User Manual
STONEX S9III Plus
GNSS Receiver

Author: AM-Ver.1-Rev.4 CS (12/04/2014)

Contents

1. A brief introduction of S9III PLUS

STONEX® devoted itself to offer to surveyors the most advanced GPS tools. GPS RTK surveying technology plays an important role in surveying tasks and its use is getting more and more widespread.

As a leading GPS RTK instrument producer, STONEX® guarantees that the S9III PLUS, our new RTK GPS receiver, is suited for nowadays demands of precision, reliability and user friendliness.

S9III PLUS is a multi-constellation GNSS receiver, able to receive three GPS signal frequencies, GLONASS and Compass/Beidou, ready for GALILEO constellation.

S9III PLUS mainframe integrates a GNSS antenna, GNSS module, UHF transmitting and receiving radio, radio antenna, GSM/GPRS modem, Bluetooth device and battery.

So S9III PLUS is totally integrated: it means that the surveyor only needs the handheld to start its job.

The exquisite outlook and the amazing color bring you a fashioned surveying station. This device has a higher stability, lesser power consumption, smaller volume and lighter weight than the previous STONEX® receivers.

S9III PLUS has a special design which makes it waterproof, dustproof and vibration-proof. The batteries and built-in radio are set in the bottom of mainframe, giving more effective dustproof and waterproof qualities and makes the S9III PLUS a better performer in field of surveying. The Wireless receiver unit (weighs) 1.2 kg: the rover is light and easy to carry. The low power consumption of receiver allows users to carry out and work in long time with only one single battery.

Integrated design and anti-jamming property are combined perfectly: the former avoids the problem of a cumbersome external antenna, and the mainframe design can resolve the jamming problem effectively.

The S9III PLUS receiver mounts a GPS/GLONASS/BD antenna with a four feed technology.

This design is able to reduce the electrical phase center error ellipsoid and in addiction it improves the Right Hand Circular Polarization Characteristics (RHCP) of the antenna, resulting in enhanced GPS signal tracking and improved multipath rejection, in case a polarization reversal has taken place as a result of the signal reflection.

S9III PLUS has a new 3G GPRS/GSM module which allow faster and more reliable connections.

This allows STONEX® S9III PLUS receiver to be a flexible system for demanding surveying applications. As a rover, it can be used as a static double frequency receiver or in a RTK configuration, where differential corrections are received from CORS via GSM/GPRS data modem (maximum range 70 km) or by another S9III PLUS receiver acting as base, linked by GSM/GPRS data modem or UHF radio modem.

In the last case S9III PLUS in base configuration can transmit with the built-in 0.5/2 W radio or can be connected to a more powerful external radio at user's disposal in order to reach the requested metric range.

The receiver can be connected to different RTK software for different applications. The data transfer is easy and fast, like a Plug and Play USB drive. STONEX® provides two year of warranty to S9III PLUS receivers.

It should be noted that high power signals from a nearby radio or radar transmitter can overwhelm the receiver circuits. Low power transmitter like those used in cell-phones do not normally interfere with receiver's operations.

It's important to draw your attention to the operational temperatures, limits which should not be exceeded for a correct functioning (see pag. 65).

It is also important to point out that in each weather case after coming back from the field you should keep the container open in a warm and dry place and at the same time take out the controller and receiver from the container, in order to make them dry.

Anyway we recommend you to manage the instrument with reasonable care.

Even if you have used other GPS or GNSS products before, we recommend that you spend some time reading this manual to learn about the special features of this product.

If you are not familiar with GNSS technology, we suggest you read a specific book in order to better understand the contents of this manual. Any way you can ask for any technical support by sending an email to our address support@stonex.it or contact your local dealer.

ATTENTION:

This manual is valid for both S9 III PLUS and S9 III N PLUS. Their constructions, functions and operations are the same, just the second model is built without internal UHF radio, so you have just to ignore every information referred to the radio.

2. S9III PLUS mainframe

2.1. The outlook of mainframe

The mainframe has an almost cylindrical shape, with a base larger than the height. There are three parts: an upper cap, a rubber loop and the main structure. The upper cap protects the GNSS antenna placed inside.
The rubber loop has the function of softening possible shocks or falls. In the front of the main structure there are 2 keys and 9 lights, on the bottom side there is one slot for the built-in radio and GSM/GPRS module, and one for the battery and SIM card.
All the others components of the receiver (Bluetooth device, main board, OEM board, etc.) are contained inside the main structure.

Fig. 2.1 - S9III PLUS mainframe   Fig. 2.2 - S9III PLUS label

2.2. Interfaces

The mainframe interfaces are shown in Fig. 2.3: the left port (five pins LEMO) is used for external power supply and external radio connection, the right port (seven pins LEMO) is used for data transferring between receiver and computer or between receiver and the handheld. Near the radio and GSM/GPRS module there are radio and GSM/GPRS antenna interfaces.

a) TNC connector for GPRS/GSM antenna

b) 5pins Lemo port for external datalink connection

c) Battery housing

d) Front panel

e) Built-in radio and GSM/GPRS module

f) 7pins Lemo port for data transport.

g) TNC connector for UHF radio antenna
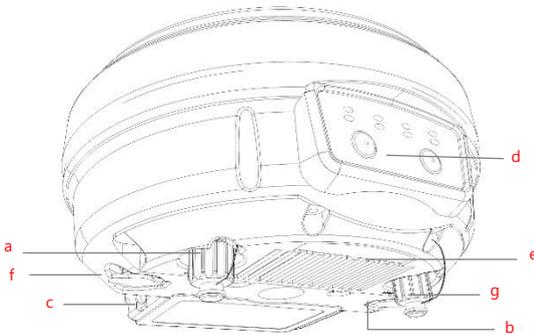
Fig. 2.3 - S9III PLUS components and ports

Fig. 2.4 - 5-pins LEMO port   Fig. 2.5 - 7-pins LEMO port

2.3. The battery housing
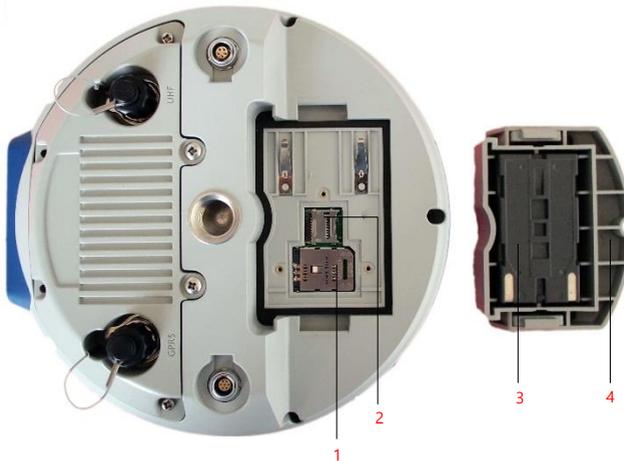
Fig. 2.6 - S9III PLUS battery housing

1. SIM card slot
2. MicroSD card slot
3. Battery
4. Battery cover

Under the place for the battery, there is the slot for SIM card and SD memory card.

2.4. Indicator leds and instrument setup
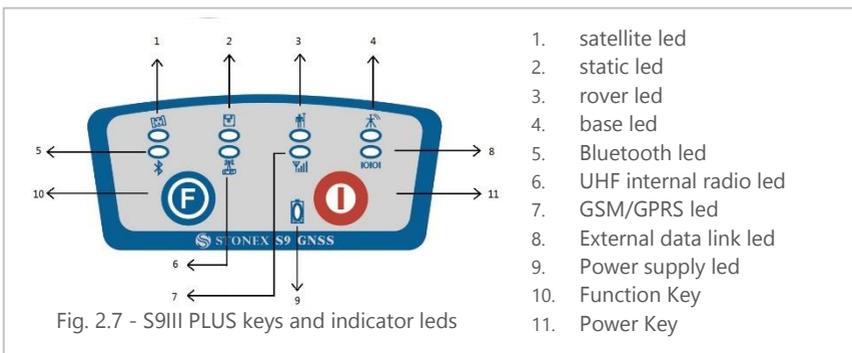
Fig. 2.7 - S9III PLUS keys and indicator leds

1. satellite led
2. static led
3. rover led
4. base led
5. Bluetooth led
6. UHF internal radio led
7. GSM/GPRS led
8. External data link led
9. Power supply led
10. Function Key
11. Power Key

The functionality as follows, from left to right:

SATELLITE led (green):
It shows the amount of locked satellites; when the receiver links one or more satellites signal it will start to blink every 30 seconds for a number of times equal to the number of locked satellites.

Fig. 2.8 - S9III PLUS satellite led

STATIC led (red):
It switches on if the static mode is selected and it starts to blink when the receiver is recording data, with the same frequency of the sample rate.

Fig. 2.9 - S9III PLUS static led

ROVER led (red):
Rover led is on when the receiver is working in rover mode.

Fig. 2.10 - S9III PLUS rover led

BASE led (red):

Base led is on when the receiver is working in base mode.

Fig. 2.11 - S9III PLUS base led

BLUETOOTH led (blue):

Once you have connected the receiver with the handheld, this led will on.

Fig 2.12 - S9III PLUS Bluetooth led

UHF INTERNAL RADIO led (green):

This led is ON when UHF internal radio is selected as RTK datalink.

It is blinking when it is transmitting data in base mode or receiving data in rover mode.

Fig 2.13 - S9III PLUS internal radio led

GSM/GPRS led (green):

This led is on when GSM/GPRS module is selected as RTK datalink. It starts to blink when there is data transfer ongoing (download in rover mode and upload in base mode).

Fig 2.14 - S9III PLUS internal radio led

EXTERNAL DATALINK led (green):

This led is on when external datalink (external radio, external Bluetooth device, etc.) is selected as RTK datalink. It starts to blink when there is data transfer ongoing (download in rover mode and upload in base mode).

Fig 2.15 - S9III PLUS external radio led

INTERNAL POWER led (green and red):

It includes two kind of status:

1. Green: power supply in good condition.
2. Red: low power (below 20%).
3. Red blinking and beeping: very low power (below 10%).

Fig. 2.16 - S9III PLUS power led

Usually when the led is red you have still one hour of power reserve. External power and internal battery share same power light. When external power is used, the led indicates external power level. When the power is below 10%, the red led will flash and you also hear three beep every 60s.

F Key: Function key
It can switch the working mode (static, base or rover) and RTK datalink (built-in radio, external datalink or GPRS/GSM).

Switch working mode: Power on the receiver while pressing F key in the meantime, wait until all lights flash, then release both buttons. Now every time you press F key, you will see one red led switched on and moving through the three working mode from left to the right.

Switch datalink: Press F key in ROVER or BASE mode, you will see one green led switched on, that moves every time you press F key through the three datalink from left to right.

I Key: Power key
It turns on/off the receiver and has also a confirm function.
Power on receiver: Press and hold I key for at least one second, the receiver will power on.

Power off receiver: Press and hold I key for few seconds, after three beeps all lights turn off, at that point release the key, the receiver is off .

