SOUTH G5 GNSS Positioning System

User Manual

Contents

Chapter I Preface

Read this chapter, you will have a brief knowledge of SOUTH Company and G5 measurement system.

§1.1 Introduction

Welcome to South Surveying & Mapping Technology CO., LTD, which is China's leading manufacturer of surveying equipment including GNSS receivers and Total Stations. To know more about SOUTH, please visit our official website https://www.southinstrument.com/

This manual takes G5 positioning system for example, to explain how to install, set up and uses the RTK system as well as the use of the accessories. We recommend that you read these instructions carefully before using the instrument.

§1.2 Applications

Control Survey: dual-band (dual-frequency) system static measurements can accurately complete the high-precision deformation observation, photo-control point measurement.
Highway Survey: quickly complete the encryption of the control points, road topographic mapping, cross-section measurement, profile measurement with K-survey.
CORS Application: provide more stable and convenient data link for field operations. It is seamlessly compatible with all types of domestic CORS applications.
Data acquisition measurement: perfect match SOUTH various measurement software to do quick and easy data acquisition.
***Stakeout shot*:** large-scale point, line, plane lofting.
***Electric Power Measurement*:** power line measurement orientation, ranging, angle calculation.
***Marine application*:** oceanographic research, dredging, piling, inserted row, making the marine operations more convenient and easier.

§1.3 Main Features

All Constellations and More Channels

With 1598 channels, G5 is capable to track signal from 5 satellite constellations , process signal of up to 16 frequencies and provide stable and reliable accuracy.

More Powerful and More Durable

Thanks to the 3W Farlink radio, when it works as an UHF base station G5 is able to transmit correction data farther than others, in optimal condition the working range can be 10 to 15 km.The shock-resistant frame, water-proof frame all have been enhanced, now the overall proof level is IP68.

Superior Endurance, Up to 25 hours working

The newly developed power management system allows G5 to work for 10 to 25 hours and can be recharged by a type-C connector.

Color Touch Screen, Makes Workflow Simpler

Users can operate G5 by touch screen and key buttons, easy and fast.

RTK-Keep

When G5 loses the RTK correction data source from base station, this function will help receiver to maintain the precise position for a few minutes.

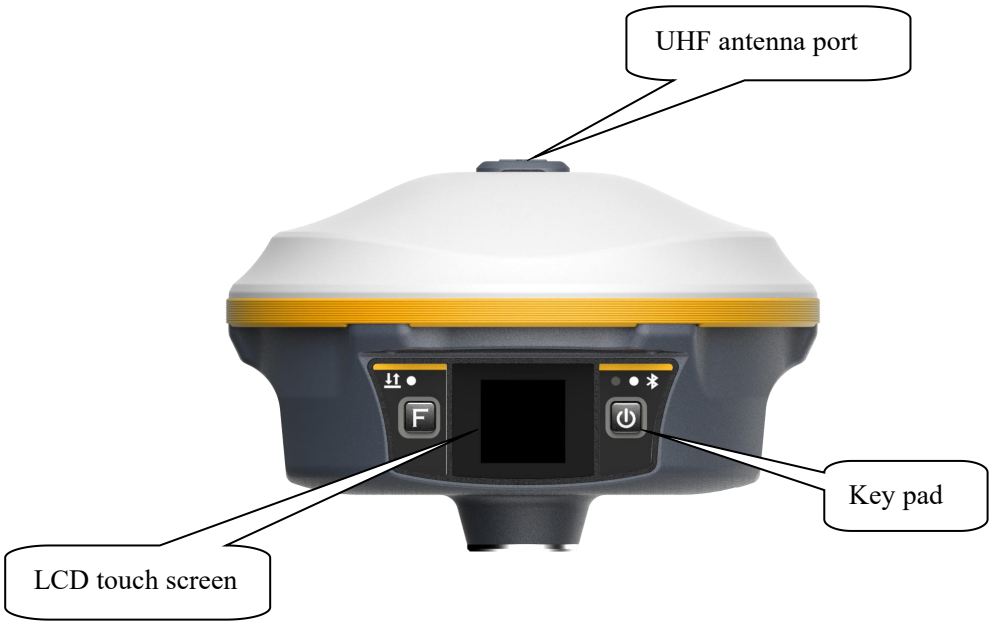
L-band Correction, 4-10cm PPP

G5 is able to receive B2b signal via L-band, and perform a single point positioning. It is a great help to surveyors who work in particularly difficult areas. This service is available in 2022 from Asian-Pacific region.

Chapter Ⅱ Hardware Component

Reading this chapter, you can grasp the components, installation and the function of G5 positioning system

§2.1 Receiver components



§2.2 Bottom Components

- **Type-c port**: USB port, OTG interface and Ethernet port..
- **5-Pin port**:

1. As a power port connected with an external power supply device.
2. As a differential transmission port connected with an external radio.
3. As a serial port to check data output and debug.

- **PPS Port**: N/A
- **Speaker**: Voice broadcast.
- **SIM Slot**: Insert SIM card.

§2.3 Indicators and Keypad

Ref	Component	Description
	**Power Button**	1) Power on/off 2) Select menu 3) In lowest menu: short press for select, long press for confirmation
	**Bluetooth Indicator**	Light on blue when Bluetooth connected
	**Data Indicator**	Flash green when Fixed solution. Flash red when not Fixed with the correction signal. No Flash when no correction data.
	**Function Key**	Shift between menus.

Keypad operation:

Fn key: Shift between options

PWR key:

1) Short press: select the option

2) Long press: to Power off (Reset, Set default, Self-check) receiver

3) Long press: to accept the configuration (when at the lowest menu), just like swiping down the touch screen.

Press any key (or click on touchscreen) will wake up screen if screen sleeps.

§2.4 Touch screen

The receiver can be operated from both keypad and touch screen. By swiping the screen, receiver can be configured.

1. Swipe right /left: to shift between options (or press Fn key to shift between options)
2. Tap screen: for selection (or short press PWR key for selection)
3. Swipe down:

----To bring up system menu [Power off], [Reset], [Set default], [Self-check] when it is at main display interface

---- In lowest level menu: swipe screen down to accept the configuration (or long press PWR key to accept the configuration).

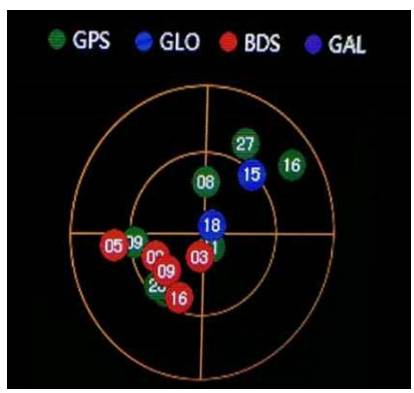
4. Swipe up

Return from sub-menu to previous menu.

§2.5 Receiver Menu

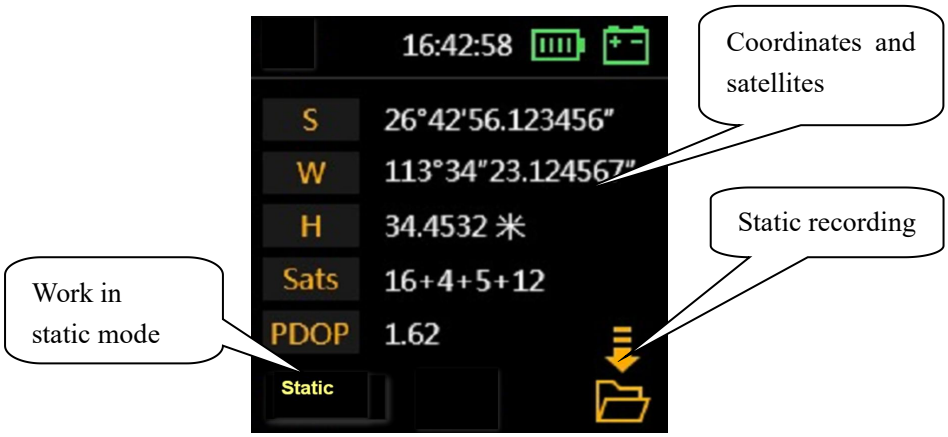
§2.5.1 Main display interface

There are 2 main display interfaces: [Coordinates display interface], [Satellite display interface].

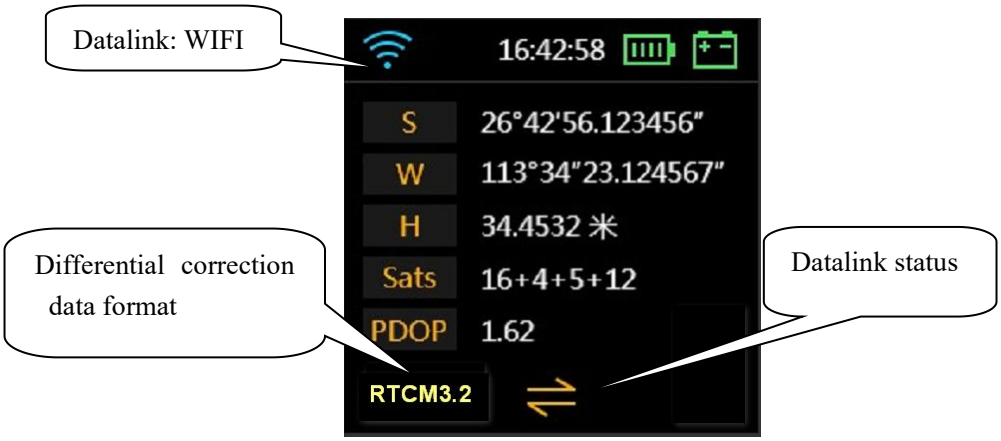


Icons in the Coordinates display interface

1) In static mode:



2) In Base mode:



3) In Rover mode:

§2.5.2 Main menu

Main menu: by swiping screen right or press F key to bring them out.

[Work mode], [Set Datalink], [System option], **[Receiver information],** there are two methods to bring them up:

Method 1: by touch screen

From main display interface, directly swipe screen right, the LCD screen will show below menus circularly as below.

[Work mode], [Set Datalink], [System option], [Receiver information], [Satellites display interface], [Coordinates display interface] ... [Work mode], [Set Datalink] …

Tap screen to select the main menu in your need (or press PWR key to select).

Method 2: by Keypad

From main display interface, Press FN key, the LCD screen will show above menus circularly and press PWR key to select the main menu (or tap screen to select).

When the receiver switched on, there are two main display interfaces: coordinates display interface and satellite display interface. Swipe left or right to switch between the two main display interfaces.

Work mode

To switch work mode between Static mode, Base mode and Rover mode.

System option

[WIFI config]: to set WIFI mode. There are two WIFI mode: AP mode and Client mode.
[Power saving mode]: to switch off the LCD display to save power.

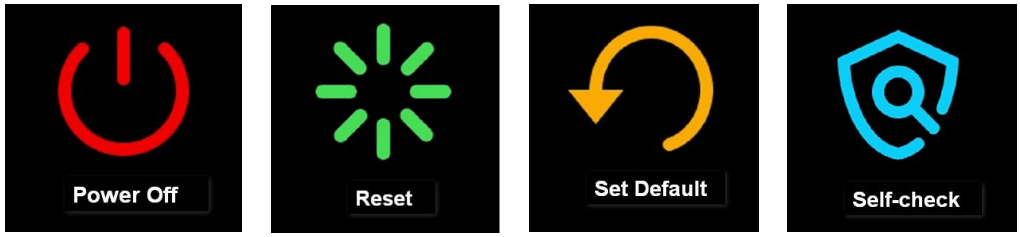
[Other option (USB mode, Ethernet mode, Language)]: to change language and set USB mode.

6) Receiver information

To show key information of receiver: serial number, firmware version, Expiry date.

§2.5.3 Power off, Reset, Set default and Self-check

Anytime when it is in **main display interface,** swipe screen down will bring them up.



System menu: [Power off], [Reset], [Set default], [Self-check]

By swiping screen down to bring system menu out (when it is at main display interface).

[Power off]: to power off receiver.

[Reset]: to restart receiver.

[Set default]: to restore to default settings.

[Self-check]: to do self-check for receiver.

§2.5.4 Set work mode

Swipe right (or Press F key) to select [work mode], then tap screen (or press PWR key) to accept.

There are three work modes：Static mode, Base mode, Rover mode (as below image):

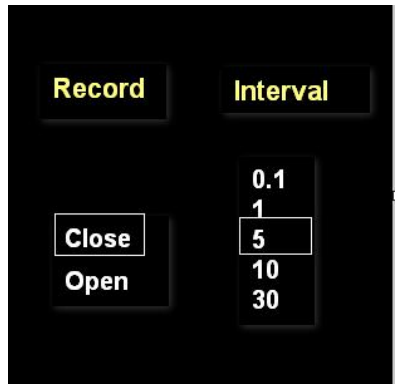
1. Static mode

1.1)Select static mode

Swipe right and select [work mode], then select [Static mode] (or press F key to select and press PWR key to accept), the receiver will enter Static mode.

1.2)Static mode settings

Tap screen to bring up settings interface (or Press PWR key to bring settings interface)



Set **[Record: open]** and your required recording Interval, then swipe down to accept (or press and hold PWR key to accept) the settings.

Set **[Record: close]** to stop recording when your field record complete.

After make the settings, swipe screen down to accept (or long press PWR key (press PWR key and hold it for 3 seconds)

Icon  on lower right corner shows it is recording static data.

2.Base mode

2.1) Enter Base mode

Swipe right to select [Work mode], then select [Base mode] ((or press F key bring out main menu and press PWR key to select [Work mode], then select [Base mode]), the receiver will enter Base mode.

2.2) Base mode settings

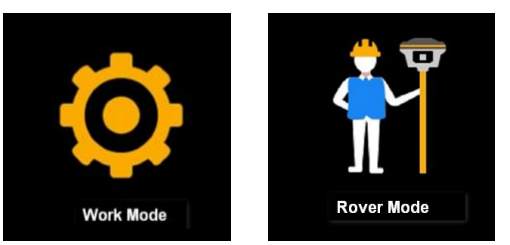
Tap the screen to enter Base mode settings (or Press PWR key to bring up settings)

In coordinates display interface, you can also tap screen to enter Base mode settings.

3. Rover mode

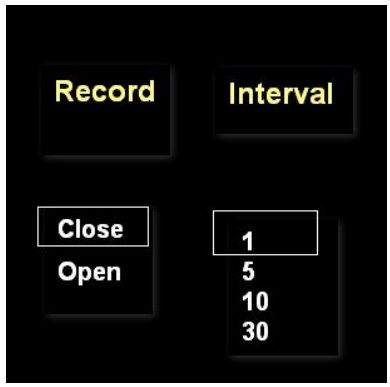
3.1) Enter Rover mode

Swipe right to select [Work mode], then select [Rover mode] ((or press F key bring out main menu and press PWR key to select [Work mode], then select [Rover mode]), the receiver will enter Rover mode.



