

**GINTEC G20M GNSS Receiver**

**User Manual**



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# 1 Introduction

## 1.1 Company Introduction

Guangzhou Geosurv Information Technology Co., LTD is a company professional in surveying and mapping industry. Advanced and high-quality products are our top priority. We try our best to offer prompt and good service to all our customers. Rich experience and abundant knowledge in this field guarantee that every decision we made is on the basis of scientific test. We strive to provide great products and service with reasonable price and believe it's the key to have more clients and gain more cooperation.

## 1.2 Outstanding Features of GINTEC G20M

Purchasing the right tools for a professional job is essential in today's competitive business environment. As the latest GNSS receiver, G20M distinguishes itself from other GNSS products. It is more compact and lightweight but integrating more advanced technology. Even still equipped with magnesium alloy fuselage, the dimension is only 100x100x61.5mm and the weight is just 555g. Many revolutionary technology in G20M makes your survey work more quickly and efficiently. Some innovation features can be summarized as below:

### **Small and Light Design**

With only 580g magnesium alloy design, G20M will be a powerful productive rover for surveyors in topographic and mapping, infrastructure and construction.

### **Full Constellation Tracking**

G20M can track full constellation GNSS satellites: GPS, Glonass, Galileo and BeiDou. It maximizes the tracking to observe all visible and available GNSS satellite signals. With the aid of UGypsophila RTK processing tech, G20M uses and locks more satellites, thereby performing better for real-time reliable accuracy.

### **IMU Tilt Survey Compatible with SurPad**

Integrated with new calibration-free IMU module and based on 4th generation pole-tilt compensation tech, G20M enables points to be measured or staked out even if surveyors tilt the pole while walking. Surveyors could pay more attention to their job at hand and complete work faster.

### **Fast-Charge Tech**

G20M provides type-C charging interface and supports multiple fast charging protocols.

Surveyors can charge G20M using portable phone battery anytime and anywhere.

### Long Life Battery

With a built-in large- capacity lithium battery, G20M can last all day without stopping. Smart power button design can indicate battery level even in shutdown status.

### Smart WEB UI Control

To provide a friendlier experience for first-timers and experienced users, we provide users with 2 kinds of WEB UI: Smart and Professional.

All of these innovations will increase your productivity and taking your performance to a new level.

## 2 General Information

### 2.1 Outlook of G20M



Figure 2-1

A: Indicators





B: Power button

C: Reset button

D: USB port

E: SIM card slot

The indicator status: light or blink. It represents different status of the RTK equipment:

	Bluetooth Indicator	Light on when device has been connected via Bluetooth.
	Satellites Indicator	Blink when normally receive satellites signals.
	Datalink Indicator	Blink when differential data is received.
	Power Indicator	Red light on when device is charging; Green light on when fully charging. Red light blinks when device is in low battery

## 2.2 Basic Operation

### 2.2.1 Turn on/off

Turn on

This is the very first step to use G20M. When the receiver has power, keep pressing power button for 3 seconds, then you will see the power button light up and hear beep.

Turn off

Keep pressing power button for 3 seconds, then you will hear beep voice and the device will be turned off.







If the device crash down, press Reset button to force it to turn off.

### 2.2.2 Charging

Red light on when device is charging. Green light on when fully charging.

G20M supports MTK PE1.1/2.0 and PD protocol fast charging. Choose the fast-charging adapter to charge it can greatly shorten charging time.

### 3 Equipment Packing List

<b>GINTEC G20M</b>					
<b>1.Main body</b>					
Name	Description	Picture	Size (L*W*H)	Weight	QTY
Receiver main body	Unicorecomm board		100*100*61.5mm	0.55KG	1
<b>2.Accessories</b>					
Name	Description	Picture	QTY		
Charger Adapter	Charger Adapter 5V-2A		1		
Charger/USB Cable	Type-C USB-Type-cable		1		
Connector	connect G20 and Pole		1		
Rover Case	Black solid hard bag		1		
<b>A Suite of G20M</b>					
Picture	G.W.	N.W.	Packing		
	5kg	4.5kg (0.9kg*5)	0.016CBM 43*22*17CM (contains 5 sets G20M)		

## 4 Setting Up

### 4.1 Setting Up Base Station

#### 4.1.1 Choose a suitable place

A suitable place is essential for base station to better receive the satellites and transmit the UHF signals. A suitable position should comply with following conditions:

- (1) Choose a wide-open area in order to easy and better receive signal of satellites. Besides, make sure there is no covering like roof or heavy foliage.
- (2) A higher place is better for transmitting the UHF signals. If rover is far away from base, then the enhanced antenna should be raised by tripod.
- (3) Make sure there is no large area of water or objects intensely interfering the satellite signal.
- (4) Check carefully that there are no high-power radio emission objects surrounded. And make sure there is no power lines around. Need keep at least 200m far from these objects.

#### 4.1.2 Set up instrument

Mount the instrument to the tripod. Level and center the instrument precisely to ensure the best performance. You can set up base on random point or on given point. If you set base on random point, you just choose a position and level the instrument. If you set base on given point, you can follow below steps:

##### (1) Leveling and Centering the instrument

###### a. Setting up tripod

First, extend the extension legs to suitable length, make the tripod head parallel to the ground and tighten the screws.

b. Make the center of the tripod and the occupied point approximately on the same plumb line.

c. Step on the tripod to make sure if it is well stationed on the ground.

##### (2) Attaching the instrument on the tripod

Place the instrument carefully on the tripod head and slid the instrument by loosening the tripod screw.