Self-Check
It is a procedure predisposed for verifying the correct working of the instrument devices, the operation way is:
-    Press and hold I key for more than 10 seconds, as for turning it off, but keeping pressed the key after all lights have turned off.
-    Release the key when you hear another beep: receiver is starting to make a self-check.
Self-check lasts typically around 1 minute. During this procedure some leds will turn on in a sequence, the meaning of lights is:
-    Internal radio led: ON if UHF module pass the test; it flashes if UFH module fails the test.
-    GSM/GPRS led: ON if GSM/GPRS module pass the test; it flashes if GSM/GPRS module fails the test.
-    Satellite led: ON if GNSS OEM module pass the test; it flashes if GNSS OEM module fails the test.
If you have noticed at least one problem during self-check, please contact your local dealer or email to support@stonex.it.

After the self-check procedure, the receiver will turn on and begin to work normally.

How can you select the working mode?

- Insert the battery, then press and hold I key + F key: the receiver will start.
- Keep pressed I key + F key until the all lights blink at the same time (Fig. 2.17), then release the keys.

Fig. 2.17 - S9III PLUS, all led blinking at the same time

- Now every time you press F key, the STATIC/ROVER/BASE lights will turn on in the corresponding order. You can select three different red lights, each of them refers to one working mode.

Press I key when the chosen light is on and the receiver will restart into the selected working mode. Summary of working modes:
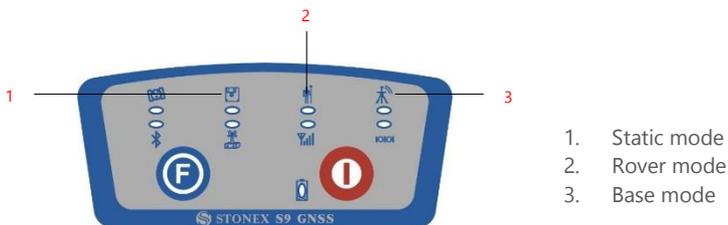

1. Static mode
2. Rover mode
3. Base mode

Fig. 2.18 - S9III PLUS summary of working mode led

Some definitions of working mode:

Static: is the stand-alone station that collect raw observations and need a post-processing in office for getting accurate results.

Base: is the fixed GPS station used to provide differential corrections to the mobile GPS receiver.

Rover: is the mobile receiver used to survey on field.

How can you select data link?

- After you have entered working mode, press F key, the UHF/GPRS/EXT lights will blink by turns. Then you can select different green lights, each one refers to different data link. This situation refers only to the rover and base mode, since in static mode there is no green light blinking.

- Press I key when the chosen light is blinking and the receiver will start in the selected working mode. Summary of data link types:

Summary of data link types:

4. Internal UHF
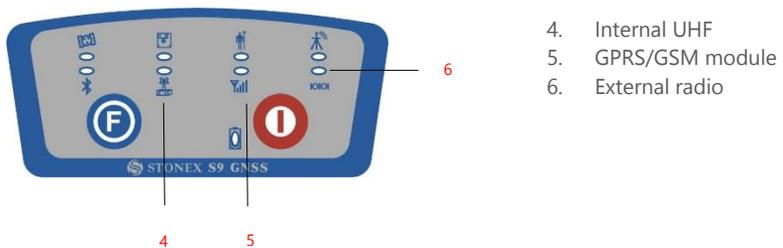5. GPRS/GSM module
6. External radio

Fig. 2.19 - S9III PLUS summary of data-link led

Some definitions of available datalink:

Network: is an internet connection by GPRS band to a base that provide differential corrections or a connection between base and rover by a GSM direct call (like a phone call).

<u>UHF:</u> is a connection between base and rover by the internal radio communication.

<u>External:</u> is a connection between base and rover by an external device attached through the 5-pin LEMO port, it is usually an external radio.

<u>Bluetooth:</u> is an option for sending or receiving the NTRIP corrections to the receiver through the Bluetooth channel.

Note: To select or to change working mode or datalink is also possible both by Stonex Assistant (see chapter V) or by field software.

3. S9III PLUS standard accessories

On the basis of the configuration chosen (base or rover) some of these accessories are included in the receiver bundle.

3.1. The case of S9III PLUS

There are two kinds of S9III PLUS cases: Rover case and Base case. The inner layout of the Base case and Rover case is different.
Base case has the room for external radio and Rover case has the room for the controller. You can distinguish them from nameplate.

Fig. 3.1 - S9III PLUS case

Fig. 3.2 - S9III PLUS Rover case   Fig. 3.3 - S9III PLUS Base case

Fig. 3.4 - S9III PLUS internal case of Rover

3.2. Power supply

Batteries

The standard configuration contains two batteries, a slot for charging batteries (named "charger" for simplicity) and an adaptor. The battery are "lithium-ion" battery (7.4V - 2500 mAh): a technology which has an higher energy-to-weight ratio with respect to NiCd or NiMh batteries, no memory effect, and slow self-discharge when not in use.

Fig. 3.5 - Lithium-ion battery

Charger

The charger can charge both batteries simultaneously. The lights of the charger shows if the battery is being charged (red light CHARGE) or if it's already charged (green light FULL). Red light POWER shows if the charger is powered on and there is also a light which turns on in case of too high temperature (red light TEMP).

Fig. 3.6 - S9III PLUS charger and adaptor

3.3. The antennas

S9III PLUS adopts a UHF all-direction transmitting and receiving antenna. There are three different internal radio settings with different frequency range. The available range are: 410-430 MHz, 430-450 MHz and 450-470 MHz. They are suitable for field surveying, light and durable. The gain is 4 dBi, it was recently improved with respect to the old model that was 2.15 dBi, leading to an increase of the range.

Fig. 3.7 – built-in radio antenna (not in scale)

S9III PLUS adopts a GPRS/GSM all-direction transmitting and receiving antenna with a frequency in the ranges 824-960 MHz and 1710-2170MHz. It is suitable for field surveying, light and durable, the length is about 21.5 cm, the gain is around 1.8-2.2/2.1-3 dBi.

Fig. 3.8 – GPRS/CDMA2000/WCDMA antenna (not in scale)

For S9III PLUS, it is possible to use like additional accessory (not included in the standard configuration) a high-gain UHF all-directional transmitting antenna for base setup. The available ranges are: 410-430 MHz, 430-450 MHz and 450-470 MHz. The antenna is around 1 meter long and can be mounted on a retractable pole or a tripod for better performance. The higher the antenna is, the larger cover area does it has for the radio signal. The gain of the antenna is 5 dBi.

Fig. 3.9 –External radio antenna (not in scale)

3.4. Cables

Receivers cables (LM.GK205.ABL)

This is a multi-function communication cable: it is used for connecting receiver and computer and, through Stonex Assistant, for transferring the static data, updating the firmware and the license.

Fig. 3.10 - Multi-function communication cable

Auxiliary cables (LM.GK185.ABL+ LM.GK224.AAZ)

External power supply cables (LM.GK185.ABL+ LM.GK224.AAZ) can be ordered and used to connect an external battery (red and black clips) to the receiver (small 5-pin LEMO):

Fig. 3.11 - External power supply cables

3.5. Other accessories

The other accessories are: 2.45 m retractable pole, two kind of brackets depending on the controller, tribrach with plummet, tripod (wood or aluminum, with quick or twist clamps), connector between receiver and tribrach, and measuring tape.

Fig. 3.12 – 2.45m retractable pole

Fig. 3.13 – Bracket

Fig. 3.14 – Tribrach and adapter with optical plummet adapter

Fig. 3.15 – Connector between tribrach and receiver

Fig. 3.16 - Measuring tape

3.6. Controllers

Stonex have actually different model of controller. Getac and new S4C. The standard configuration of controllers includes the adaptor, the battery, the USB cable. The controller is not part of the accessories for S9III PLUS generation, it must be purchased separately.

Fig. 3.17 - STONEX S4 controller

4. S9III PLUS Configuration

4.1. The installation of base and rover

BASE

ROVER

Fig. 4.1 - Base and rover configuration

Installation of Base

1) Install the tripod on the chosen location, level it and attach the receiver into tribrach.
2) Attach the transmitting radio antenna into the port "UHF". If you are using a direct GSM connection you should attach the gsm antenna into "GPRS" port.
3) Switch on the receiver and check the working mode. If it is not correct, please see next paragraph 4.2 for understanding how to select the correct working mode or you can change it later using the handheld software.
4) Switch on the handheld and start the software for the radio channel configuration and inserting the base coordinates, otherwise it is possible to make the settings by Stonex Assistant pc software.

Installation of Rover

1) Fix the bracket on the pole, fix the handheld into the bracket, put the rover on the pole and attach receiving radio antenna into the port "UHF" or gsm antenna into the port "GPRS", depending on the connection used.
2) Power on the receiver and check the working mode. If it is not correct, please see next paragraph 4.2. for understanding how to select the correct working mode or you can change it later using the handheld software.
3) Switch on the handheld and start the software, then you can do the advanced setting of the instrument and finally start the survey.

If you want to take very accurate measures (around or below cm accuracy), we recommend you to use another tripod also for the rover.

4.2. Standard operation of leds

Static mode

The STATIC and power light will keep lighted. When satellites fulfill the conditions (at least 4 GPS or 4 GLONASS satellite, PDOP< 3.5), receiver will start recording epochs, you will hear a beep, STATIC light will flash according to sampling interval (if you don't set up, the default is 1 second) and the satellite light will flash a number of times equal to the locked satellites.

Base mode

After setting up the mode, the base will enter into the transmitting mode. If external radio was set and EXT light will flash every one second means the base transmits normally, the interval is 1 second. In the same way using built-in radio INTERNAL RADIO light will flash. If you need to change the transmitting conditions, you should connect the handheld with mainframe by cable or Bluetooth firstly.

Rover mode

Bluetooth and power light will keep lighted. The satellite light will blink according to the number of satellites as described for static mode.
Using GPRS/GSM, GSM/GPRS light starts to blink with the frequency of the

received data packets. In the same way using built-in radio UHF light will flash.

4.3. How to measure the antenna height

The height of receiver is 99mm, the diameter is 186mm, the height from the center of the sealed rubber ring to the bottom is 62mm and the height from the phase center to the bottom is about 88 mm for L1 frequency and 91.5 mm for L2 frequency.

The antenna height is conventionally defined as the vertical height from the phase centre to the ground surveyed point (the distance "h" in fig. 4.5).

It is not possible to measure it directly: you have to measure other reachable heights (the distances "a", "d", "s" in fig.4.5).

The distance "a" is the vertical height from the ground to the mainframe's bottom, "d" is the vertical height from the ground to the middle of the rubber ring: both are defined as "vertical heights". On the contrary the distance "s" is measured from the ground surveyed point to the middle of the rubber ring and is called "slant height". You have to choose the measuring method according to the used software:
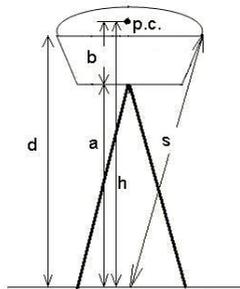

Fig. 4.5 - Different measures of the antenna height for S9 III PLUS

1. In rover and base mode you have to insert the correct antenna height according to RTK software. In STONEX® SurvCE, for example, the distances "a" and "s" are permitted: software will add the distance "b" to "a" (or convert "s") to obtain "h". For other software please read the specific user guide.