3.2) Rover mode settings

Tap the screen to enter Rover mode settings (or Press PWR key to bring up settings)



If you want the receiver to record static data during Rover mode, please set **[Record: open]** and select recording interval.

Any time, you can view or change the settings of related work mode by tap the screen.

§2.5.5 Set datalink mode

There are 7 different type of datalink modes as below:

 : UHF(Inbuilt radio) as datalink

 : Cellular network (via SIM card) as datalink

 : Dual transmit (inbuilt radio and cellular network)

 : External radio as datalink

 : Bluetooth datalink (also called controller network as datalink)

 : WIFI datalink

 : Slink(Satellite link)

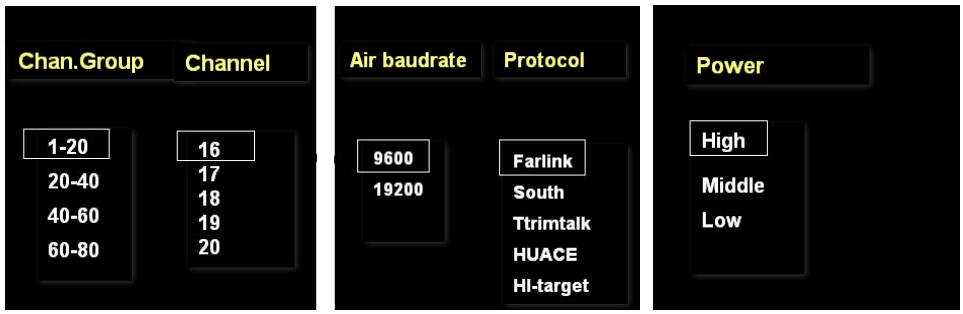
 : No datalink

1. UHF (inbuilt radio)

Firstly, set receiver to [Base mode] or [Rover mode], then enter Set datalink:

Swipe right and select [Set datalink], then select [UHF(inbuilt radio)] as below.

Tap the screen (or press PWR key) to make other settings for selected datalink.



Air baud rate: Normally, it is recommended to take default air baud rate. If need to change it, please make the same change for both base and rover receiver. More air baud rate, more data can be transmitted per second.

Radio protocol: Normally, it is recommended to take default protocol (Farlink). If need to change it, please make same change for both base and rover receiver.

Radio power: to set the base inbuilt radio transmission power.

2. Cellular network

Utilizing the inserted SIM card, the receiver can access to cellular network and transmit the differential correction data. Below icon shows the current datalink is cellular network.

3. Satellite datalink

4. Dual transmit datalink

It means both inbuilt radio datalink and cellular network datalink： correction data is transmitted simultaneously by both inbuilt radio and cellular network via SIM card.

5. Bluetooth datalink (also called controller network datalink)

Controller access to internet firstly and be connected to receiver by Bluetooth. Thus, receiver can receive correction data by utilizing controller's network.

6 WIFI datalink

Receiver access to WIFI network and transmit or receive differential correction data. It needs to make setting: [System option]-[WIFI config]-[Work mode: client].

7. External radio datalink

If an external radio is connected to receiver, then external radio datalink can be chosen as datalink.

8. Close datalink

Choose this option to close all datalink. Usually it is used only for test or debugging receiver.

§2.5.6 System option

Swipe right to select [System option] (or press F key to select), then tap it to accept (or press PWR key to accept).

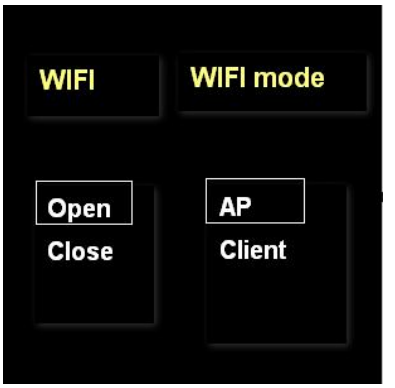
WIFI config

[WIFI work mode: AP/ Client]

AP mode: the receiver will generate hotspot so that your computer or mobile phone can connected to it and visit receiver's WEB UI.

Client mode: with the receiver's inbuilt network module, it can connect other WIFI hotspot to access to internet so that the WIFI datalink can be used.

Note: suggest to close WIFI client mode if there is no need to use WIFI datalink. By default, it is set as AP mode.



Power saving mode

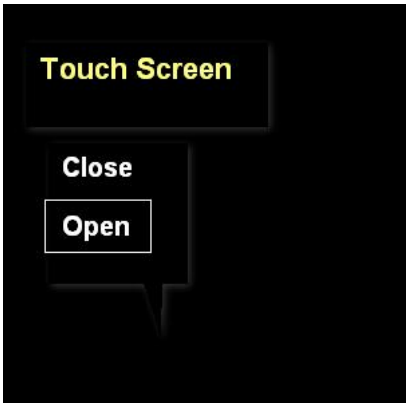
After choosing [power saving mode], the LCD display will turn dark in 2 minutes and once you tap screen or press any keypad, the screen will be activated again. It is recommended to set receiver in power saving mode to extend battery work time.

Other option

Language: select a language from here.

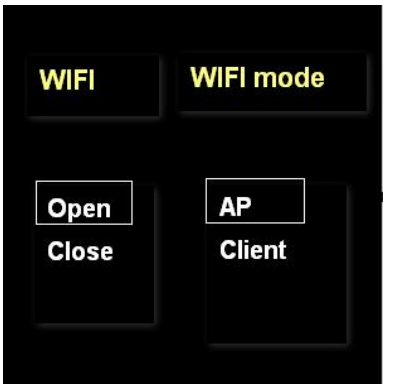
USB mode: USB flash disk mode and Ethernet mode.

Touch screen: enable or disable touch screen (if touch screen is disabled, you can use keypad to set receiver menu).



§2.5.7 WIFI config

[System option]- [WIFI config]



[WIFI: open/close]: to open or close WIFI function

[WIFI work mode: AP/ Client]

1. AP mode

The receiver will generate hotspot so that your computer or mobile phone can connected to receiver and visit its WEB UI.

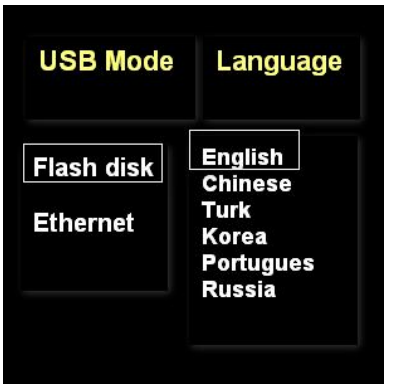
2. Client mode

With the receiver's inbuilt network module, it can connect to other WIFI hotspot and access to internet so that the WIFI datalink can be used.

Note: suggest to close WIFI client mode if there is no need to use WIFI datalink. In most of the cases, we use WIFI AP mode.

§2.5.8 USB mode config

[System option]- [Other option]- [USB mode]:



USB flash disk mode:

In this mode, the receiver works as USB flash disk. When receiver is connected to computer, this receiver's internal memory will be displayed as a removable disk in computer and all saved static data can be copied to computer, just like we are copying data from a flash disk.

Ethernet mode:

When the receiver is connected to computer by cable with ethernet mode, the receiver's inbuilt network module work as ethernet adapter, so the receiver can access to WIFI network as client so that WIFI datalink can be used.

Chapter Ⅲ Web UI Management

§3.1 Overview

Because of using the smart embedded Linux operating system and SOUTH intelligent cloud technology, the web UI allows users to configure and monitor the status of G5 in real-time. The accessing way is not only by WiFi connection, but also can be USB mode.

§3.2 Access by WiFi

The WIFI hotspot is default broadcasted by G5, search the WIFI hotspot which named with SOUTH_xxxx using smartphone, tablet or laptop, then establish the WIFI connection, input the **default IP (10.1.1.1)** into broswer, on the login interface, apply "admin" for the username and

password.

Run IE broswer on computer and input the default IP (**10.1.1.1**) into address bar, after a while, the system login interface is refreshed, then apply **"admin"** for username and password to login.

§3.3 Access by USB

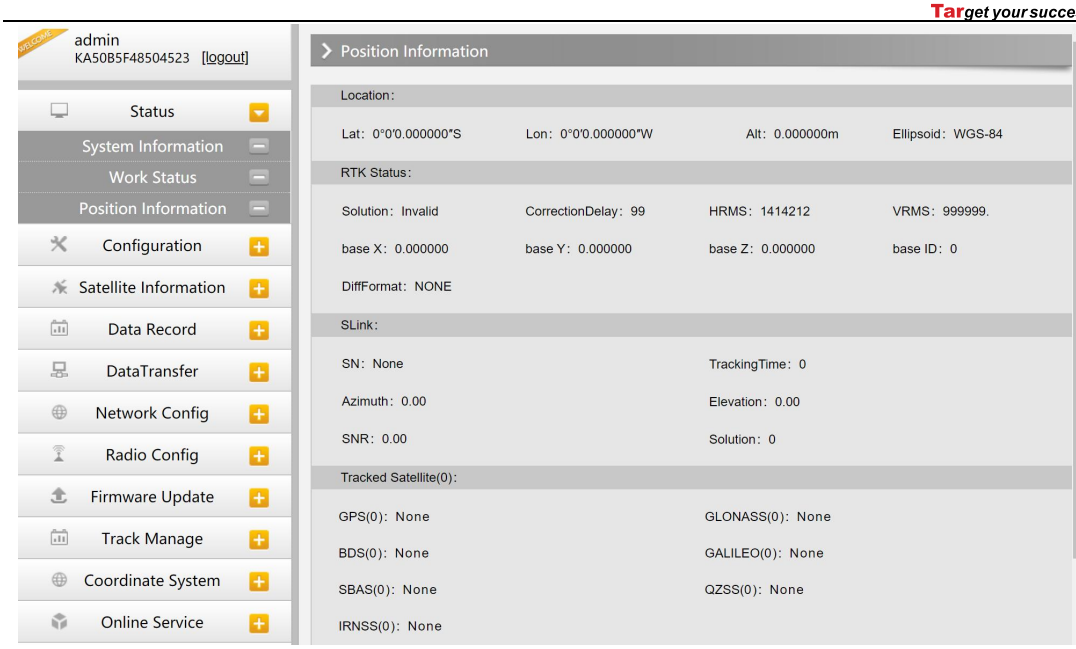
On this mode, the USB port of G5 must work as an Ethernet port, then internal web UI shall be accessed via type-c cable connection with computer.

Run IE broswer on computer and input the default IP (**192.168.155.155**) into address bar, after a while, the system login interface is refreshed, then apply **"admin"** for username and password to login.

NOTE: *The driver can be downloaded from official website automatically or please contact with us for more supports.*

§3.4 Web UI main interface

After login the Web UI management, the main interface appears with displaying configuration items and positioning. As shown at following figures.



In the Web UI home page, the configuration items are listed at left side. And the positioning information including coordinates information and satellites are displayed at right side.

Ref	Component	Description
	Status	Positioning information, satellite tracking and the others will be displayed in this page
	Configuration	It contains registration for receiver, base configuration, antenna configuration, satellite configuration, receiver configuration and system configuration.
	Satellite Information	Display and control the satellites are used or not
	Data Record	Configure the parameters for static mode and raw data download
	Data Transfer	Contains NTRIP configuration, TCP/IP configuration and data transferring with PC
	Network Config	Contains network parameters configuration, WIFI configuration and the other functions
	Radio Config	Configure the parameters and frequency for radio modem
	Firmware Update	It is used to upgrade the firmware for receiver and each modem
	Track Manage	Record track file while doing measurement
	Coordinate System	Setup a local coordinate system for G5

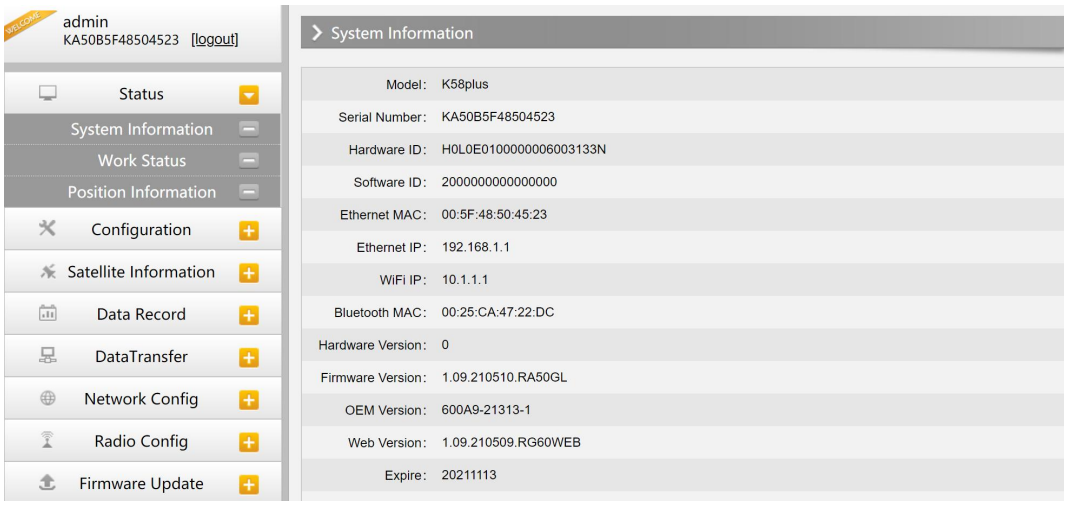
	Online Service	Upload data onto a server in real-time
	User Management	Add and manage the Web UI users
	Help	Offers solutions

§3.4.1 Status

System Information, Work Status and Position Information are listed under Status menu.

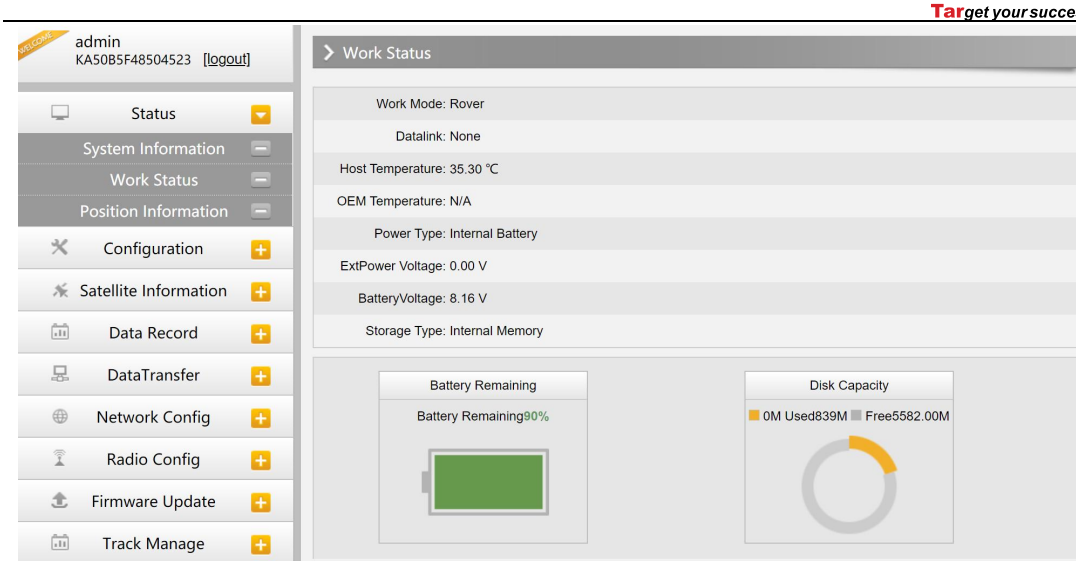
System Information

In this page, all the information is diplayed such as serial number, hardware ID, MAC address, firmware version and so on.



