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**G6TA**

# **User Manual**

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## Chapter1 Brief introduction

This chapter is mainly used to introduce the key features and the appearance of G6.

As the latest generation of GNSS receiver, G6 brings you a better user experience. The dimension and weight also has a great breakthrough, now the dimension is diameter 131mm × height 102mm, the weight is just 850g (without battery). Adopt many new technologies, there are some functions add to G6 and this make survey work more convenient.

### 1.1 Key Features

Designed and developed by a group of excellent developers, G6 has many technical innovation. All of the innovation can help you finish the survey work quickly and high efficiently. They can be summarized in 5 points, as follow:

(1) Electric bubble

G6 has electronic bubble technology, bubble is appeared on the controller display screen. Thanks to the new electronic bubble, all measurement information will be displayed in one place. And when you check whether the support pole is leveling, you don't need to use the physical bubble in the support hole to level.

(2) WIFI wireless connection

When the WIFI function is opened, G6 can be used as a hotspot. You can connect your phone to it via WIFI. Log on the WEB UI, then you can do many configurations with your phone, such as change work mode, change datalink, download static data.

(3) Dual mode Bluetooth

G6 supports 4.0 long-distance Bluetooth and can connect to mainstream mobile phone, pad and digital consume products. Meanwhile can be compatible with Bluetooth 2.1 and connected with industrial-grade controller.

(4) Double backup of the survey data

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G6 RTK survey data will have double back-up, by controller and receiver so as to make sure the survey data is safe and reliable.

(5) Compatible with all satellite constellations

Not only can track all of the current satellite systems, but also can support the satellites in planned. The excellent performance in tracking satellites make it easily cope with and face to future.

Besides the latest technical innovation, there are also development in the hardware and accessories, such as the battery and some useful tools. All of these make sure our users grasp the most advantaged thing in use.

(1) Compact and lightweight design.

The dimensions of G6 is radius 131mm × height 102mm, but its weight is just 850g (without battery). The compact and lightweight design allow users to carry out easily.

(2) Advanced datalink

The radio module and the communication protocol are compatible with the main RTK products in the market and able to work together with other brand RTK products so as to optimize your asset allocation. The 3.75G modules support WCDMA, GPRS and other networks. It can continuously and stably work with CORS.

(3) Innovation double high-capacity batteries

The double batteries design ensures the long worktime.

(4) 50HZ high-speed acquisition

With powerful intelligence platform, G6 supports maximum 50HZ high rate data acquisition so as to be convenient for taking expansion of high dynamic survey.

(5) Large capacity storage

Configure with 4GB internal memory, G6 can store a large amount of survey data. It also supports storage expansion, the maximum 32GB micro SD card.

All of the innovation and advantage in using can give a high efficiency survey experience. We always do our best to support the best equipment and technical

service to the customers.

## 1.2 G6 Receiver

G6 receiver is a flat cylindrical, 102mm in height, 131mm in diameter. The front side has 1 power buttons and 3 indicators. The back side is a battery compartment. In the compartment, there are two slots, one for SIM card another for Micro SD card.

The bottom of the receiver is some interfaces. They include a radio antenna interface, a 5 pin external power interface and a 7 pin RS232/USB interface.

### 1.2.1. Front side of the Receiver



Figure 1- 1 Front panel

Number	Name	Function
1	Top housing	Protect the antenna.
2	Lower housing	Protect the receiver in case of drop.
3	Satellite led	How many time it blinks, means how many satellites are locked, cycle once every 5 seconds.
4	Network led	It will blink when G6 is transmitting differential data.
5	Power led	After the G6 turn on, the led always light and indicate the remaining power.
6	Power key	Power on/off the receiver.

#### Satellite led (green)

It shows the amount of locked satellites; when the receiver links one or more satellites signal it will start to blink every 30 seconds for a number of times equal to the number of locked satellites. When the receiver doesn't lock satellites, the satellite led does not shine.