2. In static mode you have to write the correct antenna height in .DAT or RINEX file. If you are using STONEX® GPS Processor you have to specify the correct antenna height before processing .DAT data or exporting it into RINEX format.

Please read the specific manual of STONEX® GPS Processor, it should be noted that however the slant height "s" corresponds to the definition "Line of Edge of antenna", "a" to "Bottom of antenna" and "d" is equal to "Bottom of antenna mount".

5. STONEX® Assistant for S9III PLUS

STONEX® Assistant is a tool which is conceived for aiding the user to make easier different operations with the receiver S9 III PLUS. It is contained in the bundle CD, the actual version is 2.0.
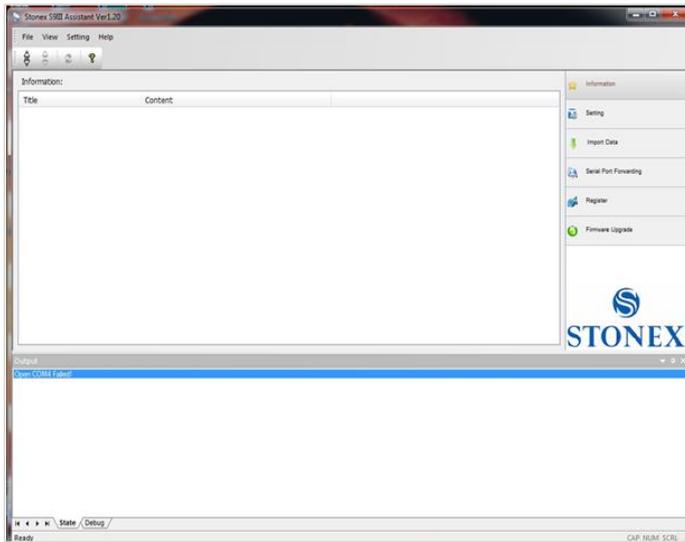

Fig. 5.1 - Main page of Stonex Assistant

The opening page is showed in Fig. 5.1.
It reports internal system configuration of the GPS receiver S9III PLUS after get PC connection.

5.1. Start Stonex Assistant on your PC

Connect the S9III PLUS to the PC using Lemo7 – USB/Serial cable.
Switch on the receiver: automatically the program should search the COM port where the receiver is connected. If this doesn't happen, for example at the first starting of Assistant in the Pc, you have to disconnect from the wrong port

and select the right COM port manually. Click on the icon showed below by number "1" for disconnection, then click on icon "2" for connecting again, a new window will be opened ("3"):
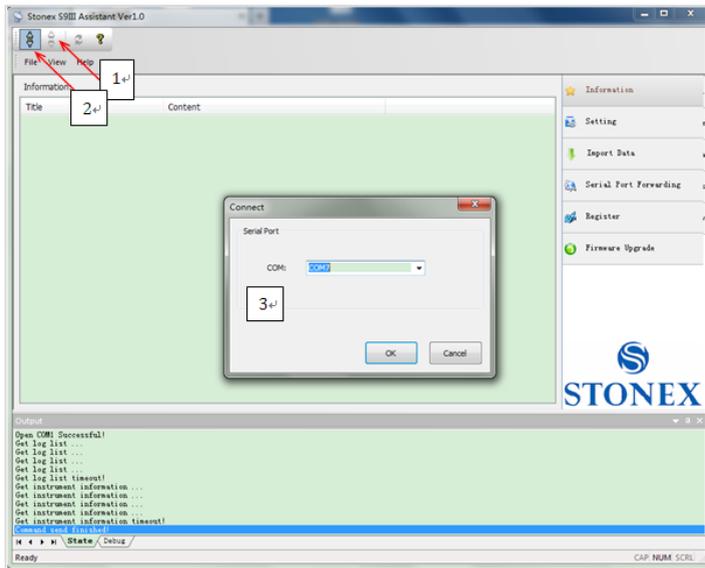

Fig. 5.2-Opening COM port

Here you have to insert the correct COM number. Usually when the cable is inserted on the USB port, the computer should create a new "virtual" serial port called "AT91 USB to serial adapter" with a new COM number, you should check in the Windows "device manager" of Pc and insert this number, then select "OK" button.
When you find the right COM port, you should see the screen shown in Fig. 5.3 that show you in the main window the system information.
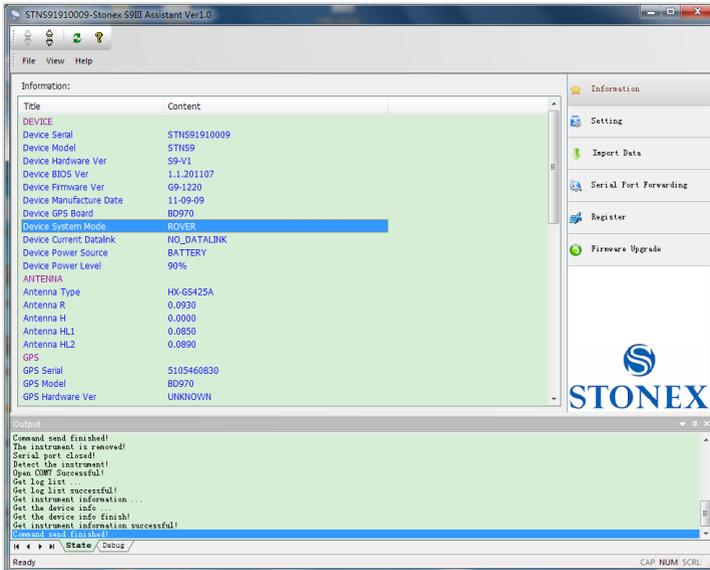
Fig. 5.3 – Information page of Stonex Assistant

From the showed information you can understand about: the battery level, the firmware version of GNSS board and mother board, the antenna information, the firmware of radio and gprs internal device, the free disk space, the current working mode and datalink setting.

5.2. Settings

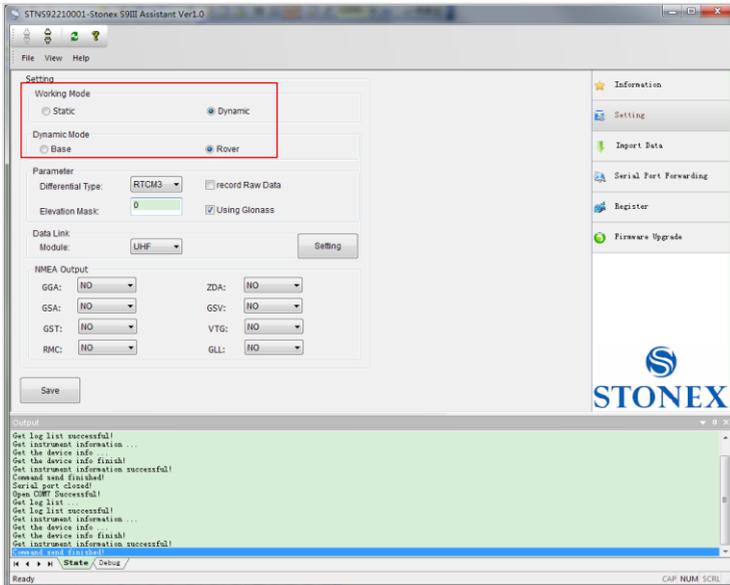If you click on the command "Setting" on right, a new window is opening as in Fig. 5.4.

Fig. 5.4 – Setting window

You can set the survey working mode Static, Dynamic --> Base/Rover (see the red rectangle in Fig. 5.4) and below in "Datalink → Module" the kind of datalink (NETWORK, UHF, EXTERNAL, BLUETOOTH) of S9 III PLUS.
At pagg.13-14 you can find a definition of the working mode and datalink.

5.2.1. Static Data Survey

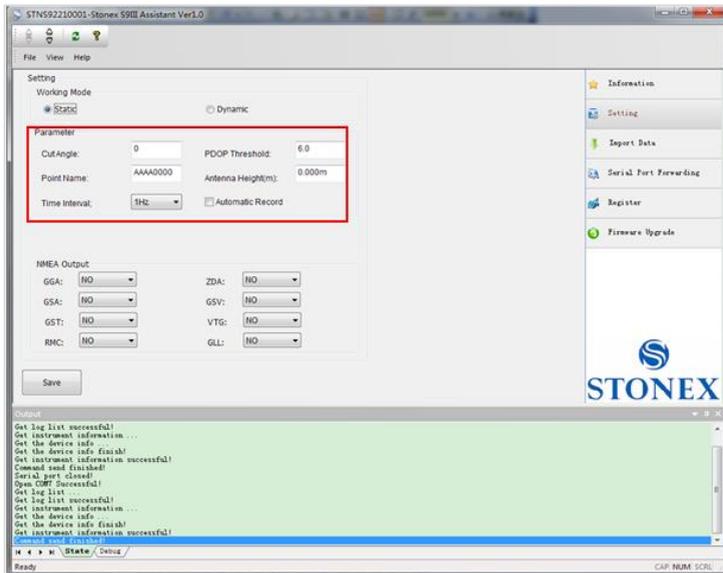Static mode data entry page is reported on Fig 5.5:

Fig. 5.5 – Static working mode

From here you can control following data settings:

Cut Angle: Define the minimum elevation of satellite to be collected in order to avoid noisy satellites (suggested value between 20° and 10°).

PDOP Threshold: Define the maximum value of PDOP for valid GPS data in order to avoid bad satellite configuration in the sky (suggested value below 3).

Point Name: Assign a "name" to the point you are surveying, please consider that only the first 4 digits are included into the name.

Antenna Height: Introduce GPS antenna height from ground, this is an important point, it was discussed in more details in Par 4.3.

Time Interval: Set sampling frequency between different GPS epochs. The sample interval can be set also higher than 1 Hz from special application but

maximum frequency depends on the GNSS internal board settings, S9 III usually could be set up to 20 Hz.

Automatic Record: Start automatic GPS static survey after power on. For static survey this option strictly NEED to be enabled in Stonex Assistant.

When the configuration is completed, click on button "Save" to update the Receiver configuration.

5.2.2. Dynamic

In the Dynamic working mode (Rover or Base) the following parameters should be specified, as you can see in Fig. 5.6.
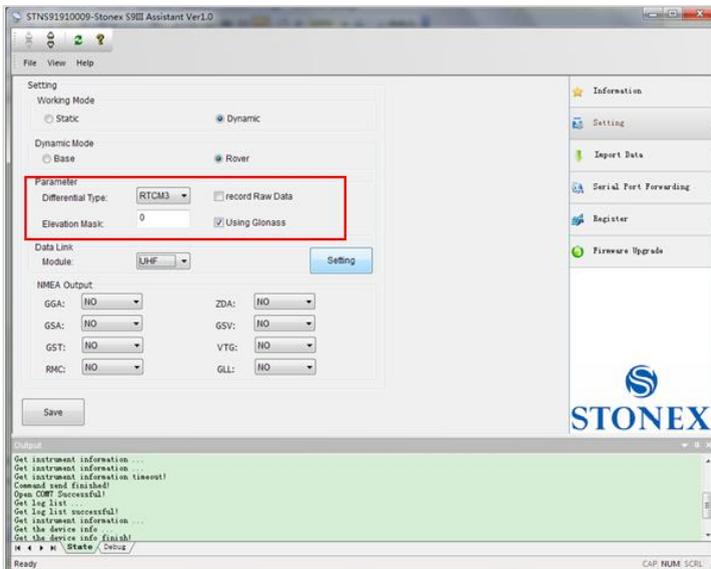

Fig. 5.6 – Dynamic Working mode parameters

Some definitions:

Differential type: To select the format of the differential corrections transmitted or received.

