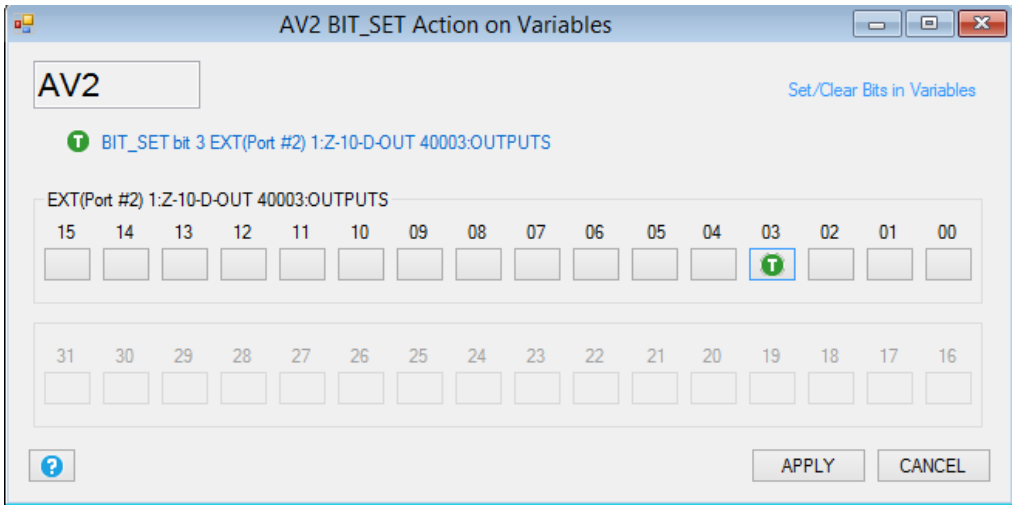


18.2. Action Block BIT_SET: Modbus Register Bit Set action



This block performs a Modbus Register bit set action.

Select which bit must be set to 1 with the mask:



18.3. Action Block DEC: Modbus Register Decrement Action

This block performs a Modbus Register decrement.

The written value is:

Modbus_register= Actual Modbus Register-1

18.4. Action Block INC: Modbus Register Increment Action

This block performs a Modbus Register increment.

The written value is:

Modbus_register= Actual Modbus Register+1

18.5. Action Block RES: Modbus Register Reset Action

This block performs a Modbus Register reset.

The written value is:

Modbus_register= 0

18.6. Action Block COPY: Modbus Register Copy Action

This block performs a Modbus Register copy from the register connected to Output1 to the register connected to Output 2 when the input1 is true.

Note that there is also the function block CPY that copy a variable to another variable (Modbus too).

19. LOCAL FIRMWARE UPDATE

In order to include new functions, the system includes Z-GPRS2/Z-Logger firmware update options.

Various different update modes are available for firmware:

Via USB: This is the easiest method. A complete update takes about 5 minutes. Z-GPRS2 / Z-Logger must be connected to a PC with SEAL software installed.

Via microSD card: This is the faster method. A complete update takes about 20 seconds. A microSD adapter for PC (many mobile phones can also read/write microSD) and a microSD card are required. This method is convenient when several devices are to be updated.

Remote: When the RTU is remote the firmware update can be made by the GPRS or by the Ethernet passing by an external (GPRS) or internal (Ethernet) FTP server.

19.1. Firmware update via USB

Open the "Software Update" section to update firmware via USB. Follow the on-screen instructions to successfully complete this operation.

CAUTION!

-BEFORE UPDATING firmware, save and backup the current configuration.

-Once the firmware is updated, the previous setup may be deleted and thus Z-GPRS2 / Z-Logger must be setup again.

19.2. Firmware update via microSD card (without using a PC)

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. Turn the module off and than on
3. With the module on, insert the microSD card in the slot
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 finished, the SD/STS led starts to flash slowly, about 3 seconds off and a half a second on (if it remains on it means the firmware is the same as the one loaded in the microSD).
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 from flash to the microprocessor flash.
8. When 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, note the current configuration.

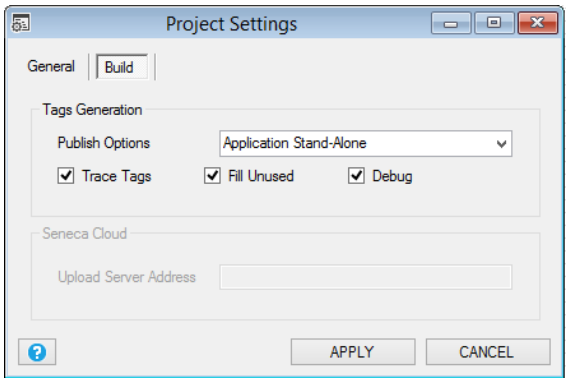
-Once the firmware is updated, the previous setup may be deleted so Z-GPRS2 / Z-LOGGER MUST be setup again.

20. REMOTE FIRMWARE UPDATE

20.1. Remote firmware update by Ethernet connection (FTP Server activated)

For update the remote RTU firmware with the ethernet connection and ftp server you must:

1) Ensure that a microSD card is inserted into the Z-Logger/Z-GPRS2
2) Setup the project settings window for create all the configuration and the program:

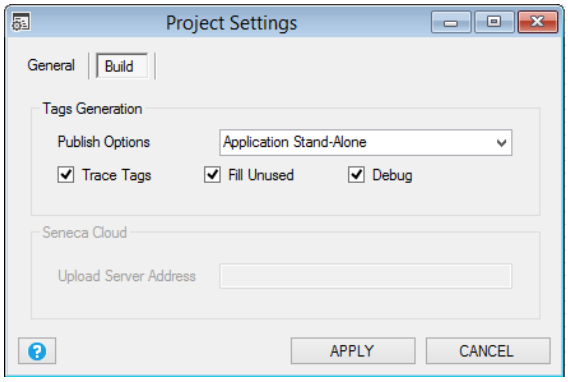


3) Create the new configuration with SEAL, save the configuration that must be used with the new firmware to a file.
4) Press Generate from the menu Build
5) Go to the new configuration directory then rename the .out file to “fwupdt.tag”
6) Copy to the RTU FTP server the file “fwupdt.tag” to the root of the RTU FTP server.
7) Copy to the RTU FTP server the file “fwupdt.bin” firmware file to the root of the RTU FTP server.
8) Now the RTU will update the firmware and then will use the new configuration.
9) Wait for the Email “configuration updated”

