# GEOMATE SG20AR GNSS

## USER GUIDE

Survey & Engineering | Apr 2025

Premium Surveying. Trusted Solutions

# Table of Content

**Preface ..... 5**
Copyright ..... 5
Safety Warnings ..... 5
FCC Statement ..... 5
CE Interference Statement ..... 6
Brazil ..... 6
Conformity to Japanese regulations ..... 6
**1 Introduction ..... 7**
1.1 Safety Information ..... 7
1.2 Regulations and Safety ..... 7
1.3 Technical Support ..... 8
1.4 Disclaimer ..... 8
1.5 Your Comments ..... 8
**2 Getting Started with SG20AR ..... 9**
2.1 About the Receiver ..... 9
2.2 Parts of the Receiver ..... 9
2.2.1 Front Panel ..... 9
2.2.2 Front Camera and Bottom Camera ..... 10
2.2.3 Receiver Ports ..... 11
2.3Batteries and Power ..... 11
2.3.1 Batteries ..... 11
2.3.2 Charging the Battery ..... 12
2.3.3 Battery Safe ..... 12
2.3.4 External Power Supply ..... 13
2.4 Connecting to an Office Computer ..... 14
2.5 Connecting to a Controller ..... 14
2.5.1 Connecting via Wi-Fi with MateSurvey Software ..... 14
2.5.2 Connecting via Bluetooth with MateSurvey Software ..... 16
2.6 Downloading Logged Data ..... 18
2.6.1 FTP Download ..... 18

2.6.2 Web Server Download ..... 19
2.6.3 USB Download ..... 19
**3 Equipment Setup and Operation ..... 21**
3.1 Base Station Setup ..... 21
3.2 Rover Station Setup ..... 22
3.3 Working with the Tilt Compensation ..... 23
3.3.1 Operation Steps ..... 23
3.3.2 Notes of using tilt measurement ..... 25
3.4 Working with the Vision Camera ..... 26
3.4.1 Vision Stakeout Operation Steps ..... 26
3.4.2 Notes of using Vision Camera ..... 29
**4 Configuring Through a Web Browser ..... 30**
4.1 Status Menu ..... 31
4.1.1 Position Submenu ..... 32
4.1.2 Activity Submenu ..... 32
4.1.3 Google Map Submenu ..... 33
4.2 Satellites Menu ..... 33
4.2.1 Tracking Table Submenu ..... 34
4.2.2 Tracking Info. Table Submenu ..... 35
4.2.3 Tracking Skyplot Submenu ..... 35
4.2.4 Satellite Activation Submenu ..... 36
4.3 Receiver Configuration Menu ..... 36
4.3.1 Description ..... 37
4.3.2 Antenna Configuration Submenu ..... 37
4.3.3 Reference Station Settings Submenu ..... 38
4.3.4 Receiver Reset Submenu ..... 40
4.3.5 Languages Submenu ..... 40
4.3.6 User Management Submenu ..... 41
4.4 Data Recording Menu ..... 41
4.4.1 Log Settings Submenu ..... 42
4.4.2 FTP Push Settings Submenu ..... 44
4.4.3 FTP Push Log Submenu ..... 45

4.4.4 Data Download Submenu ..... 46
4.5 IO Settings Menu ..... 47
4.6 Network Setting Menu ..... 53
4.6.1 HTTP Submenu ..... 53
4.6.2 HTTPS Submenu ..... 53
4.6.3 FTP Service Submenu ..... 54
4.7 Module Setting Menu ..... 54
4.7.1 Description Submenu ..... 55
4.7.2 WiFi Submenu ..... 55
4.7.3 Bluetooth Settings Submenu ..... 56
4.7.4 Radio Settings Submenu ..... 56
4.8 Firmware Menu ..... 57
4.8.1 Firmware Info Submenu ..... 57
4.8.2 Hardware Version Submenu ..... 57
4.8.3 Config File Submenu ..... 58
4.8.4 System Log Download Submenu ..... 58
4.8.5 User Log Submenu ..... 58
4.8.6 Firmware Update Submenu ..... 59
4.8.7 GNSS Board Upgrade Submenu ..... 59
4.8.8 GNSS Registration Submenu ..... 60

# Preface

## Copyright

### Copyright 2024

GEOMATE | GEOMATE POSITIONING PTE. LTD. All rights reserved. The GEOMATE are trademark of GEOMATE POSITIONING PTE. Limited. All other trademarks are the property of their respective owners.

### Trademarks

All product and brand names mentioned in this publication are trademarks of their respective holders.

## Safety Warnings

The Global Positioning System (GPS) is operated by the U.S. Government, which is solely responsible for the accuracy and maintenance of the GPS network. Accuracy can also be affected by poor satellite geometry and obstructions, like buildings and heavy canopy.

## FCC Statement

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 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. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

## CE Interference Statement

Declaration of Conformity: Hereby, GEOMATE POSITIONING PTE. LTD. declares that this SG20AR is in compliance with the essential requirements and other relevant provisions of Directive 2014/53/EU. A copy of the Declaration of conformity can be found at GEOMATE POSITIONING PTE. LTD.

## 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.

## 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).

# 1 Introduction

The GEOMATE SG20AR GNSS Receiver User Guide describes how to set up and use the GEOMATE® SG20AR GNSS receiver. In this manual, “the receiver” refers to the SG20AR GNSS receiver unless otherwise stated. Even if you have used other Global Navigation Satellite Systems (GNSS) products before, GEOMATE recommends that you spend some time reading this manual to learn about the special features of this product.

## 1.1 Safety Information

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(only RX) for signal communication through Bluetooth® wireless technology or through external communication datalink. 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 SG20AR 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.

**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 GEOMATE website (www.geomate.sg), contact your local GEOMATE dealer from which you purchased the receiver(s).

If you need support, please contact us by email (support@geomate.sg)

## 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. GEOMATE holds no responsibility for the wrong operation by users and for the losses incurred by the wrong understanding about this User Guide. However, GEOMATE reserves the rights to update and optimize the contents in this guide regularly. Please contact your local GEOMATE 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@geomate.sg

# 2 Getting Started with SG20AR

## 2.1 About the Receiver

The new GEOMATE SG20AR GNSS receiver offers integrated IMU-RTK technology to provide a robust and accurate GNSS positioning in any circumstances. Unlike the standard MEMS based GNSS receivers, the SG20AR GNSS IMU-RTK combines state-of-the-art GNSS RTK engine, calibration-free professional IMU sensor and advanced GNSS tracking capabilities. Survey projects are achieved with high productivity and reliability pushing the boundaries of conventional GNSS RTK survey.

2 Premium cameras enable Visual Stakeout. Bluetooth and Wi-Fi technology provides cable-free communication between the receiver and controller.

The receiver can be used as the part of an RTK GNSS system with GEOMATE MateSurvey software. Moreover, user can download the GNSS data that recorded in the internal memory of receiver to a computer.

The receiver can be used as the part of an RTK GNSS system with GEOMATE MateSurvey software. And you can download the GNSS data that recorded in the internal memory of receiver to a computer.

To configure the receiver for performing a wide variety of functions, you can use the web interface by connecting the receiver with PC or smartphone through Wi-Fi.

## 2.2 Parts of the Receiver

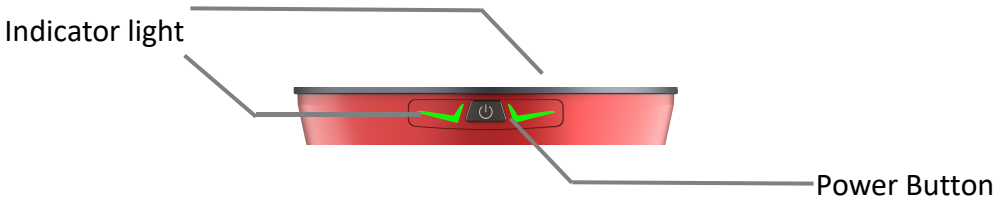
Power Button is located on the front panel. SMA port and USB Type-C port are located on the bottom of the unit.

### 2.2.1 Front Panel

The following figure shows a front view of the receiver.

Front panel

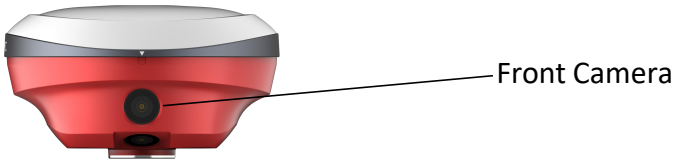
The front panel contains two indicator LEDs and one buttons.




| Name | Description |
|---|---|
| Indicator light | ✓**Indicates whether the receiver is transmitting/receiving differential data.**<br>•As a Base station: successfully transmitting differential data, flash yellow light.<br>•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.<br>✓**Shows the number of satellites that the receiver has tracked.**<br>•When the receiver is searching for satellites, the red LED flashes once every 5 seconds.<br>•When the receiver tracks N satellites, the red LED blinks N times per second, pauses for 5 seconds, and then blinks N times again.<br>✓**Indicated charging status**<br>•The power light shows yellow when charging<br>•The power light shows green when fully charged |

## 2.2.2 Front Camera and Bottom Camera

The following two figures show the rear view and bottom view of the receiver:



### 2.2.3 Receiver Ports

| Port | Name | Description |
|---|---|---|
| | USB Type-C port | • This port is a USB Type-C connector that supports USB communications.<br>• Users can use USB Type-C Cable supplied with the system to download the logged data to a computer. |
| | SMA port | • Connect a radio antenna to internal radio of the receiver. And this connector is not used if you are using an external radio. |

## 2.3Batteries and Power

### 2.3.1 Batteries

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

### 2.3.2 Charging the 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 equipment 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 GEOMATE 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 GEOMATE 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.

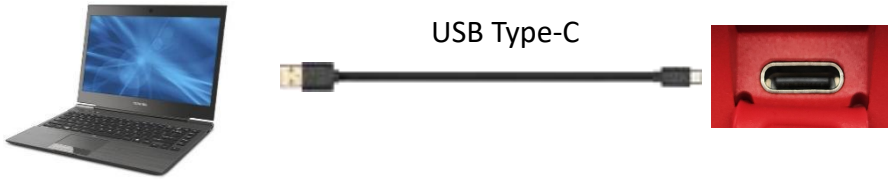
### 2.3.4 External Power Supply

Provide the external power to the receiver by the USB Type-C Cable + Power Adapter. The Power Adapter is connecting with AC power of 100-240V, the output port of the Power Adapter connects with the USB Type-C Cable.

## 2.4 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 shows how to connect to the computer for serial data transfer or settings:

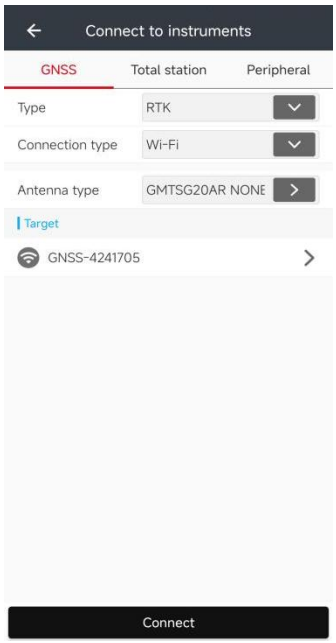



## 2.5 Connecting to a Controller

### 2.5.1 Connecting via Wi-Fi with MateSurvey Software

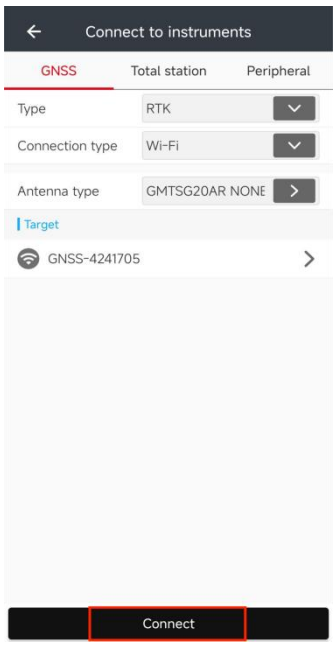
Turn on the controller → run **MateSurvey** → tap **Connect**.

In the Connect screen, select **GEOMATE** for the Manufacture field, **SG20AR** for Device Type field, WIFI for **Connection** Type field.

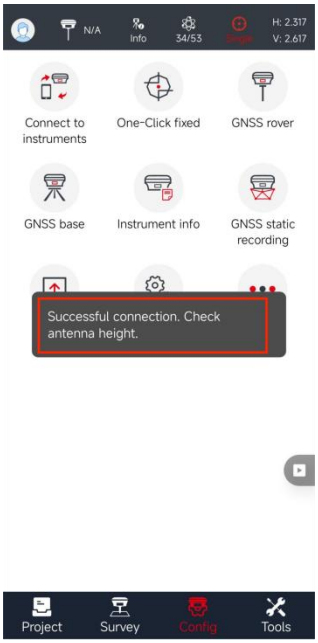


Tap the Wireless Lan icon on the right side to select the hot spot → Switch on the WiFi module by the top switch → select the target device in the list.

Tap **Connect** to link to the hot spot.



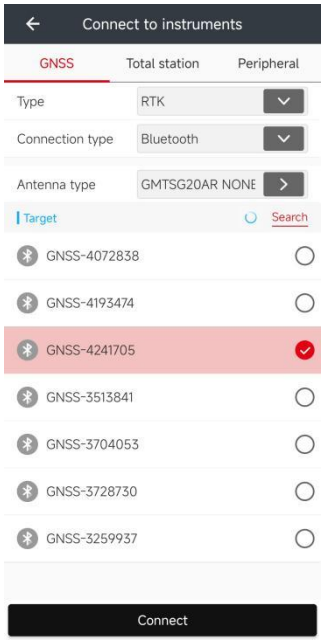
Tap the Connect button to build the connection.