##### (3) Roughly leveling the instrument by using the circular vial

a. Turn the leveling screw A and B to move the bubble in the circular vial as below Figure 4-1 shown, in which case the bubble is located on a line perpendicular to a line



running through the centers of the two leveling screw being adjusted.

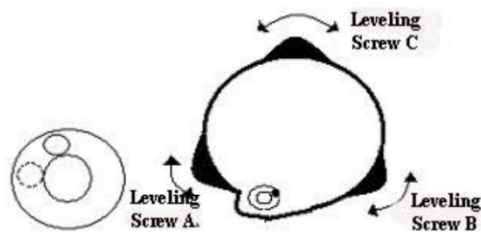


Figure 4-1

b. Turn the leveling screw C to move the bubble to the center of the circular vial.

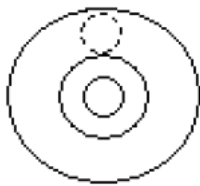


Figure 4-2

(4) Precisely leveling by using the plate vial

a. Rotate the instrument horizontally by loosening the horizontal clamp screw and place the plate vial parallel to the line connecting leveling screw A and B, and then bring the bubble to the center of the plate vial by turning the leveling screws A and B.

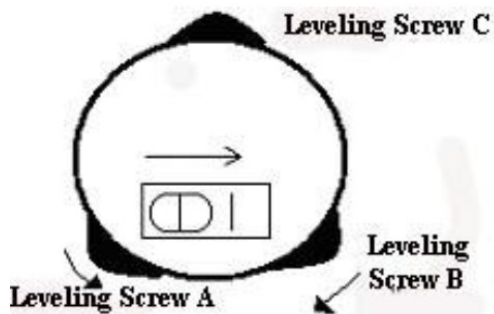


Figure 4-3

b. Rotate the instrument  $90^{\circ}$  around its vertical axis and turn the remaining leveling screw or leveling C to center the bubble once more.

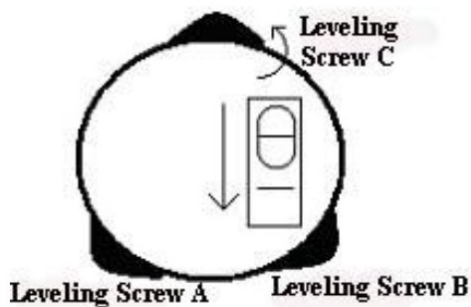


Figure 4-4

c. Repeat the above a & b steps for each 90° rotations of the instrument and check whether the bubble is correctly centered in all directions.

### 4.1.3 Measure antenna height

The antenna height must be measured when we use G20M to collect static data or use it as base station. It's the "a" show in below Figure 4-5, the height from ground measured point to phase center, only get this height can we know coordinate of the ground measured point. There are 3 measuring methods to get the antenna height:

(1) Slant height

Measure the distance from the ground measured point to the middle of mainframe scale mark. It's the "d" shown in Figure 4-5.

(2) Pole height

Measure the distance from bottom of device to ground directly. It's the vertical height "b" shown in Figure 4-5.

(3) Measuring plate

Measure the distance ground measured point to the upper edge of plate. It's the "c" shown in Figure 4-5.

Choose either one measuring method from above. Use measure tape measure the height you choose. Input the height in software. Then you can get the height from ground to phase center. The formula is as below:

$$a=b+L1$$

$$b=\sqrt{c^2 - k^2} \quad b=\sqrt{d^2 - R^2} - H$$

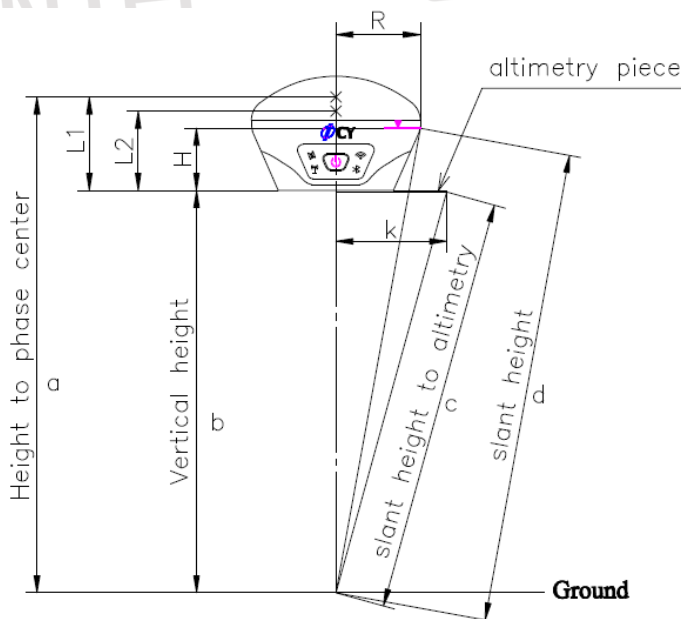


Figure 4-5 (Measure Antenna Height)

#### 4.1.4 Transmit signal through network

You can also use network (G20M has 4G module supports 4G network) to transmit signal. Insert SIM card into the receiver. And select network datalink via controller or WEB UI function.

### 4.2 Setting Up Rover Station

Rover station can receive data through different datalink methods--internal radio, rover network and controller network.

#### 4.2.1 Connect controller with rover

Attached the controller bracket to the pole. If use internal 4G, you need to insert the SIM card in controller. If use internal radio, then fix UHF antenna. You can connect the controller with rover through Bluetooth as you prefer.

Via Bluetooth

Use controller to search the Bluetooth signal of G20M, once found, the Serial NO. of G20M will show on controller, then select it to finish connect.

#### 4.2.2 Rover network mode

Insert SIM card on rover, then select network mode on controller or via WEB UI function. Input the CORS account and password, set APN and upload GGA.