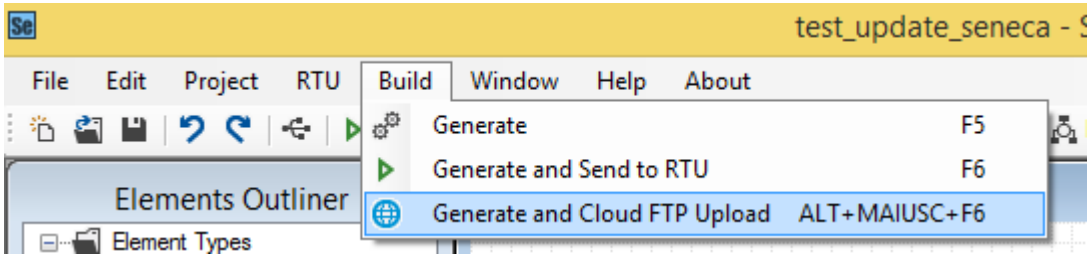
20.2. Remote firmware update by Ethernet connection (Modbus TCP-IP Server activated)

For update the remote RTU firmware with the ethernet connection and modbus tcp-ip server you must:

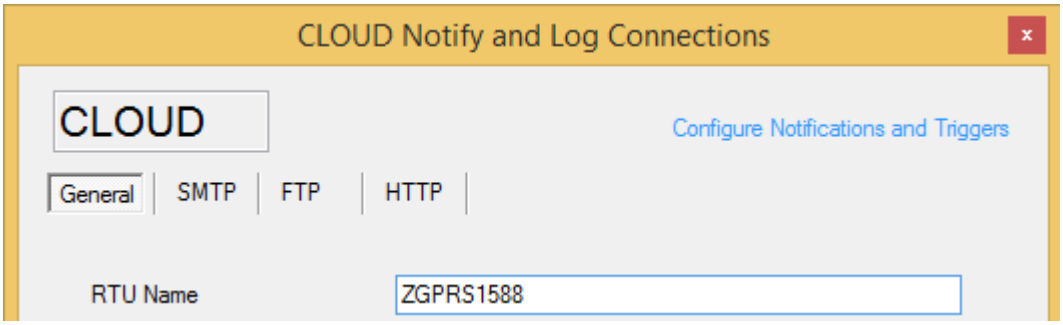
1) Ensure that a microSD card is inserted into the Z-Logger/Z-GPRS2
2) Setup the project settings window for create all the configuration and the program:



3) Create the new configuration with SEAL, save the configuration that must be used with the new firmware to a file.
4) Press “Generate and Cloud FTP Upload” from the menu Build:



This function will copy to the download ftp folder the “RTUNAME_fwupdt.tag” and the “RTUNAME _setup.tag” files, where RTUNAME is the RTU name from the Cloud-General Form, for example if RTUNAME = ZGPRS1588:



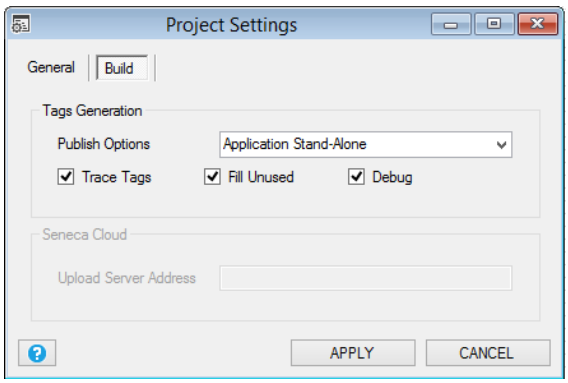
5) Copy the firmware file “RTUNAME _fwupdt.bin” to the remote FTP server into the upload folder
6) Write to the COMMAND holding register 40901 (holding register 9000) the code (decimal):
   113
   This will download to the SD card the setup to be used with the new firmware
7) Now the RTU will update the firmware and the configuration.

Wait for the Email/SMS “configuration updated” (if configured).

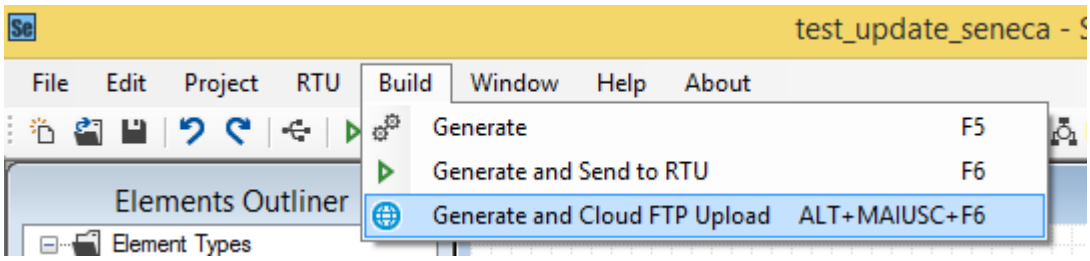
20.3. Remote firmware update by GPRS connection

For update the remote RTU firmware with the GPRS connection you must:

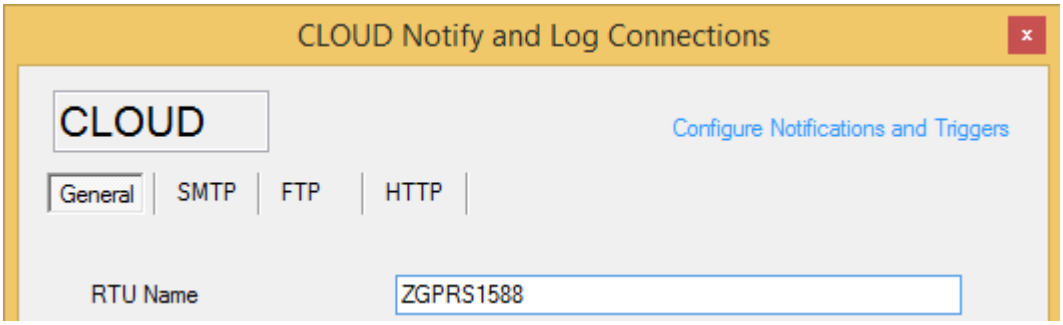
1) Ensure that a microSD card is inserted into the Z-Logger/Z-GPRS2
2) Setup the project settings window for create all the configuration and the program:



3) Create the new configuration with SEAL, save the configuration that must be used with the new firmware to a file.
4) Press “Generate and Cloud FTP Upload” from the menu Build:



This function will copy to the download ftp folder the “RTUNAME_fwupdt.tag” and the “RTUNAME _setup.tag” files, where RTUNAME is the RTU name from the Cloud-General Form, for example:



5) Copy the firmware file “RTUNAME _fwupdt.bin” to the remote FTP server into the upload folder, then send an SMS from the administrator mobile number with the text “download fw-setup”. Now the RTU will update the firmware and the configuration.
6) Wait for the Email/SMS “configuration updated” (if configured).

