

HI-TARGET VRTK USER MANUAL





vRTK GNSS RTK System

User Manual

Manual Revision

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vRTK

GNSS RTK System

User Manual



Preface

Introduction

Welcome to the vRTK receiver. These instructions describe how to use this product.

To help you use the Hi-Target series of products better, Hi-Target suggests that you read the instructions carefully. If you are unfamiliar with the product, please refer to www.hi-target.com.cn

Tips for safe use



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



Warning: 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 get the most from it. Hi-Target Surveying Instrument Co. Ltd assumes no responsibility if you fail to operate the product according to the instructions or operate it wrongly because you have misunderstood them.

Hi-Target 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 Hi-Target technology department for help, and we will answer any questions you have.

Relevant information

You can obtain this introduction by:

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

Logging on to the Hi-Target official website and downloading the electronic version of this introduction from *Partner Center*: <http://members.hi-target.com.cn/>

Advice

If you have any suggestions for future developments to this product, please email them to: sales@hi-target.com.cn. Your feedback will help us to improve our products and services.

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Chapter 1

Overview

This chapter contains:

- Foreword
- Features
- Use and precautions

1.1 Foreword

The vRTK receiver brings superior performance, high efficiency and will support your fieldwork with a reliable solution. The new generation of RTK incorporates two cameras. The main camera greatly increases the usable range of the receiver through non-contact image measurement. The lower camera provides great convenience and speed of AR release. It deploys an advanced RTK engine and a new generation of sensorless IMU, making tilt measurement much easier, while the new generation GNSS chip guarantees speed and accuracy. This means that you can count on vRTK to provide you with improved productivity.

1.2 Features

1. With an ultra-light EPP material instrument case it is more durable and portable.
2. The main camera provides non-contact image measurement with an accuracy of 2-4 cm and a lower camera is used for AR release with an accuracy of better than 2 cm.
3. The unit delivers accurate and reliable results and increases the efficiency of fieldwork with an in-house developed sensorless IMU and a new generation of GNSS chips.
4. The inclusion of a high-performance patch antenna both enhances the low elevation angle tracking capabilities and maintains a high gain for higher elevation satellites.
5. Hi-Fix technology enables both continuous connectivity and quality results as a certain level of accuracy continues to be guaranteed even in the absence of differentials.

1.3 Use and precautions

The vRTK receiver 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 1m between the radiator and your body. This transmitter must not be co-located or operated in conjunction with any other antenna or transmitter.

Notice: 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.

Notice: The product shall not be permanently installed outdoors because protection against water and dust is not guaranteed Please bring it indoors during rain.

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

The receiver must be within the specified temperature range when it is used and stored. For detailed requirements, please refer to Chapter 3 of the technical specification.



Notice: 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.

In order to ensure the continuous tracking of satellites and a good quality satellite signal, the space above the station should be as wide as possible, with no obstacles above the 15° elevation angle. To reduce the interference of various electromagnetic waves on the GNSS satellite signal, there should be no strong electromagnetic interference within 200m of the station, such as TV towers, microwave stations and high-voltage transmission lines. To avoid or reduce the occurrence of multipath effects, the station should also be positioned away from terrain and features which can act as strong reflectors such as high-rise buildings or water.

Chapter 2

Product introduction

This chapter contains:

- Overall appearance
- Button & LED
- WEB management system
- Static survey
- Tilt survey
- Firmware upgrade
- Image measurement
- AR Stake

2.1 Overall appearance

The product's appearance is divided into three parts, the upper cover, bottom cover and control panel.



Figure 2-1-1

2.1.1 Upper cover



Figure 2-1-2

2.1.2 Bottom cover

The bottom cover includes the SMA antenna interface and Type-C USB interface.



Figure 2-1-3

1. Type-C USB interface 2. Connection screw 3. Speaker 4. SMA antenna interface

- ◇ SMA antenna interface: Connect the radio antenna while using the Internal UHF mode.
- ◇ Type-C USB interface: To upgrade firmware and download static data.
- ◇ Protective plug: Used for dustproof and waterproof sockets.



Notice: If you don't use the SMA antenna interface and USB interface, please cover the rubber plug to protect them from dust and water.

If the speaker becomes flooded, the sound may be silent or hoarse, but it will return to normal after it has dried.

2.1.3 Control cover

The control panel includes a satellite light, power button and data light.



Figure 2-1-4

1. Satellite LED 2. Data LED 3. Power button



2.2.1 Button function



Table 2-2-1 Button function description

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.
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.
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.
One-key setting station	When the device is powered off, press and hold the power button for 6 seconds to turn it on.

2.2.2 LED

Table 2-2-2 LED function description

Function	Status	Description
 Power LED (red)	Long-term light out	In the non-charging state or when the charge is full, the power red light is always off.
	Long-term lighting	When charging the power red light is always on.
 Power LED (green)	Flash	The power is at $\leq 10\%$.
	Long-term lighting	1. RTK mode: no correction data. 2. Static mode: sampling has not started.
	Flash	1. RTK mode: flashes at the frequency of the correction transmit and receives.

 Data LED		2. Static mode: Sampling interval >1s: flashes at the sampling interval. Sampling interval ≤1s: flashes once per second.
	Off	1. RTK mode: no correction data. 2. Static mode: sampling has not started.
 Satellite LED	Long-term lighting	The satellite is tracked.
	Flash	The satellite is not tracked.

2.3 WEB management system

The vRTK unit has a built-in web management system that can be used to set the receiver's working mode and data output, as well as viewing receiver and satellite information. The receiver's Wi-Fi name is its S/N. You can connect it to a controller or phone (the default password is 12345678) inputting the IP address 192.168.20.1 into the browser to log in.

Note: The web management system can only be visited when the receiver's Bluetooth isn't connected.

2.3.1 Main Menu

After logging into the web management system, you click 'Start' to enter the main menu where each option contains drop-down menus.



