USER MANUAL

MySEAL

IIOT datalogger
With built-in I/O and remote control functions

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Seneca **MySEAL**

1. PRELIMINARY INFORMATION

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 MYSEAL.

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

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

SENECA, ITS SUBSIDIARIES OR AFFILIATES OR GROUP PARTNERS OR DISTRIBUTORS AND SENECA DEALERS DO NOT GUARANTEE THAT THE FUNCTIONS FAITHFULLY MEET THE EXPECTATIONS AND THAT MYSEAL, ITS FIRMWARE AND SOFTWARE ARE FREE OF ERRORS OR FUNCTION UNINTERRUPTEDLY.

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ATTENTION!

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

-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.

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-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 MYSEAL.

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.

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2. FIRST INSTALLATION

Check the "Quick Guide" and "Installation guide" before opening the package.

3. FEATURES

MYSEAL is a GSM/GPRS module that controls industrial and domestic domotics and security applications.

- 128 x 32 Dots graphic LCD display
- Rechargeable lithium ion battery, autonomy up to 8 h
- No.5 digital inputs available on internal terminal board
- No.2 analogue inputs V/mA available on internal terminal board
- No.1 replaceable GSM antenna on SMA connector
- No.1 NTC temperature sensor (also outside the terminal)
- Built-in GPS module (on MySEAL GPS module)
- ON/OFF key and display page change key
- Display LED: device power/status, GSM/GPRS status
- Micro USB slot for module configuration
- Log possibility on micro SD, micro SDHC card (max 32 GB)
- No. 2 relay digital outputs (optional card)
- Real Time multitasking operating system
- Supported IIOT protocols: MQTT and http REST

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4. TECHNICAL SPECIFICATIONS (MySEAL)

2.1 DIGITAL INPUTS	
Number of channels	4
Input type	Reed, contact, PNP, Pulsecap
Maximum frequency	30 Hz
Absorbed current	3 mA
2.3 DIGITAL OUTPUTS	
Number of channels	2 (optional)
Output type	Clean contact relay
Maximum voltage	240 Vac
Maximum current	3 A on shared

2.3 ANALOG INPUTS	
Number of channels	2 + 1 temperature
Input type	mA / Vdc, settable
Voltage input	0..30V precision 0,1% FS
Current input	0..20 mA precision 0,1% FS
NTC temperature input	Precision +/- 0.5°C

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Resolution	16 bit
2.4 DISPLAY	
DISPLAY	LCD 128 x 32 Dots 39 mm x 8.6 mm viewing area
2.5 STORAGE UNIT	
Micro SD	microSD and microSDHC, max 32 GB
2.6 POWER	
Voltage	6..15 Vdc @ 500 mA
Absorption	3.5 W
2.7 ENVIRONMENTAL CONDITIONS	
Temperature	With the power supply present: -20 +55°C With use of the battery: -20 +45°C Correct battery recharge: 0 – 45°C Anyway, Seneca recommends staying within the 0-45°C range so that operation in all modes can be guaranteed
Humidity	30..90% to 40 °C non condensing
Storage temperature	From -20 to +85 °C
Protection rating	IP20
2.8 REGULATIONS	
EN 301 511	Harmonized standard for mobile stations in the GSM900 and 1800 bands.

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EN 301 489-1	Electro-magnetic compatibility standard for radio equipment and services.
EN 301 489-7	Specific (EMC) conditions for mobile radio equipment (GSM 900 and 1800).
EN 60950	Safety of information Technology Equipment.
2.9 CASE SPECIFICATIONS	
Dimensions and weight	L: 80 mm; H: 108 mm; W: 32 mm, 150 g
Material	Polycarbonate/ABS

For further information, see the installation manual available for free download at www.seneca.it.

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5. SIGNAL LEDS

LED	*STATUS*	*MEANING*
GSM (YELLOW)	FAST FLASHING (64 ms ON / 800 ms OFF)	GSM network search
	SLOW FLASHING (64 ms ON / 3000 ms OFF)	MySEAL is connected and registered in the GSM network
	MEDIUM FLASHING (64 ms ON / 300 ms OFF)	MySEAL is connected and registered in the GSM and GPRS networks (data network)
POWER (GREEN)	ON	MySEAL is ON The Log is in STOP status
	SLOW FLASHING	MySEAL is in data logging status
	FAST FLASHING	MySEAL is accessing the microSD

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6. BASIC NOTIONS

MySEAL is equipped with 4 counters and 4 totalizers, up to a maximum of 30 Hz signals can be acquired, 4 digital inputs, 2 analogue inputs and 2 relay digital outputs.

MySEAL I/O can be logged and the log sent as a file in csv format (comma separated values) via ftp or email. The last row of the log file can also be sent via SMS.

Counter and totalizer overflow is 999,999,999. An additional input status change switches the value to 0.

MySEAL can also log onto its own microSD.

Dozens of years can be continuously saved on a 32GB microSD.

Regardless of the acquisition time, analogues can be sampled every 50 ms. If the log acquisition time is set to 10 minutes, for example, the following is acquired for each analogue:

the sampled value at the end of the tenth minute

the average value in the 10 minutes

the maximum value in the 10 minutes

the minimum value in the 10 minutes

4 different alarm thresholds are available for each of the two analogue inputs. An SMS can be sent with a settable text when this alarm trips.

Counter/totalizer inputs and analogue inputs can be tiered. The tiered values will always be used in logs and SMS.

Other types of alarms concern counters, totalizers, digital input increases, power outage, plumbing leaks and the hour meter.

The alarm is made up of an editable text and can be sent via SMS or email (also in UNICODE format).