21. LOCAL CONFIGURATION UPDATE

21.1. Local configuration update by SD card

For changing a configuration you can download it with SEAL or prepare a sd card with the new configuration file.

For use a SD card for update the configuration proceed as follows:

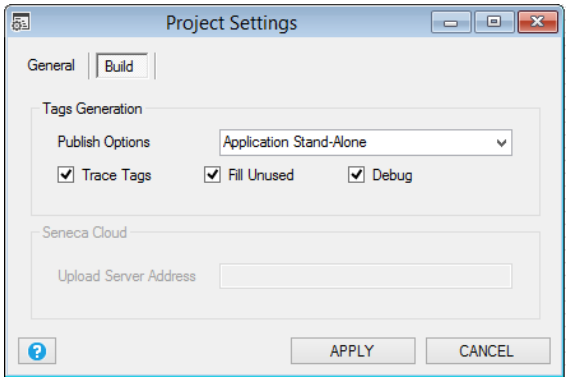
1. Copy the file called “setup.tag” containing the firmware to a microSD card, the file must be copied to the main microSD folder.
2. Turn the device OFF
3. Insert the microSD card in the slot
4. Power ON the device
5. The configuration is updated and the device will reboot.

22. REMOTE CONFIGURATION UPDATE

22.1. Remote configuration update by Ethernet connection (FTP Server enabled)

For changing the remote RTU actual SEAL configuration/program using the Ethernet connection you must:

1) Setup the project settings window for create all the configuration and the program:

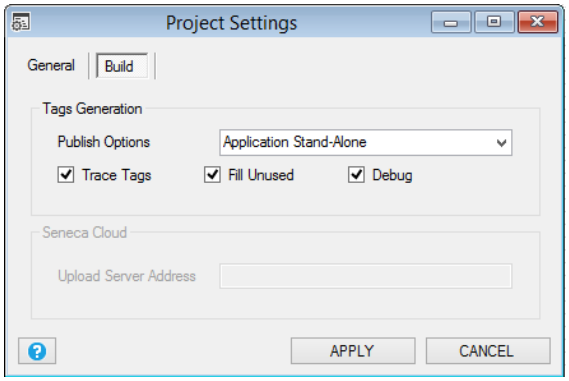


2) Create the new configuration with SEAL, save the configuration to a file.
3) Press Generate from the menu Build
4) Go to the new configuration directory then rename the .out file to “setup.tag”

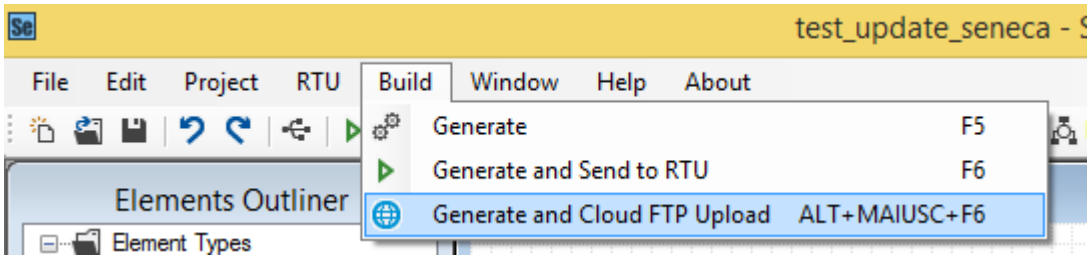
5) If you have activated the RTU FTP server copy the file “setup.tag” to the root of the RTU FTP server, the RTU will use the new configuration.
6) Wait for the Email “configuration updated” (if configured).

22.2. Remote configuration update by Ethernet connection (Modbus TCP-IP Server enabled)

1) Setup the project settings window for create all the configuration and the program:

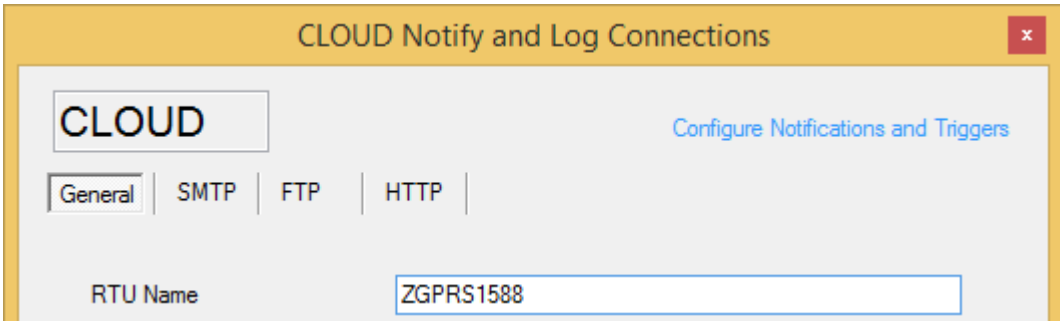


2) Create the new configuration with SEAL, save the configuration to a file.
3) Press “Generate and Cloud FTP Upload” from the menu Build:



This function will copy to the download ftp folder the “RTUNAME_fwupdt.tag” and the “RTUNAME_setup.tag” files.

where RTUNAME is the RTU name from the Cloud-General Form, for example if RTUNAME = ZGPRS1588:



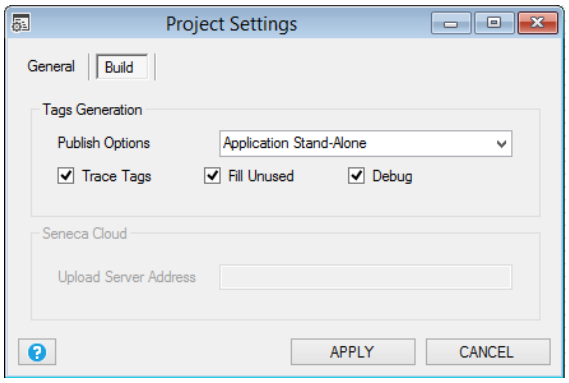
4) Write to the COMMAND holding register 40901 (holding register 9000) the code (decimal): 114
   This will download to the SD card the setup.
5) Now the RTU will update the configuration.

Wait for the Email/SMS “configuration updated” (if configured).