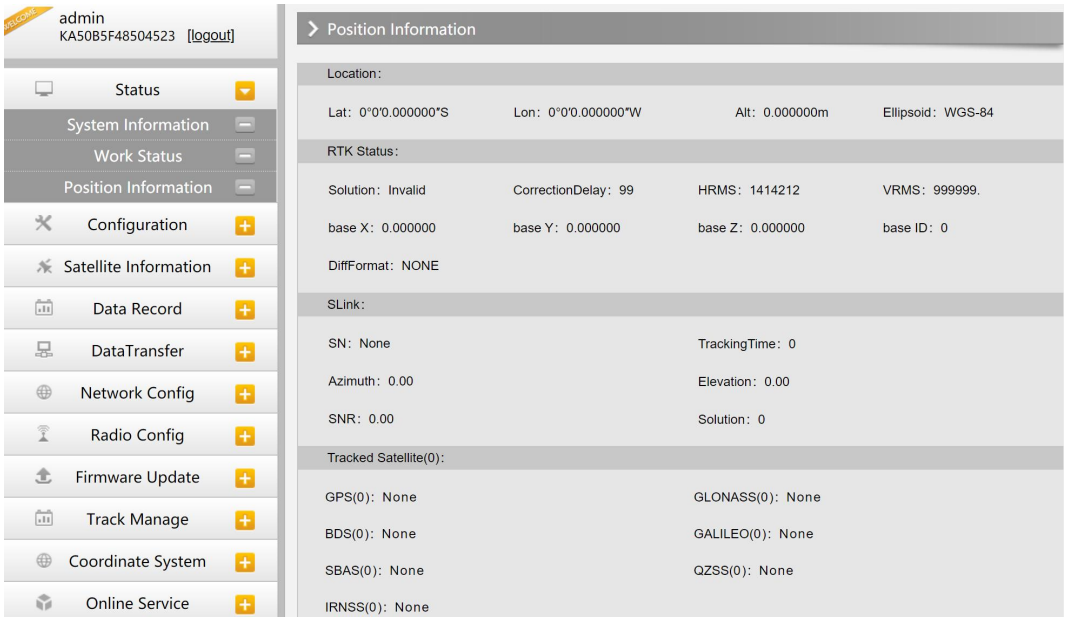
Work Status

The physical state of G5 such as working mode, datalink, host temperature, remaining power and the free memory is obtained from this page



Position Information

In this page, users can be clear at a glance on current position information and satellite information

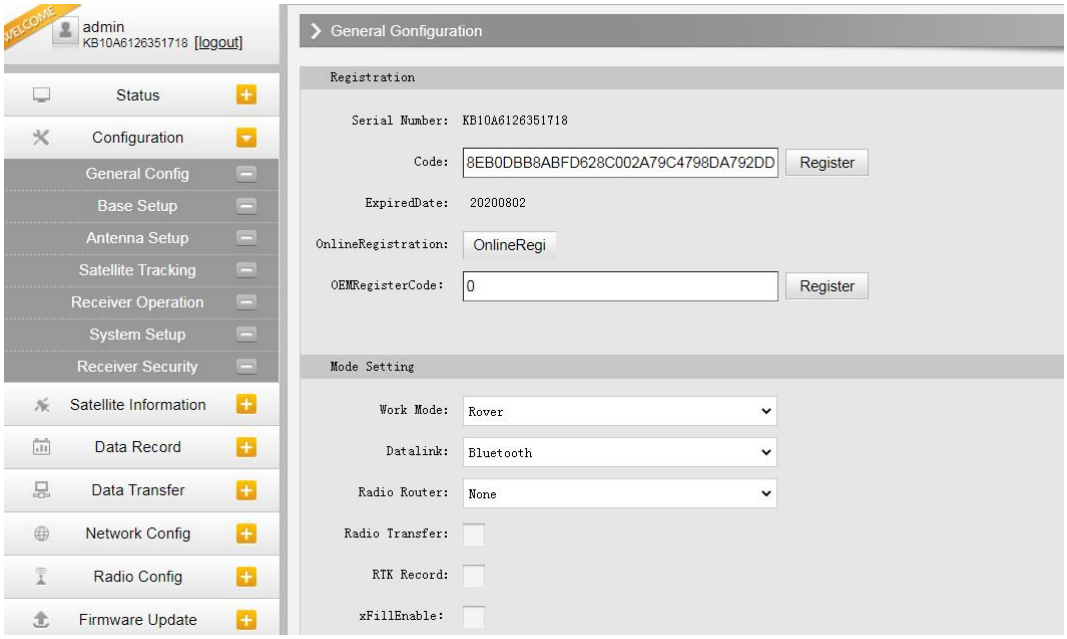


§3.4.2 Configuration

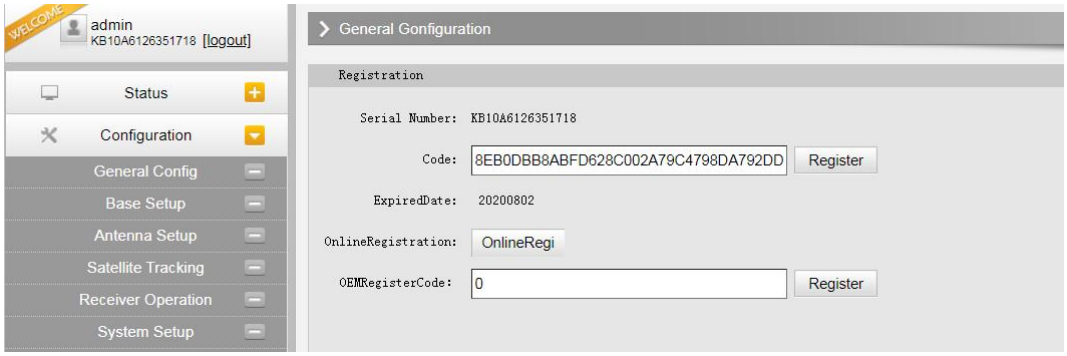
General Config, Base Setup, Antenna Setup, Satellite Tracking, Receiver Operate and Default Language are contained under Configuration menu. Users are able to configure all kinds of parameters for G5 under Configuration menu, and all the settings are immediate effect after saving.

General Config

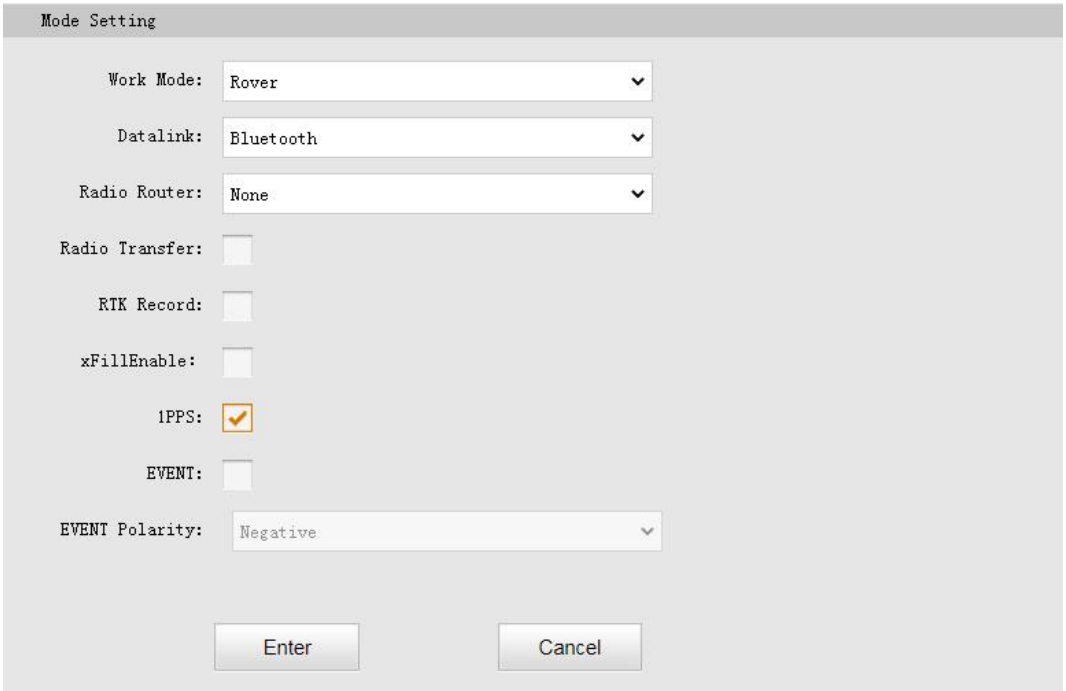
The registration for receiver working mode setting can be completed in this general configuration page.



If the code of G5 has expired or is going to be run out, please provide the serial number of your G5 for us to apply for another available code, then input the code into the blank or register the receiver online.

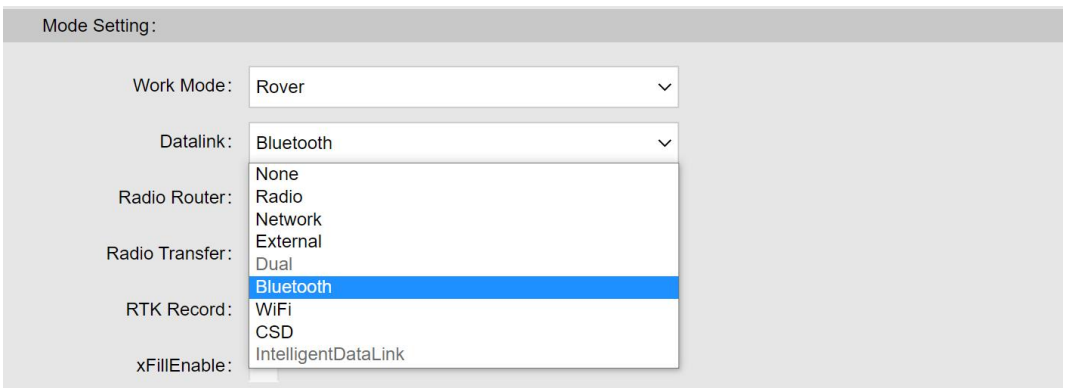


G5 allows users to setup the working mode and datalink from this Web UI that only need the mobile phone or tablet PC is able to connect the wifi hotspot of G5.

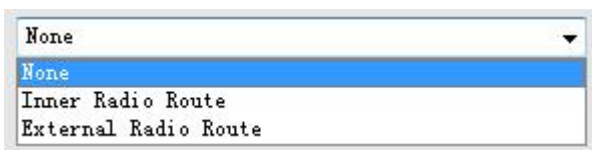


Work Mode: There are Rover, Base and Static contained in this dropdown list

Datalink: Pull down the list, there will be all kinds of options for datalink, such as radio, Network, External, Bluetooth, WIFI and CSD.



Radio Route: This feature is used to transfer the correction which from the reference station to the other rover by radio, the rovers will have the same reference coordindates. This is in the case of working in some places where there is poor signals from reference station or there is only a SIM card for a few rovers.It is able to use internal radio or connect an external radio to transfer the correction. This feature is only available on Rover mode.



RadioTransfer: This is the function that G5 is able to transfer the correction from Base station to the other rovers with the internal UHF, definitely, G5 can work as a radio repeater.

Note: please take in mind that the "Repeater" rover should keep away from Base station to avoid signal interference.

RTK Record: This is used to enable raw data recording in base mode or rover mode for post-processing

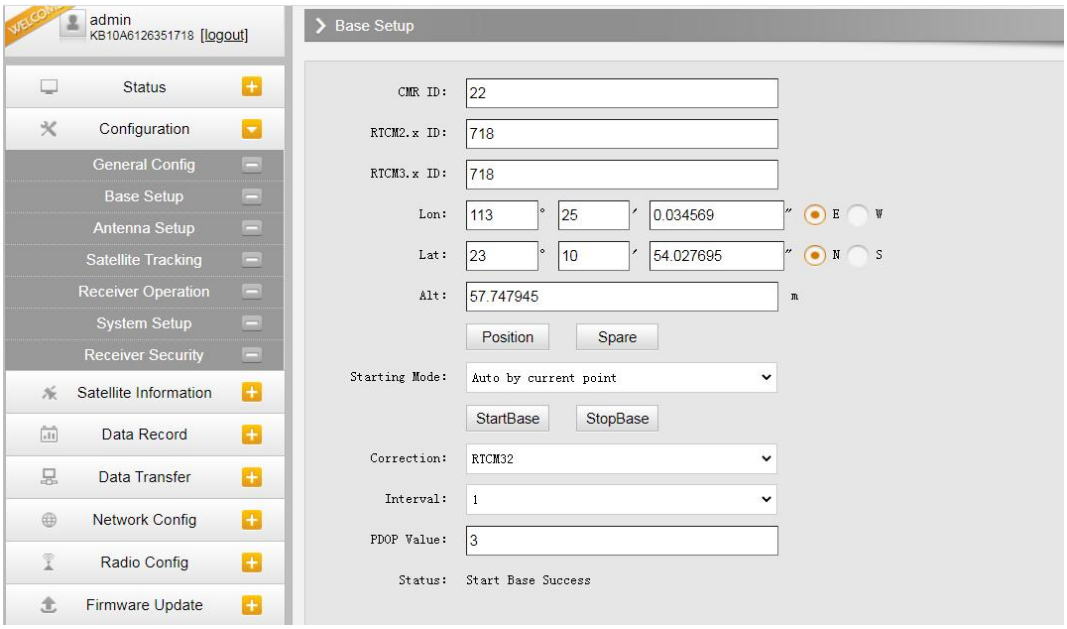
1 PPS: This option is for the 1 pulse per second output

EVENT: This option is for the EVENT marker input

EVENT Polarity: EVENT input method.

Base Setup

When G5 works as a base, the basic configuration for base can be setup in this page. Users can input the correct coordinates or capture a current position for the base. Also users can define what kind of correction format is transmitted.



CMR ID/RTCM2.X ID/RTCM3.X ID: Users can specify the ID for transmitting correction.

