SEAL QUICK GUIDE
FOR SENECA RTU
Z-GPRS3
Z-UMTS
Z-LOGGER3

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Date	Version	Changes
29/06/2016	1.00	First revision
22/07/2016	1.02	Added chapter on the use of audio alarms
02/08/2016	1.03	Added chapter on the use of the address book and groups to send alarms to
14/12/2016	1.04	Added support to Z-UMTS and Z-LOGGER3 RTUs Deleted chapters and added in the Application Note section

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ATTENTION!

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

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

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ATTENTION!

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

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

-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.

-Check the data quantity sent via GPRS and SMS before using Z-GPRS3 and Z-UMTS.

Please remember that mobile phone service providers consider the entire communication that permits file transmission as data traffic (and therefore data transmission overhead, the number of connection attempts, etc. must also be included in the count) and not just the dimensions of each 2G/3G transaction.

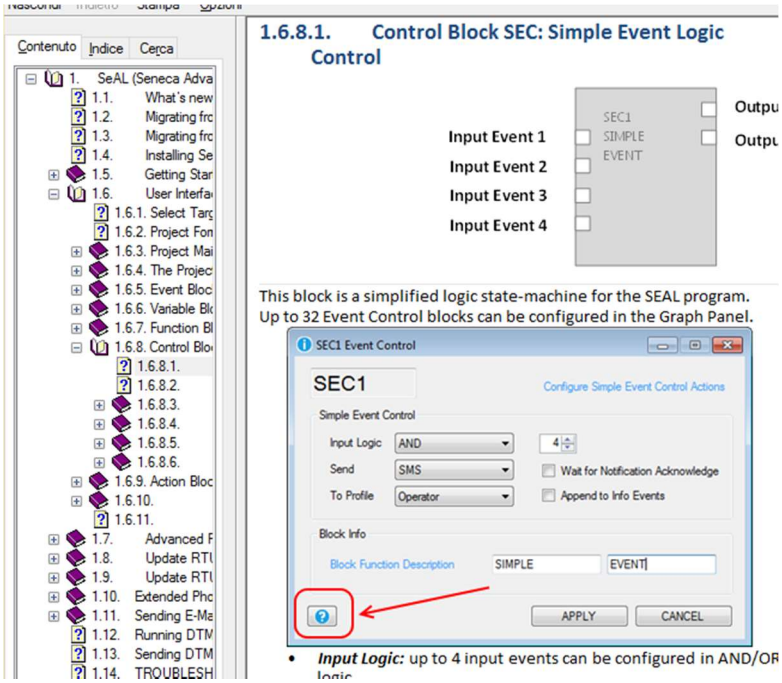
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1. PRELIMINARY INFORMATION ON SEAL

This manual wishes to introduce you to SEAL programming for Seneca RTUs.

Further information about SEAL can be found in the SEAL online help; further information on Z-GPRS, Z-UMTS and Z-LOGGER3 can be found in the user manual.

Each function Block has a help key leading straight to the explanation of the block:



1.1. EVENTS - LOGIC - ACTIONS

SEAL (SEneca Advanced Language) is a configuration and programming software for Seneca RTUs.

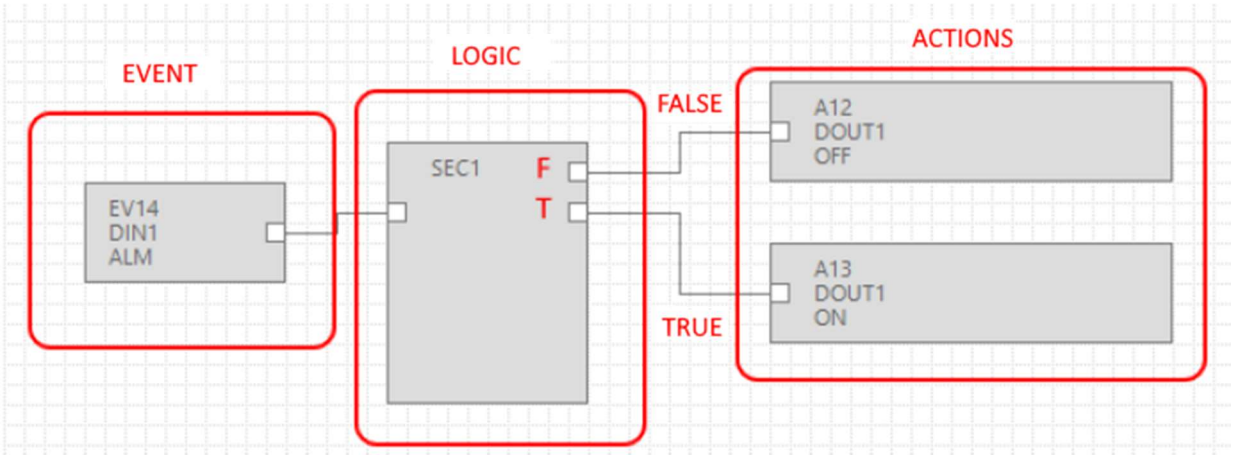
SEAL allows making simple programs using an approach such as:

EVENTS -> LOGIC -> ACTIONS

Events, Logic and Actions are called ***function blocks*** that are interconnected among themselves with threads, creating ***chains***.