#### 4.2.3 Rover controller network

This method means the SIM card is inserted in controller. The controller gets the correction data and send to device via Bluetooth. It's less stable compare with device network.

#### 4.2.4 Download backup data

Once finish surveying, you can download the backup data via WEB UI as shown in Figure 4-8. The backup data format is “. dev”

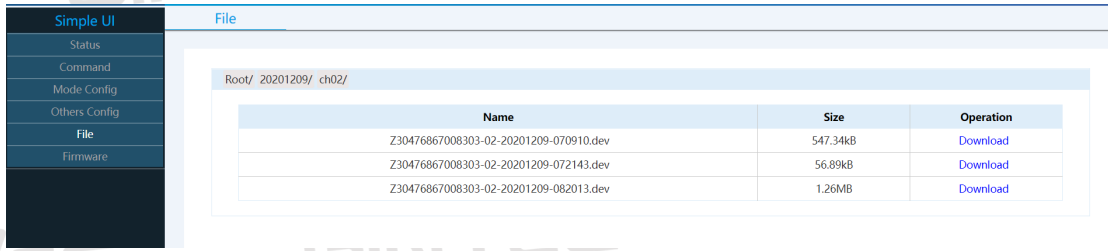


Figure 4-8

## 4.3 Static Surveying

Static surveying requests at least 2 receivers put on 2 points on a baseline. Keep these receivers in the same position and track at least 4 satellites then get relative distance of these 2 points. Static surveying provides the highest accuracy achievable and requires the longest observation times, from less than an hour to five hours or longer.

The static surveying function in G20M including outdoor surveying and indoor data post processing.

### 4.3.1 Baseline network design

#### (1) Synchronous pattern

As we know, static surveying uses at least two or more than two receivers track same satellites during same period. And then we can get data of these points. The pattern that formed by these points called synchronizing pattern. If use three or more than three receivers, the pattern formed by these points called synchronizing pattern cycle. As show in Figure 4-9.

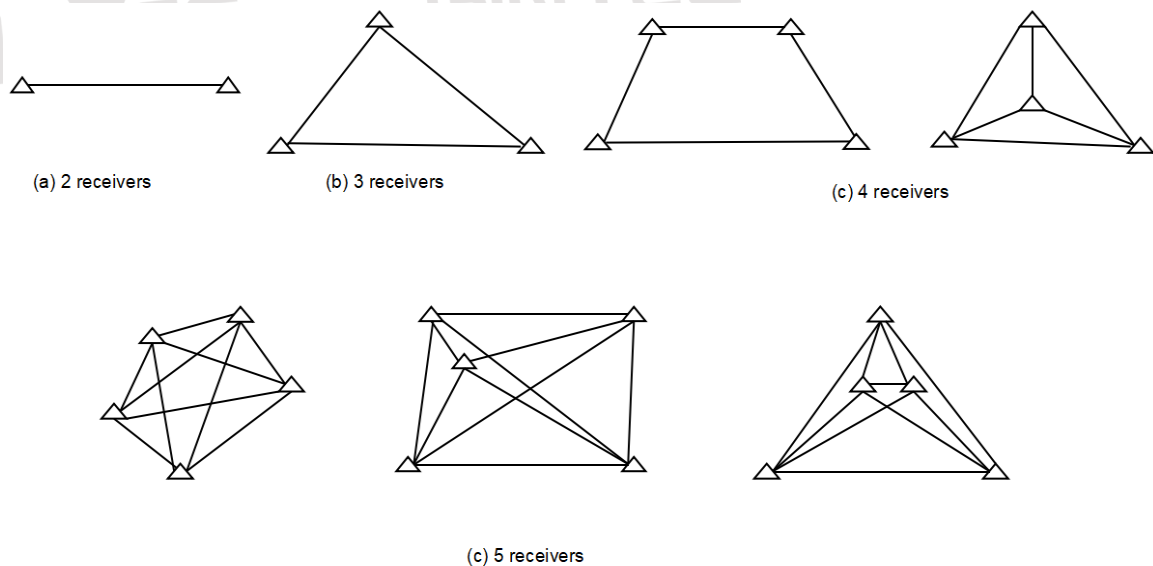


Figure 4-9 (synchronous pattern)

#### (2) Asynchronous pattern

If there are too many points in one baseline network, you should connect these synchronous cycles together and form the asynchronous pattern.

Asynchronous pattern can be connected via three ways as shown in Figure 4-10:

(a) Point connecting. Point connecting network is defined as a figure by connecting two adjacent shapes by only one common point. The advantage of this type is high efficiency, fast extending. But it cannot confirm the high precision surveying. Therefore, it is not recommended in precise working.

(b) Side connecting. Side connecting network is defined as a figure by connecting two adjacent shapes by their same side. It is widely used in the surveying field due to its high precision.

(c) Point and side connecting. Because every type of network has its own advantage and disadvantage, we can combine these types to achieve higher efficiency but lower investment in time. Mixed connecting network is common in surveying work.