Position: Click this button to capture the coordinates for current position

Spare: This is used to the repeat station

Base Start Mode: Here contains 3 methods to start the Base, manually start base, automatically start base by fixed point, automatically start base by current point.

Correction: Here contains the global general used correction formats including RTCM23,

RTCM30, RTCM32.

POP Value: This value is setup for the PDOP limitation.

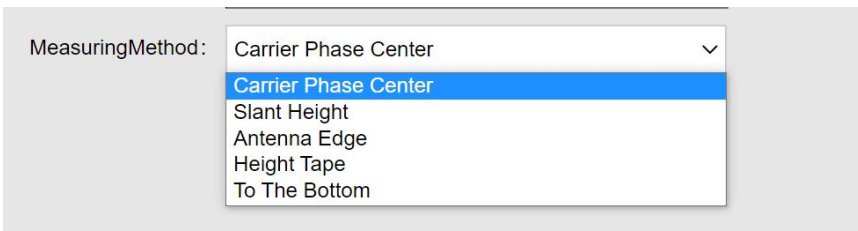
Status: Here will display the status for base in real-time.

Antenna Setup

The antenna parameters are configured in this page including the antenna height, measuring method.

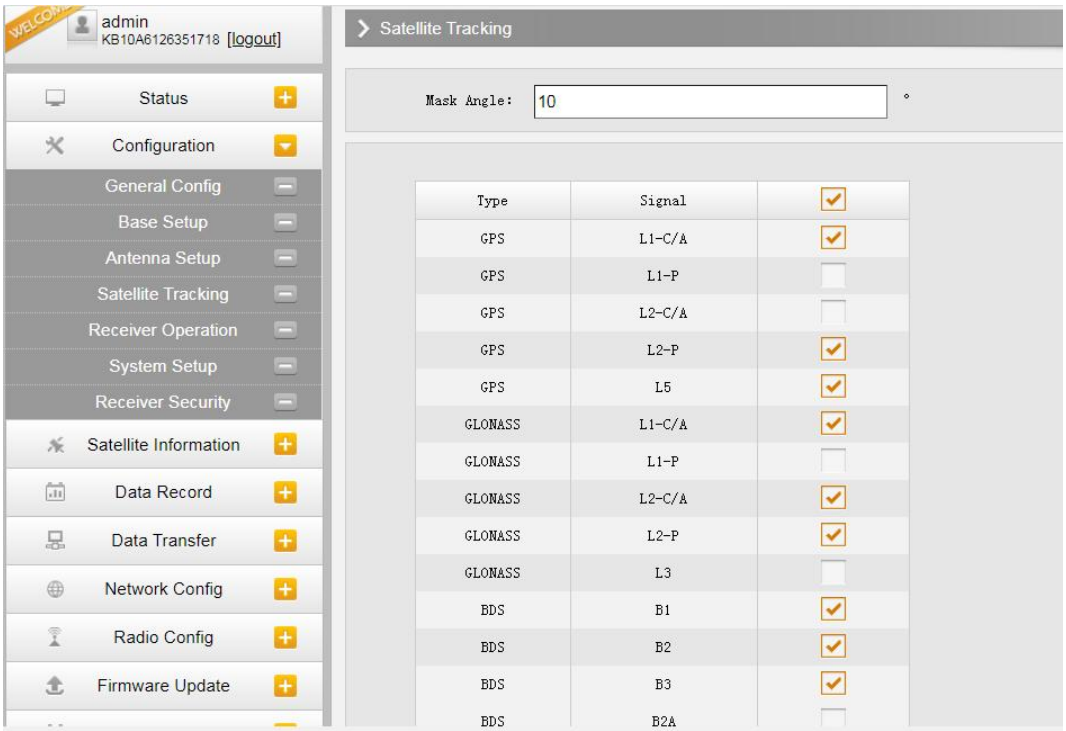
Antenna Height: This is the value for height of antenna while surveying.

Measuring Method: Here provides several methods for measuring the antenna height such as carrier phase center, slant height, antenna edge, height plate and to the bottom.



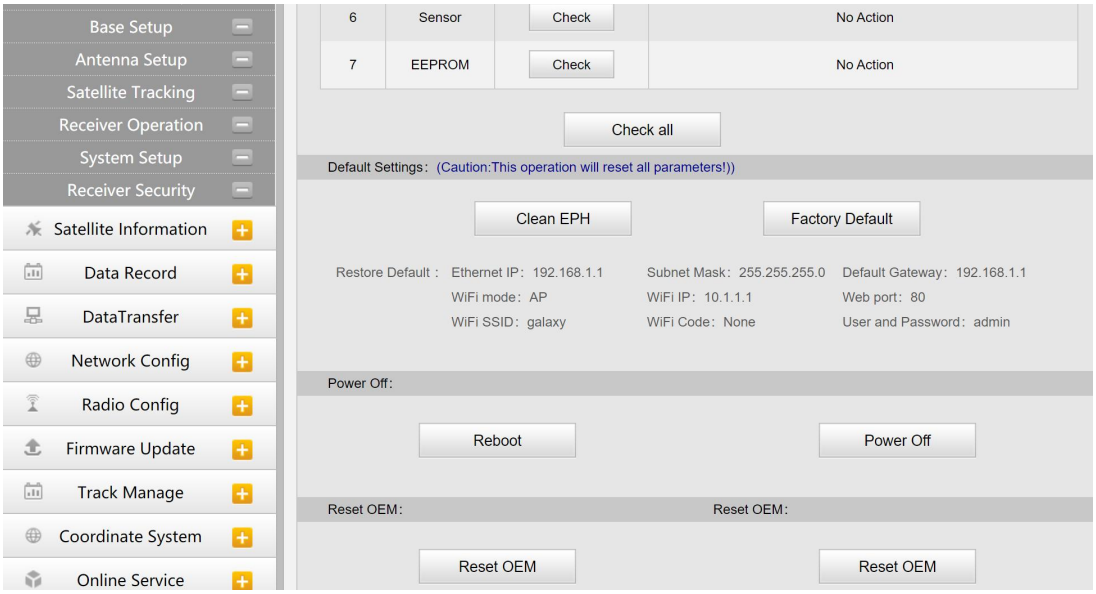
Satellite Tracking

In this page, users can define the mask angle for satellite tracking, and check on the box of corresponding band from the constellation that to use this band or not



Receiver Operate

The page provides all kinds of operations to control the receiver such as self-check operation, clean epochs, factory reset, reboot and power off.



Self-check: Users can also do the self-check from this configuration page, click on the Check all button to check all the modems or click on the check button corresponding to the modem to check one by one.

Clean EPH: Click this button to clear the remaining epochs to let recever track the satellites better.

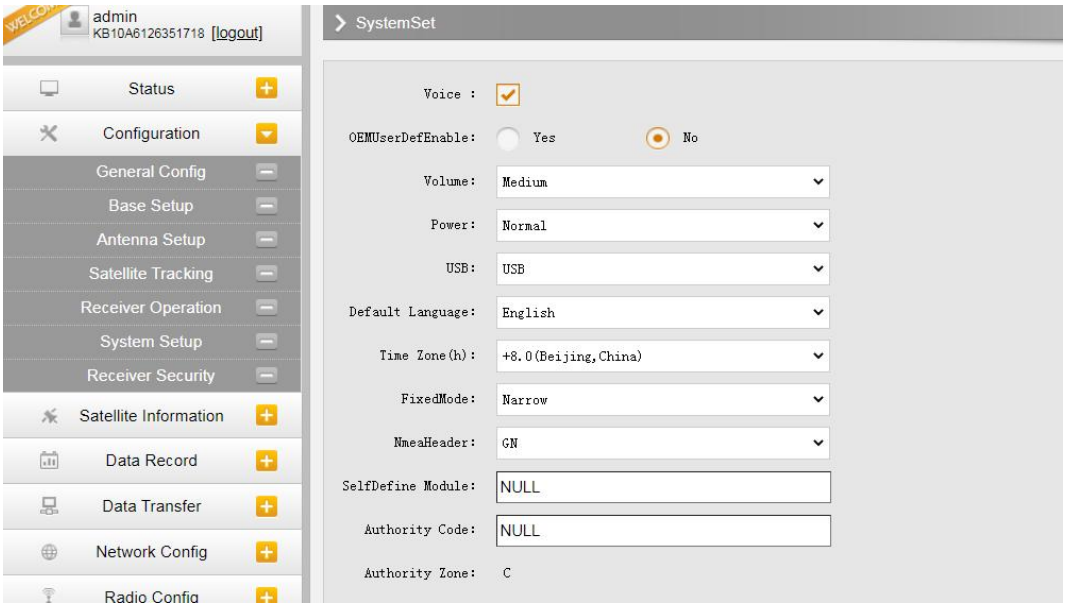
Factory Default: Click this button to bring the receiver back to factory default setting.

Reboot: Click this button to restart the receiver.

Power Off: Click this button to power off the receiver.

System Setup

This page is used to control Voice prompt, volume of voice, power saving, USB mode and the default language for receiver.



Voice Prompt: Check on this box to turn on the voice guide, uncheck it to turn off the voice guid.

V**oice Volume:** Define the voice volume for speaker.

Power: Configure the receiver to use the power saving mode or not.

USB: This is used to configure G5 what kind of USB mode output from type-c port when connect the receiver with computer via USB cable. USB and network port for optional.

Default Language: Configure the default language for G5 which associates with voice guid.

Note: This is not the language setup for web UI, the Web UI only supports Chinese and English.

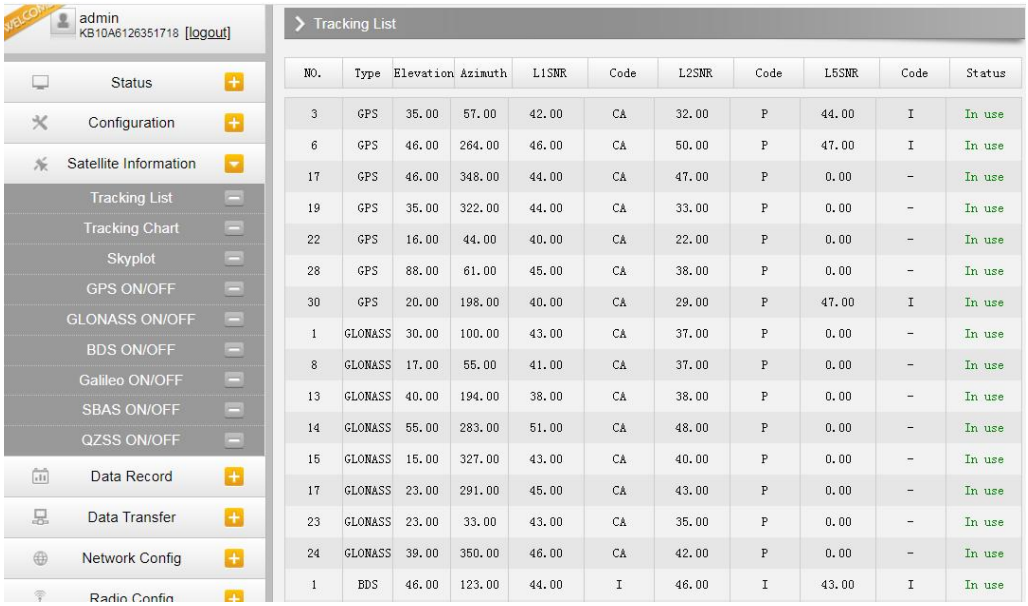
Time Zone(h): Use this to setup the corresponding time zone for your country or area.

§3.4.3 Satellite Information

The “Satellite Information” provides all kinds of tables, graph and the skyplot to view the information of tracking satellites. And it is allowed to configure to use which satellite in constellation on/off page by checking on the corresponding box.

Tacking Table

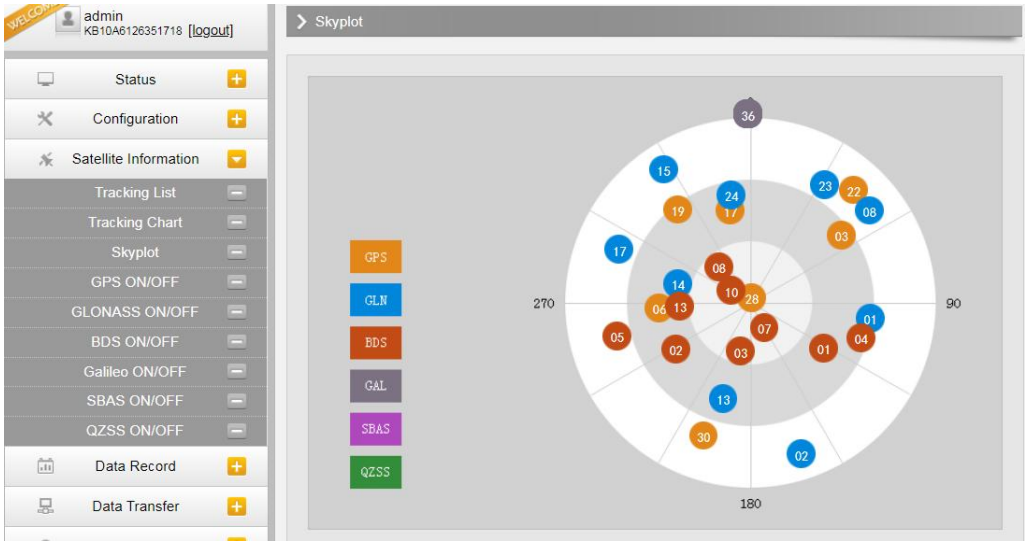
Here is the table to list all current used satellites and the other information for these satellites.