Figure 1- 2 Satellite led

### **Network led (green)**

This light is on when GSM/GPRS module is selected as RTK datalink. It starts to blink when there is data transfer ongoing (In both radio, Bluetooth and network data link mode, it will blink when there is data transfer ongoing).



Figure 1- 3 Network led

### **Internal power led (green and red)**

When you power on the G6, the power led will be on. According to the remaining power of the battery, it includes three kinds of status:

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



Figure 1-4 Power led

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

### 1.2.2. Back side of the Receiver



Figure 1- 5 G6 back side

Number	Name	Function
1	Battery compartment cover	Protect the battery
2	Compartment locker	Open/lock the cover
3	SIM card slot	Put and read SIM card
4	Micro SD card slot	Put and read Micro SD card

#### Installing/Uninstalling SIM card and microSD card

There is a SIM card slot and a micro SD card slot in the middle of the two battery houses, the upper one is micro SD card slot. To install the SIM card, just push the SIM card into the SIM card slot according to the prompting figure. The microSD card installation is similar to the SIM card installation.

To remove the SIM card and microSD card, push the card and then take out the card.

**Note:** When you select network mode to work, you need to install SIM card.

#### Installing/Uninstalling battery

To install the battery, push the compartment locker, insert the battery into the battery compartment, then lock the compartment locker.

To remove the battery, push the compartment locker and then take out the battery.

1.2.3. The bottom of Receiver



Figure 1-6 G6 bottom



Figure 1- 3    5-PIN interface



Figure 1- 4    7-PIN interface

Number	Name	Function
1	Beeper	Broadcast voice message
2	5 pin interface	Connect to external radio and external battery
3	7 pin interface	USB port, also can connect to the controller via the multi-function cable
4	Radio antenna interface	Connect to radio antenna



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## **Chapter2 Basic operations of G6**

In this section, we highlight the basic operations of G6. It includes the installation of bas and rover, the operation of keys, switching work mode and datalink, self-test. All of these basic operations are simple and easy. But they are very important.

### **2.1 The installation of base and rover**

#### **The installation of base**

1. Install the tripod on the chosen position, level it and attach the receiver into tribrach.
2. Attach the transmitting radio antenna into the port “UHF” if the data link is radio.
3. Switch on the receiver and select the base working mode. If it is not correct, please see next paragraph 2.3 for understanding how to select the correct working mode or you can change it later using the handheld software.
4. Switch on the handheld and start the software for the radio channel configuration and inserting the base coordinates, otherwise it is possible to make the settings by Web UI function.

#### **The installation of rover**

1. Fix the bracket on the pole, fix the handheld to the bracket, put the rover on the pole and attach receiving antenna into the port “UHF”, depending on the connection used.
2. Power on the receiver and select the rover working mode. If it is not correct, please see next paragraph 2.3 for understanding how to select the correct working mode or you can change it later using the handheld software.
3. Switch on the handheld and start the software, then you can do the advanced setting of the instrument and finally start the survey.

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

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## 2.2 The operation of keys

There is a power key in the receiver, the operations are as follows.

### Power key

The main function of power key is power on/off and confirm button.

- **Power on:** when the Receiver is in the OFF status (no light), press the power key, and then the receiver will enter the initialization status. Then you will listen beep for three times and the voice broadcast the current receiver status, it means the receiver powered on successful.
- **Power off:** when the G6 receiver is in the ON status (power supply light ON), press and hold power key for few seconds until all lights blink, then release the power key and there will be a voice broadcast “If you want to turn off the device”. Press the power key to confirm, then G6 will be turned off.

## 2.3 Self-checking

If the indicators are abnormal or the receiver can't work normally, for example the Bluetooth can't be connected, the radio mode can't work, it can't connect to the CORS. Then you can use the automatic detection function, which is Receiver self-checking. Self-checking will check GPS, radio, GSM, Bluetooth, WIFI and sensor. During this procession, it has voice guide tell you whether it's normal or not.