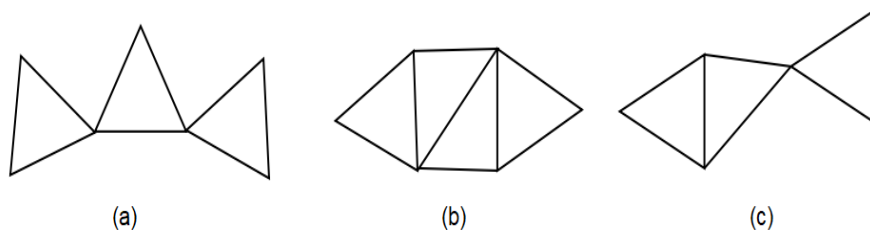


Figure 4-10 (asynchronous pattern)

### 4.3.2 Outdoor surveying

#### (1) Choose suitable points

Suitable points are essential to make sure whole surveying work goes smoothly and efficiently. The points should be fixed only after you well analyze and collect full information of the surveying area. Choose these points best suits your accuracy and surveying purpose. When choose the point in static surveying, you should pay attention to below:

- a. The points should comply with your surveying purpose.
- b. The points should also be easy-to-use for other surveying methods.
- c. Convenient transportation. So, it's easy for you to set up device.
- d. Away from high power radio emission objects, make sure no magnetic field influence nearby.
- e. Away from large water area or mirror building, reduce the multi-path interface.
- f. Good ground foundation, so the point can be saved enduringly.
- g. Make marks after choose the points, including its position info and sketch of its surroundings.

#### (2) Setting up devices

After choose the points, you set up the device on these points. Power on the device, then you can set "Static Mode" via controller software or WEB UI. As shown in below

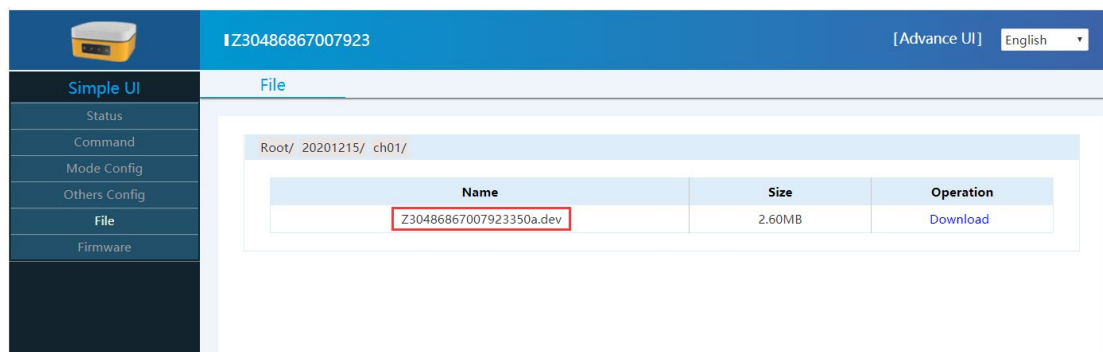
Figure 4-11.

Figure 4-11

You can define the point name and set interval frequency and input the antenna height and others. Once working, you can observe the satellite signal status and record the satellite data in device or in controller.

### 4.3.3 Download data

Connect G20M via WEB UI for data downloading. File name given should comply with the notes of outdoor surveying made by yourself. Data file name includes station name and days of the year. It is easy for you to distinguish.



## 5 WEB UI Control

### 5.1 Connect and register WEB UI

G20M can be a Hotspot. You can connect it with phone, controller, PC or other devices through its Wi-Fi. The default Wi-Fi name is device S/N number, no password needed. After connecting the Wi-Fi, input IP"192.168.10.1" into your web browser to turn it on.



Then you will enter the WEB UI interface, as shown in Figure 5-1.

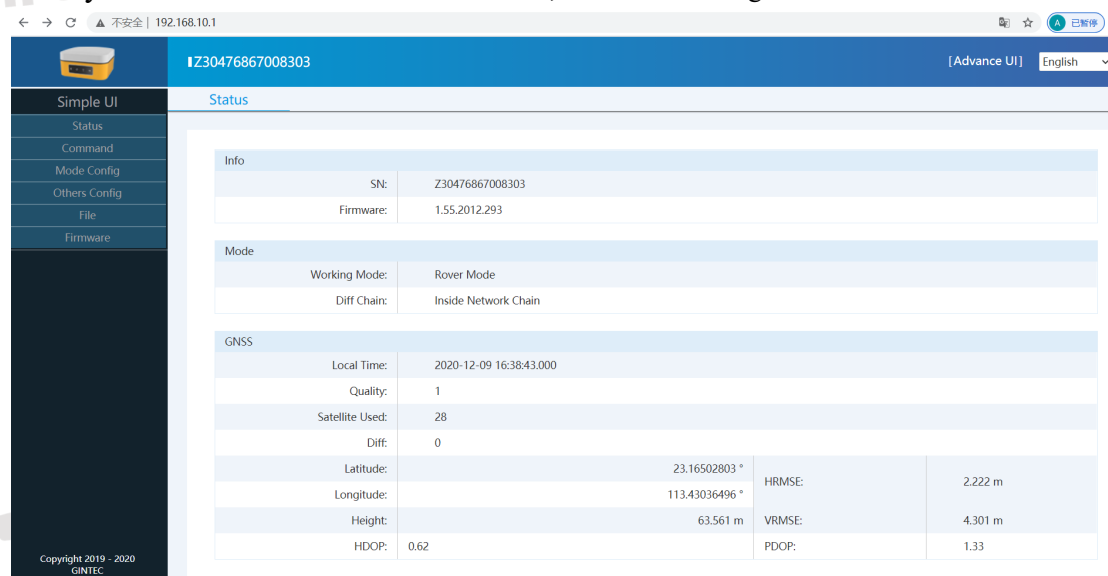


Figure 5-1

The WEB UI includes Status, Command, Mode Config, Others Config, File and Firmware.

## 5.2 Status

In “Status”, you can see current work status of receiver and some basic information. Including Device Info, Mode and GNSS Info. (As shown in Figure 5-1)

## 5.3 Command

In “Command” you can reboot/shutdown G20M, reset config (Reset factory settings), clean storage and Register code.

