STONEX

STONEX S70G
Handheld
User Manual

Jun 2021 - Ver.1.1

www.stonex.it

Contents

Introduction

This document is user guide for S70G and it is intended to introduce how to use the controller correctly.

The S70G is a controller with a dedicated F9P GNSS sensor. The device is thinked for RTK projects and much more.

The integrated design of the controller makes the S70G only 0.6 kg, which is light and portable. The GNSS sensor supports the all satellites system signals like Beidou, GPS, GLONASS, Galileo,. The users no longer must worry about upgrading RTK hardware to support other satellite systems.

With the 4 constellation S70G GNSS receiver is a multiple-frequency receiver and designed for GNSS surveying applications. It is available as a standalone rover, which can be switched freely whenever and wherever, offering maximum versatility in the system configuration to meet your specific requirements. At the same time, S70G receiver can upgrade easily to continually meet your new demand.

It is supplied with an antenna connected directly to the tablet which guarantees a precision of 2cm, but it is also possible to connect an external antenna to obtain, in case of need, even more precise data.

S70G is able to work in real time through the reception of RTK corrections transmitted by a network of GNSS Permanent Stations.

At the same time, it can also record the raw data received from satellites for post processing in the office. This allows the operator to achieve greater precision and to be able to work even in areas where there is not a good coverage of the GSM signal.

This chapter provides basic information to help you get familiar with your GNSS receiver.

Key Features:

- Rugged housing
- Support full constellation satellites
- RTK and Post Processing solutions
- 4G LTE and Bluetooth / WLAN datalink support
- High quality display
- IP67

1. Controller appearance

1.1. Front view

Figure 1.1: Controller front view

The image clearly explains the button's features. On the front side is present the front camera. With the buttons on the right respect the central button is possible manage the level of the volume and open the main menu.

On the right there is the Power On/Off button and the return button to go back in the option/windows.

1.2. Back view

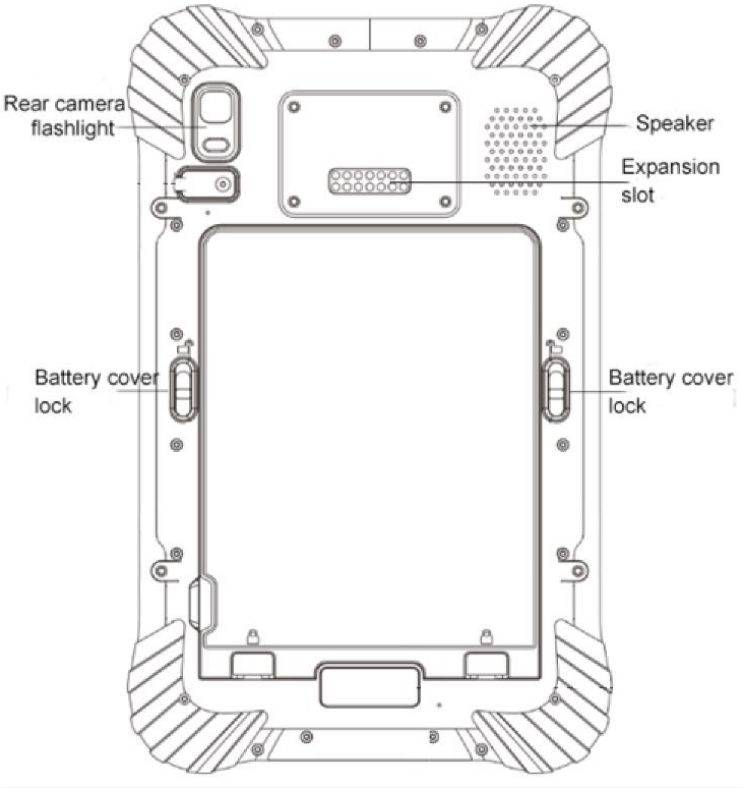


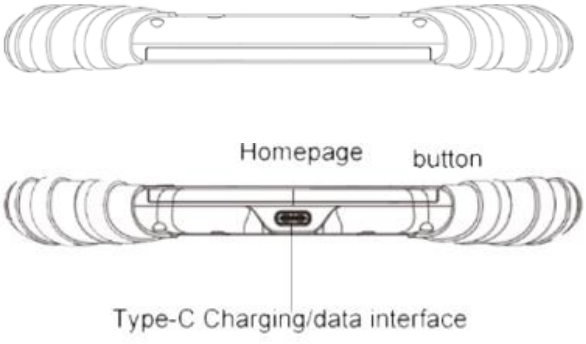
Figure 1.2: Controller Back view

The back view shows the tools presents on the back of the controller.

On the right there is the speacker, on the left there is the camera.

In the middle there is the port for the GNSS sensor.

1.3. Upper and lower view



On the lower view there is the Type C port to charge the controller

2. Working Mode

S70G is a controller based on the Android 9 operative system.

The controller is thinked to be used for GIS applications and RTK project. With the GNSS sensor is possible perform also Static session on the control points.

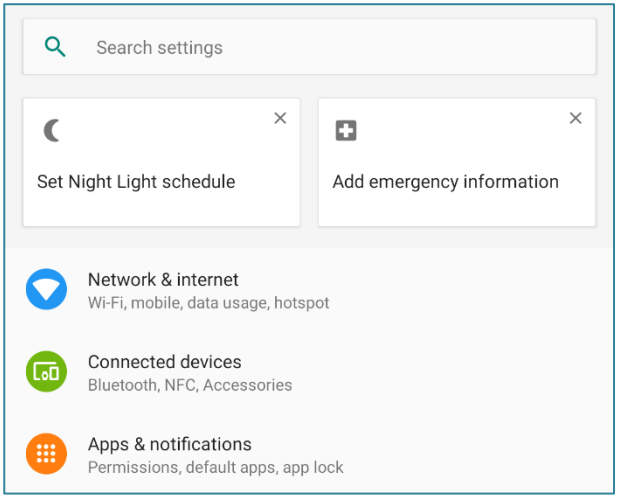
In the next paragraphs it will be explained how use the S70G with the Stonex field Application Cube-a and also with the SW Map, the GIS application.

The guide will start with the starter configuration the user has to do during the first start of the device.

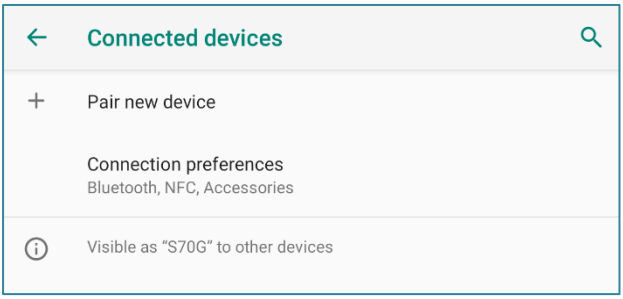
2.1 Initialization

When you turn on the controller for the first time, it is necessary recognize the GNSS sensor applied on it.

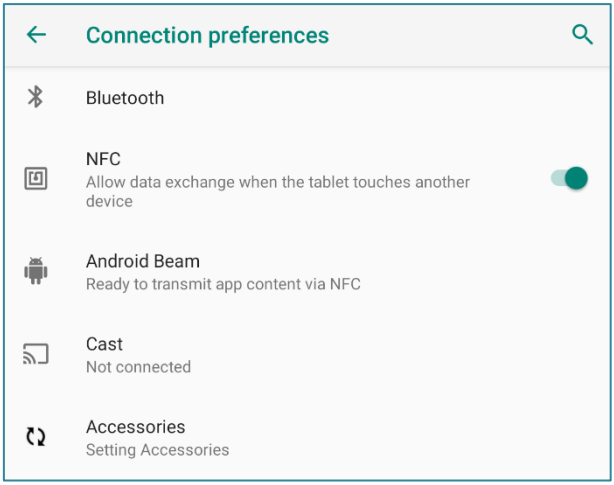
To do that, go in Android settings menu.



Select **Connected devices**



Select **Connection preferences**



Inside the connection preferences select **Accessories**.