Figure 2-3-1 Home

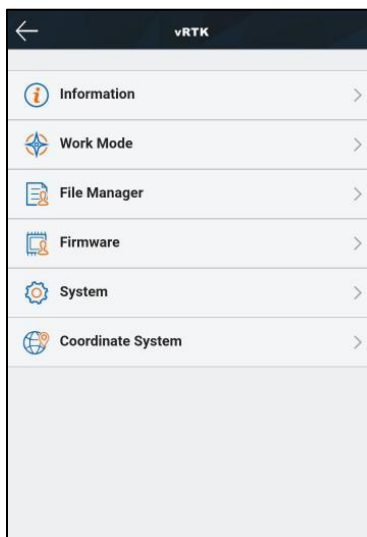


Figure 2-3-2 Main menu

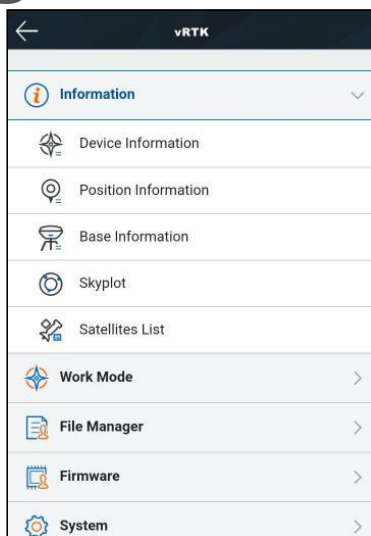


Figure 2-3-3 Information

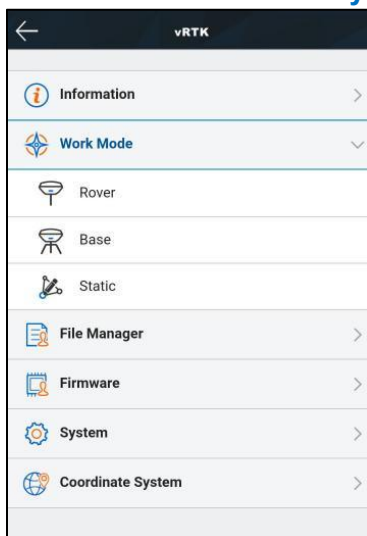


Figure 2-3-4 Work mode

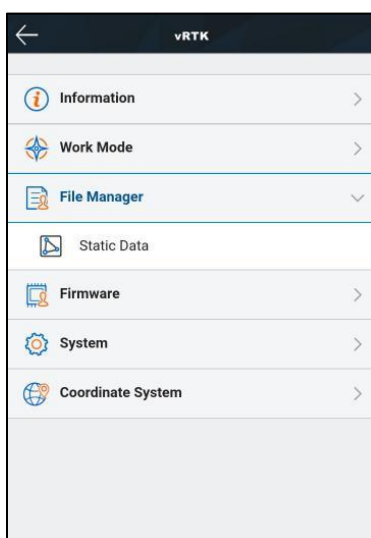


Figure 2-3-5 File manager

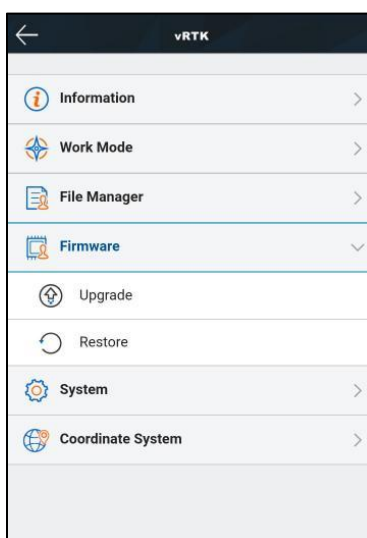


Figure 2-3-6 Firmware

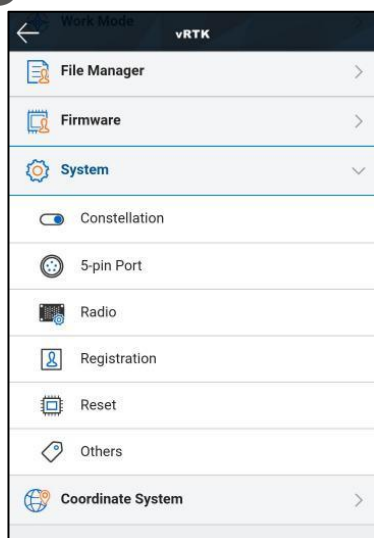


Figure 2-3-7 System

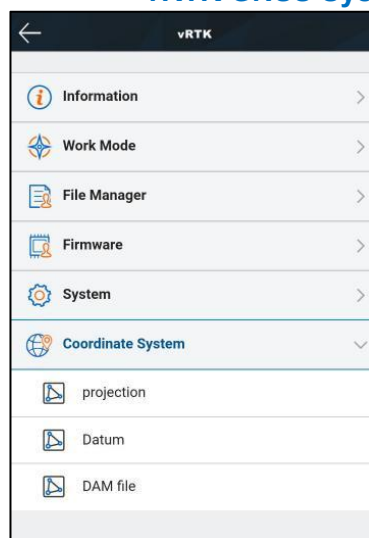


Figure 2-3-8 Coordinate System

Main menu	Sub-menu	Description
Information	Device info	Device model, version, registration info, etc.
	Position info	Coordinates, satellite tracking, solution state, etc.
	Base info	Coordinates and distance to the base
	Sky plot	Check the sky plot
	Satellites list	Satellite tracking information
Work mode	Rover	Data link and parameter settings of the rover
	Base	Data link and parameter settings of the base
	Static	Static measurement parameter settings
File manager	Static data	Download, delete and format static data
Firmware	Upgrade	Select and upgrade the firmware
	Restore	Restore the system
System	Constellation	The satellite tracking switches
	5-pin port	NMEA-0183 protocol output via 5-pin port
	Radio	Radio frequency list
	Reset	Reset the motherboard
	Registration	Device registration and information
	Others	Switch of the static RINEX and volume control, etc
Coordinate System	Projection	Modify projection model, central meridian, scale factor, etc.
	Datum	Modify source ellipsoid, target ellipsoid and transformation model
	DAM File	Export/import of coordinate system parameters in dam format

Table 2-3-1 Menu description

2.3.2 Information

1. Device information

This includes the main information about the device: device model, S/N, firmware version, OEM info, battery power, work mode, configuration parameters and others.





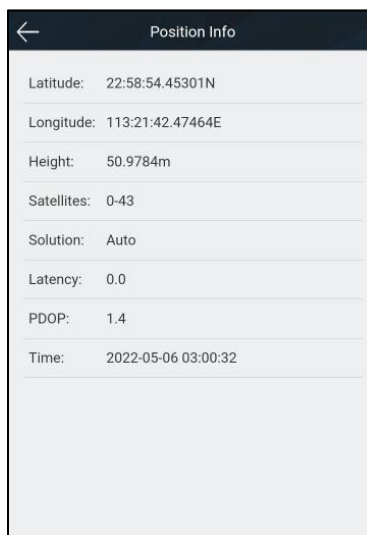
Device Info	
Device:	vRTK (16270903)
Firmware:	V2.4.7.1
OEM Info:	GH1201213602121 (V21861)
Expiry Date:	2022-06-15(Host)
Expiry Date:	2010-01-01(Warranty Extension)
Expiry Date:	2000-01-01(RTK XTRa)
SIM Type:	External card
Battery:	35% 
Work Mode:	Internal GSM Rover
Status:	Connecting
Signal:	

Figure 2-3-9 Device information

2. Position information

This shows the device's position, satellites, the solution state, latency, PDOP and time.



