



SL8 GNSS RTK System User Manual

Manual Revision

Geosolution i Goteborg AB

Revision Date	Revision Level	Description
August 2025	1	SL8 GNSS RTK System User Manual

Preface

Introduction

Welcome to the user manual for the SL8. This manual applies to SL8 and provides instructions on how to set up and operate these devices.

Please note that the images, icons, and other illustrations shown in this manual may differ from the actual product. Always refer to the physical product for accurate reference.

Experience requirement

To ensure optimal use of the SL8, it is recommended to read this manual carefully before operation. If you are not yet familiar with the SL8, please visit SatLab official website: <https://www.satlab.com.se/>

Tips for safe use



Notice: These are special operations and need your special attention. Please read them carefully.



Caution: The contents here are very important as the wrong operation may damage the machine. This can lead to the loss of data, or break the system and endanger your safety.

Exclusions

Before using the product, please read these operating instructions carefully, as they will help you to use it better. GeoSolution i Göteborg AB assumes no responsibility if you fail to operate the product according to the instructions or operate it wrongly because you have misunderstood them.

SatLab is committed to constantly perfecting the product's functions and performance, improving its service quality and reserves the right to change these operating instructions without notice.

We have checked the contents of the instructions and software and hardware but please note the possibility of deviation. The pictures in the operating instructions are for reference only and the actual products may vary from them.

Technology and service

If you have any technical issues, please call the SatLab technology department for help, and we will answer your question.

Relevant information

You can obtain this introduction by:

Purchasing SatLab products: this manual is found in the instrument container and will help you to operate the instrument.

Logging on to the SatLab official website and downloading the electronic version of this introduction from Partner Center:
<http://members.SatLab.com.cn/>

Advice

If you have any suggestions for this product, please email us: sales@SatLab.com.cn. Your feedback information will help us to improve our product and service.

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CHAPTER**1**

Overview

This chapter contains:

- Foreword
- Features
- Use and Precautions

Foreword

The SL8 is a new-generation GNSS receiver integrated with professional dual cameras, enabling seamless measurement and staking-out in a single step. Its non-contact measurement capability significantly expands the usable range of GNSS, ensuring highly efficient and safe operation.

Features

- ◇ Based on high-performance Android imaging processing technology, the controller obtains coordinates in real time, with an operating range of 2-15m and a typical accuracy of 2-4cm;
- ◇ The controller supports seamless switching between 360° AR staking-out and host-based image staking-out, delivering an immersive staking-out experience that is both fast and accurate, with precision better than 2cm;
- ◇ Featuring a new seamless inertial navigation system, it automatically initializes upon power-on, enabling immediate measurement upon arrival at the point. This ensures high efficiency, convenience, stable operation without easy exit, and reliable accuracy;
- ◇ It supports laser imaging measurement, enabling rapid acquisition of hard-to-reach measurement points;
- ◇ The new-generation GNSS chip features 1408 channels and supports BDS-3 new signal frequencies B1C, B2a, and B2b for RTK resolution;
- ◇ The built-in WEB management system enables real-time monitoring and flexible configuration of the host unit;
- ◇ The omnidirectional radio antenna features a built-in multi-protocol radio module, ensuring compatibility with multi-brand RTK systems. With adjustable radio power, it delivers a typical operating range of 12 km;
- ◇ It supports WiFi, Bluetooth, and NFC communication;

- ◇ It features a built-in gravity acceleration sensor (electronic bubble) ;
- ◇ New appearance, lightweight and compact design, enabling rapid measurement;
- ◇ It supports dual-format static data storage (*.GNS / RINEX data) ;
- ◇ The new generation ergonomically designed controller features built-in 4G full-network support and is equipped with a dedicated charger for rapid charging;
- ◇ The Hi-Survey software features a redesigned UI, enhanced base map visualization, advanced road calculation algorithms, and open connectivity capabilities.

Use and Precautions

We hereby declare that the manufacturer information of SL8 products is as follows:

Manufacturer: Geosolution i Goteborg AB

Brand Name: Satlab Geosolution

Address: Stora Avagen 21, 436 34 ASKIM, Sweden

SL8 is designed to be resistant to both chemicals and impact, but precision instruments require careful use and maintenance and care should be taken.

**Notice:**

This equipment complies with radiation exposure limits set forth for a controlled environment. This equipment should be installed and operated with a minimum distance of **31cm** between the radiator and your body. This transmitter must not be co-located or operated in conjunction with any other antenna or transmitter.

We recommend that a distance of 0.31m or more be maintained between this device and people during operation. Operations closer than this distance is not recommended.

The product shall not be permanently installed outdoors because protection against water and dust is not guaranteed Please bring back to indoors in rainy weather.

This device needs a license from the national regulatory authority before use.

The receiver must be within the specified temperature range when it is used and stored.

For parameters of radio frequency and output power, please refer to **Chapter: Technical Specifications**.

**Notice:**

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.
-

**Cautions**

This equipment complies with radiation exposure limits set forth for a controlled environment. This equipment should be installed and operated with a minimum distance of 31cm between the radiator and your body. This transmitter must not be co-located or operated in conjunction with any other antenna or transmitter.

We recommend that a distance of 0.31m or more be maintained between this device and people during operation. Operations closer than this distance is not recommended.

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.
- (2) this device must accept any interference received, including interference that may cause undesired operation.

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

Product Introduction

This chapter contains:

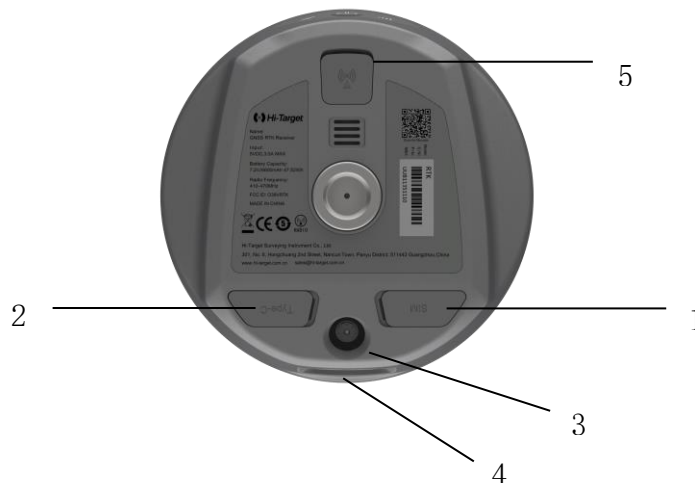
- Appearance and Interfaces
- Button & LED

Appearance and Interfaces

The overall appearance of the product is as shown in the figure below:



The external interfaces include an SMA radio antenna port, a SIM card slot, and a Type-C USB port.