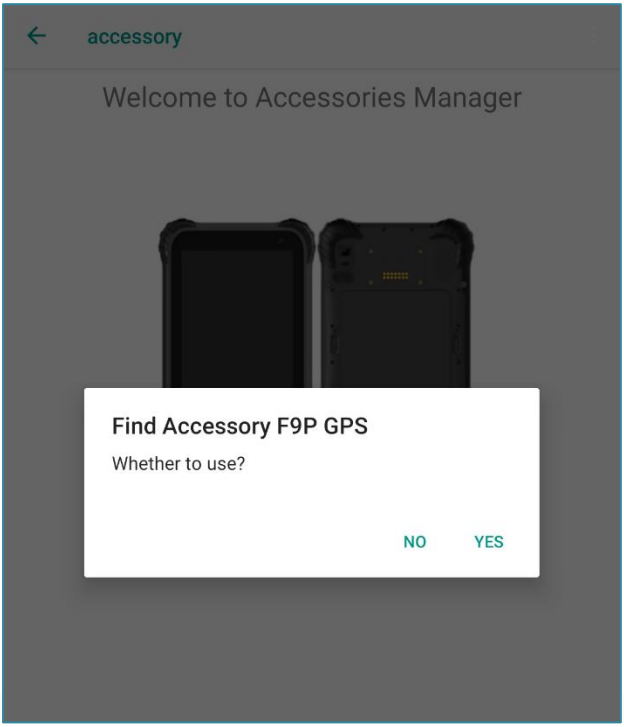
As default the S70G doesn't recognize the GNSS sensor.

As you can see in the picture here below, there are not accessories recognized.

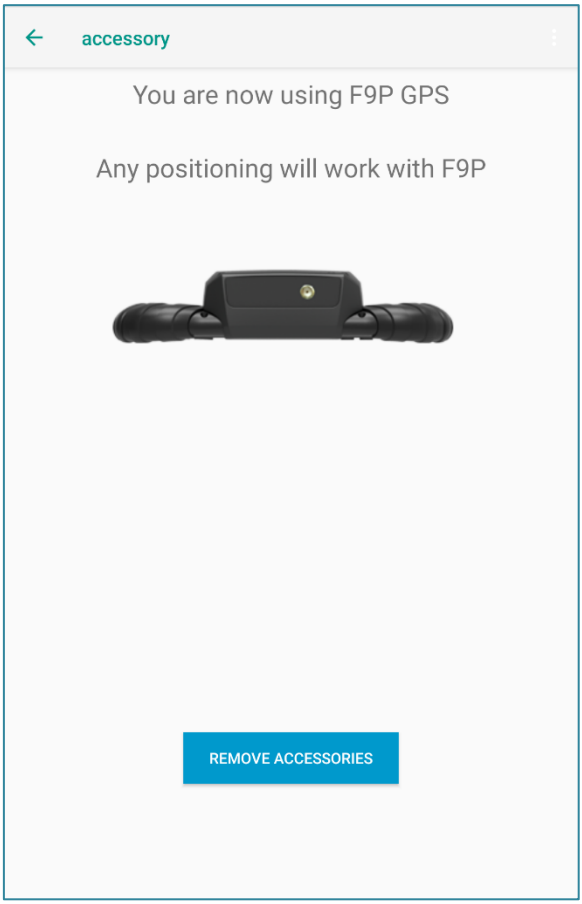
If you have the same configuration inside the previous picture press **Start Detect.**

The process of the detection will start automatically.

After a few seconds, the S70G automatically detect the GNSS sensor, confirm the option that appears. During the procedure, the device will restart.



When the procedure is completed, the user can check the correct detection go again inside the accessories menu. If the detection is done correctly, the device will appear.



If during the 1st initialization, the device is already detected, the procedure of the pairing is not necessary.

2.2 Cube-a

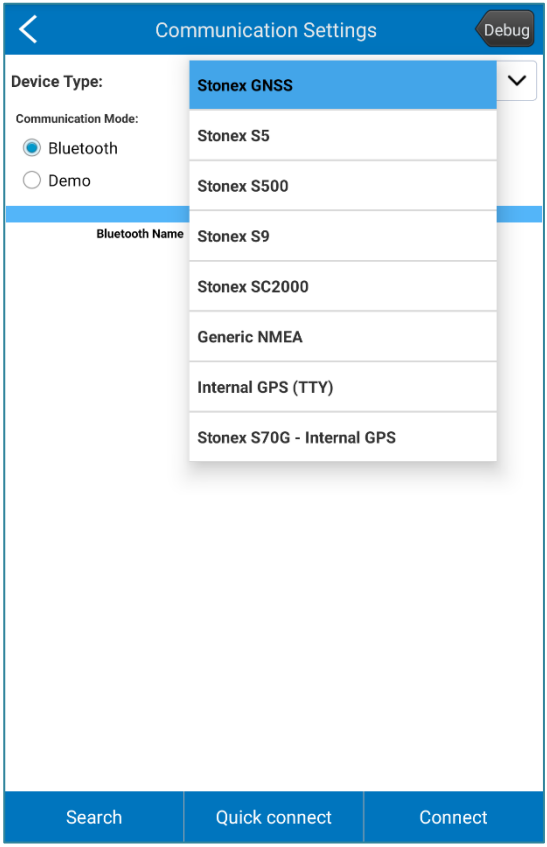
To use the Stonex Cube-a on the S70G, please install the software and insert the license.

Then enable the GNSS location option inside the settings of Android.

2.1.1 Connection

As firs open the Cube-a and complete the registration.

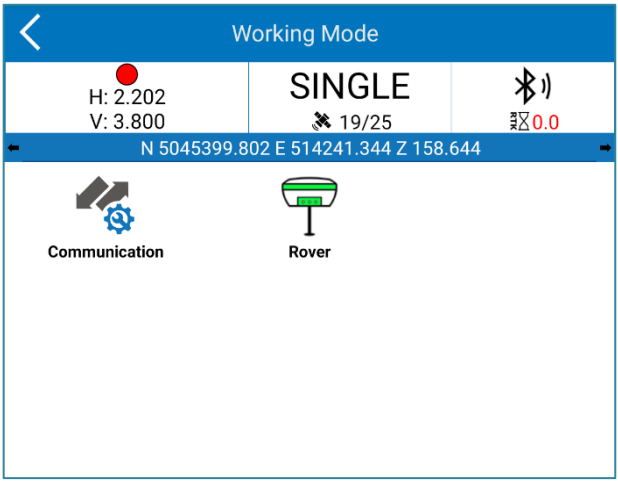
Then select **Device** then **Communication.**



As Device Type select **Stonex S70G – Internal GPS**

Confirm the selection with **Connect**

After the connection you will have this window.



2.2.2 Choose Antenna Type

After established the connection to the GNSS sensor, inside Device menu, select **Antenna Type** in base of the configuration of S70G you are using.

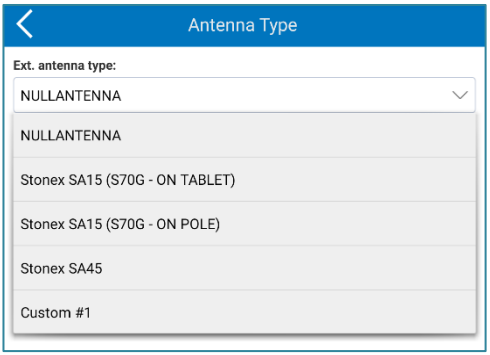
There are 3 standar possible configuration.

- S70G used with SA15 antenna without pole

- S70G used with SA15 mounted on the top of the pole

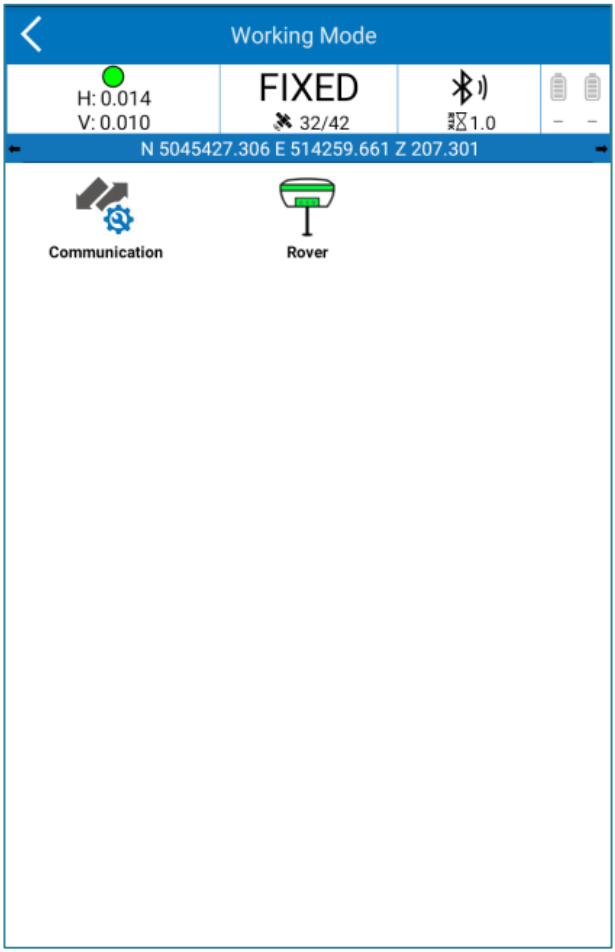
- S70G used with SA45 antenna mounted on the top of the pole

In base of the configuration used, select the antenna profile. Don't forget to insert the correct pole height.