Elevation mask: Define the minimum elevation of used satellite to be collected in order to avoid noisy satellites (suggested value between 20° and 10°).

Record Raw data: to record raw data inside memory of S9 III PLUS. This function is useful for "stop & go" survey.

5.2.2.1. Base coordinates setting

If you choose "Dynamic" and "Base" option, a "Base Setting" button will appear on the screen, see red arrow in Fig. 5.7. Click on it and the Base Setting window will appears on the screen (Fig 5.8):
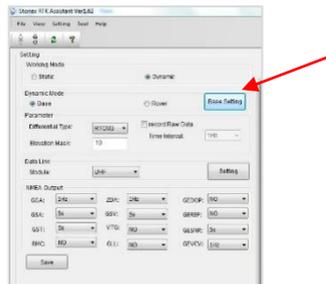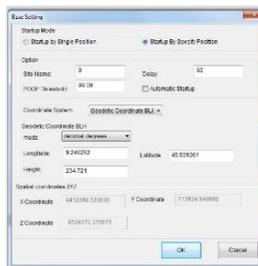

Fig. 5.7 – Base Setting button

Fig. 5.8 – Base Setting window

Inside this form, you can choose if the Base coordinates must be inserted manually ("StartUp By Specific Position") if known, or calculated from GPS observations ("Startup By Single Position") if unknown.

Startup By Single Position

If checkbox "Startup by Single Position" is selected, the GPS Receiver will calculate the geographical coordinates of the base using an approximate value

from GPS observations. The time delay to be wait before switching on for base transmission must be inserted in the Text box "Delay". You can also specify a maximum PDOP allowed for starting base transmission in "PDOP Threshold" and a name for base site in "Site Name". If the box "Automatic Startup" is active, when the conditions are fulfilled base will start to transmit without waiting for a field software command.
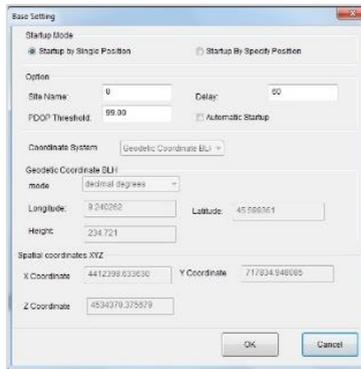

Fig. 5.9‐Startup By Single Position

Click "OK" to confirm your data entry.

Startup By a Specific Position:

By choosing the "Startup by Specific Position" it is possible to introduce directly the geographical coordinates of the base (Known point). In mode box (red arrow 1) you can select different format of geographical coordinates. You can insert also geocentric coordinates X,Y,Z by changing option in the box "Coordinate system" (red arrow 2).
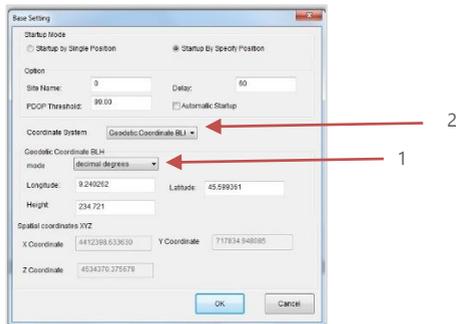
Fig. 5.10 – Startup by a specific position

5.2.3. Data Link

Here you can select the type of datalink used to get/provide differential corrections.

Four different options are available for "rover" mode: GPRS/GSM modem ("Network"), internal radio ("UHF"), external radio or external device ("External"), Bluetooth device ("Bluetooth"), or no datalink ("No Data link").

In the "base" mode we have the same first four choices (Network, UHF, External, Bluetooth) and another choice, that is "Network and External", which allows base to transmit at the same time to the GPRS/GSM modem and to the external device.

5.2.3.1. Network

This option is relative to get GNSS differential corrections from a CORS system.
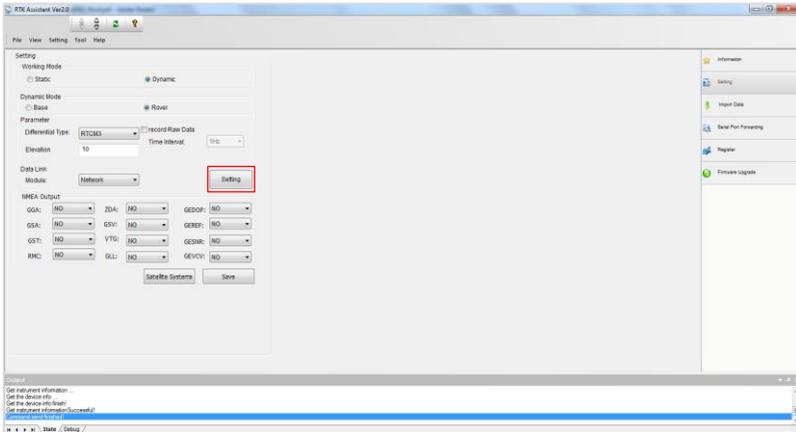
Fig. 5.11 – Network

If you will click on the button "Settings" (red rectangle in Figure 5.11), a new form will open. From here you can choose the type of connection:
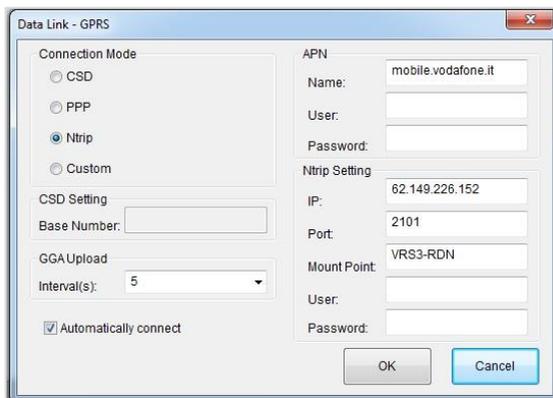

Fig. 5.12 – Network menu

CSD: Normal dial GSM call, using a phone number that you can insert in "Base Number" text box. When user need to set a rover for a direct call, the right part of the page becomes grey (see in Figure 5.13), in the left part he should insert:

a) the Base SIM telephone number
b) set an interval for GGA upload (the suited interval depends of the correction source)
c) enable the automatic connection.

In the base configuration he should only enable the automatic connect, not other set is required, it is also necessary to switch on first the base and then the rover. Anyway you can also refer to a specific tutorial regarding how to set a direct call between two S9 III PLUS.

Fig. 5.13‐CSD Settings
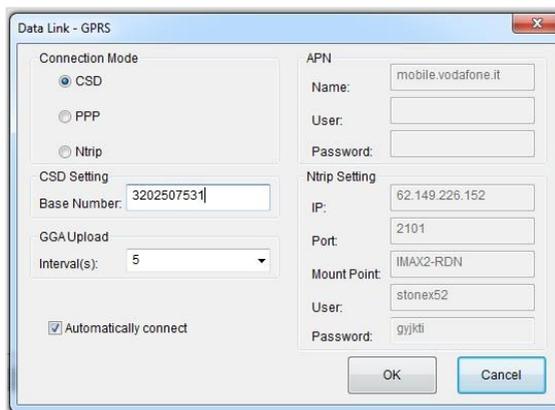
PPP: For VPN (Virtual Private Network) users, where each SIM card has a static IP address. Therefore, the rover can be connected directly to the base via entering the base IP. The user have to set into the right part (see Figure 5.14):
d) APN parameters for internet connection, that depends on the provider of the network connection, usually only "Name" is required.
e) IP address and port.
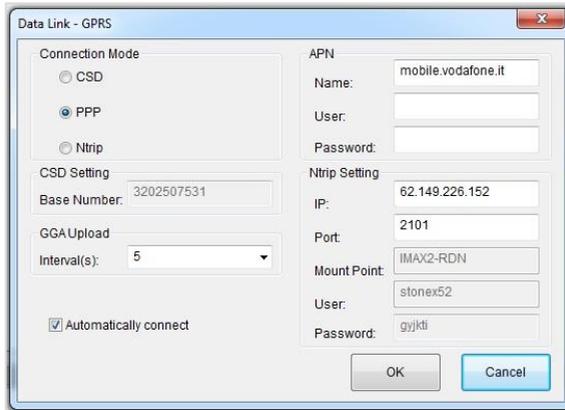
Fig. 5.14 – PPP Settings

NTRIP: It is the most common. Connection of a rover to a provider using data transfer in accord with NTRIP protocol by internet GPRS connection. If you select this option, you have to insert the following data in the right side (see Figure 5.15):

a) APN parameters for internet connection.
b) NTRIP setting parameters: IP address of CORS provider, Port number, Type of Mount Point, User Name and Password of the user.

Fig. 5.15 – NTRIP Settings

<u>Custom:</u> It is used for other internet GPRS connection to a network software/server that doesn't require a user name and a password or only a password. If you select this option, you have to insert the following data in the right side (see Figure 5.16):
- a) APN parameters for internet connection.
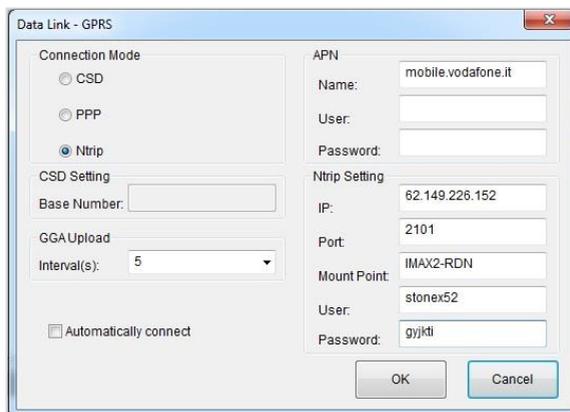- b) NTRIP setting parameters: IP address and Port number of computer where the software runs, Type of Mount Point and Password if required (usually for base it is not required so you can it empty).
- c) Enable the automatic connection.
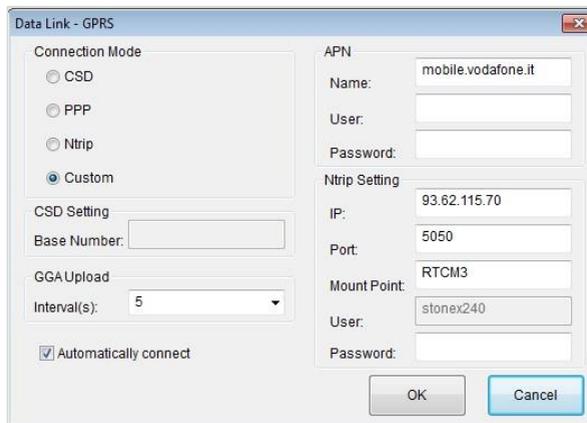
Fig. 5.16 – Custom Settings

<u>GGA Upload:</u> input window provide the interval of NMEA GGA string upload, this string contains the rover coordinates that must be sent to the CORS or base, the proper interval depends on the base, usually it is not important to set it.
<u>Automatically connect:</u> when this box is enabled, the receiver, as soon as it is switched on, will try automatically the connection to the previously stored server without need that user sends any command through a software.
Click on "OK" button to confirm your entry.