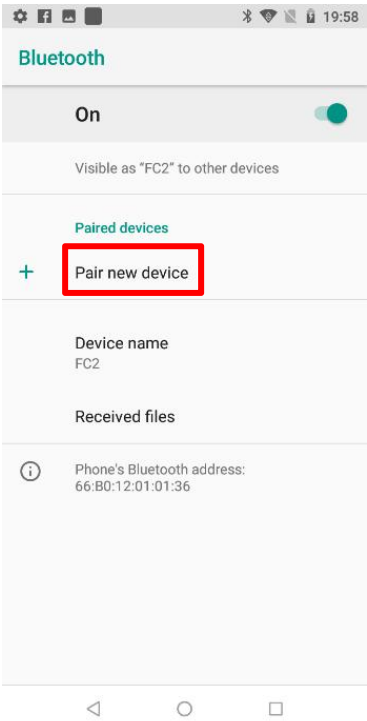

## 2.5.2 Connecting via Bluetooth with MateSurvey Software

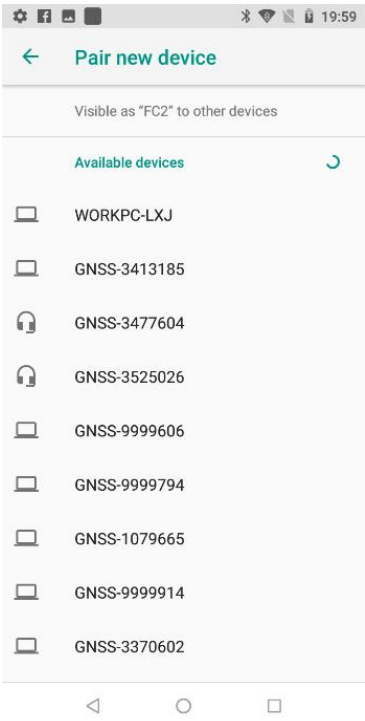
Turn on the controller → run MateSurvey → tap **Connect**.

In the Connect screen, select GEOMATE for the Manufacture field, **SG20AR** for Device Type field, **Bluetooth** for Connection Type field.

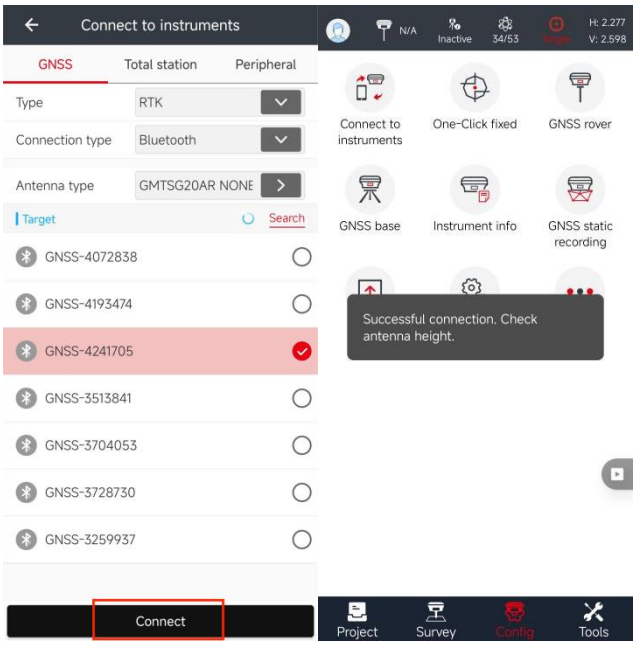


Tap the **Bluetooth Manager** and turn on the **Bluetooth** function to search Bluetooth device around → select the target device in the list → Tap back button → select the target device in the Bluetooth manager list.




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



## 2.6 Downloading Logged Data

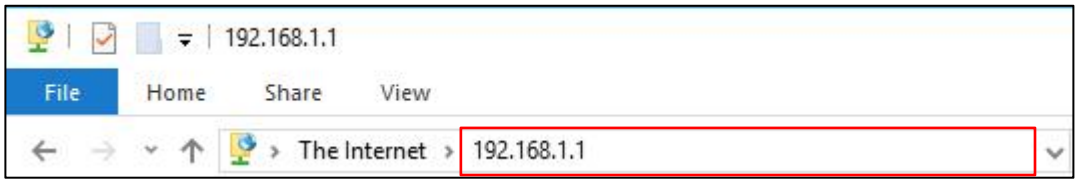
Data logging involves the collection of GNSS measurement data over a period at a static point or points, and subsequent post-processing of the information to accurately compute baseline information. Data logging using receivers requires access to suitable GNSS post-processing software such as the GEOMATE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

### 2.6.1 FTP Download

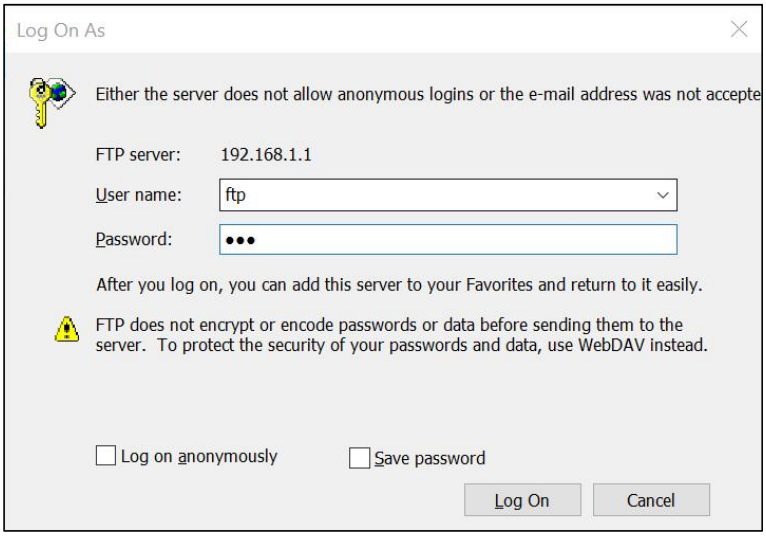
The procedures of downloading logged data through FTP are as follows:

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

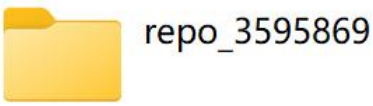
(2)After the successful connection, open the file manager in the computer and input “ftp://192.168.1.1” in the address box.




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



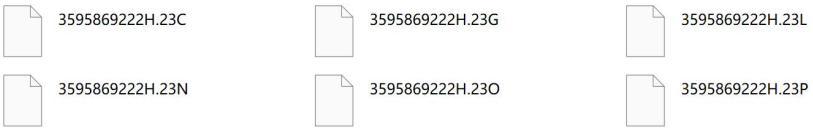

(4)Double click the folder “repo_receiver SN” (take 3225804 as example), you will see 2 folders. The “push_log” folder is used to save the log files, and the "record_1" folders are used for store static data.



(5)Double click the folder that you have configured to store the static data, you will see the folder(s) created by the SG20AR 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, and then the folder named as data format will be displayed.

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




Notes : Fo r rinex files, the name o f the file is represented as XX XXXXDD D NN, where XXXXX X is the SN o f the receiver, D DD is day o f 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.

### 2.6.2 Web Server Download

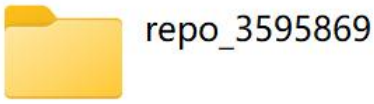
The procedures of downloading logged data through web server refer to 4.4.4 Data Download Submenu.

### 2.6.3 USB Download

The procedures of downloading logged data in the receiver are as 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 SG20AR system automatically and named by the date which is decided 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 (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 rinex files, the name of the file is represented as XXX XXXD DD NN, where XXX XXX 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

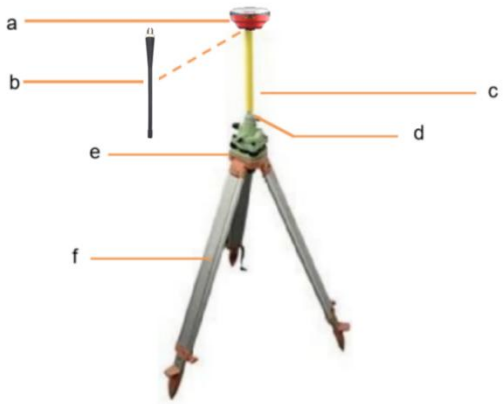
## 3.1 Base Station Setup

**Note:**

The receiver with PN number A11364980007070507 is equipped with a TX/RX radio.

The receiver with PN number A11364980005070507 is only equipped with a RX radio.

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




**Components:**

| No. | Name |
|---|---|
| a | SG20AR GNSS receiver |
| b | SMA Whip Antenna |
| c | Extension pole (30 cm) |
| d | Tribrach adaptor |
| e | Tribrach w/ Opti |
| f | Aluminum tripod |

**Steps:**

(1)Put tripod in the target position, center and level it roughly.

(2)Place and lock the tribrach in the tripod.

**If work as a UHF base station**, the SMA Whip Antenna need to be connected to the receiver.

(3)Connect the receiver to external battery by using external power cable if necessary.

(4)Connect the receiver to external storage disk by using USB cable if necessary.

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

(6)Measure the antenna height by using H.I. tape and auxiliary H.I. tool.

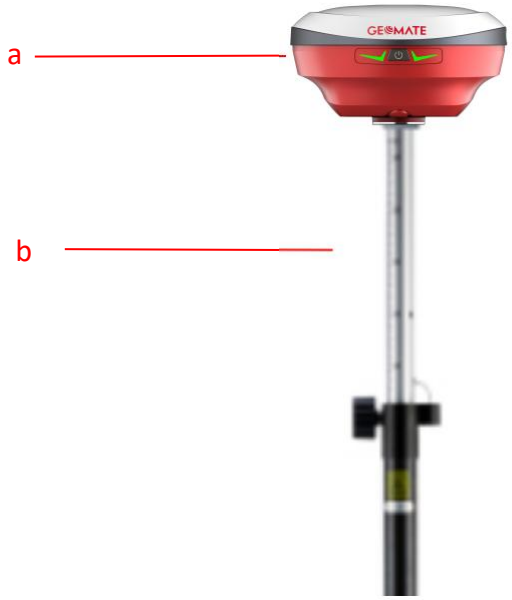
(7)Switch on the data controller and connect it to the receiver.

(8)Use software to configure the receiver as UHF base mode.

## 3.2 Rover Station Setup

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

**Components:**




| No. | Name |
|---|---|
| a | SG20AR GNSS receiver |
| b | 2M range pole w/bag |

Notice: Keep the receiver fully charged.

If work as a UHF rover station,the SMA Whip Antenna need to be connected to the receiver.

Steps:

(1)Screw the receiver onto the pole.

(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)Use software to start surveying.

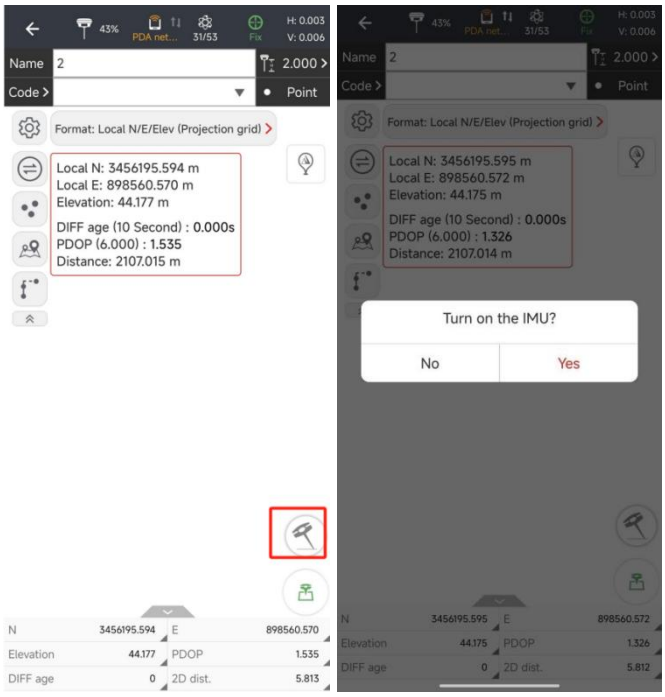
## 3.3 Working with the Tilt Compensation

SG20AR use 200 Hz AUTO-IMU,automatic pole tilt compensation for automatic inertial navigation initialization, and the user do not need to calibrate it manually any more.

After enable the tilt survey, the SG20AR IMU can be ready after a few steps walk or a bit movement automatically.

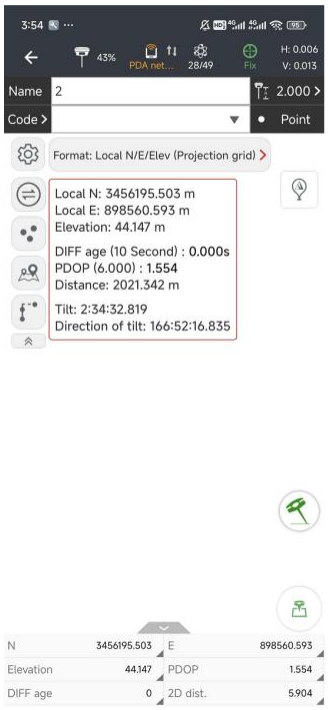
### 3.3.1 Operation Steps

(1)Open MateSurvey-> Tap PT Survey-> Tap to activate tilt measurement.