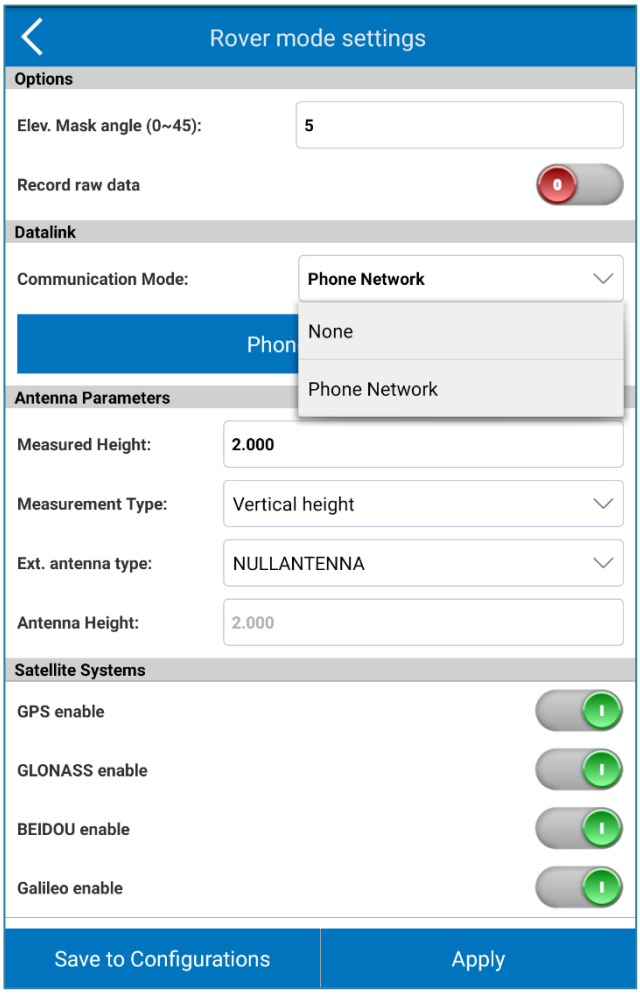
2.2.3 RTK

To perform an RTK project, after having set the info of the project and established the connection to the GNSS sensor go in Device menu and select **Rover.**



Select Rover and fill in the parameters asked by the software as the type of connection, User, Password, Mountpoints etc..

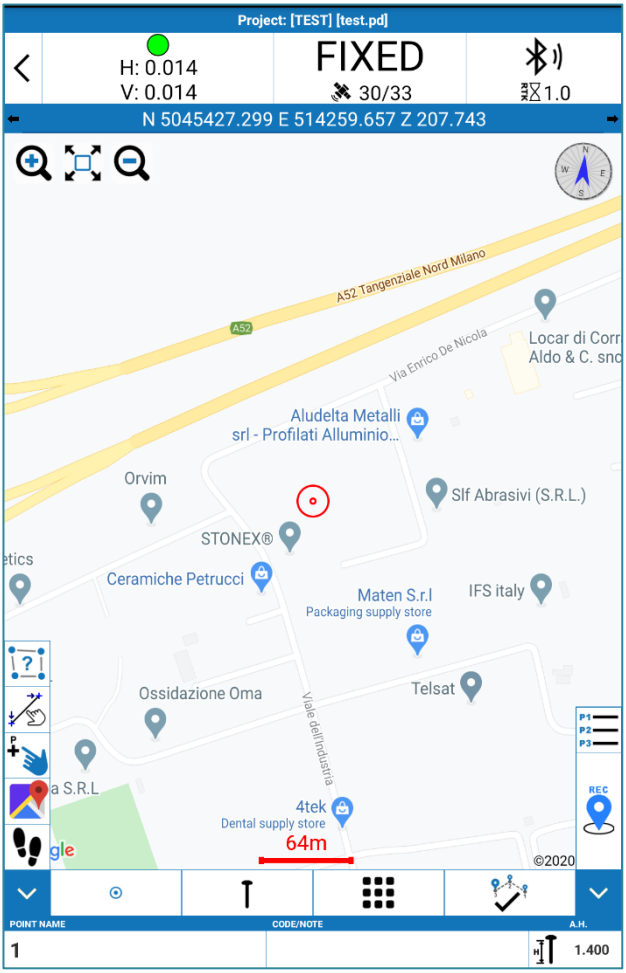
As Datalink, select Phone Network to get the RTK connection via internet.



After having set correctly, the RTK profile wait the change of the status of the controller's position.

When is FLOAT or better FIXED, start to work.

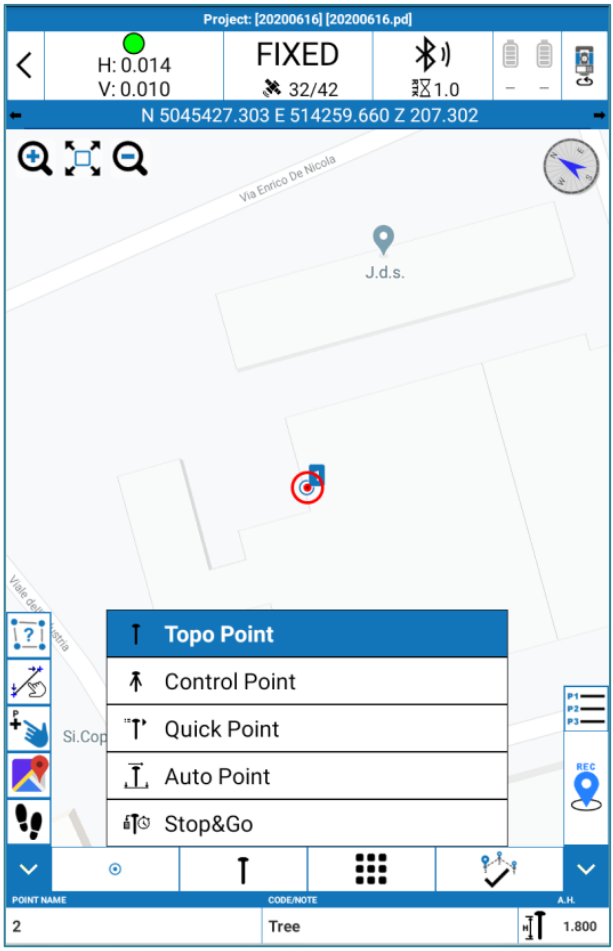
To work go inside Survey menu.



2.2.4 Stop&Go

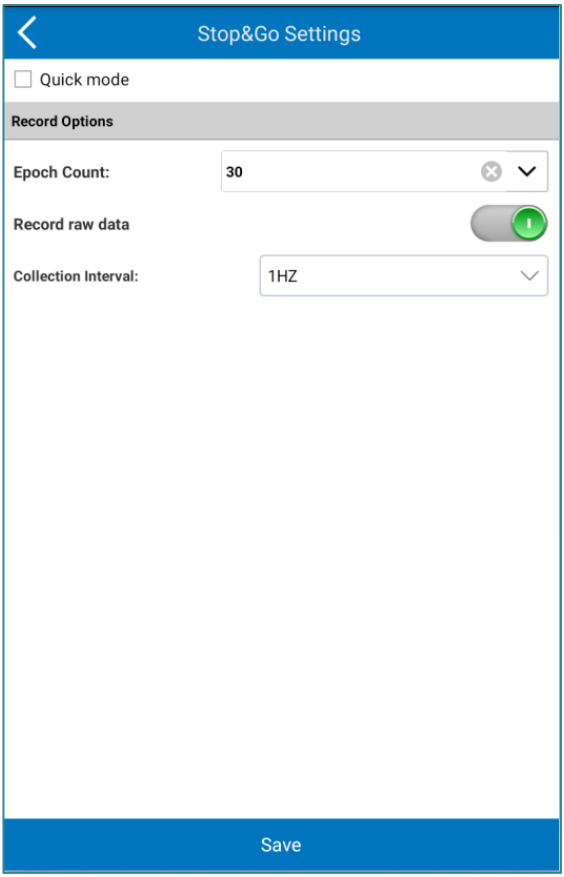
With the S70G is possible perform jobs also in Stop&Go.