1. When the receiver is in powered on status, keep press the power key until a voice broadcast “if you want to turn off the device”, then release the power key. Keep press the power key again until you hear a beep, then there will be voice broadcast “start self-checking” and you could release the power key (The new device should be self-checked once).
2. In the process of device self-checking, there will be voice broadcast the test results. If the module checking is successful, voice broadcast “success” and the led always on until the self-checking is completed. If the module checking fails, voice broadcast “self-checking fails”, the led will continue blink and the buzzer beeps until you restart G6. Self-checking procedure lasts about 1 minute.

- 
3. If each module led are ON (not blinking) and voice broadcast the self-checking success (for example “self-checking GPS success”), it means the modules could work normally.

**Note:** After self-checking, built-in radio frequency will return to factory settings. If necessary, please contact your local dealer to change the frequency to match your usage.

## 2.4 Measure the antenna height

When we use G6 collect static data or set G6 on a known point as a base station, the antenna height should be measured. Antenna height is actually the vertical height of the phase center to ground measurement point. But there are differences between different measure methods.

**Base and Static mode antenna height measurement:** You can measure from the ground to the altimetry piece of the receiver, you can measure from the ground (known point) to altimetry piece. In this situation you should select “Height to altimetry piece”.

**Rover mode antenna height measurement:** Measure methods of rover mode includes pole height, straight height and slant height.

- (1) Pole height, the height of the carbon pole, we can read it from the pole, then input to the software.
- (2) Straight height, straight height it's the antenna phase center height. Straight height = the height from ground to bottom of Receiver + antenna phase center to the bottom of receiver.
- (3) Slant height, measure from ground to the altimetry piece of the receiver. Select slant height in the software, then input the height you measured.

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## Chapter3 Web UI function

G6 has WIFI function, it could work as a hotspot, then Phone, controller, PC and other devices can connect its WIFI. The default WIFI name is device number, there is no password for this WIFI.

After you power on the G6 receiver, you could search the hotspot via phone/PC/controller. The hotspot name is the G6 serial number, and there is no password (This WIFI don't have the internet access, you could just login the web page to view the receiver status and set modes).

WLAN	
PTC6004L	
cmcc	
tips-SJB	
zhizaobu	

Figure 3-1

After connecting the WIFI, input IP "192.168.10.1" into your web browser to open.

Then it will pop up a window. It ask for log account and password, default is:

**Account:** admin      **Password:** password

The Web UI contains Status, Information, Download, Management, and Settings. It also can show the device number in the web.

### 3.1 Status

In Status, you can see the current work status of the receiver, some basic information. Such as system mode, current datalink, coordinate, satellites, solution and so on. The detailed information you can see from the picture.



Figure 3- 2 Status

### 3.2 Information

Then it's the "Information", this menu shows the information inside the receiver, such as firmware version of the receiver, GNSS firmware version, GSM mode information, sensor version, battery information and so on.



Figure 3- 3 Information

### 3.3 Download

"Download" is for downloading static data, you can download the datas you want to use, you also can package them together. The format of raw data is ".dat" version, if you want to use ".Rine" version, you can select.



Figure 3- 4 Download

### 3.4 Management

“Manage” includes many useful function. You can upgrade firmware, register the receiver, make self-checking, change the log password and restart the receiver. So “Manage” will be used in many stations.



Figure 3- 5 Management

#### 3.4.1 Device register

The register code is a 32 digits and letters, you could register the device via WEB UI function. The detailed steps as follow.

In management page, you could see “registration”. Input register code to “Authcode” then click submit, the receiver will be registered.