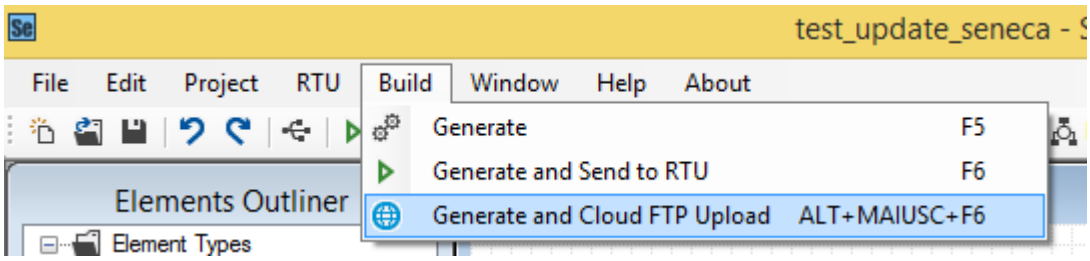
22.3. Remote configuration update by GPRS connection

For changing the actual SEAL configuration/program to a remote RTU that use the GPRS connection you must:

6) Setup the project settings window for create all the configuration and the program:

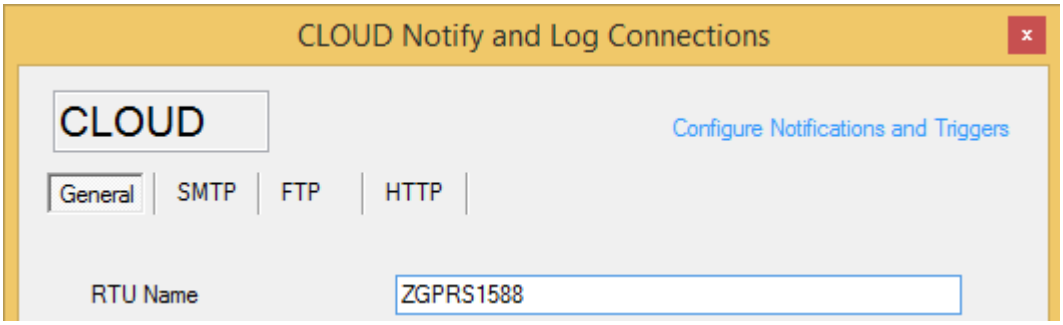


7) Create the new configuration with SEAL, save the configuration to a file.
8) Press “Generate and Cloud FTP Upload” from the menu Build:



This function will copy to the download ftp folder the “RTUNAME_fwupdt.tag” and the “RTUNAME_setup.tag” files.

where RTUNAME is the RTU name from the Cloud-General Form, for example if RTUNAME = ZGPRS1588:



9) Send a SMS from the administrator mobile number with the text “download setup”.
10) Wait for the Email/SMS “configuration updated”

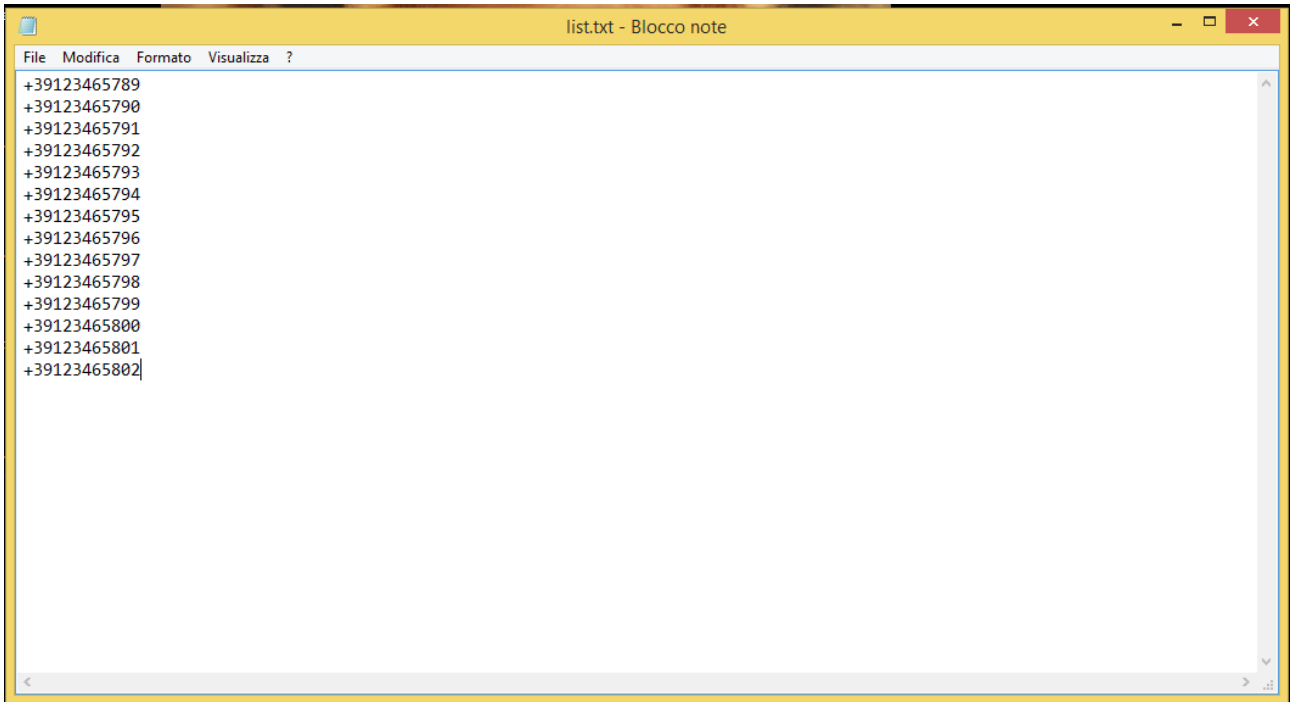
23. EXTENDED PHONEBOOK INTO microSD FOR RING COMMAND

SEAL supports the creation of an extended phonebook (up to 1000 users) that can execute only the ring command.

23.1. Creation of an Extended Phonebook File

First of all you must create a list of telephone numbers (with the +xx international prefix), use windows notepad for to do that.

Each line one number, like this:



Then rename the file to .csv

Use the menu->RTU->Convert Phonebook CSV

for obtain the “data.bin” file.