To do that inside the Survey working area open the list of the measurement options.



Select Stop&Go from the list.

After the selection a popup window will appear.



Inside this window turn on the record of the raw data. The download is explained after.

The other 2 settings required are the number of the epochs and the collection interval.

2.2.5 Static

With the S70G is possible also perform a static session, then post process the observations and calculate a control point with accuracy.

For the Static it is recommended the use of the pole and the external A45 antenna.

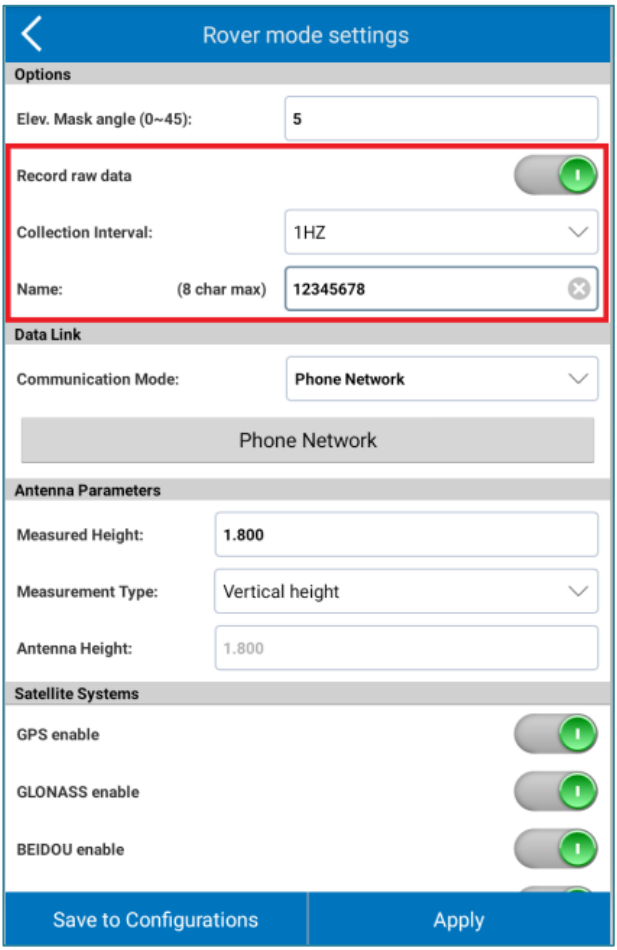
This configuration is specific for these kinds of job and for RTK jobs with accuracy position during the survey or the stake out.

After configured the system, place the rover on the control point.

Then open the working mode and select Rover.

Here it is fundamental enable the feature **Record Raw Data**.

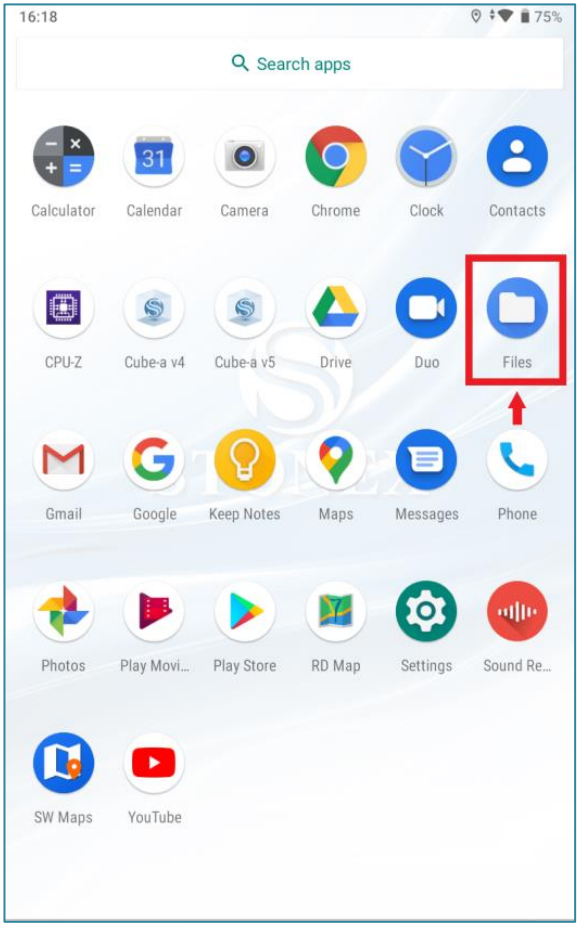
Also select the interval of the data collection and the name to recognize the raw data inside the folder during the download.



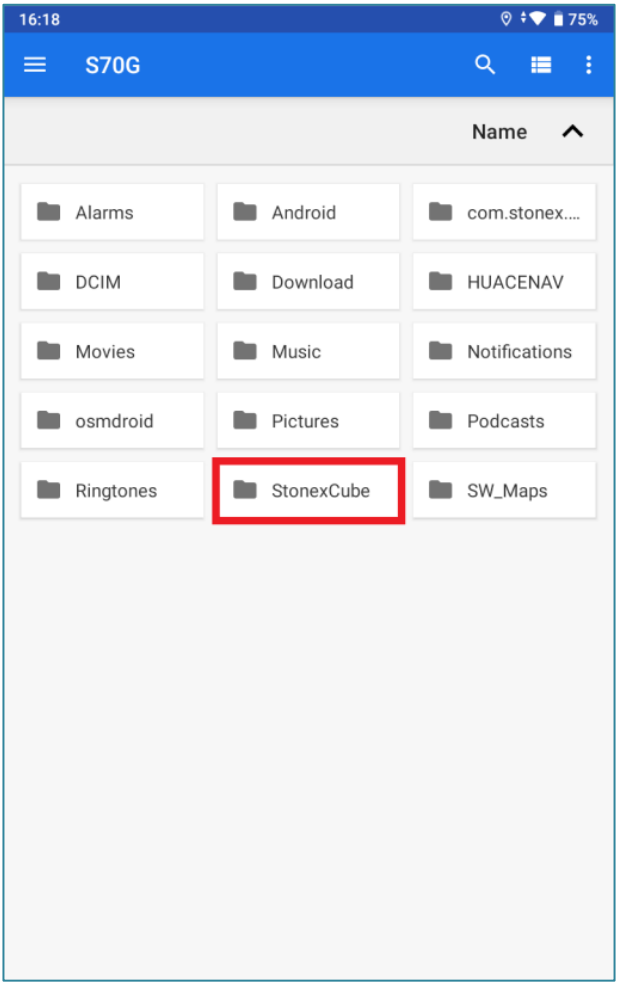
2.2.6 Download the Raw Data

To download the raw data of the controller and then perform the Post process of the measure go out of Cube-a.

Then open the file manager of the S70G.



Go inside the Stonex Cube-a folder.



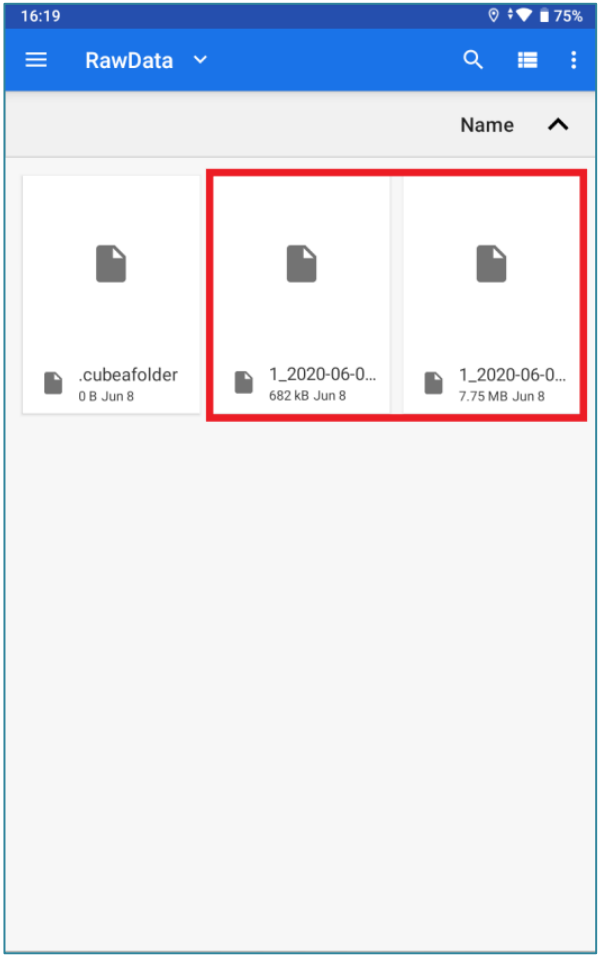
Open the folder of the project where it has been done the session.