5.2.3.2. UHF Radio

Choose this option when you are taking differential corrections from your GPS Base.

If you select UHF from the scroll box and click the "Setting" Button a new form will open as you can see in Fig 5.17, where you can introduce following data: Frequency settings, Used channel number, Protocol and Spacing, Transmitting power.
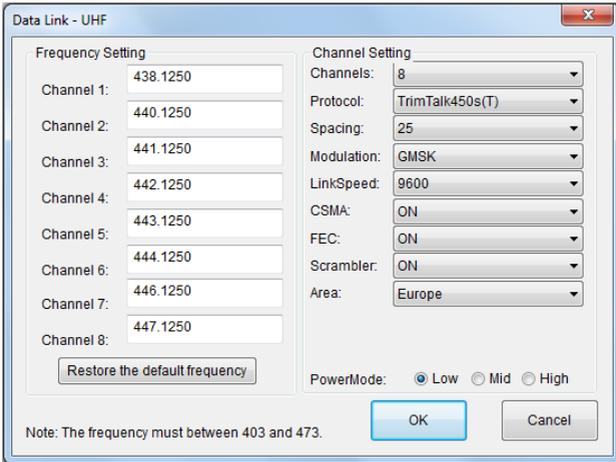
Fig. 5.17 - UHF Radio Settings

Frequency setting: insert the frequency, expressed in MHz, of the radio link associated to each channel. There are 8 channels available in the internal UHF radio. The allowed frequencies are in the range 410-470 MHz.

Channels: Selected the default radio channel active after power on.

Protocol: Selected the use protocol that should be suited on which radio is at the other side.

Spacing: 12.5 or 25 kHz.

Modulation: Must be consistent with the protocol set. Selectable mode phase (GMSK) and frequency (4FSK).

Link Speed: must be congruent with the protocol and the selected band.

CSMA: to prevent transmission if the selected channel is already occupied.

FEC (forward error corrector): used primarily with radio protocol Satel. It introduces the information that make more "robust" the radio message, making it less susceptible to interference.

Scrambler: used mainly with Satel protocol.

Area: makes the receiver fully complaint with the rules of the geographical area.

Power mode: Select the transmission power level, low is 0.5 Watt while high is 2 Watt.

Click on button "OK" to confirm your choice.

5.2.3.3. External

This option give us the possibility to use an external device, usually an external UHF Radio or an external Bluetooth device connected by cable at lemo-5 connector.

If you select "External" and Click on "Settings", a new form will open and in this form you can insert the baud rate of the external device:
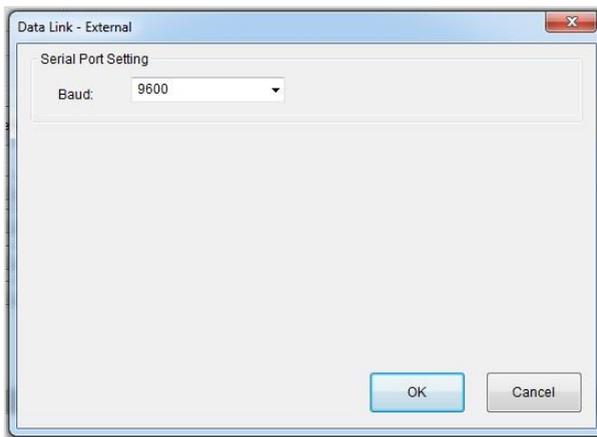
Fig. 5.18 - External radio baud rate

Click on button "OK" to confirm.

5.2.3.4. Bluetooth

This option give us the possibility to use the internal Bluetooth device for RTK data exchange.
In this case the same channel used for sending commands to receiver and getting position information from receiver is used also for transmitting the differential corrections from handheld to the receiver, for example if the handheld is connected through internet or it is connected to a mobile phone connected to internet. Please remember that if you select Bluetooth as datalink, you do not see any datalink led on the display.
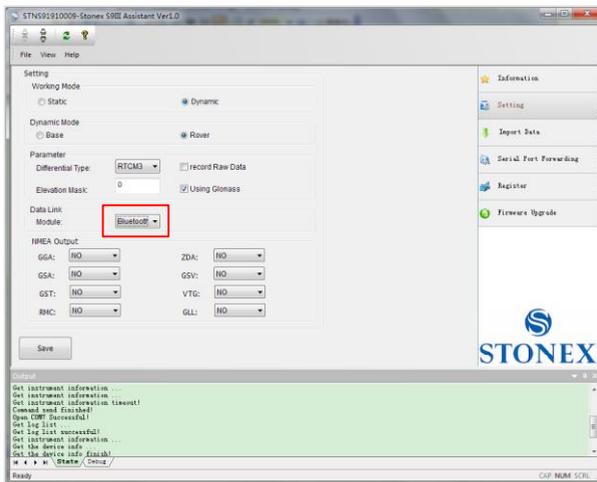
Fig. 5.19 - Bluetooth

When you have completed all your selection, please click on "Save" button and the configuration will be stored inside S9 III PLUS memory.

5.2.3.5. No Datalink – only for Rover

This option has to be selected if customer don't need any kind of corrections.

5.2.3.6. Network and External - only for Base

This option give to the base the possibility to transmit the corrections through two different data links at the same time: to an external device and to the GSM/GPRS modem.

This case can be useful for example if the external device is an external radio, but the customer knows that can be too far for receiving the radio signal, so he can put a SIM card inside his rover and try a direct GSM call to the base, this is an example but there can be others application of this functionality. In Figure 5.20 you can see the setting for the described example: the CSD mode is selected, the "automatically connect" function is enabled, at the same time the baud-rate for external radio connection is set to 19,200.
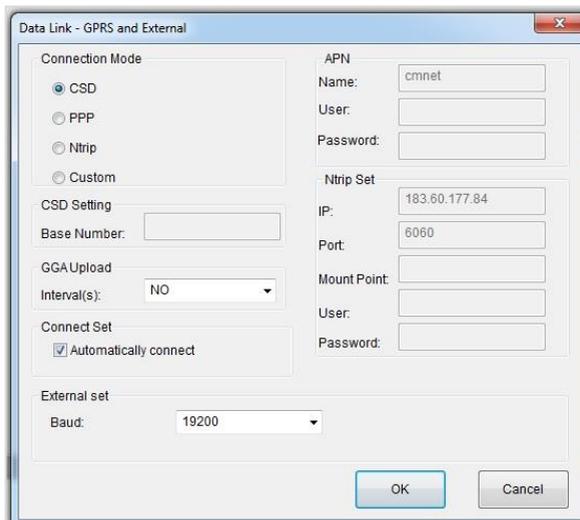
Fig. 5.20 – Network and External option

5.2.4. NMEA Output string

NMEA output messages setting is available in the Setting session, as you can see in the following figure 5.21.
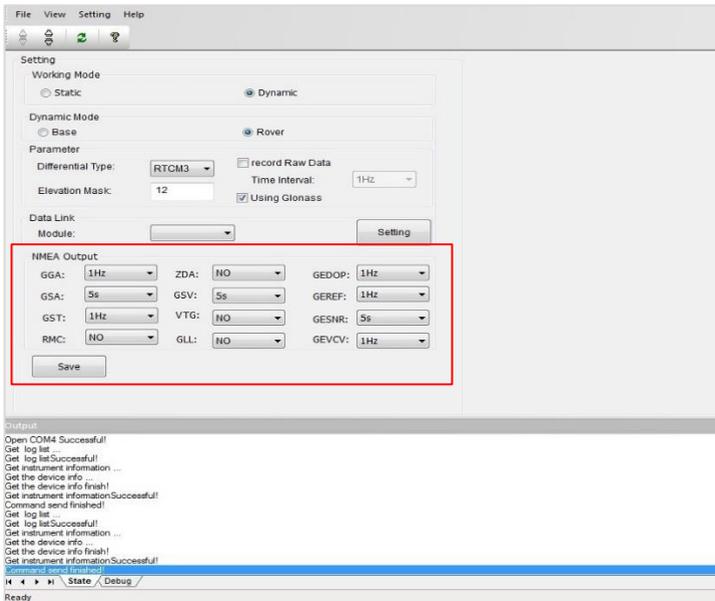
Fig 5.21 - NMEA String

In this area you can configure the default NMEA messages that are output to the datalogger at the startup of the receiver, enabling or disabling the different string. You can select the following NMEA strings: GGA, GSA, GST, RMC, ZDA, GSV, VTG, GLL, you can refer to the NMEA user guide for the content of these parameters. You can also specifying the output frequency, the maximum allowed frequency depends on the GNSS board option.

Beside of these, there are other 4 available output string specific for S9III PLUS receiver, they are:

GEDOP includes the values of PDOD, HDOP, VDOP and TDOP, default frequency 1 Hz.

GEREF includes the coordinates and index of the used reference station, default frequency 1 Hz.

GESNR included the signal to noise ratio for the collected satellites, default frequency 5 sec.

GEVCV includes the covariance matrix values, default frequency 1 Hz.

If you modify these parameters, you have to restart receiver for applying the new parameters.

5.3. Import Data

This section of the Assistant allows the user to download raw data from S9 III PLUS memory to Pc, instead of doing manual copy of files. After connecting the receiver click on "Import Data": a new window is opened as in Fig. 5.22.
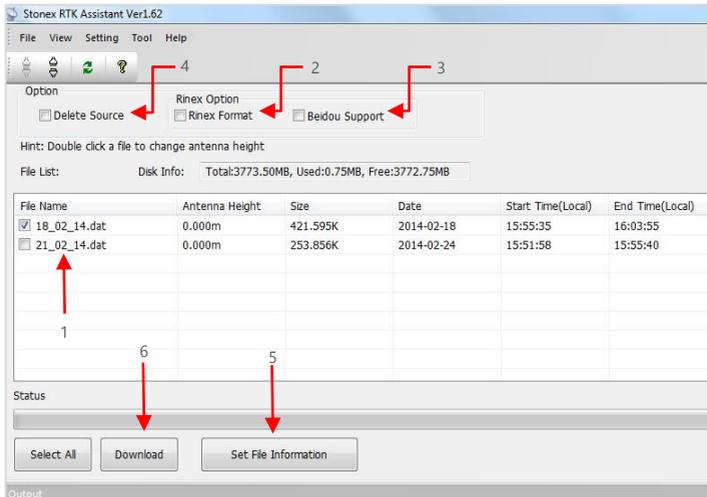
Fig. 5.22 – Import Data window

Inside this window you can see all files stored in the memory of S9 III PLUS (excluding the configuration file), which are files with raw GNSS observations. By checking the box at the left of each file (see red arrow with number 1), you can select it for download operations.