Position Info	
Latitude:	22:58:54.45301N
Longitude:	113:21:42.47464E
Height:	50.9784m
Satellites:	0-43
Solution:	Auto
Latency:	0.0
PDOP:	1.4
Time:	2022-05-06 03:00:32

Figure 2-3-10 Position information

3. Base information

This includes the coordinates and distance from the base in the rover mode.

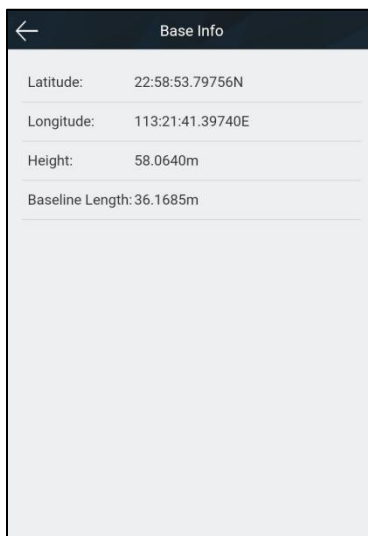


Figure 2-3-11 Base information

4. Sky plot

This displays satellites which are visible from the device and switches for each constellation.

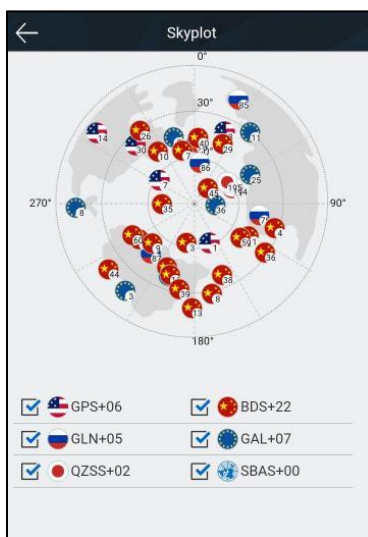
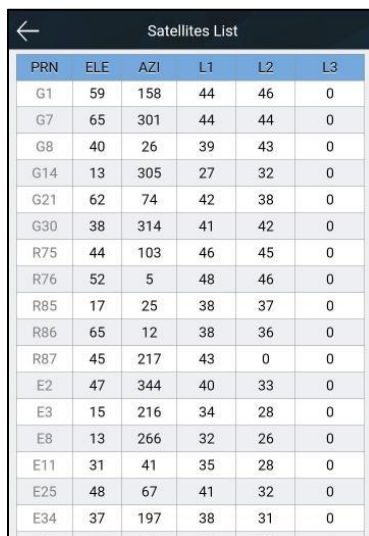


Figure 2-3-12 Sky plot

5. Satellites list

This shows satellite tracking information.



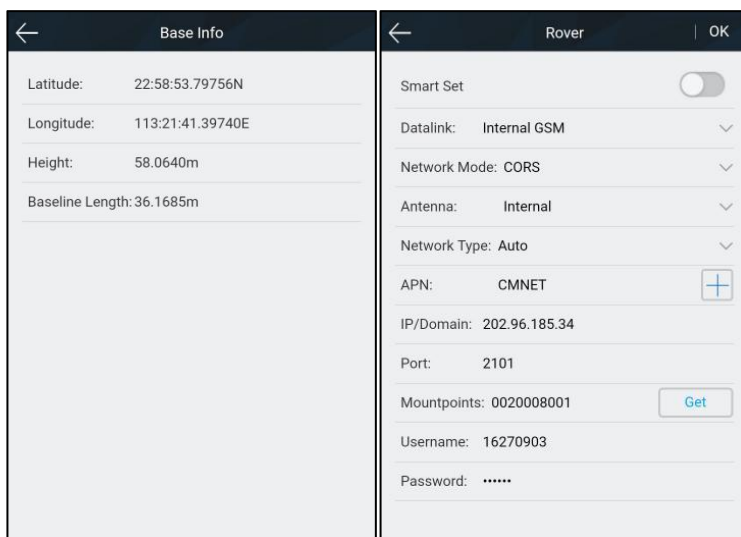
PRN	ELE	AZI	L1	L2	L3
G1	59	158	44	46	0
G7	65	301	44	44	0
G8	40	26	39	43	0
G14	13	305	27	32	0
G21	62	74	42	38	0
G30	38	314	41	42	0
R75	44	103	46	45	0
R76	52	5	48	46	0
R85	17	25	38	37	0
R86	65	12	38	36	0
R87	45	217	43	0	0
E2	47	344	40	33	0
E3	15	216	34	28	0
E8	13	266	32	26	0
E11	31	41	35	28	0
E25	48	67	41	32	0
E34	37	197	38	31	0

Figure 2-3-13 Satellites list

2.3.3 Work Mode

1. Rover

Set up the rover's data link and its parameters. The rover station data link includes internal UHF.



← Base Info

Latitude: 22:58:53.79756N

Longitude: 113:21:41.39740E

Height: 58.0640m

Baseline Length: 36.1685m

← Rover | OK

Smart Set ☐

Datalink: Internal GSM

Network Mode: CORS

Antenna: Internal

Network Type: Auto

APN: CMNET

IP/Domain: 202.96.185.34

Port: 2101

Mountpoints: 0020008001

Username: 16270903

Password:

Figure 2-3-14 Rover

2. Base

Set up the data link and parameters of the base and get point coordinates by averaging. The base station data link mode includes internal UHF.

