

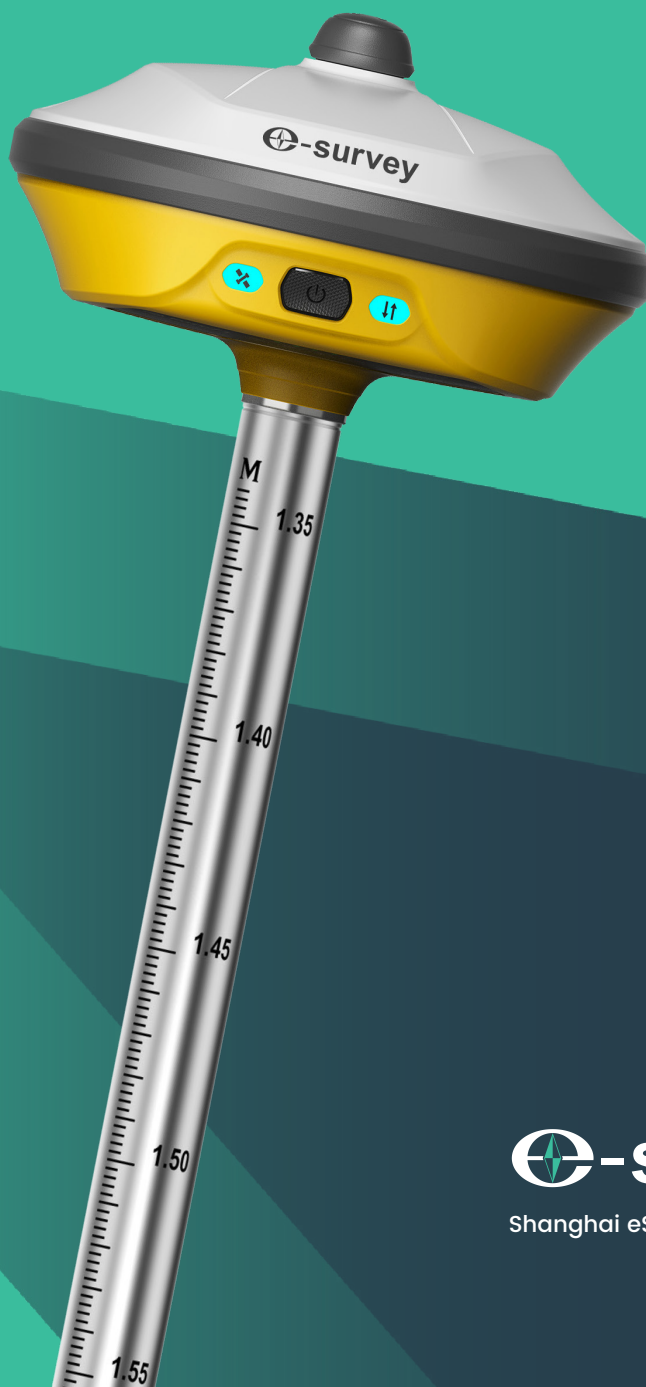
User Guide



Land Survey

eRTK10

AR Visual Stakeout GNSS Receiver




 **e-survey**

Shanghai eSurvey GNSS Co., Ltd.

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Certificate



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1 Before You Start

Dear customers,



Thank you for purchasing our device. Before you start, please carefully read the following:

- This user guide is for your device only. If the actual situation does not match with the situation in the user guide, the actual situation shall prevail.
- For safety and instructions on how to use this device, please carefully read the precautions, exemptions from responsibility and instructions in the user guide.
- The information in this user guide is subject to change without notice. We reserve the right to change or improve the device as well the content in the user guide without any obligation to notify you. For any questions, please contact us.

1.1 Precautions for Safe Operation

For the safety of your product and prevention of injury to operators and other persons as well as prevention of property damage, please read this part carefully before using your product.

Precautions can be divided into the following types according to the degree of loss or injury in case of negligence or omission:

-  **WARNING:** Precautions requiring special attention. Ignoring this indication may possibly result in death or serious injury to the operator.
-  **CAUTION:** Precautions mainly for informing, such as supplementary instructions and using limitations. Ignoring this indication may possibly result in personal injury or property damage.

1.1.1 Warning

- Please do not disassemble the device. Otherwise, fire or electric shock may occur. Only e-Survey authorized distributors can disassemble or rebuild the device.
- Please do not cover the charger when charging. Otherwise, fire may occur.
- Please do not use wet charger, defective power cable, socket or plug, and power cable not specified by e-Survey. Otherwise, fire or electric shock may occur.
- Please do not put the device close to burning gas or liquid, and do not put it in the fire or high temperature condition. Otherwise explosion may occur.
- Please avoid short circuit of the battery. Otherwise, fire may occur.
- Please avoid disturbance of severe electrostatic discharge. Otherwise, the device may have some degradation of performance like switching on/off automatically, etc.