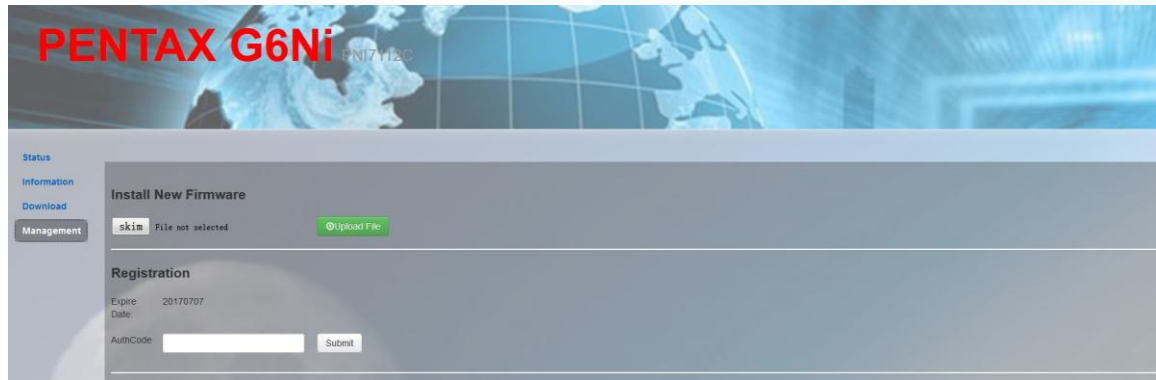


Figure 3- 6 Registration

You could also register device via controller. Connect G6 with the PenSurvey software in controller. Click “About”, you will see “Register instrument”, then click it. The last step is inputting code, then finish registration.

## 3.5 Settings

“Settings” includes “Working Mode”, “Device Configuration” and “NMEA Message”. All of these functions are very useful. Here will introduce every selection.

### 3.5.1. Working mode

You can select different work mode to configure, static, rover and base. In different mode, there are different configuration you can make.

#### ① Static mode

As the pictures show, you can set cutoff angle, select satellites system, input the point name, antenna height, PDOP threshold. And the antenna measurement and collect interval. These are all the parameters can be used in static collection.

At last, there are two record options. If you activate auto record, it will collect data automatic when you power on the receiver.

Settings

Working Mode

Device Configuration

NMEA Message

×

System Mode

☒ Static
☐ Rover
☐ Base

Cutoff Angle

10

°

GLONASS

☒ Enable
☐ Disable

Beidou

☒ Enable
☐ Disable

SBAS

☐ Enable
☒ Disable

Point Name

\_123

Antenna Height

0

mm

Antenna Measurement

Antenna slant height mode

▼

Pdop Threshold

3.50

[1-99]

Interval

1HZ

▼

Convert to RINEX

☐ NO
☒ YES

Auto Record

☐ NO
☒ YES

Save

Cancel

Figure 3- 7 Static mode

## ② Rover Mode

In rover mode, you can select different datalink. Different datalink also has different options can be edited. The datalink includes UHF, Network, External and Bluetooth.

If you select UHF mode, then you can select radio channel and radio protocol as you want. You also can select whether store the raw data. The interface is as follow:



Settings

Working Mode

Device Configuration

NMEA Message

System Mode

☐ Static
☒ Rover
☐ Base

Current Datalink

☒ UHF
☐ Network
☐ External
☐ Bluetooth

Cutoff Angle

°

GLONASS

☒ Enable
☐ Disable

Beidou

☒ Enable
☐ Disable

SBAS

☐ Enable
☒ Disable

Record Raw Data

☒ NO
☐ YES

Radio Channel

MHz

Radio Protocol

Figure 3- 8 Rover mode (UHF datalink)

If you select Network, then besides select satellites system and record raw data, the most important is that you can input CORS information, such as IP, account. Then get the mount point.

Settings

Working Mode

Device Configuration

NMEA Message

System Mode

☐ Static
☒ Rover
☐ Base

Current Datalink

☐ UHF
☒ Network
☐ External
☐ Bluetooth

Cutoff Angle

°

GLONASS

☒ Enable
☐ Disable

Beidou

☒ Enable
☐ Disable

SBAS

☐ Enable
☒ Disable

Record Raw Data

☒ NO
☐ YES

Relay Mode

☐ Enable
☐ Disable

---

APN	<input type="text" value="CMNET"/>
APN User	<input type="text"/>
APN Password	<input type="text"/>
Connect Mode	<input type="text" value="Ntrip"/> ▼
Caster Address	<input type="text" value="122.13.16.137"/>
Caster Port	<input type="text" value="6070"/>
Mountpoint	<input type="text" value="S9I0111600408"/>
	<input type="text"/> ▼ <input type="button" value="Get Mountpoint"/>
Upload GGA	<input type="text" value="5"/> ▼ s
User	<input type="text" value="admin"/>
Password	<input type="password" value="..."/>
Auto Connect	<input type="radio"/> NO <input checked="" type="radio"/> YES
<input type="button" value="Save"/> <input type="button" value="Cancel"/>	