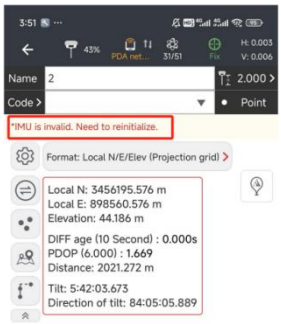
(2) Shake around according to the procedures in the interface to do initialization.

(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 “Tilt measurement is not available, reinitialize IMU.” at the top of interface.



(6)Tap to close tilt compensation.

### 3.3.2 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 measurement is not available, reinitialize IMU.” (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.

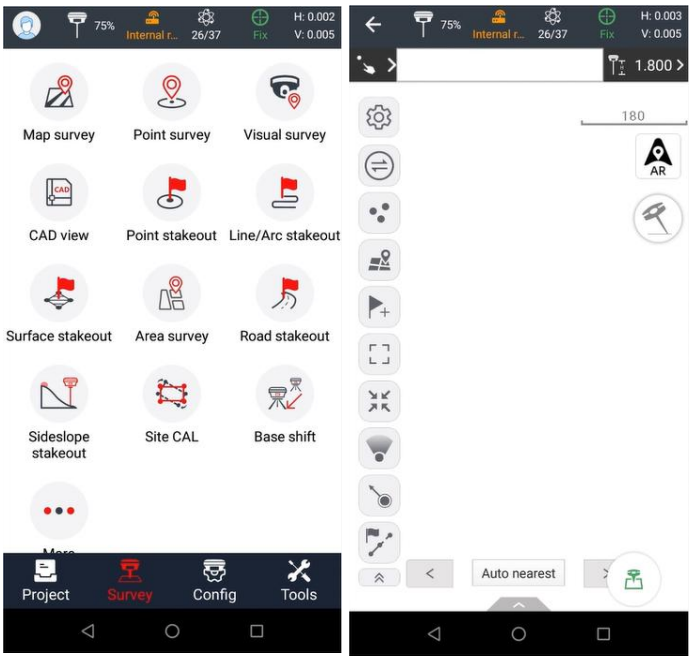
(5)Initialization is required:

- when the RTK is turned on every time.
- when IMU module is turned on every time.
- 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 hits the ground toughly.

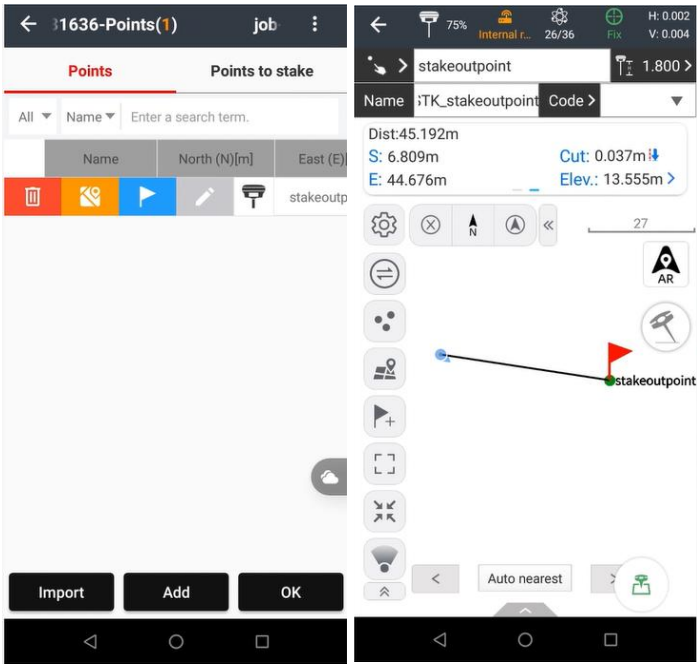
## 3.4 Working with the Vision Camera

### 3.4.1 Vision Stakeout Operation Steps

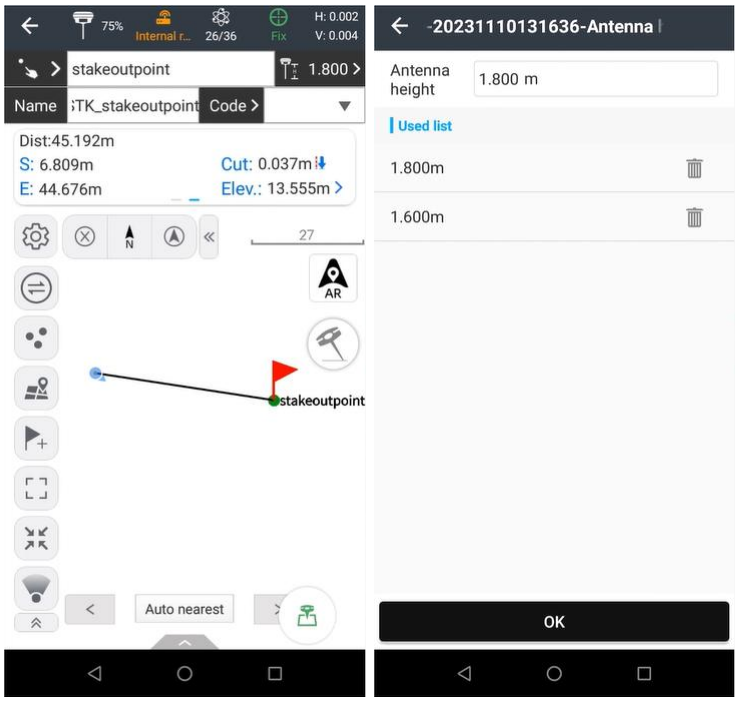
(1)Open MateSurvey-> Tap Stakeout-> Tap Point stakeout （Here take point stakeout as an example, currently also supports Line stakeout, CAD stakeout）




(2)Tap points, select a stakeout point, slide right and tap stakeout



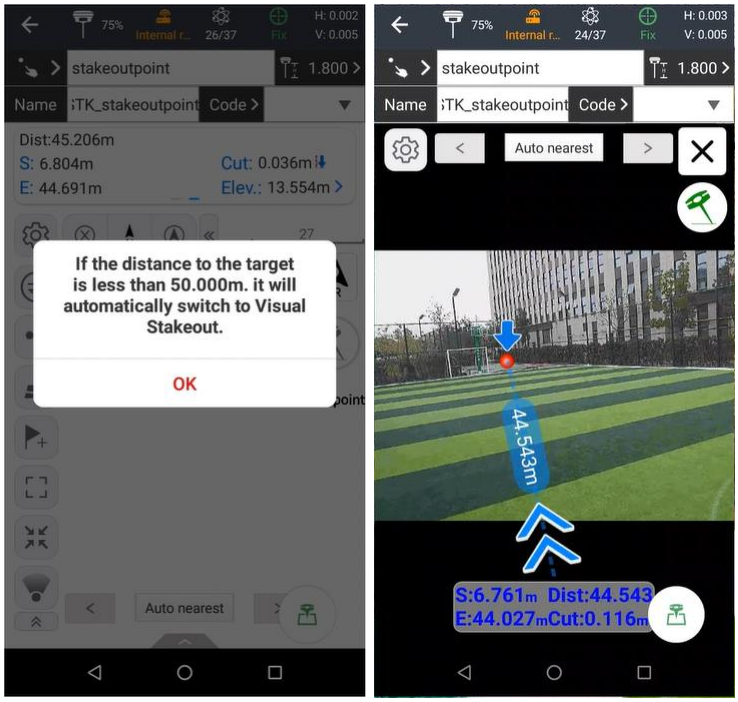
(3)Check whether the height of the antenna is consistent with the height of the 2M Range Pole w/ Bag




(4)Tap AR, the software will prompt you to activate tilt measurement

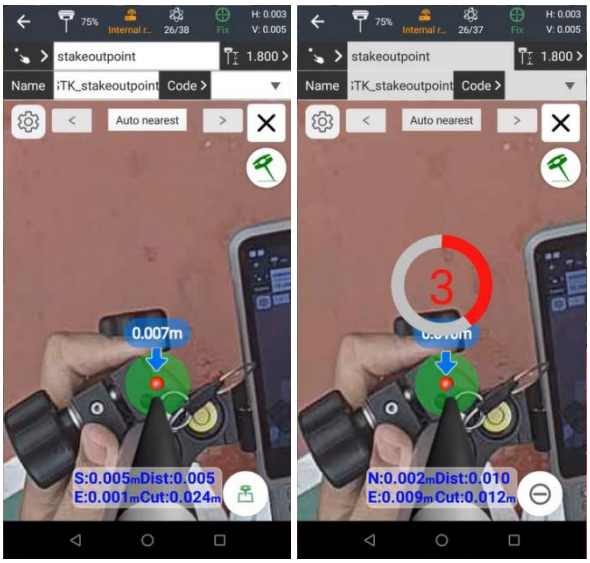
(5)This icon will appear when the initialization is successful.

(6)If the distance to the target is less than 50.0m meters, it will automatically switch to Vision Stakeout. (with Front Camera)



(7)If the distance to the target is less than 3.0m meters, it will automatically switch to Vision Stakeout. (with Bottom Camera)

(8)After we are within 1cm from the target point, we can click the measurement icon to collect




**Note:**

When the stakeout target point has a height, it is necessary to input the height of the target point as 0 or the actual height.

PDA and receiver camera should face the same direction.

### 3.4.2 Notes of using Vision Camera

(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 every time;
- when IMU module is turned on every time;
- 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.

# 4 Configuring Through a Web Browser

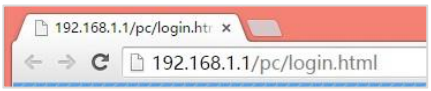
Supported browsers:

- 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:

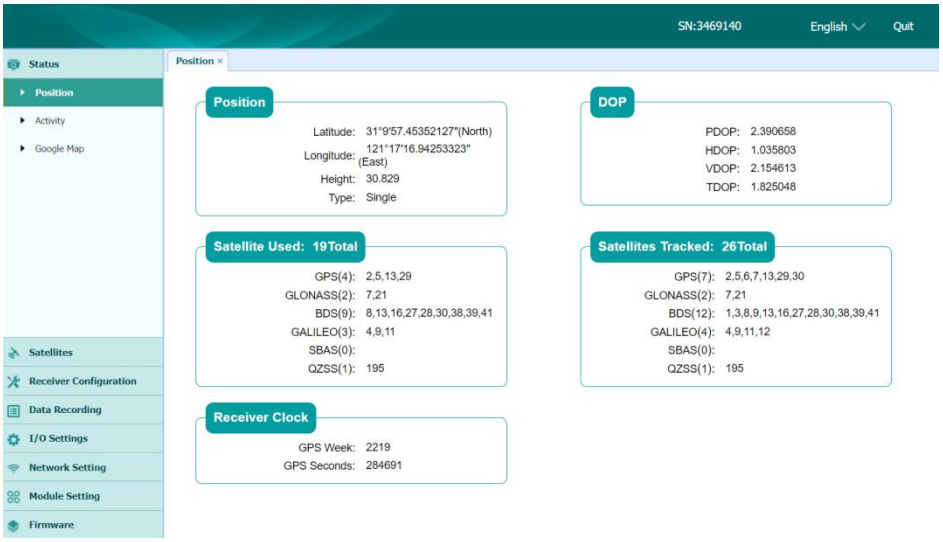
The default login account for the receiver is:

➢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 log in, the web page 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 web page in another language, select the corresponding language name from the dropdown list on the upper right corner of the web page.