You can also choose to convert the downloaded file into RINEX format by checking at box "Rinex Format" on the top of the page (see red arrow with number 2), if receiver has enabled also the Beidou/Compass satellites you can also specify to include them into RINEX activating box "Beidou Support" (see red arrow with number 3). Checking at "Delete Source" you can enable the automatic erase of the selected files after download on the PC memory (see black arrow with number 4). If you double click on one row or choose "Set File Information" (see red arrow with number 5), you can also modify the value of the antenna height of the receiver used during survey, finally click on the "Download" button (see red arrow with number 6) and you can save the

marked files on your PC, in the folder you prefer. As regards the antenna height editing, you can see the submenu in Figure 5.23:
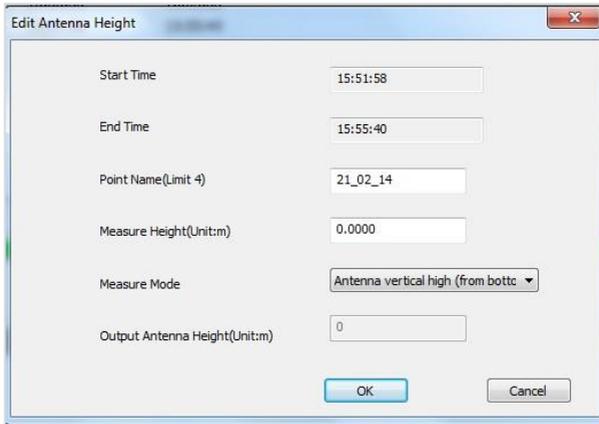
Fig. 5.23 - Edit Antenna Height window

In the "Edit Antenna Height" menu you can modify the point name (only 4 character will be taken into account), insert the correct antenna height in meters and specify how the height was measured ("Measure Mode" box), there are three different option:
a) Antenna phase center: from ground to the phase center (not possible from the practical point of view)
b) Antenna slant height mode: from ground to the white line in the middle of blue rubber.
c) Antenna vertical height: from the ground to the bottom of receiver.
In "Output Antenna Height" box you will see the resulting antenna height from ground to the phase center.

5.4. Serial Port Forwarding

This function is for advanced users and technical support only.

Port forwarding allows the configuration of the GNSS OEM module, UHF module and GPRS module directly. For using this functionality you need to order a cable DB9 serial port connection from 5-pin Lemo (see below Fig. 5.24).

Fig. 5.24 – Cable for serial port forwarding

Please note that unintended commands might affect the operation of the receiver.
Connect both USB cable to 7-pin LEMO and serial cable to 5-pin LEMO, then connect receiver to Assistant, click on "Serial Port Forwarding": a new window is opened as in Fig. 5.25.
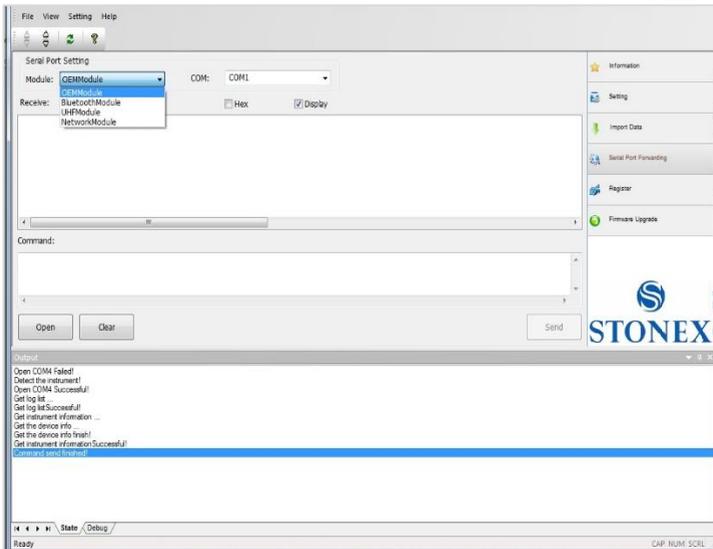
Fig. 5.25 – Serial Port Forwarding window

Select in box "Module" the device you want to connect (OEMModule, BluetoothModule, UHFModule, NetworkModule) and in the box "COM" the correct serial port number, then press "Open", the software inform you to restart the receiver as you can see in Fig. 5.26.
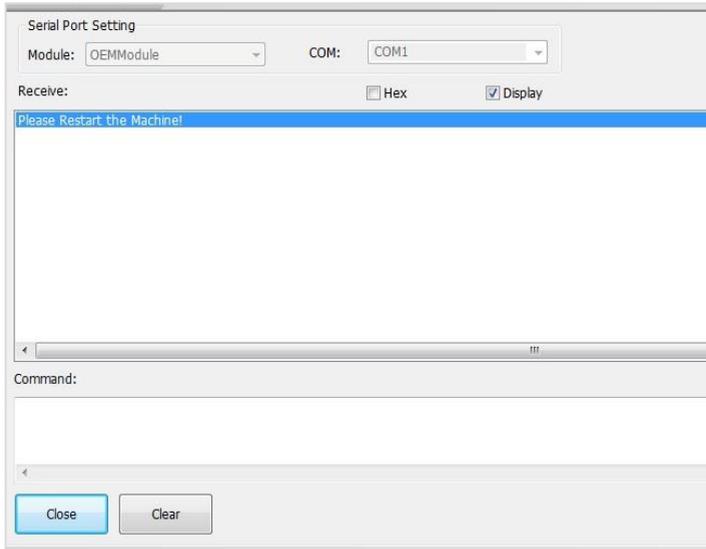
Fig. 5.26 – Serial Port Forwarding window, second step

Then you can switch off the receiver and disconnect USB cable, but keep connected the serial cable. Once receiver is off you will come back to the main page of Assistant, click again on "Serial Port forwarding", then switch on the receiver, you will see some message on screen as showed in Fig. 5.27:
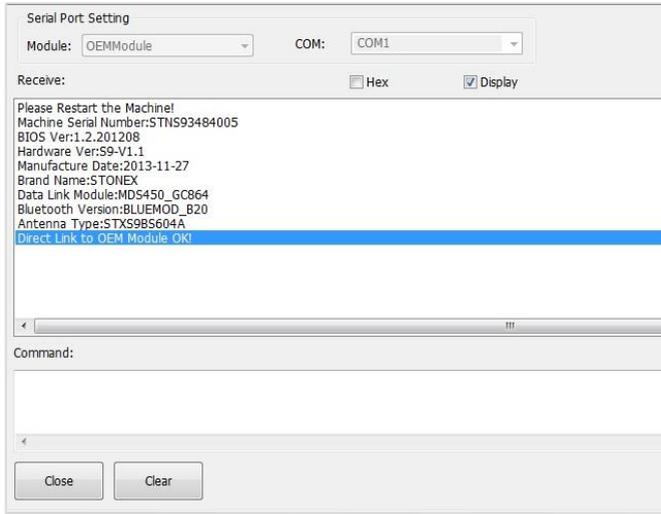
Fig. 5.27 – Serial Port Forwarding window, third step

If you read "Direct Link to OEM Module Ok" (or another device), then you will be able to communicate with the module directly, send commands or click "Close" and start any other software you need for communicating with the board/device.

5.5. Register

This command allows you to register the temporary or permanent license code. Click on "Register" and a window as in Fig. 5.28 is opened.
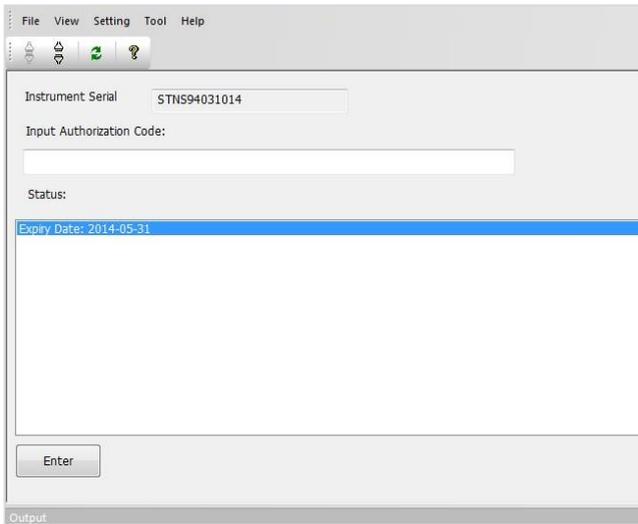
Fig. 5.28‑Register the receiver

1) In the "Status" window, you can see the data of expiry of the license, **if the expire date contains the year 2050, it means that the license is already permanent.**

2) In the "input authorization code" window you can insert the new temporary or permanent code provided by Stonex. Click on "Enter" to confirm. A confirmation box is opened, push "Confirm" to allow the new code installation.

Fig. 5.29‑Confirmation window

Then software will inform you the new expiry date
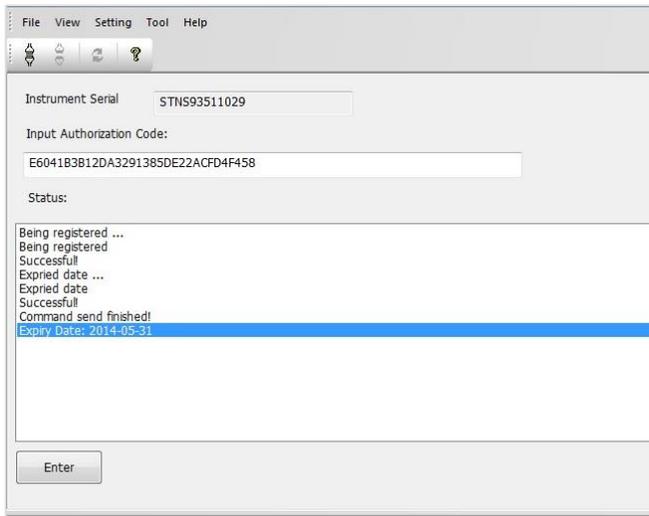
Fig. 5.30 – Registration successful

If you noticed that code is going to expire or it is expired, please ask to your local dealer/agent.

