CHCNAV

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ViLi i100 Visual -LiDAR GNSS RTK Receiver

USER GUIDE

Survey & Engineering | July 2025

Table of Content

Preface

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Safety Warnings

GNSS (Global Navigation Satellite System) receivers are electronic devices that use signals from satellites to determine location, speed, and time. While GNSS receivers are generally safe to use, there are some safety considerations that users should keep in mind:

(1) Do not rely solely on GNSS for navigation: GNSS signals can be disrupted by various factors such as tall buildings, trees, and bad weather. It is important to use other navigation aids such as maps, compasses, and visual landmarks.

(2) Keep GNSS receivers away from other electronic devices: Electronic devices such as mobile phones, radios, and computers can emit electromagnetic interference (EMI) that can disrupt GNSS signals. Keep GNSS receivers away from such devices to avoid EMI.

(3) Do not tamper with GNSS receivers: Tampering with GNSS receivers or modifying their software can cause them to malfunction or produce inaccurate readings. Only use GNSS receivers that are certified and authorized for use.

(4) Follow manufacturer instructions: Follow the manufacturer's instructions regarding the safe use and handling of GNSS receivers. This includes instructions for charging, cleaning, and storing the device.

(5) Dispose of GNSS receivers properly: When disposing of GNSS receivers, follow local regulations for electronic waste disposal to avoid harming the environment.

(6) It is important to use GNSS receivers safely to avoid accidents or injury. If you experience any issues or concerns with your GNSS receiver, contact the manufacturer or a qualified technician for assistance.

FCC Interference Statement

This equipment has been designed to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules in the Portable Mode. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

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.

CE Interference Statement

Declaration of Conformity: Hereby, CHC Navigation Technology Ltd. declares that this ViLi i100 is in compliance with the essential requirements and other relevant provisions of Directive 2014/53/EU.

Conformity to Japanese regulations

Japanese Radio Law and Japanese Telecommunications Business Law Compliance.

• This device is granted pursuant to the Japanese Radio Law and the Japanese

Telecommunications Business Law.

• This device should not be modified (otherwise the granted designation number will become invalid).

Brazil

Este equipamento nÃao tem direito à protecao contra interferência prejudicial e nao pode causar interferência em sistemas devidamente autorizados. Para maiores informacöes, consulte o site da ANATEL-www.anatel.gov.br.

1 Introduction

The ViLi i100 GNSS Receiver User Guide describe show to setup and use the CHCNAV ViLi i100 GNSS receiver. In this manual, “the receiver” refers to the ViLi i100 GNSS receiver unless otherwise stated. Even if you have used other Global Navigation Satellite Systems (GNSS) products before, CHCNAV recommends that you spend sometime reading this manual to learn about the special features of this product. If you are not familiar with GNSS, go to www.chcnav.com for an interactive look at CHCNAV and GNSS.

1.1 Safety Information

1.1.1 Warnings and Cautions

An absence of specific alerts does not mean that there are no safety risks involved.

A Warning or Caution information is intended to minimize the risk of personal injury and/or damage to the equipment.

 WARNING - A Warning alerts you to a potential misused or wrong setting of the equipment.

 CAUTION - A Caution alerts you to a possible risk of serious injury to your person and/or damage to the equipment.

1.2 Regulations and Safety

The receivers contain a built-in wireless modem for signal communication through Bluetooth wireless technology or through external communication data link. Regulations regarding the use of the wireless modem vary greatly from country to country. In some countries, the unit can be used without obtaining an end-user license. However, in some countries, the administrative permissions are required. For license information, consult your local dealer. Bluetooth operates in license-free bands.

Before operating a ViLi i100 GNSS receiver, determine if authorization or a license to operate the unit is required in your country. It is the responsibility of the end-user to obtain an operator's permit or license for the receiver for the location or country of use.

1.2.1 Use and Care

This receiver is designed to withstand the rough environment that typically occurs in the field. However, the receiver is high-precision electronic equipment and should be treated with reasonable care.

 CAUTION - Operating or storing the receiver outside the specified temperature range will cause irreversible damage.

1.3 Technical Support

If you have a problem and cannot find the information you need in this manual or CHCNAV website (www.chcnav.com) , contact your local CHCNAV dealer from which you purchased the receiver(s). If you need to contact CHCNAV technical support, please contact us by email(support@chcnav.com).

1.4 Disclaimer

Before using the receiver, please make sure that you have read and understood this User Guide, as well as the safety information. CHCNAV holds no responsibility for the wrong operation by users and for the losses incurred by the wrong understanding about this User Guide. However, CHCNAV reserves the rights to update and optimize the contents in this guide regularly. Please contact your local CHCNAV dealer for new information.

1.5 Your Comments

Your feedback about this user guide will help us to improve it in future revision. Please email your comments to support@chcnav.com.

2 Getting Started with ViLi i100

2.1 About the Receiver

Powered by next-gen sensor fusion and 3D laser scanning, the ViLi i100 redefines accuracy and reliability: it filters GNSS satellite signals affected by blockage or reflection, ensuring stable, jump-free 5 cm accuracy in challenging environments such as alleys, forests, or near high-rise buildings—once accurate, always accurate.

Its SFix 2.0 engine delivers 5 cm accuracy within 20 meters in GNSS-denied areas by leveraging 860,000 pts/sec LiDAR and SLAM-based constraints, trained on tens of thousands of real-world datasets to resolve GNSS outages without switching to a total station. With high-precision laser sensing and LandStar software, ViLi i100 enables real-time cut and fill volume calculations on site with 99.98% accuracy — simply scan, set boundaries, and receive instant results without surface contact, making the workflow accurate, efficient and safe.

With Vi-LiDAR, capture a scene once and batch-select target points to extract multiple 3D coordinates without precise aiming or steady holding; the ViLi i100 eliminates hand tremor effects, increases speed and safety, and delivers 5 cm accuracy even at 15 meters via its 8 MP telephoto camera. An all-in-one GNSS receiver merging standard RTK features with next-gen innovation, ViLi i100 — paired with LandStar software — supports CORS, UHF, and PPP modes; dual cameras enable CAD and AR visual stakeout, boosting efficiency by 50%.

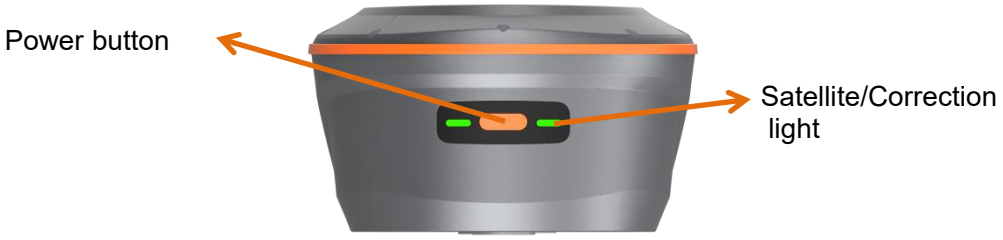
2.2 Parts of the Receiver

The operating controls are all located on the front panel. Type-C port ,SMA port and connectors are located on the bottom of the unit.

2.2.1 Front Panel

The following figure shows a front view of the receiver.

The front panel contains two indicator LEDs and one button.



	Description
Indicator light	✓ **Indicates whether the receiver is transmitting/receiving differential data.** •As a Rover station: tracking satellites will flash red light, successfully receiving differential data from Base station will flash yellow light when it is single or float, flash green light when it is fixed. ✓ **Shows the number of satellites that the receiver has tracked.** •When the receiver is searching for satellites, the red LED flashes once every 5 seconds. •When the receiver tracks N satellites, the red LED blinks N times per second, pauses for 5 seconds, and then blinks N times again. ✓ **Indicated charging status** •The power light shows yellow when charging •The power light shows green when fully charged
Power Button (Yellow/Green)	•Press and hold 3s to turn on or off;

2.2.2 Other Panels

The lower housing contains one radio antenna connector(SMA port), one USB type C communication port and one bottom camera.

The receiver unit integrates a total of four cameras:

- Main Camera: Vi-LiDAR Sensor, AR Stakeout Front Camera
- Left & Right Auxiliary Cameras: Point-Cloud Colorization
- Bottom Camera: AR Stakeout Downward Camera

2.2.3 Receiver Ports

Port	Name	Description
	USB port	• This port is a type-C USB connector that supports USB communications. • Users can use USB Cable supplied with the system to download the logged data to a computer but can't upload the data. • USB port can used to charge the ViLi i100 GNSS receiver
	Radio antenna connector	• Connect a radio antenna to internal radio of the receiver. And this connector is not used if you are using an external radio.

2.3 Batteries and Power

2.3.1 Batteries

The receiver has an built-in non-removable Lithium-ion battery.

2.3.2 The Internal Battery

The rechargeable Lithium-ion battery is supplied partially charged.

WARNING – Charge and use the rechargeable Lithium-ion battery only in strict accordance with the instructions.Charging or using the battery in unauthorized device can cause an explosion or fire and can result in personal injury and/or equipment damage.

To prevent injury or damage:

•Do not charge or use the battery if it appears to be damaged or leaking.

•Charge the Lithium-ion battery only in a CHCNAV product that is specified to charge it. Be sure to follow all instructions that are provided with the battery charger.

•Discontinue charging a battery that gives off extreme heat or a burning odor.

•Use the battery only in CHCNAV equipment that is specified to use it.

•Use the battery only for its intended use and according to the instructions in the product documentation.

2.3.3 Battery Safe

 WARNING – Do not damage the rechargeable Lithium-ion battery. A damaged battery can cause an explosion 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 include, but are not limited to discoloration, warping, and leaking battery fluid.

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

•Do not immerse the battery in water.

•Do not use or store the battery inside a vehicle under hot weather condition.

•Do not drop or puncture the battery.

•Do not open the battery or short-circuit its contacts.

 WARNING – Avoid contact with the rechargeable Lithium-ion battery if it appears to be leaking. Battery fluid is corrosive and contact with it can result in personal injury and/or property damage.

To prevent injury or damage:

•If the battery leaks, avoid with the battery fluid.

•If battery fluid gets into your eyes, immediately rinses your eyes with clean water and seek medical attention. Please do not rub your eyes!

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

2.4 Product Basic Supply Accessories

2.4.1 Rover Kit Basic Supply

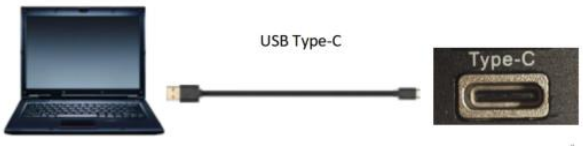
Item	Picture
ViLi i100 Visual-LiDAR GNSS Receiver	
SMA Whip Antenna(410-470MHz)	
45W PD Power Adapter	
Type-C Cable	
Range Pole (AR)	
Android Stylus	
Transport Hard Case/ Rover	
LT800 Android Tablet	

LiDAR Protective Cover Kit	
Tablet Bracket	
Landstar 8 Data Collection Software (Android)	

2.5 Connecting to an Office Computer

The receiver can be connected to an office computer for serial data transfer or settings via a USB Type-C. Before you connect to the office computer, ensure that the receiver is powered on by internal battery or external power.

The following figure show to connect to the computer for serial data transfer or settings:

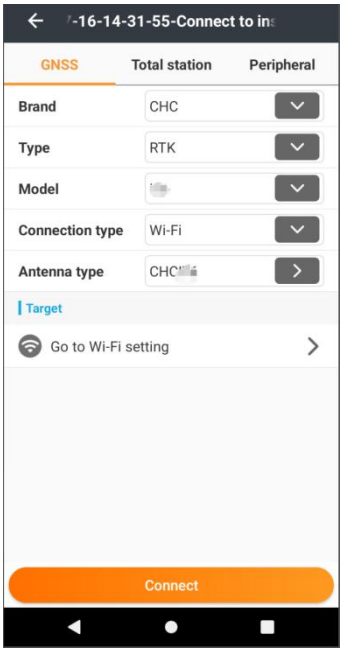


2.6 Connecting to a Controller

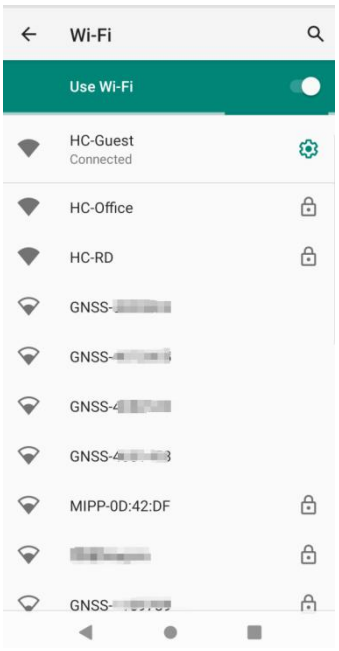
2.6.1 Connecting via Wi-Fi with LandStar 8 Software

Turn on the controller → run LandStar 8 → goto **Config** main menu → tap **Connect**.

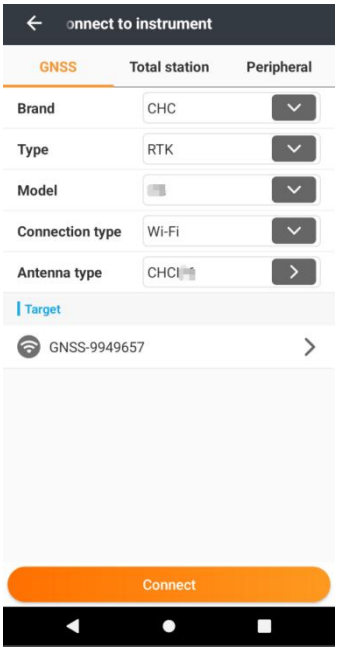
In the Connect screen, select **CHC** for the Brand, **ViLi i100** for Device Type , **WIFI** for Connection Type.



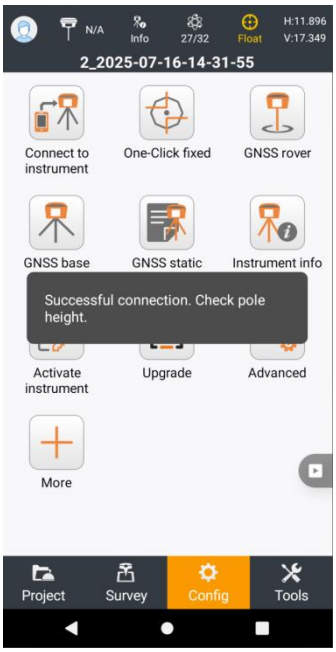
Tap the Wireless Lan icon on the right side to select the hotspot → Switch on the WiFi module by the top switch → select the target device in the list.



Tap **Connect** to link to the hotspot. If the first-time connection to this hotspot, user may type in the password.



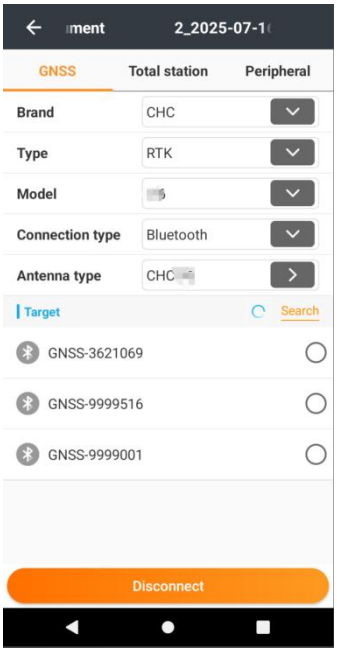
Tap the **Connect** button to build the connection.



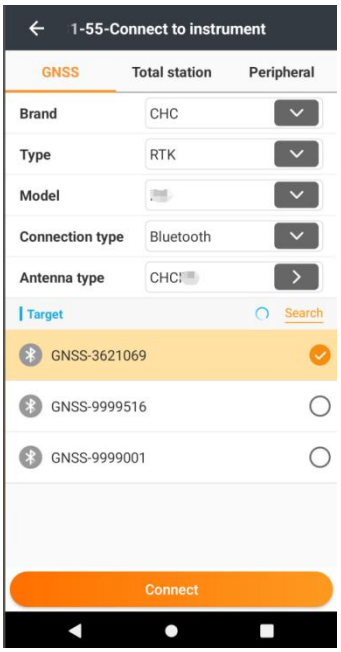
2.6.2 Connecting via Bluetooth with LandStar 8 Software

Turn on the controller → run LandStar 8 → goto **Config** main menu → tap**Connect**.

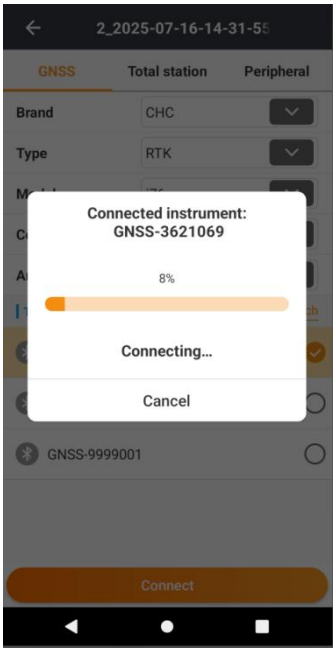
In the Connect screen, select **CHC** for the Manufacture field, **ViLi i100** for Device Type field, **Bluetooth** for Connection Type field.



Tap the **Bluetooth Manager** and turn on the **Bluetooth** function to search Bluetooth device around → select the target device in the list → Tap back button → select the target device in the Bluetooth manager list.



Tap the **Connect** button to build the connection.



2.7 Downloading Logged Data

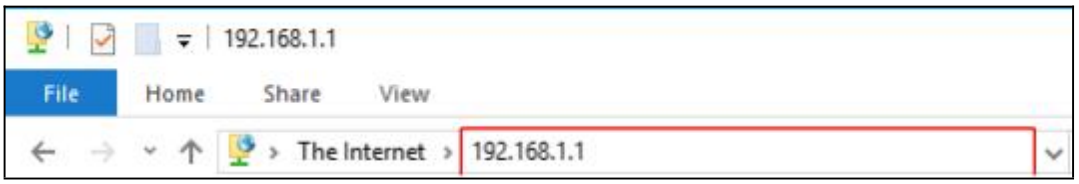
Data logging involves the collection of GNSS measurement data over a period at a static point or points, and subsequent post-processing of the information to accurately compute baseline information. Data logging using receivers requires access to suitable GNSS post-processing software such as the CHC Geomatics Office (CGO) Software.

2.7.1 FTP Download

The procedures of downloading logged data through FTP areas follows:

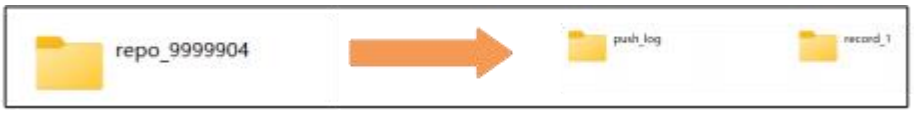
(1) Switch on the receiver, search its Wi-Fi in the computer and connect.