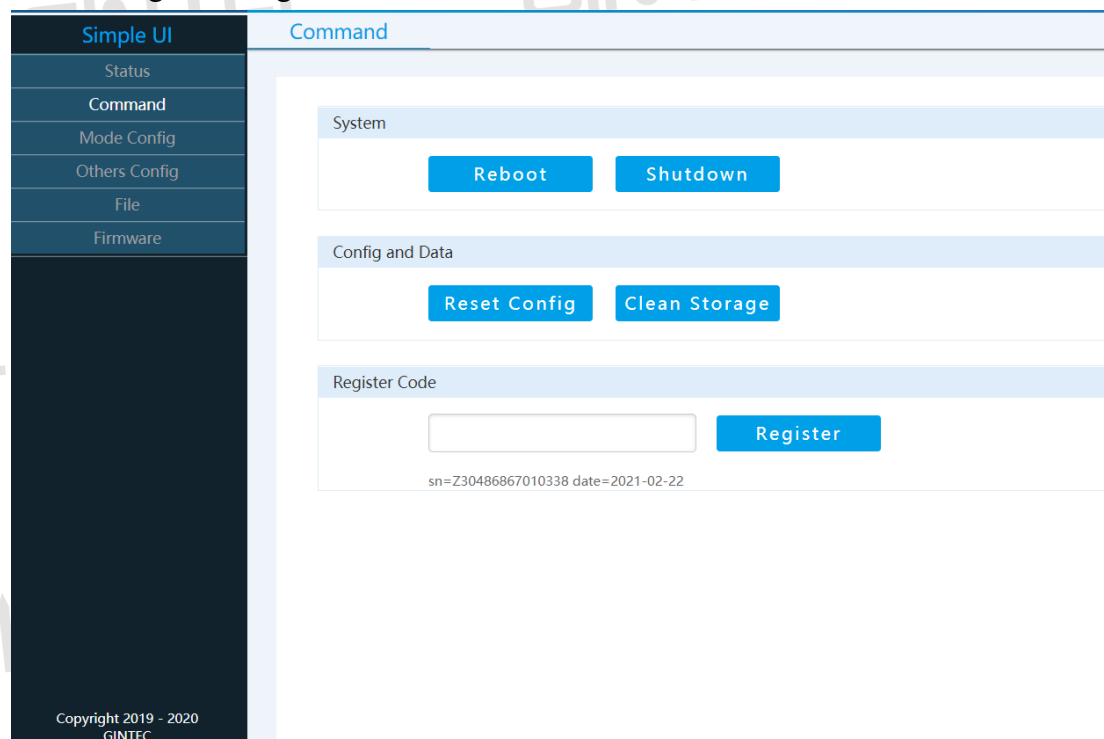


Figure 5-2

## 5.4 Mode Config

In “Mode Config” you can set working mode.

In “Working Mode”, you can select different work modes: Rover Mode, Base Mode or Static Mode. In different mode, you can define different configuration.



## Base Mode

<b>Simple UI</b>	<b>Mode Config</b>
Status	
Command	
<b>Mode Config</b>	
Others Config	
File	
Firmware	
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### Working Mode

Mode:

Elev Cutoff:

Station ID:

PDOP Threshold:

Diff Type:

Base Mode:

### Chain

Diff Chain:

## Rover Mode

<b>Simple UI</b>	<b>Mode Config</b>
Status	
Command	
<b>Mode Config</b>	
Others Config	
File	
Firmware	

### Working Mode

Mode:

Elev Cutoff:

### Chain

Diff Chain:

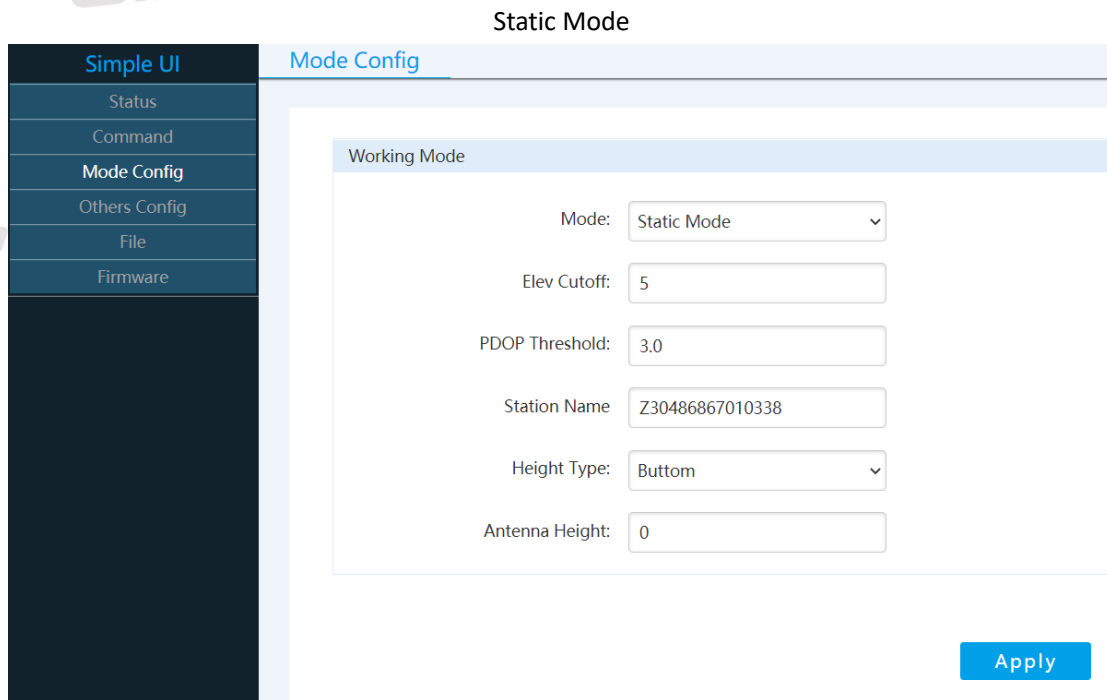


Figure 5-3

## 5.5 Others Config

In “Other Config”, you can config satellite systems and WIFI.