NO.	Type	Elevation	Azimuth	L1SNR	Code	L2SNR	Code	L5SNR	Code	Status
3	GPS	35.00	57.00	42.00	CA	32.00	P	44.00	I	In use
6	GPS	46.00	264.00	46.00	CA	50.00	P	47.00	I	In use
17	GPS	46.00	348.00	44.00	CA	47.00	P	0.00	-	In use
19	GPS	35.00	322.00	44.00	CA	33.00	P	0.00	-	In use
22	GPS	16.00	44.00	40.00	CA	22.00	P	0.00	-	In use
28	GPS	88.00	61.00	45.00	CA	38.00	P	0.00	-	In use
30	GPS	20.00	198.00	40.00	CA	29.00	P	47.00	I	In use
1	GLONASS	30.00	100.00	43.00	CA	37.00	P	0.00	-	In use
8	GLONASS	17.00	55.00	41.00	CA	37.00	P	0.00	-	In use
13	GLONASS	40.00	194.00	38.00	CA	38.00	P	0.00	-	In use
14	GLONASS	55.00	283.00	51.00	CA	48.00	P	0.00	-	In use
15	GLONASS	15.00	327.00	43.00	CA	40.00	P	0.00	-	In use
17	GLONASS	23.00	291.00	45.00	CA	43.00	P	0.00	-	In use
23	GLONASS	23.00	33.00	43.00	CA	35.00	P	0.00	-	In use
24	GLONASS	39.00	350.00	46.00	CA	42.00	P	0.00	-	In use
1	BDS	46.00	123.00	44.00	I	46.00	I	43.00	I	In use

Skyplot

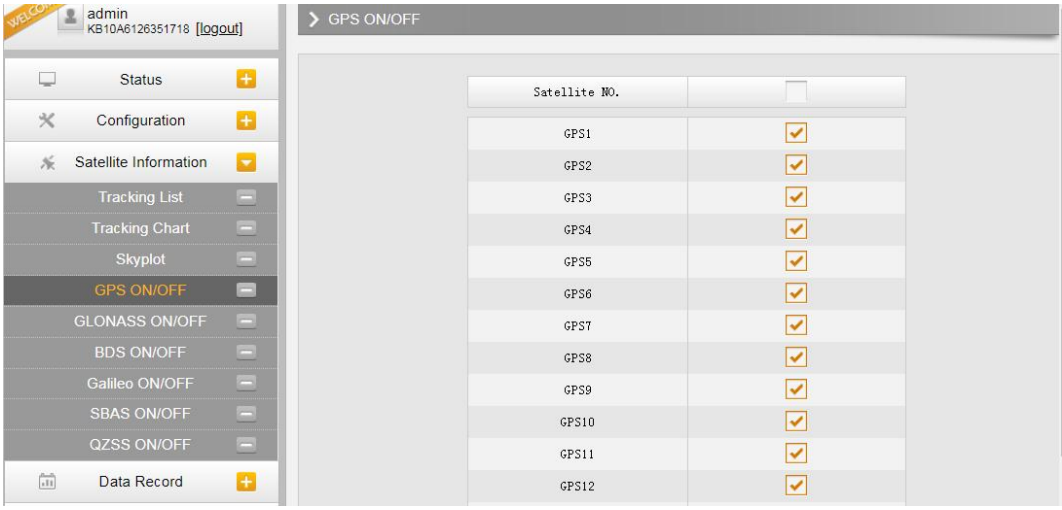
In this page, all the tracking satellires are shown on the skypolt, this let users intuitively view and know where the current position of satellite is.



GPS on/off

For all the running GNSS constellations or the augmentation system, G5 allows to configure to use which satellite or not.

In gnss on/off page, all the running satellites are listed, and unselect the box corresponding to the satellite to not use it.

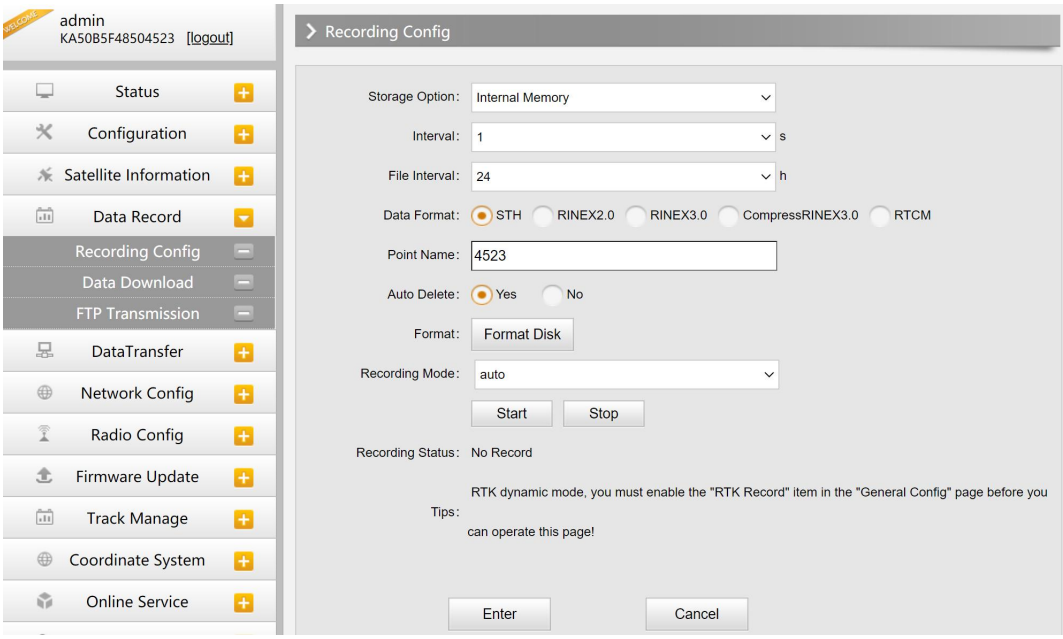


§3.4.4 Data Record

The “Data Record” performance is mainly used to configure all the parameters for receiver in static mode. Much more operations can be done on G5 such as storage path, interval, data format and data files download.

Recording Config

The page provides more practical operations for raw data storage.



Storage Option: Here are the options to be selected for where the raw data will be stored, internal memory or external memory.

Interval: This is the sampling interval for data storage, 20Hz sampling interval now is available for G5.

File Interval: This is used to define the data storage time for the static file.

Data Format: Here are 3 options to select to store what kind of format data, STH, Rinex2.0 and Rinex3.0.

Point Name: A point name is required. The last 4 digits of SN is default setting for the point name.

Auto Delete: This is used to configure G5 to delete the previous data files automatically if the memory is full.

Format: Click this button to format the internal memory for G5.

Recording Mode: Here are 2 options to configure G5 to record raw data automatically or not if it achieves the sampling conditions.

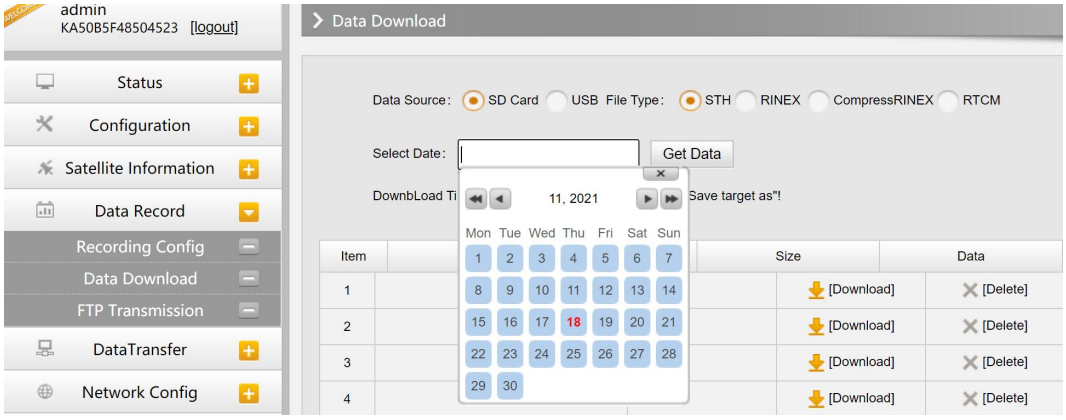
Start/Stop: Click these buttons to start recording or strop recording the raw data.

Recording Status: Here shows the status of static data storage.

Data Download

This page provides the data files to download

Choose the storage where the static data recorded, and file type, then click on the blank of "Select Date" to choose what date the data was recorded and click "Get Data" button, all the files recorded in the date you choose will show in the table, tap download button to download the data files.

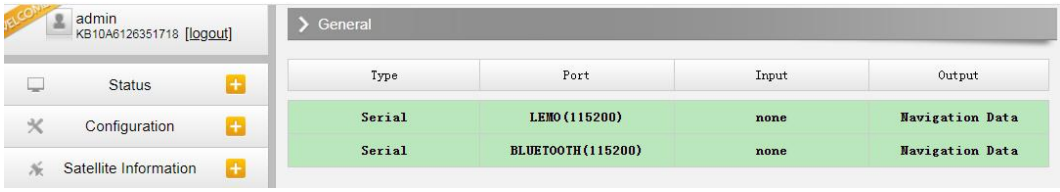


§3.4.5 Data Transfer

This performance contains General, Serial Port Config, TCP/IP Config, NTRIP Config and Data Flow Config. The "Data Transfer" allows to configure the output mode for raw observation data and differential data, as well as to the NTRIP performance configuration.

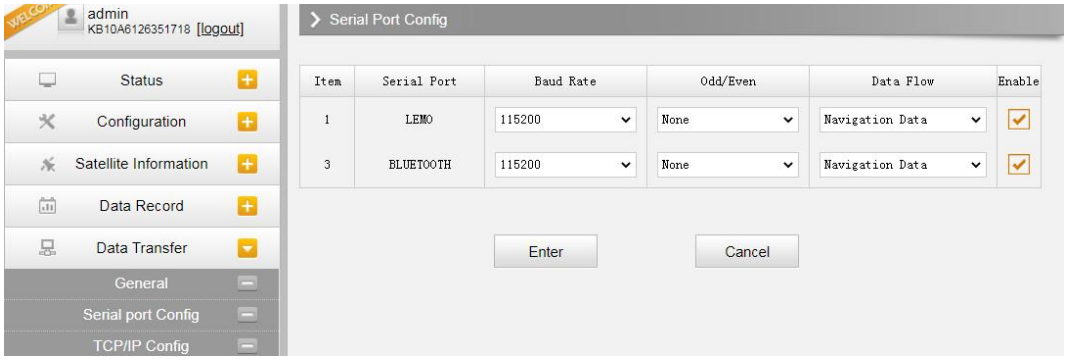
General

This page shows the service condition and the output contents of the ports, if the port item display in green, that means the port is being used, and the port is not used while the item display in red.



Serial port Config

This page is allowed to configure the baud rate, odd-even check and the data flow for serial port (5-pin port) and Bluetooth.



In the dropdown list of data flow, there shows 4 items for selection.

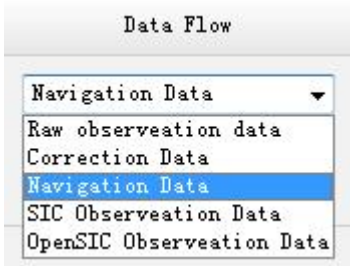
Raw observation data: This is the raw observation data straight from OEM board.

Correction Data: This is the correction data straight from OEM board.

Navigation Data: This is the navigation data output from receiver such as NMEA-0183, GSV, AVR, RMC and so on. It is configured in Data Flow Config page.

SIC Observation Data: This is the user-defined format observation data from SOUTH.

OpenSIC Observation Data: This is the open version of SOUTH user-defined format observation data for secondary development.

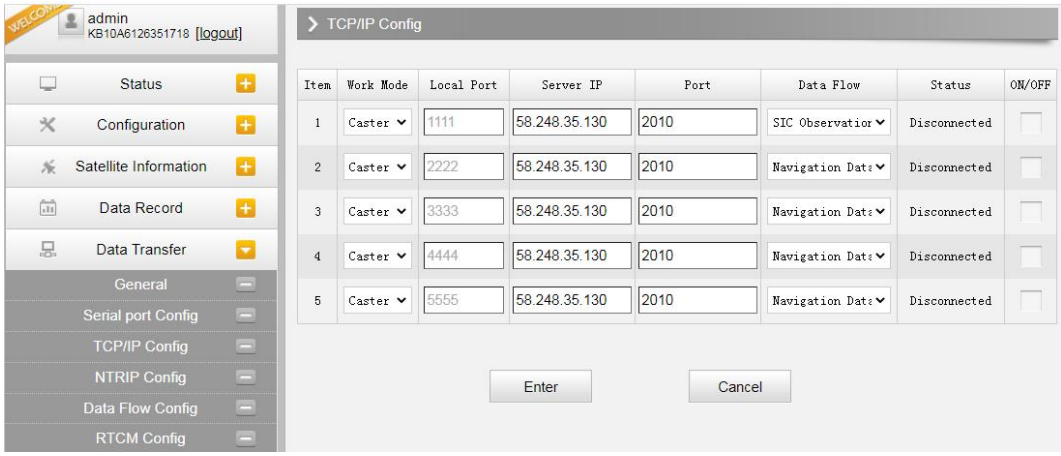


TCP/IP Config

This is used to configured the raw data or navigation data to be uploaded or transferred to a server. And there are Caster and Server working mode for this performance.

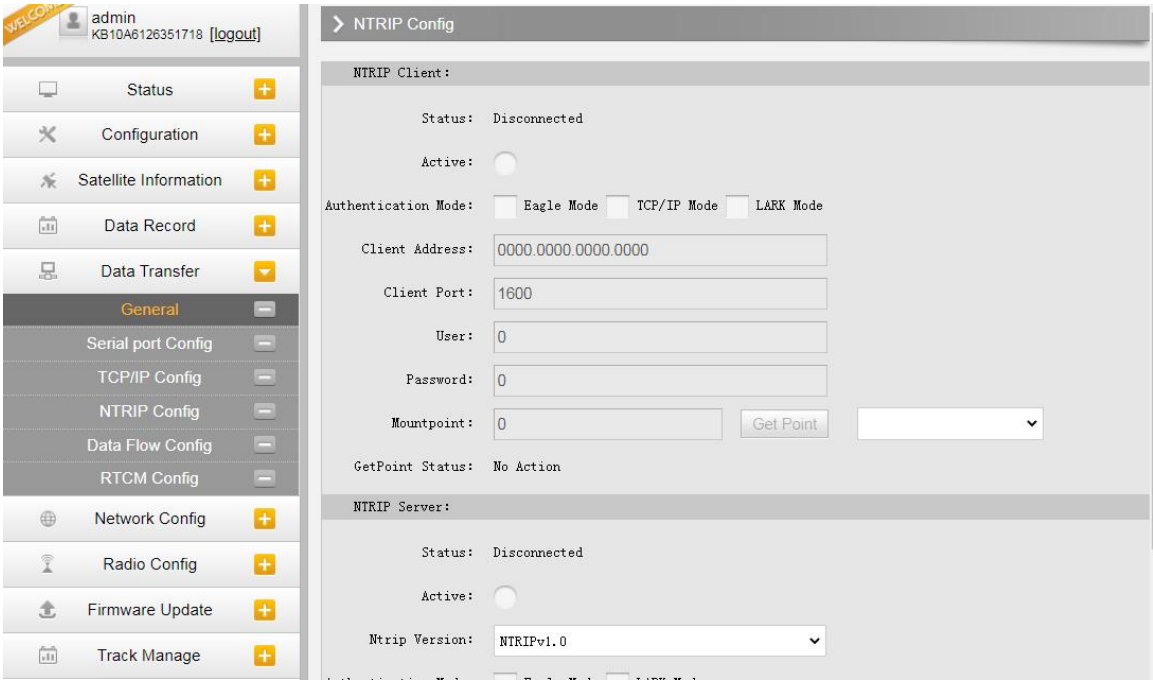
Caster: If this working mode is selected, G5 will be a client to upload the data to a specify server if it connects to the internet by WIFI or Network connection with SIM card inserted. Input the specified IP and port for server, and the data format what is uploaded. Then users are able to see the uploaded data on server.