External Interfaces:

1. SIM Card Slot: For external SIM card installation.
2. Type-C USB Port: Used for instrument charging, firmware updates, data download, and connecting external radios.
3. Secondary Camera: Supports AR staking-out.
4. Main Camera & Laser Module: Enables image-based measurement and laser measurement.

5. SMA Antenna Port: Connect the radio antenna when using the built-in radio mode.

Buttons and Indicators



1. Satellite LED
2. Power LED (Power Button)
3. Data LED

Button Functions

Detailed description of power button functions

Function	Description
Power-on	Press and hold the power button for 1 second
Power-off	Press and hold the power button for more than 3 seconds but less than 6 seconds
Forced shutdown (use when the device crashes)	Press and hold the power button for at least 12 seconds
Query current status	Press the power button once to receive the product's current working status
Switch working mode	Double-click the power button to change the mode. Each double-click switches to a different working mode, and click the power button to confirm the one you want
Reset motherboard	When the device is powered on, press and hold the power button for 6 seconds and release it after hearing a second "dingdong" sound
One-click site setup	When power off, press and hold the power button for 6 seconds to turn on the device

LED

指示灯功能详细说明

Item	LED	Description
 Power LED(Red)	Long-term lighting	In the charging state, and the power is not fully charged, the power red light is always on
	Long-term light out	In the non-charging state or after the power is full, the power red light is always off
 Power LED(Green)	Flash	When the battery level is $\leq 10\%$, the power indicator light flashes once per second, with each flash lasting 0.5 seconds
	Long-term lighting	When not charging and powered on, the power green light stays on when the battery level is above 10%. When charging and powered on, the power green light stays on. When charging and powered off, the power green light stays on after the battery is fully charged.
 Data light (Green)	Flash	1. Reference station and rover: Flash according to the differential data transmission and reception frequency (light up for 0.2 seconds each time a differential data packet is received). 2. Static: a) If the sampling interval is >1 second, flash according to the sampling interval, lighting up for 0.2 seconds each time. a) b) If the sampling interval is ≤ 1 second, flash according to 1 second, lighting up for 0.2 seconds each time.
	Long-term light out	Reference station differential data not transmitted, rover station did not receive differential data, static mode not started.
 Satellite light (Green)	Long-term lighting	The satellite has been tracked
	Flash	Satellite not tracked, flashes once per second, each flash lasting 0.5s

CHAPTER

3

WEB management system

This chapter contains:

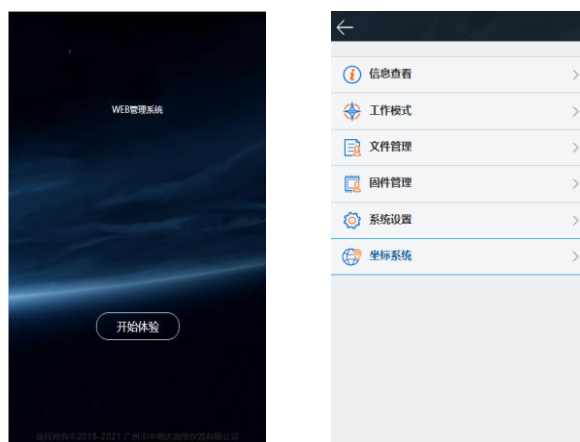
- Main menu
- Information view
- Working mode
- Document management
- Firmware management
- System Settings

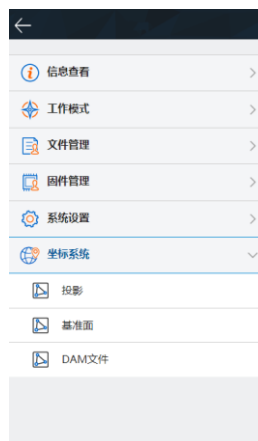
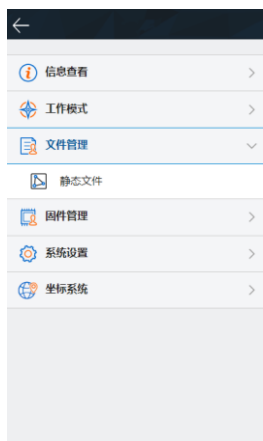
WEB management system

The laser dual-camera RTK series products have a built-in WEB management system, which can monitor and freely configure the host in real time. The name of the receiver's WiFi hotspot is the instrument body number, connect to the hotspot through the controller WiFi (the password is 12345678 by default), and enter the IP address 192.168.20.1 in the controller browser to log in (Note: the host can only connect to the host when the Bluetooth is idle and log in to the web).

Main menu

After logging in to the WEB management system, click "Start Experience" to enter the main menu page, and each column of the main menu contains drop-down menus.





WEB menu bar function

Main menu	Submenu	Feature introduction
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Information view	Device information	Device model, version information, registration information, etc
	Location information	Equipment positioning coordinates, device star search, solution status, etc
	Base station information	base station coordinates and base station level
	Satellite starry sky map	View satellite sky maps
	Satellite tracking list	Satellite tracking information
Working mode	Rover	Rover data link, parameter settings
	Base	Base station data link, parameter settings
	Static	Static measurement parameter setting
Document management	Static files	Static file download, delete, format
Firmware management	Upgrade firmware	Firmware selection and upgrade
	Restore the system	Restore the system
System Settings	Satellite tracking	Switches for satellite system tracking
	Data output	Data output settings
	Radio settings	Radio frequency table
	Host registration	Host registration information and registration
	Reset the motherboard	Reset the motherboard to its initial state

	Other settings	Static RINEX recording switch and volume adjustment
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Information view

1. Device information

Displays the main information of the current device: device model, body number, firmware version, motherboard information, expiration date, battery, working mode and configuration parameters, etc.

← 设备信息	
当前设备:	iRTK5 (13673045)
固件版本:	V2.9.0
主板信息:	5835C01017 (V5.48)
有效期:	2024-02-29(主机)
有效期:	2025-00-01(延保码)
有效期:	2113-01-01(断点续测)
有效期:	2024-11-23(eSIM)
ICCID:	89860620220033668315
IP:	10.82.41.106
SIM卡类型:	eSIM卡
电量:	80% 
工作模式:	超级基站 基准站

1) Location information

Displays the location information, satellite status, solution status, differential age and PDOP, and real-time time of the current device.