And at the end open the raw data folder.

Inside it, it will be present the .log file of the static session.

Modify the extension of the .log in .dat to obtain the dat file.

Then use the .dat with the Stonex Cube-manager-p software for the post process.



2.3 SW Maps

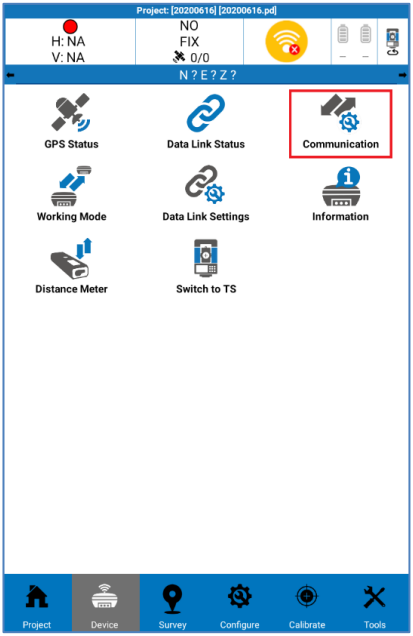
With Stonex S70G is possible to use the free GIS field software SW Maps.

SW Maps is a GIS app for collecting, presenting and sharing geographic information, for phones and tablets. SW Maps is currently available for devices running Android 4.0.3 and above. Google Play Services are required and will be updated if necessary. To install SW Maps, copy APK file into internal storage and install it (give all permission to Android System).

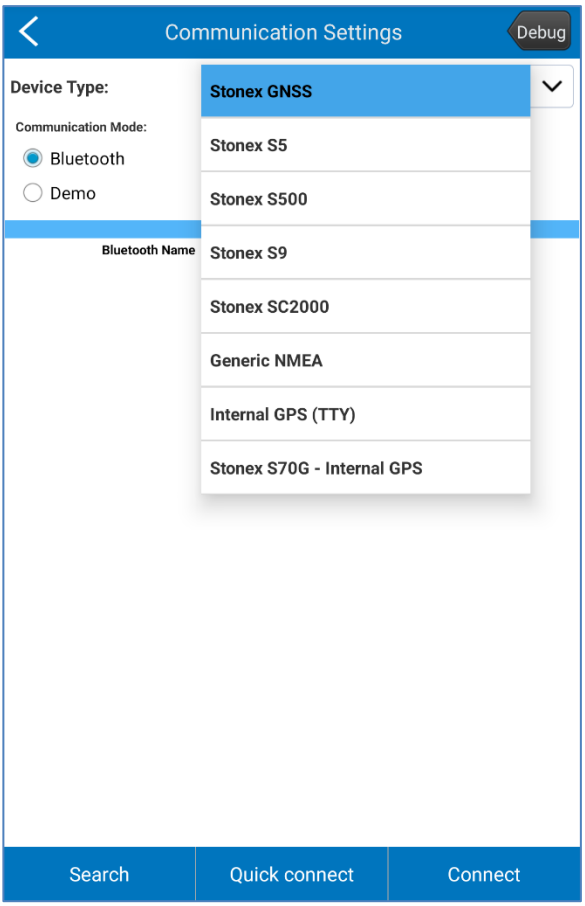
SW Maps can take the position from an external receiver or from the internal GPS of S70G. Before using SW Maps, you can configure the internal GPS with Cube-connector software.

2.3.1 Configuring the internal GPS of S70G

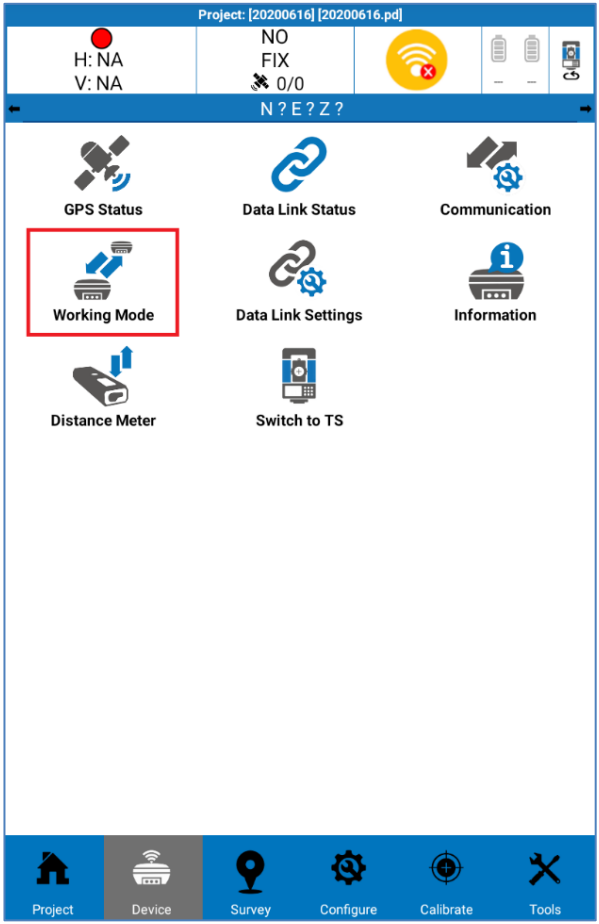
In Cube-connector, click on “Device” then on “Communication”.