Server: G5 will upload the data onto internet by the static WIFI if server is selected, then users are able to obtain its dynamic data by accessing to G5 through the IP from receiver.



NTRIP Config

This is used to configure the NTRIP performance while receiver is going to connect to internet. G5 supports complete NTRIP performance including NTRIP Client, NTRIP Server and NTRIP Caster.



NtripClient

This is the general used function for rover set in network mode. At the field of NtripClient, the specify IP address, access port of reference station, as well as the assigned username and password shall be input for the NTRIP connection.

Status: This field will display the status of NTRIP connection, connect or disconnect.

Active: Check on this circle to activate this function.

Authentication Mode: This includes Eagle Mode, TCP/IP Mode and LARK Mode.

① Eagle Mode is SOUTH standard mode, usually, this mode is used on the case of both Base and Rover are using network mode.

② TCP/IP Mode is for private network use.

③ LARK Mode, which is a new technology on network use, it is similar to GSM dial. This mode no longer rely on a CORS server that the corrections are transmitted by GPRS network. Besides, it is different from the feature of Caster.

The other fields are the standard configuration for NTRIP connection, IP, port, username and password, after this information is input into the corresponding field, click on Get Point button to download the source table from server, then choose a proper mountpoint to access.

Ntrip Server

This configuration is used in Base+network mode that Base station will transfer its correction onto the server as long as it connects to internet, then Rover can download the base's correction from server for use. Or use the LARK mode.

Ntrip Version: This field provides NTRIPv1.0 and NTRIPv2.0 for optional.

Access Point: This field is allowed to user-defined the correction format which base will transfer to the server, such as HHHH_RTCM30

NtripCaster

This feature is finally realized on G5 the receiver is equivalent to a CORS system that it generates and broadcasts the user-defined correction for rover if G5 connects a static IP address.

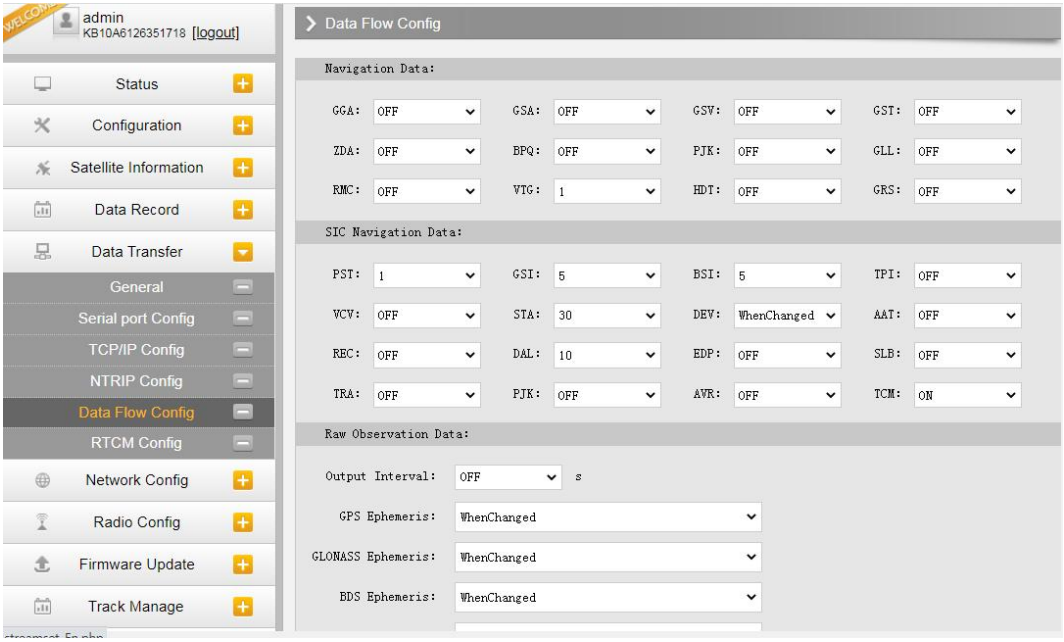
Port: This is the specify port for the access.

Access Point: This is mountpoint which can be user-defined.

Data Flow Config

In this page, users can optionally to configure the content and the update rate of data flow that to output or not to output what kind of data format.

Click on the dropdown list for each data format to define the update rate



§3.4.6 Network Config

The “Network Config” is able to configure the ways and the contents for internet access of G5. GSM/GPRS Config, CSD Config, WIFI Config, Bluetooth Config, Port Forwarding, Router and Network Testing are under the list of Network Config.

GSM/GPRS Config

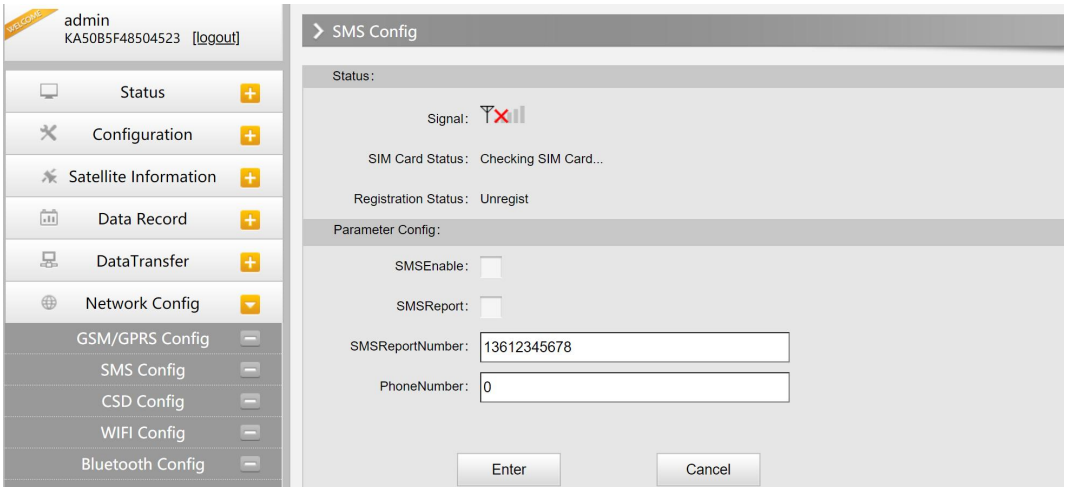
In this page, all the information of receiver under network mode will be displayed including the hardware information and dialing status.

Status: The dialing status and hardware information are displayed in this field that users can intuitively to view the signal of network, module model and the IMEI number of the module.

Parameter Config: The parameters of SIM card are input in this field including APN, assigned username and password, dial mode.

MSM Config

On this configuration dialog, input a phone number into the blank, G5 will send text message onto the phone which number is written.



CSD Config

CSD is the meaning of direct dial between Base and Rover with SIM card inserted (the CSD function should be activated on local SIM card), this function is mainly used in the area where there is very poor internet signal coverage.

Status: This field displays the dialing status when CSD is used on G5.

Parameter Config: To enable the CSD function with checking the box of Enable option in this field, then input the phone number for Rover and Base in CallNumber and LocalNumber.

Tips: please choose CSD as datalink for receiver in General Config.

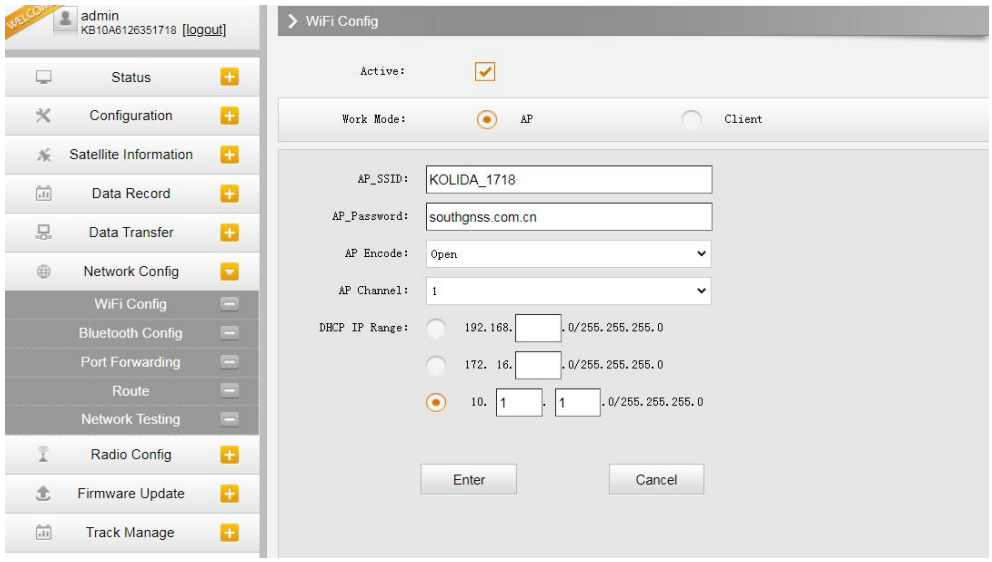
WIFI Config

This is mainly used on the WIFI configuration for G5, there are AP mode and Client mode for optional.

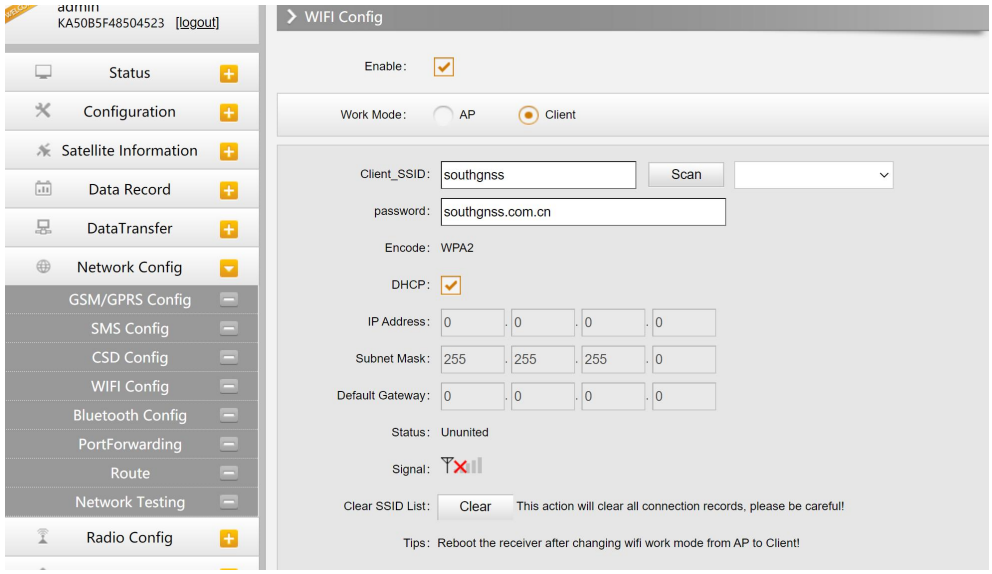
AP: This is used to enable the WIFI hotspot for G5 to broadcast for mobile terminals such as smartphone or tablet to connect and access the Web UI.

Check the box of AP in Work Mode to enable the WIFI hotspot for G5, and define the SSID, password, encryption method and broadcasting channel for WIFI connection.

DHCP IP Range: This is allowed to user-defined the IP for Web UI login.

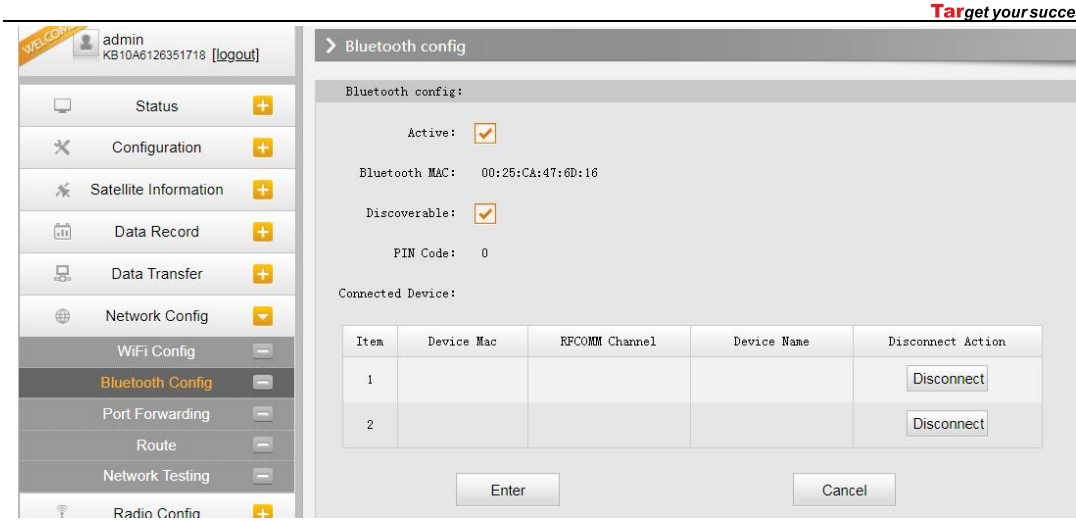


Client: This option enables G5 to search and connect the other WIFI hotspot which connects to the internet, the receiver is able to download and use the mountpoint from reference station.
Client_SSID: This is the WIFI hotspot which G5 is going to connect
Scan: Click this button to search the surrounding available WIFI hotspot.
Password: This is the password which the WIFI hotspot requires.
IP fields: If G5 successfully connects to the WIFI, there will be an LAN IP address generated by G5.
ClearSSID: Click this button to clear the SSID list.



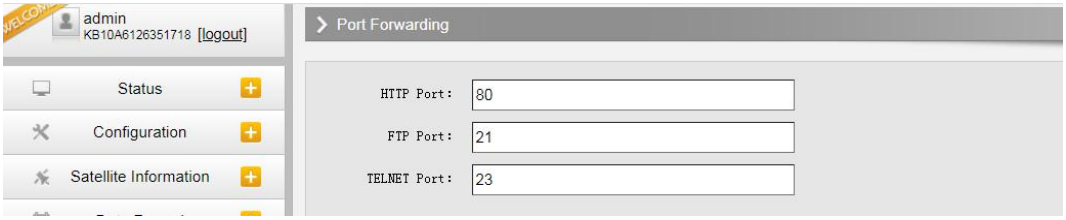
Bluetooth Config

In this page, users can view the information and connection status of Bluetooth, such the MAC of Bluetooth, discoverable or not, the PIN code, and the connection devices in following table.



Port Forwarding

This page is mainly used to view and configure the internet transmission port for G5, customize and debug receiver.



Router

This is mainly used to view and configure the parameters for router, only under the condition of customize and debug receiver.

Network Testing

This function is mainly used to test network status for G5 after logging on the internet.