(2) After the successful connection, open the file manager in the computer and input "ftp://192.168.1.1" in the address box.



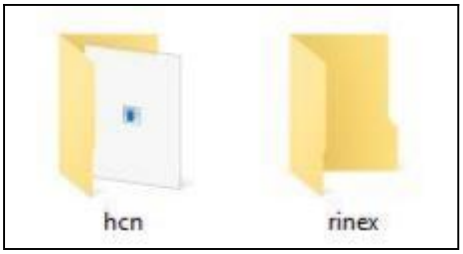
(3) Input user name and password, the default user name and password are "ftp".

(4) Double click the folder "repo_receiver SN" (take xxxxxxxx as example), you will see 9 folders. The "push_log" folder is used to save the log files, and the other 8 folders represent different logging sessions and are used for store static data.

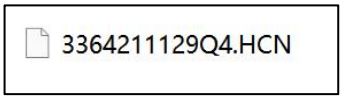


(5) Double click the folder that you have configured to store the static data, you will see the folder(s) created by the ViLi i100 system automatically and named by the date which is decide by GPS time when you start to log data.

(6) Select the destination folder and double click it, two folders named as different data format (hcn and rinex) will be displayed.



(7) Select the data format that you configured to save the static data, you will find the static raw data.



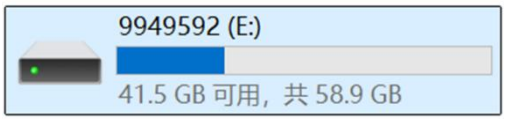
Notes: For hcn files, the name of the file is represented as XXXXXXDDDNN, where XXXXXX is the SN of the receiver, DDD is day of year, and NN is the recording session.

WARNING – The static data will be saved in the first logging session, the "record_1" folder, by default. Old files will be deleted if the storage space is full. If you configure not to auto delete old files when the memory is low, the receiver will stop data logging.

2.7.2 USB Download

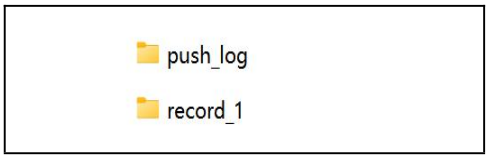
The procedures of downloading logged data in the receiver areas follows:

(1) Switch on the receiver and connect it with a computer by Type-C. After the successful connection, a removable disk named as the Serial Number (SN) of the receiver will appear on the computer.

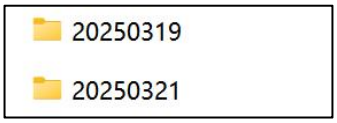


(2) Double click the removable disk and you will see the folder named as “repo”.

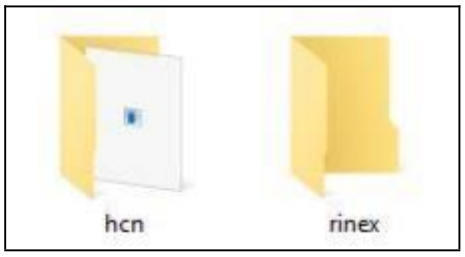
(3) Double click this folder, you will see 9 folders. The “push_log” folder is used to save the log files, and the other 8 folders represent different logging session and are used for store static data.



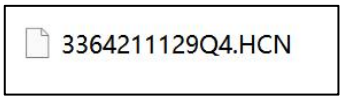
(4) Double click the folder that you have configured to store the static data, you will see the folder(s) created by the ViLi i100 system automatically and named by the date which is decide by GPS time when you start to log data.



(5) Select the destination folder and double click it, and then two folders named as different data format (hcn and rinex) will be displayed.



(6) Select the data format that you have configured to save the static data, you will find the static raw data.



Tip – For hcn files, the name of the file is represented as XXXXXXDDDNN, where XXXXXX is the SN of the receiver, DDD is day of year, and NN is the recording session.

WARNING – The static data will be saved in the first logging session, the "record_1" folder, by default. Old files will be deleted if the storage space is full. If you configure not to auto delete old files when the memory is low, the receiver will stop data logging.

3 Equipment Setup and Operation

3.1 Real-Time Rover Station Setup

For good performance, the following rover station setup guidelines are recommended:

Components:

No.	Name
a	ViLi i100 GNSS receiver
b	2M range pole w/bag

Steps:

(1) Keep the receiver fully charged.

If work as a UHF rover station, the UHF whip antenna need to be connected to the receiver.

(2) Turn on the receiver by pressing the power button for 3 s.

(3) Switch on the data controller and connect it to the receiver.

(4) Use software to configure the receiver as cellular rover or UHF rover mode.

(5) Center and level the receiver more precisely.

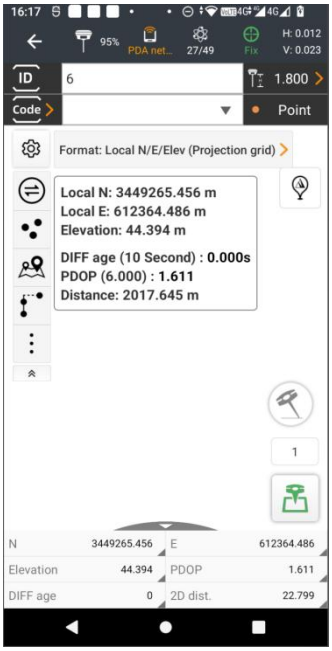
(6) Use software to start survey.

3.2 Working with the Tilt Compensation

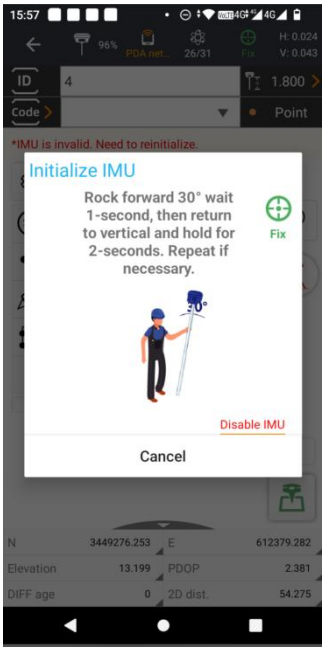
After enable the tilt survey, the ViLi i100 with the Auto-IMU can be ready after a few steps walk or a bit movement automatically.

3.2.1 Operation Steps for first IMU initialization

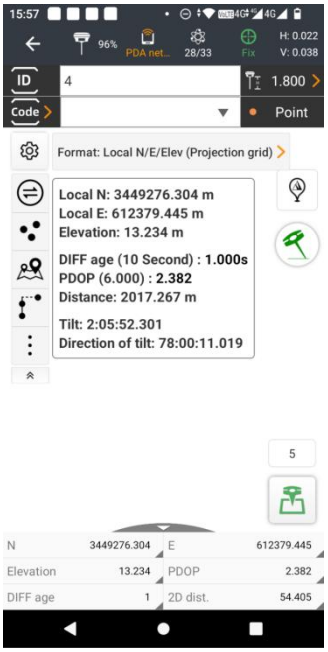
(1) Open Landstar8-> Tap Point Survey-> Tap  to activate tilt measurement.



(2) Hold the pole vertical for a while and shake according to the procedures in the interface to do initialization.



(3) This icon will appear when the initialization is successful.



(4) Enter the Name and Antenna, then tap , point will be collected and store to Points automatically.

(5) When this icon appears, the text will show “IMU is invalid. Need to reinitialize” at the middle of interface.

(6) Tap  to close tilt compensation.

3.2.2 Notes of using tilt measurement

1. At the beginning of initialization, the pole height of the instrument should be the same as that antenna height in the software.

2. In the process of tilt measurement, if the controller shows that “Tilt is not available, please measure in alignment” (red), please shake RTK slightly from left to right or back to front until the reminder disappears.

3. The controller will prompt “Tilt is not available, please measure in alignment” when the receiver is stationary over 30 seconds or the pole hit the ground toughly.

4. The pole cannot be shaken when point is collected.

5. Initialization is required:

➢when the RTK is turned on everytime;

➢when IMU module is turned on everytime;

➢when receiver drops at working;

➢when the pole is tilted more than 65 degree;

➢when the receiver is stationary more than 10 minutes;

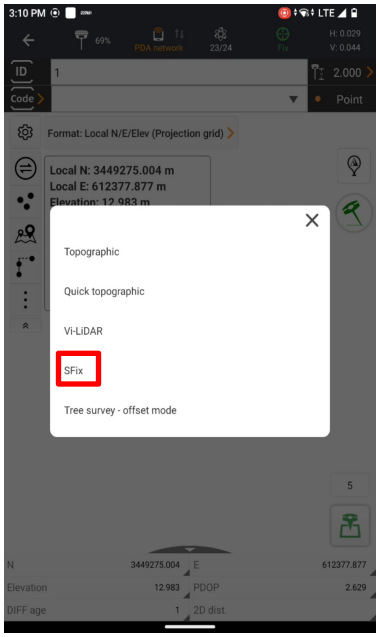
➢when the RTK rotates too fast on the matching pole (2 rounds per second);

➢when the pole hit the ground toughly.

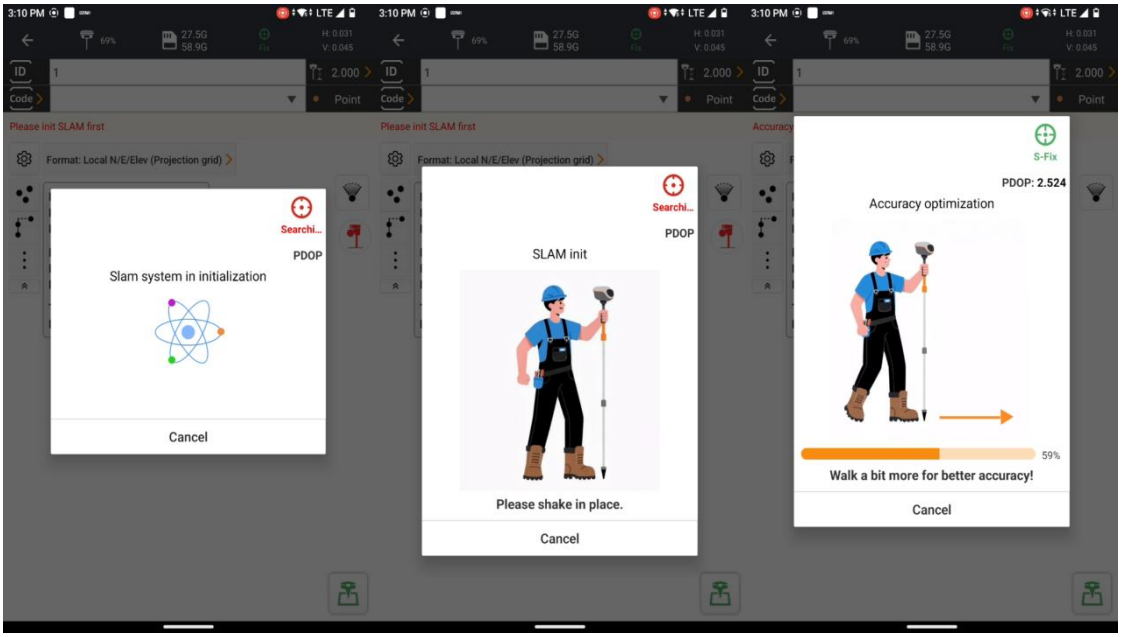
3.3 LiDAR functions

3.3.1 SFix mode

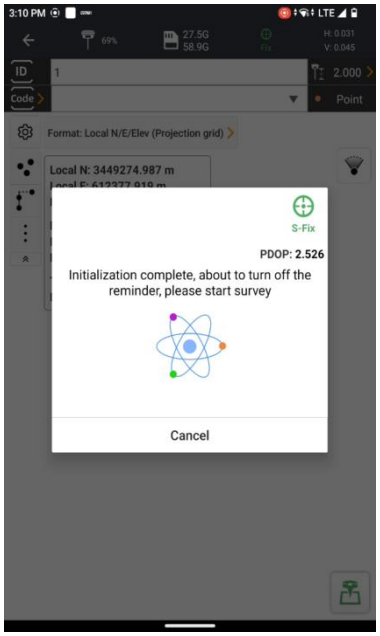
(1) In the Point Survey interface, tap the survey mode icon and select SFix mode;



(2) The software will first enter the initialization screen. Follow the on-screen prompts to complete the initialization.



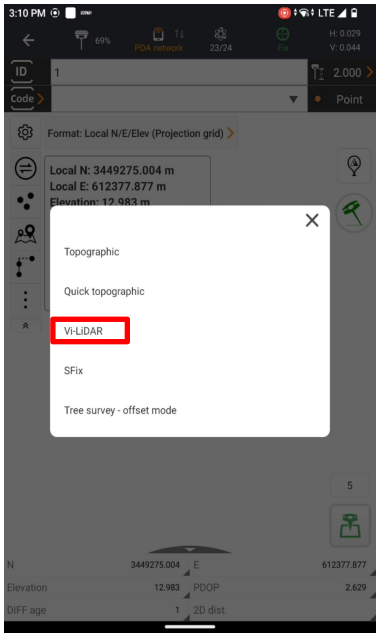
(3) Once finished, the software will automatically switch to the SFix point measurement screen, and SFix mode will be ready for use;



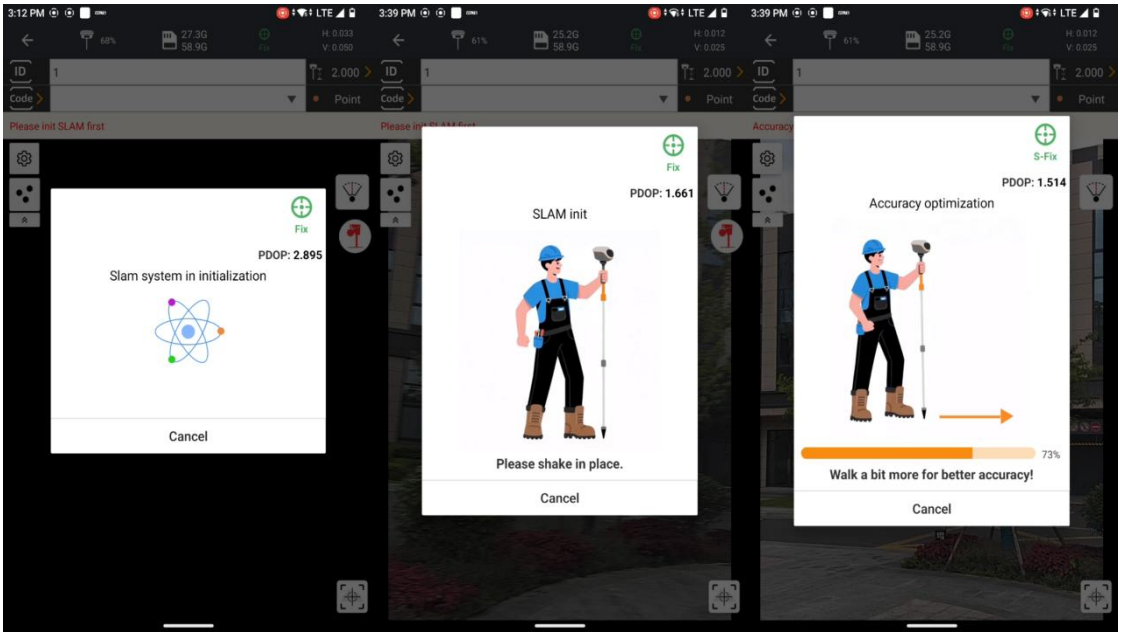
(4) Before surveying, enter the point name and instrument height, then tap the measure icon. Once collection is complete, the point is automatically saved to Point Manager;

3.3.2 Vi-LiDAR mode

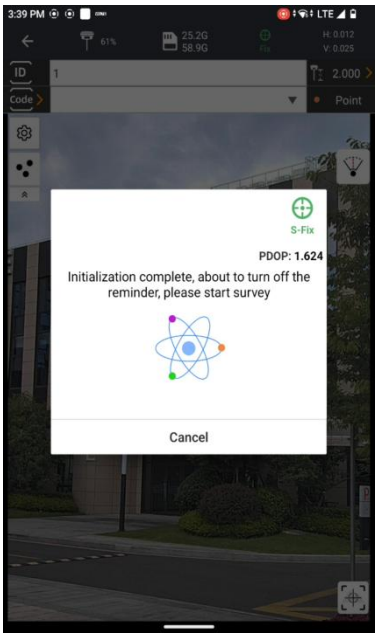
(1) In the Point Survey interface, tap the survey mode icon and select Vi-LiDAR mode;



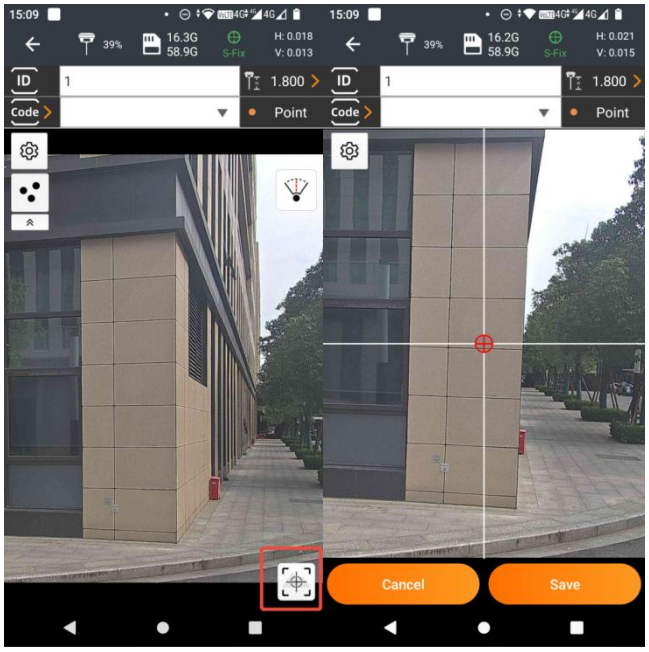
(2) The software will first enter the initialization screen. Follow the on-screen prompts to complete the initialization;



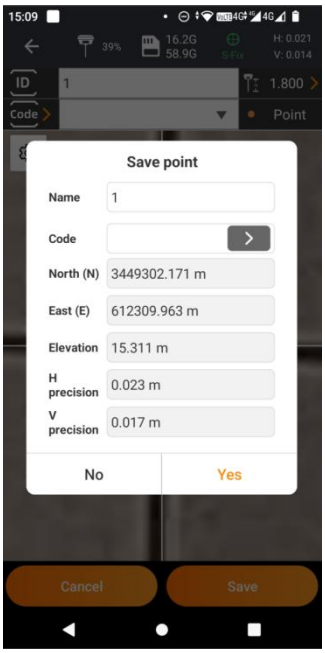
(3) Once finished, the software will automatically switch to the Vi-LiDAR point measurement screen, and Vi-LiDAR mode will be ready for use;



(4) In the Vi-LiDAR interface, activate the main camera. Rotate the device to align the on-screen center with the target, then tap the “shoot button” icon. After the shot, drag and zoom the photo to position the crosshair precisely on the target, confirming the selection



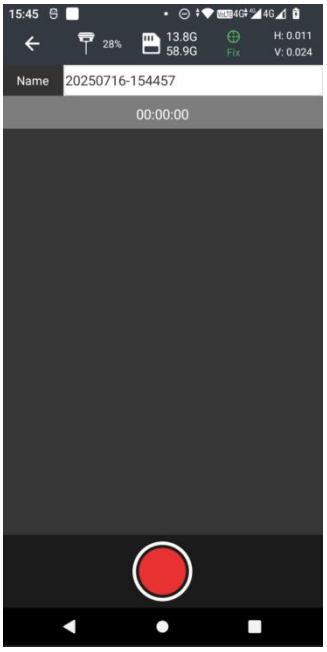
(5) After selecting the point, tap “Save” to compute its coordinates; upon confirmation, the point is automatically saved to Point Manager.