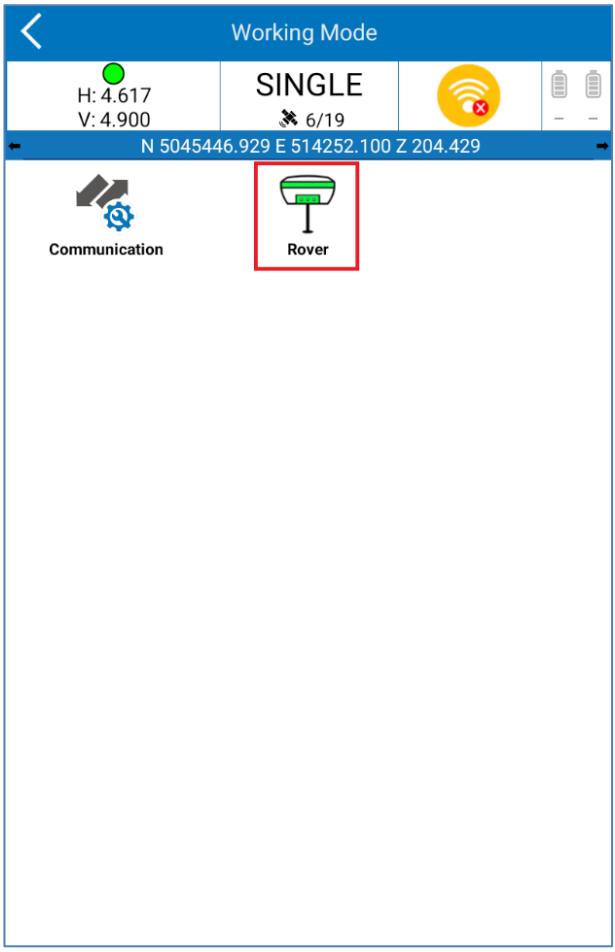


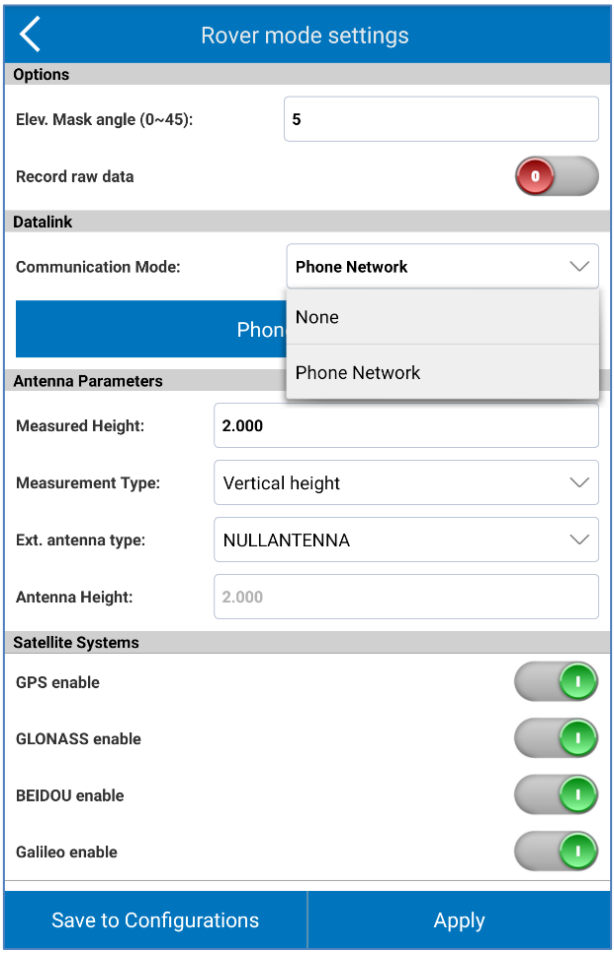
Inside Communication Settings window select “Stonex S70G - Internal GPS” in the Device Type then click on “Connect”.



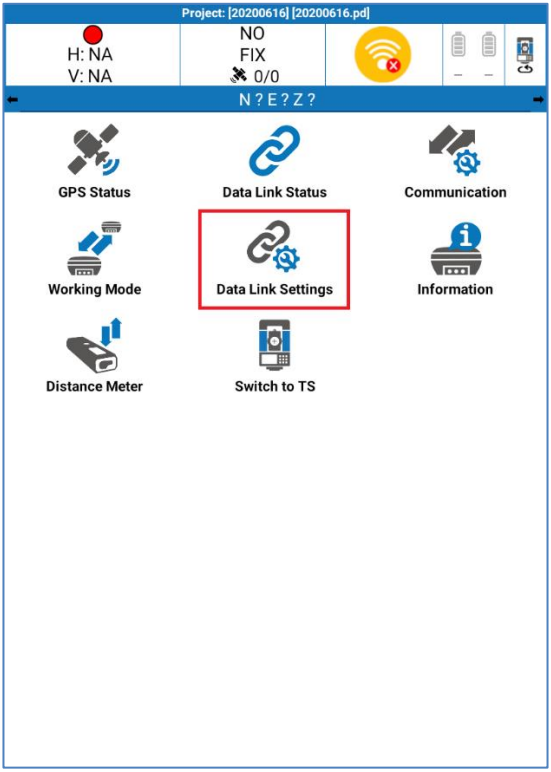
In the Device menu, click on “Working Mode” then on “Rover” to set the antenna parameters and the satellite systems, then click on “Apply”.



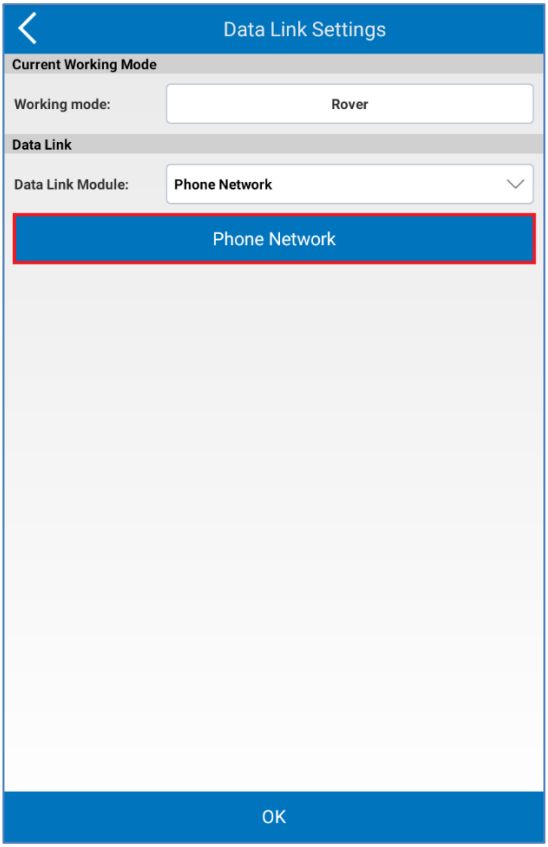

Working Mode
H: 4.617
V: 4.900
SINGLE
6/19
N 5045446.929 E 514252.100 Z 204.429
Communication
Rover


Rover mode settings
Options
Elev. Mask angle (0~45):
5
Record raw data
0
Datalink
Communication Mode:
Phone Network
None
Phone Network
Phon
Antenna Parameters
Measured Height:
2.000
Measurement Type:
Vertical height
Ext. antenna type:
NULLANTENNA
Antenna Height:
2.000
Satellite Systems
GPS enable
GLONASS enable
BEIDOU enable
Galileo enable
Save to Configurations
Apply

In the Device menu, click on “Data Link Settings” to set the Rover working mode and the communication mode.



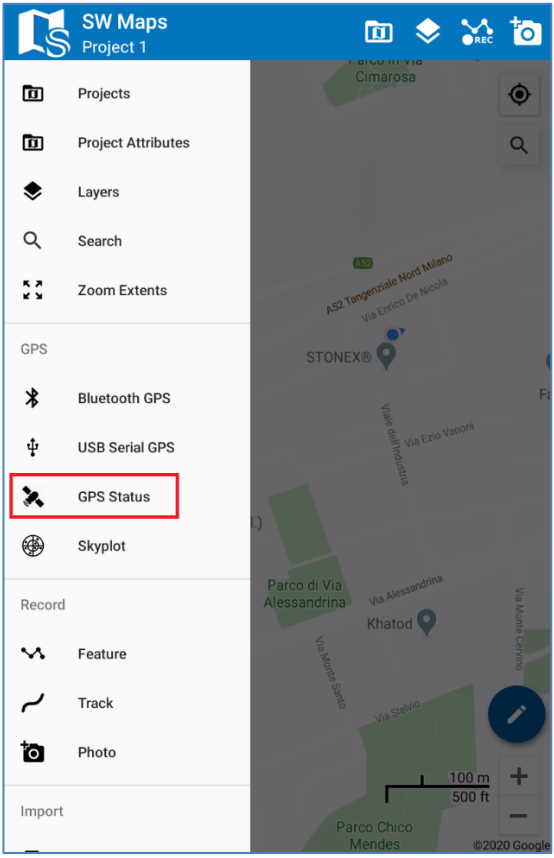
Data Link Settings window will open; in the Data Link Module drop down menu you can choose the communication mode. It you want to send differential corrections from controller for example, you should choose “Phone Network”, then click on blue bar Phone Network to set the CORS parameters.