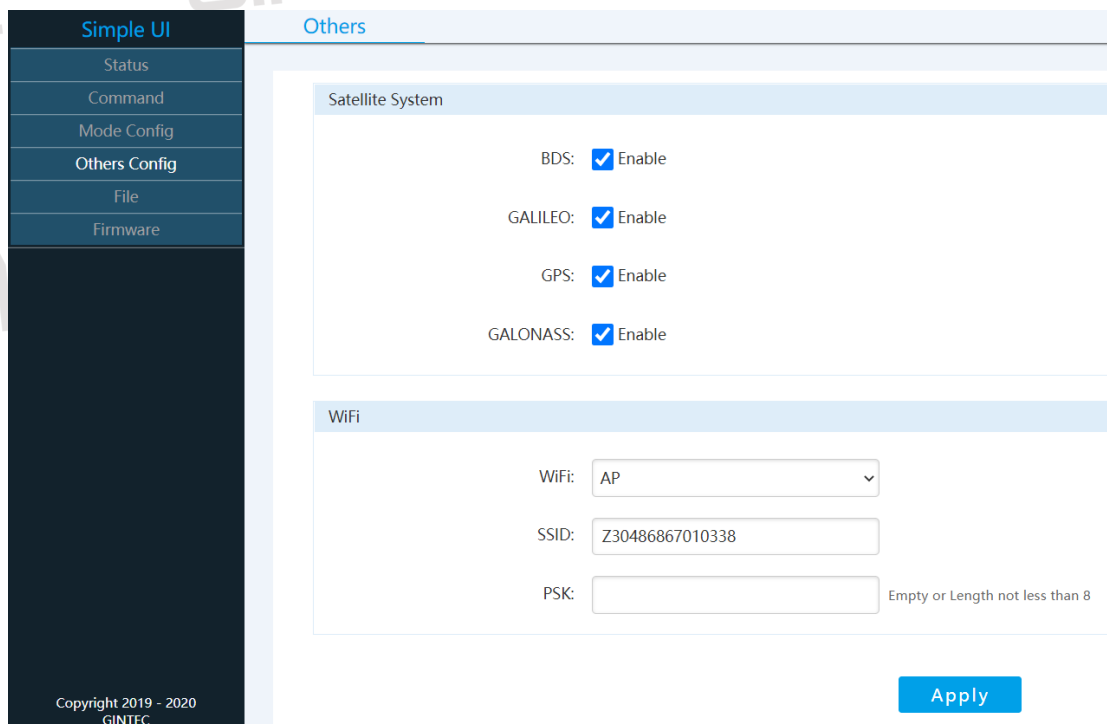


Figure 5-4

## 5.6 File

In “File”, you can delete or download data files. If you want to download static data, choose the correct file and find static file in ch01 then download.

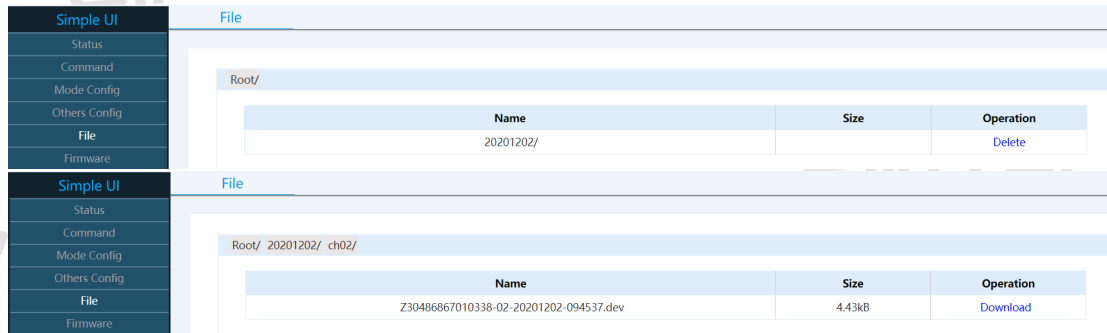


Figure 5-5

## 5.7 Firmware

In “Firmware”, you can find the current G20M Version installed and upgrade firmware.

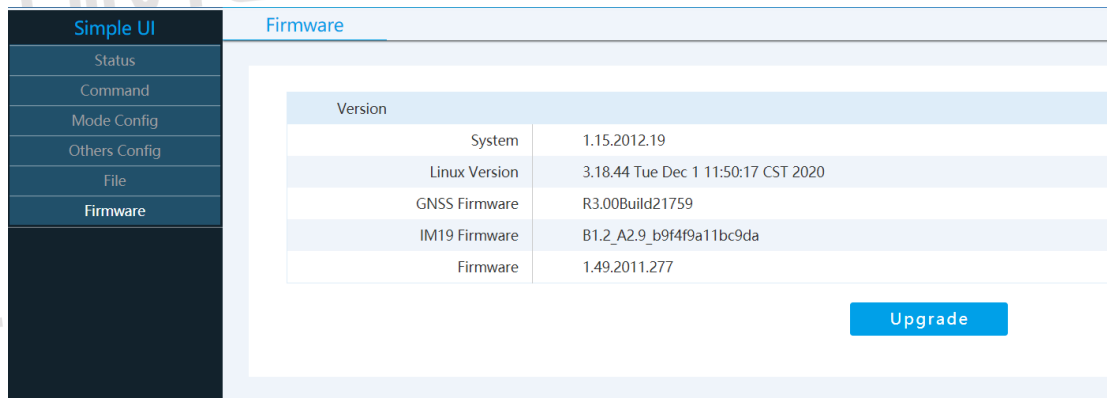


Figure 5-6

## 6 Frequently Use Functions

### 6.1 Device registration

The register code is 16 numbers and letters. For example:

G20M034804060, A7EC-AC8B-B904-94F5

G20M034804060 is serial number

A7EC-AC8B-B904-94F5 is register code, when you register, there are two ways: via WEB UI or via Controller. Detailed steps are as follow:

#### (1) Register via WEB UI

After connecting the Wi-Fi, input IP “192.168.10.1” into your web browser. Then you can see page as show in Figure 6-1. Click “Command”, you can find “Register Code”.

Input your registration code, then click “Register”. The receiver will be registered.

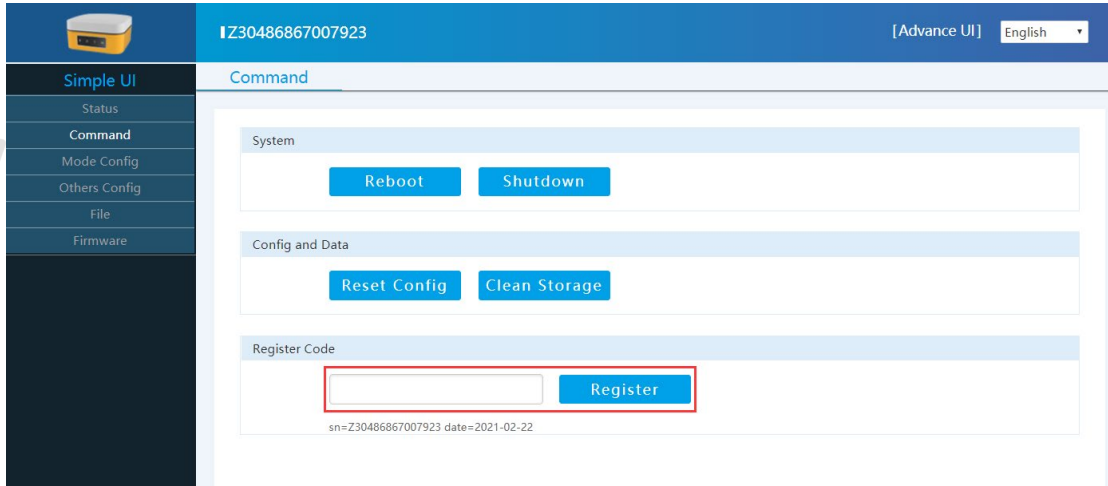


Figure 6-1

## (2) Register via Controller

Connect G20M with controller (via Wi-Fi or Bluetooth). Find SurPad software in controller interface, then click “SurPad”, it shows as Figure 6-2. Click “Device” you can see “Device Register”, click it, then you can see the page to input the code as Figure 6-3. After input the code, click “Registration”, then finish the registration.

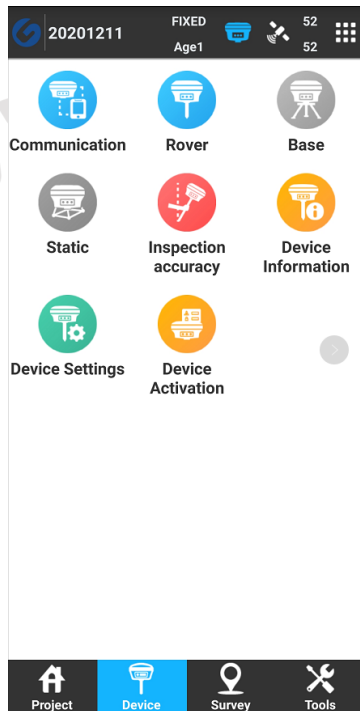


Figure 6-2

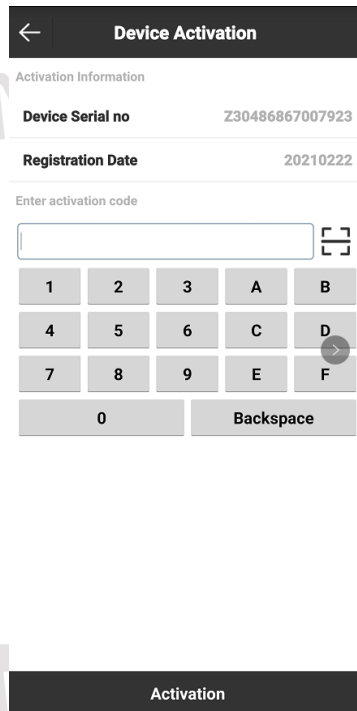


Figure 6-3

## 6.2 Upgrade firmware

You can upgrade firmware in WEB UI function. In “Firmware”, you can find “Upgrade”. Click it to select new version of firmware. After select the right version, click”Upload file” to finish upgrade.