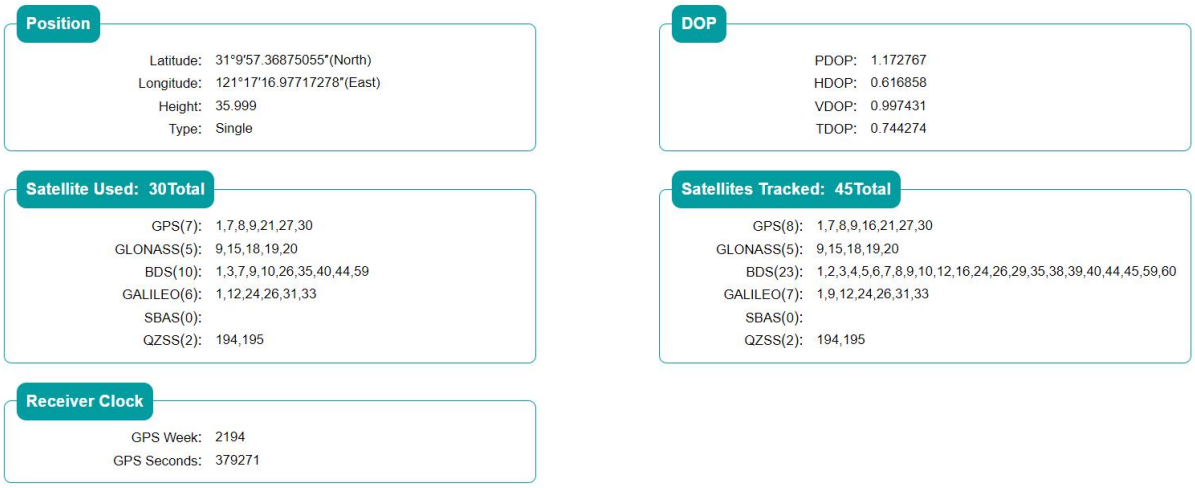
Currently, these languages are available:

## 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.

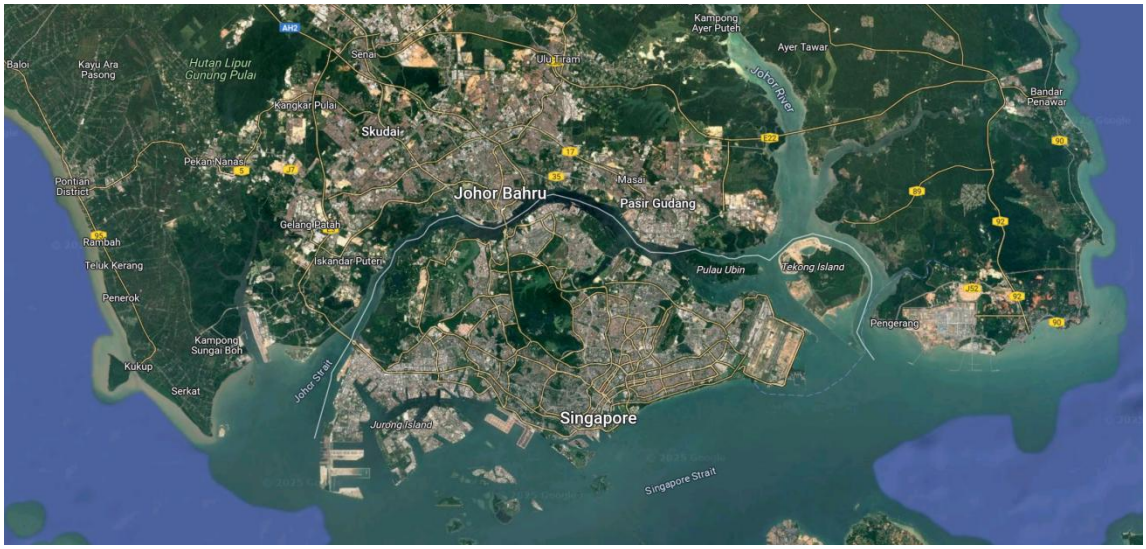



### 4.1.2 Activity Submenu

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 perfor

### 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, altitude angle, azimuth angle, L1 SNR, L2 SNR, L5 SNR and enable/disable status of each one.

Tracking Table ×

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

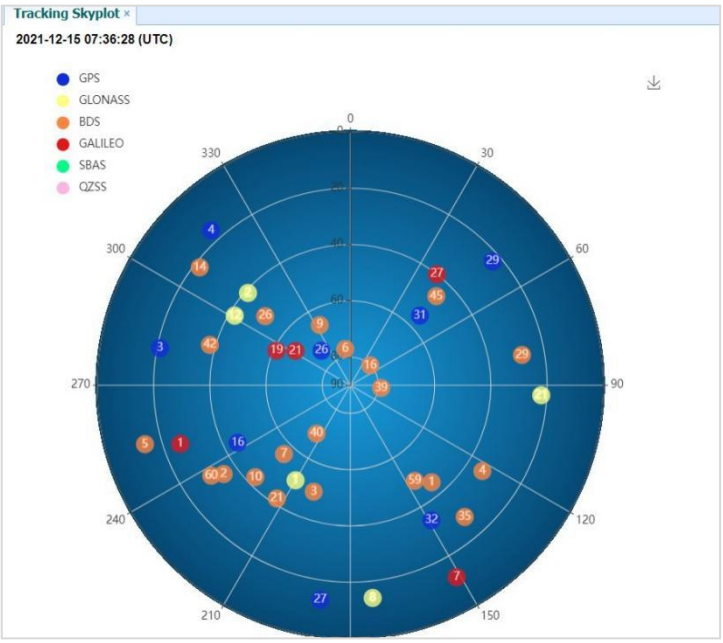
| SV | Type | Elevation Angle | Azimuth Angle | L1 SNR | L2 SNR | L5 SNR | B1C SNR | B2A SNR | Enabled |
|---|---|---|---|---|---|---|---|---|---|
| 3 | GPS | 21 | 282 | 40.000 | 40.850 | 30.880 | 0.000 | 0.000 | Yes |
| 4 | GPS | 15 | 318 | 40.030 | 36.800 | 27.800 | 0.000 | 0.000 | Yes |
| 16 | GPS | 45 | 242 | 44.820 | 39.450 | 0.000 | 0.000 | 0.000 | Yes |
| 26 | GPS | 74 | 318 | 48.720 | 43.430 | 36.160 | 0.000 | 0.000 | Yes |
| 27 | GPS | 12 | 188 | 34.690 | 35.890 | 26.250 | 0.000 | 0.000 | Yes |
| 29 | GPS | 23 | 50 | 41.370 | 36.580 | 0.000 | 0.000 | 0.000 | Yes |
| 31 | GPS | 55 | 44 | 45.450 | 41.970 | 0.000 | 0.000 | 0.000 | Yes |
| 32 | GPS | 35 | 149 | 42.840 | 38.490 | 30.140 | 0.000 | 0.000 | Yes |
| 1 | GLONASS | 52 | 211 | 41.760 | 46.170 | 0.000 | 0.000 | 0.000 | Yes |
| 2 | GLONASS | 40 | 313 | 47.100 | 46.320 | 0.000 | 0.000 | 0.000 | Yes |
| 8 | GLONASS | 14 | 174 | 36.530 | 43.730 | 0.000 | 0.000 | 0.000 | Yes |
| 12 | GLONASS | 41 | 300 | 45.760 | 49.200 | 0.000 | 0.000 | 0.000 | Yes |
| 21 | GLONASS | 22 | 94 | 37.800 | 44.160 | 0.000 | 0.000 | 0.000 | Yes |
| 1 | BDS | 45 | 140 | 39.830 | 42.710 | 44.970 | 0.000 | 0.000 | No |
| 2 | BDS | 35 | 235 | 35.420 | 43.410 | 42.250 | 0.000 | 0.000 | No |
| 3 | BDS | 50 | 199 | 40.270 | 44.410 | 43.470 | 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.

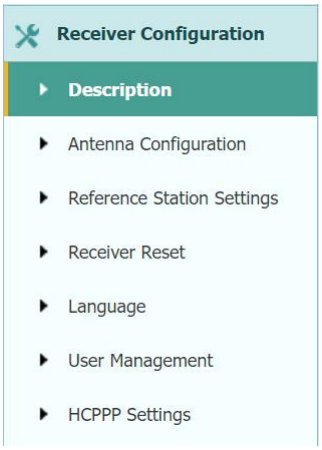


### 4.2.4 Satellite Activation Submenu

Use this menu to enable or disable satellites.

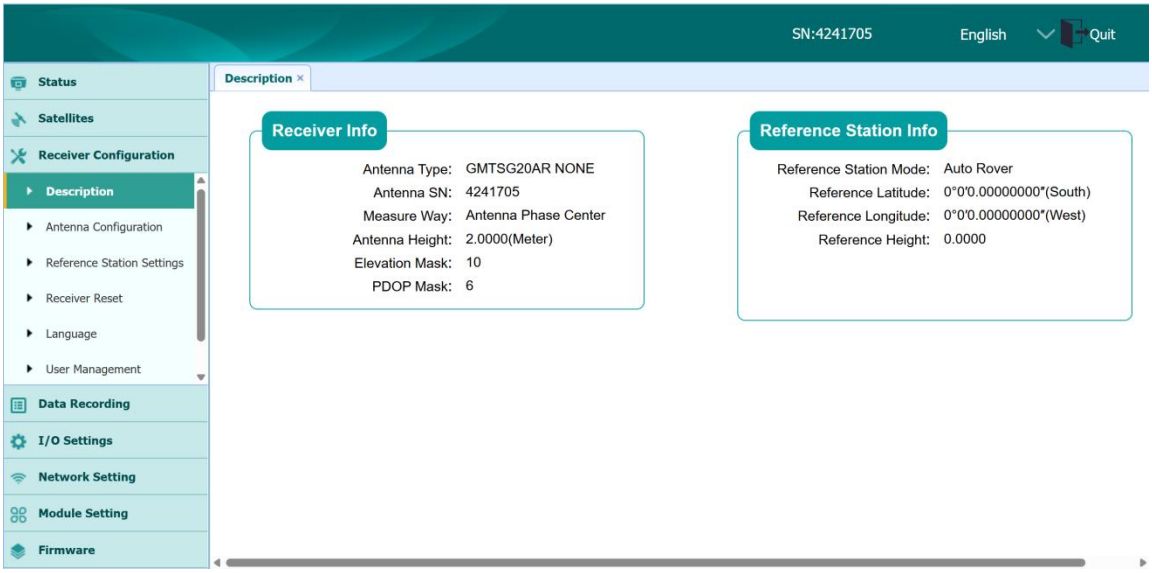
## 4.3 Receiver Configuration Menu

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:



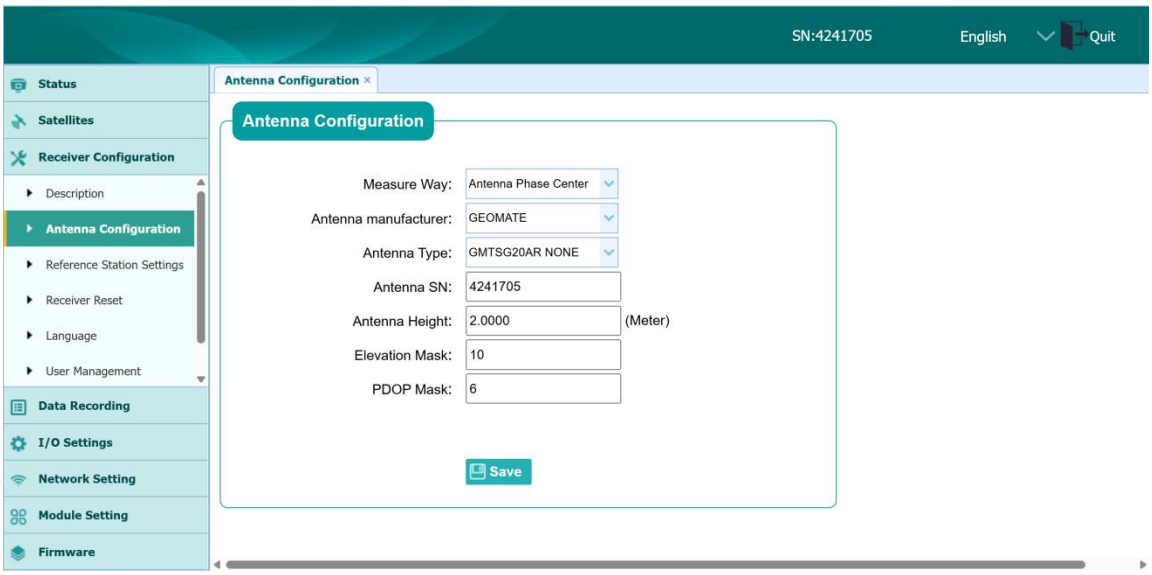
### 4.3.1 Description

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:



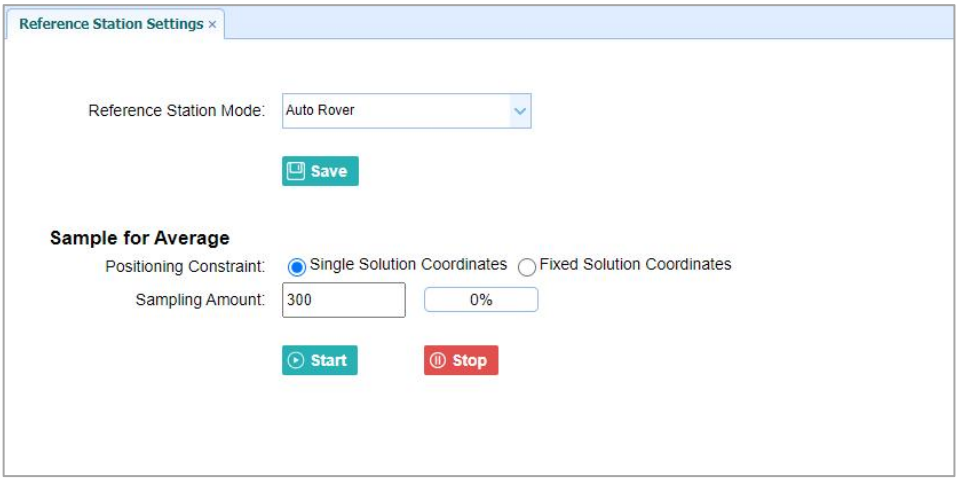
### 4.3.3 Reference Station Settings Submenu

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:

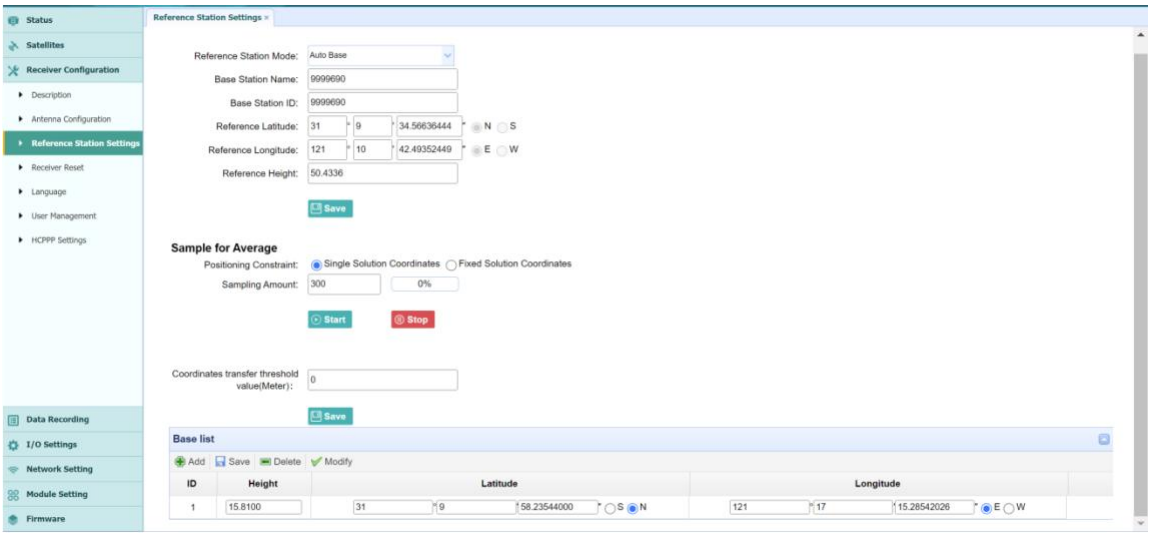
For Reference Station Mode:

There are three modes available:

(1) **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.