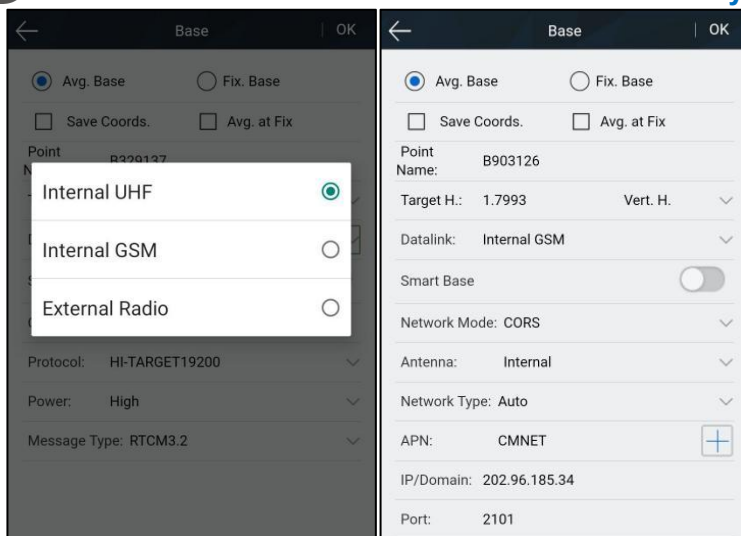


Figure 2-3-15 Base

3. Static

Set up the file name and parameters for the static collection.

Note: After ticking Static Mode, you can only cancel it in the base rover setting interface.

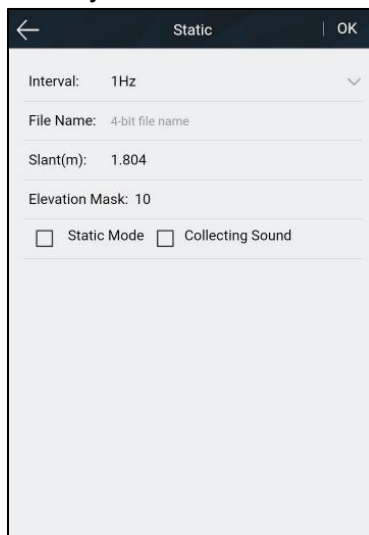


Figure 2-3-16 Static

2.3.4 File manager

1. Static data

Display static data files and supports the Download, Delete and Format actions.

Note: After checking the "Static Mode", you can only uncheck the "Static Mode" in the base station mode or rover mode.



<input type="checkbox"/>	Name	Modified	Size
<input type="checkbox"/>	_9541374.GNS	05/17 02:25	100.23K
<input type="checkbox"/>	_9541373.GNS	05/17 02:24	276.06K
<input type="checkbox"/>	_9541372.GNS	05/17 02:22	319.64K
<input type="checkbox"/>	_9541371.GNS	05/17 02:20	352.85K
<input type="checkbox"/>	_9541370.GNS	05/17 02:17	357.68K
<input type="checkbox"/>	_9541013.GNS	04/11 17:52	5.52M
<input type="checkbox"/>	_9541012.GNS	04/11 12:30	12.59M
<input type="checkbox"/>	_9541011.GNS	04/11 10:55	6.43M

Download Delete Format

Figure 2-3-17 Static data

2.3.5 Firmware

1. Upgrade

Display specific device version information. Click 'Select', choose the upgrade package required and then click 'Start'. The receiver will automatically detect and upgrade the firmware.



← Upgrade

Host Version: V2.4.7.1

System Version: V1.7.2

Radio Type: M10_TR4602_B

Radio Version: v1.2.0

Net Version: SC20R09_Beta1212

INS Version: 4.3.0.0

Minimum System Version: V1.6.9

Minimum Firmware Version: V2.4.0

File Name:

Type:

Select Start

Figure 2-3-18 Upgrade

2. Restore

You can restore the system to its former state after the last firmware upgrade.

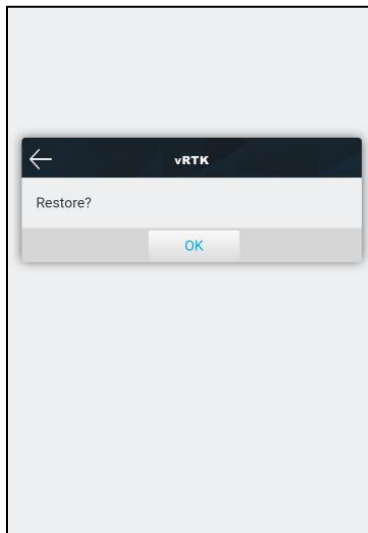


Figure 2-3-19 Restore

2.3.6 System

1. Constellation

Switch off and on satellite tracking.

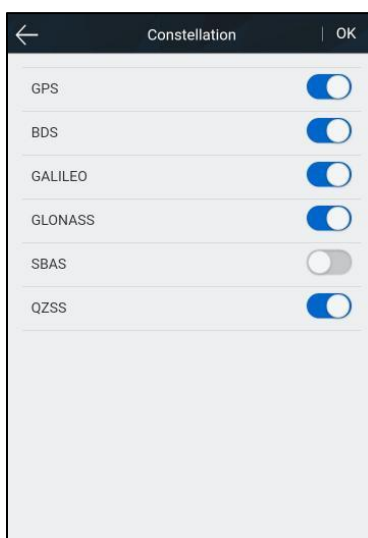
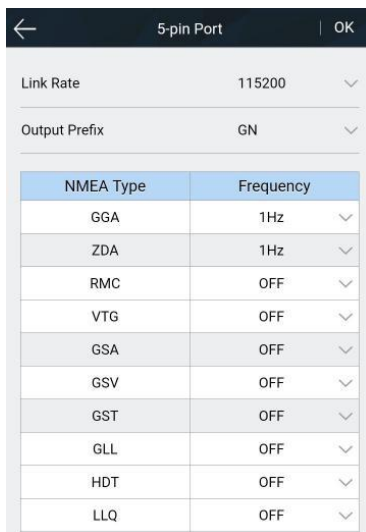


Figure 2-3-20 Constellation

2.5 pin port

Manage the output settings of the 5-pin port.

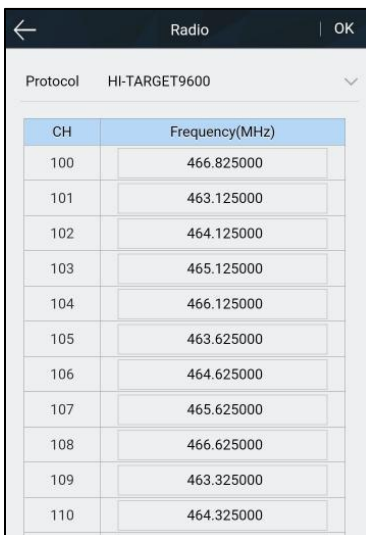


NMEA Type	Frequency
GGA	1Hz
ZDA	1Hz
RMC	OFF
VTG	OFF
GSA	OFF
GSV	OFF
GST	OFF
GLL	OFF
HDT	OFF
LLQ	OFF

Figure 2-3-21 5-pin Port

3. Radio

You can select the radio modulation protocol from HI-TARGET19200, HI-TARGET9600, TRIMTALK450S, TRIMTALK III, SATEL-3AS, SOUTH19200, SOUTH9600, CHC19200 and CHC9600, TRANSEOT.