A chain example is for instance:

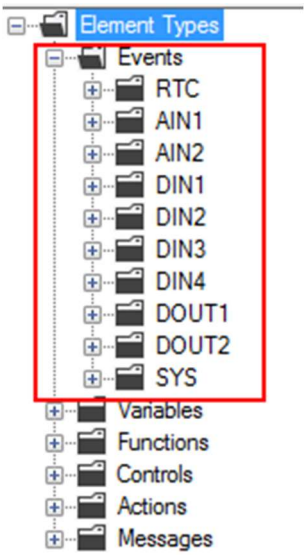
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Event DIN1 ALM (alarm on digital input 1) is connected to the SEC (Simple Event Control) control logic, if the event is false (and therefore there is no alarm), the "FALSE" action is carried out (the output to relay 1 is not energized); if the event is true (and therefore the alarm is active), the "TRUE" action is carried out (the output to relay 1 is energized):

1.2. EVENTS

In SEAL ***Events*** can be found in the ***Events*** folder:



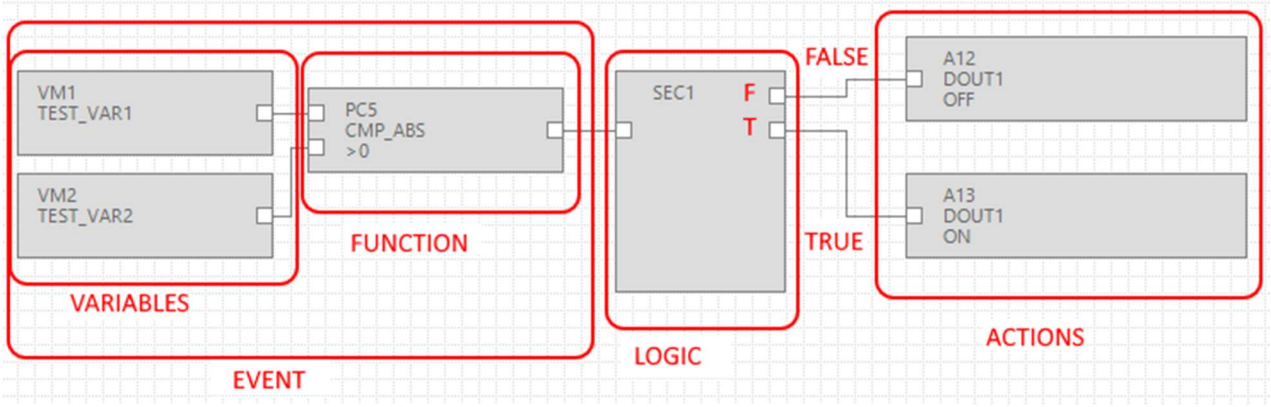
Events include: Alarms on analogue (AIN) and digital (DIN) inputs, etc...

An event can only be boolean (digital), so it can be either true or false.

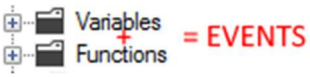
Apart from predefined events, it is possible to join a ***variable*** with a ***function*** generating a new ***event***.

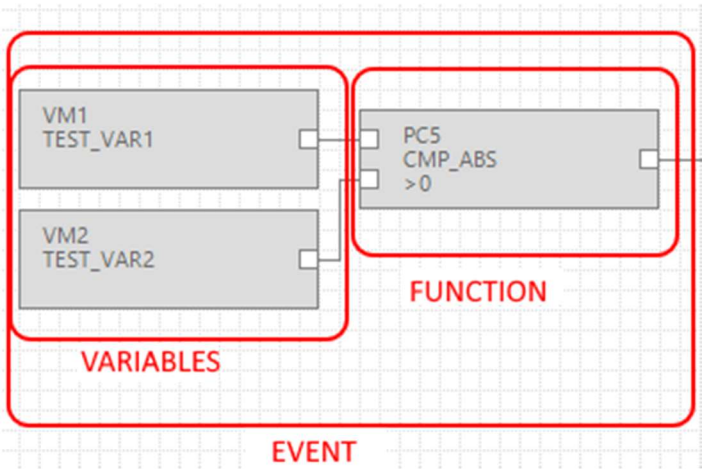
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In this example, two modbus variables have been defined, “Test_VAR1” and “Test_VAR2”, if “TEST_VAR1” > “TEST_VAR2” the "TRUE" action is performed and the output to relay 1 is energized, otherwise the "FALSE" action is performed and the output to relay 1 is deenergized.



Therefore the variables connected with a function form an ***event***.



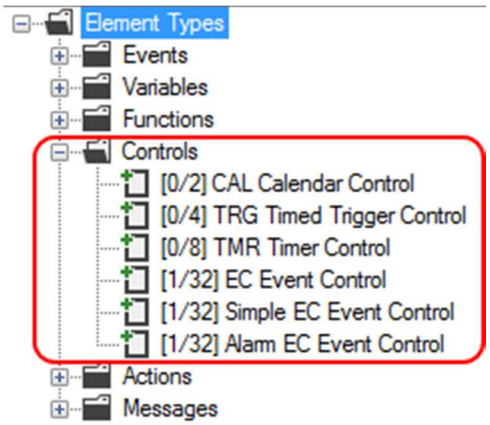


1.3. LOGIC

The logic allows selecting which actions must be performed if the event is true or false.

The function blocks that execute the logic are in the "Controls" folder:

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The number in square brackets [xx/yy] has the following meaning:

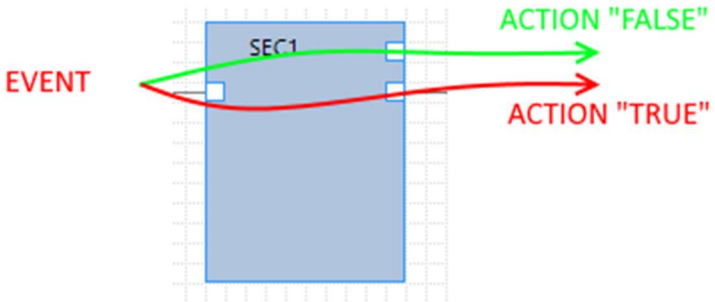
xx = Number of function blocks of the stated type used in the current project

yy = Maximum number of usable function blocks of the type stated

1.3.1. SEC: SIMPLE EVENT CONTROL

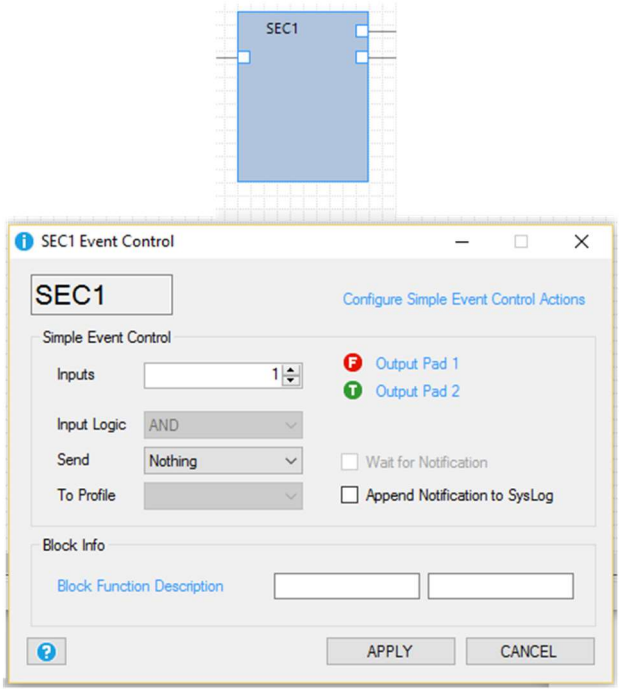
The most useful function block is SEC (Simple EC Event Control), and, as you can see, a maximum of 32 SECs can be used.