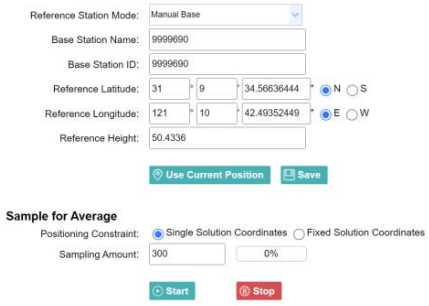



(2) **Auto Base**: The receiver will serve as a base after this mode is enabled, and then broadcast correction data based on coordinate inputted by user or obtained through autonomous positioning automatically.



(3) **Manual Base**: The receiver will serve neither as a base nor a rover 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:

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

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

**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:

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

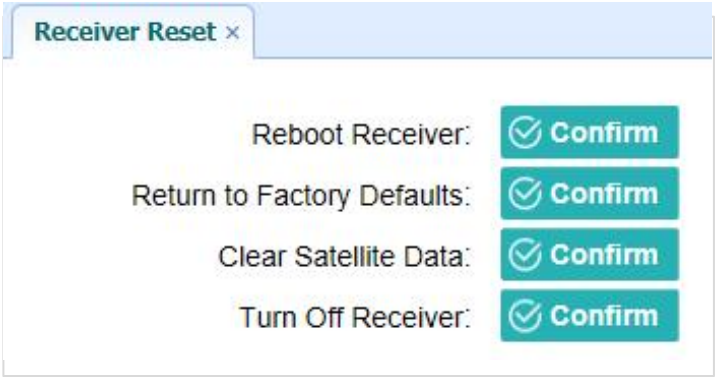
**Fixed Solution Coordinates**: Only collect coordinates of receiver with a fixed solution.

After the configuration of positioning limit and sampling amount, click Start to carry out 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

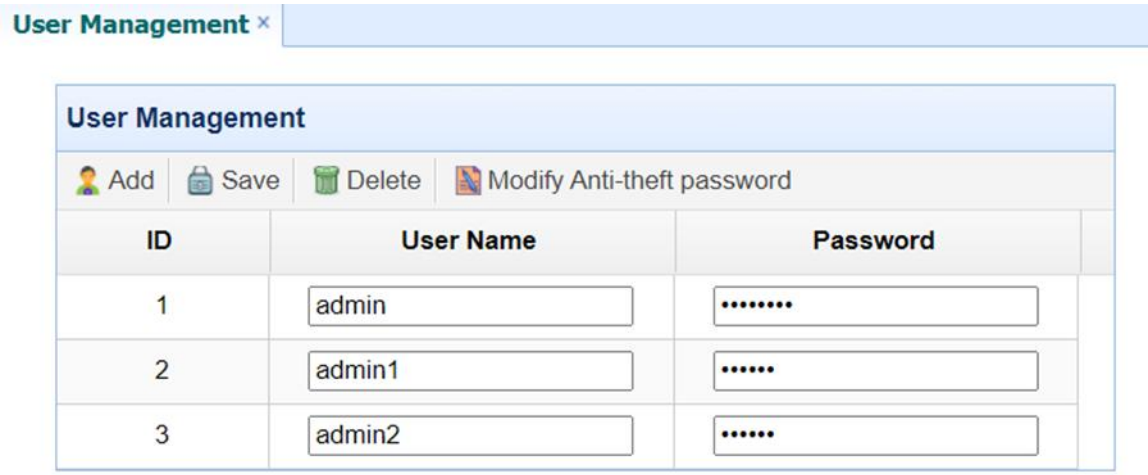
Use this screen to reset the receiver completely or partially:




### 4.3.5 Languages Submenu

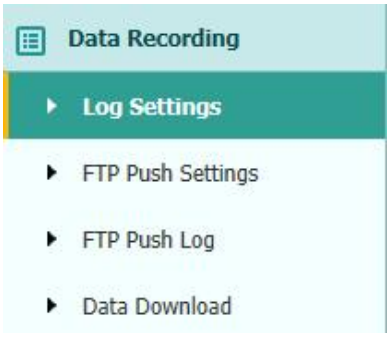
Use this screen to select the web interface language:

### 4.3.6 User Management Submenu



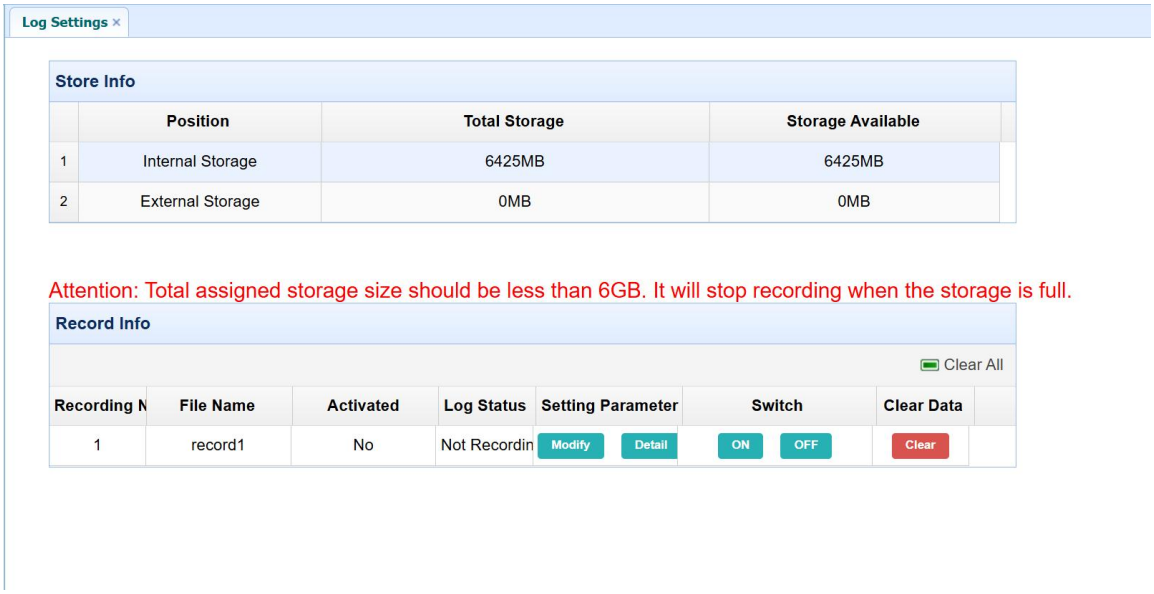

## 4.4 Data Recording Menu

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:

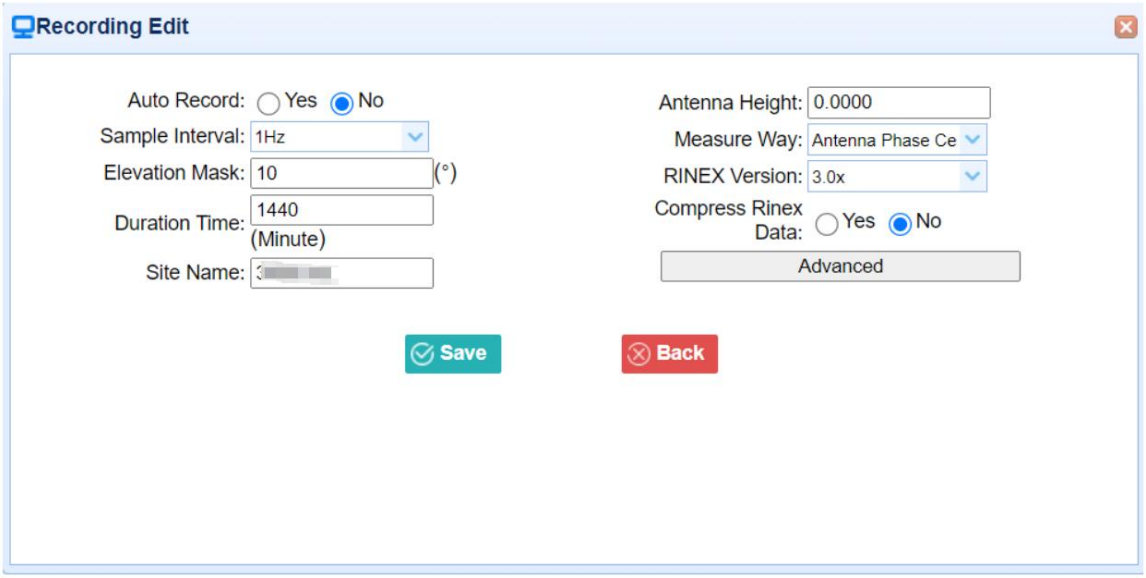


### 4.4.1 Log Settings Submenu

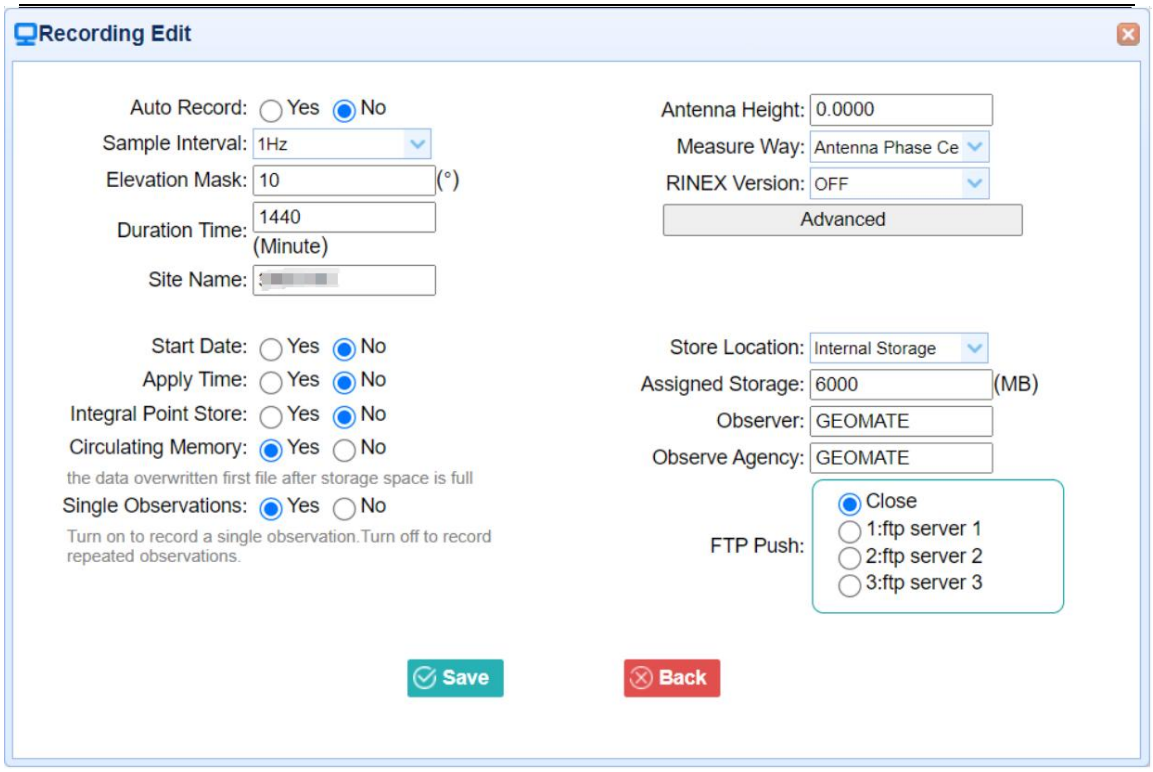
Here shows the data logging status, including internal and external storage usage and data logging status of each session. Also, users can configure the data logging settings for each session, including recording name, store location, storage limit, store formats, start time, etc.




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 Save button to save the settings and back to the Log Settings screen. Also, users can click Back 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.

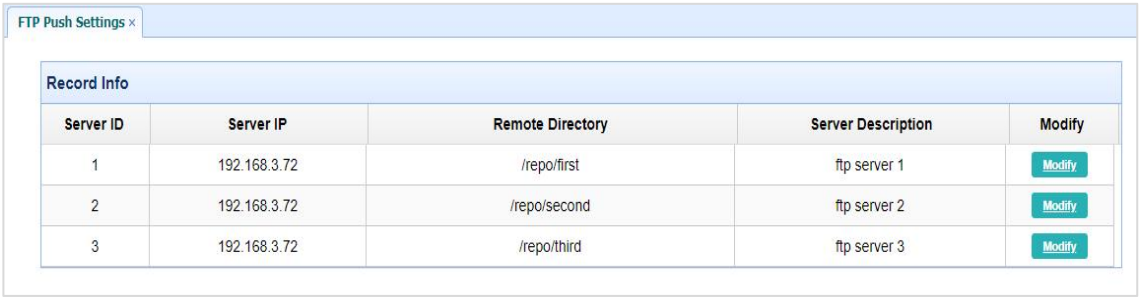
To switch on or off ANY data logging session, tap the ON or OFF button on the right of the required session.