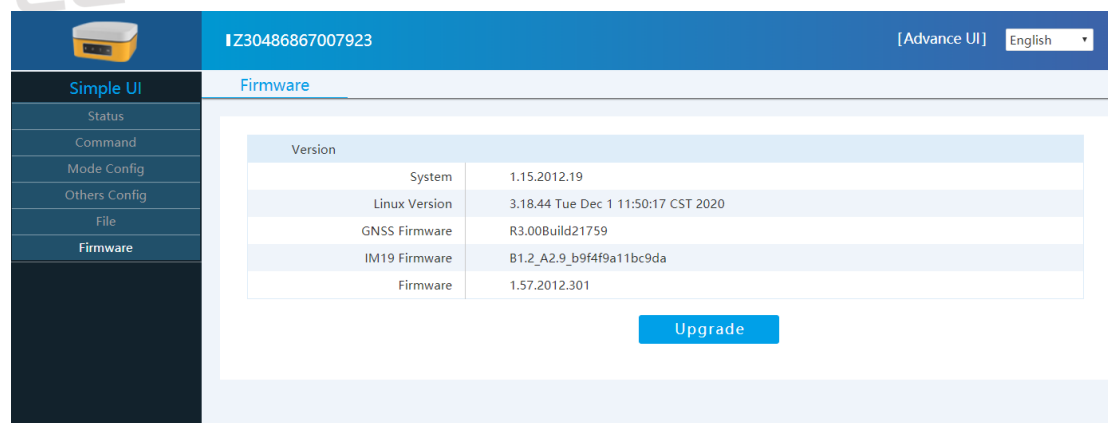


Figure 6-4

## 6.3 Restore factory settings

In WEB UI, “Command” you can find “Reset Config” under “Config and Data”, Click “Reset Config” to reset the device.

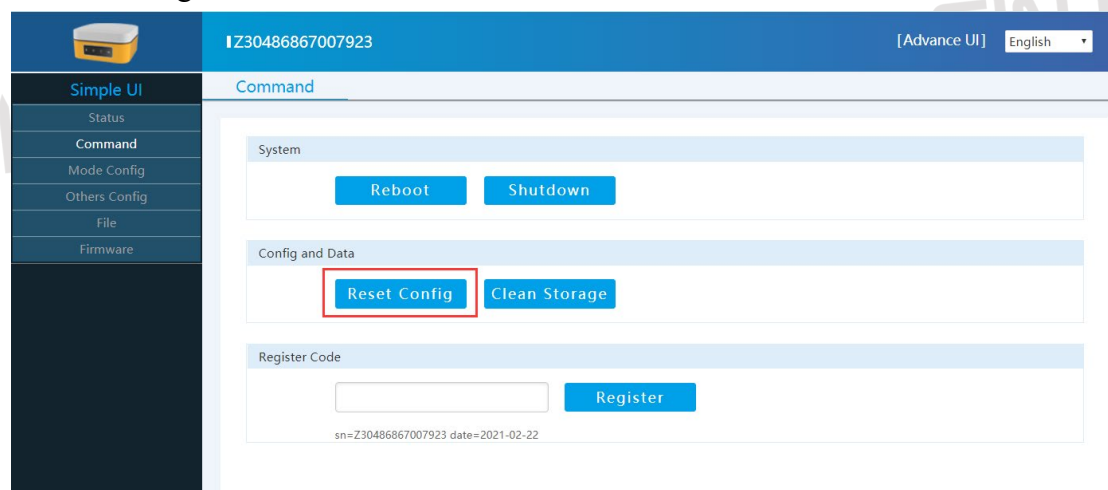


Figure 6-5

## 7 Technical Parameters

GNSS	Channel	432
	Satellites	GPS: L1,L2,L5 GLONASS: L1,L2 BDS: B1,B2,B3 Galileo: E1,E5A,E5B QZSS: L1,L2,L5 SBAS: L1
	Cold start	<40s
	Signal recapture	<1s
Accuracy	Static Accuracy	Horizontal: $\pm(2.5+1\times 10^{-6}D)$ mm Vertical: $\pm(5.0+1\times 10^{-6}D)$ mm
	DGPS Accuracy	Horizontal: 0.4m; Vertical: 0.8m
	RTK Accuracy	Horizontal: $\pm(10+1\times 10^{-6}D)$ mm Vertical: $\pm(15+1\times 10^{-6}D)$ mm
	Time Accuracy	20ns
	Tilt Measurement Accuracy(within 30° )	<2cm
	Update Frequency	5Hz
POWER	Battery	Built-in Battery,9600mAh 3.7V
	Duration	$\geq 9$ h
	Input	5V/2A DC
SYSTEM	Operation System	Linux
	Memory	32G Internal
	Bluetooth	V2.1+EDR / V4.0 Dual Mode
	WIFI	802.11 a/b/g/n/ac
	4G Network	LTE FDD: B1/B3/B5/B8 LTE TDD: B38/B39/B40/B41 TD-SCDMA: B34/B39 CDMA: BC0 WCDMA: B1/B8 GSM: 900/1800MHz
	Tilt Survey	Support Integrated with new calibration free tilt module

INTERFACE	Type-C	Charge and Data Transmission
	Other	Micro SIM Slot
Operation	Button	Power Button
	Indicator	4 indicators: Satellites, Datalink, Bluetooth, Power
Physical	Material	Magnesium alloy main body, ABS/PC top cover
	Dimension	100mm*100mm*61.5mm
	Weight	555g
ENVIRONMENT	Work Temperature	-20°C ~ +60°C
	Stock Temperature	-40°C ~ +80°C
	Waterproof/ Dustproof	IP65 Standard
	Shock and Vibration	Withstand 1.5m pole drop onto the cement ground
	Humidity	100%

# GINTEC

Guangzhou Geosurv Information Technology Co., Ltd

Add: 1101 E、 F, #B, NO.9 CAI PIN RD, Science City, Huang Pu

District, Guangzhou China

Tel: +86 020 82514956

Fax: +86 020 82274707

Email: [overseas@gintec.cn](mailto:overseas@gintec.cn)

Website: [www.gintec.cn](http://www.gintec.cn)