← 位置信息	
经度:	113:22:03.58630E
纬度:	22:59:00.83591N
高程:	32.7280m
卫星:	0-30
解状态:	单点
差分龄期:	0.0
PDOP:	0.0
时间:	2017-10-10 14:40:35

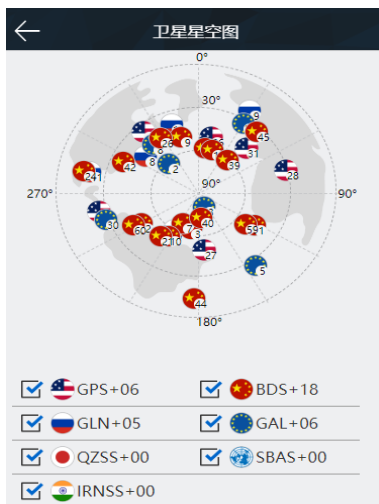
2) Base station information

In Rover mode, the obtained base station coordinates and base station horizontal distance are displayed.

← 基站信息	
经度:	0:0:00.00000
纬度:	0:0:00.00000
高程:	0.0000m
基站平距:	0.0000m

3) Satellite image

Displays a visual satellite sky map of the device, including auxiliary switches to view the distribution of each satellite.



4) Satellite tracking list

Displays tracked satellite information in the form of a list.

卫星跟踪列表

PRN	AZI	ELE	L1	L2	L3
2	50	104	42	31	0
5	44	25	48	37	0
6	11	121	30	0	34
13	82	82	47	39	0
15	58	227	50	42	0
20	42	312	48	40	0
29	49	284	54	44	0
30	11	62	31	14	34
66	42	1	50	44	0
67	42	281	51	49	0
81	81	303	50	46	0

Working mode

1) Rover

Set the Rover data link and the configuration parameters corresponding to the data link. Rover data link modes include: built-in radio, built-in network, notebook differential, and plug-in radio.



移动台	
数据链:	内置电台
频道:	6
电台协议:	HI-TARGET9600
中继	☐
PPK模式	☐

2) Base station

Set the data link of the base station and the configuration parameters corresponding to the data link, and smooth the coordinates of the base station. The base station data link mode includes built-in radio, built-in network, and plug-in radio.



基准站	
☒ 平滑设站	☐ 已知点设站
☐ 保存坐标	☐ 固定解平滑
点名:	B907216
目标高:	2.0000 直高
数据链:	内置电台
智能单基站	☐
频道:	63
电台协议:	HI-TARGET19200
功率:	中
电文格式:	RTCM3.2

3) Static

Set the file name and configuration parameters for static acquisition. (Note: After "Pure Static" acquisition is checked, "Pure Static" can only be unchecked in base station or Rover mode.))



← 静态 | 确认

采样间隔: 1s

文件名: 8位文件名

斜高(m): 0.002

截止高度角: 10

☐ 纯静态

Document management

Static files

Displays data files saved by static collection, and supports downloading, deleting, and formatting files.



←	静态文件		
☐	文件名称	创建时间	大小
☐	_0002832.GNS	10/10 14:36	7.55K
☐	_0002831.GNS	10/10 14:33	104.00K
☐	_0002830.GNS	10/10 14:30	32.00K
☐	B092915.GNS	09/29 17:29	12.54M
☐	_0002724.GNS	09/29 15:49	11.40M
☐	B092913.GNS	09/29 14:10	3.77M
☐	下载	删除	格式化

Firmware management

1) Firmware upgrade

Display the specific version information of the device, click "File Selection", select the corresponding upgrade package, click "Start Upgrade",

and the host will automatically detect the upgrade package and upgrade.



升级固件	
主机版本:	V2.9.8
系统版本:	V1.8.0
电台类型:	M10_TR4602_B
电台版本:	v1.1.0
网络版本:	SC20R09_Beta1212
INS版本:	2.1.2.00
文件名:	
固件类型:	

文件选择 开始升级

2) Restore the system

Restore the system to the state it was in after the last firmware upgrade.



←

确认还原系统?

确认

System Settings

1) Satellite tracking

Switches tracked by each satellite system.



卫星系统	跟踪开关
GPS	开启
BDS	开启
GALILEO	开启
GLONASS	开启
SBAS	开启
QZSS	开启

2) Data output

You can set the output interface, the parameters of the corresponding output interface, the switch of the message type, and adjust the output frequency: 1Hz, 2Hz, 5Hz, 10Hz, 20Hz, of which 10Hz and 20Hz are currently only supported by GGA statements.



输出接口
☒ 小五芯串口
☐ 蓝牙
☐ WiFi
☐ TCP客户端

波特率: 115200

输出前缀: GN

NMEA类型	输出频率
GGA	1Hz
ZDA	1Hz
RMC	OFF
VTG	OFF
GSA	OFF



输出接口
☐ 小五芯串口
☐ 蓝牙
☐ WiFi
☒ TCP客户端

输出前缀: GN

IP/域名: 202.96.185.34

端口: 2000

NMEA类型	输出频率
GGA	1Hz
ZDA	1Hz
RMC	OFF
VTG	OFF

3) Radio settings

Radio module

You can choose the station modulation protocol (LORA, HI-TARGET, TRIMTALK450S, TRIMMARK III., TRANSEOT, SOUTH) to customize the channel frequency of the station channel 100-115.

← 电台设置 确认	
调制协议 HI-TARGET19200	
CH	Frequency(MHz)
100	459.2250
101	463.1250
102	464.1250
103	465.1250
104	466.1250
105	463.6250
106	464.6250
107	465.6250

4) Host registration

display the validity period of the host and the service registration; Select the registration type and enter the corresponding registration code to register online.

← 主机注册 确认	
有效期:	2024-03-19(主机)
有效期:	未绑定服务(中海达服务)
注册类型:	主机
主机注册码:	24位注册码

5) Reset the motherboard

Restore the motherboard to its initial state.



6) Other settings

Set the switch for static RINEX recording, base station detection switch, SIM card management switch, RINEX version selection, language version selection, and adjust the host voice volume.



coordinate system

1) projection

Set the projection parameters of the coordinate system, and support Gaussian third-degree band, Gaussian six-degree band, Mercator, and

horizontal Mercator.

The 'Projection' (投影) settings screen contains the following fields:

- 投影: 高斯-克吕格 (Gauss-Krüger)
- 中央子午线: 114:00:00.00000E
- 北向加偏数(m): 0.0000
- 东向加偏数(m): 500000.0000
- 投影面高程(m): 0.0000
- 平均纬度: 00:00:00.00000N
- 比例尺因子: 1.0000
- 加带号: ☐
- X正方向(北向): ☒
- Y正方向(东向): ☒

2) Datum

Set the datum parameters.