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.

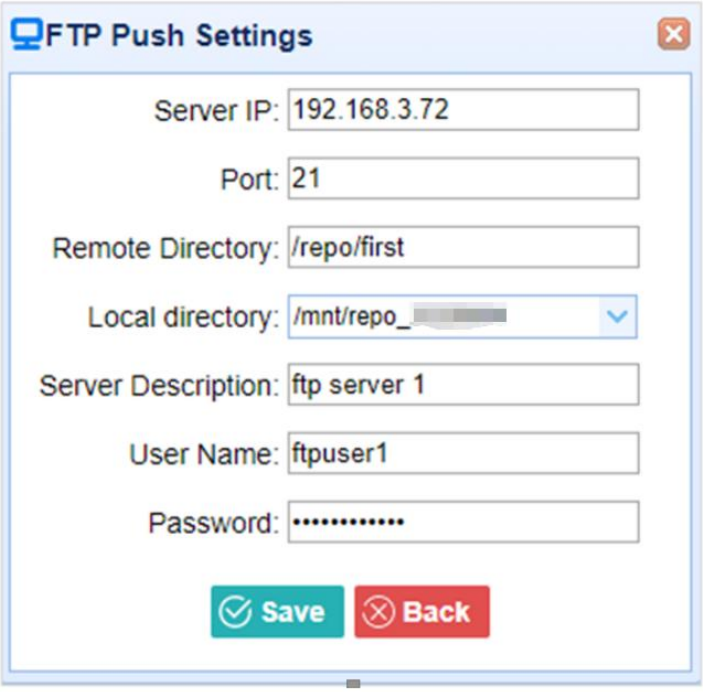
### 4.4.2 FTP Push Settings Submenu

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.



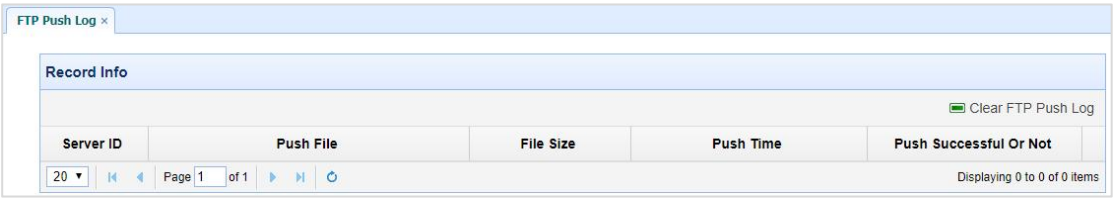

| Server ID | Server IP | Remote Directory | Server Description | Modify |
|---|---|---|---|---|
| 1 | 192.168.3.72 | /repo/first | ftp server 1 | Modify |
| 2 | 192.168.3.72 | /repo/second | ftp server 2 | Modify |
| 3 | 192.168.3.72 | /repo/third | ftp server 3 | Modify |

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

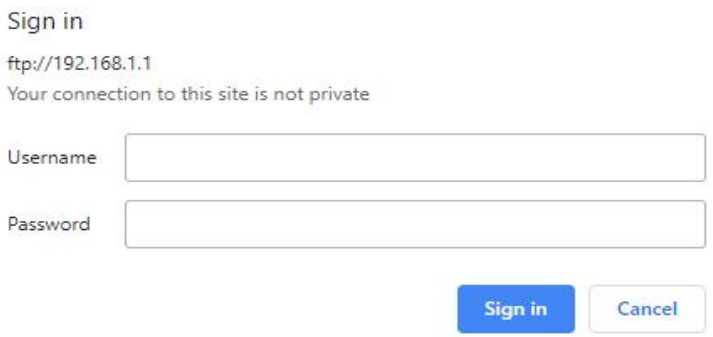
Shows the related information about the recorded filed that be pushed. And users can tap **Clear Ftp Push Log** button in the upper right corner to clear the log of FTP Push operations.



### 4.4.4 Data Download Submenu

In this submenu, users can download the data files that recorded in the internal storage through the internal FTP site.

1.Click this submenu, and then the log on dialogue box will prompt you to enter a user name and password:




The default logon account for the internal FTP site is:

➢User name: ftp

➢Password: ftp

2.Click the directory named as “repo” to view and download the files currently stored on the receiver:

3.To find the file need to be downloaded, click the name of data logging session → the date of file that be recorded → the format of the file → the name of the target file.

4.To download a file, left click the name of the target file → download the file according to the prompts.

## 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.

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

I/O Settings ×

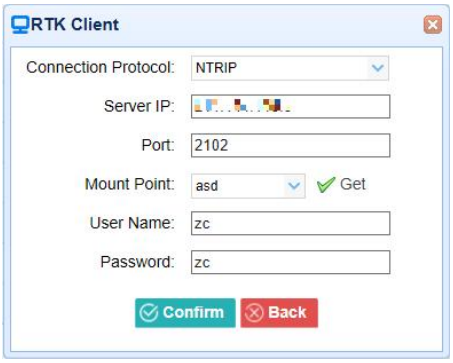
| | Type | Description | Output | Connection Status | Modify |
|---|---|---|---|---|---|
| 1 | RTK Client | 211.144.118.5:2102 | --- | Unconnected | Connect Disconnecting De |
| 2 | TCP/UDP_Client1/NTRIP Serve | 192.168.3.18:9900 | --- | Unconnected | Connect Disconnecting De |
| 3 | TCP/UDP_Client2/NTRIP Serve | 192.168.3.18:9901 | --- | Unconnected | Connect Disconnecting De |
| 4 | TCP/UDP_Client3/NTRIP Serve | 192.168.3.18:9902 | --- | Unconnected | Connect Disconnecting De |
| 5 | TCP/UDP_Client4/NTRIP Serve | 192.168.3.18:9903 | --- | Unconnected | Connect Disconnecting De |
| 6 | TCP/UDP_Client5/NTRIP Serve | 192.168.3.18:9904 | --- | Unconnected | Connect Disconnecting De |
| 7 | TCP/UDP_Client6/NTRIP Serve | 192.168.3.18:9905 | --- | Unconnected | Connect Disconnecting De |
| 8 | TCP Server/NTRIP Caster1 | 9901 | --- | Closed | Connect Disconnecting De |
| 9 | TCP Server/NTRIP Caster2 | 9902 | --- | Closed | Connect Disconnecting De |
| 10 | TCP Server/NTRIP Caster3 | 9903 | --- | Closed | Connect Disconnecting De |
| 11 | TCP Server/NTRIP Caster4 | 9904 | --- | Closed | Connect Disconnecting De |
| 12 | Serial Port | 115200 | --- | --- | Settings |
| 13 | Bluetooth | GNSS-3411955 | GPGGA:5s, | --- | Settings |
| 14 | Radio | 462.5500MHz | --- | --- | Settings |

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

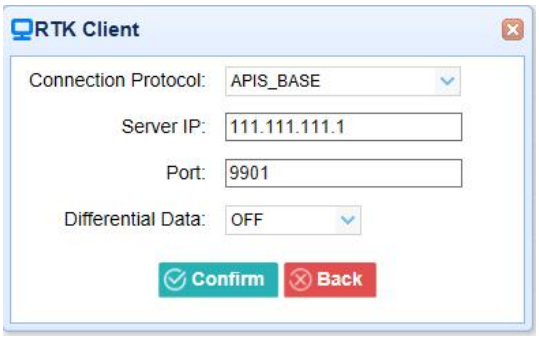
## 1.RTK Client

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 log on CORS or APIS.

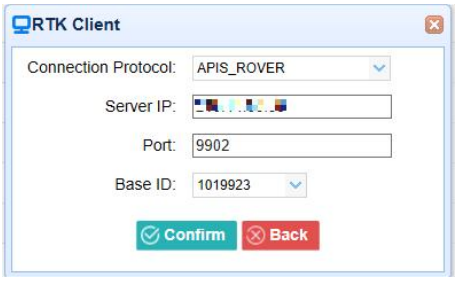
➢Connection Protocol: NTRIP



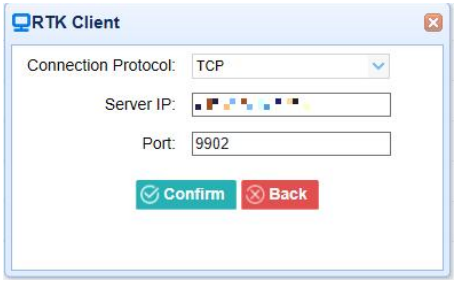

➢Connection Protocol: APIS_BASE




➢Connection Protocol: APIS_ROVER



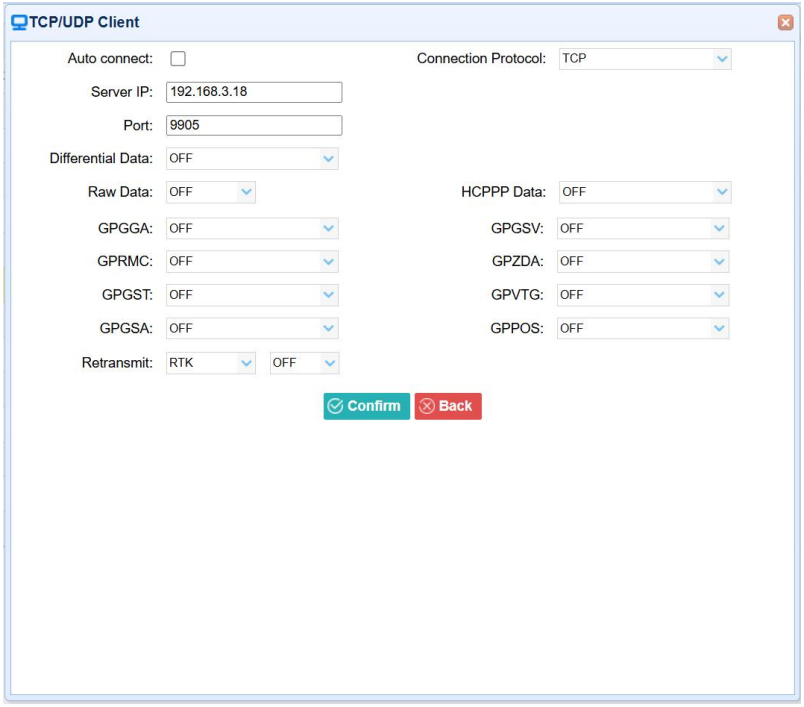
➢Connection Protocol: TCP



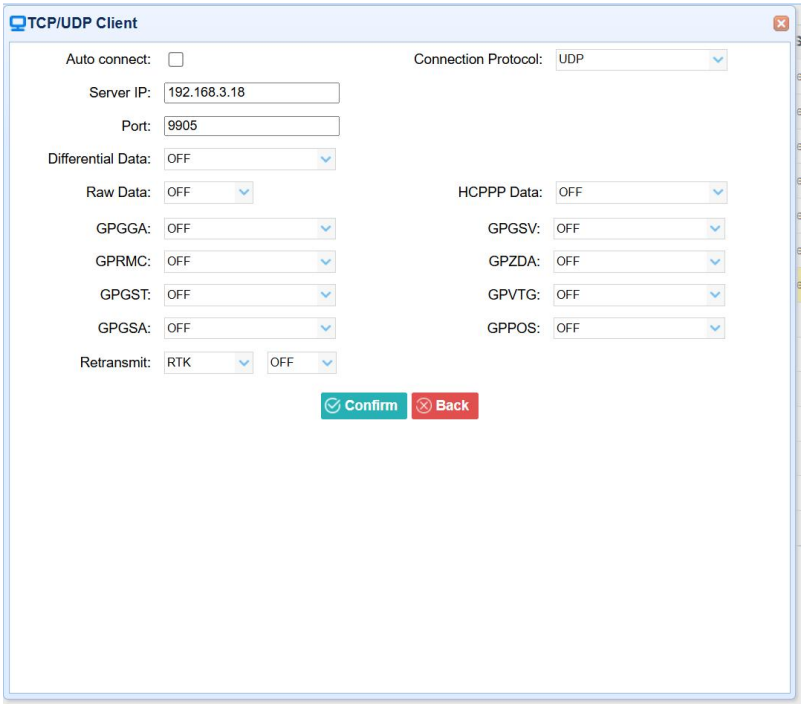

**2.TCP/UDP Client/NTRIP Server**

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.