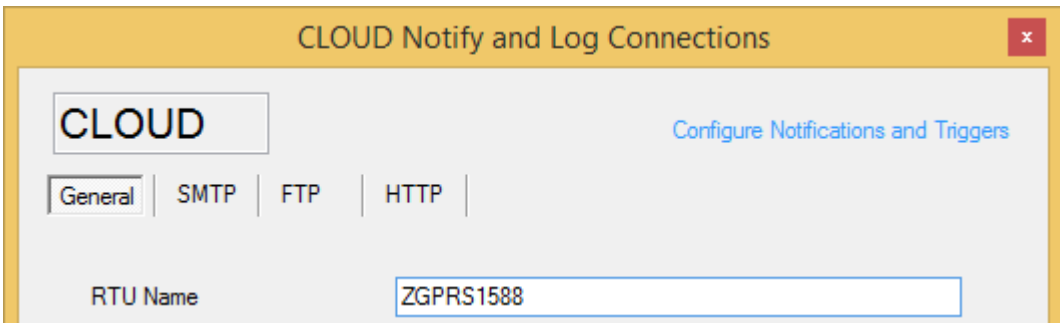
For more info refer to 11.12.

23.2. Update of an Extended Phonebook File Via Ethernet

For update the phonebook via Ethernet you must activate the internal ftp server, then copy the “data.bin” file to the ftp server root. The extended phonebook will be automatically updated.

23.3. Update of an Extended Phonebook File Via Gprs

For update the phonebook via GPRS you must copy the “RTUNAME_data.bin” file to the ftp server download folder that you have previously configured, where RTUNAME is the RTU name from the Cloud-General Form, for example:



Now send an SMS with the text:

DOWNLOAD DATA

The extended phonebook will be automatically updated.

24. SUPPORTED SMS COMMANDS (ONLY Z-GPRS2)

24.1. Set the Telephone Sms Character Alphabet

Some Smartphones send SMS with UNICODE characters instead of using the GSM alphabet.

Z-GPRS2 only runs SMS commands with GSM alphabet.

In most cases, SMS characters are set to GSM alphabet by default. If Z-GPRS2 does not recognise any SMS command, check the alphabet used by the phone.

For Android smartphones:

Press the Message icon -> Settings -> Change writing -> GSM alphabet

24.2. List of Supported Sms Commands

Z-GPRS2 lets you run commands if the SMS sender 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*

SMS COMMANDS FOR MODBUS REGISTERS	
GET MBUS <LABEL>	*Returns the value of the Modbus tag with the indicated label via SMS*
GET MBUSn	*Returns the value of the n-th Modbus tag via SMS*

SMS COMMANDS FOR DIGITAL OUTPUTS	
GET DOUT	*Returns the value of the digital output*
GET DOUTn	*Returns the value of the nth digital output*
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

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*
EMAIL TAG	*Sends the value indicated by "TAG" to the first email contact* *EMAIL AIN sends an email with the value of the 2 analogs* *EMAIL AIN1 sends an email with the value of the analog 1* *EMAIL AIN2 sends an email with the value of the analog 2* *EMAIL DIN sends an email with the value of the digital inputs* *EMAIL DIN1 sends an email with the value of the digital input 1* *EMAIL DIN2 sends an email with the value of the digital input 2*

	EMAIL DIN3 sends an email with the value of the digital input 3 *EMAIL DIN4 sends an email with the value of the digital input 4* *EMAIL TEMP sends an email with the internal temperature sensor value*
EMAIL SYSLOG	*Sends the last week syslog.csv log file on microSD via email (first administrator address in the address book)*
FTP SYSLOG	*Sends 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 Sends this file to the actual upload channel (E-MAIL or FTP).*
DOWNLOAD FW	*The RTU will download from the FTP download folder the "fwupdt.bin" firmware file. Then (if the release il different from the installed) a firmware update is done.*
DOWNLOAD SETUP	*The RTU will download from the FTP download folder the "setup.tag" SEAL configuration file. Then a configuration update is done.*
DOWNLOAD FW-SETUP	*The RTU will download from the FTP download folder the "fwupdt.bin" firmware file and the "fwupdt.tag" configuration file. Then (if the release il different from the installed) the firmware and the configuration are updated.*
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*

NOTE

If the command is not recognized by Z-GPRS2, an error SMS will be sent:

"COMMAND NOT RECOGNIZED"

You can set MyALARM2 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 generate when a voice SIM is used (data SIM do not permit voice call service).

25. SUPPORTED MODBUS TCP-IP COMMANDS (ONLY BY ETHERNET)

If you have enabled the Modbus TCP-IP server by Ethernet connection you are able to send commands to Z-GPRS2/Z-Logger.

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

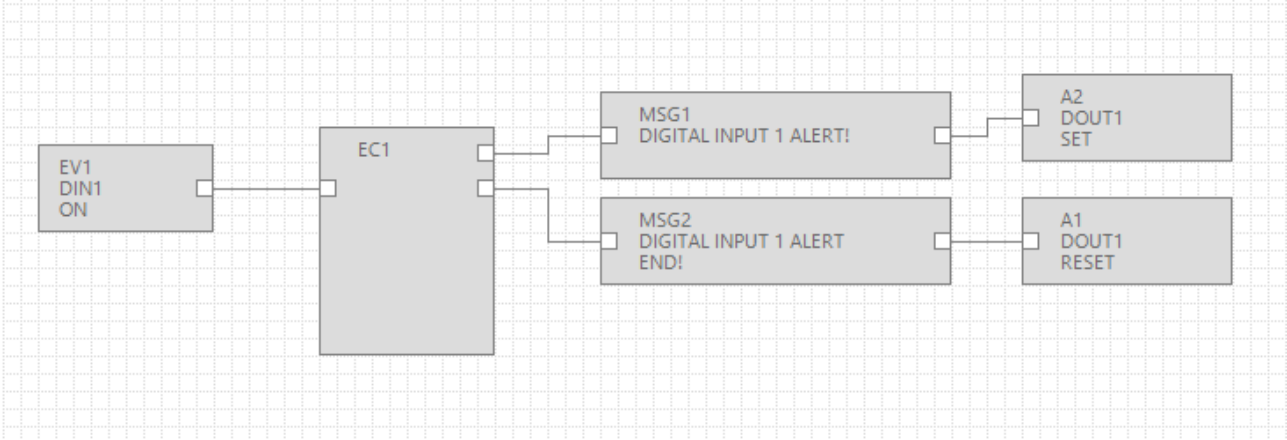
COMMAND	***VALUE (decimal)***
RESET RTU	1
UNMOUNT SD CARD	7
STOP DATALOGGER	18
START DATALOGGER	17
COPY ALL LOGS FROM FLASH TO SD CARD	19
RESET LOG SESSION	20
ERASE ALL LOG FROM FLASH	16
RESET GSM MODEM	65
STOP MODBUS TCP-IP AND MODBUS RTU LOG	98
START MODBUS TCP-IP AND MODBUS RTU LOG	97
DOWNLOAD AND 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	115
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
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