The 'Datum' (基准面) settings screen contains the following fields:

- 源椭球: WGS84
- a(m): 6378137
- 1/f: 298.2572236
- 目标椭球: WGS84
- a(m): 6378137
- 1/f: 298.2572236
- 转换模型: 无

3) DAM file

Manage DAM files, including exporting, importing, saving, and deleting.



CHAPTER

4

Static survey

This chapter contains:

- Static settings
- Static data collection steps
- Static Data Download

Static survey

The static survey is a kind of positioning survey, which is mainly used to establish various control networks. There are two ways to set up the device to work in the static mode:

1. Satsurv software – static interface – to set up the static or temporary static mode.
2. Web interface – work mode – to set up the static or temporary static mode.

Users can download the static data file to the computer, if necessary, and then use the static post-processing software (HBC data processing software package) to process the data.

Static data collection steps

1. Set up the receiver on a control point with a tripod, making sure the tripod is strictly centered and leveled. The benchmark must be installed.
2. Measure the slant height of the receiver three times in three directions, ensuring that the difference of each measurement is less than 3mm, and then take the average value as the final height. The slant height of the receiver is measured from the center of the measuring point to the upper part of the top of the benchmark.
3. Record the point name, S/N, receiver height and beginning time.
4. Press the power button to power on and set up the static collecting mode.
5. Turn off the receiver after the static data is collected and record the turn-off time.
6. Download and process the static collection data.

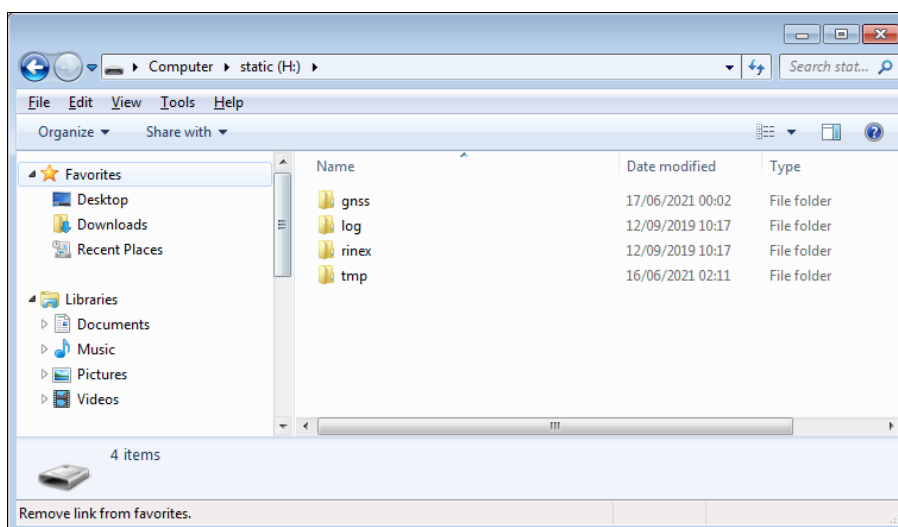
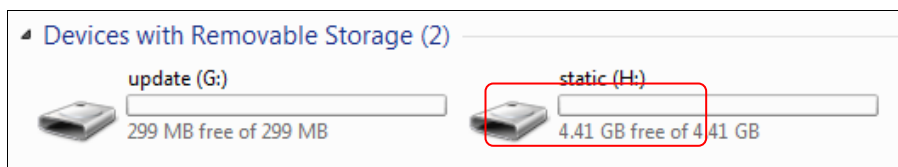


Notice: Don't move the tripod or change the collecting set while the receiver is collecting data

Static Data Download

1. Download by USB cable

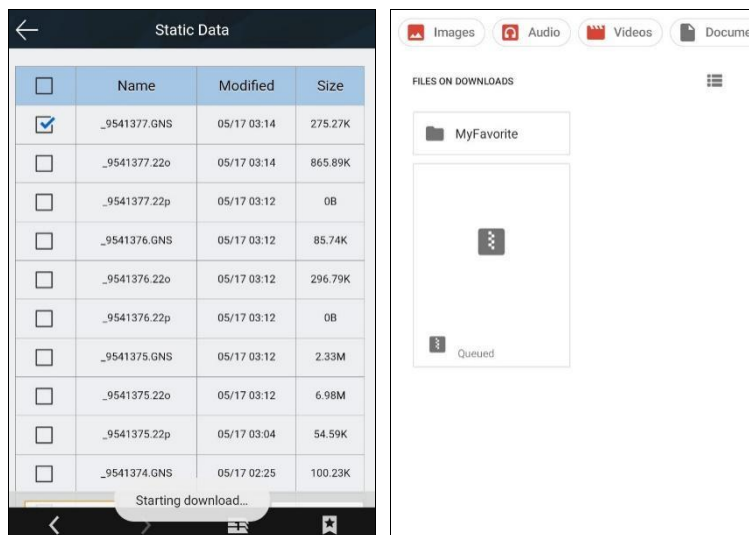
Connect the receiver to a computer with the Type-C USB cable and copy the static data to the computer. The static data is in the GNSS folder of the static drive.



2. Download in the web management system

The Wi-Fi name of the receiver is its S/N. You can connect it to a controller or phone (the default password is: 12345678) and then input the IP address 192.168.20.1 into the browser to log into the WEB management system. Then, open the file manager interface and select the static file that needs to be exported. Click Download and the file can be downloaded to the controller or phone.

The default save path of the static data to be downloaded from the website is device internal storage > MyFavorite. You can customize the save path according to your needs.



CHAPTER

5

Dynamic RTK Surveying

This chapter contains:

- Base Station Setup
- Rover Station Setup

Base Station Setup

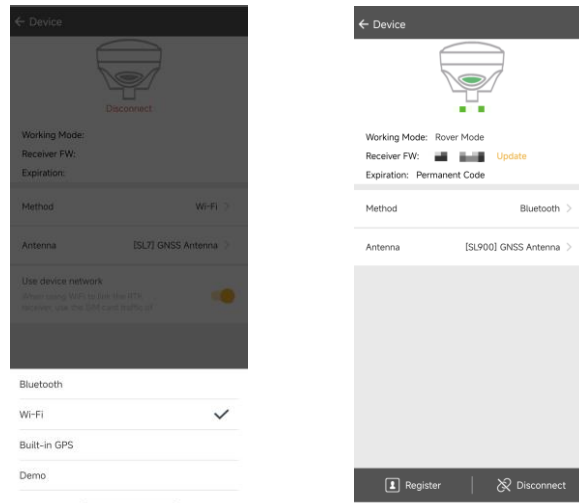
In dynamic RTK surveying, according to the propagation method of differential signals, it can be categorized into radio mode (internal UHF, external radio) and network mode.