5.6. Firmware update

Click on "Firmware Upgrade" button and a new window as in Fig. 5.31 is opened. Then click on "Upgrade" button showed by red rectangle to select the location of the folder where the update firmware is located. Then select the firmware file and automatically the software will recognize the correct receiver and select proper file (see Fig. 5.32), so it is not possible to install a wrong firmware. Finally restart the receiver, as explained by a message (see Fig. 5.33). Once restarted you can check on the main screen of Assistant that the new firmware is installed.
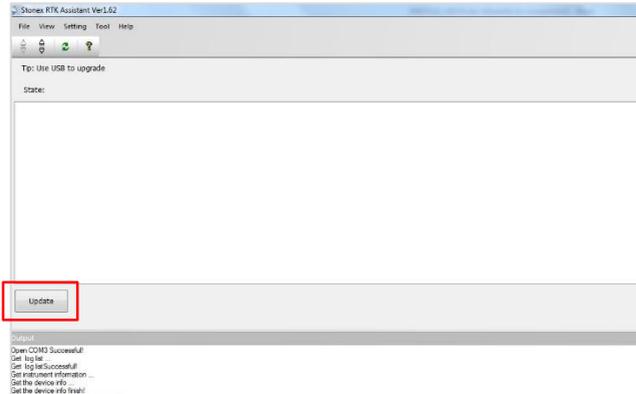
Fig. 5.31 – Firmware update window
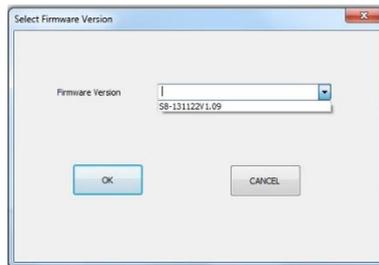
Fig. 5.32 – Select Firmware Version window
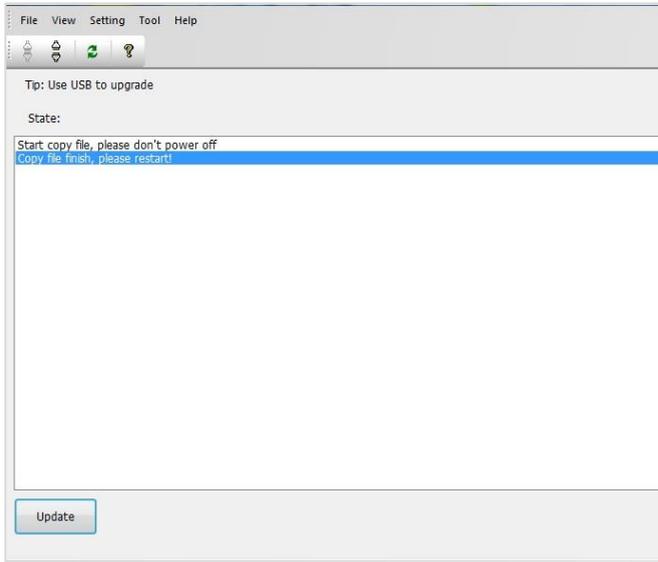
Fig. 5.33 - Firmware update window, last step

If Stonex will release a new firmware, you will receive a communication from your local dealer/agent. In any other case before doing this operation please ask to the technical support of your dealer or of Stonex Support office.

6. Appendices

Appendix 1: Default Radio Settings

S9III PLUS uses a single UHF radio to cover the different the whole band 410-470 MHz. Preset values is done directly from Stonex Europe in accord to the following tables:

Rate / Channels	MHz
1 Channel	438.125
2 Channel	440.125
3 Channel	441.125
4 Channel	442.125
5 Channel	443.125
6 Channel	444.125
7 Channel	446.125
8 Channel	447.125

Tab. A1.1 – Internal radio default frequency

Appendix 2: Technical Specifications

RECEIVER

Channels	220
Satellite Tracked	GPS: Simultaneous L1 C/A, L2E, L2C,L5
	GLONASS: Simultaneous L1 C/A, L1P, L2 C/A (GLONASS M Only), L2P
	SBAS: Simultaneous L1 C/A, L5
	GALILEO (reserved): Simultaneous L1 BOC, E5A, E5B, E5AltBOC1
	COMPASS: B1 (QPSK), B1- MBOC (6,1, 1/11), B1-2 (QPSK), B2 (QPSK), B2-BOC (10,5), B3 (QPSK),B3BOC (15,2,5), L5 (QPSK)
	QZSS: L1 C/A, L1 SAIF, L2C, L5
Position Rate	Up to 20 Hz (50 Hz optional)
Signal Reacquisition	< 1 sec
RTK Signal Initialization	typically < 10 s
Hot Start	typically < 15 s
Initialization Reliability	> 99.9 %
Internal Memory	256 MB
Micro SD Card	4 GB Internal Memory (Over 60 days of raw static data storage with recording sample every 1 second)

POSITIONING1

HIGH PRECISION STATIC SURVEYING (Long time observations)

Horizontal	2.5 mm + 0.1 ppm RMS
Vertical	3.5 mm + 0.4 ppm RMS

FAST STATIC

Horizontal	3 mm + 0.5 ppm RMS
Vertical	5 mm + 0.5 ppm RMS

CODE DIFFERENTIAL POSITIONING

Horizontal	0.25 m + 1 ppm RMS
Vertical	0.45 m + 1 ppm RMS
SBAS POSITIONING (Typical)	
Horizontal	0.5 m RMS
Vertical	0.85 m RMS
REAL TIME KINEMATIC (< 25Km) – NETWORK SURVEYING3	
Fixed RTK Horizontal	8 mm + 1 ppm RMS
Fixed RTK Vertical	15 mm + 1 ppm RMS

COMMUNICATION

Connectors I/O	7-pins Lemo and 5-pins Lemo interfaces. Multicable with USB interface for connecting with PC
Bluetooth Device	2,4 GHz class II: maximum range is 50 m
Reference Outputs	CMR, CMR+, sCMRx, RTCM 2.3, RTCM 3.0, RTCM 3.1
Navigation Outputs	ASCII (NMEA-0183) GSV, AVR, RMC, HDT, VGK, VHD, ROT, GGK, GSA, ZDA, VTG, GST, PJT, PJK, BPQ, GLL, GRS, GBS

INTEGRATED GNSS ANTENNA

High accuracy four constellation microstrip antenna, zero-phase center, with internal multipath suppressive board

INTERNAL RADIO

Frequency Range	403 - 473 MHz
Channel Spacing	12.5KHz / 25 KHz
Emitting Power	0.5 / 1/2 W
Maximum Range	3-4 Km (urban environment), Up to 10 Km with optimal conditions4
Protocol	Transparent EOT/EOC/FST, SATEL, South, Stonex Type 1, TRIMTALK II/IIe, TRIMMARK 3, TRIMTALK 450S

WIRELESS MODULE

Band	GSM/GPRS/EDGE: 850/900/1800/1900 MHz WCDMA/HSDPA: 2100/1900/850 MHz
Output Power	GSM850， EGSM900：33 dBm(2W) GSM1800， PCS1900：30 dBm(1W) WCDMA：23 dBm

POWER SUPPLY

Battery	2500 mAh high capacity Lithium battery, Voltage 7.2 V
Voltage	9 to 15 V DC external power input with over-voltage protection
Working Time in Static Mode (GPS+GLONASS)	7 hours
Working time in GSM RTK (GPS+GLONASS)	6.5 hours5
Charge time	typically 5 hours
Power consumption	< 3.8 W
Remaining time battery light blinking	1 hour

PHYSICAL SPECIFICATION

Weight	1.2 Kg with internal battery, radio standard UHF antenna
Operating Temperature	-40°C to 65°C (-22°F to 140°F) (internal radio TX 50°C)
Storage Temperature	-40°C to 80°C (-40°F to 176°F)
Waterproof/Dustproof	IP67. Protected from temporary immersion to depth of 1 meter and from 100% humidity
Shock Resistance	Designed to survive a 2 m pole drop on concrete
Vibration	Vibration resistance

1. Accuracy and reliability are generally subject to satellite geometry (DOPs), multipath, atmospheric conditions and obstructions. In static mode they are subject even to occupation times: the longer is the Baseline, the longer must be the occupation time.
2. Depends on SBAS system performance.
3. Network RTK precisions depends on the network performances and are referenced to the closest physical base station.
4. Varies with the operating environment and with electromagnetic pollution.

Appendix 3: Safety Recommendations

Warnings and Cautions

An absence of specific alerts does not mean that there are no safety risks involved in the use of this equipment.

Always follow the instructions that accompany a Warning or Caution, reported in this.

This information are intended to minimize the risk of personal injury and/or damage to propriety. In particular, observe safety instructions that are presented in the following form:

> **WARNING -** A Warning alerts about risk for health and/or damage to the propriety. A warning identifies the nature of the risk and the extent the possible injury and/or damage. It also describes how to protect yourself and/or the equipment from this risk.
>
> **CAUTION -** A Caution alerts about a possible risk of damage to the equipment and/or loss of data, but no risk for human safety.

Wireless Module Approval

The receivers uses internal wireless modules or can be connected to an external data communications UHF radio. Regulations regarding the use of the radio-modems vary greatly from country to country. In some countries, the unit can be used without obtaining an approval license. Other countries require specific approval or auto certification by the set maker.

Before using this instrument, check if authorization to operate the receiver is required in your country. It is the responsibility of the importer to verify if it is necessary a certification or license for the equipment in the country of use.

Instrument Approval

Covers technical features of the equipment relatives to electromagnetic emissions that can cause interference and disturbances to other instruments (note like emc compatibility) or generate not correct functionalities of the instrument itself. Approval is granted by the manufacturer of the equipment. Some countries have unique technical requirements for operation in particular frequency bands. To comply with those requirements, Stonex srl may modified the equipment to be subjected to grant.

Unauthorized modification of the units voids already got approvals, the warranty time and the operational licenses of the instrument.

Pacific Crest XDL Micro UHF 410-470 MHz Data transceiver

Antenna Installation Warning

1. All antenna installation and servicing is to be performed by qualified technical personnel only. When servicing the antenna, or working at distances closer than those listed below, ensure the transmitter has been disabled.

2. Typically, the antenna connected to the transmitter is a directional (high gain) antenna, fixed-mounted on the side or top of a building, or on a tower. Depending upon the application and the gain of the antenna, the total composite power could exceed 90 watts ERP. The antenna location should be such that only qualified technical personnel can access it, and that under normal operating conditions no other person can touch the antenna or approach within 0.6 meters of the antenna.

You can see below a table showing the Antenna Gain versus Recommended Safety Distance:

	Antenna Gain (TRM 450 Series)		
	0-5 dBi	5-10 dBi	10-16.5 dBi
Minimum RF safety distance	0.6 meters	1.06 meters	2.3 meters

For USA: The FCC has adopted a safety standard for human exposure to radio frequency electromagnetic energy. Proper use of this radio modem results in exposure below government limits. The following precautions are recommended:

DO NOT operate the transmitter when someone is located less than 20 cm (7.8 inches) of the antenna.

DO NOT collocate (place within 20 cm) the radio antenna with any other transmitting instruments.

DO NOT operate the transmitter unless all RF connectors are secure and any open connectors are properly terminated.

DO NOT operate the equipment near electrical blasting caps or in an explosive atmosphere.

All equipment must be properly used according to the installation instructions for safe operation.

All equipment should be repaired and calibrated only by a qualified technician.

GPRS/GSM/UMTS modem ZTE WCDMA
Be sure the use of this product is allowed in the country and in the environment required. The use of this product may be dangerous and has to be avoided in the following areas:
- Where it can interfere with other electronic devices in environments such as hospitals, airports, aircrafts, etc.
- Where there is risk of explosion such as gasoline stations, oil refineries, etc.

It is responsibility of the user to enforce the country regulation and the specific environment regulation.

Do not disassemble the product; any mark of tampering will compromise the warranty validity.

Cautions have to be taken for the SIM, checking carefully the instruction for its use. Do not insert or remove the SIM when the product is in switched on.

Every module has to be equipped with a proper antenna with specific characteristics. The antenna has to be installed with care in order to avoid any interference with other electronic devices and has to guarantee a minimum distance from the body (20 cm).