It is also possible to have an audio call made by MySEAL.

MySEAL 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 of SMS 0, 1 up to 15.

Fast commands can also be run via audio call by sending phone keypad tones.

MySEAL can save log files via FTP or email and on microSD or microSDHC (max 32 GB).

MySEAL is ready to connect to the Cloud since it can use the MQTT and http REST protocols.

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All configurations are possible via the SEAL software, available for free download at www.seneca.it in the download or MySEAL sections.

MySEAL can operate as a datalogger even without a SIM card, saving logs on microSD and leaving the GSM modem off.

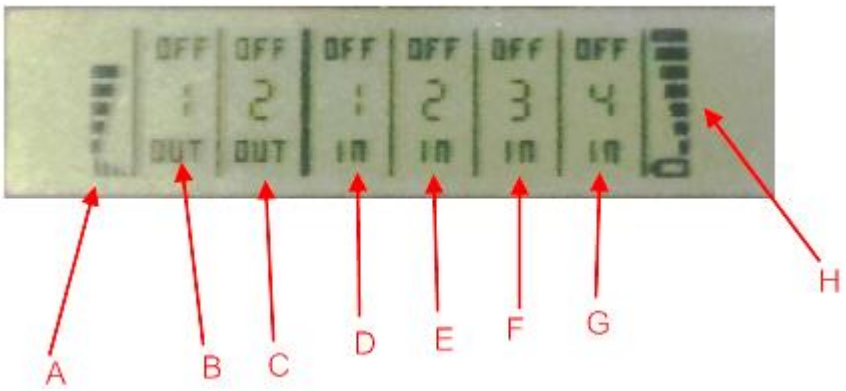
MySEAL can calculate sunrise and sunset times. These can be used to generate actions.

Audio calls can be customised in the MySEAL GPS model for alarms and a series of alarms tied to the GPS location can be managed.

7. Display

7.1. Main page

The main MySEAL display page provides the following information:



A = GSM signal level

B = Output 1 status

C = Output 2 status

D = Digital input 1 status

E = Digital input 2 status

F = Digital input 3 status

G = Digital input 4 status

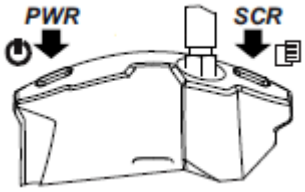
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H = Battery charge level

To indicate battery charge level, the bars indicated by H quickly change from minimum to maximum level.

7.2. Changing the displayed page

To change the displayed page, press the SCR key. The key is illustrated in the figure:



7.3. MAIN menu

Press and hold down the left PWR key for several seconds to open the main MySEAL menu.



The various items in the main menu can be scrolled using the right SCR key.

Confirm selections by pressing the left PWR key.

7.4. PAGE CONTEXT menus

Some pages let you view other information via a context menu.

The context menu can be opened by opening the required page and pressing and holding down the right SCR key for several seconds.

Pages with context menus are identified by the triangle icon displayed at the top right.

7.4.1. Totalizer, Counter and Delta display

The display only shows values for totalizers 1 through 4. Counter values and increases from the previous period (delta) can be viewed as follows:

Press the SCR change page key to view a totalizer value. At this point, hold down the SCR key until the menu appears:

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use the right SCR key to move between the various fields. Confirm selections by pressing the left PWR key.

7.4.2. Date/time, calculated sunrise/sunset time and set GPS coordinates display

Only the date/time is displayed. The sunrise/sunset time calculated according to the current data and GPS position, current GPS coordinates in latitude and longitude according to WGA84 standards can be displayed as follows:

Press the SCR change page key to view the date/time. At this point, hold down the SCR key until the menu appears:



use the right SCR key to move between the various fields. Confirm selections by pressing the left PWR key.

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8. SUPPORTED SIM CARDS

MySEAL supports the following types of SIM CARDS:

Top-up voice SIM CARD

Subscription voice SIM CARD

Data transmission only SIM CARD

Operations can be run "at zero cost" for voice type SIM CARDS by ringing MySEAL to run set operations. With a voice SIM, MySEAL can also make voice calls or run commands from tone codes.

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

ATTENTION!

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

-Before inserting the SIM CARD in MySEAL, 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.

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9. GSM SIGNAL

The MySEAL GSM signal level can be found on the display or via the Seal software (in the test setup 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).

ATTENTION!

-Insert the SIM card with MySEAL off.

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

The field can be inserted in the log files, in this case it is expressed in dBm where -115 dBm is the minimum (0) and -52 dBm is the maximum (7).

Please refer to the following equivalence table:

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

For correct MySEAL operation used for ftp, http, MQTT or email, the minimum required field level is 2/7 (please remember that the signal often fluctuates).

For MySEAL operation used only via SMS, 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, AUDIO AND GPRS)

SIGNAL LEVEL 2 = SUFFICIENT SIGNAL (MINIMUM SIGNAL FOR SMS, AUDIO AND GPRS)

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

SIGNAL LEVEL 4 = GOOD SIGNAL

SIGNAL LEVEL 5 = VERY GOOD SIGNAL

SIGNAL LEVEL 6 = EXCELLENT SIGNAL

SIGNAL LEVEL 7 = EXCELLENT SIGNAL

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

Visit www.seneca.it, MySEAL section or contact Seneca srl for further information.

ATTENTION!

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

-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 MYSEAL.

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.

10. INTERNAL UPS

RTUs are fitted with rechargeable batteries.

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

A) Work up to 1 hour without external power supply.