Device Setup

Set the receiver on a stable known or unknown point. To ensure the receiver can track a large number of high-quality satellites, place the base station in an area with an open view. Avoid locations where obstructions with an elevation angle greater than 15 degrees (such as large buildings or extensive blockages) are present. Keep away from strong signal reflectors such as houses, hillsides, and large bodies of water, as well as high-power equipment (high-voltage lines, radio stations, transformers, etc.). Additionally, to propagate differential signals over longer distances, set the base station at a higher elevation.

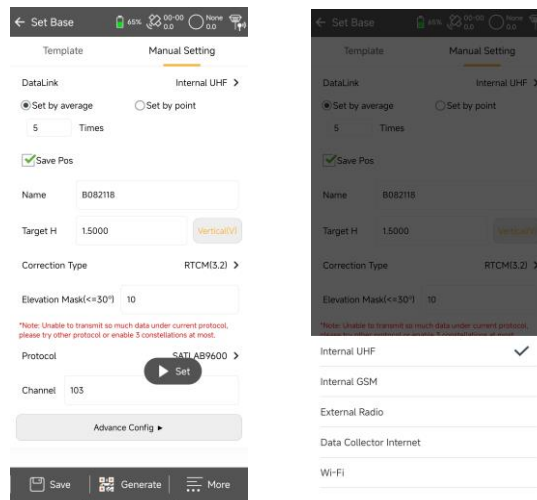
Device Connection

Start the Satsurv software on the controller and enter the [Device Connection] interface. Generally, use Bluetooth or Wi-Fi for connection.



Base Station Parameter Configuration

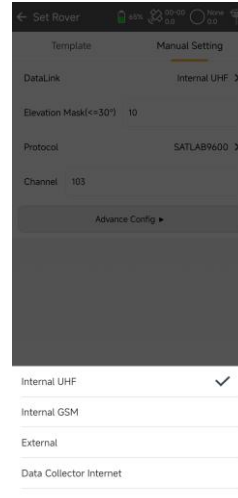
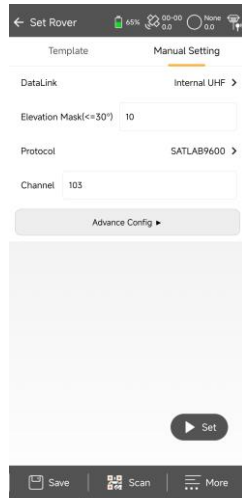
Base station parameters include setting the target height, base station coordinates, working mode and corresponding parameters, message format, elevation angle, etc. After editing the parameters, click the [Set] button in the upper right corner. The software will prompt “Setup successful!”.



Rover Station Setup

Mount the rover station receiver on a telescopic centering pole, and fix the controller on the bracket. The setup of the rover station is basically the

same as that of the base station, including working mode configuration, elevation angle, etc. The difference is that the working modes for the rover station include the addition of “Data Collector Internet”.



CHAPTER**6**

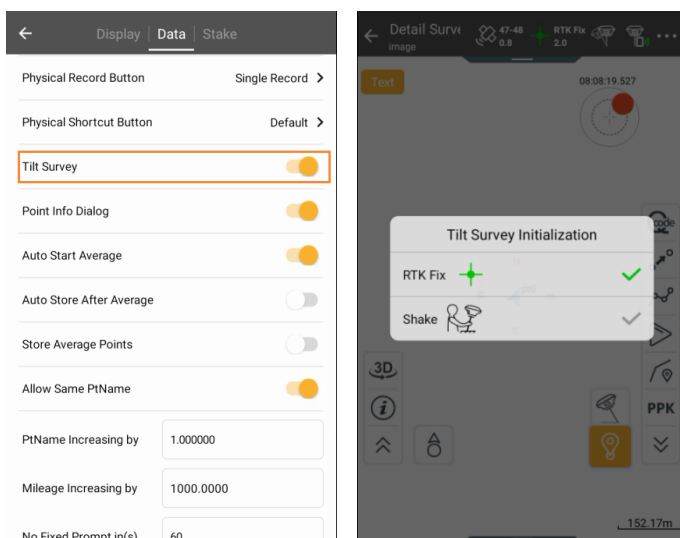
Tilt Survey

This chapter contains:

- Tilt Survey Initialization

Tilt Survey Initialization

Connect the receiver in the Satsurv software and open the Tilt Survey in the option at Survey → Surveying Configure → Data interface. Click the Tilt Survey icon and follow the prompt on the Satsurv Road interface to finish the initialization.



When the receiver gets the fixed solution, shake the receiver back and forth (once every second) for initialization until Shake is marked with .

When all of the initialization items are ticked, the receiver prompts “Tilt compensation started” and the tilt survey icon becomes illuminated. This means that the tilt survey initialization is now complete and you can perform the tilt survey on the receiver.



Notice:

1. Make sure the pole height is consistent with the set pole height before the tilt survey.

2. When turning on the Tilt Survey switch, you will need to complete the initialization operation before normal use.
 3. To meet most users' operational needs, the maximum measurement angle of the tilt survey is 70°.
 4. To ensure measurement accuracy, the receiver will announce “turn off tilt survey” after remaining stationary for 30 seconds. At this point, gently shake the receiver to use it again.
-

CHAPTER**7**

Firmware Upgrade

This chapter contains:

- Upgrade by USB Cable
- Upgrade by Using the Web Management System
- Remote online firmware upgrade

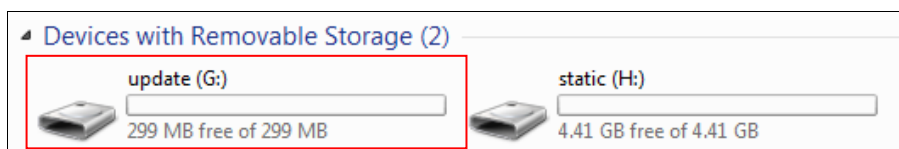
Firmware Upgrade

You can upgrade the firmware of the receiver, motherboard and module by using a USB cable, the web management system or online remotely.

Upgrade by USB Cable

Steps to using a USB cable in order to upgrade the firmware:

1. Turn on the receiver and connect it to a computer with the cable attached. This will show the updated drive in the receiver.
2. Copy the firmware (which can be downloaded from our official website or the technical team) to the receivers update drive. Disconnect the computer and restart the receiver, which automatically recognizes the firmware and starts the firmware upgrade process.
3. There will be different prompt voices for the success or failure of the upgrade. If it fails, please contact our technical team.