How to do:

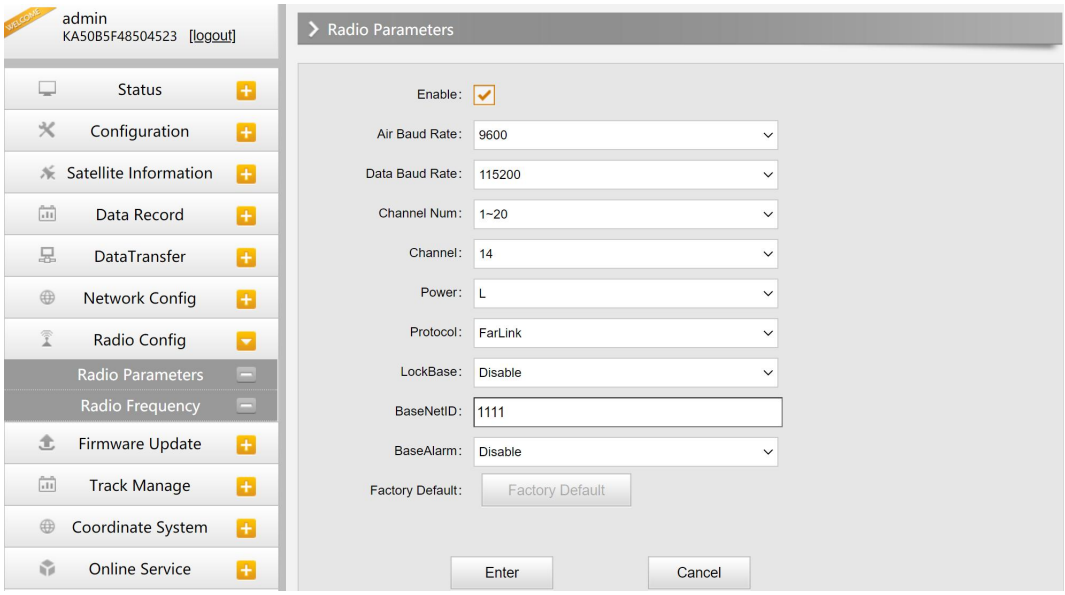
Input the IP address which G5 already connected, then click PING button, the testing information will be displayed in the following window.

§3.4.7 Radio Config

As the name implies, the parameters of radio can be done in “Radio Config”, it is divided into Radio Parameter and Radio Frequency.

Radio Parameter

This page is mainly used to configure the parameters for internal radio module of G5.



Air Baud Rate: This represents the data transmission rate in the air of internal radio, the higher value, the bigger of data size transmitted per second, usually keep the default setting.

Data Baud Rate: The data baud rate of SOUTH radio module has been unified to be 115200, keep it as default.

Channel: This is the communication channels for internal UHF, the value of the channel must be the same both in Base and Rover.

Power: This appears only in Base mode, the radio transmitting power is allowed to define in High, Middle or Low power.

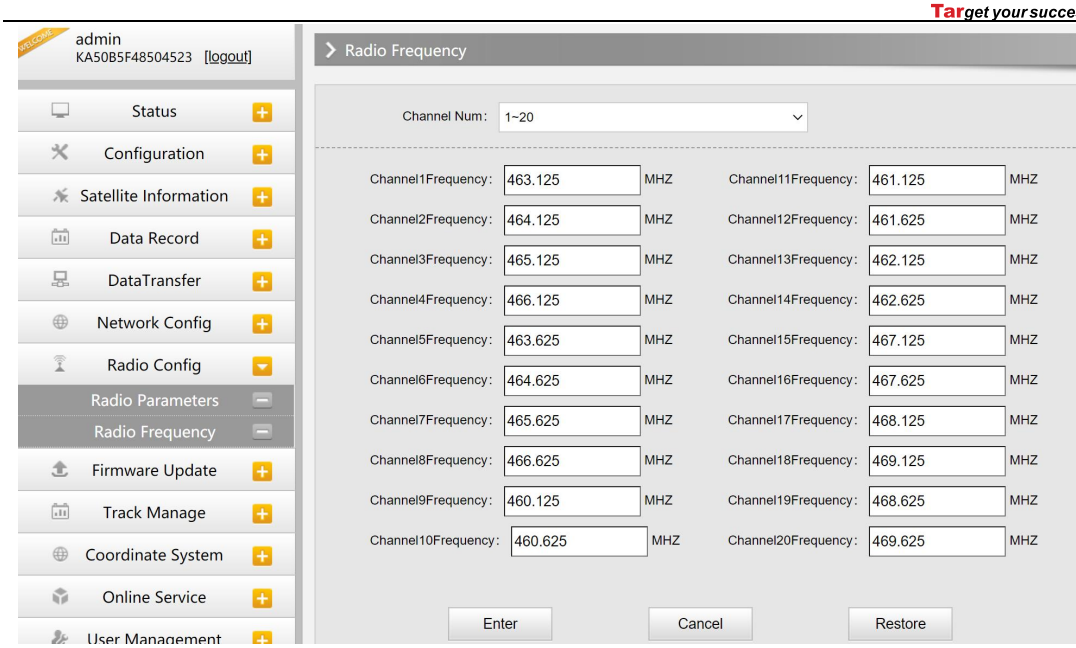
Protocol: This is radio communication protocol for data transmission, FarLink， SOUTHand TRIMTALK are optional in this page. If it is changed, Base and Rover must use the same protocol for communication.

Factory Default: Click this button to restore the factory default for internal UHF module.

Radio Frequency

For G5, the powerful internal radio module supports much more radio channels apply to the legal frequency in different countries or areas.

There are 20 radio channels listed in this page after clicking on radio frequency. Users are able to change the frequency freely in the channel spacing, click Restore button to bring the frequency of each channel back to default setting.

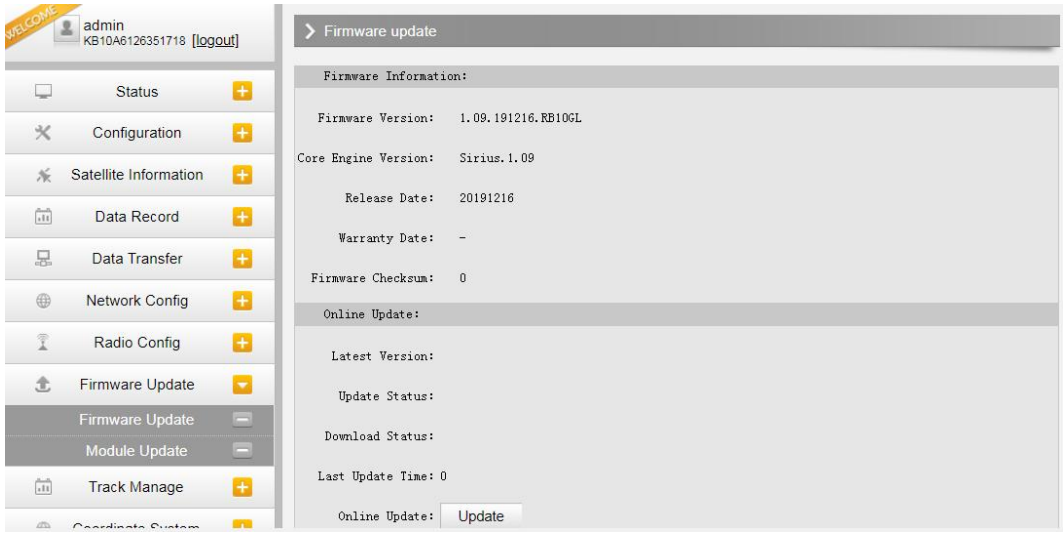


§3.4.8 Firmware Update

Update the latest firmware for receiver or for corresponding modems can be done in “Firmware Update”.

Firmware Update

This page displays all the information of the firmware which current installed on G5, and allows to update the latest version firmware for receiver. To get latest version firmware please contact with SOUTH technician.

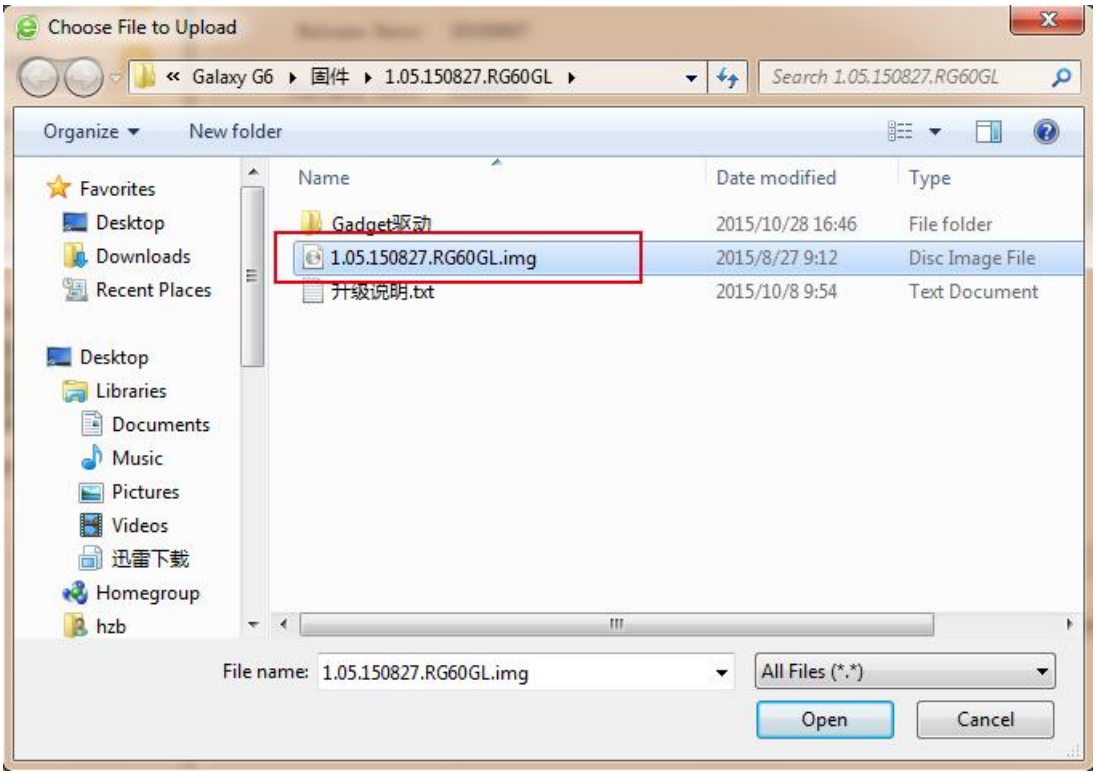


Online Update: G5 supports to update the firmware online anytime if there is something update or optimized.

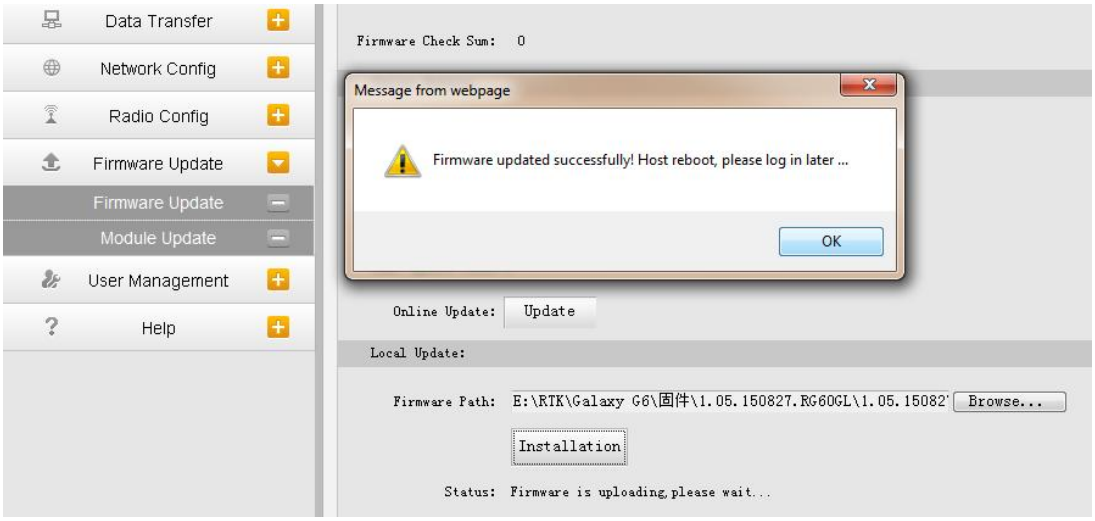
Local Update: Update the latest firmware by using a firmware file.

How to upgrade the firmware with Local Update

a) Click on “Browse” button to load firmware file (Please take in mind that the firmware is ended with .img as the extension name).



b) And then click “Installation” button to start upgrading.



c) After the firmware is completed upgrading, a dialog will appear saying “Firmware updated successfully! Host reboot, please log in later…”, then the receiver will restart automatically.

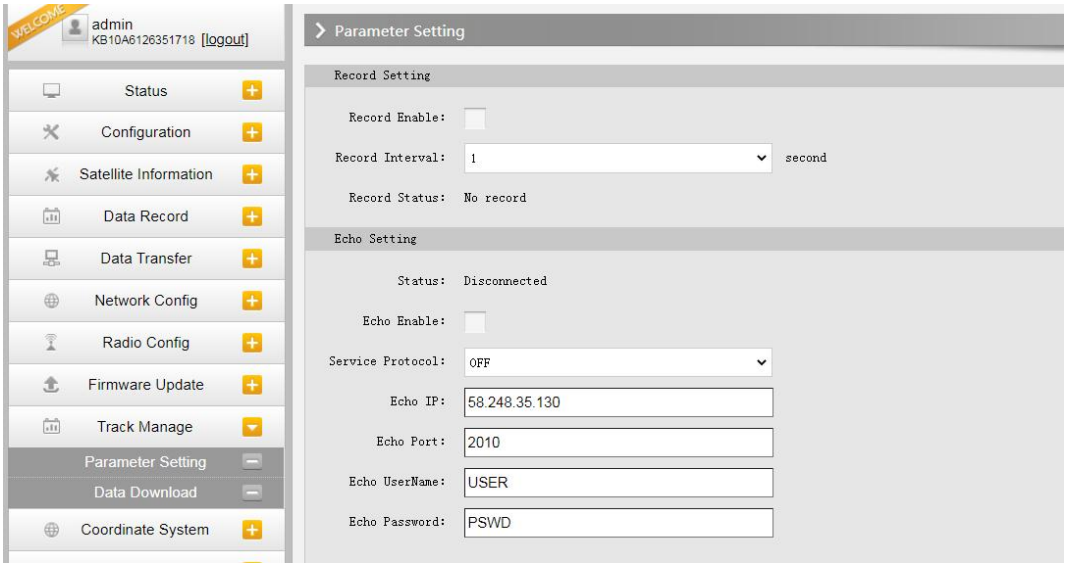
Module Update

This page is used to update the firmware for corresponding modem such as OEM board, radio module and sensor.