When the voltage batteries are insufficient, the RTU will execute the following algorithm:

1) Finishes sending the data

2) Closes all open files on microSD

3) Off

B) Turn off without external power.

C) Without external power supply, the card will send the log data and then turn off

In SEAL this behaviour can be changed in the system configuration:

ATTENTION!

RTUs ARE SUPPLIED WITHOUT CHARGED BATTERIES.

CHARGE THE BATTERIES THAT POWER THE RTUs FOR AT LEAST 48 HOURS BEFORE USE

ATTENTION!

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

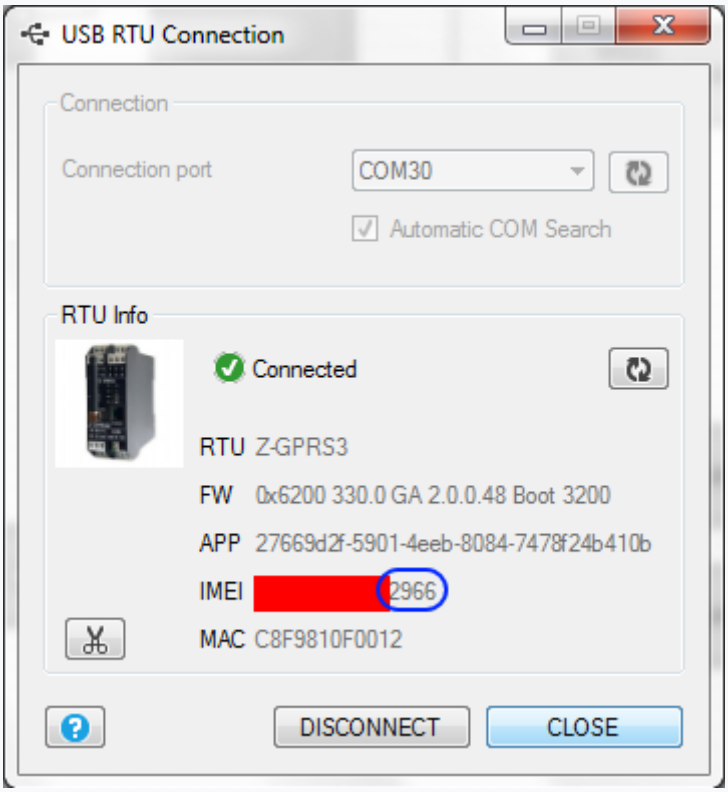
11. THE ADDRESS BOOK

For security reasons, Z-GPRS3 and Z-UMTS accept the SMS command or the audio call only from the numbers in the address book.
The address book consists of a maximum of 8 telephone numbers / emails.
Groups of numbers / emails can be used to send alarms / logs to a limited number of users.
For more information, see the SEAL online Guide.

11.1. SENDING AN SMS COMMAND WITH PASSWORD

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An SMS command can be accepted even if the phone number is not present in the address book.
To obtain this function, a password must be entered before the SMS command.
The password is different for each RTU and is obtained from the last 4 digits of the modem IMEI.
To obtain the password it is necessary to connect the RTU with SEAL:



Then send the SMS command:
"2966 NET"
The RTU will answer even if the phone number is not present in the address book.

11.2. ADDRESS BOOK ON MICROSD CARD

The internal address book can be expanded using a file on the microSD card.
A maximum of 1000 phone numbers can be added, but these numbers are only enabled to send a ring (and therefore execute a ring command).
To change the address book of the MicroSD card, refer to the SEAL online Guide.

11.3. ACQUIRING AND SENDING LOG DATA

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When the logger is activated, the RTU saves the data in an internal Flash, then it can send it to the email server, ftp server, http server, MQTT broker or MicroSD card.

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

The files are in standard CSV text format (compatible with Windows Excel®).

There are 3 types of loggers:

Event logger, data logger and data logger on Trigger

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

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

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

11.3.1. EVENT LOGGER

The event logger works by defining the events (digital input / output events, blackouts, analogue alarms etc.) with the configuration of the SEAL software.

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

The event log can be sent at least once a day and the files are sent via FTP, email or saved on a microSD card.

NOTE:

If no event is generated, the event log file will consist of a single line with the text:

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

11.3.2. Sending the event log file to an FTP server

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

An event logger can also include diagnostics, for example:

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

For events (e.g. alarm status Digital1 and Digital2):

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

The file name of the event logger is:

RTUNAME_msgyyyyMMddhhmmss.csv

Where:

RTUNAME is the name of the RTU

yyyy is the year of the send file

MM is the month of the send file

dd is the day in the send file

hh are the hours to the send file

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mm are the minutes in the send file

ss are the seconds in the send file

Therefore the file name can be:

MYSEALTEST_msg20160606000057.csv

11.3.3. Sending the event logger file to an EMAIL server

MySEAL is compatible with SMTPS servers with SSL 3.0 encryption (for example GMAIL™).

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

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

An event logger can also include diagnostics, for example:

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

For events (e.g. alarm status Digital1 and Digital2):

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

The file name of the event logger is:

RTUNAME_msgyyyyMMddhhmmss.csv

Where:

RTUNAME is the name of the RTU

yyyy is the year of the send file

MM is the month of the send file

dd is the day in the send file

hh are the hours to the send file

mm are the minutes in the send file

ss are the seconds in the send file

Therefore the file name can be:

MySEAL_msg20160606000057.csv

11.3.4. Saving the event logger file on the microSD card

MySEAL is only compatible with microSD cards formatted in FAT32 (the FAT16 file system is not recommended).

Event logger files are stored in the / SYS directory.