Upgrade by Using the Web Management System

Copy the firmware to the controller or phone and use Wi-Fi to connect it to the receiver. The name of the Wi-Fi is the device's S/N. Then, input 192.168.20.1 to log in, click Firmware upgrade - Select - File to choose the firmware, and then click start to transfer the new firmware version.

Remote online firmware upgrade

The Receiver is connected to the external network (insert a SIM card that can connect to the external network). When the Receiver detects a motherboard or firmware version on the server that is higher than its current version, it will send the firmware information to the Satsurv software. Click “Update Now” in the Hi-Survey pop-up window to begin the update. Select “Automatically restart the Receiver” to start updating the Receiver or motherboard firmware, thereby completing the update; or click “Device Connection” - “Check for Updates” in Satsurv, and select to check for updates for the host or motherboard firmware.

**Notice:**

1. When the download fails, it will resume downloading if the network recovers within two minutes; otherwise, it will exit the firmware upgrade detection.
 2. It will not forcibly power off during the upgrade. If the power is forcibly cut off, the instrument may be damaged and become abnormal.
-

CHAPTER

8

Image Measurement

This chapter contains:

- Image Survey
- Laser Image Measurement

Image Survey

The dual-camera laser RTK supports image measurement. This requires the iHand55 controller and Hi-Survey software version 2.3.0 or above.

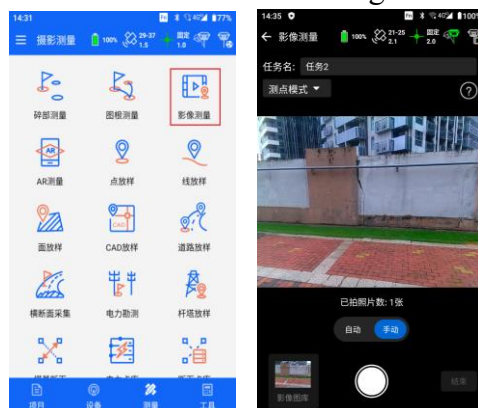
Image measurement scenarios are defined as capturing locations that are inaccessible. After successful solution calculations using the controller software, you can select points on the image and calculate their coordinates.

Device Preparation

Connect to an RTK that supports image measurement via WiFi. After setting up a rover data link, wait for the solution to switch to fixed. Click Survey -> Surveying Configure -> Data and turn on Tilt Survey. Return to the main interface, click the Tilt Survey icon in the top bar, and follow the pop-up prompts to initialize the tilt survey. Once you have successfully entered Tilt Survey mode, click on the Survey page to enter the Image Survey function.

Manual Shooting Process

Enter the Image Survey interface, select Point Measurement Mode in the upper left corner, and switch to Manual Shooting.



At a suitable distance from the object to be measured (generally 2-15 meters is appropriate), shoot in an arc around it. At least three qualified images must be taken before clicking End.

Automatic Shooting Process

Enter the image survey interface, select Point Measurement Mode in the upper left corner, and switch to Automatic Shooting.



From a suitable distance from the object to be measured (generally 2-15 meters is suitable), click the Capture button to continuously capture in an arc around it, at a rate of two images per second. Capture for at least 3 seconds before clicking the Capture button to end.

Modeling Mode

After capturing, transfer the image data to the Image Library. Users can use the Image Library for 3D reconstruction or copy the album data to desktop modeling software for modeling. (Album data is stored in: ZHD folder\Current project folder\Media\Album folder to be copied).

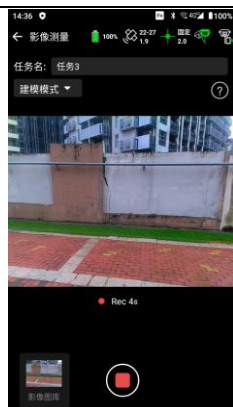


Image Saving

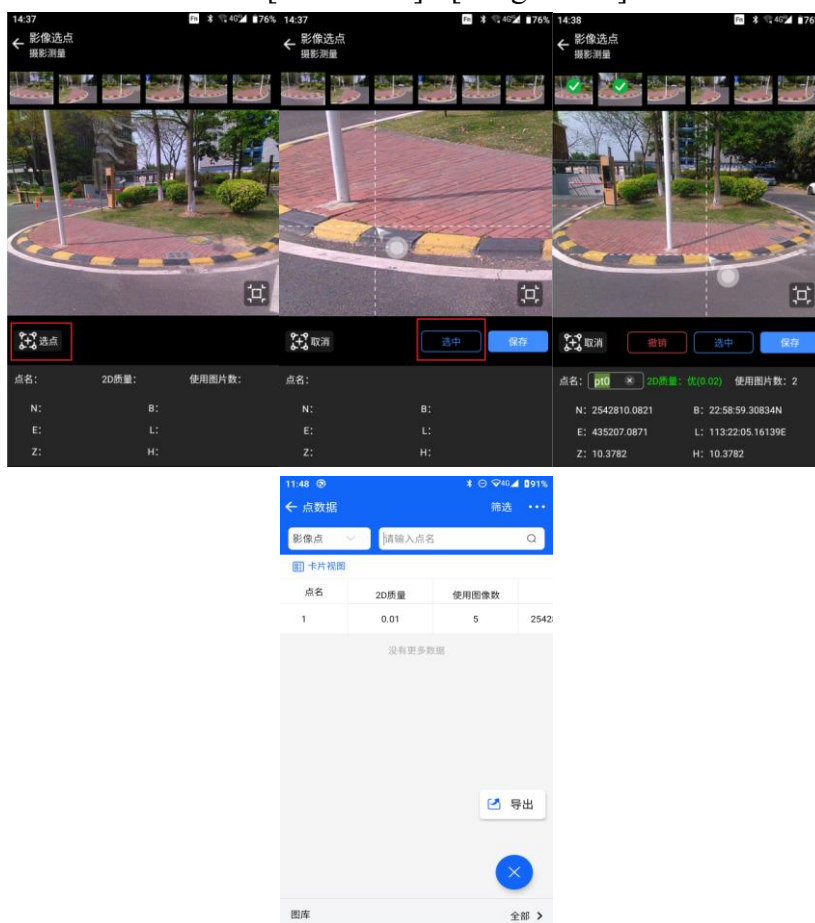
After shooting for more than 3 seconds in automatic mode or more than 3 images in manual mode, click the Capture/End button. The image group transfer progress bar will appear on the screen. When the progress bar reaches 50%, the image group transfer is complete and the 3D reconstruction phase begins. (In Modeling mode, the transfer is completed directly to the album.) A "Skip" button will appear (you can enable automatic skipping of aerotriangulation configuration in the Surveying Configure - Data). Click this button to skip the 3D reconstruction process. (After the image group is saved, you can continue the 3D reconstruction process in the Image Library or export the image group for data processing using other aerotriangulation software.)