CH	Frequency(MHz)
100	466.825000
101	463.125000
102	464.125000
103	465.125000
104	466.125000
105	463.625000
106	464.625000
107	465.625000
108	466.625000
109	463.325000
110	464.325000

Figure 2-3-22 Radio

4. Registration

Display the registration information of the receiver. You can select the registration type, and then enter a corresponding code to register online.

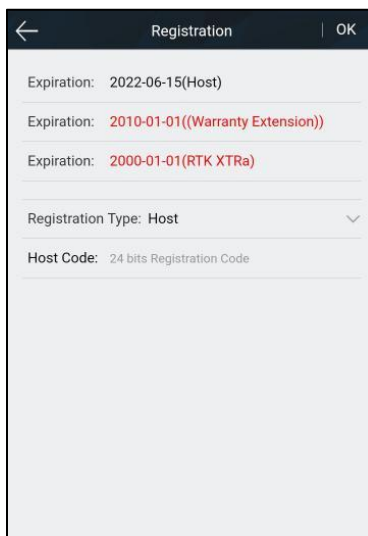


Figure 2-3-23 Registration

5. Reset

Reset the motherboard.

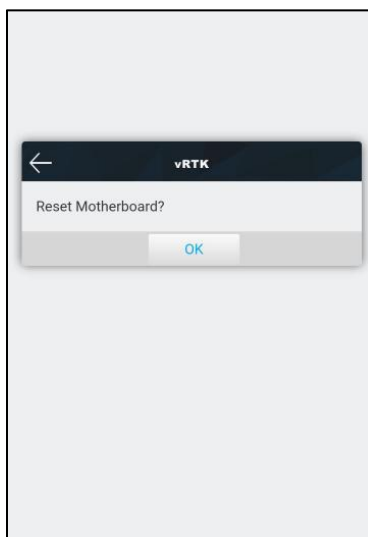


Figure 2-3-24 Reset

6. Others

You can set the switches of the Store RINEX Data and Check Base Position, select the RINEX version, select the time zone and adjust the voice and volume of the receiver.

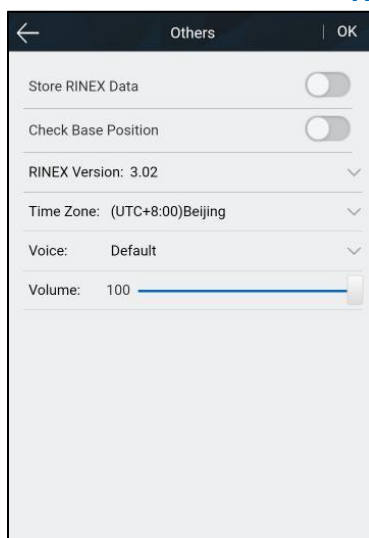


Figure 2-3-25 Others

2.3.7 Coordinate System

1. Projection

Frequently-used projections are built-in such as Gauss, Mercator and Lambert.

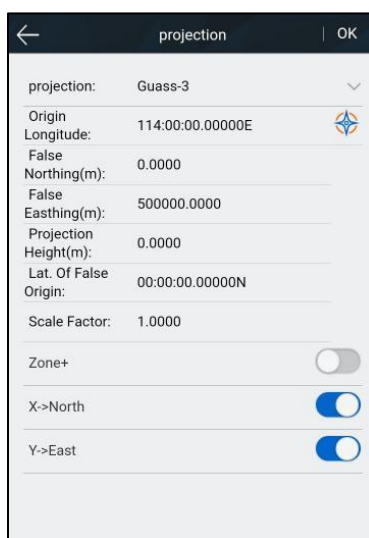
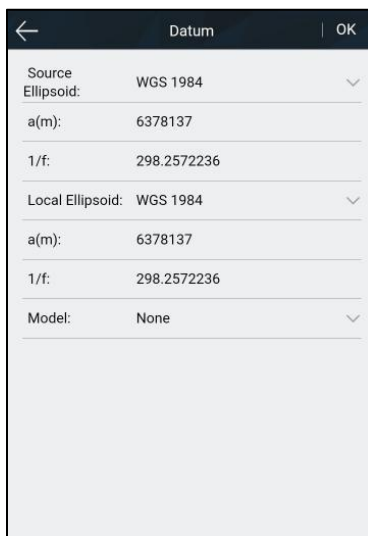


Figure 2-3-26 Projection

2. Datum

Users can define source ellipsoid, local ellipsoid and datum transfer model settings.

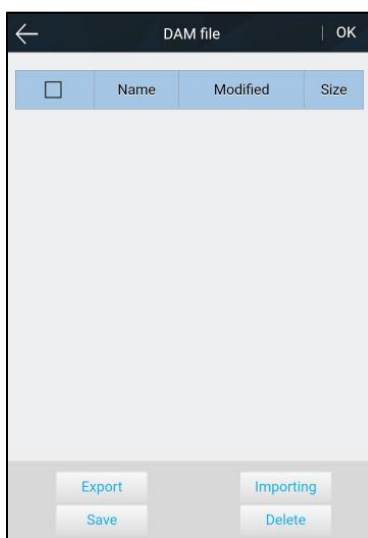


Datum	
Source Ellipsoid:	WGS 1984
a(m):	6378137
1/f:	298.2572236
Local Ellipsoid:	WGS 1984
a(m):	6378137
1/f:	298.2572236
Model:	None

Figure 2-3-27 Datum

3. DAM File

Each software project corresponds to a separate '.dam' file and a new file will be created when a new project is created. This will have the same name as the project.



	Name	Modified	Size
<input type="checkbox"/>			

Export
Importing
Save
Delete

Figure 2-3-28 DAM File

2.4 Static survey

The static survey is a kind of positioning survey, which is mainly used to establish various control networks.

2.4.1 Static settings

There are two ways to set up the device to work in the static mode:

1. Hi-Survey Road 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 a computer, if necessary, and then use the static post-processing software (HBC data processing software package) to process the data.

2.4.2 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.
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 start time.
4. Press the power button to start the device and set up the static collecting mode.
5. Turn off the receiver after the static data is collected and record the time.
6. Download and process the static data collected.