Figure 3- 9 Rover mode (Network datalink)

If you select External, then it can connect to external radio. There is a very important thing, the external serial port band rate, this should be same with external radio.

Settings

Working ModeDevice ConfigurationNMEA Message

System Mode

☐ Static
☒ Rover
☐ Base

Current Datalink

☐ UHF
☐ Network
☒ External
☐ Bluetooth

Cutoff Angle

10°

GLONASS

☒ Enable
☐ Disable

Beidou

☒ Enable
☐ Disable

SBAS

☐ Enable
☒ Disable

Record Raw Data

☒ NO
☐ YES

External Serial Port Baud Rate

38400

Save

Cancel

Figure 3- 10 Rover mode (External datalink)

Then the last it's Bluetooth, after selecting the datalink as Bluetooth, there are little option that you can configure, for example the cutoff angle, satellites system and record raw data.

Settings

Working ModeDevice ConfigurationNMEA Message

System Mode

☐ Static
☒ Rover
☐ Base

Current Datalink

☐ UHF
☐ Network
☐ External
☒ Bluetooth

Cutoff Angle

10°

GLONASS

☒ Enable
☐ Disable

Beidou

☒ Enable
☐ Disable

SBAS

☐ Enable
☒ Disable

Record Raw Data

☒ NO
☐ YES

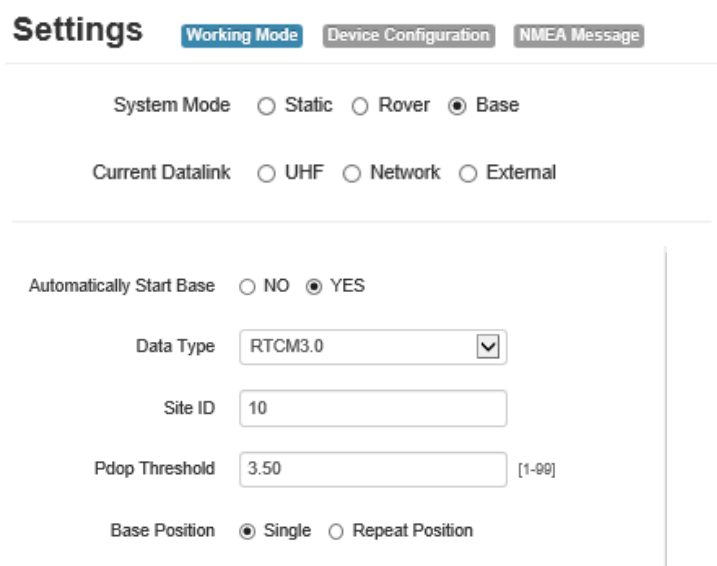
Save

Cancel

Figure 3- 1 Rover mode (Bluetooth datalink)

### ③ Base Mode

Base mode also contains different datalink, most of the parameters are same. The only difference is the base mode has some more options can be edited, shows as follow. Others are same as rover.