§3.4.9 Track Manage

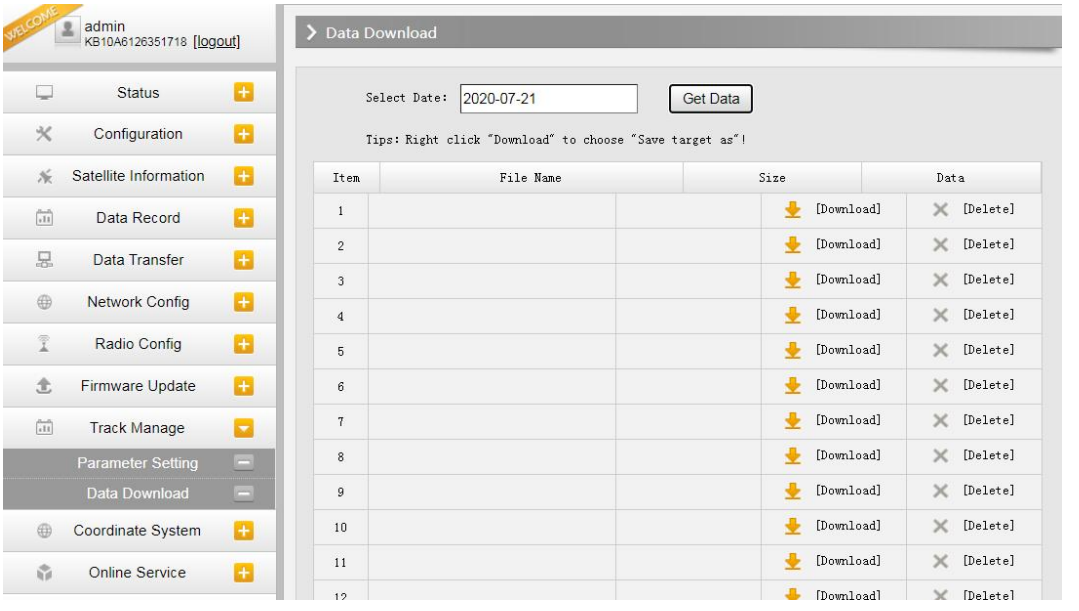
G5 supports to record the track while doing measurement, and upload the data onto the server.

Parameter Setting



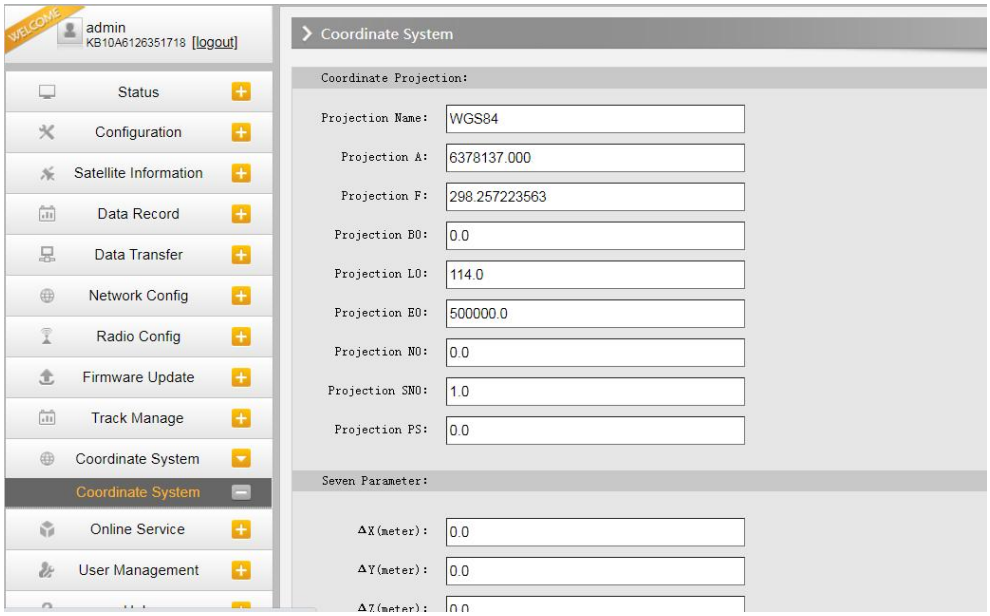
Data Download

On this page, users can download the track data file from receiver. Choose the recording date and click “Get Data” to load all the data files recorded at that day, then choose the files and click download button.



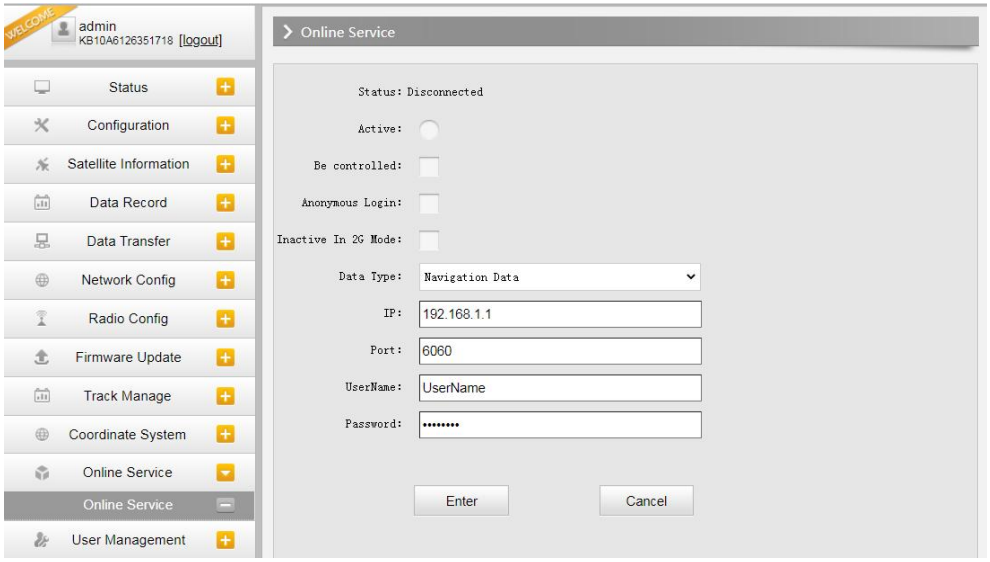
§3.4.10 Coordinate System

G5 allows users to setup the local coordinate system on internal web UI management. The instrument would output the local coordinates according to this coordinate system.



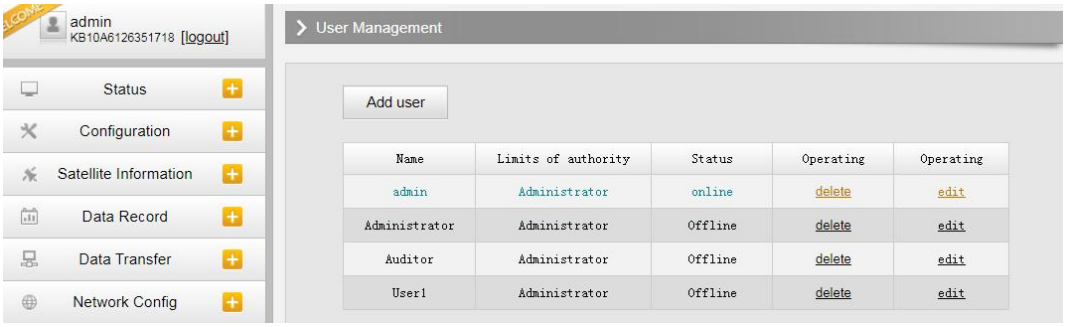
§3.4.11 Online Service

This function is to upload the data onto a server real-time, including Navigation data, raw observation data, correction data, SIC observation data and open SIC observation data.



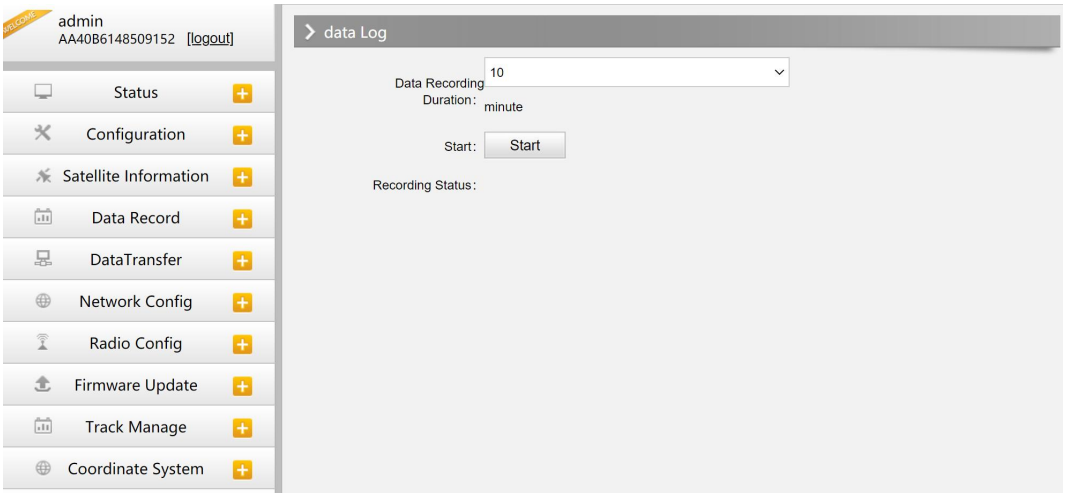
§3.4.12 User Management

This page is used to manage the authority of login Web UI for users, including the username, password and add users.



§3.4.13 System log

In this page, users can record some data from G5 for fixing some bugs.



Chapter Ⅳ Accessories

§4.1 Instrument Case

§4.2 Charger

Receiver Charger

Charging Cable

§4.3 Cable

Type-c data cable

The cable is to connect the receiver host and the computer to transfer static data and upgrade the host firmware.

§4.4 UHF Antenna

§4.5 Other Accessories

Other accessories include carbon fiber pole, controller bracket, connector, tribrach, etc.

The model and type of instrument accessories will change with the upgrade of the instrument.

The specific configuration can refer to accessories list.

reference received, including interference that may cause undesired operation.

G5 Specifications

SPECIFICATIONS

GNSS Features

Channels	1760
GPS	L1C/A, L1C, L2C, L2P, L5
GLONASS	L1C/A, L2C/A, L2P, L3CDMA
BDS	B1I, B1C, B2I, B2a, B3
GALILEO	E1, E5A, E5B, E5AltBOC, E6
SBAS	EGNOS, WAAS, GAGAN, MSAS, SDCM(L1,L5)
QZSS	L1C/A, L1C, L2C, L5, L6
Navic	L5
On module L-Band (Reserve)	
Positioning output rate	1Hz~50Hz
Initialization time	< 10s
Initialization reliability	> 99.9%

Positioning Precision*

Real-time kinematic (Baseline<40km)	Horizontal: 6 mm + 0.5 ppm RMS Vertical: 10 mm + 1 ppm RMS
GNSS static	Horizontal: 2.5 mm + 0.5 ppm RMS Vertical: 5 mm + 0.5 ppm RMS
Standalone	Horizontal: 1.2m Vertical: 1.9m RMS
DGNSS	Horizontal: 0.4m Vertical: 0.7m RMS
SBAS positioning	Horizontal: 0.6m Vertical: 0.8m RMS
RTK initialization time	2 ~ 8s
IMU tilt compensation	Additional horizontal pole tip uncertainty typically less than 10mm + 0.7 mm/° tilt down to 30°
IMU tilt angle	0° ~ 60°

Hardware Performance

Dimension	165mm(φ) × 108mm(H)
Weight	1.35kg (battery included)
Material	Magnesium aluminum alloy shell
Operating temperature	-30℃ ~ +70℃
Storage temperature	-40℃ ~ +80℃
Humidity	100% Non-condensing
Waterproof/Dustproof	IP68 standard, protected from long time immersion to depth of 1m IP68 standard, fully protected against blowing dust
Shock/Vibration	Withstand 2 meters pole drop onto the cement ground naturally
Power supply	6-28V DC, overvoltage protection
Battery	Inbuilt 10000mAh rechargeable, unremovable Li-ion battery
Battery life	Static: 20~25hrs Base: 10~12hrs Rover: 16~20hrs

Communications

I/O Port	5-PIN LEMO external power port + RS232 Type-C interface (charge + OTG + Ethernet) 1 UHF antenna interface 1 PPS ouput interface SIM card slot (Micro SIM)
Internal UHF	3W receiver and transmitter
Frequency range	410 - 470MHz
Communication protocol	Farlink, Trimtalk450s, SOUTH, HUACE, Hi-target, Satel
Communication range	Typically 15km with Farlink protocol
Cellular mobile network	4G cellular module standard
Bluetooth	Bluetooth 4.2 standard, Bluetooth 2.1 + EDR
NFC Communication	Realizing close range (shorter than 10cm) automatic pair between receiver and controller (controller requires NFC wireless communication module else)

WIFI

Modem	802.11 b/g standard
WIFI hotspot	Receiver broadcasts its hotspot form web UI accessing with any mobile terminals
WIFI datalink	Receiver can transmit and receive correction data stream via WiFi datalink

Data Storage/Transmission

Storage	16GB SSD internal storage standard, extendable up to 64GB Automatic cycle storage (The earliest data files will be removed automatically while the memory is not enough) Support external USB storage The customizable sample interval is up to 20Hz
Data transmission	Plug and play mode of USB data transmission Supports FTP/HTTP data download
Static data format	STH, Rinex2.x, Rinex3.x
Differential data format	CMR, RTCM 2.x, RTCM 3.x(MSM included)
Position output data format	NMEA 0183, PJK plane coordinate, SBF
Network model supports	Fully support NTRIP protocol

Sensors

Electronic bubble	Controller software can display electronic bubble, checking leveling status of the carbon pole in real-time
IMU	Built-in IMU module, calibration-free and immue to magnetic interference
Thermometer	Built-in thermometer sensor, adopting intelligent temperature control technology, monitoring and adjusting the receiver temperature

User Interaction

Operating system	Linux
Buttons	Dual-button
Indicators	3 LED indicators
Display	1.3-inch color touch screen
Web interaction	With the access of the internal web interface management via WiFi or USB connection, users are able to monitor the receiver status and change the configurations freely
Voice guidance	It provides status and operation voice guidance, and supports Chinese/English/Korean/Spanish/Portuguese/Russian/Turkish
Secondary development	Provides secondary development package, and opens the OpenSIC observation data format and interaction interface definition
Cloud service	The powerful cloud platform provides online services like remote manage, firmware update, online register and etc.

**The data comes from the SOUTH GNSS Product Laboratory, and the specific situation is subject to local actual usage.*

CE FC