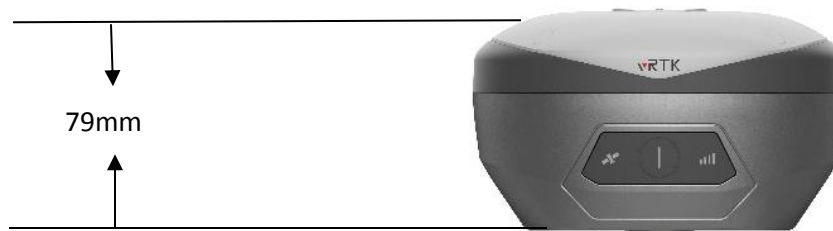


Figure 2-4-1 Height



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

2.4.3 Static Data Download

1. Download by USB cable

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



Figure 2-4-2 Static Drive

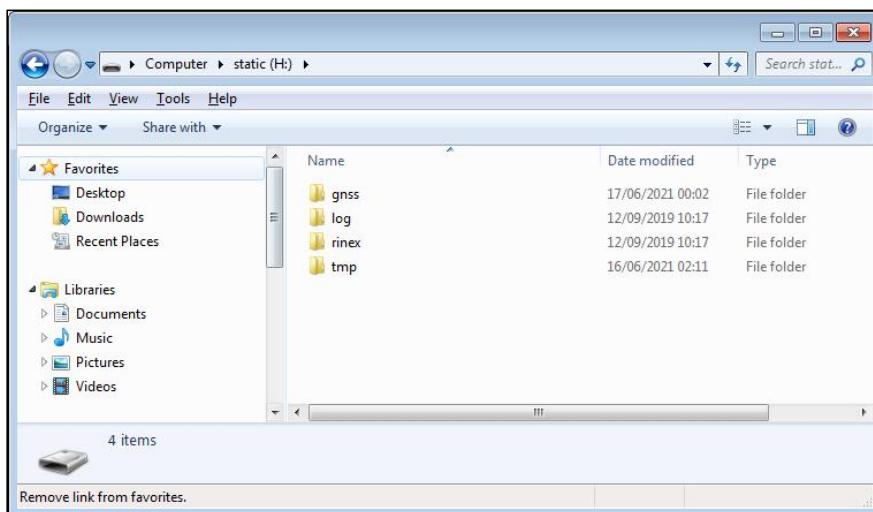


Figure 2-4-3 Static Drive

2. Download using 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 you want to export. Click 'Download' and the file will be downloaded to the controller or phone.

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

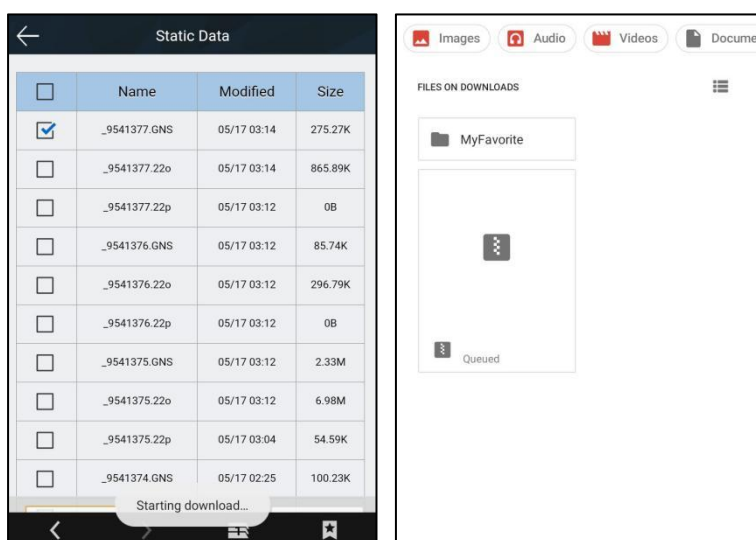


Figure 2-4-4 file manager

2.5.1 Calibration-free Tilt Survey

Connect to the receiver via the Hi-Survey Road software and open the Tilt Survey by using the option found at Survey → Surveying Configure → Data interface. Click the Tilt Survey icon and follow the prompt from the Hi-Survey Road interface to finish the initialization. New Version of IMU module can realize two steps for fast Tilt Survey with auto Installation.

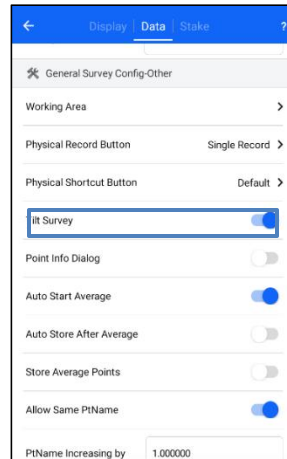


Figure 2-5-1 Tilt Survey

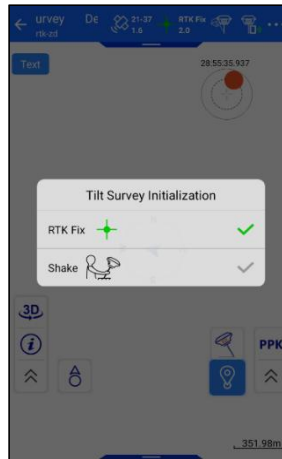



Figure 2-5-2 Shake

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, do not turn the device quickly during the measurement process.

5. Data quality is not as good in an occluded environment. If accuracy requirements are high, please try to use this function in an open environment.

6. When you enter the tilt survey for the first time every 7 days, you need to complete the static calibration according to the prompts you receive. Let the device stand for about 10 seconds to complete this.

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

2.6.1 Upgrade by USB Cable

Steps to using a USB cable 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.



Figure 2-4-3 Update Drive.

2.6.2 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.



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 in operation.

The vRTK receivers now have new dual cameras, which support the image measurement function. The iHand55 and the Hi-Survey software are required; V2.3.0 and later versions must be used.

The image measurement scene is defined as shooting the unreachable position. After the solution is successfully solved by the controller's software, the points can be marked on the photo and their coordinates can be calculated.

2.7.1 Image Survey

1. Equipment Preparation

To perform image measurement, it is necessary:

- (1) To connect via Wi-Fi to a receiver that supports image measurement;
- (2) That the receiver has entered the tilt survey mode;
- (3) That the solution state is fixed.

2. Shooting Process

After reaching the shooting conditions, enter the image measurement interface:

- (1) Fixed-point shooting;
- (2) Click to end;
- (3) Upload optimization;
- (4) Save;
- (5) Point calculation.