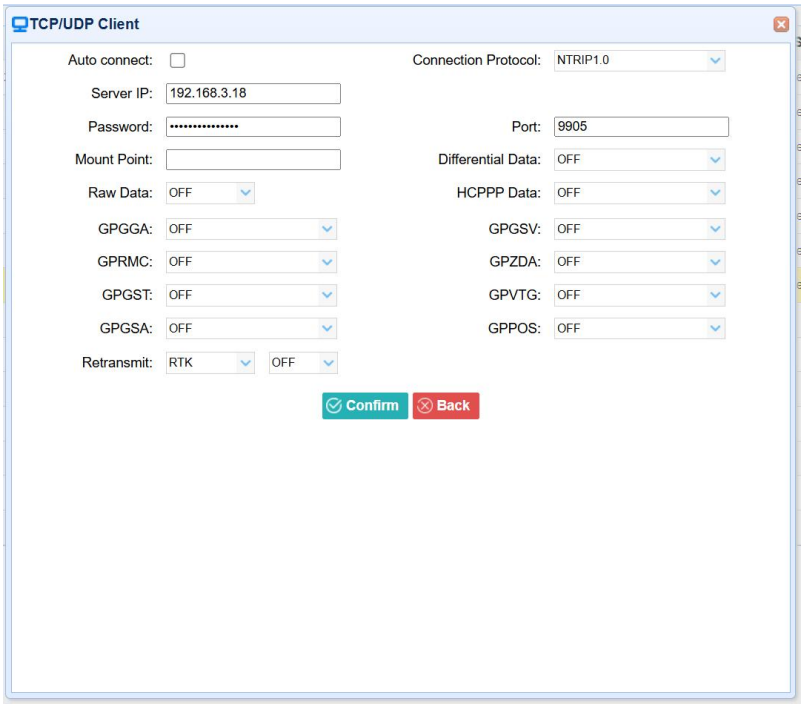
➢Connection Protocol: TCP



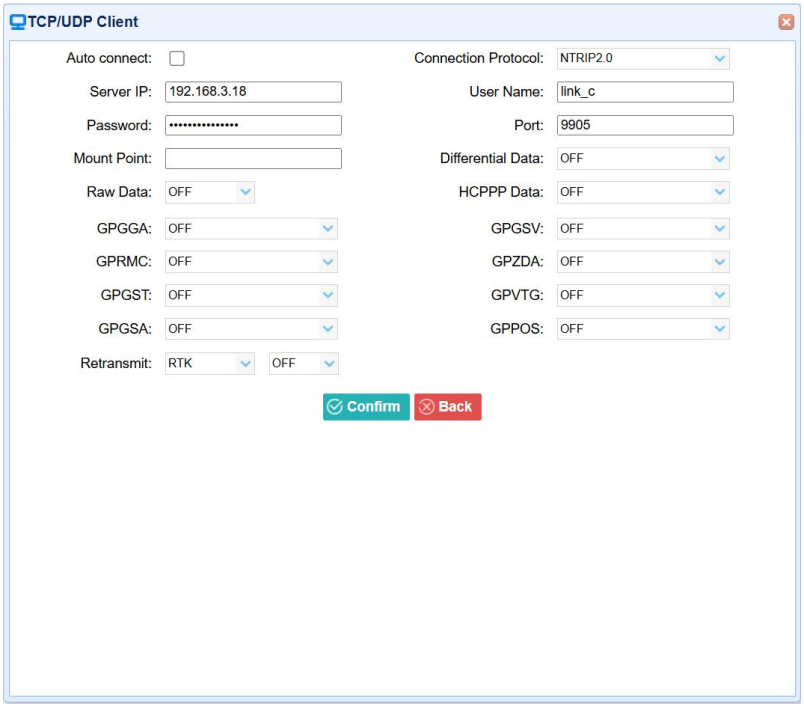
➢Connection Protocol: UDP




➢Connection Protocol: NTRIP1.0



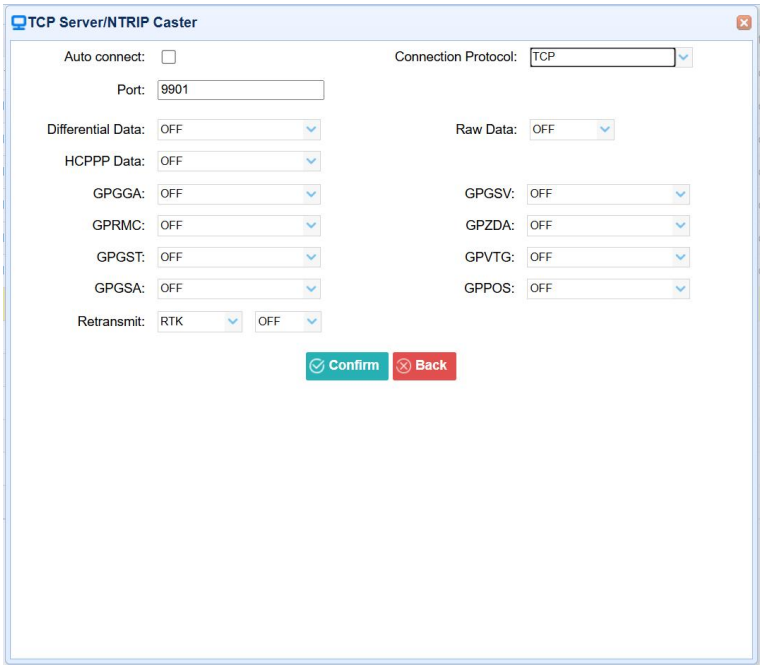
➢Connection Protocol: NTRIP2.0



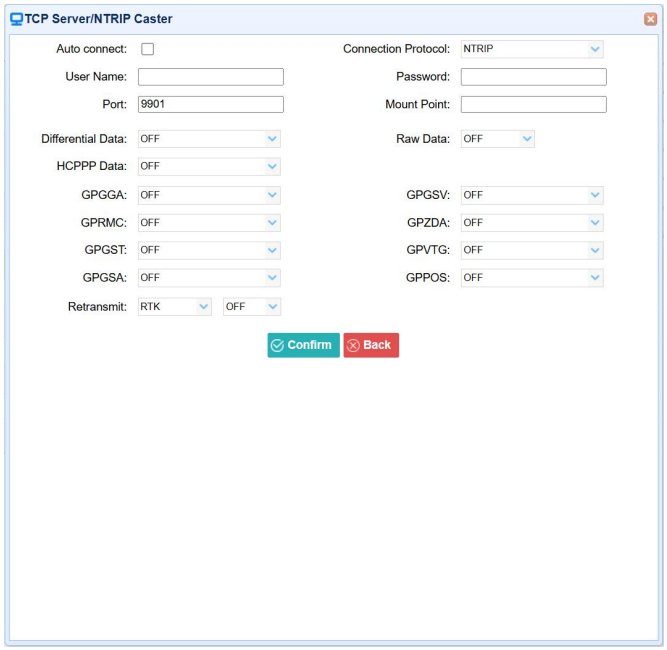

3.**TCP Server/NTRIP Caster**

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

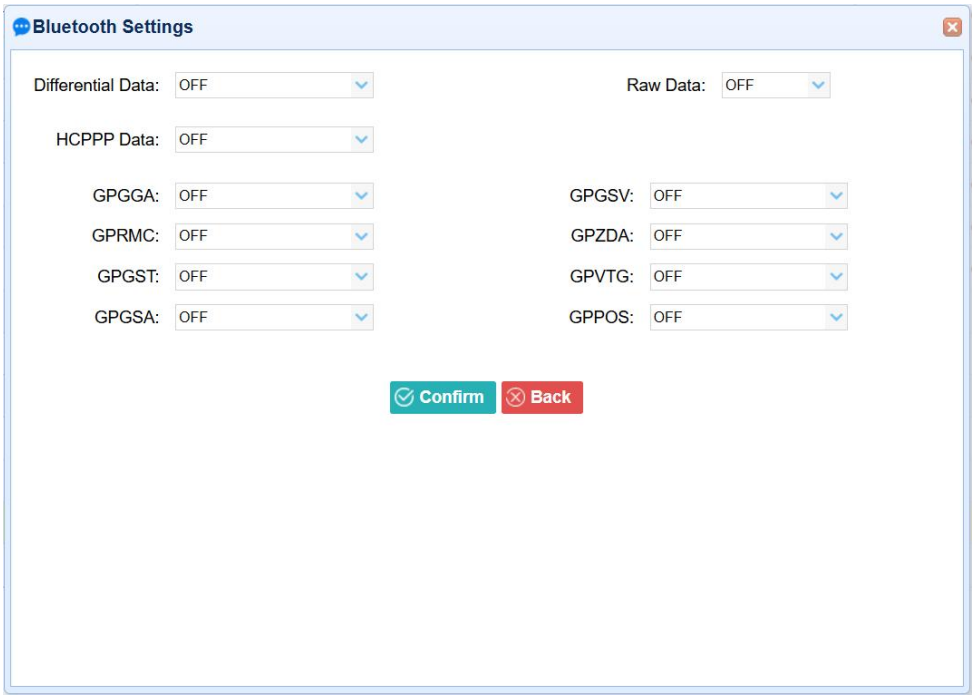


➢Connection Protocol: NTRIP



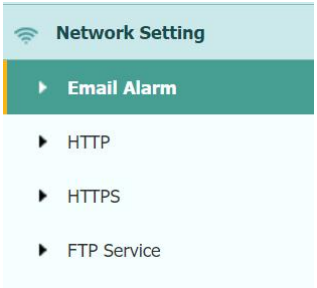

## 4.**Bluetooth**

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.



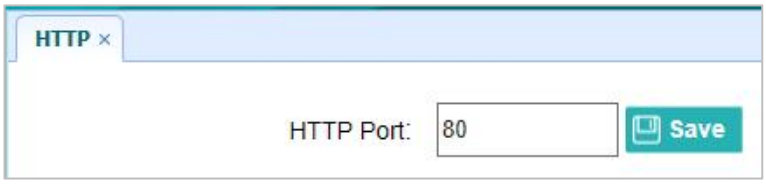
## 4.6 Network Setting Menu

Use this menu to set email alert for specific situation, configure HTTP or HTTPS port, and the username and password of internal FTP site:



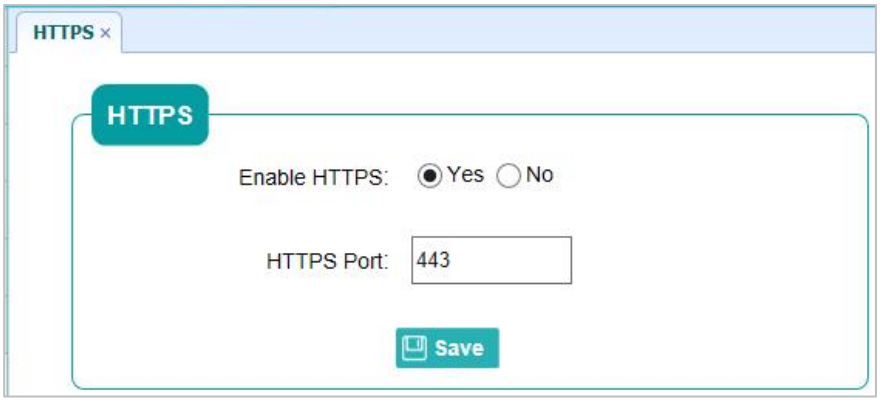

### 4.6.1 HTTP Submenu

Use this submenu to configure HTTP port.



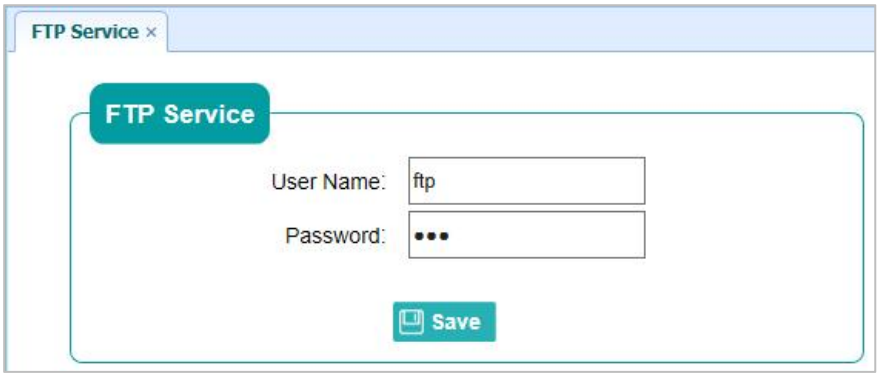

### 4.6.2 HTTPS Submenu

Use this submenu to configure HTTPS port.



### 4.6.3 FTP Service Submenu

Use this submenu to configure the user name and password of internal FTP site.