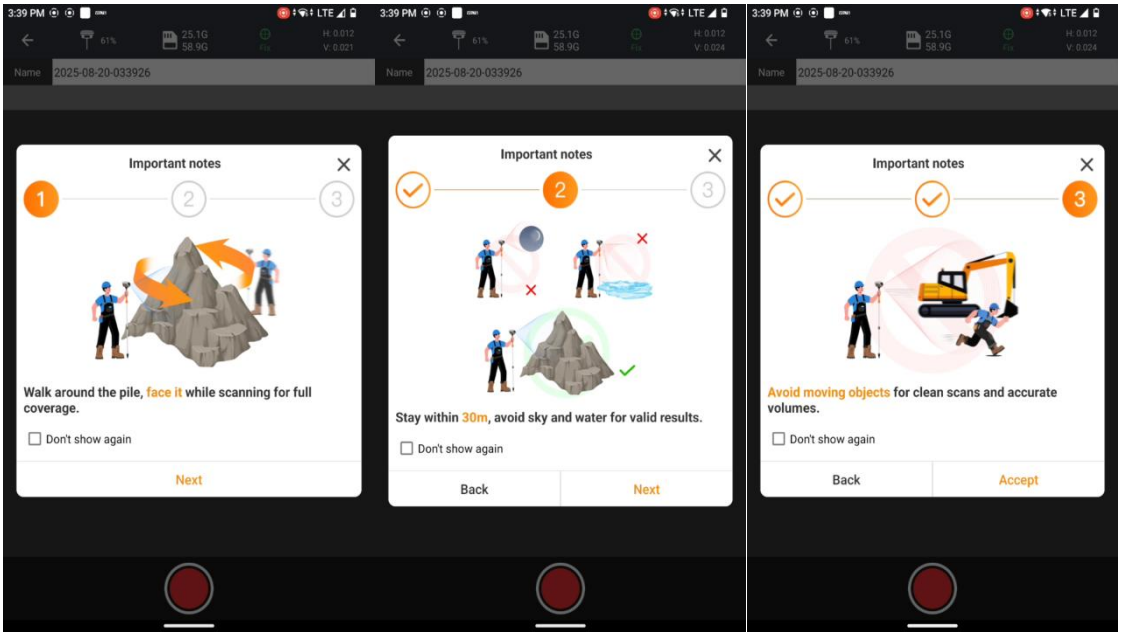
(6) Afterward, we can select additional points within the photo or exit to recapture and measure a new point.

3.3.3 3D Point Cloud Earthwork Calculation

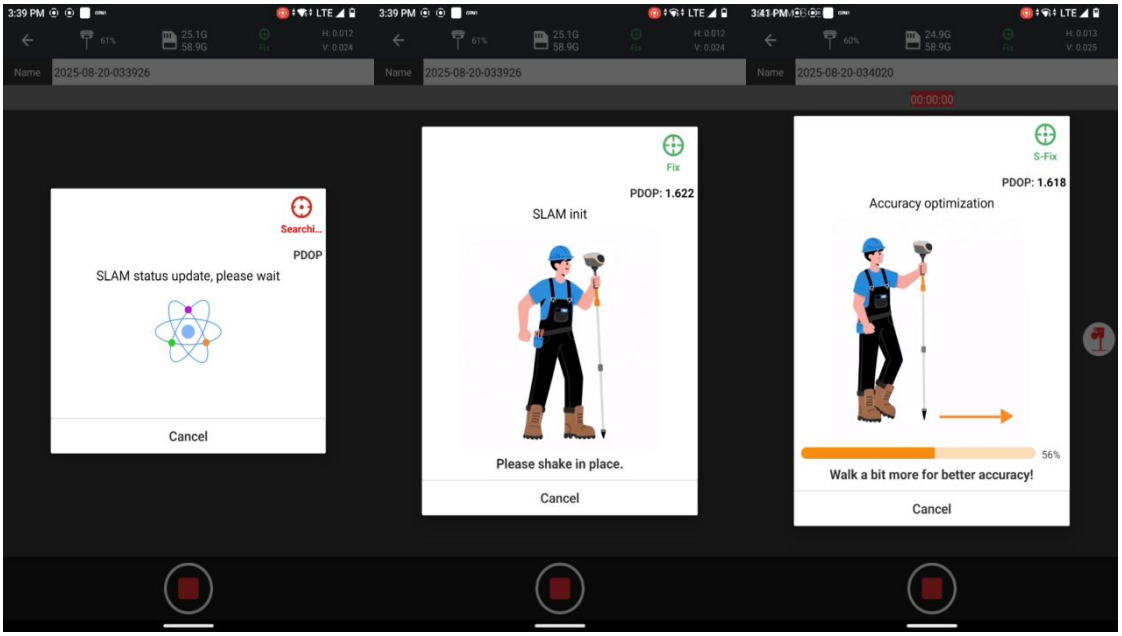
(1) After connecting the receiver, go to Survey → Point Cloud Scan. The project name defaults to the current time and can be edited manually.



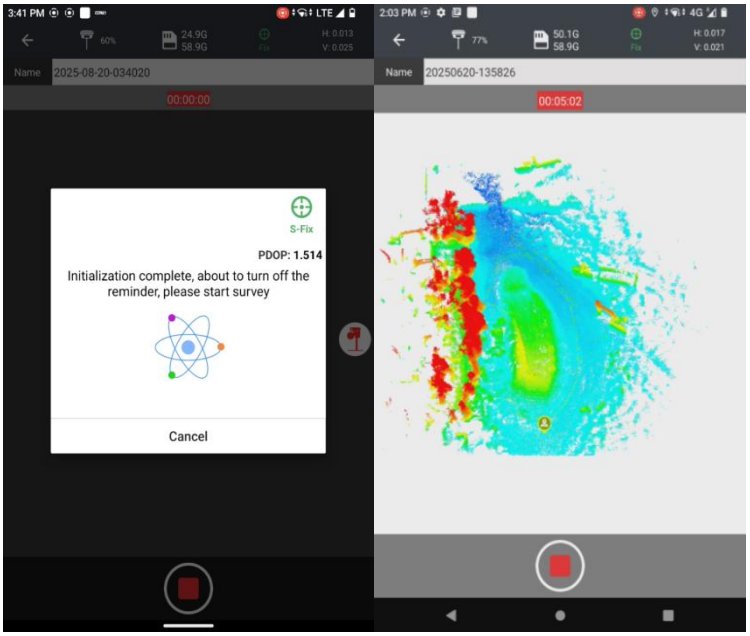
(2) Before starting to scan , the software will prompt for important notes;



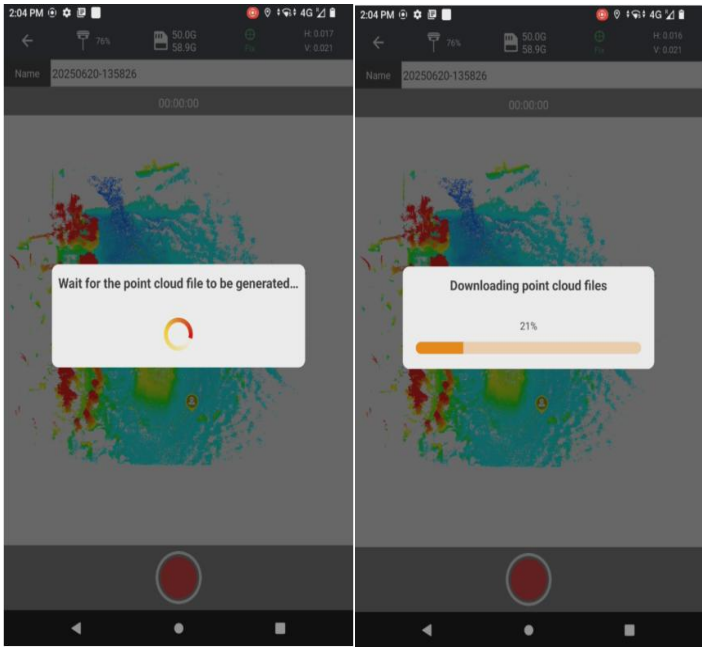
(3) Tap the center button at the bottom to open the project and follow the on-screen prompts for SLAM initialization.



(4) Once initialized, point-cloud scanning begins immediately, showing a live preview of the cloud and current position while logging the project's acquisition time. Pan and zoom to inspect the scanned scene

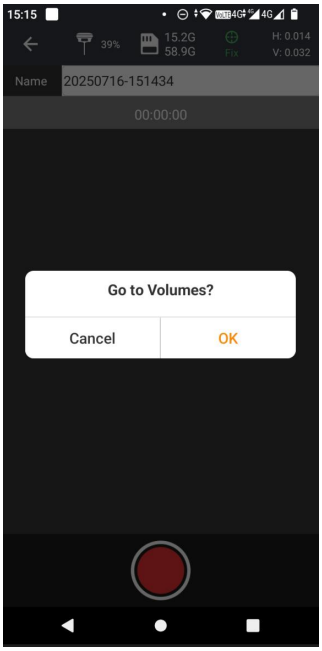


(5) When scanning is complete, tap the center button at the bottom to close the project. The system will show "Generating point-cloud file" followed by "Downloading point-cloud file"; wait until the host finishes processing

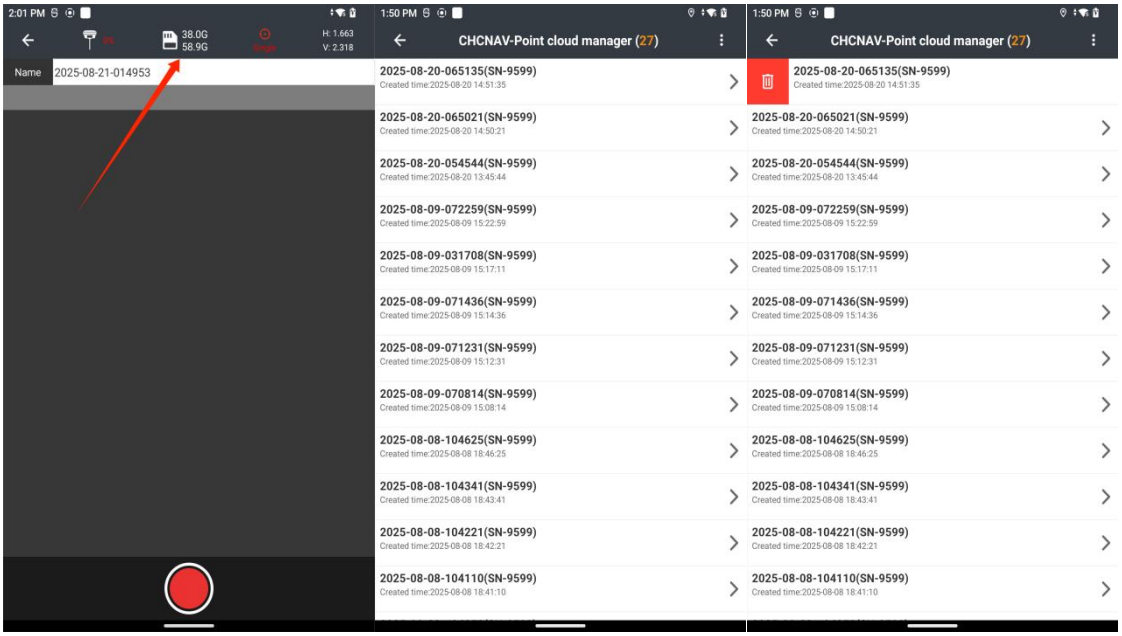


(6) After the point-cloud file transfer finishes, a prompt will ask “Go to Volumes?

- Tap OK to open the earthwork interface and compute volumes for the current cloud (see section 3.3.4).
- Tap Cancel to return to the acquisition screen and start the next scan by pressing Start

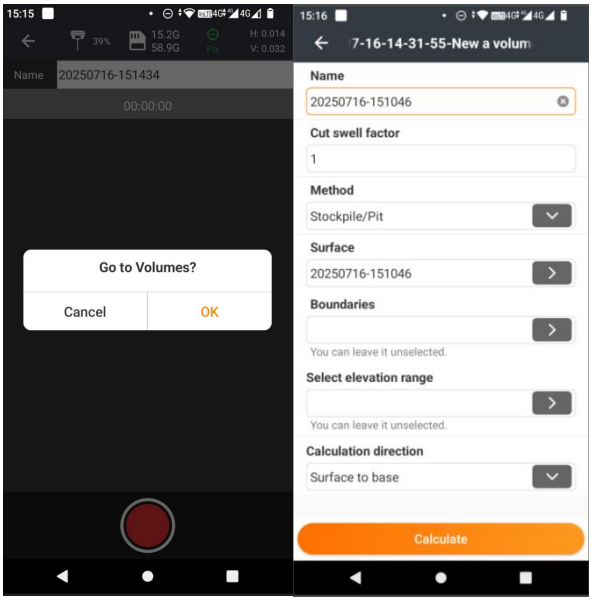


(7) If you click "Cancel", you can click the storage icon above to view the point cloud file, and swipe left to delete the unnecessary files;



3.3.4 Volumes

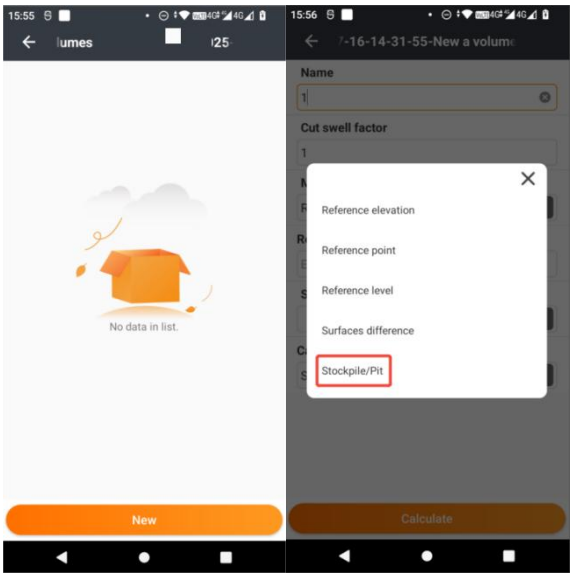
(1) If software jump straight to earthwork calculation after the scan, the software automatically creates the task, imports the task name and surface file from the point cloud, and sets the calculation mode to “Stockpile/Pit” by default.



(2) If no automatic jump occurs after scanning, manually create the calculation:

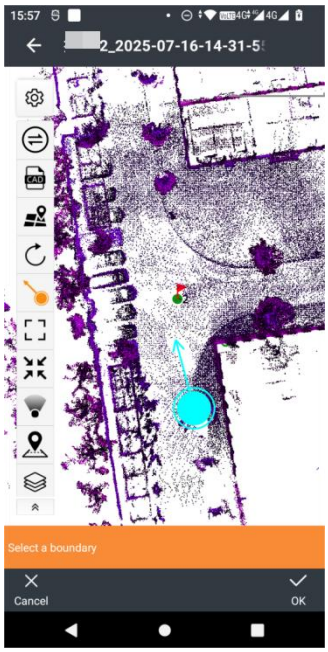
- Tap New, enter the task name.
- Set calculation mode to “Stockpile/Pit.

- In Surface File, select the corresponding point-cloud task to compute.

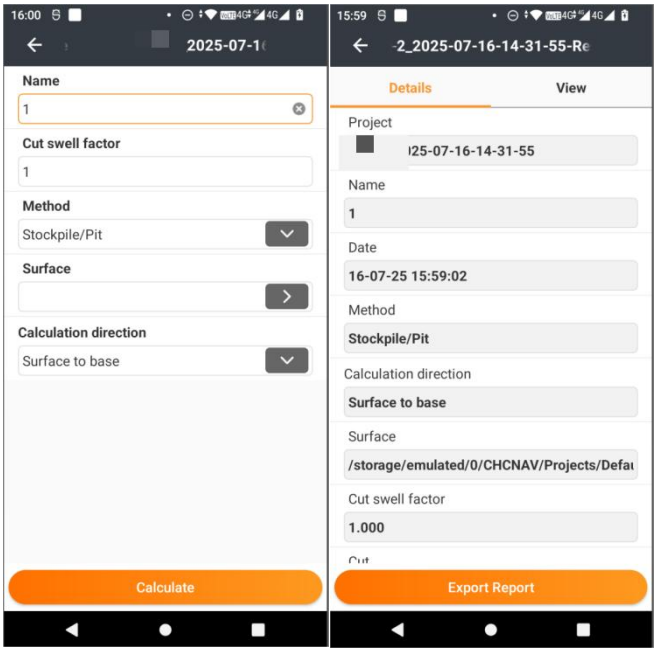


(3) Tap Boundary to set the point-cloud area by either:

- Select—choose an existing boundary.
- Draw—pick points to create a new boundary.