Figure 2-7-1 Fix-Point Shooting

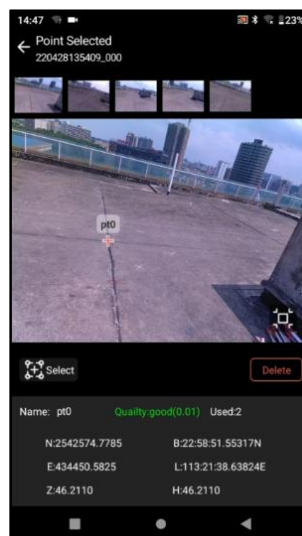


Figure 2-7-2 Point Calculation

2.7.2 Schematic Diagram Of Video RTK Shooting

1. Error Demonstration

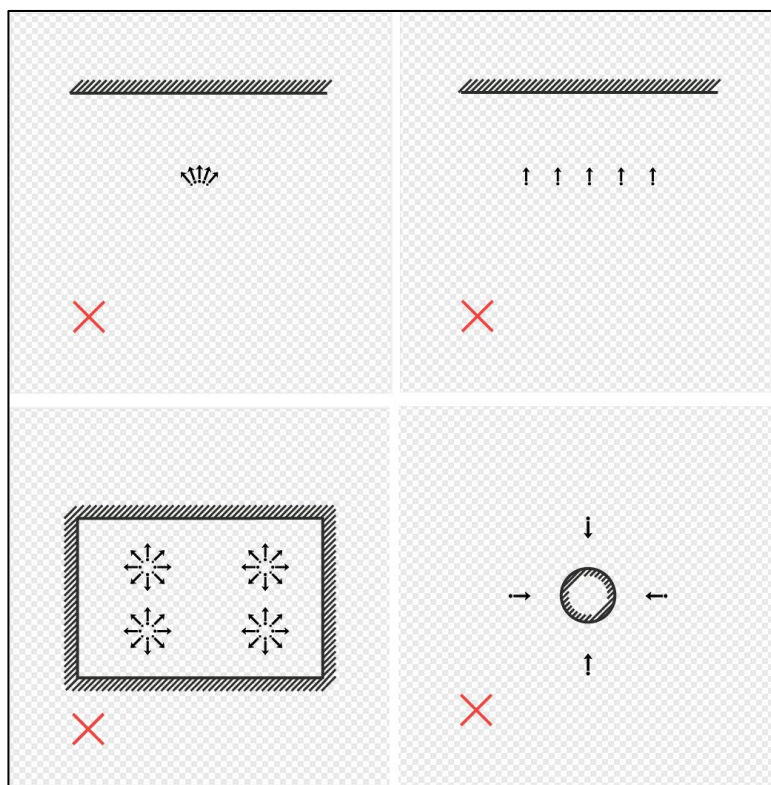


Figure 2-7-3 Error Demonstration

2. Correct Demonstration

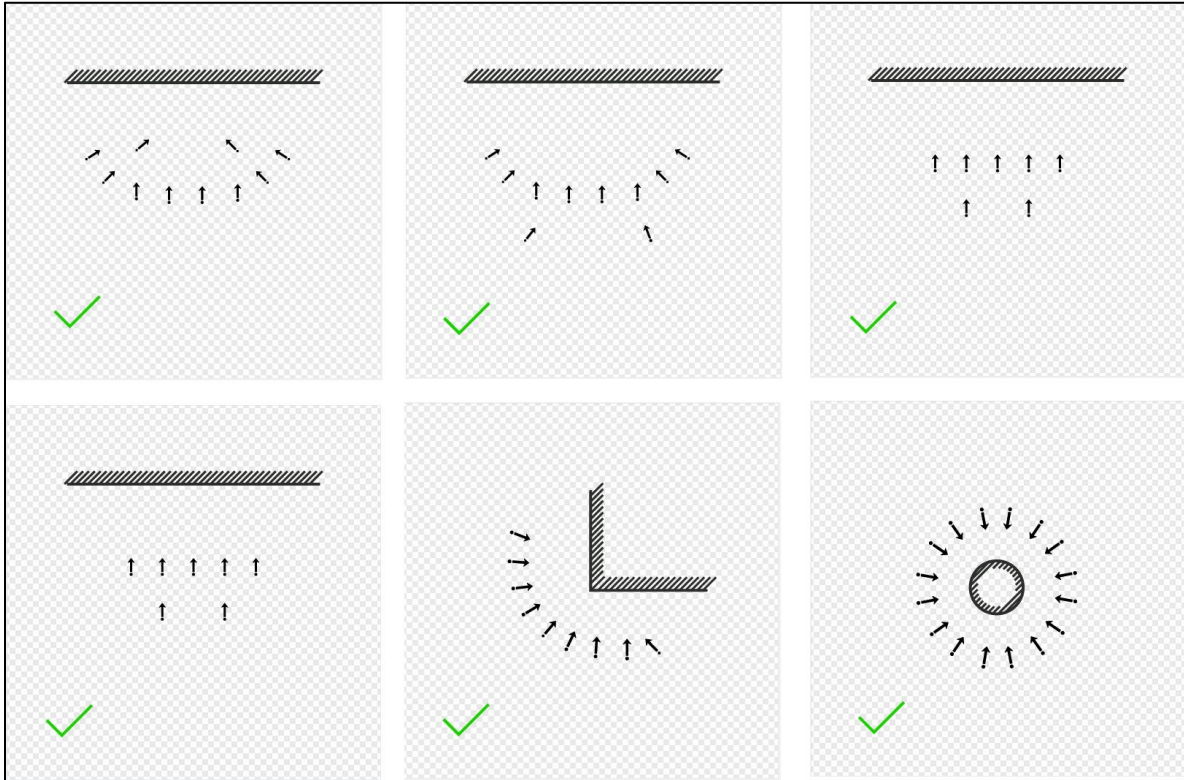


Figure 2-7-4 Correct Demonstration


2.8 AR Stake

2.8.1 AR Stake Instructions

The vRTK receivers have newly added dual cameras, which can support the AR stakeout function. The iHand55 controller and the software Hi-Survey V2.3.0 or later versions are required.

The AR stakeout scene is defined as when the stakeout point is approximately 3m from the receiver, the camera of the receiver is called, and the precise position of the stakeout point is displayed in real time through the controller.

After entering the point stakeout interface:

- (1) Enter the stakeout point;
- (2) Click the AR stakeout button  ;
- (3) Complete the prompts for the stakeout;
- (4) The stakeout is successful.

Click the AR stakeout button, when the distance from the stakeout point is $> 3\text{m}$, use the control AR stakeout (control navigation); if the distance from the stakeout point is less than or equal to 3m , switch to the AR stakeout (receiver navigation).