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

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Exxxxxxx.csv

Where xxxxxxx is an incremental number.

11.4. DATA LOGGER AND LOGGER ON TRIGGER

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

The minimum sampling time is 1 minute.

The card can send data in two ways:

1) Notification

2) Report

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

The report sends data every time the report is generated (for a sampling time = 1 minute and a report time = 5 minutes, the report is made up of 5 lines of data).

The logger on trigger works by defining one or more event actions (trigger), when the trigger action is true a complete line acquisition is performed.

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

NOTE:

Only the notification data can be used for the POST http and MQTT functions, so only one line will be sent at a time.

11.4.1. Sending the logger file to an FTP server

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

A typical data logger file opened with excel ™ is:

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

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51766	LOG	05/06/2016 14:38	0	0	0	0	0	0	1	1	43	43	42	44
51767	LOG	05/06/2016 14:39	0	0	0	0	0	0	1	1	43	43	42	44
51768	LOG	05/06/2016 14:40	0	0	0	0	0	0	1	1	43	43	42	44

Where:

INDEX is a progressive acquisition number.

LOG is a constant text.

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

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

The Data Logger on the Trigger file when opened with excel ™ is:

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

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

For example, the line with index 9 is generated by trigger "B" (DIN2 HIGH).

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

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

The file name of the Data Logger is:

RTUNAME_logyyyyMMddhhmmss.csv

Where:

RTUNAME is the name of the RTU

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

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

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

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

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

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

So the file name of the first example can be:

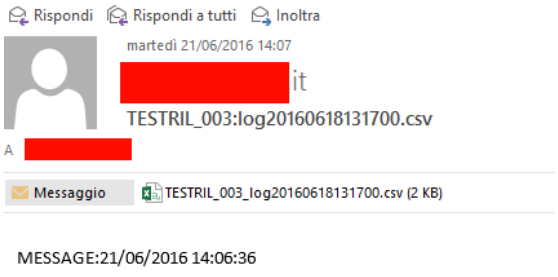
MYSEAL_log20160605143600.csv

11.4.2. Sending data logs and triggered data logs to an EMAIL (SMTP) server

MySEAL is also compatible with SMTPS servers with SSL 3.0 / TLS 1.0 encryption (for example GMAIL ™)

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

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



MESSAGE:21/06/2016 14:06:36

A typical data logger file opened with excel ™ is:

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

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Where:

INDEX is a progressive acquisition number.

LOG is a constant text.

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

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

The Data Logger on the Trigger file when opened with excel™ is:

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

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

For example, indexed line 9 is generated by trigger "B" (DIN2 HIGH).

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

Note that the RTU directly calculates the Average / Minimum / Maximum of a built-in analogue input.

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

RTUNAME_logyyyyMMddhhmmss.csv

Where:

RTUNAME is the name of the RTU

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

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

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

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

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

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

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Therefore the file name in the example can be:

MYSEAL_log20160605143600.csv

10.2.1. Sending data loggers and data loggers on trigger data to an HTTP server

Data logger The logs are sent using the notification (the connection is made every time sampling occurs).

The standard used for sending data is JSON.

For more information, consult the PROTOCOL HTTP SENECA user manual (must be requested from service@seneca.it).

11.4.3. Saving data logger data on the microSD card

MySEAL is only compatible with microSD cards formatted in FAT32 (the FAT16 file system is not recommended).

Log files are stored in the / LOG directory.

If the log file is to be sent more frequently than once a day, the RTU will create a directory for every day, for example:

ROOT

--LOG

--20160618

--20160619

--20160620

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

Lxxxxxxx.csv

Where xxxxxxx is an incremental number.

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12. Sending data to an MQTT broker

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

For more information on MQTT see:

http://mqtt.org/

or further information on the implementation of MQTT, refer to the SENECA MQTT PROTOCOL user manual (it must be requested from service@seneca.it).

13. HOW MANY LOGS IN A MICROSD?

A microSD is typically pre-formatted in FAT32 format with an allocation unit that depends on the manufacturer.

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

Using a classic 4 GByte microSD formatted with a 32768 bytes file allocation, the number of allocation units is approximately:

4 000 000 000/32768 = approximately 122070 allocation units

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

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

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

122070/3600 files per day = approximately 34 days

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

In a “cmd” type shell, enter:

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

Where “x” is the letter of the microSD unit

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

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

Saving a file every 15 minutes will create a file of approximately 10 KB, then use 10 allocation units:

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

Otherwise, saving a log every 1 minute:

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

The minimum size of the unit is generally:

512 bytes per 2 GB microSD

1024 bytes per 4 GB microSD

14. ACTIONS AND MESSAGES

The SEAL software configurator can manage actions and messages.

14.1. ACTIONS

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

Examples of actions are: Activating digital output 1, resetting a totalizer etc.

14.2. TEXT AND AUDIO MESSAGES

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

Messages can be sent via EMAIL, SMS, voice call, HTTP POST and MQTT.

Examples of messages are: sending a text alarm "Input 1 high ALARM!" When analogue input 1 exceeds 15 mA.

Audio messages are located in the / AUDIO directories, audio files are already loaded or can be edited on the SD card.

15. SENDING AUDIO COMMANDS (DTMF) TO MYSEAL

MYSEAL can receive audio calls for the execution of commands using the DTMF code.

When an RTU is called it plays the audio file on the SD card:

/AUDIO/80.pcm

At the end, the RTU can execute the QUICK COMMANDS from 0 to 15 simply by typing the command number and then confirming with "*", press "#" to cancel.