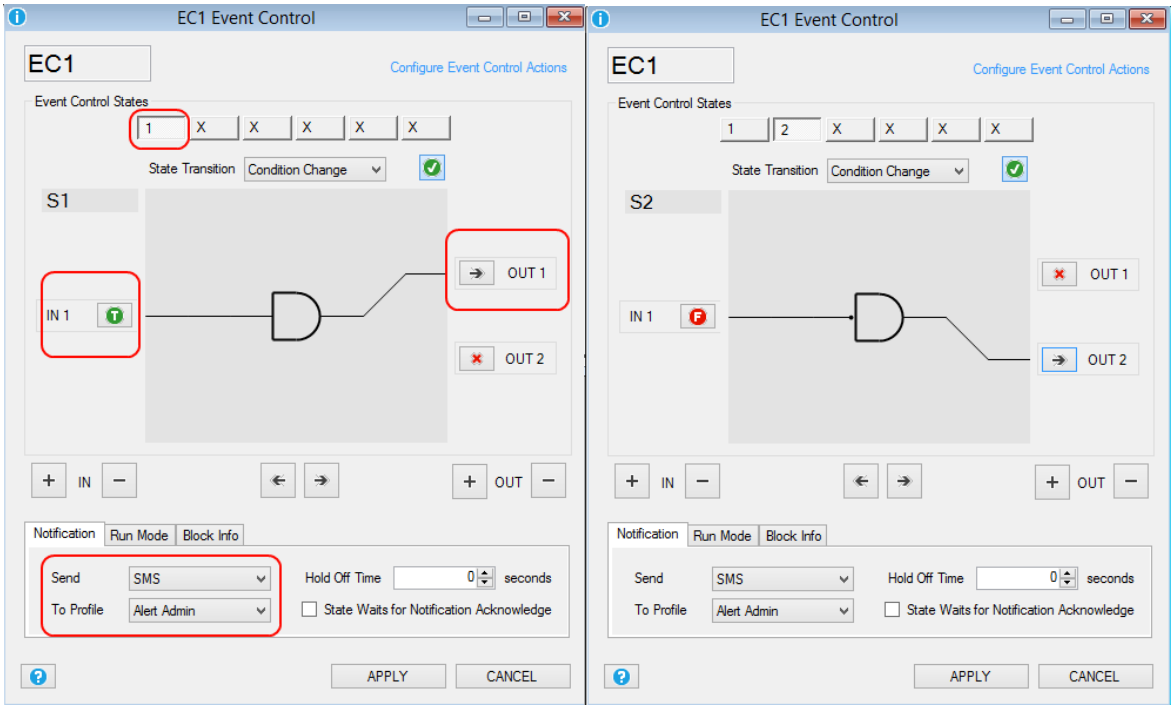
26. SEAL PROGRAM EXAMPLES

26.1. Send Alert SMS on digital input 1 and copy alert state on output 1

We use the DIN_ON Event like event source, then connect an Event Control with 2 outputs: the first for the alert condition and the second for the alarm end condition:



Configure the EC1 block for routing the alert condition in state S1 and the alert end condition in state S2:



We active also the SMS alert notification to the Alert Admin profile.

So when the digital input goes from OFF to ON (if configured normally open) the SMS with the text:

“Digital Input 1 Alert!”

Is sent to the Alert Admin Profile.

When the digital input goes from ON to OFF (if configured normally open) the SMS with the text:

“Digital input 1 Alert End!”

Is sent to the Alert Admin Profile.

The alert state is copied to the digital output 1: when the digital input 1 is in alert the digital output 1 is in SET state, when the alert end the digital input 1 is in RESET state.

26.2. Temperature Control with Logger and Alerts

We want to maintain a room temperature from 15°C to 20°C, when the temperature is over 25°C we want to obtain an SMS Alert, also if the temperature is below 10°C we want to obtain a SMS alert.

We read the temperature from a Seneca Z-4TC Modbus module.

Connect to Output 1 a fan and to output 2 a heater.

We want to log the temperature to the micro SD card too.

We add the CH1_MEASURE register from the Z-4TC Seneca module with the first register temperature.

Then we test if the temperature value is > 20°C then we close the out1 so the fan is activated.

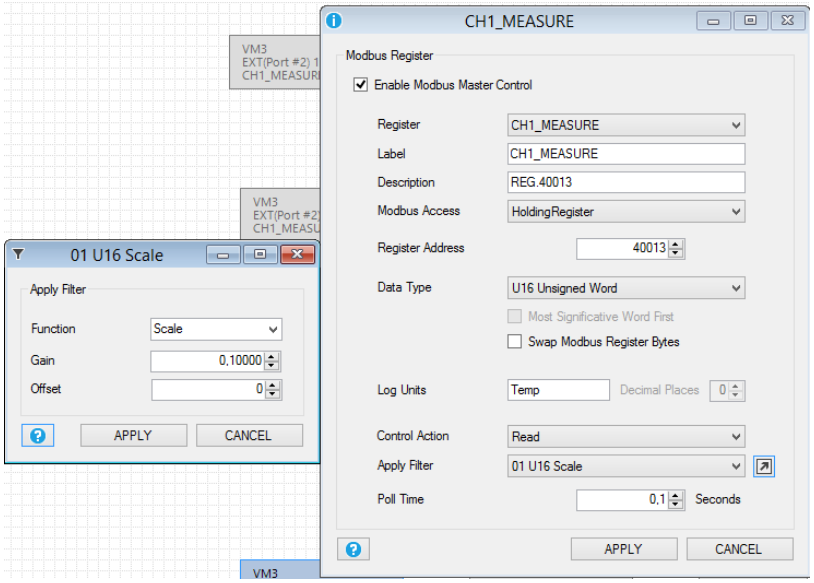
If the temperature is < 20°C the fan is powered off. Note that we have add a 0,5°C Hysteresis.