**Settings** Working Mode Device Configuration NMEA Message

System Mode ☐ Static ☐ Rover ☒ Base

Current Datalink ☐ UHF ☐ Network ☐ External

Automatically Start Base ☐ NO ☒ YES

Data Type

Site ID

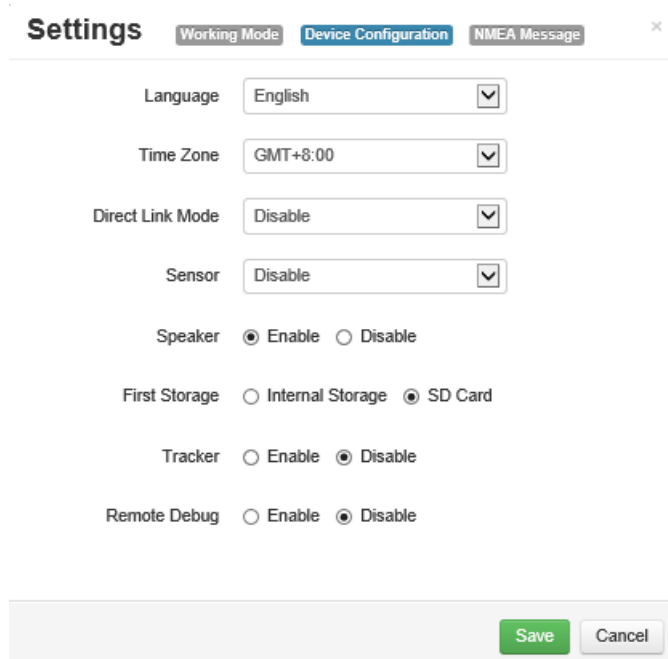
Pdrop Threshold  [1-99]

Base Position ☒ Single ☐ Repeat Position

Figure 3- 2 Base mode

### 3.5.2. Device configuration

Device configuration can finish many basic configurations via WEB UI function, such as changing language, select time zone first storage and others.



**Settings** Working Mode Device Configuration NMEA Message

Language

Time Zone

Direct Link Mode

Sensor

Speaker ☒ Enable ☐ Disable

First Storage ☐ Internal Storage ☒ SD Card

Tracker ☐ Enable ☒ Disable

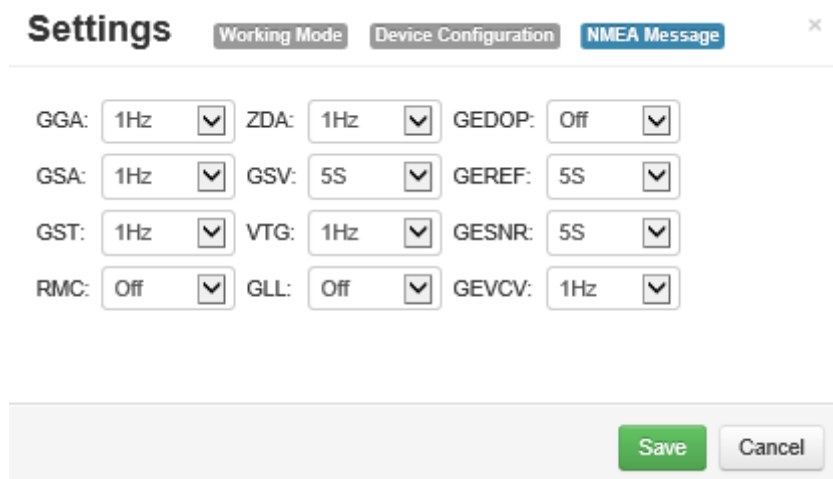
Remote Debug ☐ Enable ☒ Disable

Figure 3- 3 Device configuration

---

### 3.5.3. NMEA Message

Here you can configure the NMEA message, turn on/ off them. If you need them out put, you also could select the update frequency. The NMEA contains GGA, GSA, GST, RMC, ZDA, GSV, VTG, GLL, GEDOP, GEREf, GESNR and GEVCV.



The screenshot shows a 'Settings' window with three tabs: 'Working Mode', 'Device Configuration', and 'NMEA Message'. The 'NMEA Message' tab is active. It contains a grid of 12 dropdown menus arranged in 4 rows and 3 columns. The first column contains GGA, GSA, GST, and RMC. The second column contains ZDA, GSV, VTG, and GLL. The third column contains GEDOP, GEREf, GESNR, and GEVCV. The current values are: GGA: 1Hz, ZDA: 1Hz, GEDOP: Off, GSA: 1Hz, GSV: 5S, GEREf: 5S, GST: 1Hz, VTG: 1Hz, GESNR: 5S, RMC: Off, GLL: Off, and GEVCV: 1Hz. At the bottom right, there are 'Save' and 'Cancel' buttons.