QUICK COMMANDS can be modified from SEAL in the APP icon -> quick command, for example:

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16. SEAL (SEneca Advanced Language)

Seal is a programming environment for Seneca RTUs, for more information see the SEAL guide.

The latest version of the Seal software can be downloaded from:

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

For more information install SEAL and go to the online guide.

ATTENTION!

For full support of the SEAL functions it is necessary to have inserted the microSD card!

17. FIRMWARE UPDATE

To include new functions, the system allows updating the MySEAL firmware.

Several firmware update modes are available:

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

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

Via FTP server: when the RTU cannot be reached directly, the firmware update can be carried out by sending an SMS, http, MQTT, then the update file is downloaded directly onto the RTU from an FTP server.

17.1. Firmware update via microSD card

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

Proceed as follows to update the firmware:

1. Copy the file called "fw.bin" containing the firmware onto a microSD card. The file must be copied to the microSD root folder.

2. With MySeal OFF, insert the microSD card into the slot

3. Switch MySeal on

4. The display shows the confirmation to update the firmware, a bar will represent the percentage of writing completion.

8. When finished, the module turns off and on again automatically

The firmware update can be checked:

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

ATTENTION!

-Before updating the firmware, copy the current configuration.

-Once the firmware has been updated, the previous configuration may be cancelled, therefore MySEAL may have to be reconfigured.

18. SUPPORTED SMS COMMANDS

18.1. List of supported SMS commands

MySeal allows you to run commands if the SMS sender's number is enabled.

List of commands:

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SMS COMMANDS FOR DIGITAL INPUTS / METERS / TOTALIZERS	
GET DIN	***Get the status of all digital inputs***
GET DINn	***Get the status of the n-th digital input***
GET DINn.TOT	***Get the status of the n-th totalizer***
GET DINn.CNT	***Get the status of the n-th counter***
RESET CNT	*Reset all counters to 0*
RESET CNTn	*Reset the n-th counter*

SMS COMMANDS FOR DIGITAL OUTPUTS	
SET DOUTn.OPEN	*Opens the n-th digital output*
SET DOUTn.CLOSE	*Closes the n-th digital output*
SET TOGGLEn	*Changes the status of the n-th digital output*
SET PULSEn.OPEN	*Performs an opening impulse on the n-th digital output*

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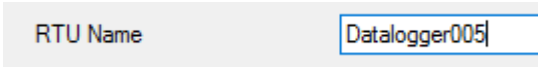
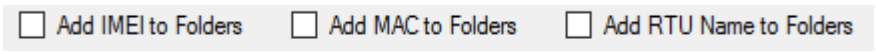
SMS COMMANDS FOR THE ADDRESS BOOK	
SET PHONE +nnnnnnn	Adds the number + nnnnnn to the address book as an administrator
RESET PHONE +nnnnnnn	Removes the number + nnnnnn from the address book
SET EMAIL nnn@nnn.nnn	Adds the email nnn@nnn.nnn to the address book as an administrator
RESET EMAIL nnn@nnn.nnn	Deletes the email nnn@nnn.nnn from the address book as an administrator

SMS COMMANDS FOR TEMPERATURE MEASUREMENT FROM NTC	
SET HVAC.OFFSET<TEMP_OFFSET>	Adds an offset in °C to the current temperature. Example: SET HVAC.OFFSET -1 Subtracts 1 °C from the temperature measured by the NTC

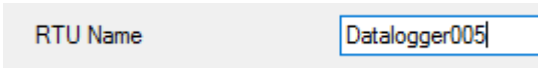
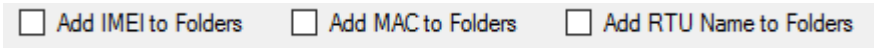
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GENERIC SMS COMMANDS	
STATUS	Returns the value of the tags set by SEAL.
SET GSM.APN apn_name user password	Sets up the APN For example to set the Vodafone APN (does not require a password) SET GSM.APN web.omnitel.it
SET GSM.FTP path name_ip port user password	Sets up the working FTP server: path is the path of the ftp server name_ip is the ip address of the ftp server port is the ftp port user is the user for access password is the login password For example: SET GSM.FTP /prova/ 192.168.180.33 21 pippo pluto
SET GSM.SMTP name_ip port user password	*Sets up the SMTP server to send email* *name_ip: ip address or SMTP server name* *port: port of the SMTP server* *user: username of the SMTP server* *password: server password* *For example:* *SET GSM.SMTP out.alice.it 25 pippo pluto*
GET AIN	*Returns the two analogue values*
EMAIL TEST	*Forces an email to be sent with an attachment to the first administrator in the email address book*
FTP TEST	*Forces a text file sent to be sent to the currently set ftp server*
EMAIL TAG	*Sends the tag indicated by "TAG" to the first email contact* *EMAIL AIN sends an email with the value of the 2 analogue inputs*