SEC separates "False" and "True" events:

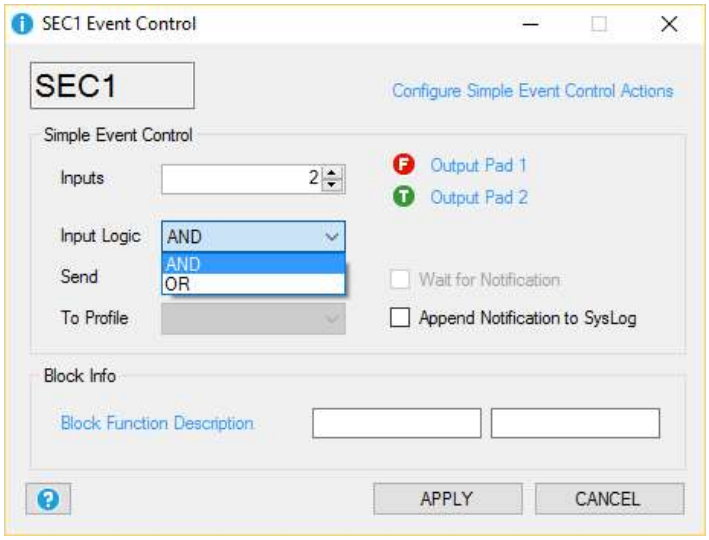


Double-clicking on the function block, the settings of Simple Event Control are displayed:

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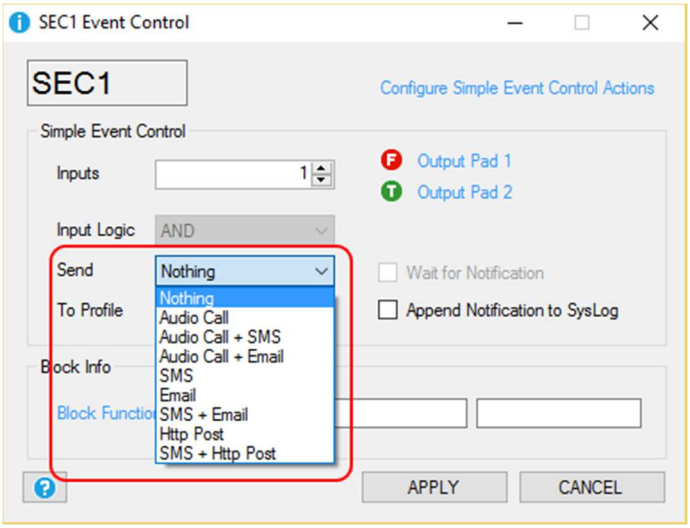
SEC can process from 1 to 4 inputs, if > 1 it is possible to choose the input logic:



That is input events must all be true (AND) or just one (OR) must be.

It is possible to associate sending text messages or audio calls with "Send":

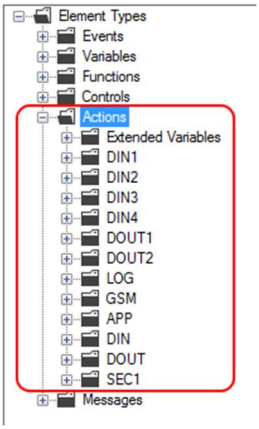
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If you want events to be displayed ***in the event logger***, flag the "Appen Notification to Syslog" checkbox.

1.4. ACTIONS

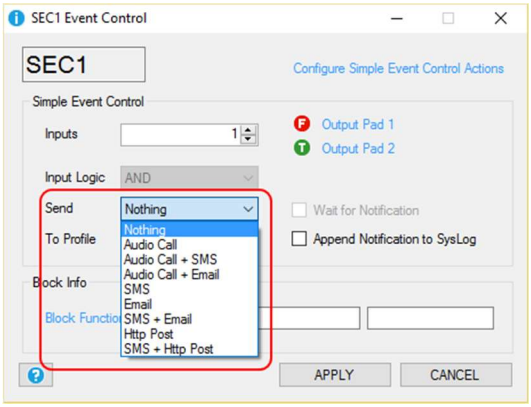
Actions are available in SEAL in the Actions folder:



Actions are available on meters, digital outputs, logs, etc.

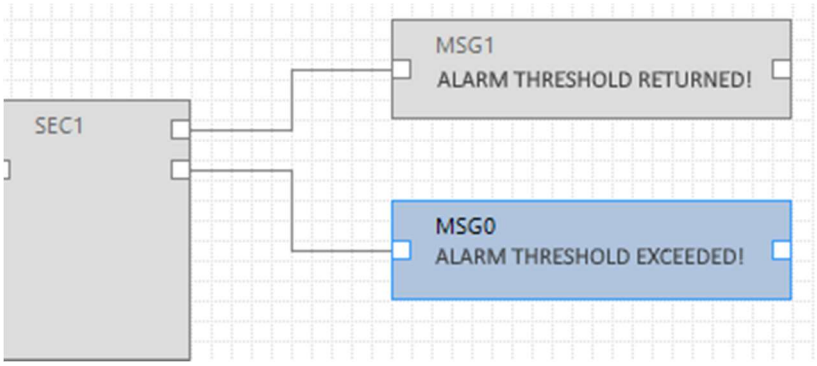
Sending a text message (or an audio call) is considered a particular action and must be managed through Messages and the configuration of the logic block:

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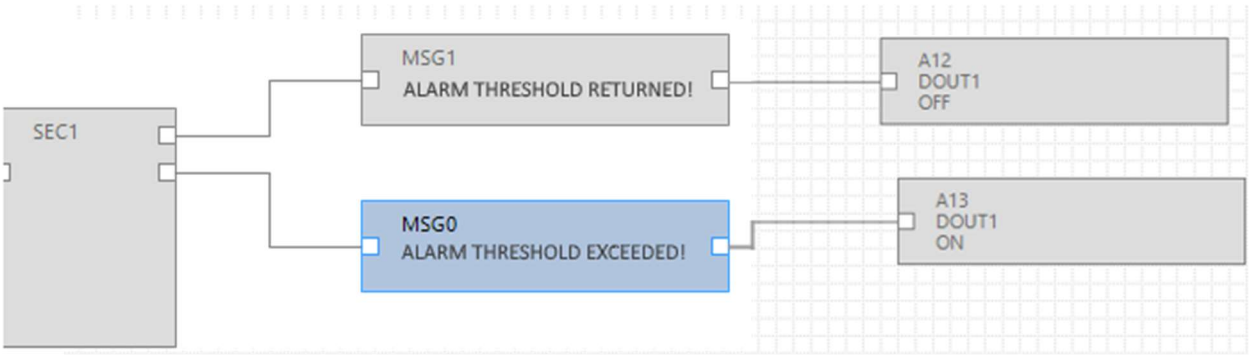


Messages can in turn be connected to the real action (that can be there or not).

For instance, it is possible to send an SMS if a threshold is exceeded on analogue 1, doing it this way:



It is also possible to follow the messages with the command of digital output1:

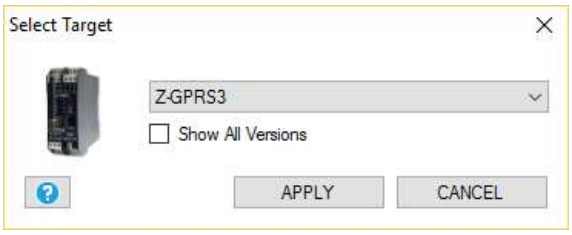


2. COMPILING AND PROGRAMMING THE FIRST SEAL PROJECT

As an example, make a simple project for Z-GPRS3 step by step whose purpose is sending an alarm SMS if there is a change of status of digital input 1 (DIN1).

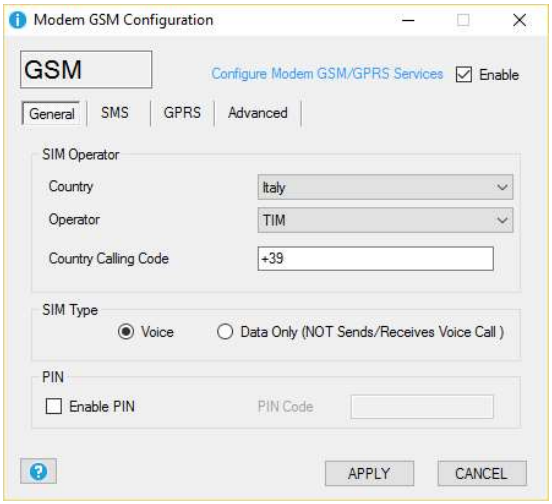
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First of all, configure the target by choosing for example "Z-GPRS3":



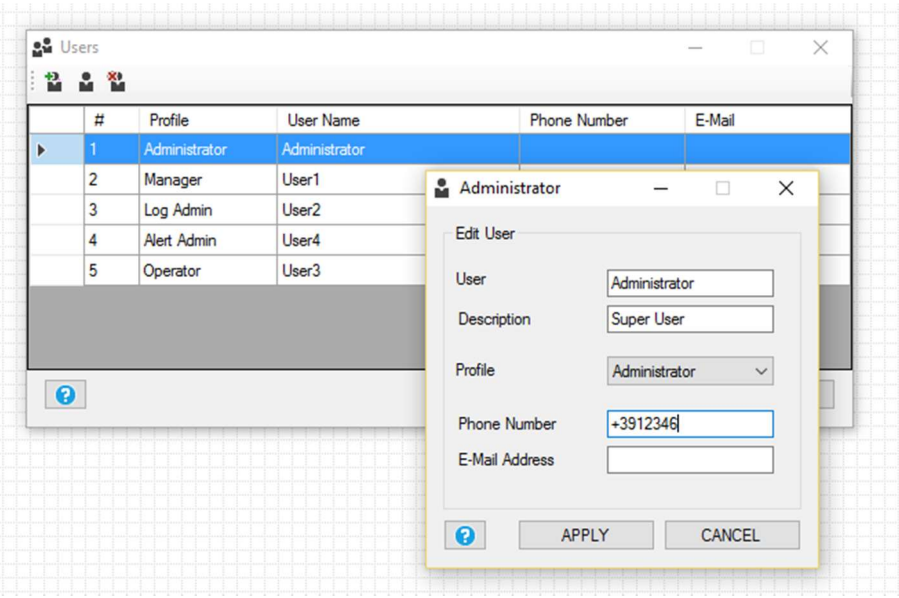
Go to the configuration of the SIM card that will send the alarm SMSs by clicking on icon GSM .