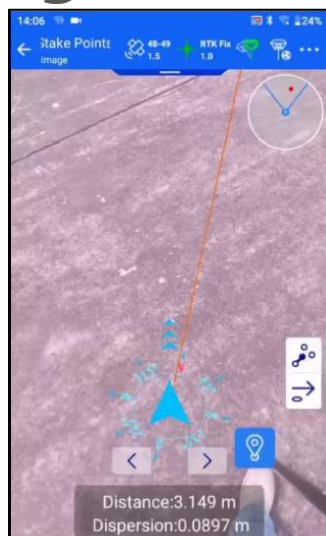


Figure 2-8-1 Control Navigation

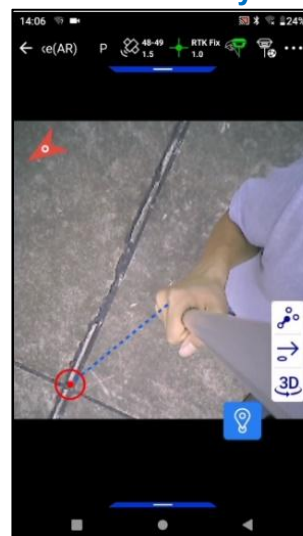


Figure 2-8-2 Receiver Navigation

For detailed steps, please refer to 'Hi-Survey Software User Manual' - Point Stakeout (AR Stakeout).

Chapter 3

Technical Specification

This chapter contains:

- Technical Specification

Table 3-1-1 Technical Parameters

Configuration		Detailed Indicators
GNSS configuration	Channels	1408
	Satellite signals tracked simultaneously ^[1]	BDS: B1I,B2I,B3I,B1C,B2a,B2b*
		GPS: L1C/A,L1C,L2P(Y),L2C,L5
		GLONASS: L1, L2
		GALILEO: E1,E5a,E5b,E6*
		QZSS: L1,L2,L5,L6*
		IRNSS:L5*
		SBAS:L1 C/A,L5
	Output format	ASCII: NMEA-0183, Binary data
	Positioning output	1~20Hz
	Static data format	GNS and RINEX
	Message type	RTCM2.X,RTCM3.X
	Network Mode	VRS,FKP,MAC,support NTRIP protocol
System configuration	Operating system	Linux system
	Data storage	8G internal storage,supports automatic cyclic storage of static data
Accuracy and reliability ^[2]	RTK position precision	Horizontal: $\pm (8+1 \times 10^{-6}D)$ mm (D is the distance between measurement points)
		Vertical: $\pm (15+1 \times 10^{-6}D)$ mm (D is the distance between measurement points)
	Static measurement precision	Horizontal: $\pm (2.5+0.5 \times 10^{-6}D)$ mm (D is the distance between measurement points)
		Vertical: $\pm (5+0.5 \times 10^{-6}D)$ mm (D is the distance between measurement points)
	DGPS position precision	Horizontal: $\pm 0.25m+1ppm$
		Vertical: $\pm 0.50m+1ppm$
	SBAS position precision	0.5m
	Tilt survey precision ^[3]	less than 8mm+0.7mm/ ° tilt(2.5cm accuracy in the inclination of 60 °)
	AR stake precision	Typical accuracy:2cm

	AR measure precision	2cm ~ 4cm
	Initialization time	2-10s
	Initialization reliability	> 99.99%
	Breakpoint continuity test	Provides RTK measurements even during differential signal interruptions
Camera	Pixel	Professional Dual HD Camera, 2MP & 5MP
	Function	Support live view stakeout, image measurement, working distance 2~15m
Data communication	I/O ports	USB type C interface; SMA interface.
	Cellular Mobile	Full band support for cellular mobile network LTE FDD:B1/B3/B5/B7/B8/B20 LTETDD:B38/B40/B41 WCDMA:B1/B5/B8 GSM:850/900/1800/1900MHz
	Wi-Fi	802.11 b/g access point and client mode for WiFi hotspot service
	Bluetooth	Bluetooth® 4.0/2.1+EDR ,2.4GHz
	Internal UHF	Power: 0.5W/1W/2W adjustable
		Frequency: 410MHz~470MHz
		Protocol: HI-TARGET, TRIMTALK450S, TRIMMARK III, TRANSEOT, SATEL, CHC, SOUTH
		Channels: 116 totally, 16 configurable
Sensors	Tilt survey	Built-in high-precision inertial guidance, automatic attitude compensation
User interface	Button	Power button*1
	LED prompt light	3 LED lights, Satellite light, Data light, Power button
Functional applications	Advanced features	NFC flash connection, WebUI interaction, U disk firmware upgrade
	Intelligent application	Intelligent voice
	Remote service	Message push, online upgrade
Physical	Host battery	High-capacity lithium battery 6900mAh, working time better than 15 hours ^[4]
	External power supply	USB 15W charging
	Size	Φ 130mm×80mm
	Weight	≤0.97kg
	Power consumption	2.6 W
	Material	The housing is made of magnesium alloy

Environment	Water/dustproof	IP68
	Drop test	Resist natural fall of 2m high measuring rod
	Relative humidity	100% non-condensing
	Operation temperature	-40°C ~ +75°C
	Storage temperature	-55°C ~ +85°C


Notice:

1. BDS B2b, GALILEO E6, QZSS L6, and IRNSS L5 are available through firmware upgrades.
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. The data is derived under normal conditions.
3. Irregular operations such as rapid rotation and high-intensity vibration may affect the inertial guidance accuracy.
4. The battery operating time is related to the operating environment, operating temperature and battery life.

Chapter 4

Accessories and Interface

This chapter contains:

- Data cable
- Antenna
- Battery & charger

4.1 Data cable

Type-C cable: Used to connect the receiver to a PC for upgrading firmware and downloading static data.



Figure 4-1-1 Type-C cable

4.2 Antenna

The UHF radio antenna is used in the Internal UHF mode.



Figure 4-2-1 Hi-Survey Road

4.3 Battery & charger

1. Battery: The receiver has a built-in 6900mAh/7.2V battery.



Notice:

If the battery needs to be stored for a long time, it should be charged to about 70% and then placed in a dry, low-temperature environment. It is recommended that you charge and discharge the battery every 3 months. If you do not have the conditions that are needed for charging and discharging, take out the battery after 3 months and charge it to about 70% before storing it once more.

2. Charger: To charge the receiver, use the standard charger. When it is in charge, the power button light will turn red.



Figure 4-3-1 Cable



Figure 4-3-2 Charger

**Notice:**

Please use this product's standard charger to charge the receiver. We will not be responsible for any accidents that occur during the charging process or any damage to the instrument if you use other chargers instead.