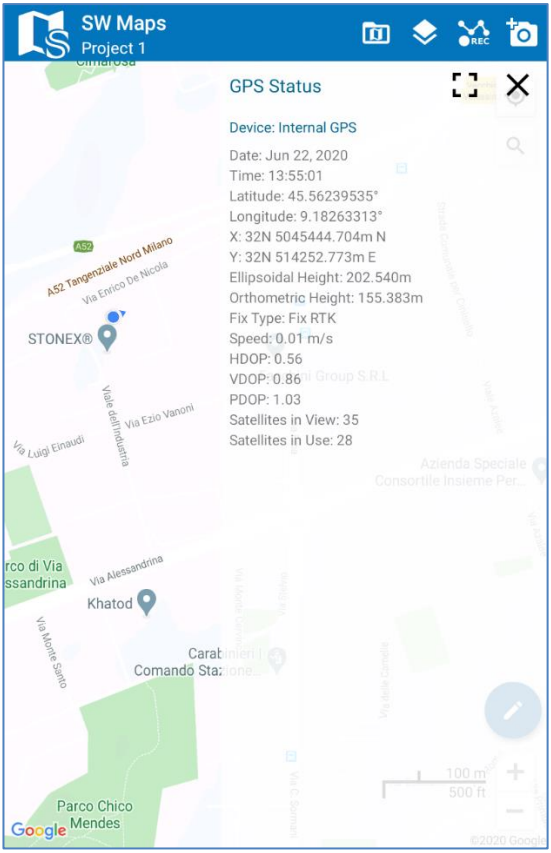


2.3.2 Surveying with SW Maps

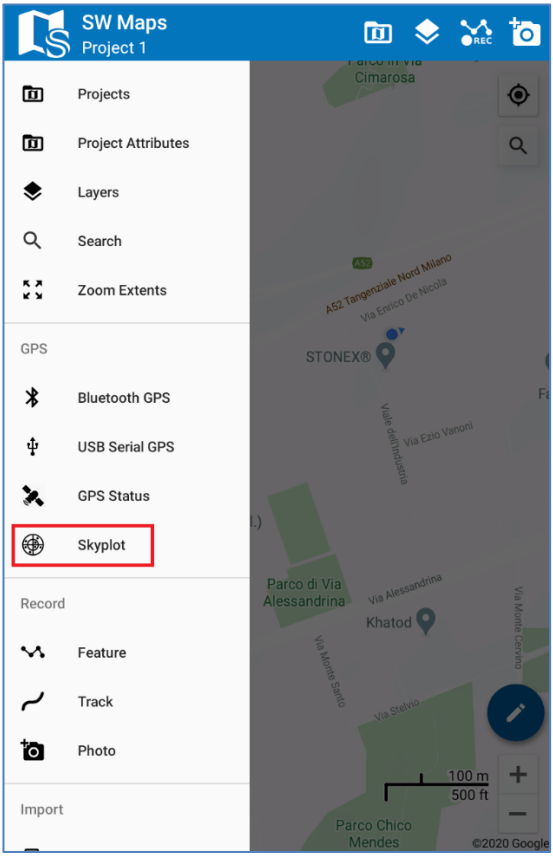
After the internal GPS configuration with Cube-connector, you' re ready to start surveying with SW Maps.

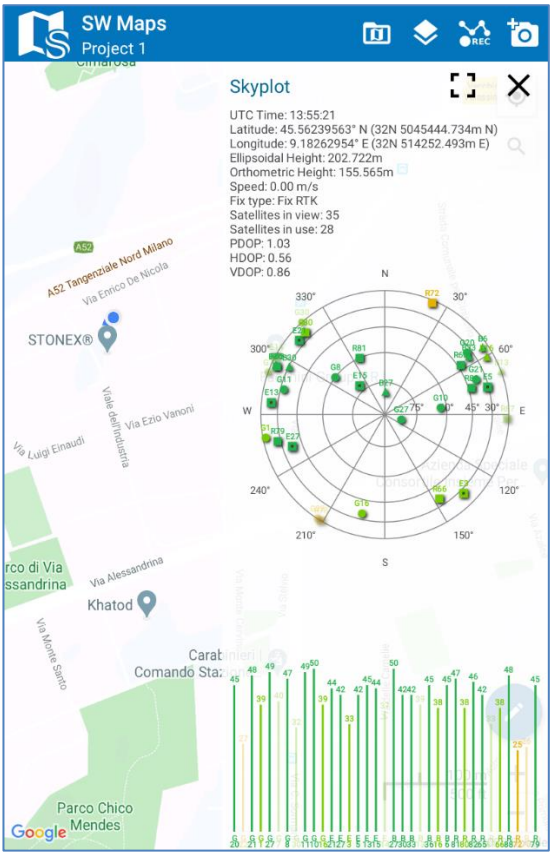
In the main menu of SW Maps, click on "GPS Status" to see some info about the GPS status, such as the current coordinates, the type of solution, PDOP, used satellites.




SW Maps
Project 1
GPS Status
Device: Internal GPS
Date: Jun 22, 2020
Time: 13:55:01
Latitude: 45.56239535°
Longitude: 9.18263313°
X: 32N 5045444.704m N
Y: 32N 514252.773m E
Ellipsoidal Height: 202.540m
Orthometric Height: 155.383m
Fix Type: Fix RTK
Speed: 0.01 m/s
HDOP: 0.56
VDOP: 0.86
PDOP: 1.03
Satellites in View: 35
Satellites in Use: 28
A52
A52 Tangenziale Nord Milano
Via Enrico De Nicola
STONEX®
Viale dell'Industria
Via Ezio Vanoni
Via Luigi Einaudi
Via Alessandria
Khatod
Via Monte Santo
Parco Chico Mendes
Google
100 m
500 ft
©2020 Google

You can also see the skyplot: in the main menu click on “Skyplot” to see the current geographic coordinates, some info about the GPS signal and the skyplot.




SW Maps
Project 1
Skyplot
UTC Time: 13:55:21
Latitude: 45.56239563° N (32N 5045444.734m N)
Longitude: 9.18262954° E (32N 514252.493m E)
Ellipsoidal Height: 202.722m
Orthometric Height: 155.565m
Speed: 0.00 m/s
Fix type: Fix RTK
Satellites in view: 35
Satellites in use: 28
PDOP: 1.03
HDOP: 0.56
VDOP: 0.86
N
E
S
W
STONEX®
A52 Tangenziale Nord Milano
Via Enrico De Nicola
Viale dell'Industria
Via Ezio Vanoni
Via Luigi Einaudi
Via Alessandrina
Khatod
Via Monte Santo
Parco Chico Mendes
Google

3. Phace center offsets

S70G strong of its versatility can be used in three possible configurations. In base of the scope of the project and the necessities on field

3.1 S70G with SA15

This is the ideal configuration for GIS application. The user can have the best performance in terms of usability and versatility of the device, always having a good accuracy through the RTK.

SA15 - Mounted on tablet S70G - Offset 6.5 cm (bottom of antenna to ARP)

3.2 S70G with SA15 mounted on the pole

This configuration is thinked for the accurate GIS application and much more. With this, it's possible make accurate surveys store and staking points using the pole.

SA15 - Mounted Pole with the adapter–- Offset 13.0 cm (bottom of adapter to ARP)

3.3 S70G with SA45 mounted on the pole

This configuration to get the very good accuracy, positioning and signal reception. This configuration is thinked for the survey application.

SA45 – Mounted on the Pole – L1=46 mm, L2=41 mm

3.4 S70G with SA65 mounted on the pole

And here the latest configuration to get the best in terms of operation , accuracy, positioning and signal reception. This configuration is thinked for the survey application.

SA65 – Mounted on the Pole – L1=46 mm, L2=50 mm

4. Configurations & accessories

4.1 Standard configuration

P/N	Description
50-550728	STONEX S70G GNSS, 184 Ch, 4G, Wi-Fi, BT, Bundle
	S70G Antenna SA15
	S70G Strap
	S70G Battery
	S70G Charger
	Carton Box
	SW Cube-link
	Pen Drive set 8Gb with Manual

4.2 Operating configuration

P/N	Description
50-550728	STONEX S70G GNSS, 184 Ch, 4G, Wi-Fi, BT, Bundle
	S70G Antenna SA15
	S70G Strap
	S70G Battery
	S70G Charger
	Carton Box
	SW Cube-link
	Pen Drive set 8Gb with Manual
30-350089	Soft bag for GPS and controller (SB-100)
40-450514	Software Stonex Cube-a GPS Vers 4.x

4.3 Optional Accessories

P/N	Description
30-350354	S70G Antenna SA15 **1**
30-350358	SA15 Antenna Support for pole **2**
30-350357	S70G Antenna Cable for SA15 **3**
30-357123	SA45 GNSS Survey Antenna **4**
30-357134	SA65 GNSS Survey Antenna **11**
30-350353	S70G Antenna Cable for SA45/SA65 **5**
30-350601	Carbon fiber pole 2m, 2 sections with holes for antenna cable **10**
30-350355	S70G Strap **6**

	30-350351	S70G Battery **7**
	30-350352	S70G External battery charger **8**
	30-350272	Cradle for UT20 Tablet **9**
	30-350222	RAM Tough Claw with ball **9**
	30-350223	RAM short double socket **9**

1

2

3

4

10

5

6

7

8

9

11

4.4 SA15 Pole Solution

P/N	Description
50-550728	STONEX S70G GNSS, 184 Ch, 4G, Wi-Fi, BT, Bundle
	S70G Antenna SA15
	S70G Strap
	S70G Battery
	S70G Charger
	Carton Box
	SW Cube-link
	Pen Drive set 8Gb with Manual
30-350089	Soft bag for GPS and controller (SB-100)
40-450514	Software Stonex Cube-a GPS Vers 4.x
30-350358	SA15 Antenna Support for pole
30-350357	S70G Antenna Cable for SA15
30-350601	Carbon fiber pole 2m, 2 sections with holes for antenna cable
30-350272	Cradle for UT20 Tablet
30-350222	RAM Tough Claw with ball
30-350223	RAM short double socket