Now select the parameters of your service provider:

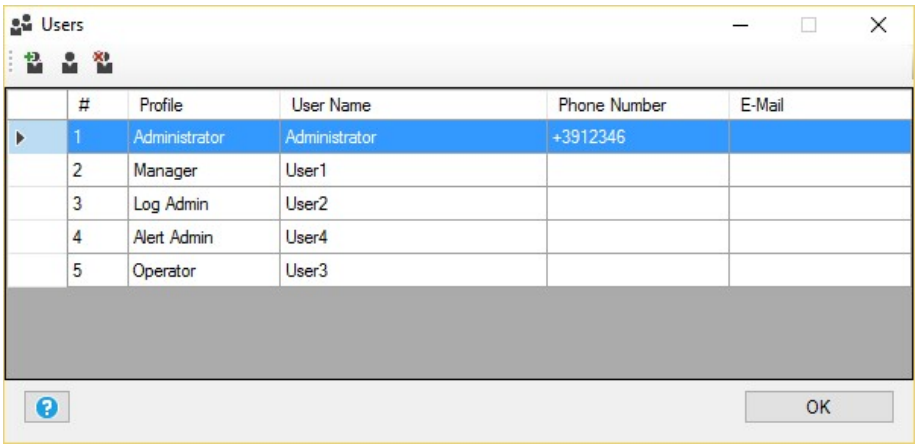


Add the telephone number to send the SMSs to, to the address book, clicking on icon :

Double click on "Administrator" and enter the number +3912346:



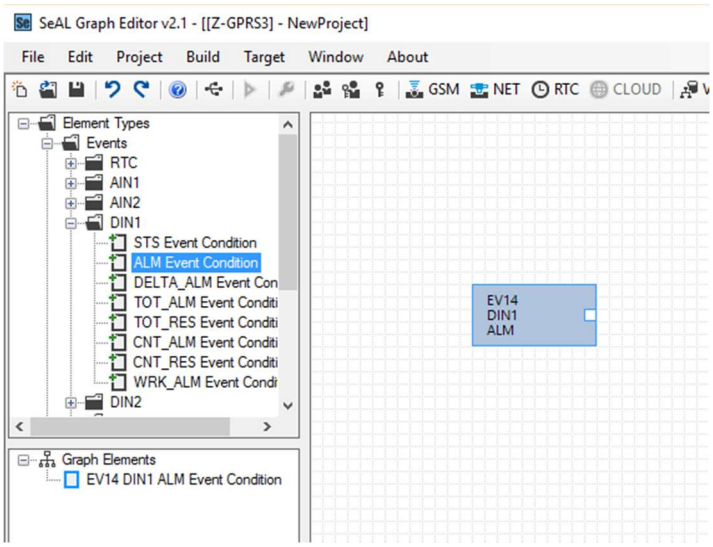
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The configuration is now complete.

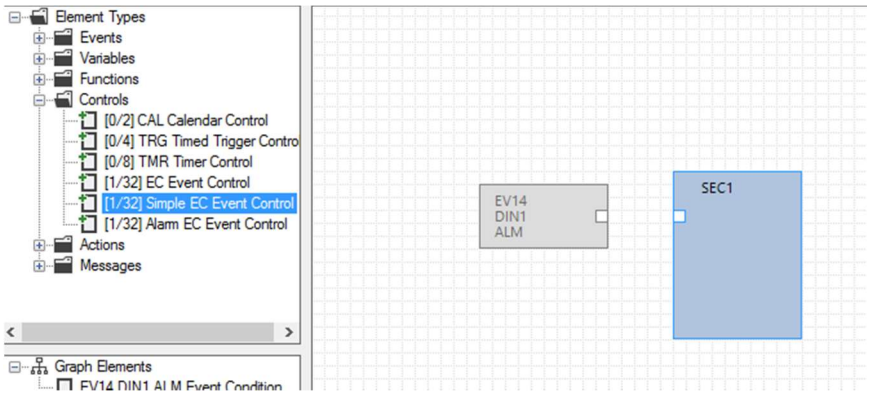
Now it is necessary to program the alarm chain regarding digital input 1.

First of all, drag the alarm event or the DIN1 ALM function block onto the project:



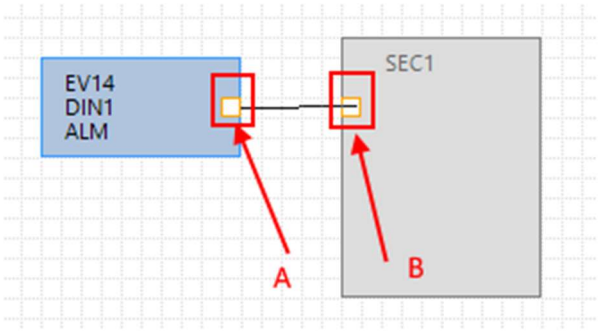
Drag the function block of Simple Event Control logic:

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And then connect the event to the logic this way:

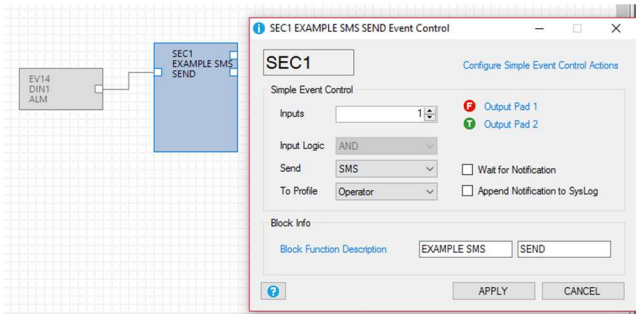
Left-click on A, keep pressing the key and release it on point B:



Now double click on the function block of the "SEC1" logic:

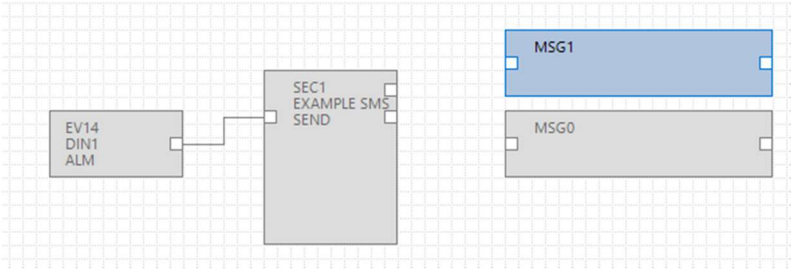
Set the "SMS" to "Send" to the Operator profile.