For Europe
The European Community provides some Directives for the electronic equipments introduced on the market.
All the relevant information's are available on the European Community website:

http://ec.europa.eu/enterprise/sectors/rtte/documents/

The text of the Directive 99/05 regarding telecommunication equipments is available, while the applicable Directives (Low Voltage and EMC) are available at:

http://ec.europa.eu/enterprise/sectors/electrical

FOR USA
For your own safety, and in terms of the RF Exposure requirements of the FCC always observe the precautions listed here.
- Maintain a minimum separation distance of 20 cm (7.8 inches) between yourself and the radiating antenna.
- Do not collocate (place within 20 cm) the radio antenna with any other transmitting device.

Bluetooth/WiFi radio Module
The radiated output power of the internal Bluetooth module of this equipment is far below the FCC and EU radio frequency exposure limits. In any case, be sure to use the equipment with the radio far at least 20 cm from the human body. The Bluetooth module match the guidelines found in radio frequency "safety standards and recommendations "published by Scientific organizations.
Stonex srl therefore believes the internal wireless radio is safe for use by end users. The level of energy emitted is far less than the electromagnetic energy

emitted by wireless devices such as UMTS phones. However, the use of Bluetooth/WiFi may be restricted in some special situations or place , like aircraft , hospital ,etc. If you are unsure of existence of restrictions, you should ask for authorization before switching on the Bluetooth radio.

Raccomandation for installing antennas for internal radios
An absence of specific alerts does not mean that there are no safety risks involved in the use of this equipment.
Always follow the instructions that accompany a Warning or Caution, reported in this. This information are intended to minimize the risk of personal injury and/or damage to propriety. In particular, observe safety instructions that are presented in the following form:

CAUTION
For your own safety, and to match the RF Exposure requirements of the FCC, always observe these precautions:
- Always maintain a minimum separation distance of 20 cm (7.8 inches) between yourself and the radiating antenna.
- Do not collocate (place within 20cm) the radio antenna with any other transmitting device.
- Do not switch on the GSM or UHF module without the antenna mounted to the external connector.

UHF Antennas having a gain greater than 5 dBi, are strictly prohibited for use with this device. The required antenna impedance must be 50 ohms.

GSM/UMTS Antennas having a gain greater than 3 dBi (for mobile applications) are strictly prohibited for use with this device.
To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropical radiated power (e.i.r.p.) is not more than the one necessary to get successful connection.

Rechargeable Lithium-ion batteries

These receivers use a rechargeable Lithium-ion battery.

WARNING

- Do not creates damage at the rechargeable Lithium-ion battery.

A damaged battery can cause an explosion, with risk or fire, and can result in personal injury and/or property damage.

To prevent injury or damage:

– Do not use or charge the battery if it appears to be damaged. Signs of damage are   discoloration, warping, leaks of liquids.

– Do not expose the battery to fire, high temperature, or direct strong sunlight.

– Do not introduce the battery in water or liquid substance , in general.

– Do not use or store the battery in very hot ambient.

– Do not drop or puncture the battery.

– Do not open the battery and do not put in short-circuit its electrical contacts.

WARNING

- Avoid direct contact with the rechargeable Lithium-ion battery if it appears damage. Battery liquids are corrosive and, and contact with it can result in personal injury or damage to proprieties.

To prevent injury or damage:

– If the battery leaks, avoid contact with the battery fluid.

– If battery fluid gets into your eyes, immediately rinse your eyes with clean water and seek medical attention. Do not rub your eyes!

– If battery fluid gets onto your skin or clothing, immediately use clean water to wash off the battery fluid.

Appendix 4: Copyrights, warranty and environmental recycling

Copyrights and trademarks

© 2016, STONEX® Limited. All rights reserved.

STONEX®, the STONEX® logo, and S9 GNSS receiver are trademarks of STONEX® Limited.

STONEX® Assistant, STONEX® GPS Processor and STONEX® SurvCe are trademarks of STONEX® Limited.

Bluetooth is a trademark owned by Bluetooth SIG, Inc. and licensed to STONEX®. All other trademarks are the property of their respective owners.

Copyrights, warranty and environmental recycling

Version 2016

The terms and conditions of this Limited Warranty constitute the complete and exclusive warranty agreement between The Customer or Dealer and STONEX® for the Product and supersede any prior agreement or representation made in any STONEX® sales document or advice that may be provided to Customer by any STONEX® representative in connection with Customer's purchase of the Product. No change to the conditions of this Limited Warranty is valid unless it is made in written form and signed by an authorized STONEX® supervisor.

STONEX ® warrants that its products:
- (1) Be free from defects in materials or workmanship for generally 2 years.
  - a) Accessories or specific parts for which different limited warranty period shall apply.
- (2) Have been tested/calibrated in proper working status prior to shipment.

The warranty period starts from date of first sale of the instruments.
At its sole discretion, under the warranty period, STONEX® will repair the product or send parts for replacement at its expense.

STONEX® agrees to repair or replace the defected instrument within thirty (30) days only if STONEX® recognizes that the defects of the instrument are not caused by human factors or no obvious damage to its surface is visible. STONEX® warrants any new replaced parts or products are warranted to be free from defects in materials and workmanship for thirty (30) days or for the remainder of the Limited Warranty Period of the Product in which they are installed, whichever is longer. Faulty Parts or Products replaced under this Limited Warranty shall become property of STONEX®.

All products that have to be repaired have to be returned to our technical representative office location via any delivery company the customer prefers, nevertheless STONEX® is not accountable for the unlikely event that the Products gets lost in transit.

Any damage inflicted by the customer or by third party after the products has been delivered to the customer is excluded from the limited warranty as well any damage arising from an improper use, from any action or use not provided for in the enclosed user guides and/or manuals.

Shipping policy

The Customer or the dealer is required to pay for the charges for shipping of fault part or instruments to STONEX® representative office and STONEX® is providing the shipping for return. Dealers need to follow STONEX® repair/service procedure (see appendix 6) to achieve a better and prompt service result.

Return policy Dead On Arrival instruments

All returned products have to be shipped to STONEX® representative office.
The original Purchaser has a period of seven (7) days starting from date of purchasing to signal the existence of a defect in the instrument for a full refund (less shipping and handling), provided the merchandise is in new, resalable condition and returned in the original, undamaged packaging. Customer has to pay for both the return and the original freight fees, regardless of the original freight paid by the Company.

All warranty books, instruction manuals, parts and accessories must be included as well as the original box in which the item was shipped. We recommend to place the original carton inside another box, to avoid any additional damage to the carton itself. In some cases, returns of special items

will require a re-stock fee. Acceptance of returned merchandise is final only after inspection by STONEX®.

Above terms and policies shall apply as for hardware. Dealers need to follow STONEX® repair/service procedure (see appendix 4) to achieve a better and prompt service result.

Firmware/Software warranty

Stonex® doesn't warrant that operation of Firmware/Software on any instruments will be uninterrupted or error-free, or that functions contained in Firmware/Software will operate to meet your requirements.
Stonex® will forward the Software/Firmware Fix to the dealer or customer. Firmware/software Fix means an error correction or other update created to fix a previous firmware version that substantially doesn't conform to the instruments specification.

Over Warranty repair(s) policy

Customer shall pay the standard repair fees for any service (whether part replacement or repairs) and performed by STONEX® under request and explicit authorization of the customer itself. In this case the customer is charged for return shipment's fees as well.

Disclaimer and Limitation of Remedy

All other express and implied warranties for this product, including the implied warranties of merchantability and fitness for a particular purpose and/or noninfringement of any third party's rights, are hereby disclaimed. Stonex® expressly disclaims all warranties not stated in this limited warranty. Any implied warranties that may be imposed by law are limited in duration to the term of this limited warranty. Some jurisdictions do not allow the exclusion of implied warranties or limitations on how long an implied warranty lasts, so the above exclusions or limitations may not apply to customer.
Customer must read and follow all set-up and usage instructions in the applicable user guides and/or manuals enclosed. If customer fails to do so, this product may not function properly and may be damaged.

Customer may lose data or sustain personal injuries. Stonex®, its affiliates and suppliers do not warrant that operation of this product will be uninterrupted or error free; as do all electronics at times. If this product fails to work as warranted above, customer's sole and exclusive remedy shall be repair or replacement. In no event will Stonex®, its affiliates or suppliers be liable to customer or any third party for any damage in excess of the purchase price of the product.

This limitation applies to damages of any kind whatsoever including (1) damage to, or loss or corruption of, customer's records, programs, data or removable storage media, or (2) any direct or indirect damages, lost profits, lost savings or other special, incidental, exemplary or consequential damages, whether for breach of warranty, contract, tort or otherwise, or whether arising out of the use of or inability to use the product and/or the enclosed user guides and/or manuals, even if Stonex®, or an authorized Stonex® representative, authorized service provider or reseller has been advised of the possibility of such damages or of any claim by any other party. Some jurisdictions do not allow the exclusion or limitation of incidental or consequential damages for some products, so the exclusions or limitations may not apply to customer. This limited warranty gives customer specific legal rights, and customer may also have other rights which vary from country/state/jurisdiction to country/state.

Instruments

Two (2) years on STONEX® Products:

S9 III PLUS GNSS Series

Accessories

Accessories & Specific Parts Warranty

For Accessories provided by Stonex® with the instruments S10 GNSS the following general warranty time is for reference:

Batteries	7 months
Battery chargers	7 months
Adapters for battery chargers, Cables, Tribrach, Pole, Antennas	2 years

Service Procedure

Repair/Service procedure for dealers:
(1) S/N of the instrument and a detailed description of the defect (sometimes pictures or video) will be required to indicate the cause and problem.
(2) If dealer wants to repair an instrument under warranty period on their site:
1) If dealers don't have the part in stock they have to send an official order to STONEX® and pay for it and so STONEX® will send the new part to them so they can repair the instrument.
2) When the repair is over, the dealer has to fill the "Spare Part Refund" module and send it to the dedicated mail address.
3) Wait for STONEX®'s authorization SPR no;
4)When dealer receive the SPR authorization no they can send back to STONEX® appointed office the broken part with attached the SPR module;
5) When STONEX® receives the broken part STONEX® shall verify it and if everything is ok the cost of the part shall be refund (refund will be done only after check of the failure part and final approval of STONEX®).
(3) If the instrument needs to be sent back to STONEX® for repair/replacement, dealer/customer has to send to STONEX® a "Returned Merchandise Authorization (RMA)" before they send back the fault instrument. STONEX® shall, at its sole discretion, decide on the place of performance for work under warranty.

Environmental recycling

The cardboard box, the plastic in the package and the various parts of this product have to be recycled and disposed of in accordance with the current

legislation of your Country.

For Countries in the European Union (EU)

The disposal of electric and electronic device as solid urban waste is strictly prohibited: they must be collected separately.
Contact Local Authorities to obtain practical information about correct handling of the waste, location and times of waste collection centres. When you buy a new device of ours, you can give back to our dealer a used similar device.
The dumping of these devices at unequipped or unauthorized places may have hazardous effects on health and environment.
The crossed dustbin symbol means that the device must be taken to authorized collection centers and must be handled separately from solid urban waste.

For Countries outside European Union (EU)

The treatment, recycling, collection and disposal of electric and electronic devices may vary in accordance with the laws in force in the Country in question.
This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.
If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
-    Reorient or relocate the receiving antenna.
-    Increase the separation between the equipment and receiver.

\- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

STONEX