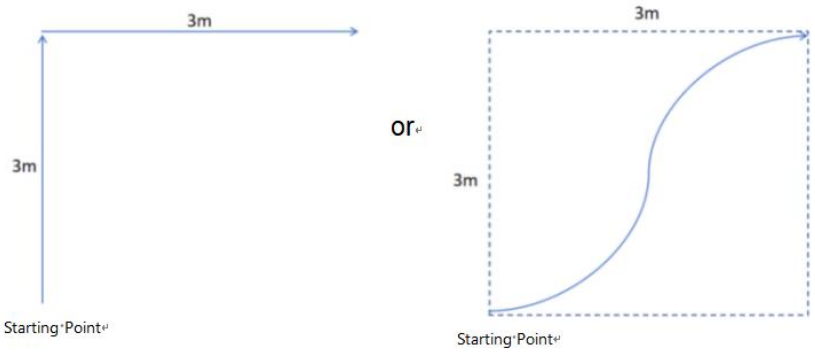


(4) Tap 【Calculate】 to generate the detailed results for the earthwork task, then tap 【Export Report】 to produce a comprehensive task report



3.3.5 LiDAR Precautions

(1) SLAM initialization must be performed in an open environment with a fixed solution maintained throughout the process.



(2) Follow the illustrated trajectory for motion-based initialization; the device does not need to be static at the start.

(3) SFix, Vi-LiDAR and point-cloud scanning share the same SLAM initialization; after completion, SFix and Vi-LiDAR can be switched seamlessly in point-measurement mode without re-initializing

(4) In SFix mode, accuracy in heavily occluded areas degrades after ~20 m

(5) When using the SFix mode, the laser head should be kept away from walls, corners or other objects, maintaining a distance of 0.5 meters

(6) In Vi-LiDAR mode, ensure no moving people or objects are in front of the camera before shooting to avoid point-cloud noise and mis-selection.

(7) Center the target point in the frame when taking photos in Vi-LiDAR mode.

(8) Maintain a distance of 5–15 m from the target when using Vi-LiDAR mode.

(9) Keep the device viewing angle between 45° and 90° relative to the target surface .

(10) Single-session point-cloud scanning supports up to 3 hours of continuous acquisition.Projects ≤1 h can be volume-calculated directly in LS8; projects >1 h should be post-processed in Site Office.

(11) Align the laser head perpendicular to the object; for earthwork or single-structure projects, scan directly facing the target.

(12) Keep the device ≥0.5 m from the target to ensure full point-cloud coverage.

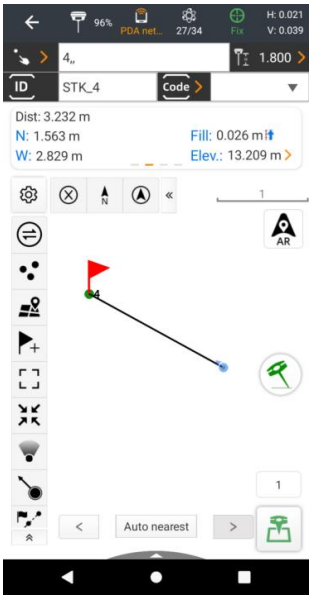
(13) Avoid rapid, large-angle turns to prevent real-time point-cloud distortion.

(14) Minimize fast-moving people or objects in the scene and keep the radar front clear to reduce motion noise.

3.4 Stakeout functions

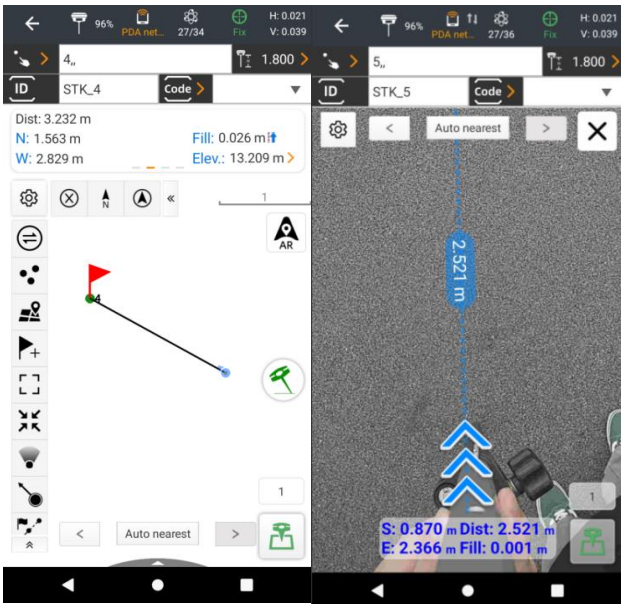
3.4.1 Point stakeout

(1) Open the Point Stakeout interface, tap the point-selection icon in the upper-left corner to enter the Point Management screen, choose the point you want to stake out, then tap OK in the lower-right corner. The selected point will appear in the stakeout interface; simply follow the displayed direction and distancer to perfom the stakeout.

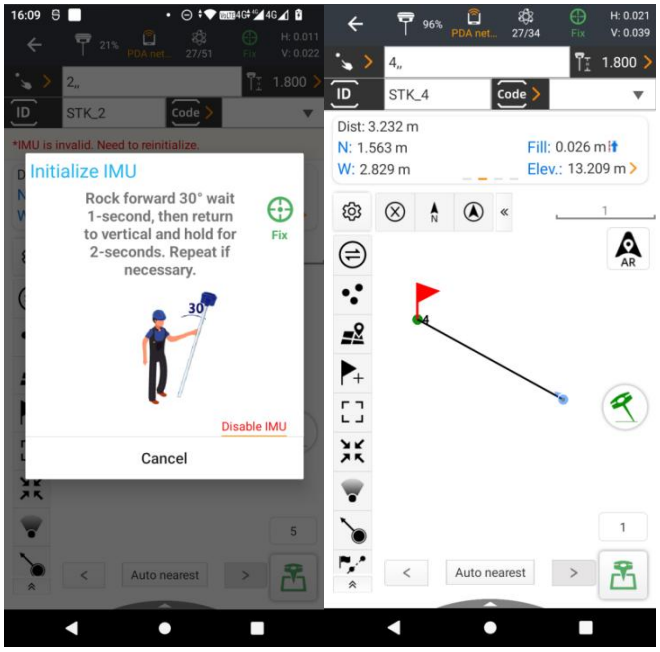


3.4.2 AR stakeout

For point stakeout, ensure IMU is initialized. Select the point, tap the “AR” icon on the right, then follow the on-screen direction and distance

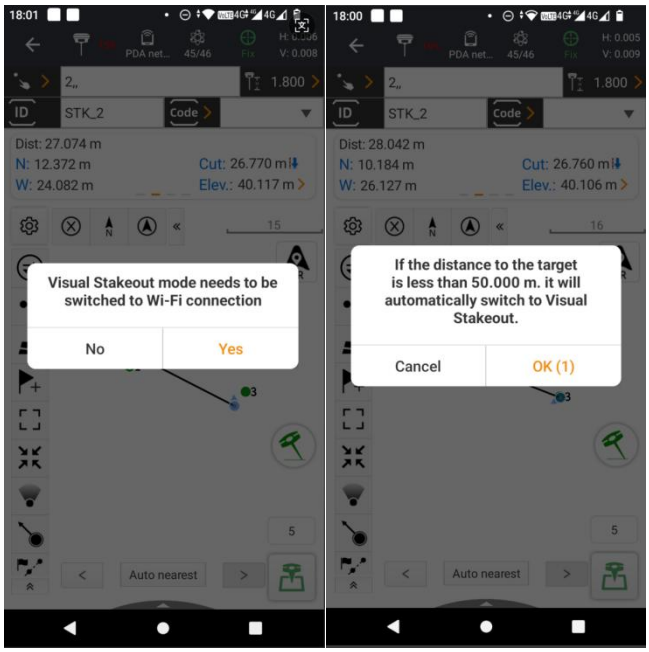


(1) Open Point Stakeout, enter the pole height, and tap the Tilt icon to enable tilt compensation. Follow the on-screen prompts to initialize; when successful, the icon turns green  .



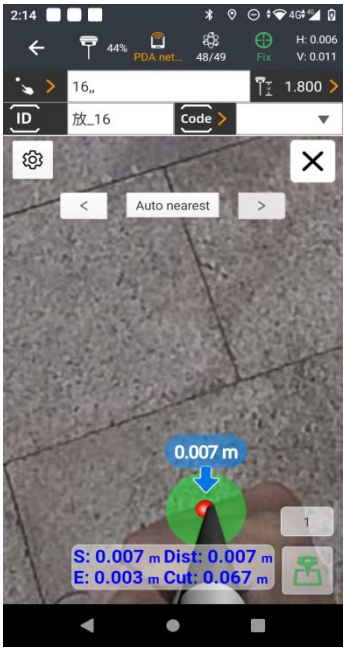
(2) Tap the AR icon to start AR stakeout.

If the controller is connected via Bluetooth, a prompt will appear: “Vision mode requires Wi-Fi.” Tap OK, switch to Wi-Fi in the connection screen, and reconnect.



(3) In Vision Settings, we can adjust the switch distance: the front camera is used from 50 m to 3 m, and the bottom camera takes over within 3 m.

(4) In the video, the target stakeout point appears as a red dot. When the virtual pole tip touches the dot, you've reached the point. Tap the stakeout icon and the point is automatically saved.



4 Configuring Through a Web Browser

Supported browsers:

• Google Chrome

• Microsoft Internet Explorer version 10, or higher

To connect to the receiver through a web browser:

1. Turn on the Wi-Fi of the receiver.

2. Search the wireless network named as GNSS-XXXXXXX (the SN of your receiver) on your computer, and then establish the connection.

3. After the successful connection between your computer and the receiver, enter the IP address (192.168.1.1) of the receiver into the address bar of the web browser on your computer:

4. The web browser prompts you to enter a login account and password:

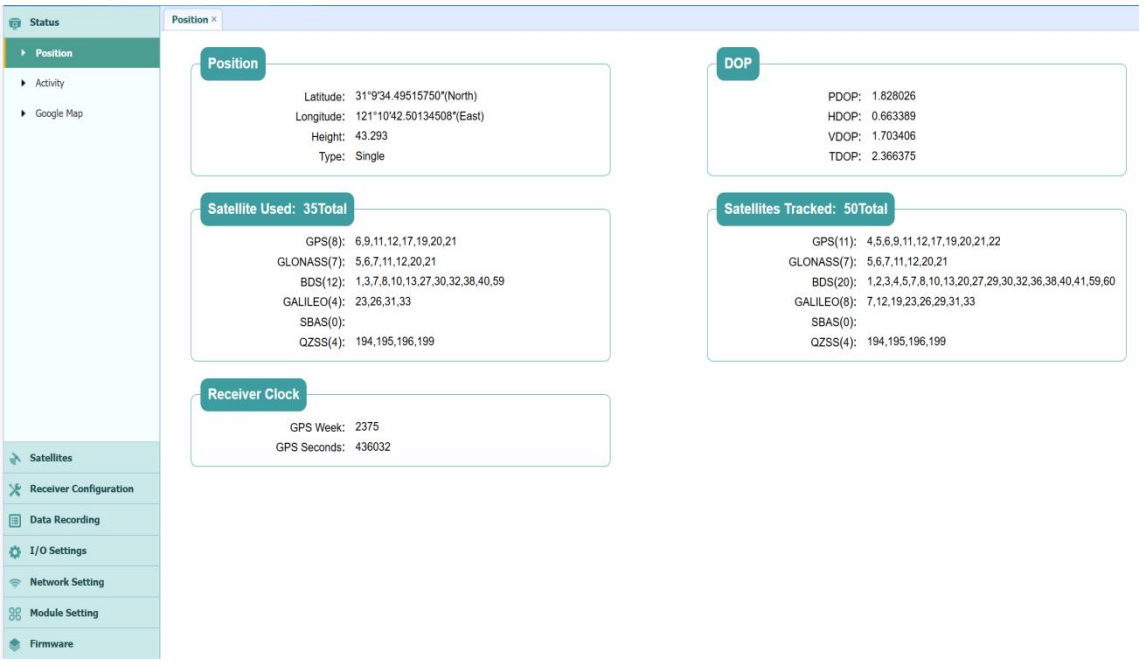
The default login account for the receiver is:

➢ Login Account: admin

➢ Password: password

Note – Tick **remember me** option, and then the browser will remember the Login Account and Password you entered.

5. Once you login, the webpage appears as follows:



This web page shows the configuration menus on the left of the browser window, and the setting on the right. Each configuration menu contains the related submenus to configure the receiver and monitor receiver performance.

This chapter describes each configuration menu.

To view the webpage in another language, select the corresponding language name from the drop down list on the upper right corner of the webpage.

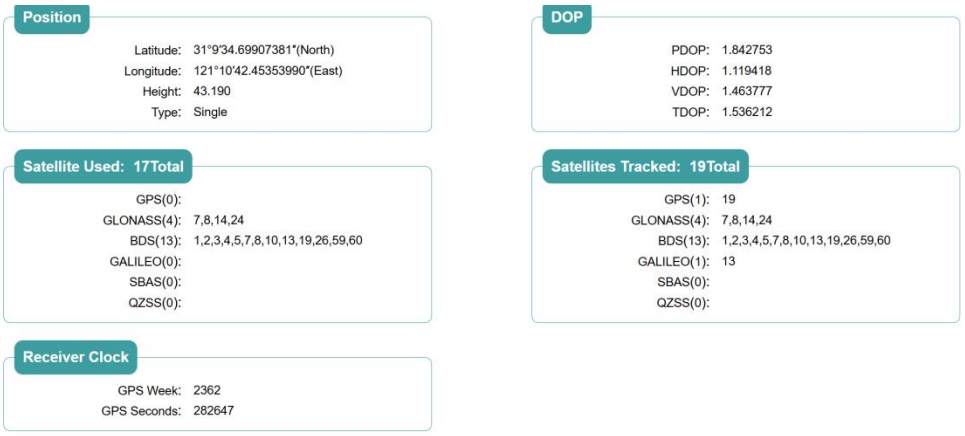
Currently, seven languages are available:

4.1 Status Menu

This menu provides a quick link to review the receiver's position information, satellites tracked, runtime, current data log status, current outputs, available memory, and more.

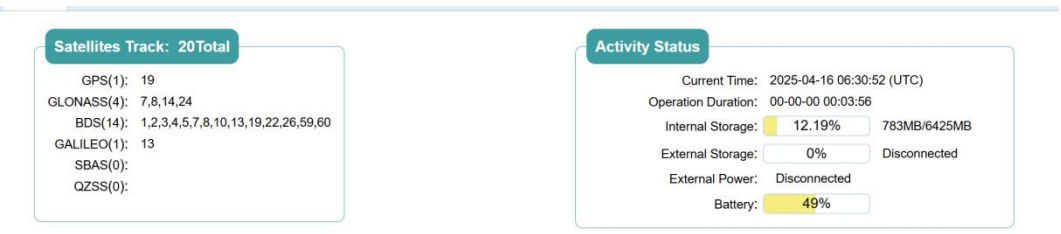
4.1.1 Position Submenu

This page shows the relevant position information about the receiver's position solution which including the position, DOP values, satellites used and tracked, and the receiver clock information.



4.1.2 Activity Submenu

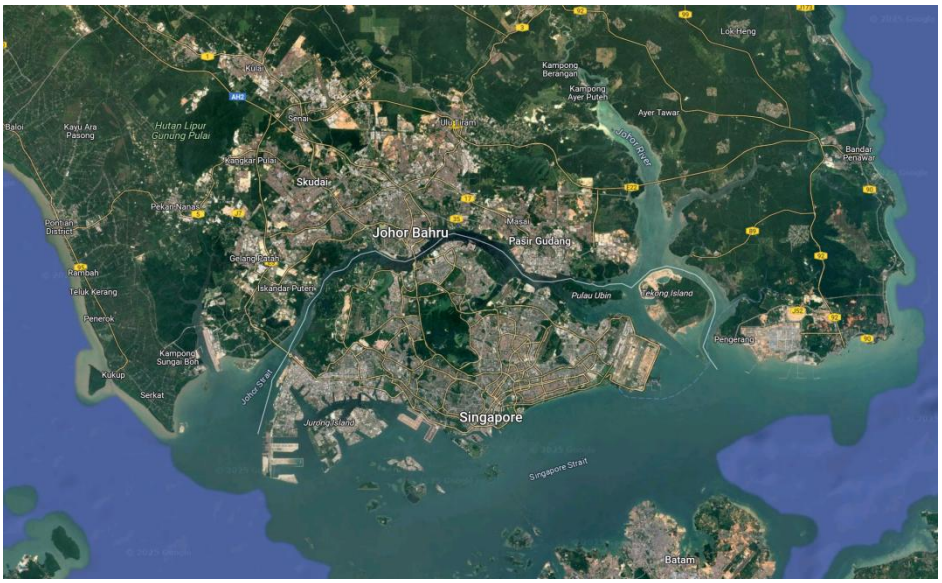
Lists several important items to help you understand how the receiver is being used and its current operating condition. Items include the identities of currently tracked satellites, internal and external storage usage rate, how long the receiver has been operational, state of the internal battery, power source state, files being logged, and data streams being output. With this information, it is easy to tell exactly what functions the receiver is performing.



	Type	Description	Output	Connection Statu	Modify
1	RTK Client	211.144.118.5:2102	---	Unconnected	Connect Disconnecting Detail
2	TCP/UDP_Client1/NTRIP Server	192.168.3.18:9900	---	Unconnected	Connect Disconnecting Detail
3	TCP/UDP_Client2/NTRIP Server	192.168.3.18:9901	---	Unconnected	Connect Disconnecting Detail
4	TCP/UDP_Client3/NTRIP Server	192.168.3.18:9902	---	Unconnected	Connect Disconnecting Detail
5	TCP/UDP_Client4/NTRIP Server	192.168.3.18:9903	---	Unconnected	Connect Disconnecting Detail
6	TCP/UDP_Client5/NTRIP Server	192.168.3.18:9904	---	Unconnected	Connect Disconnecting Detail
7	TCP/UDP_Client6/NTRIP Server	192.168.3.18:9905	---	Unconnected	Connect Disconnecting Detail
8	TCP Server/NTRIP Caster1	9901	---	Closed	Connect Disconnecting Detail
9	TCP Server/NTRIP Caster2	9902	---	Closed	Connect Disconnecting Detail
10	TCP Server/NTRIP Caster3	9903	---	Closed	Connect Disconnecting Detail
11	TCP Server/NTRIP Caster4	9904	---	Closed	Connect Disconnecting Detail
12	Serial Port	115200	---	---	Settings
13	Bluetooth	GNSS-3782275	GPGGA:5s,	---	Settings
14	Radio	458.050000MHz	---	---	Settings

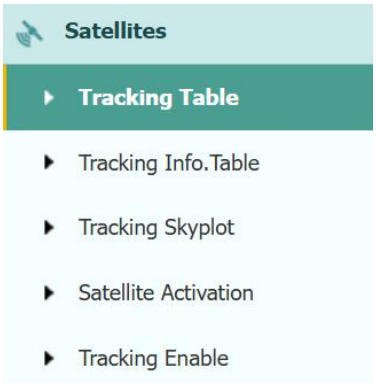
4.1.3 Google Map Submenu

Tap this submenu to show the location of the receiver on Google map.