Since the user is the Administrator, it is present in all profiles and so it will receive the SMSs:

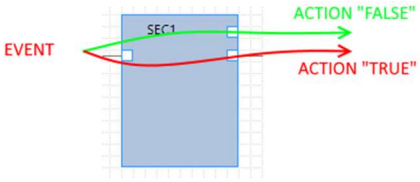


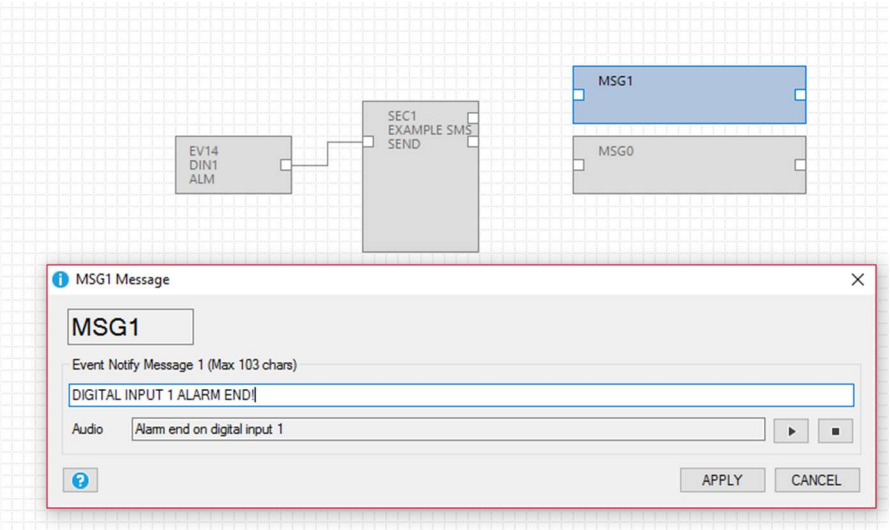
Now add the actions that are, in this case, text messages and add the first two Messages: MSG0 and MSG1:

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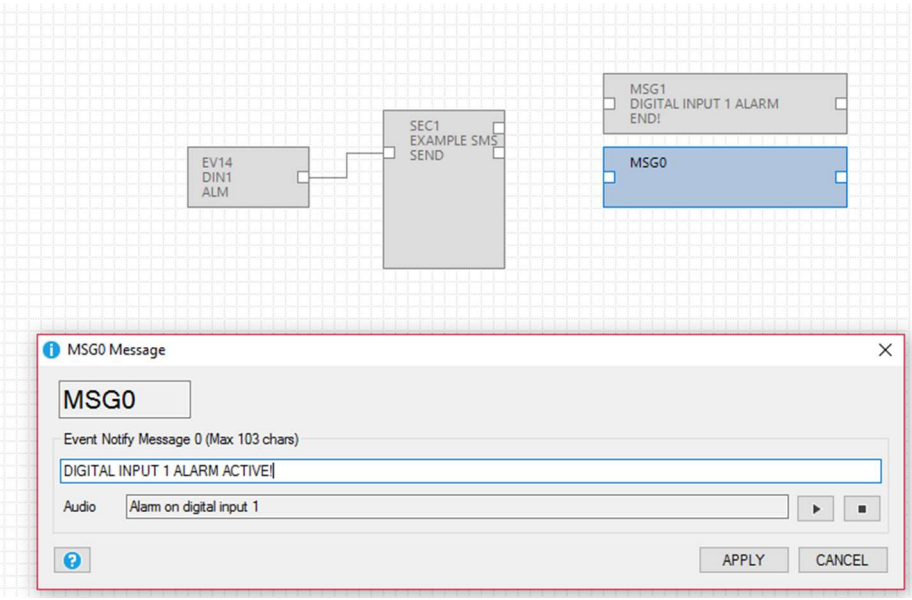


Double click on function blocks MSG0 and MSG1 to modify the default text with your message. Pay attention that SEC1 has false event in pad 1 and true event in pad 2:

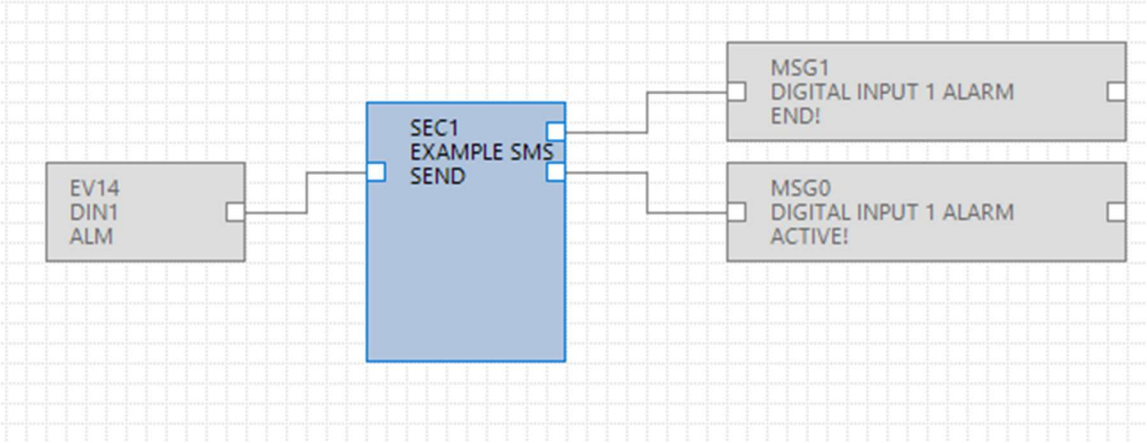




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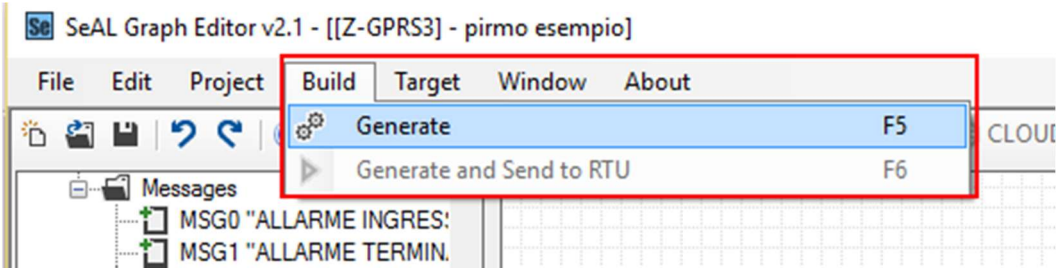


The final chain is obtained connecting the function block of the logic to the two messages:

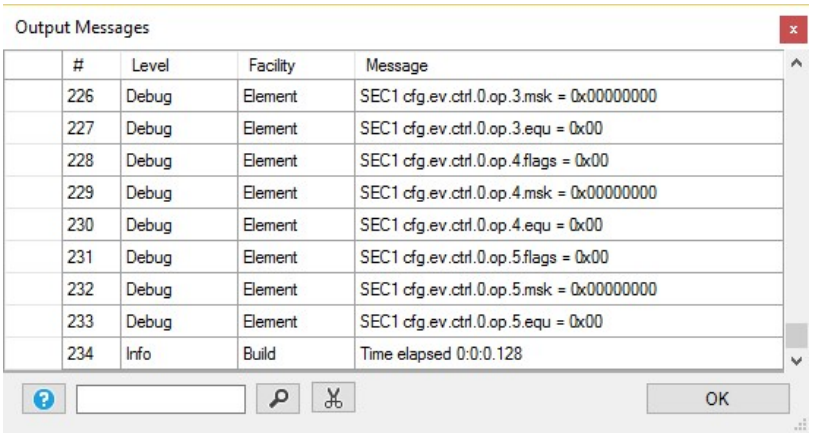


Both the configuration and the project are complete so now it is necessary to fill in and send the project to the RTU.

Using the Build menu, fill in checking there are no mistakes:

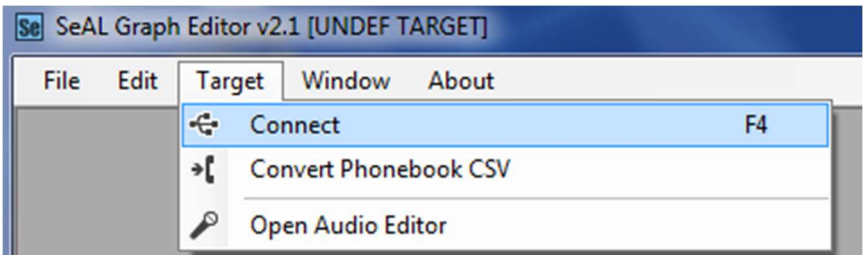


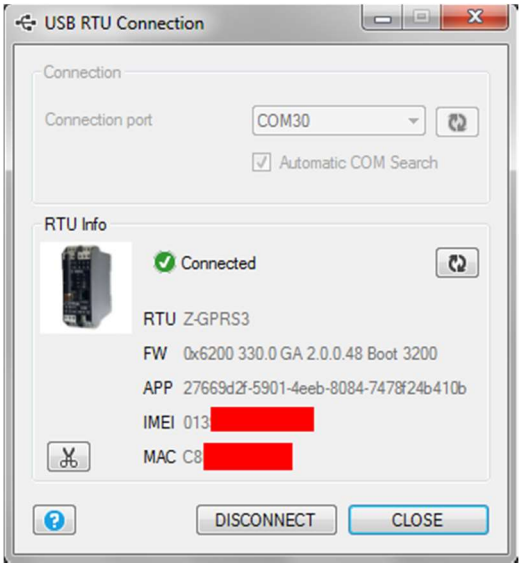
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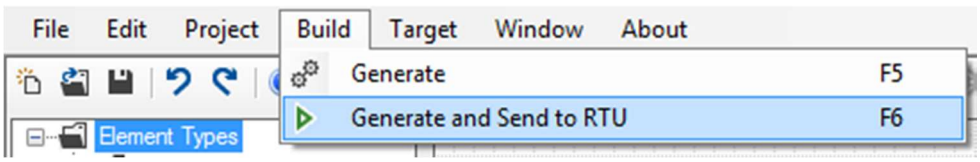
No mistakes have been highlighted.

Now you can send the project to the RTU connecting the USB cable and then pressing "Connect":





Now send the project with Build -> "Generate and Send to RTU":



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At this point, just short circuit terminal 15 and 13 to send the alarm SMS:

"DIGITAL INPUT 1 ALARM ACTIVE!"

to the configured number.

If the short circuit on terminals 15 and 13 is removed, another alarm SMS is generated:

"DIGITAL INPUT 1 ALARM END!"

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3. WEB SERVER AND MODBUS TCP-IP SERVER SERVICES

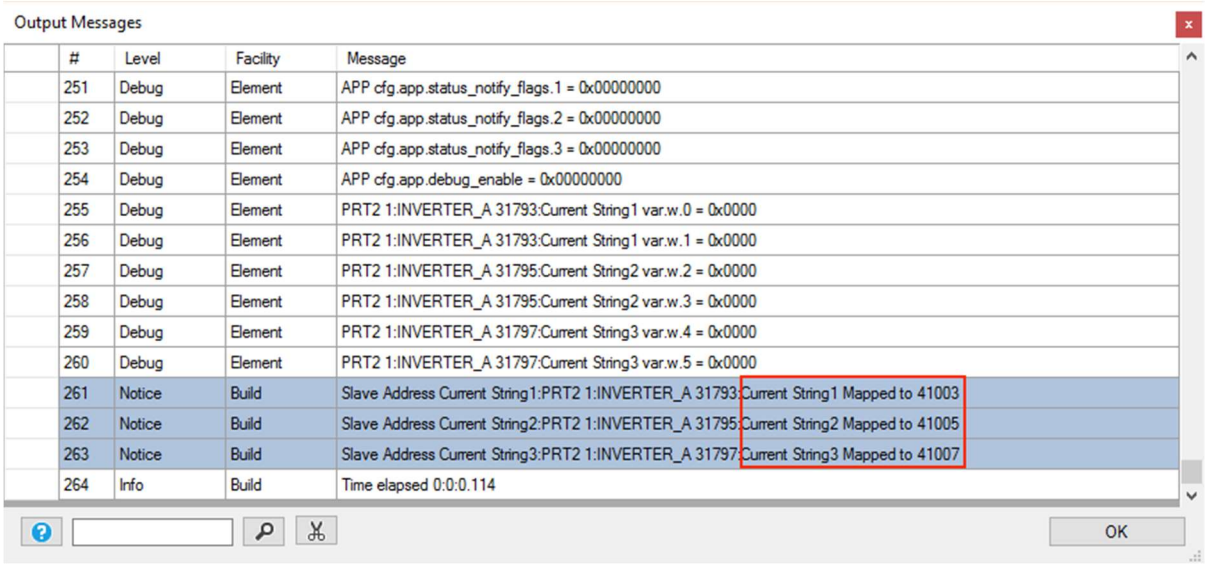
RTUs have two servers, the web server and the modbus TCP-IP server:

- WEB SERVER: allows to view the values of the logger variables in real time, simply using a web browser for PC, smart phone or tablets. It is possible to see the status of the RTU, view any errors, download the log files on the SD card, etc.