Message	Frequency
GGA	1Hz
ZDA	1Hz
GEDOP	Off
GSA	1Hz
GSV	5S
GEREf	5S
GST	1Hz
VTG	1Hz
GESNR	5S
RMC	Off
GLL	Off
GEVCV	1Hz

Figure 3- 4 NMEA message

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## Chapter4 G6 standard accessories

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

### 4.1 The case of G6

There are two kinds of G6 cases: Rover case and Base case. The inner layout of the base case and rover case is different.

Base case has the room for external radio and rover case has the room for the controller. You can distinguish them from nameplate.

### 4.2 Power supply

#### Batteries

Every receiver could be inserted two batteries. The battery is “lithium-ion” battery (7.4 V - 3350 mAh): a technology which has a higher energy-to-weight ratio with respect to NiCd or NiMh batteries, no memory effect, and slow self-discharge when not in use.



Figure 4- 1 Lithium-ion battery

#### Charger

The charger can charge two batteries simultaneously. The lights of the charger show if the battery is being charged (red light CHARGE) or if it's already charged (green light FULL).

### 4.3 The antenna

G6 adopts a UHF all-direction transmitting and receiving antenna. The available range are: 450-470 MHz. They are suitable for field surveying, light and durable. The gain is 4 dBi.












450-470MHz

Figure 4- 2 built-in radio antenna (not in scale)

### 4.4 Other accessories

Table 4-1

No	Pcs	Name	Figure (not in scale)
1	1	Charger	
2	2	Battery	
3	1	25cm Support pole	
4	1	Adapter	
5	1	UHF antenna	
6	1	Host-PC cable	

7	1	Calibrator	
8	1	Aluminum plate	
9	1	CD-ROM	



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## Chapter5 Appendixes

### Appendix 1 Default radio configuration

The frequency and protocol of the 8 channels could be modified via Web UI or controller. So you could change it easily. And the Frequency range is from 450MHz to 470MHz, so you can select as you want.

**Table 5- 1 Default frequency and protocol of internal radio**

Channel	Frequency	Protocol
1	459.5500MHz	Trimtalk 450S
2	457.1750MHz	Trimtalk 450S
3	457.5500MHz	Trimtalk 450S
4	457.5000MHz	Trimtalk 450S
5	457.6000MHz	Trimtalk 450S
6	454.0250MHz	Trimtalk 450S
7	457.6250MHz	Trimtalk 450S
8	454.0750MHz	Trimtalk 450S

## Appendix 2 Specification

<b>Model</b>		G6
Weight ( with battery )		About 1kg
Size ( mm )		Φ131 × H 102
Operating time		> 10 hours
ROM		4G
Channels		555
Update rate		1Hz ~ 20Hz
Cold start time		45s
Hot start time		30s
Operating temp.		− 30°C ~ + 65°C
Storage temp.		− 40°C ~ + 75°C
Protection class		IP67
Radio Modem		Built-in
Radio power		1W
Data format		RTCM、CMR+、NMEA
RTK Initiation Reliability		99.99%
Handheld		
Operating system		Windows mobile 6.5
Operating software		PenSurvey, FieldGenius9.0
Accuracy		
Dynamic	Horizontal	$\pm (8 + 1 \times 10^{-6} D) \text{ mm}$
	Vertical	$\pm (15 + 1 \times 10^{-6} D) \text{ mm}$
Static	Horizontal	$\pm (25 + 1 \times 10^{-6} D) \text{ mm}$
	Vertical	$\pm (5 + 1 \times 10^{-6} D) \text{ mm}$

## FCC WARNING

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.

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

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

To maintain compliance with FCC's RF Exposure guidelines, This equipment should be installed and operated with minimum distance between 20cm the radiator your body: Use only the supplied antenna.