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	EMAIL AIN1 sends an email with the value of analogue input 1 *EMAIL AIN2 sends an email with the value of the analogue input 2* *EMAIL DIN sends an email with the value of the digital inputs* *EMAIL DIN1 sends an email with the value of digital input 1* *EMAIL DIN2 sends an email with the value of digital input 2* *EMAIL DIN3 sends an email with the value of digital input 3* *EMAIL DIN4 sends an email with the value of digital input 4* *EMAIL TEMP sends an email with the internal temperature sensor value*
EMAIL SYSLOG	*Sends the syslog.csv log file of the last week from microSD via e-mail (first administrator address in the address book)*
FTP SYSLOG	*Sends the syslog.csv log file of the last week from microSD to the FTP server*
UPLOAD LOG	*Creates a dump of the contents of the internal flash of the logs on Micro S (logdump.csv file), then sends this file to the actual upload channel (EMAIL or FTP).*
DOWNLOAD FW	*The RTU will download the firmware file "RTUNAME_fwupdt.bin" from the FTP download folder (where RTUNAME is the name entered in the "Cloud" SEAL section)* *Then (if the version is different from the installed version) a firmware update is performed.* *for example:*  *The firmware file must be:* *"Datalogger005_fwupdt.bin"* *Note if at least one of the following flags has been flagged in the SEAL "Cloud" section:*  *The firmware file must only be "fwupdt.bin".*
DOWNLOAD SETUP	*The RTU will download the installation file "RTUNAME_ setup.tag" (where RTUNAME is the name entered in the "Cloud" section of SEAL) from the FTP download folder. Then a configuration update will be performed.*

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	For example:  *The setup file must be:* *"Datalogger005_setup.tag"* *Note if at least one of the following flags has been flagged in the SEAL "Cloud" section:*  *The file name must only be "setup.tag".*
DOWNLOAD FW-SETUP	*The RTU will download the firmware and setup file from the FTP download folder.* *Then (if the version is different from the installed version) the firmware and configuration are updated.* *The firmware name must be:* *"fwupdt.bin"* *The setup file name must be:* *"fwupdt.tag"*
DOWNLOAD DATA	*The RTU will download the "data.bin" file with the extended address book from the FTP download folder (up to 1000 users). Then the extended address book is updated.*
RESET	*Restarts the RTU*
NET	The RTU will send the current IP address
GSM IMSI	*Returns the IMSI code: (International Mobile Subscriber Identity)*
GSM ICCID	*Returns the SIM ICCID code (Integrated Circuit Card IDentifier)*
GSM IMEI	*Returns the IMEI of the modem (International Mobile Equipment Identity)*

ATTENTION!

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

"COMMAND NOT RECOGNIZED"

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MySEAL can be configured to send a confirmation (SMS or ring) when the command has been successfully completed.

ATTENTION!

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

19. GPS MODEL

The MySEAL GPS model includes additional functions tied to the geographic position of MySEAL.

Additional functions are alarm on virtual origin and on speed. A "tracker" function can also be enabled: MySEAL GPS can send its position at a certain frequency to be able to always follow the car and/or boat position.

In addition to these alarms, the current MySEAL position can be sent on Google maps™ via SMS, EMAIL, http and MQTT.

For indoor applications or with low signal, an external GPS antenna can be connected. Visit www.seneca.it, MySEAL GPS section for further information.

In the event of an alarm, actions can be run, SMS and emails, http and MQTT sent or audio calls made.

The GPS position can be logged like any other variable.

19.1. GPS display screen

The MySEAL GPS model comes with an additional screen compared to other models to view GPS data in real-time:



where:

A) Speed in km/h

B) Distance from the virtual origin centre in Km

C) Tracker status (on if the icon flashes)

D) Virtual origin/speed alarm status ("ON" if the alarm is on)

E) GPS signal status ("FIX" if connected to satellites, "..." if the GPS signal is too low)

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ATTENTION!

- ***The higher the GPS signal and number of linked satellites, the higher the reading resolution***

19.2. Fix GPS

GPS signal fix is a function run by MySEAL GPS when started.

This function detects which satellites are within MySEAL GPS range and connects to them.

When started, the following is displayed on the GPS screen:

GPS initializing

It then starts fixing:

GPS searching

This phase should be run with the internal or external GPS antenna. Fix lasts from 1 to 2 minutes. The following confirmation appears on the screen:

GPS fix

If the signal is insufficient (indoors or in tunnels), the following will be displayed:

GPS …

Until sufficient signal is restored.

19.3. Alarm on maximum speed

MySEAL GPS lets you set a speed limit to generate an alarm. This ensures that your vehicle never exceeds a safety speed. To generate the maximum speed alarm, the set limit (in Km/h) must be exceeded for at least 2 GPS acquisitions. The GPS refresh time can be set using the setup software and is 10 seconds by default. Thus, to generate a maximum speed alarm (with 10 second GPS refresh time) the speed must exceed the limit for at least 40 seconds.

ATTENTION!

If alarms on virtual origin and maximum speed are enabled simultaneously, you cannot distinguish which of the two generated the alarm.