- MODBUS TCP-IP SERVER: allows to access in real time the values of the variables that are logged via SCADA or Modbus TCP-IP client.

For the Modbus TCP-IP addresses of the RTU internal variables, refer to the user manual.

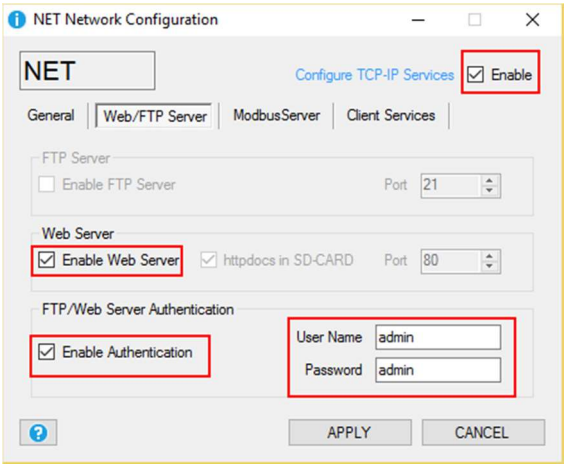
The Modbus TCP-IP addresses of the RTU extended variables are calculated when filling in, refer to the filling in output:



3.1. ENABLING THE WEB SERVER AND THE TCP-IP SERVER

To enable the web server and the modbus TCP-IP server, click on icon NET and set the parameters to access the web server:

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To access the factory web server using a browser, enter:

http://IP/maintenance/index.html

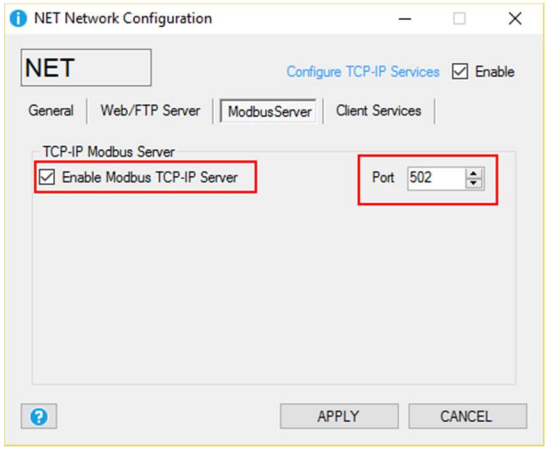
where IP is the current IP address of the RTU (default 192.168.90.101).

To access the web server customised in the SD card using a browser, enter:

http://IP/index.html

where IP is the current IP address of the RTU (default 192.168.90.101).

To enable the modbus TCP-IP server:



The Modbus TCP-IP protocol uses port 502 by default, refer to your SCADA to set the correct port number.

3.2. REMOTE ACCESS TO THE WEB SERVER AND MODBUS TCP-IP SERVER

It is possible to access the modbus TCP-IP server and Web server remotely as follows:

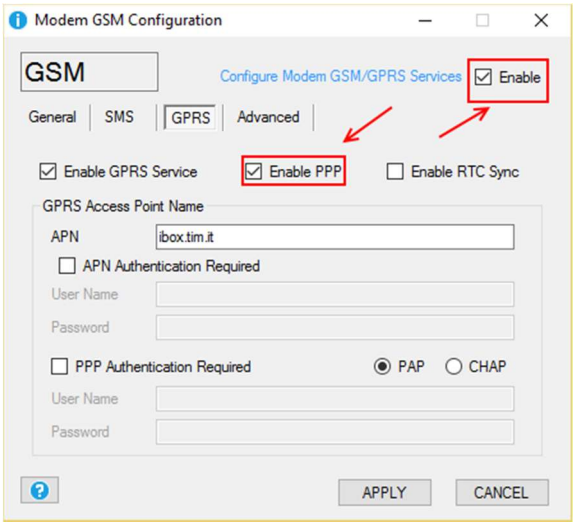
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- CONNECTION VIA ADSL /Xdsl

For this type of connection, the Ethernet connection is used and the ADSL / xDSL modem must be configured so that the server ports can be seen by the internet (port forwarding or virtual server according to the modem model)

- CONNECTION VIA A GSM/GPRS MODEM

A GSM/GPRS PPP connection is used for this type:



No emails can therefore be sent via an SMTP EMAIL server since they require an SSL connection.

As to the remote connection, there are various types of SIM:

3.2.1. CLASSIC SIM WITH DATA TRAFFIC

This SIM is the most common and is normally used in smart phones. Typically, this SIM cannot be reached directly because all incoming ports are filtered.. With this type of SIM you can only send log files and alarms and can access neither the modbus TCP-IP server nor the WEB server.

If you need to connect to the RTU you must contact your service provider to have the SIM with "incoming ports opened"

3.2.2. CLASSICAL SIM WITH DATA SERVICE AND INCOMING PORTS OPEN

This SIM is a classical SIM enabled for data service whose incoming ports have been opened by the service provider. With this type of SIM you can access the modbus TCP-IP server as well as the Web server but the IP address changes every time you connect (dynamic ip).

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To solve the problem, the RTU can answer the SMS (whose text is "NET") by sending the current IP address. The Seneca OPC Server can also be used to connect to the Modbus TCP-IP server automatically, using a FTP server that always keeps the last valid IP address.

3.2.3. SIM WITH PRIVATE APN

This SIM allows accessing a private network (external to the internet) and having a fixed and static IP available. It is therefore possible to set both the web server and the Modbus TCP-IP server directly.

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