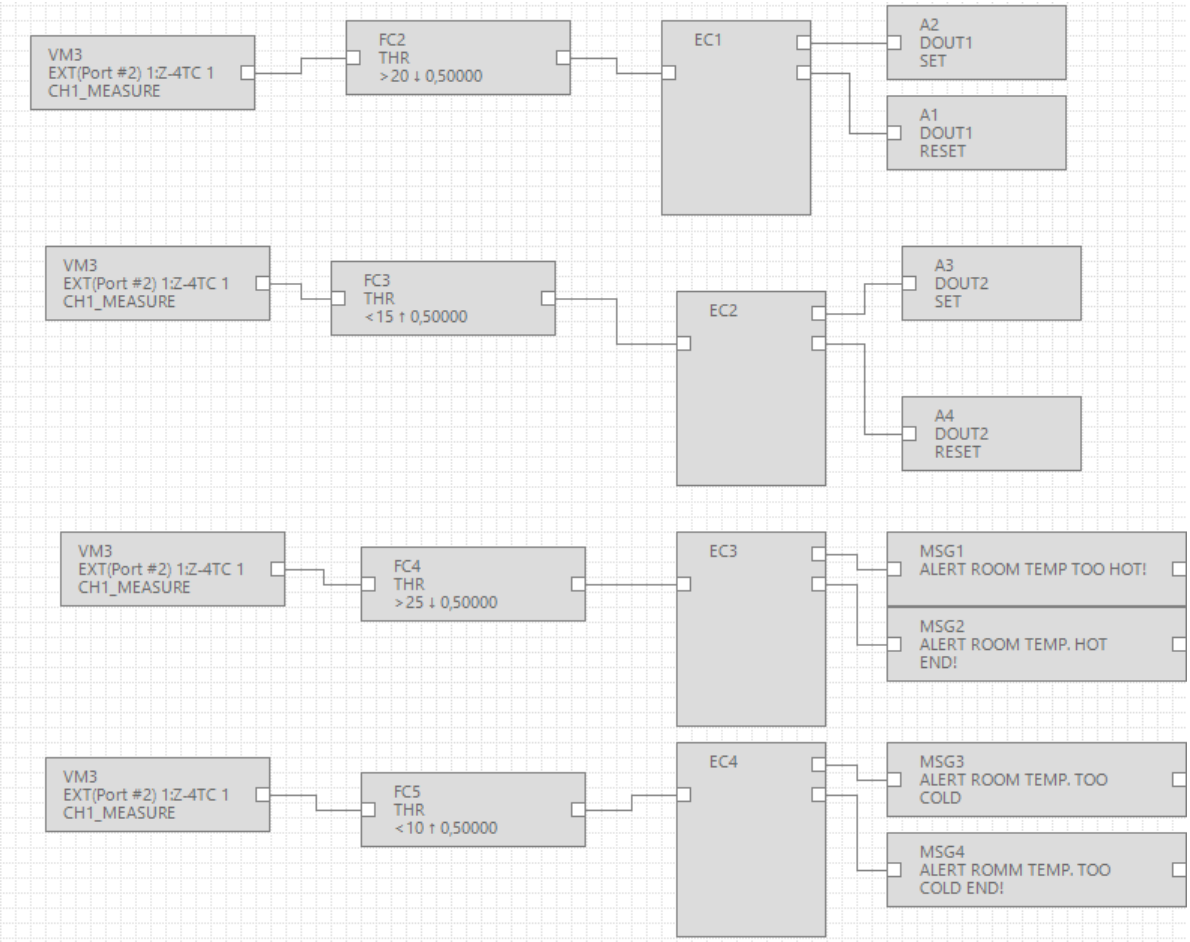
Similary is made for the heater when the temperature is < or > of 15°C.

The alert values will send a text alert with the “room temp too hot” or “room temp too cold” text.

We divide by a factor 10 the Z-4TC Modbus register because the value is in °C*10.

So for obtaining °C we must add a filter scale:



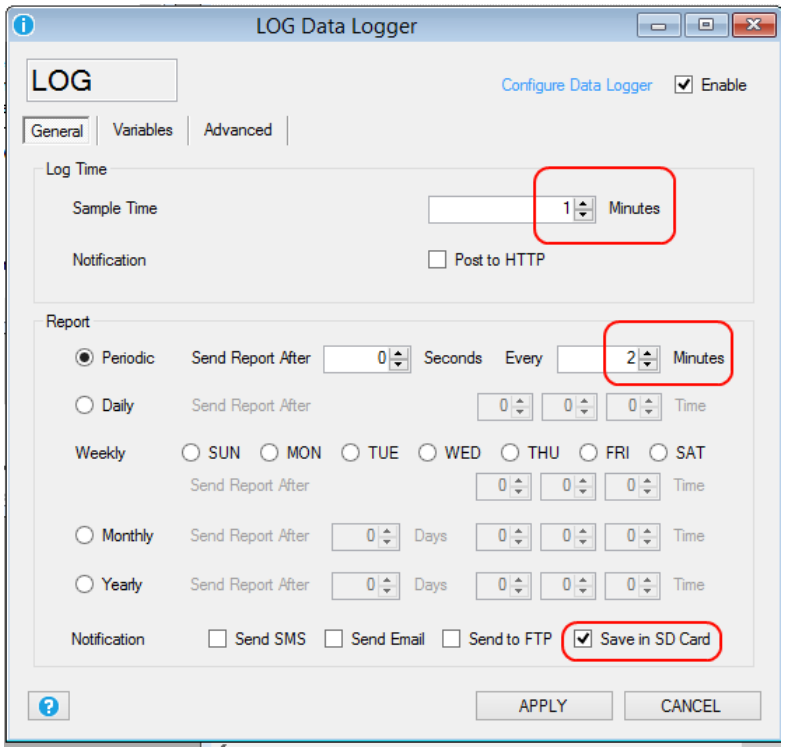


For logging in to the datalogger window we select the modbus register variable from the Z-4TC:

	33	GSM_DBM	S16	DBM	State	☐
▶	34	EXT(Port #2) 1:Z-4TC 1 40013...	U16	REG3	Temp	☑

We call the variable “Temp”.

We sample every 1 minute and we save to microSD a .csv file every 2 minutes:

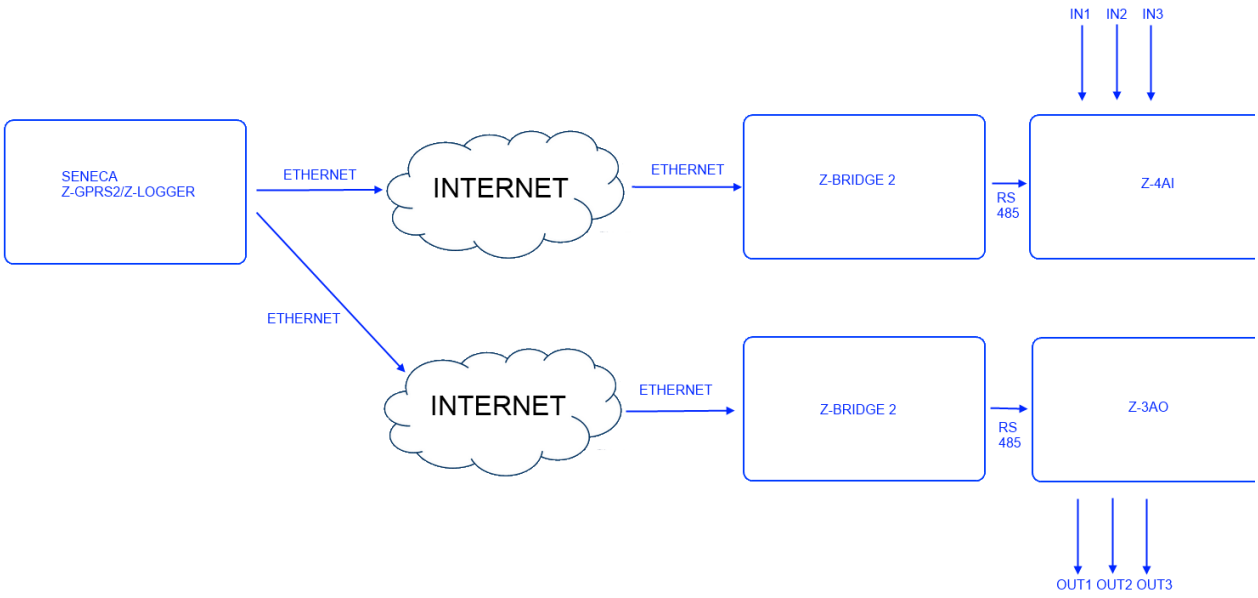


26.3. Remote inputs to remote outputs copy by ethernet connection

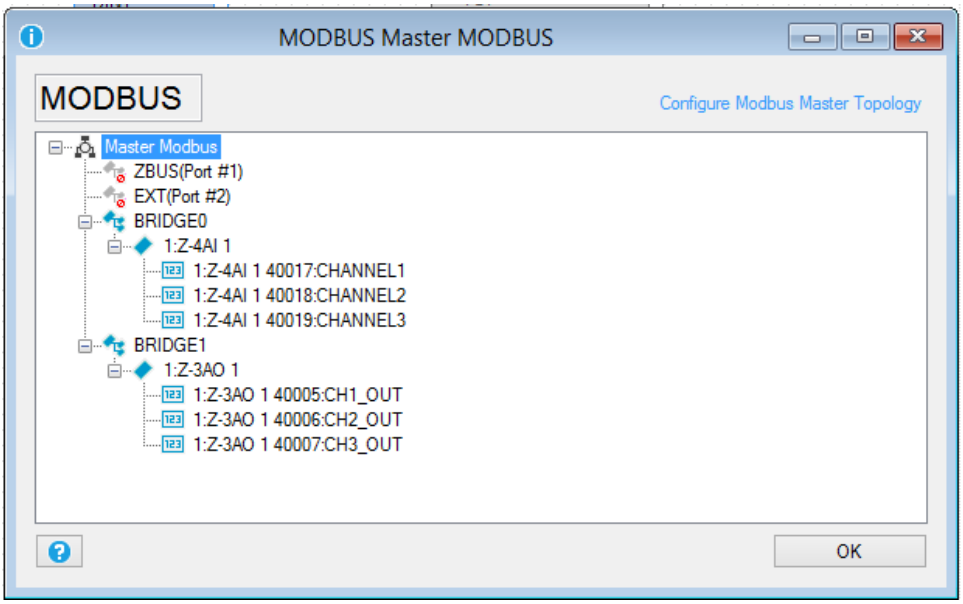
Using the ethernet connection is possible to copy inputs to outputs through internet.

We use a Ethernet module for copy 3 Analog inputs from the Z-4AI to the 3 Analog outputs of the Z-3AO.

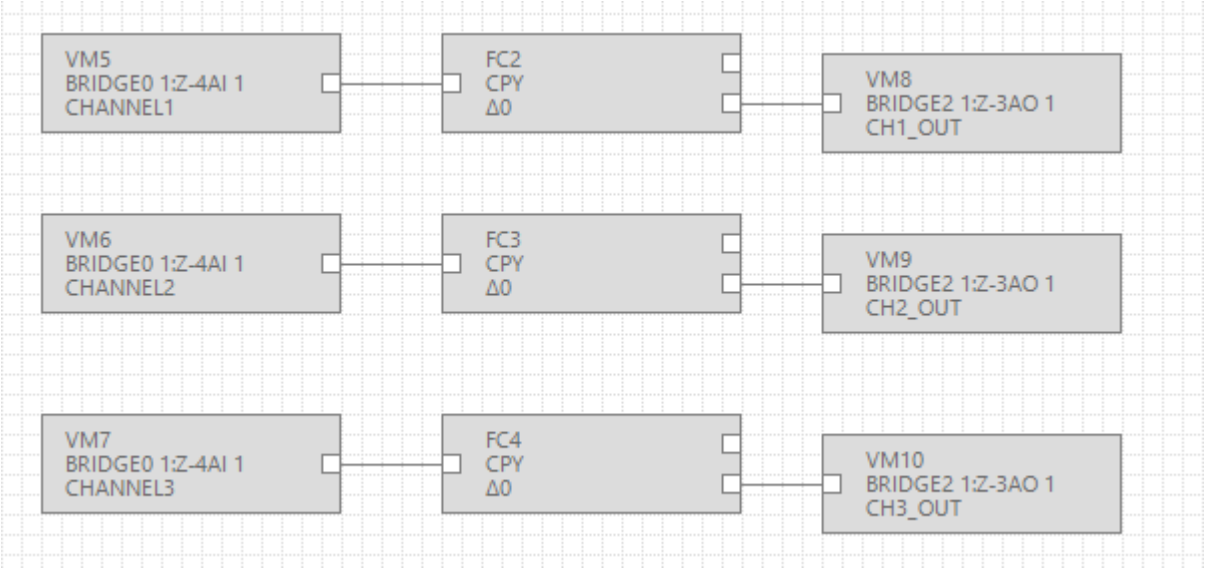
We use a Z-Bridge2 module for converting Modbus TCP-IP to Modbus RTU from ethernet to RS485:



The modbus configuration use a Z-Bridge2 connected with a Z-4AI, then another Z-Bridge2 with a Z-3AO:



We use the analog copy block for read (using Modbus TCP-IP) from the Z-4AI channels an write to the Z-3AO channels:



27. 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 no e-mail arrives at the administrator e-mail address	***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 you can not enable SSL protection
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	-If you are using the ethernet port for sending FTP file the microSD card must be inserted -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 correctness of the IP / 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 Z-GPRS2 installation -Use an optional external antenna: for further information, contact Seneca or visit the Z-GPRS2 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
No communications from RS485 serial #1 BUS IDC10	-Turn switch SW2 to “ON” see chapter 2
Z-GPRS2 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.
Using Z-GPRS2 via ethernet, you get the SMS: "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