Select Point Calculation

In a successfully 3D reconstructed image group, click the Select Point button and drag the arrow to select the desired point. You can also zoom in the photo to make the selecting more precise. After selecting the same point in two or more photos, the software automatically calculates the point coordinates and displays the point name, 2D quality, and number of photos used. The point name can be modified.

When you are satisfied with the point coordinates and quality, click Save. The point will be saved to [Point Data] - [Image Point].

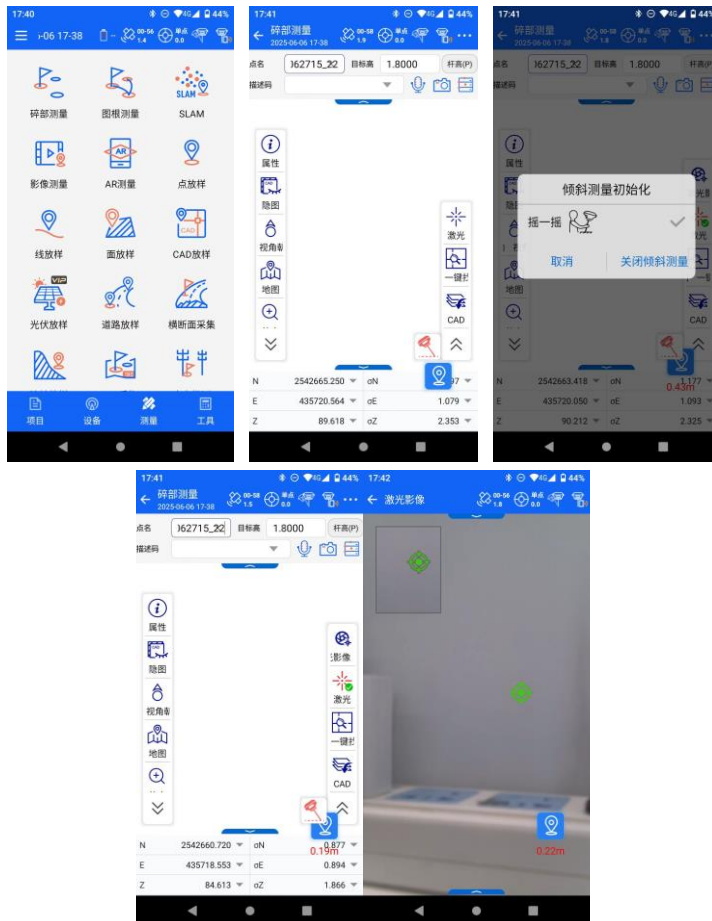


For detailed image measurement setup steps, please refer to the 'Hi-Survey

Software User Manual' - Image Measurement.

Laser Image Measurement

After connecting the host to the Hi-Survey software, turn on the "Laser" switch in the software's [Detail Survey]. A reminder will appear stating "Tilt Survey Initialization." Shake the device to enter the tilt survey mode, then tap the "Image" switch to turn on the image. Aim the laser at the point you want to measure and tap Measure to record the measurement data.



CHAPTER

9

AR Stake

Chapter Introduction:

- AR Stake Introduction

AR Stakeout Instructions

The dual-camera laser RTK supports AR stakeout. This requires the iHand55 controller and Hi-Survey software version 2.3.0 or above.

The AR stakeout scene is defined as when the stakeout point is about 3m away from the host, the host camera is called, and the precise position of the stakeout point is displayed in real time through the controller, and the precise position of the stakeout point can be reached in one shot.

Equipment Preparation

To perform AR stakeout, you must:

1. Connect to a host that supports image measurement via Wi-Fi;
2. Be in tilt survey mode;
3. Have a fixed solution.



Stakeout Process

After entering the point stakeout interface,

1. Enter the stakeout point;
2. Click the AR Stakeout button;
3. Follow the prompts to stake out;
4. Stake out successfully.

Click the AR Stakeout button. If you're $>3\text{m}$ from the stakeout point, AR stakeout will be performed using the controller(controller navigation - Figure 1). If you're $\leq 3\text{m}$ from the stakeout point, AR stakeout will be performed using the host (host navigation - Figure 2).

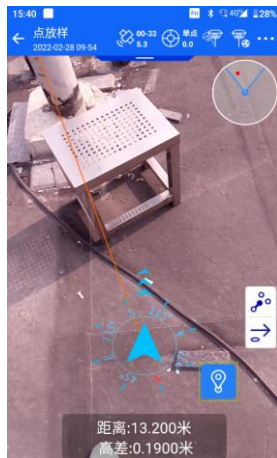


Figure 1



Figure 2

For detailed setup steps, refer to the ‘Hi-Survey Software User Manual’ - Point Stakeout (AR Stakeout).

CHAPTER

10

Accessories

Chapter Introduction:

- Data Cable
- Antenna
- Measurement Reference Components
- Charger

Data Cable

Type C Data Cable: Connects the device to a computer for firmware upgrades and static data downloads. It also serves as a charging cable, charging the device when connected to a charger.



Antenna

One radio antenna is included as standard. A UHF radio antenna is required for use in internal radio base or internal radio rover mode.



Measurement Reference Components

The measurement reference is used to measure instrument height.



Charger

Once the data cable is connected to the charger, plug it into the device and a power source to charge the device.



CHAPTER

11

Parameters

Chapter Introduction:

- Technical Specifications

Technical Specifications

Configuration		Detailed Indicators
GNSS Feature	Specification	
GNSS Signal ^[1]	Channel	1408
	GPS	L1C/A, L1C, L2P(Y), L2C, L5
	BDS	B1I, B2I, B3I, B1C, B2a, B2b
	GLONASS	L1, L2, L3
	Galileo	E1, E5a, E5b, E6
	QZSS	L1, L2, L5, L6*
	NavIC	L5
	SBAS	L1, L2, L5
	PPP	B2b-PPP, Galileo E6-HAS
Positioning Performance ^[2]	High-Precision Static	Horizontal: 2.5 mm + 0.1 ppm RMS Vertical: 3.5 mm + 0.4 ppm RMS
	Static and Fast Static	Horizontal: 2.5 mm + 0.5ppm RMS Vertical: 5 mm + 0.5ppm RMS
	Post Processing Kinematic (PPK / Stop & Go)	Horizontal: 8mm + 1ppm RMS Vertical: 15mm + 1ppm RMS Initialization time: Typically 10 min for base and 5 min for rover Initialization reliability: Typically>99.9%
	PPP	Horizontal: 10cm Vertical: 20cm
	Code Differential GNSS Positioning	Horizontal: ±0.25m+1ppm RMS Vertical: ±0.5m+1ppm RMS SBAS: 0.5m (H), 0.85m (V)