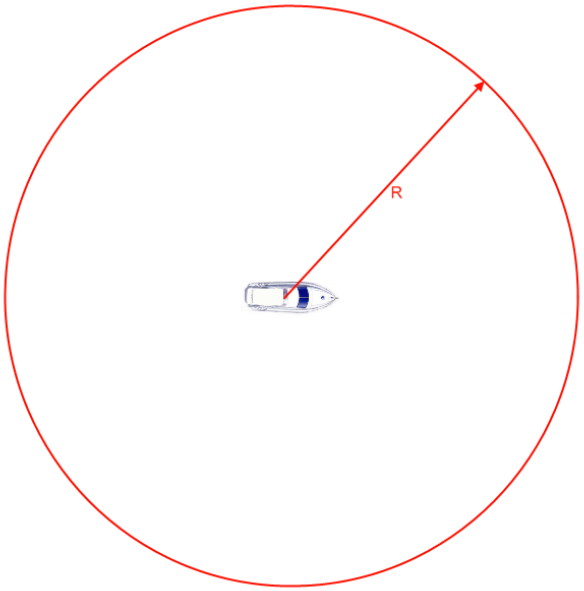
19.4. Alarm on virtual origin

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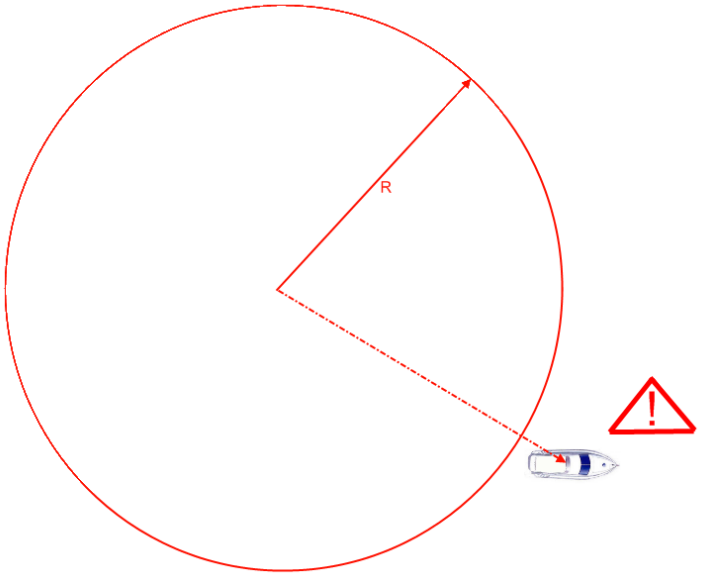
MySEAL GPS lets you set a virtual origin. Exiting the virtual origin generates an alarm.

The origin is a circumference of settable radius whose centre is acquired by an event (ring, SMS or event).

The alarm on virtual origin can be applied to boats or any other vehicle. After docking or parking, the alarm can be turned on using the digital input or by sending an SMS or ring (if ring command is set). MySEAL GPS will now monitor the vehicle to ensure it does not exit the R radius of the virtual origin whose centre is the docking or parking position:



An alarm is generate if the vehicle is moved and exits the virtual origin:



When the alarm is turned off, the vehicle can be moved without generating an alarm and turned back on at the next dock or park.

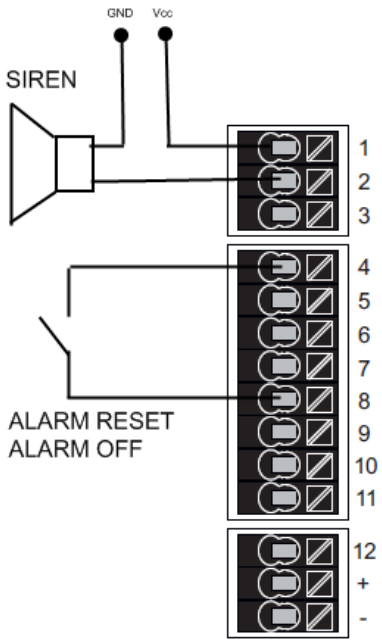
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The vehicle must remain outside the virtual origin for at least 3 GPS acquisitions to generate an alarm. The GPS refresh time can be set using the setup software and is 10 seconds by default. Thus, to generate an alarm (with 10 second GPS refresh time) the vehicle must continuously remain outside the origin for at least 40 seconds.

19.4.1. Alarm on virtual origin: connection example

Connections to apply the alarm on virtual origin are essential since the alarm can be turned on/off by a ring or SMS and the alarm received by audio call or SMS.

However, it is convenient to install an alarm on/off system directly on the vehicle's dashboard and connect a siren to an output (the drawing refers to the terminal block of a MYSEAL-2, for MySEAL-3 refer to the installation manual:



19.5. "Tracker" function

A function can be set to track the GPS position at settable times (default: 2 minutes) via SMS or EMAIL. The "tracker" function can be set to automatically turn on in the event of alarm or on SMS command.

ATTENTION!

If the GPS signal is insufficient (for example, indoors), the tracker function stops until the GPS signal is sufficient to send coordinates.

19.6. GPS coordinate log

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GPS coordinates can be logged just like any other variable.

The following tags are saved in the GPS coordinate log:

LAT: latitude

LON: longitude

V: speed (in Km/h)

ALT: metres above sea level (metres).

GPS coordinates are provided in WGS84 standard in degrees to be directly compatible with Google Maps ™ .

Following is an example of a .csv file with GPS coordinates:

INDEX;TYPE;TIMESTAMP;LAT;LON;V;ALT
1;LOG; 21/05/2013 12:05;45,396141;11,956049;0,000000;73,119713

19.7. Sending an alarm via audio message

A default audio message or a different one can be recorded using a PC with microphone for each alarm.

The call is made to the first member in the set group. If this number answers the call, the second member is not called. Otherwise, if the first member does not answer the call, MySEAL GPS will call the second until someone in the group answers the call.

If no one in the group confirms receipt, MySEAL will restart calling the first number in the group (for a maximum of 3 times).

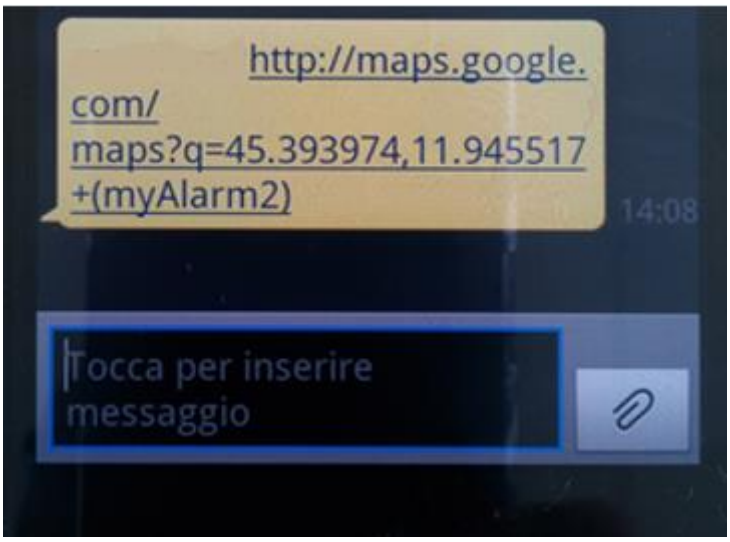
ATTENTION!