4.2 Satellites Menu

Use the Satellites menu to view satellite tracking details and enable/disable GPS, GLONASS, BDS and Galileo constellations. These menus include tabular and graphical displays to provide all required information on satellite tracking status.



4.2.1 Tracking Table Submenu

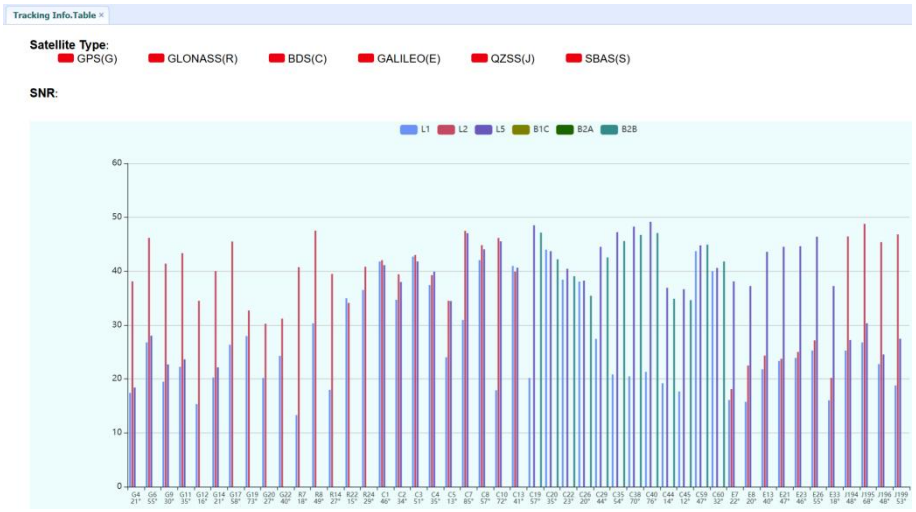
Provides the status of satellites tracked in general, such as the satellite ID, satellite type, attitude angle, azimuth angle, L1 SNR, L2 SNR, L5 SNR and enable/disable status of each one.

All ◉ GPS ○ GLONASS ○ BDS ○ GALILEO ○ SBAS ○ QZSS ○

SV	Type	Elevation Angle	Azimuth Angle	L1 SNR	L2 SNR	L5 SNR	B1C SNR	B2A SNR	B2B SNR	Enabled
4	GPS	21	75	34.360	37.280	17.950	0.000	0.000	0.000	No
6	GPS	55	326	29.460	45.910	29.160	0.000	0.000	0.000	Yes
9	GPS	30	111	29.260	40.490	20.910	0.000	0.000	0.000	Yes
11	GPS	34	284	26.580	42.530	25.530	0.000	0.000	0.000	Yes
12	GPS	15	316	33.620	34.750	0.000	0.000	0.000	0.000	No
14	GPS	22	179	27.570	40.050	21.720	0.000	0.000	0.000	No
17	GPS	58	100	30.070	44.920	0.000	0.000	0.000	0.000	Yes
19	GPS	73	26	31.830	38.550	0.000	0.000	0.000	0.000	Yes
22	GPS	40	195	26.070	31.200	0.000	0.000	0.000	0.000	No
7	GLONASS	18	34	28.430	41.250	0.000	0.000	0.000	0.000	Yes
8	GLONASS	49	84	30.330	48.240	0.000	0.000	0.000	0.000	Yes
14	GLONASS	27	292	30.560	37.430	0.000	0.000	0.000	0.000	Yes

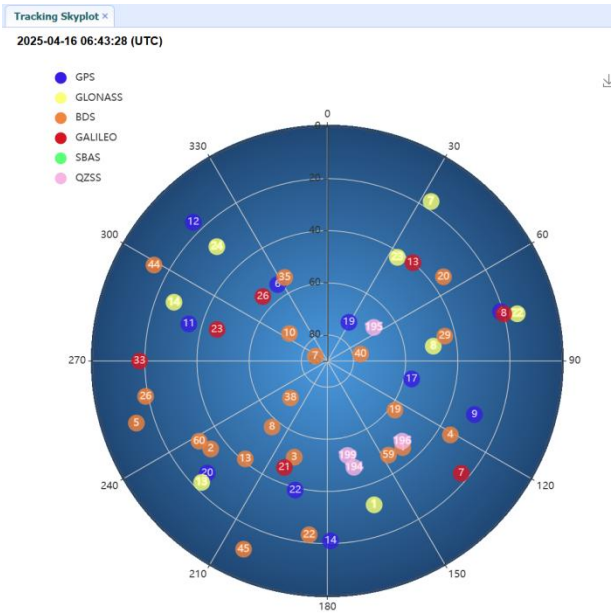
4.2.2 Tracking Info. Table Submenu

The following figure is an example of satellite track diagram page. Users can determine the satellite types and the corresponding SNR of L-band carriers to be displayed in any combination.



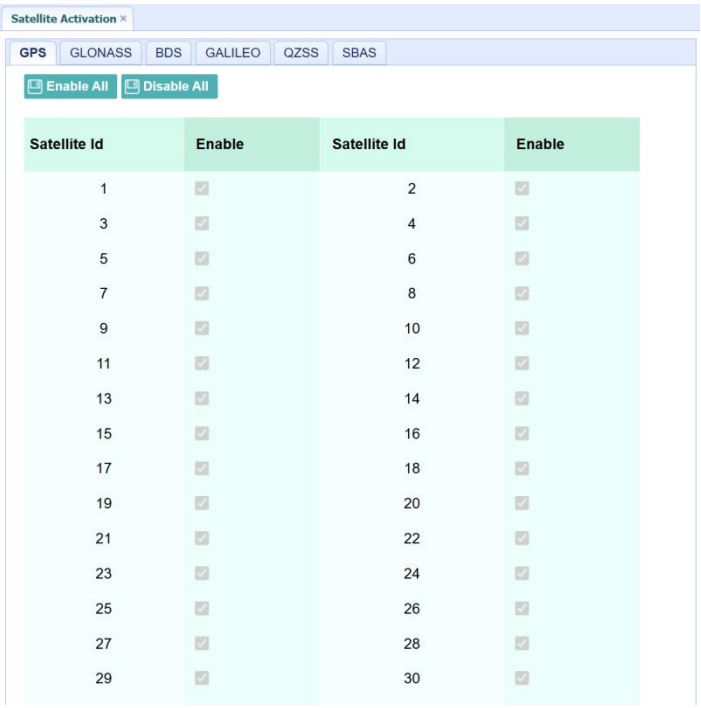
4.2.3 Tracking Skyplot Submenu

The following figure is an example of Skyplot page.



4.2.4 Satellite Activation Submenu

Use this menu to enable or disable satellites.



Satellite Id	Enable	Satellite Id	Enable
1	☑	2	☑
3	☑	4	☑
5	☑	6	☑
7	☑	8	☑
9	☑	10	☑
11	☑	12	☑
13	☑	14	☑
15	☑	16	☑
17	☑	18	☑
19	☑	20	☑
21	☑	22	☑
23	☑	24	☑
25	☑	26	☑
27	☑	28	☑
29	☑	30	☑

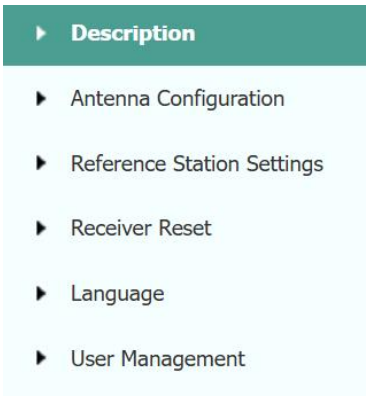
4.2.5 Tracking enable

Use this menu to enable or disable Satellite frequency band.

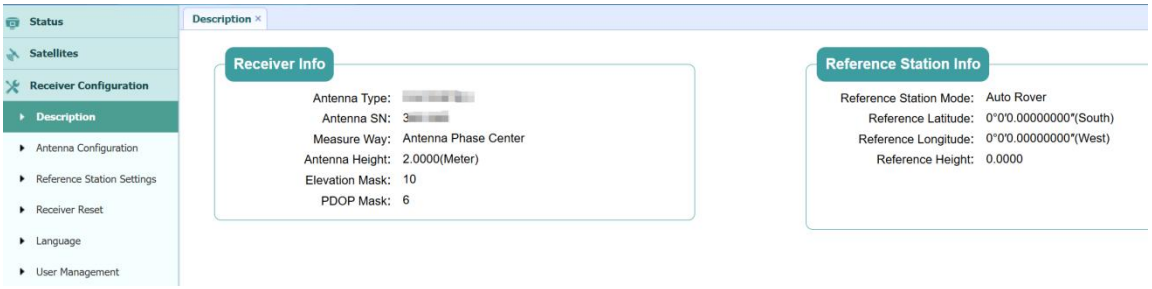
Type	Signal	Enable
GPS	L1-C/A	☑
GPS	L2	☑
GPS	L2-CS	☑
GPS	L2-P	☑
GPS	L5	☑
SBAS	L1-C/A	☑
GLONASS	R1	☑
GLONASS	R2	☑
GALILEO	E1	☑
GALILEO	E5-A	☑
GALILEO	E5-B	☑
BDS	B1	☑
BDS	B2	☑
BDS	B3	☑
BDS	B1-B1C	☐
BDS	B2-B2A	☐
BDS	B2-B2B	☑
Qzss	Q1	☑
Qzss	Q2	☑
Qzss	Q5	☑
IRNSS	L5	☑

4.3 Receiver Configuration Menu

Use this menu to configure settings such as the antenna type and height, elevation mask and PDOP setting, the reference station coordinates, receiver resetting and web interface language:



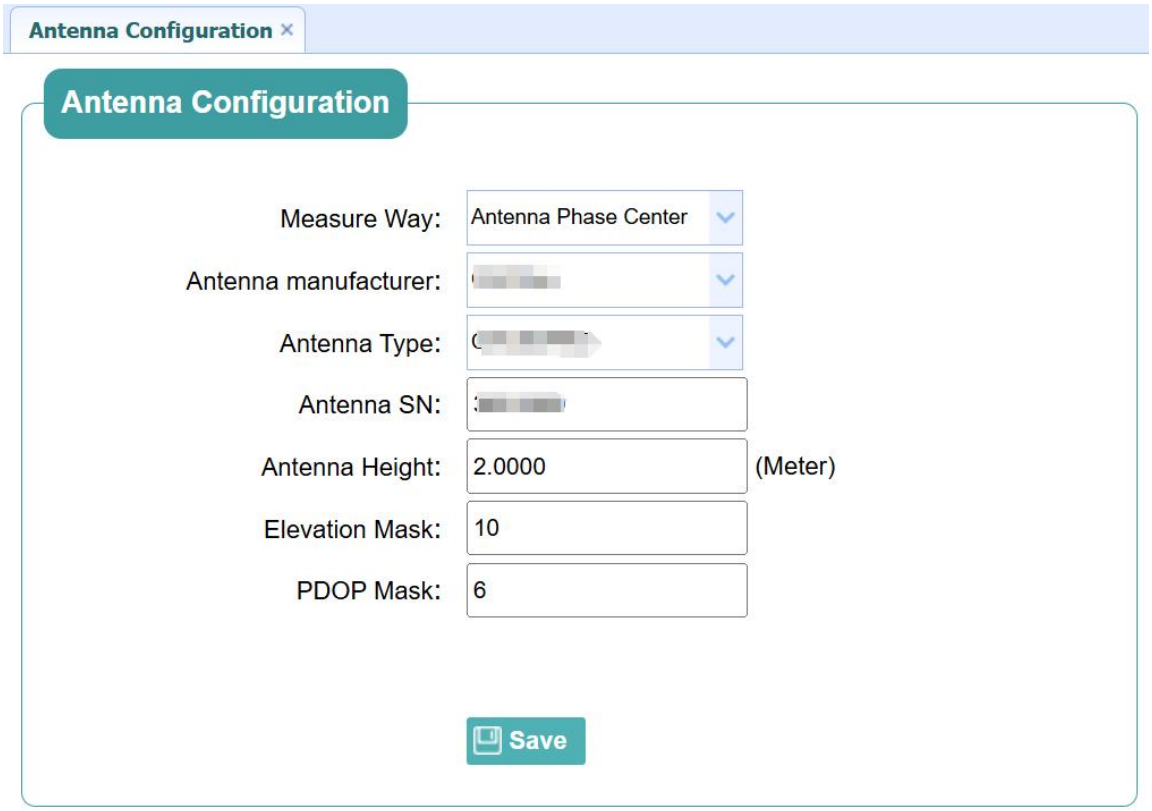
4.3.1 Description



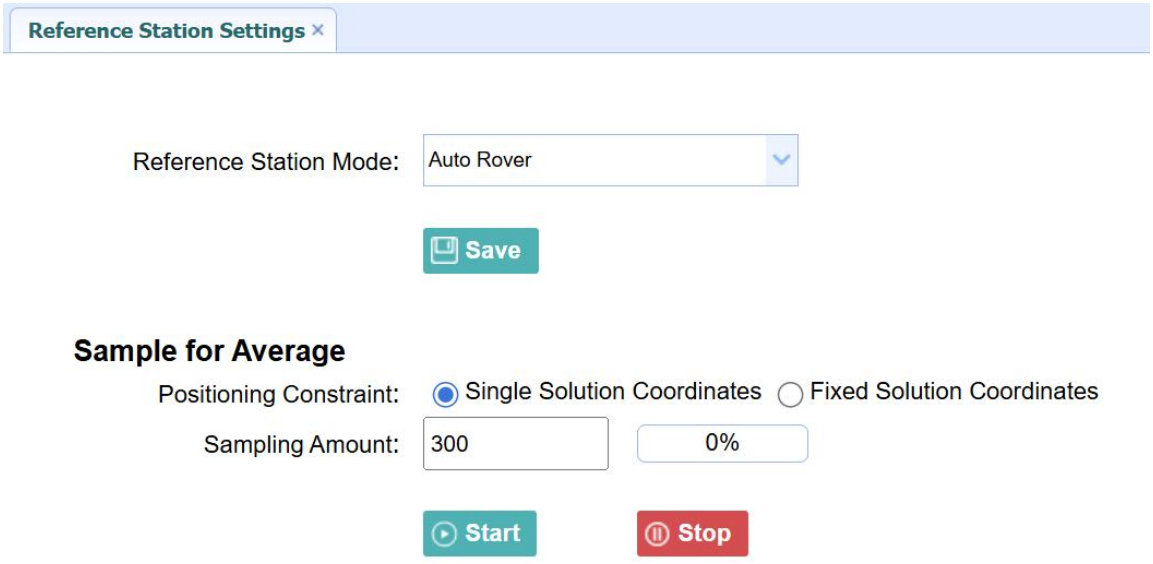
This submenu shows the receiver information and reference station information, including antenna related information, elevation mask angle, reference station work mode and position, etc.

4.3.2 Antenna Configuration Submenu

Use this screen to configure all the items related to the GNSS antenna. You must enter the correct values for all antenna-related fields, because the choices you make affect the accuracy for logged data and broadcast correction data significantly:



4.3.3 Reference Station Settings Submenu

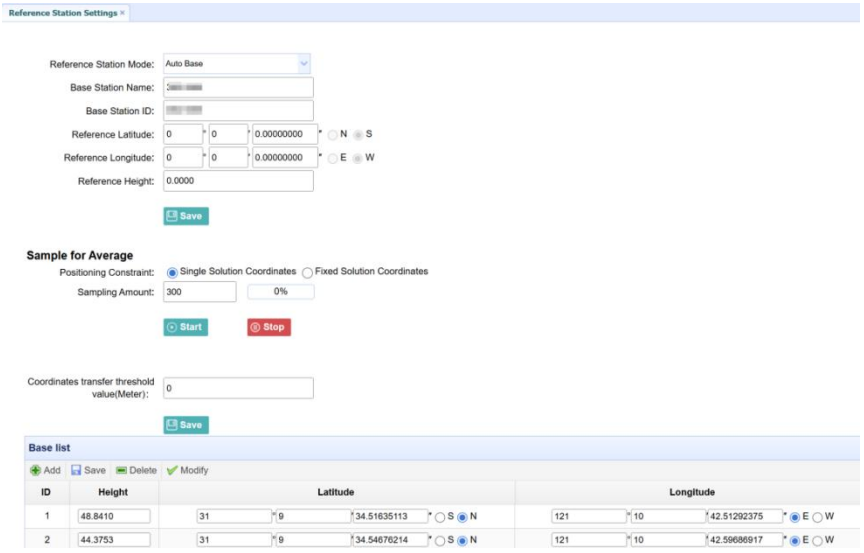


Use this screen to configure settings such as the station coordinates and the broadcast station identifiers. You must enter accurate information in these fields, as this data affects the accuracy of logged data files and broadcast correction data significantly:

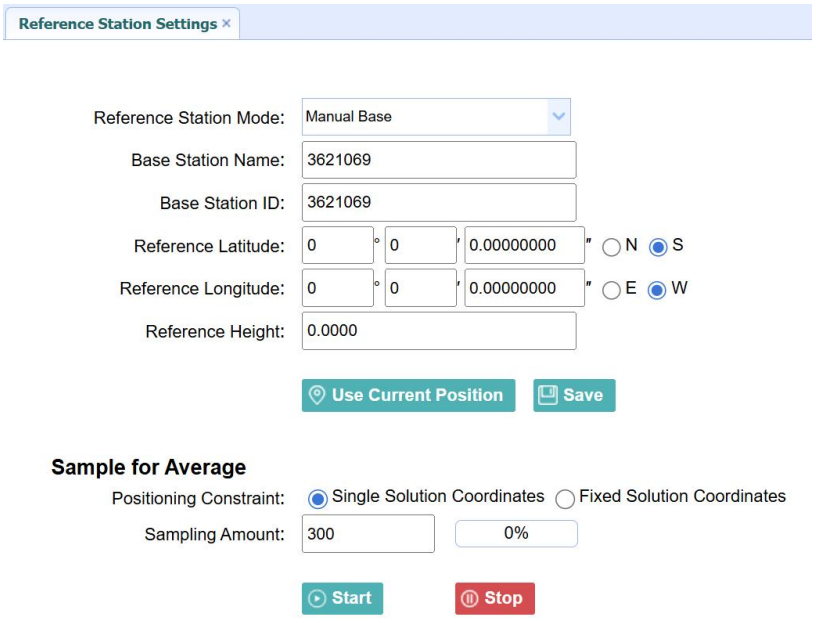
For Reference Station Mode, there are three modes available:

a) **Auto Rover:** The receiver will serve as a rover after this mode is enabled, and then receive correction data through the working mode set last time.

b) **Auto Base:** The receiver will serve as a base after this mode is enabled, and then broadcast correction data based on coordinate inputted by user or obtained through autonomous positioning automatically.



c) **Manual Base:** The receiver will serve as a base after this mode is enabled. Users need to configure the receiver manually.