	Real Time Kinematic (RTK)	Horizontal: 8mm+1ppm RMS Vertical: 15mm+1ppm RMS Initialization time: Typically <10s Initialization reliability: Typically > 99.9%
	Positioning rate	1 Hz, 5 Hz and 10 Hz
	Time to first Fix	Cold start: < 45s Hot start: < 30s Signal re-acquisition: < 2s
	Hi-Fix ^[3]	Horizontal: RTK+10mm / minute RMS Vertical: RTK+20mm / minute RMS
	Tilt Survey Performance ^[4]	200Hz, auto calibration, additional horizontal pole-tilt uncertainty typically less than 8mm+0.3mm/°tilt(0~ 60°)
	Image stakeout accuracy	2cm
	Laser measurement	5cm@10m
Physical	Dimensions (W x H)	130.97mm × 68.7mm
	Weight	≤ 0.73kg (1.61lb)
	Operation temperature	-25°C~+50°C (-13°F~+122°F)
	Storage temperature	-40°C~+55°C (-40°F~+131°F)
	Humidity	100% non-condensing
	Water/dustproof	IP68 dustproof, protected from temporary immersion to depth of 1.0m (3.28ft)
	Shock and vibration	MIL-STD-810G, 514.6
Electrical	Internal Battery ^[5]	Internal 7.2V / 4900mAh lithium-ion rechargeable battery
		RTK rover(UHF/Cellular): up to 12 hours

	External power	using standard smartphone chargers or external power banks (Support 5V 2.8A Type-C USB external charging)
Communication	I/O Interface	1 × USB type C port; 1 × SMA antenna port, 1 × Nano SIM card slot
	WiFi	Frequency 2.4GHz, Supports 802.11 a/b/g/n/ac/ax
	Bluetooth	BT 5.2, 2.4GHz
	NFC	Near Field Communication for device touch pairing
	Network modem	TDD-LTE, FDD-LTE, GSM
	Internal UHF Radio	Power: 0.5W/1W Adjustable
		Frequency: 410MHz~470MHz
		Protocol: LORA, HI-TARGET, TRIMTALK450S, TRIMMARK III, SATEL-3AS, TRANSEOT, etc.
		Working Range: Typically 3~5km, optimal 8~15km
Laser	Range	30m
	Laser product classification	Class 3R
Camera	Front camera	Image-assisted laser aiming
	Bottom camera	Support real scene stakeout
Control Panel	Physical button	1
	LED Lights	Satellite, Signal, Power
System Configuration	Storage	64GB ROM internal storage
	Output format	ASCII: NMEA-0183
	Output rate	1Hz~20Hz
	Static data format	GNS, Rinex
	Real Time Kinematic	RTCM2.X, RTCM3.X, CMR

	(RTK)	
	Network Mode	VRS, FKP, MAC, Support NTRIP protocol
Note: [1]QZSS L6 can be provided by firmware upgrade. [2]The measurement accuracy, precision, reliability and initialization time depend on various factors, including tilt angle, number of satellites, geometric distribution, observation time, atmospheric conditions and multi-path validation, etc. The data are derived under normal conditions. [3]Accuracies are dependent on GNSS satellite availability. Hi-Fix Positioning ends after 5 minutes without differential data. Hi-Fix is not available in all regions, check with your local sales representative for more information. [4]Irregular operations such as rapid rotation and high-intensity vibration may affect the inertial navigation accuracy. [5]The battery operating time is related to the operating environment, operating temperature and battery life. Descriptions and Specifications are subject to change without notice		

Radio	Frequency range (MHz)	Transmit Power
BT LE	Transceiver: 2402 - 2480	6.94 dBm Conducted
BT Classic	Transceiver: 2402 - 2480	8.84 dBm Conducted
2.4G WIFI	Transceiver: 2412 - 2472	17.49 dBm Conducted
5G WIFI	Transceiver: 5180 - 5320	17.42 dBm Conducted
5G WIFI	Transceiver: 5500 - 5700	17.62 dBm Conducted
5.8G WIFI	Transceiver: 5745 -5825	12.77 dBm Conducted
GSM 900	Transmitter: 880 - 915	35 dBm Conducted
GSM 900	Receiver: 925 - 960	N/A
GSM 1800	Transmitter: 1710 -1785	32 dBm Conducted
GSM 1800	Receiver: 1805 - 1880	N/A
LTE Band 1	Transmitter: 1920-1980	25 dBm Conducted
LTE Band 1	Receiver: 2110 - 2170	N/A
LTE Band 3	Transmitter: 1710-1785	25 dBm Conducted
LTE Band 3	Receiver: 1805 - 1880	N/A
LTE Band 5	Transmitter: 824-849 (Non-EU band)	25 dBm Conducted
LTE Band 5	Receiver: 869-894 (Non-EU band)	N/A
LTE Band 7	Transmitter: 2500-2570	25 dBm Conducted
LTE Band 7	Receiver: 2620-2690	N/A
LTE Band 8	Transmitter: 880-915	25 dBm Conducted
LTE Band 8	Receiver: 925-960	N/A
LTE Band 20	Transmitter: 832-862	25 dBm Conducted
LTE Band 20	Receiver: 791-821	N/A
LTE Band 28	Transmitter: 703-748	25 dBm Conducted
LTE Band 28	Receiver: 758-803	N/A
LTE Band 38	Transceiver: 2570-2620	25 dBm Conducted
LTE Band 40	Transceiver: 2300-2400	25 dBm Conducted
LTE Band 41	Transceiver: 2496-2690	25 dBm Conducted
GNSS	Receiver: BDS B1I; GPS L1; GLONASS G1; Galileo E1; GPS L5; GLONASS G2; Galileo E5	N/A
NFC	Receiver: 13.56	N/A
Radio	Transmitter: 410 - 470	32.82 dBm Conducted

The following conditions and restrictions apply:

- 1) Restricted to indoor use when operation in the 5150-5350MHz.
- 2) LTE band 28 is restricted to operate between 703MHz-736MHz for the transmitter and 758MHz-791MHz for the receiver.
- 3) LTE band 41 is restricted to operate between 2500MHz-2690MHz.