4.5 SA45 Pole Solution

P/N	Description
50-550728	STONEX S70G GNSS, 184 Ch, 4G, Wi-Fi, BT, Bundle
	S70G Antenna SA15
	S70G Strap
	S70G Battery
	S70G Charger
	Carton Box
	SW Cube-link
	Pen Drive set 8Gb with Manual
30-350089	Soft bag for GPS and controller (SB-100)
40-450514	Software Stonex Cube-a GPS Vers 4.x
30-357123	SA45 GNSS Survey Antenna
30-350353	S70G Antenna Cable for SA45/SA65
30-350601	Carbon fiber pole 2m, 2 sections with holes for antenna cable
30-350272	Cradle for UT20 Tablet
30-350222	RAM Tough Claw with ball
30-350223	RAM short double socket

4.6 SA65 Pole Solution

P/N	Description
50-550728	STONEX S70G GNSS, 184 Ch, 4G, Wi-Fi, BT, Bundle
	S70G Antenna SA15
	S70G Strap
	S70G Battery
	S70G Charger
	Carton Box
	SW Cube-link
	Pen Drive set 8Gb with Manual
30-350089	Soft bag for GPS and controller (SB-100)
40-450514	Software Stonex Cube-a GPS Vers 4.x
30-357134	SA65 GNSS Survey Antenna
30-350353	S70G Antenna Cable for SA45/SA65
30-350601	Carbon fiber pole 2m, 2 sections with holes for antenna cable
30-350272	Cradle for UT20 Tablet
30-350222	RAM Tough Claw with ball
30-350223	RAM short double socket

Appendix

Copyrights and trademarks

STONEX®, the STONEX® logo, and S70G GNSS receiver are trademarks of STONEX® Limited.

STONEX® Cube-a and Stonex® Cube Link and Stonex® Cube-manager-p and Stonex® Cube-connector are trademarks of STONEX® Limited.

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

Release Notice

This is the July 2020 release of the STONEX® S70G new model handheld user guide.

The following limited warranties give you specific legal rights. You may have others, which vary from state/jurisdiction to state/jurisdiction.

Notice

1. Some special places, such as airports, hospitals, gas stations and other places, do not allow the use of electronic equipment. Please comply with the rules and do not use this product in these places.

2. For your safety and the safety of others, please do not use this product while driving a vehicle.

3. In order to avoid potential safety problems, do not put this product near the vehicle's airbag.

4. For your safety, please do not use this product during thunderstorms.

5. Although this product is waterproof, do not leave this product for long periods of time in areas with water or moisture.

6. This product has an operating temperature range of -20°C~+60°C and a storage temperature range of -30°C~+70°C. Extreme temperatures can affect the device's performance and service life.

7. Please use an original rechargeable lithium battery. Low-quality batteries will affect the performance and service life of the device, and may even have the danger of explosion.

8. Although the product has been tested to withstand harsh operating environments, do use the product in an improper manner.

9. Please do not disassemble this product. In case of failure, please send to our authorized service centres to proceed with repairs.

10. After the device has reached the end of its service life, please discard in a proper way to avoid environmental pollution.

11. When replacing the battery or during the use of an external power supply, shut down the device completely before removing the battery or disconnecting the external power supply to prevent damage.

12. This product is a Class B product, which may cause radio interference. The user may be required to take necessary preventive measures.

Battery Instructions

1. This product uses a rechargeable lithium battery as a power source. When the power is low, please charge the battery. To maintain battery life, it is recommended to deplete the battery's power before charging.

2. When the battery charger is not in use, please remove it from the power supply. Do not connect the charger to the battery for more than one week. Excessive charging will shorten the battery life.

3. Temperature affects the battery charging limit. Therefore, the battery may need to be cooled or warmed up before charging.

4. Please use the battery for its original intended purpose to prevent short-circuiting the battery. A short circuit will occur when a conductive material connects the battery's positive and negative terminals.

5. Do not use a battery that is damaged.

6. Placing the battery in extremely cold or hot places will lead to shortened battery life. Exposing the battery to extreme temperatures may cause the phone to malfunction, even if the battery is fully charged.

7. Do not put the battery in a fire. Please discard the battery in a proper manner or take the battery to a battery recycling station. Please dispose waste batteries in accordance with local laws and regulations.

8. The battery life of the S70G controller varies according to the brightness level of the screen set. The battery life of the controller can reach up to10 hours in energy saving mode. With a brightness of 75%, WIFI / UMTS connection enabled, RTK engine active, the battery life is about 8 hours. Battery lifetime at 100% brightness can significantly decrease.

9. Working Temperature: -20℃ ~ +60℃

Storage Temperature: -30℃ ~ +70℃

Charging mode need to operate indoors, please pay attention to the environment temperature should be -20℃ ~ +35℃

Standards and Directives

Hereby [Stonex s.r.l.] declares that the equipment type [S70G] is in compliance with Directive 2014/53/EU.

This device complies with Part 2, 22, 24 and 27 of the FCC Rules.

The use of belt clips, holsters and similar accessories should not contain metallic components in its assembly. The use of accessories that do not satisfy these requirements may not comply with FCC and ISED RF exposure requirements, and should be avoided.

This device complies with Part 15 of the FCC Rules.

Operation is subject to the following two conditions:

(1) this device may not cause harmful interference, and

(2) this device must accept any interference received, including interference that may cause undesired operation.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Changes or modifications made to this equipment not expressly approved by Stonex s.r.l. may void the FCC authorization to operate this equipment.

NOTE: 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.

Consult the dealer or an experienced radio/TV technician for help.

This device is restricted to indoor use where operated in the European Community using frequency in 5150MHz ~ 5250MHz to reduce the potential for interference. Restriction in BE, BG, CZ, DK, DE, EE, IE, EL, ES, FR, HR, IT, CY,LV,LT,LU,HU,MT,NL,AT, PL, PT, RO, SI, SK, FI, SE, UK.

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 centre. 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.

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.

Modulation Mode

GSM	GMSK for GSM/GPRS
WCDMA	QPSK; HSDPA:QPSK/16QAM; HSUPA:BPSK
LTE	QPSK/16QAM
WLAN	2.4GHz:802.11b(DSSS):CCK, DQPSK,DBPSK 802.11g(OFDM):BPSK,QPSK,16-QAM,64-QAM 802.11n(OFDM):BPSK,QPSK,16-QAM,64-QAM SRD:DBPSK/DAPSK/16QAM/64QAM/256QAM
Bluetooth	BT(1Mbps): GFSK BT EDR(2Mbps): π/4-DQPSK BT EDR(3Mbps): 8DPSK
BLE	GFSK

GPS	BPSK

Power control level	GSM900: 5, DCS1800: 0
Power class	GSM900: 4, GSM1800: 1
Antenna Specification	GSM/WCDMA/LTE: PIFA Antenna Bluetooth/2.4/5GHz WLAN/GPS: PIFA Antenna
Operating Mode	Maximum continuous output

Frequency Range	880.2MHz-914.8MHz for GSM/GPRS/EGPRS 9001710.2MHz-1784.8MHz for DSC/GPRS/EGPRS 18001922.4MHz-1977.6MHz for WCDMA2100882.4MHz-912.6MHz for WCDMA900LTE Band 1: 1920 MHz to 1980 MHz LTE Band 3: 1710 MHz to 1785 MHz LTE Band 7: 2500 MHz to 2570 MHz LTE Band 8: 880 MHz to 915 MHz LTE Band 20: 832 MHz to 862 MHz LTE Band 28: 704.5 MHz to 746.5 MHz 2.4GHz WLAN IEEE 802.11b/g/n(HT20): 2412MHz to 2472 MHz 2.4GHz WLAN IEEE 802.11n(HT40): 2422MHz to 2462 MHz5GHz WLAN IEEE 802.11a20/n20/n40/ac20/ac40/ac80: 5150 MHz to 5250 MHz; 5250 MHz to 5350 MHz; 5470-5725MHz SRD: 5745MHz to 5825MHzBluetooth: 2402 MHz to 2480 MHzGPS: 1575.42MHz; NFC: 13.56 MHz

Network	GSM:850/900/1800/1900EVDO：BC0WCDMA:B1/B2/B5/B8TD-SCDMA: B34/B39TDDLTE:Band38/Band39/Band40/Band41FDDLTE: Band1/Band2/Band3/band4/band5/Band7/Band8/Band17/Band20/Band28

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