For **Reference Latitude** and **Reference Longitude**:

There are mainly three methods to enter the reference coordinates and shown as follows:

a) **Acquire Current Position**: Click this button to acquire current position obtained through autonomous positioning automatically.

b) **Manual Input**: Manually input the coordinate of a control point.

c) **From CORS**: After the receiver logging in CORS, the software can record the coordinate of current

position based on fix solution.

For **Sample for Average**:

Users can determine the positioning limit and sampling amount. The positioning limit falls into two types:

a) **Single Solution Coordinates**: Collect the coordinates of receiver obtained through autonomous positioning.

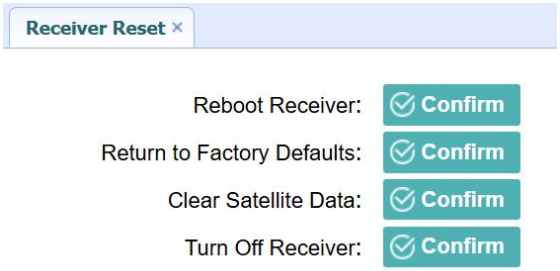
b) **Fixed Solution Coordinates**: Only collect coordinates of receiver with a fixed solution.

After the configuration of positioning limit and sampling amount, click Start to carryout sampling and averaging → the progress bar will show the progress → the result will be served as the coordinate of current position.

If users need to save the changes, please tap Save button.

4.3.4 Receiver Reset Submenu

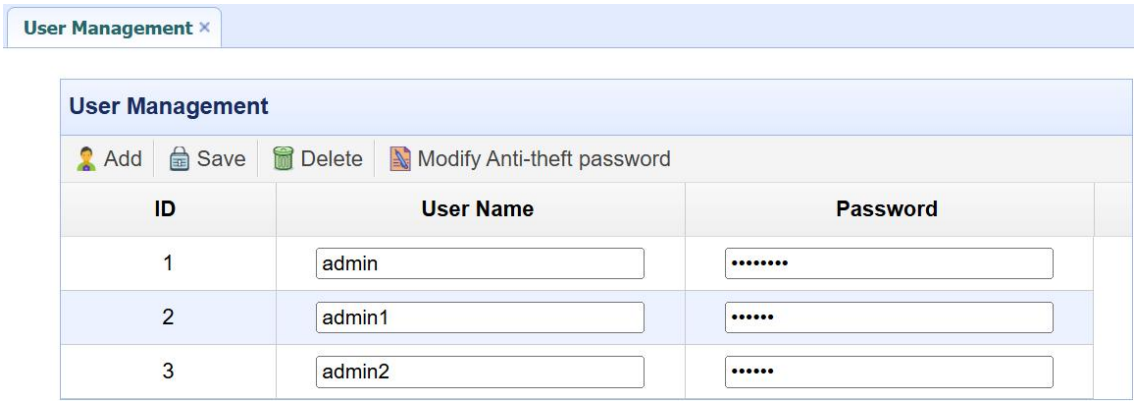
Use this screen to completely or partially reset the receiver:



4.3.5 Languages Submenu

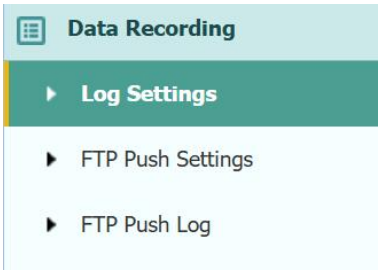
Use this screen to select the web interface language:

4.3.6 User Management Submenu



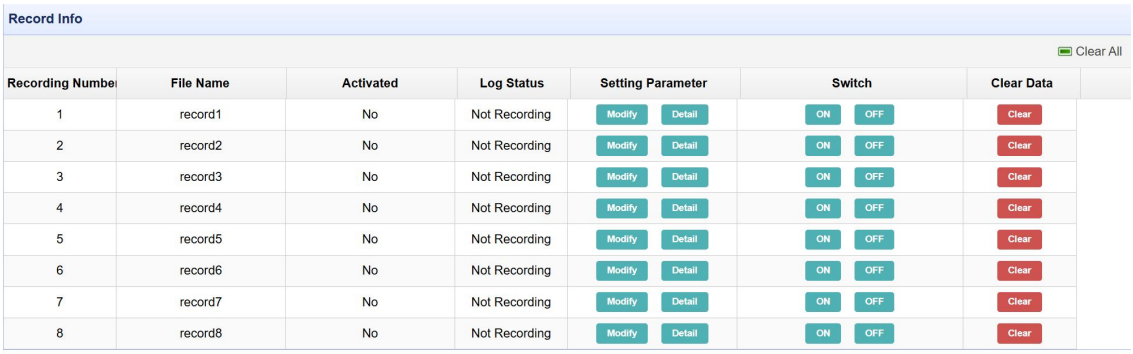
4.4 Data Recording Menu

Use the Data Logging menu to set up the receiver to log static GNSS data and to view the logging settings. You can configure settings such as observable rate, recording rate, continuous logging limit, and whether to auto delete old files when memory is low. This menu also provides the controls for the FTP push feature:

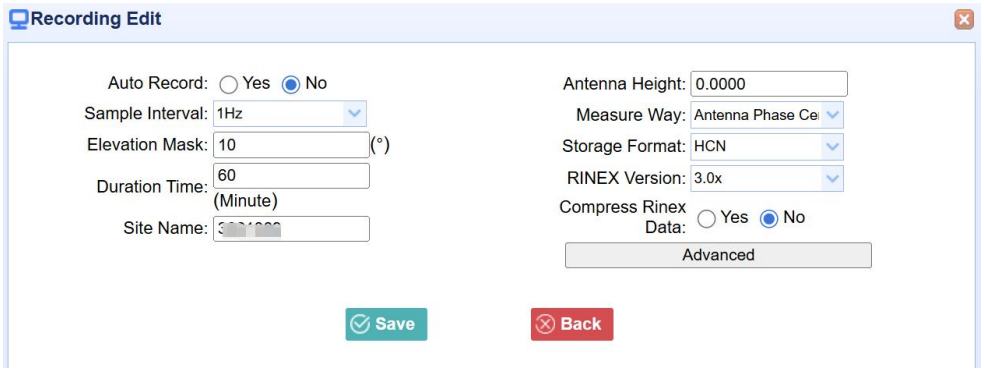


4.4.1 Log Settings Submenu

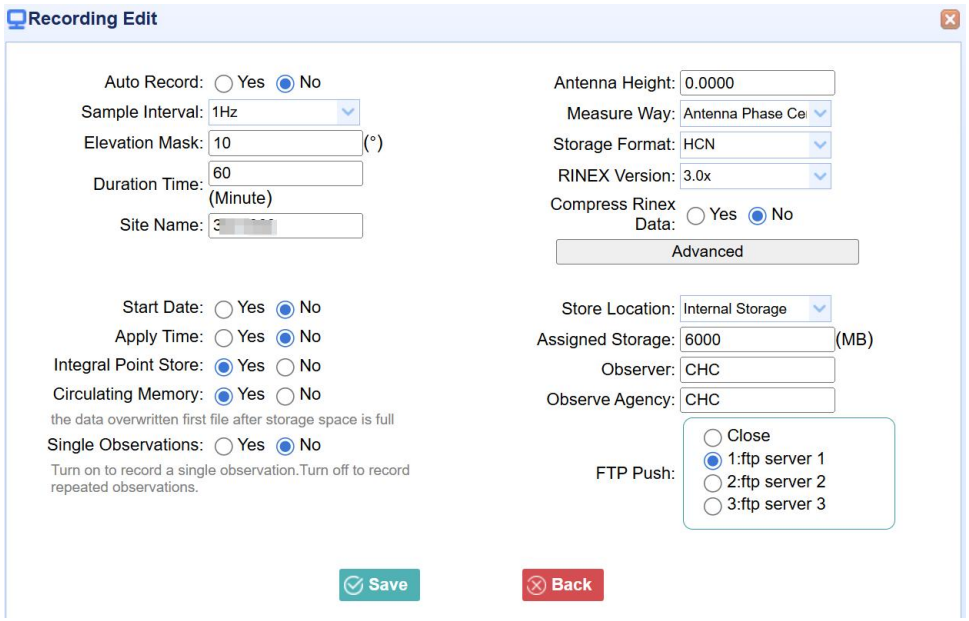
Here shows the data logging status, including internal and external storage usage and data logging status of each session. Also, users can configure the data logging settings for each session, including recording name, store location, storage limit, store formats, start time, etc.



To edit the settings of each session, click the **Modify** button to the right of the required session, and then the Recording Edit screen appears:



Click advanced to see more settings.



In this screen, you can configure all the data logging parameters, and determine whether the recording files will be affected by the FTP Push. The parameters are mainly as follows:

➢ **Auto Record:** on or off.

➢ **Sample Interval:** Select the observable rate from the dropdown list.

➢ **Elevation Mask:** Enter the elevation mask.

➢ **Duration Time:** Set the duration of data logging.

➢ **Site Name:** Enter the name of the site.

➢ **Antenna Height:** the measured height value.

➢ **Measure way:** Antenna Phase Center, Vertical Height, Slant Height

➢ **Storage Format:** Select the format of the data store.

➢ **RINEX Version:** OFF, 3.02, 2.11

➢ **Start Date:** Select Yes or No option to determine whether to auto record start date.

➢ **Apply Time:** Select Yes or No option to determine whether to auto record apply time.

➢ **Integral Point Store:** Select Yes or No option to determine whether to allow receiver to save data every hour.

➢ **Circulating Memory:** Select Yes or No option to determine whether to auto delete old files if the storage space is full.

➢ **Repeat Observations:** Select Yes or No option to determine whether to turn on to record a single observation.

➢ **Store Location:** Internal Storage, External Storage.

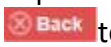
➢ **Assigned Storage:** The assigned memory size of current thread(for example, Record 1) is 10000MB

➢ **Observer:** Enter the name of observer.

➢ **Observer Agency:** Enter the name of observer agency.

➢ **FTP Push:** Decide whether to push the stored files to the FTP server of your choice.

Tap 

button to save the settings and back to the Log,Also, users can click 

to abandon the changed settings and back to Log Settings screen.

Note – To modify data logging parameters, make sure the data logging session is switched off.

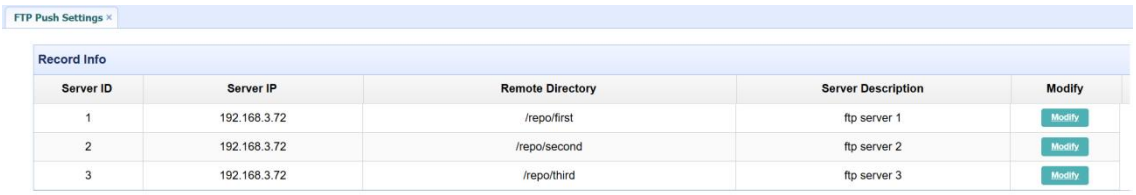
To switch on or off ANY data logging session, tap the ON or OFF button on the right of the required session.

To delete the recorded files of ANY data logging session, tap the Clear button on the right of the required session.

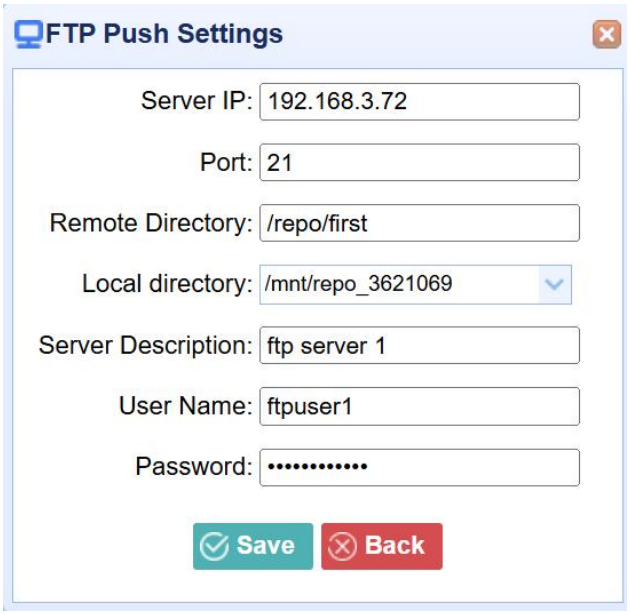
To delete the recorded files of ALL data logging sessions, tap the Clear ALL Accounts button.

4.4.2 FTP Push Settings Submenu

Use this screen to configure the receiver to push stored files to the FTP server of your choice. Only files that are configured to use FTP push are transmitted.

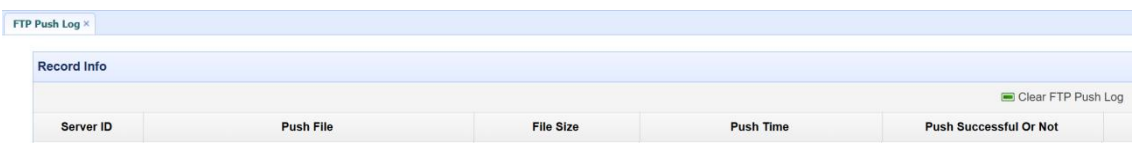


Tap **Modify** button on the right of the required FTP server and the FTP Push Settings screen appears:

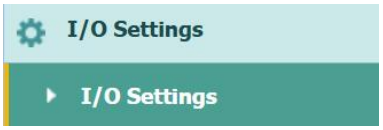


4.4.3 FTP Push Log Submenu

Shows the related information about the recorded filed that be pushed. And users can tap **Clear Ftp Send Log** button in the upper right corner to clear the log of FTP Push operations.



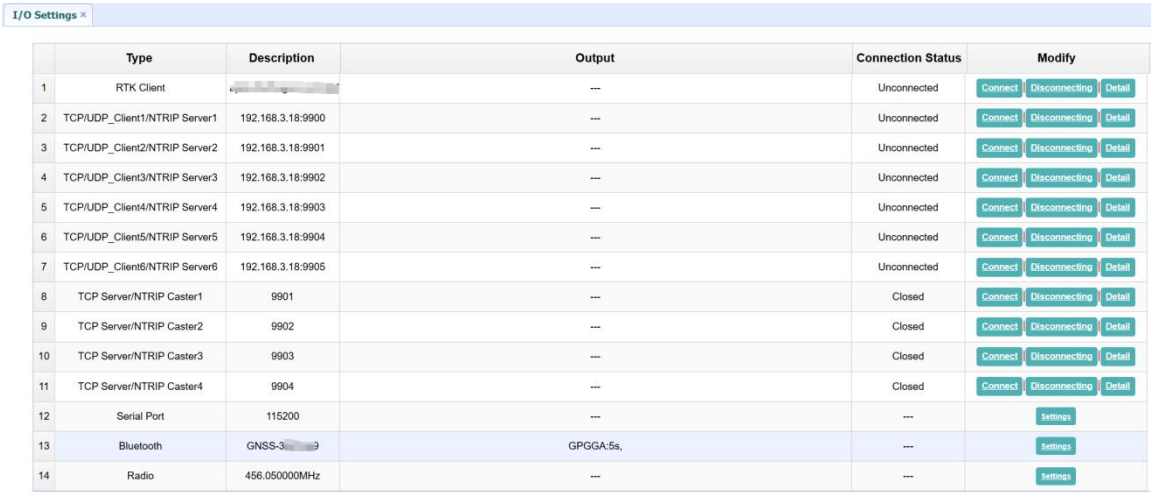
4.5 IO Settings Menu



Use the IO Settings menu to set up all receiver outputs and inputs. The receiver can output CMR, RTCM, Raw data, Ephemeris data, GPGGA, GPGSV, on TCP/IP, UDP, serial port, or Bluetooth ports.

4.5.1 IO Settings Submenu

The following figure shows an example of the screen that appears when you select this submenu.



	Type	Description	Output	Connection Status	Modify
1	RTK Client	[redacted]	---	Unconnected	Connect Disconnecting Detail
2	TCP/UDP_Client1/NTRIP Server1	192.168.3.18:9900	---	Unconnected	Connect Disconnecting Detail
3	TCP/UDP_Client2/NTRIP Server2	192.168.3.18:9901	---	Unconnected	Connect Disconnecting Detail
4	TCP/UDP_Client3/NTRIP Server3	192.168.3.18:9902	---	Unconnected	Connect Disconnecting Detail
5	TCP/UDP_Client4/NTRIP Server4	192.168.3.18:9903	---	Unconnected	Connect Disconnecting Detail
6	TCP/UDP_Client5/NTRIP Server5	192.168.3.18:9904	---	Unconnected	Connect Disconnecting Detail
7	TCP/UDP_Client6/NTRIP Server6	192.168.3.18:9905	---	Unconnected	Connect Disconnecting Detail
8	TCP Server/NTRIP Caster1	9901	---	Closed	Connect Disconnecting Detail
9	TCP Server/NTRIP Caster2	9902	---	Closed	Connect Disconnecting Detail
10	TCP Server/NTRIP Caster3	9903	---	Closed	Connect Disconnecting Detail
11	TCP Server/NTRIP Caster4	9904	---	Closed	Connect Disconnecting Detail
12	Serial Port	115200	---	---	Settings
13	Bluetooth	GNSS-3[redacted]9	GPGGA:5s,	---	Settings
14	Radio	456.050000MHz	---	---	Settings

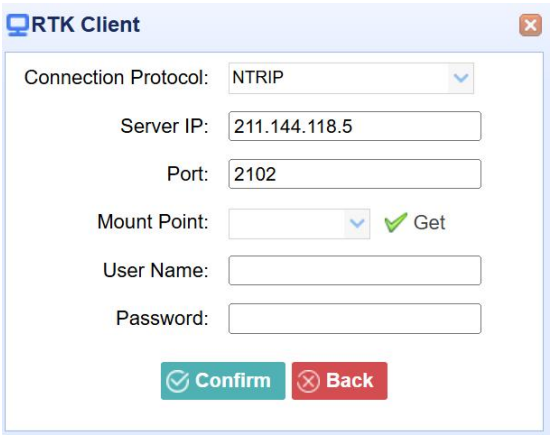
In this submenu, users can configure 6 types of input and output settings.