- ***DO NOT hang up while MySEAL GPS is making a call since the SIM answering machine may answer. In this case, MySEAL GPS will consider the call answer valid.***
- ***Seneca recommends turning off the answering machine on phone numbers authorised to receive audio calls.***

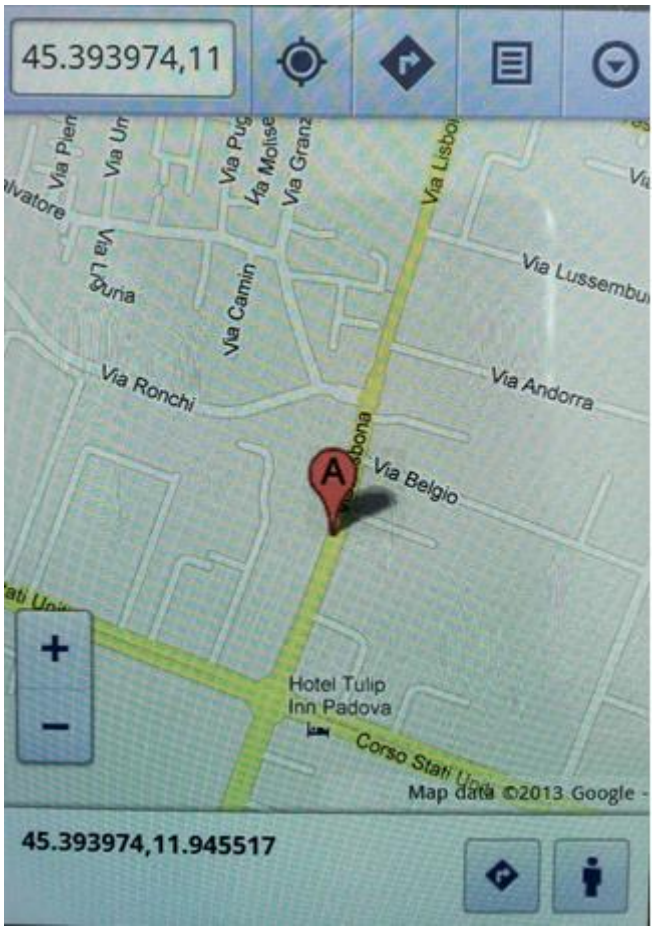
19.8. Current position on SMS and direct display on Google maps™

MySEAL GPS can send the current GPS position via an SMS link to Google maps™. This operation can be run on either action or SMS command:

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Using a Smartphone with data connection, tap on the SMS link to display the current position map;



19.9. Additional SMS commands for the MySEAL GPS model

SMS COMMANDS SPECIFIC TO THE "MySEAL GPS" MODEL	
GET GPS	*Returns the current position link to Google*

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	maps™ via SMS.
EMAIL GPS	*Returns an email to administrators with the current position link to Google maps™.*
SET GSM.GPS <raggio>	*Sets the new virtual origin radius in kilometres (example for a 500 metre radius, enter 0.5) and turns on the alarm on virtual origin.*
SET GSM.GPS 0 <velocità>	*Turns on the alarm on speed using the km/h limit, disabling the virtual origin alarm.*
SET GSM.GPS <raggio> <velocità>	*Sets the new virtual origin radius in kilometres (example for a 500 metre radius, enter 0.5) and turns on the alarm on virtual origin.* *It also turns on the alarm on speed using the limit set in km/h.*
SET GSM.GPS 0 0	*Turns off the alarm on virtual origin and on speed.*
SET GPS.TRACK ON	*Starts the tracking function.*
SET GPS.TRACK OFF	*Stops the tracking function.*
SET GPS.ORG	*Sets the current GPS coordinates as the centre of the virtual origin.* *Acquired GPS coordinates are also used to calculate sunrise and sunset.*

19.10. Additional actions for the MySEAL GPS model

Compared to other MySEAL models, the GPS version adds the following actions that can be used for events and as quick commands.

ACTION	***COMMENT***
USE COORDINATES AS ORIGIN	Uses current GPS coordinates as the centre of the virtual origin and to calculate sunrise/sunset.

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SEND CURRENT GPS POSITION	Sends the current GPS position via SMS with link on Google maps ™
START TRACKER	Starts the GPS tracking function.
STOP TRACKER	Stops the GPS tracking function.

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20. TROUBLESHOOTING

PROBLEM	SOLUTION
Sending an 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. Refer to http://wiki.apnchanger.org/Main_Page -Make sure the GSM signal is over or equal to 2/7 -The email ended up in SPAM -The SMTP server supports SSL protection and the gateway was not correctly set -A competitor's SMTP server was set instead of the one for the SIM used.
Sending an 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
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 MySEAL installation -Use an optional external antenna: for further information, contact Seneca or visit the MySEAL 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

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MYSEAL worked correctly for a few days/months but stopped sending both SMS and logs.	-No SIM credit. Top-up the SIM card. -The SIM card expired because credit was never topped up for more than one year. Replace the SIM card or contact your mobile phone provider.

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