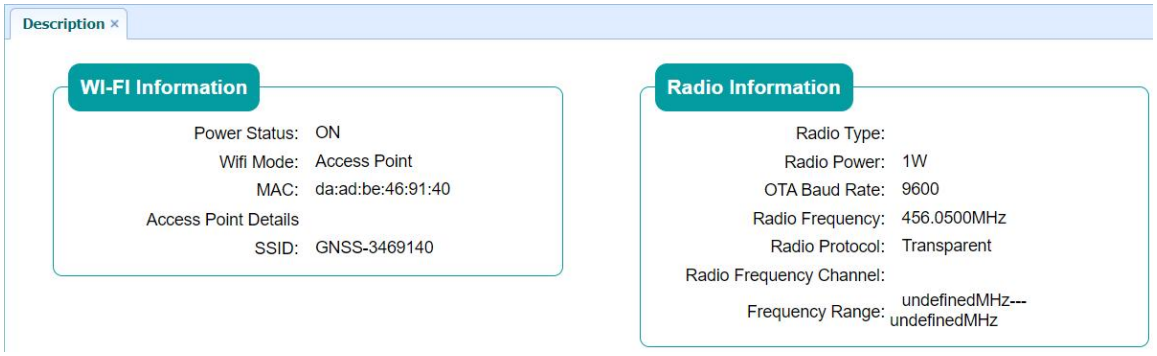



## 4.7 Module Setting Menu

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

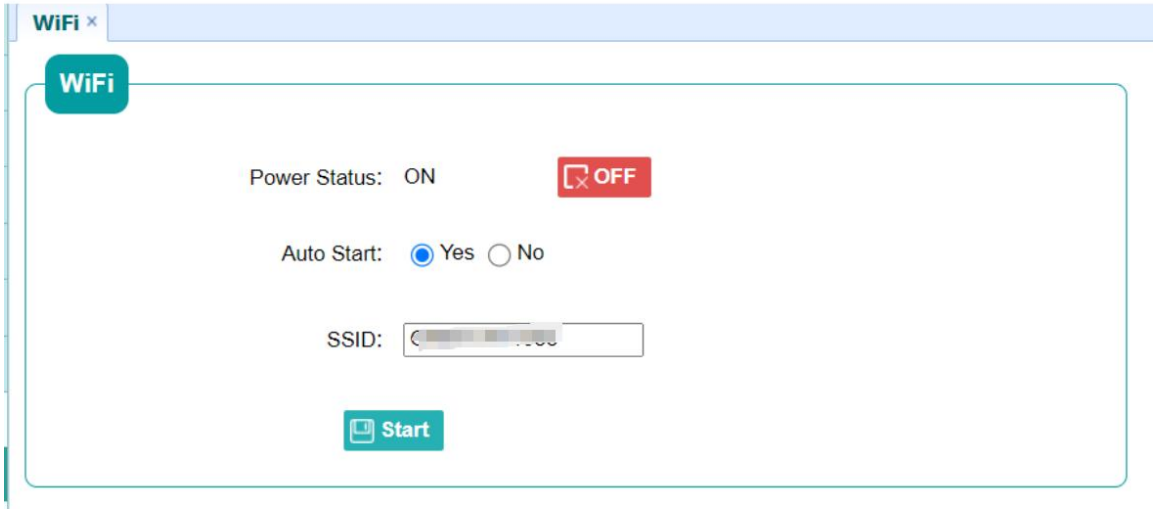
### 4.7.1 Description Submenu

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



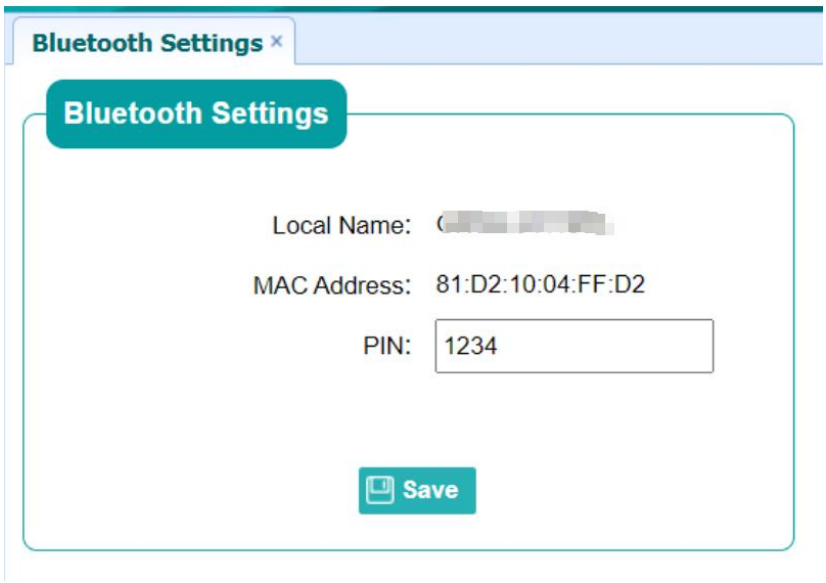

### 4.7.2 WiFi Submenu

Use this submenu to turn on/off WiFi function.



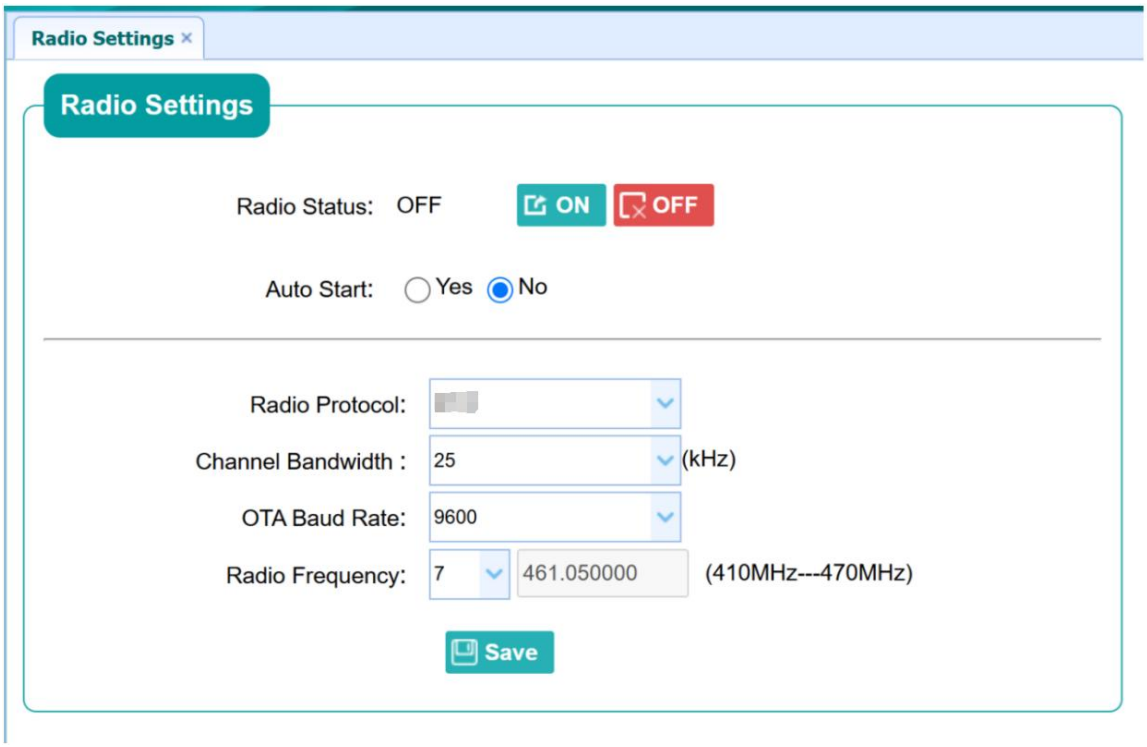
### 4.7.3 Bluetooth Settings Submenu

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



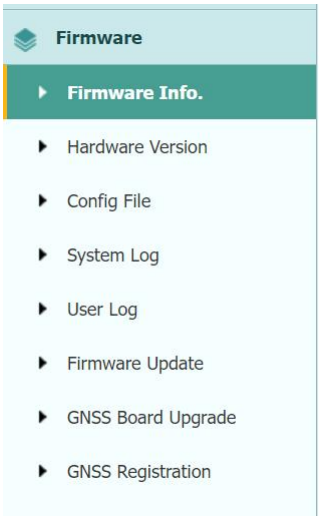

### 4.7.4 Radio Settings Submenu

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



## 4.8 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:

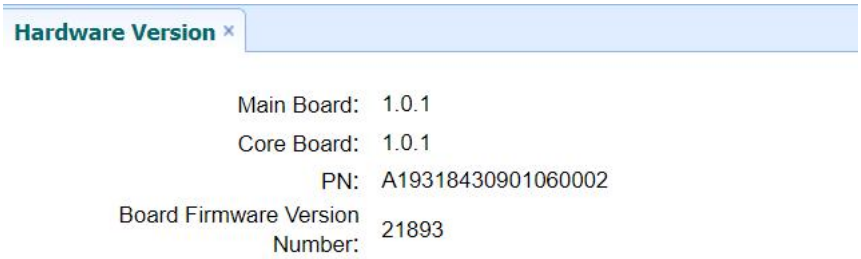



### 4.8.1 Firmware Info Submenu

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

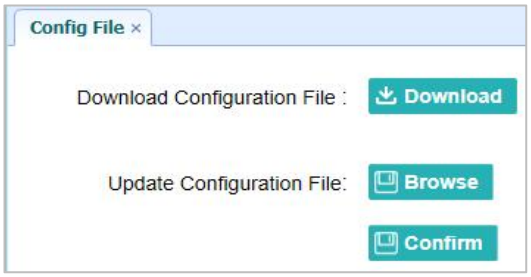
### 4.8.2 Hardware Version Submenu

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



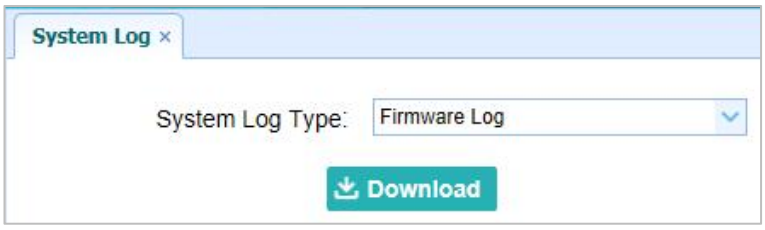
### 4.8.3 Config File Submenu

Use this submenu to update Configuration File.



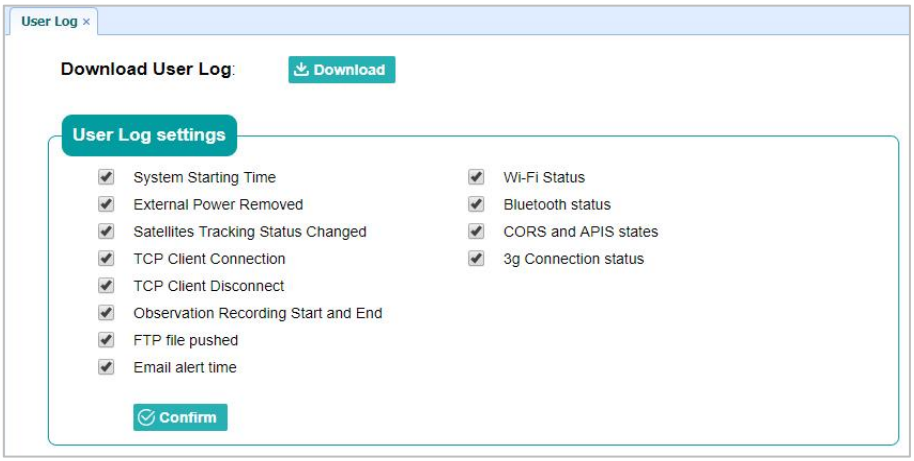

### 4.8.4 System Log Download Submenu

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



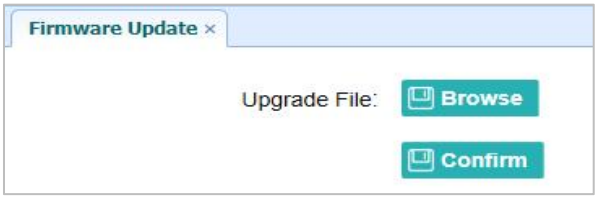

### 4.8.5 User Log Submenu

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.



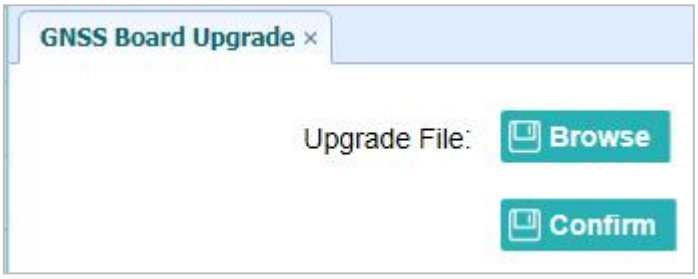

**Notes**

It may take abo ut 3 o r 4 minutes to co mplete the firmware upgrading. Do no t to uch the power butto n o r unplug the power until the upgrading process finishes, o r damage will be caused to the receiver.

The rece iver will restart after the firmware upgrading is do ne, so users need to reco nnect the receiver with yo ur computer via Wi -Fi, and then log-in the receiver thro ugh a web browser to co ntinue the configuratio n.

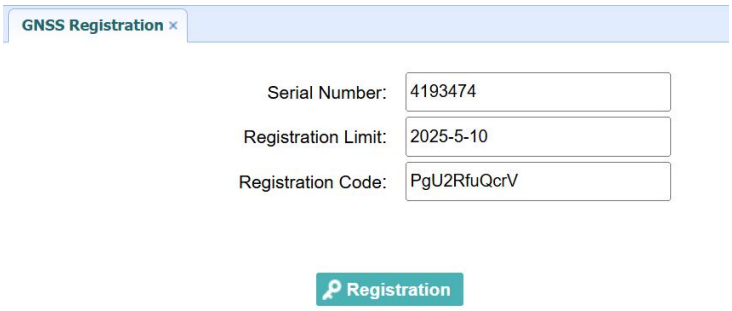
### 4.8.7 GNSS Board Upgrade Submenu

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.



# GEOMATE POSITIONING

38 BEACH ROAD, #29-11, SOUTH BEACH TOWER,
Singapore 189767

Tel: +65 8919 0418 | Fax: +86 21 649 50 963
Email:support@geomate.sg

Skype: geomate_support
Website: www.geomate.sg

*This document is intended for general information purposes only. It does not consider the reader's specific circumstances and environmental constraints of use of GNSS*

# FCC warning statements:

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.

Caution: Any changes or modifications to this device not explicitly approved by manufacturer could void your authority to operate this equipment.

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.

The device has been evaluated to meet general RF exposure requirement This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment.
This equipment should be installed and operated with minimum distance 50cm between the radiator & your body.