1. RTK Client

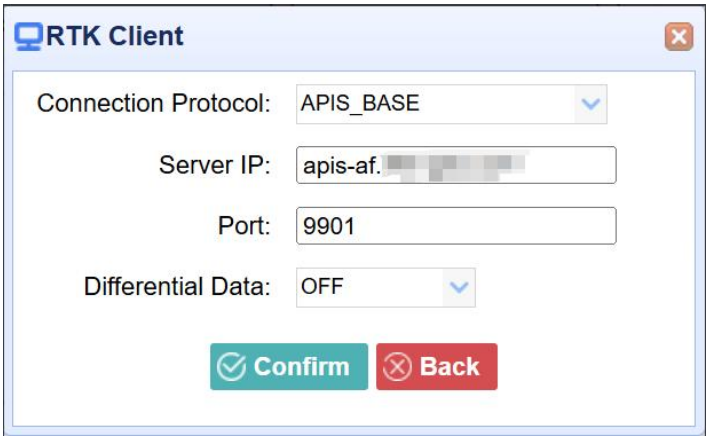
After configuring the settings of RTK client, users can log on CORS or APIS. Tap the **Connect** button to the right → the *IO Settings* screen will appear → choose one of the connection protocols among the NTRIP, APIS_BASE and APIS_ROVER → configure the related parameters

➢click Confirm to logon CORS or APIS.

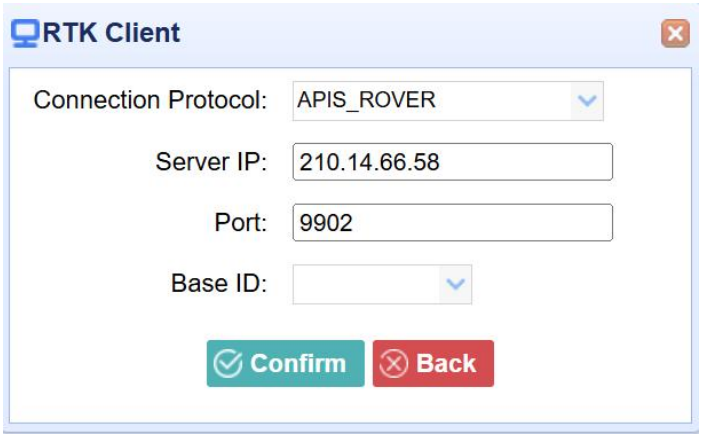
➢Connection Protocol: NTRIP



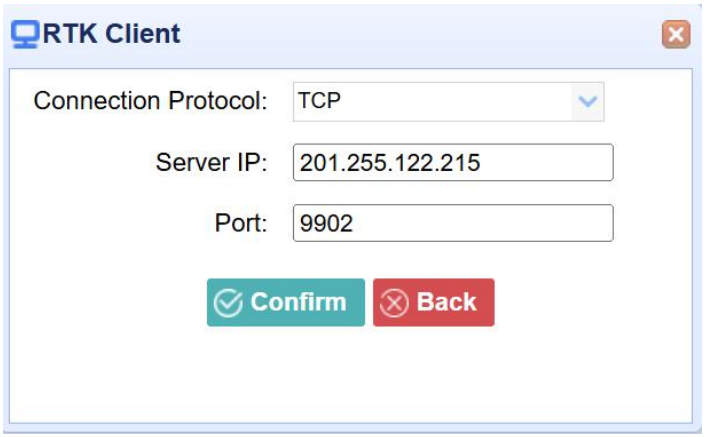
➢ Connection Protocol: APIS_BASE



➢Connection Protocol: APIS_ROVER



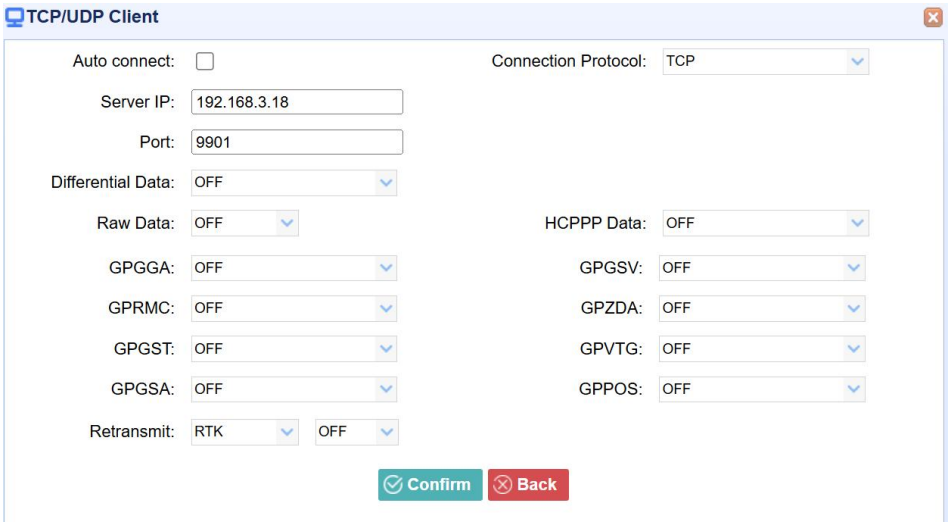
➢Connection Protocol: TCP



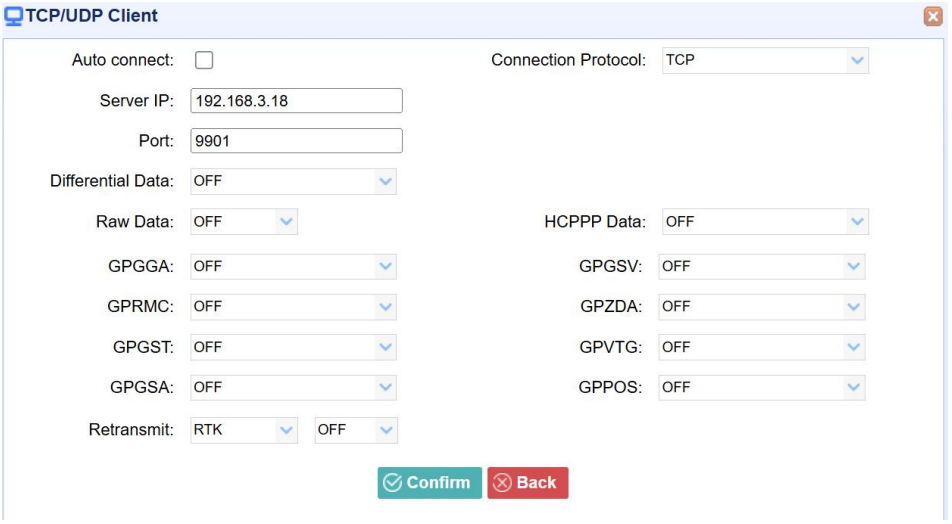
1. TCP/UDP_Client/NTRIP Server

Tap the **Connect** button on the right of required TCP/UDP Client → the *IO Settings* screen will appear → select the connection protocol from TCP, UDP,NTRIP1.0 and NTRIP2.0 → enter the IP and Port of the target server → configure messages that you want to output to the target server → click Confirm to save and complete the connection.

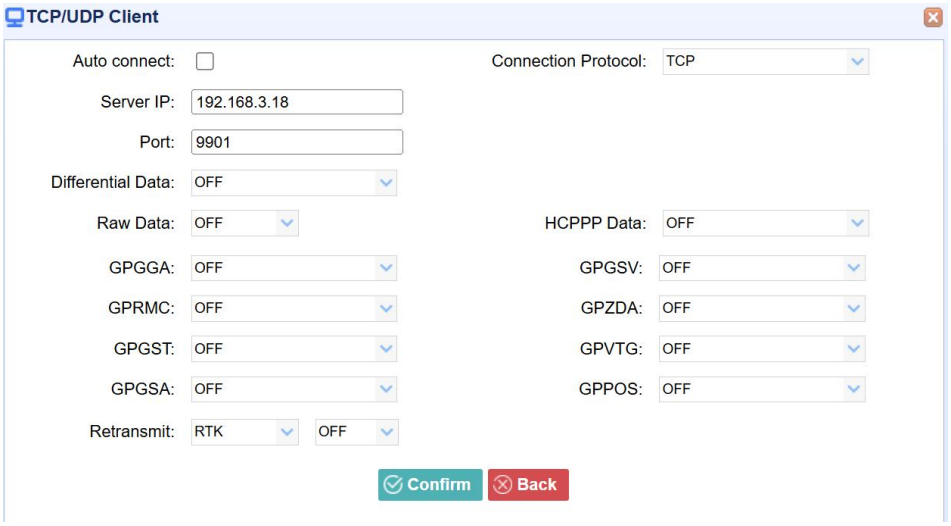
➢Connection Protocol: TCP



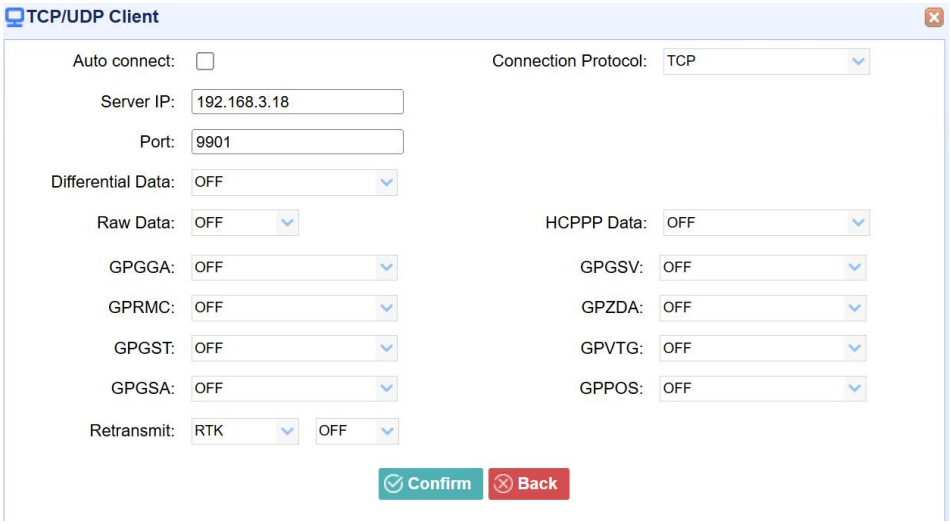
➢Connection Protocol: UDP



➢ Connection Protocol: NTRIP1.0



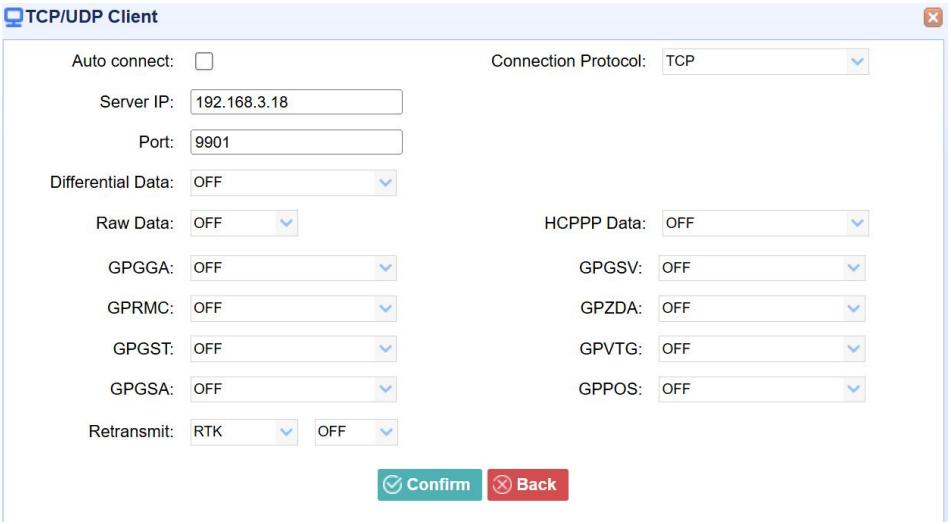
➢Connection Protocol: NTRIP2.0



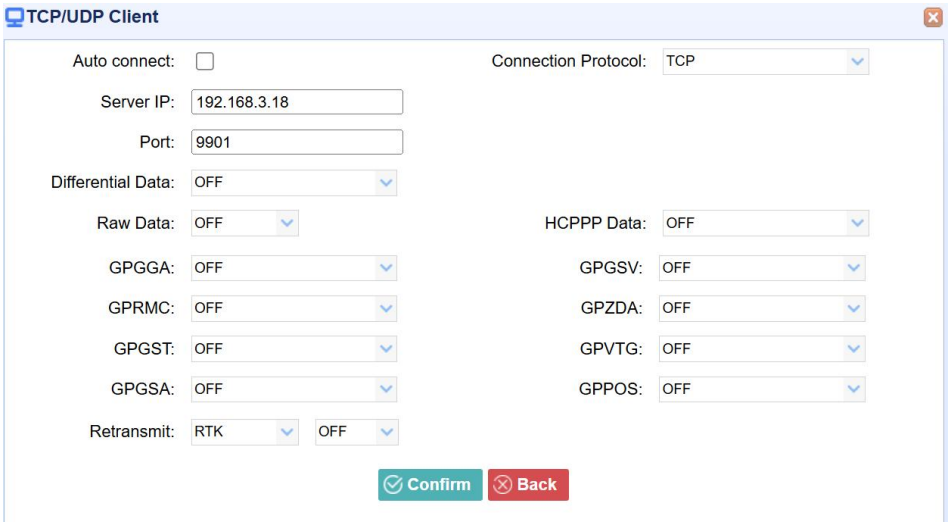
2. **TCP Server/NTRIP Caster**

Tap the **Connect** button to the right of required TCP Server/NTRIP Caster→ the **IO Settings** screen will appear → select one of the connection protocols between NTRIP and TCP → configure the other related parameters → click Confirm to save the settings and open the server.

➢ Connection Protocol: TCP

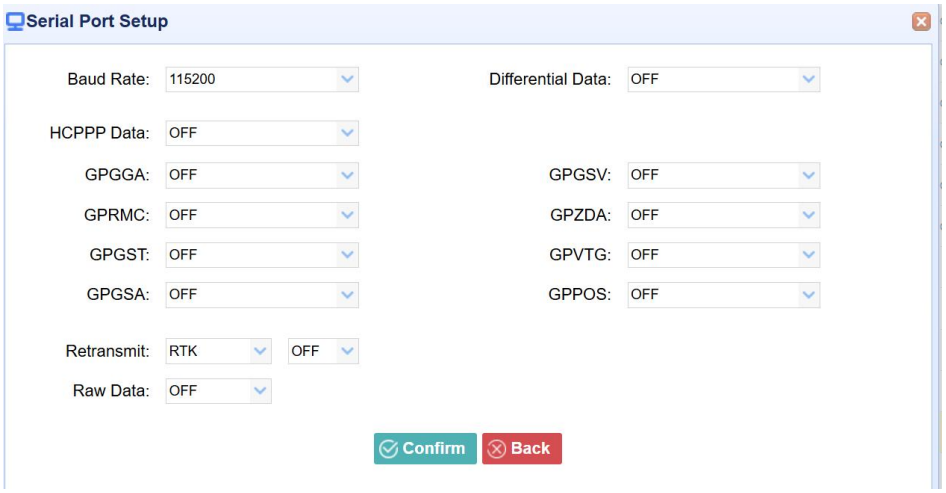


➢Connection Protocol: NTRIP



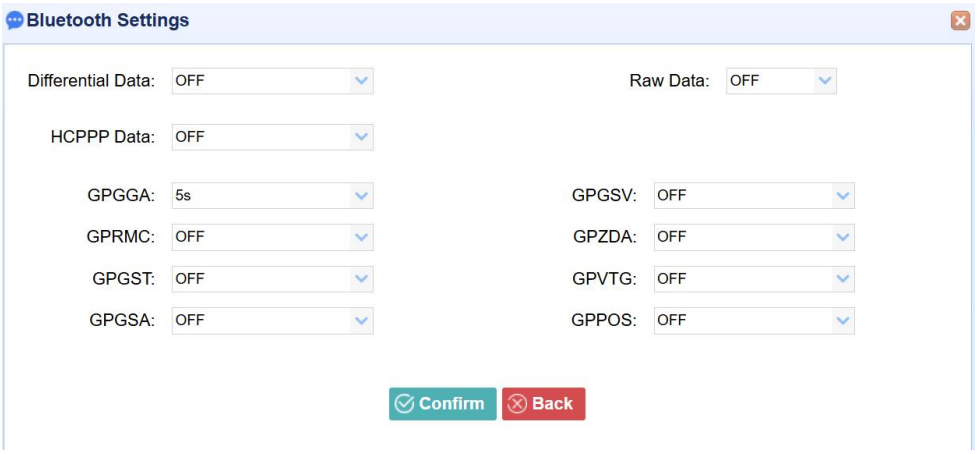
3. Serial Port

Tap the **Settings** button on the right of Serial Port → the *Serial Port Setup* screen will appear → select Baud Rate used to transmit data → configure the messages that you want to output through the serial port → click Confirm to save the settings and start to transmit.



4. Bluetooth

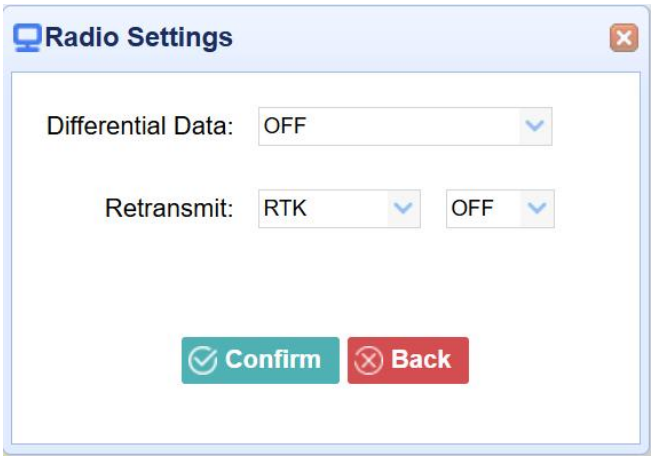
Tap the **Settings** button to the right of Bluetooth → the *Bluetooth Set* screen will appear → configure the messages that you want to transmit through Bluetooth → click Confirm to save the settings and start to transmit.



5. Radio

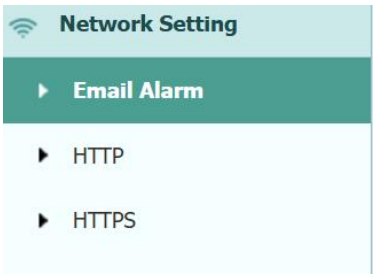
Tap the **Settings** button to the right of Radio → the *Radio Settings* screen will appear → select the format of differential data that you want to transmit through radio from the dropdown list

➢ click Confirm to save the settings and start to transmit.



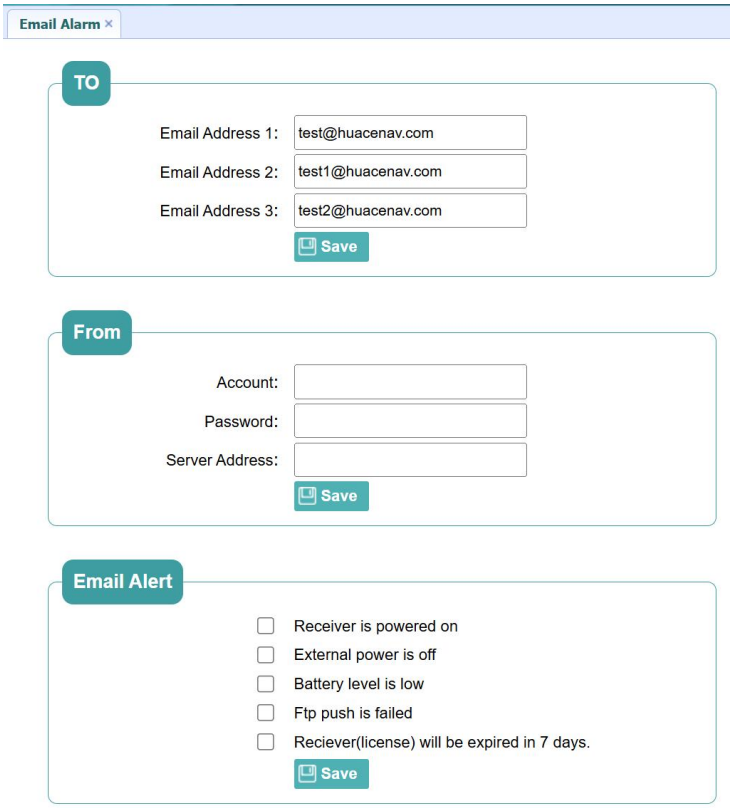
4.6 Network Setting Menu

Use this menu to view network information, set email alert for specific situation, configure HTTP or HTTPS port.



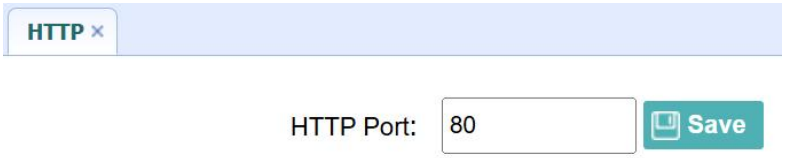
4.6.1 Email Alarm Submenu

Use this submenu to choose which situation of receiver will be alerted and input the email address.



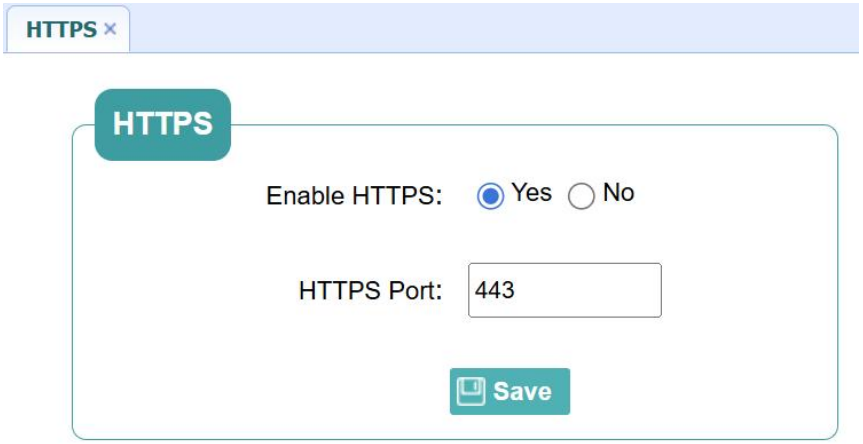
4.6.2 HTTP Submenu

Use this submenu to configure HTTP port.



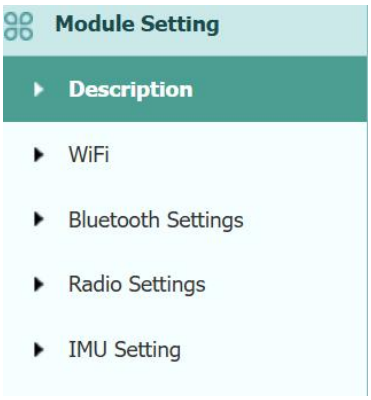
4.6.3 HTTPS Submenu

Use this submenu to configure HTTPS port.



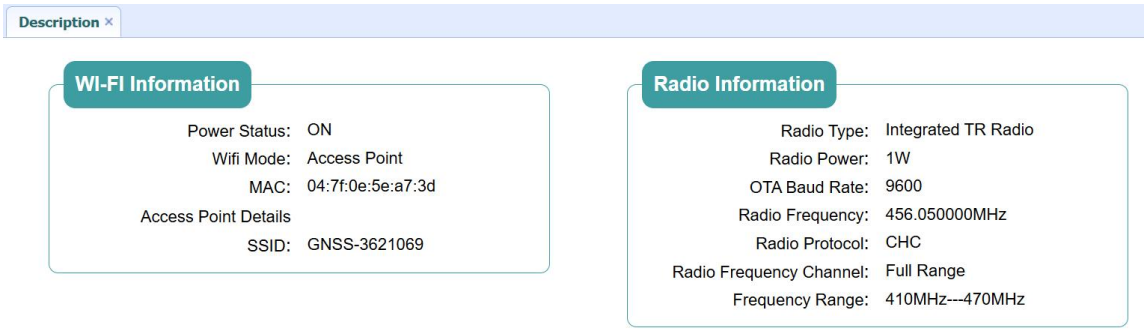
4.7 Module Setting Menu

Use this menu to check module information, configure WiFi, bluetooth, radio related settings, and turn on/off static voice of buzzer:



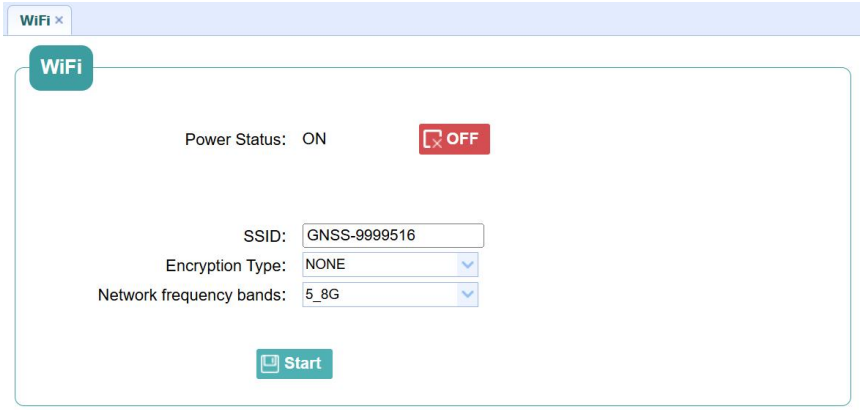
4.7.1 Description Submenu

Use this submenu to check the information of WiFi module, bluetooth module and radio module.



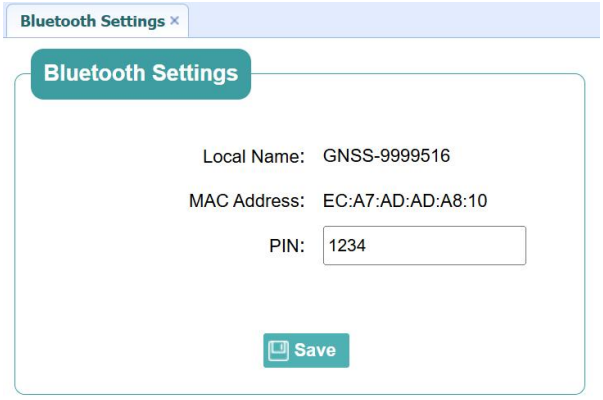
4.7.2 WiFi Submenu

Use this submenu to turn on/off WiFi function and modify password.



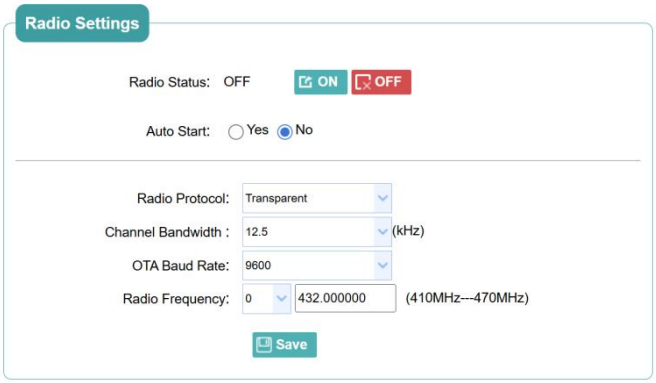
4.7.3 Bluetooth Settings Submenu

Use this submenu to turn on/off bluetooth function and modify PIN number.



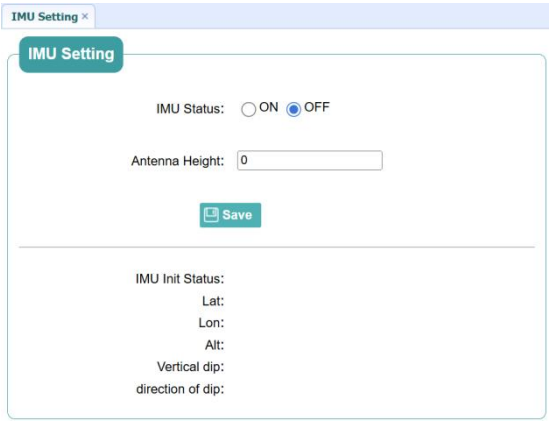
4.7.4 Radio Settings Submenu

Use this submenu to turn on/off radio function and configure radio parameters.



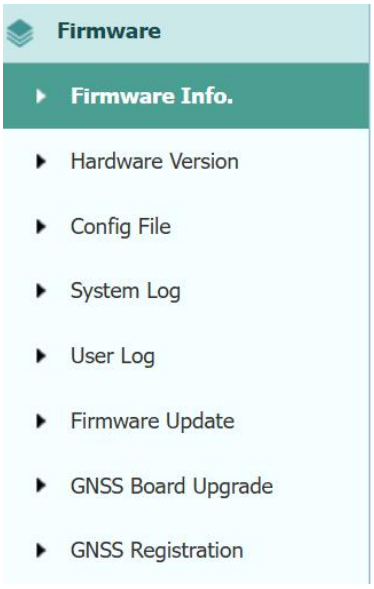
4.7.5 IMU Settings Submenu

Use this submenu to turn on/off IMU function.



4.8 Firmware Menu

Use this menu to check the current firmware information, download the system log, update the receiver firmware, download or update the configuration file and register the receiver, and more:

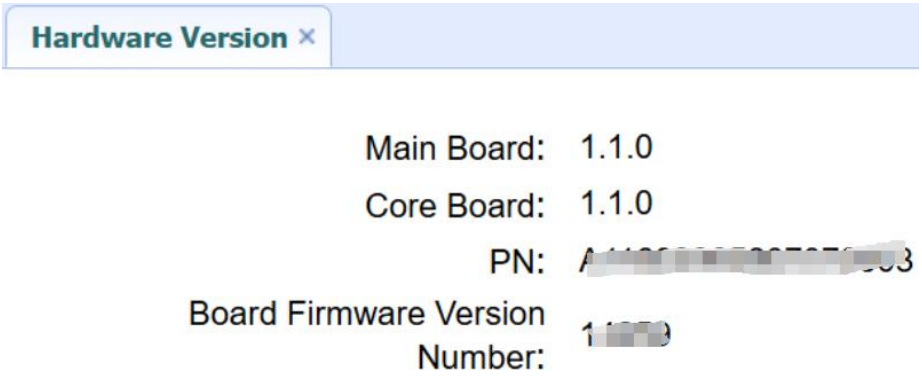


4.8.1 Firmware Info Submenu

Use this submenu to check the current firmware information. The following figure shows an example of the firmware information.

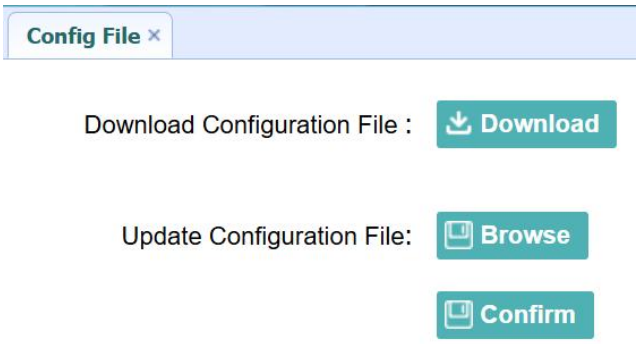
4.8.2 Hardware Version Submenu

Use this submenu to check the hardware information, including mainboard version and core board version:



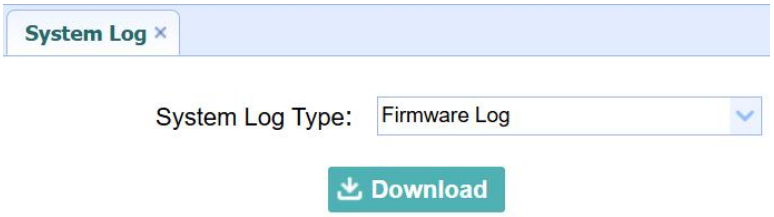
4.8.3 Config File Submenu

Use this submenu to update Configuration File.



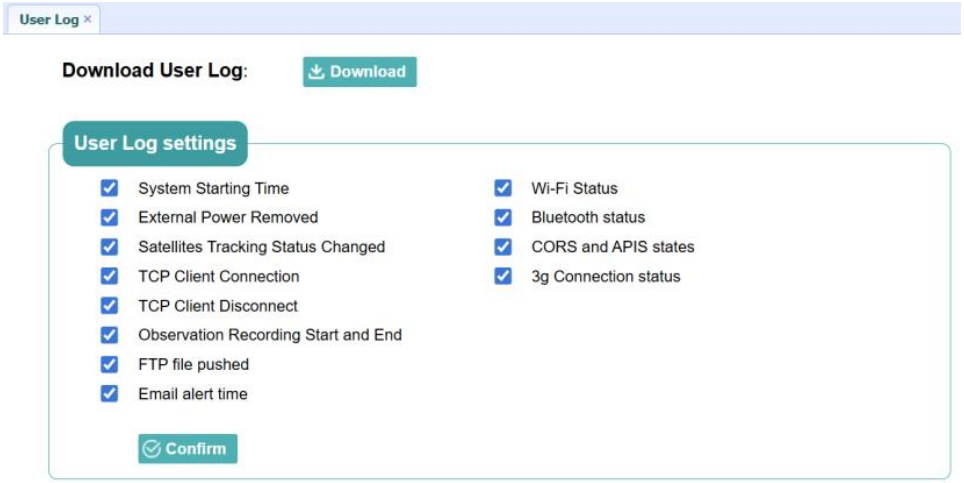
4.8.4 System Log Download Submenu

Use this submenu to download the system log of the receiver.



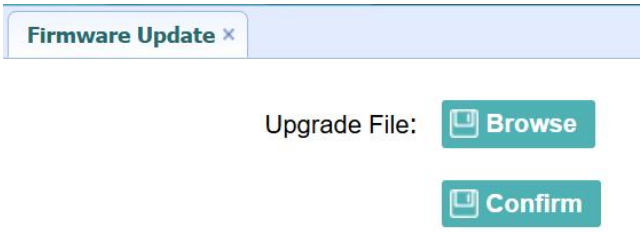
4.8.5 User Log Submenu

Use this submenu to download the user log. Tap Download to download current user log; Tick items that you want to see on the user log and tap confirm button to confirm selected user log.



4.8.6 Firmware Update Submenu

Use this submenu to load new firmware to the receiver across the network. Tap the **Browse** button to locate the upgrade file → tap **Confirm** button to confirm the selected upgrading file and start upgrading.



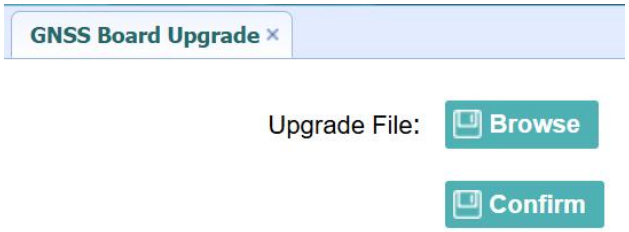
NOTES:

(1)It may take about 3 or 4 minutes to complete the firmware upgrading. Do not touch the power button or unplug the power until the upgrading process finishes, or damage will be caused to the receiver.

(2)The receiver will restart after the firmware upgrading is done, so users need to,reconnect the receiver with your computer via Wi -Fi, and then log-in the receiver through a web browser to continue the configuration.

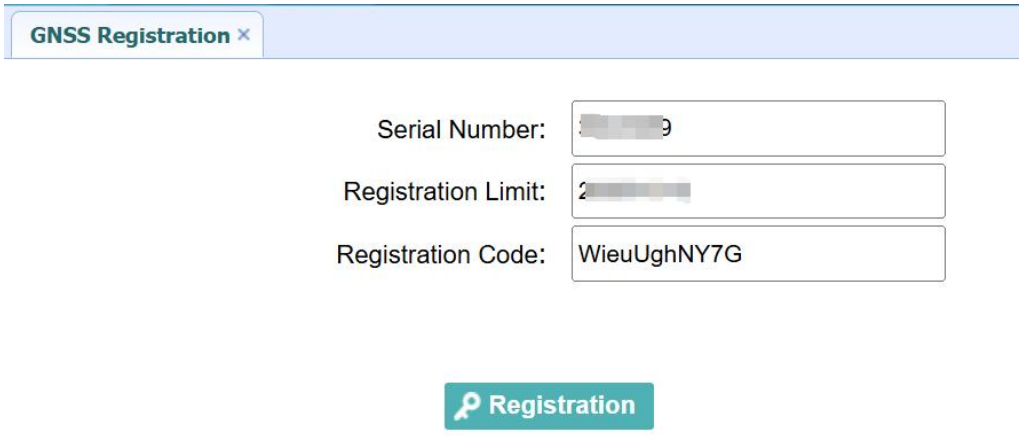
4.8.7 GNSS Board Upgrade Submenu

Use this submenu to upgrade GNSS Board. Use this submenu to load new board to the receiver across the network. Tap the **Browse** button to locate the upgrade file → tap **Confirm** button to confirm the selected upgrading file and start upgrading.



4.8.8 GNSS Registration Submenu

Use this submenu to register the receiver. Paste or enter the registration code to the Registration Code field → tap **Registration** button to complete the registration.



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