1.1.2 Caution

- Please put the device firmly on the pole.
- To avoid accidental damage, please only use original supplied parts. Otherwise, damage to the device may occur.
- When transporting, please try your best to lighten libration on the device.
- Please do not touch the device with wet hand. Otherwise, electric shock may occur.
- Please do not arbitrarily stand or seat on the carrying case, or turn over it. Otherwise, the device may be damaged.

1.2 Exemptions from Responsibility

You are expected to follow all operating instructions and regularly check the performance of this device. We assume no responsibility for any damage and loss of profits caused by the following conditions:

- A faulty or intentional usage or misuse.
- Any disasters, such as earthquakes, storms, floods etc.
- A change of data, loss of data, an interruption of business etc.
- Wrong transport.
- Use of non-original parts.
- Usage not explained in the user guide.

2 eRTK10 at a Glance

The eRTK10 main body is designed with magnesium alloy material to provide durable usage and better heat dispersion and light weight 891 g. And when it's fully charged, it can continuously work for 10h.




2.1 Appearance

The eRTK10 main body is as follows:



2.2 Indicator Light

Through the color of the indicator light, you can know the following:

-  Satellite status
 - Off: no receiving satellites.
 - Green: fixed solution.
 - Flashing green: have solution but not fixed.
 - Flashing red and green alternately: the mainboard abnormal.
-  Datalink status
 - Green: datalink is not connected. / no differential data is received .
 - Blue: datalink is connected. / raw data recording disabled.
 - Flashing green: differential data is received.
 - Flashing blue: raw data recording enabled.
-  Battery status
 - Off: No charging connected. Press the Power button, the lights is on for 3 seconds displaying the battery level. One light represents 25%.
 - Flashing Green: connected to the charger and is charging.
 - Green: connected to the charger and fully charged.

2.3 Power Button

Through the power button, you can achieve the following:

- Power on the receiver: long press the button for 3 seconds and release it. All indicator lights will be on.
- Power off the receiver: long press the button for 3 seconds, release it until you hear the voice *Power off?*, and press the button again.
- Broadcast the current mode: press the button after powering on. The receiver will broadcast the current working mode, including rover, base or static.

- Self-check: to troubleshoot the receiver when the receiver cannot work normally, long press the button for 2 seconds, release it until you hear the voice *Power off?*, and long press the button for 3 seconds until you hear the voice *Self-check*.

2.4 Type-C

Through Type-C port, you can charge the receiver and transmit the data.

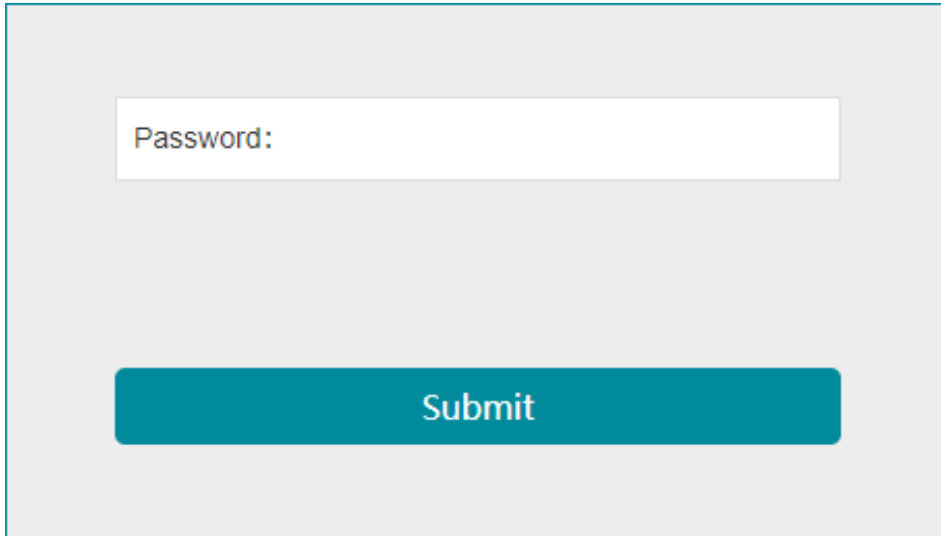
3 Web UI

The receiver WIFI can be used as a hotspot, and you can connect to the hotspot with your PC, smart phone or tablet.

After connecting to the hotspot, you can manage working status, change working mode, configure basic settings, download raw data, update firmware and register device, etc.

Taking the interface of your PC as an example, to enter the Web UI, do the following:

1. Find the receiver WIFI hotspot with your computer.
Hotspot name: the device serial number
2. Open the web browser, and input IP address **192.168.10.1**. The following interface shows:

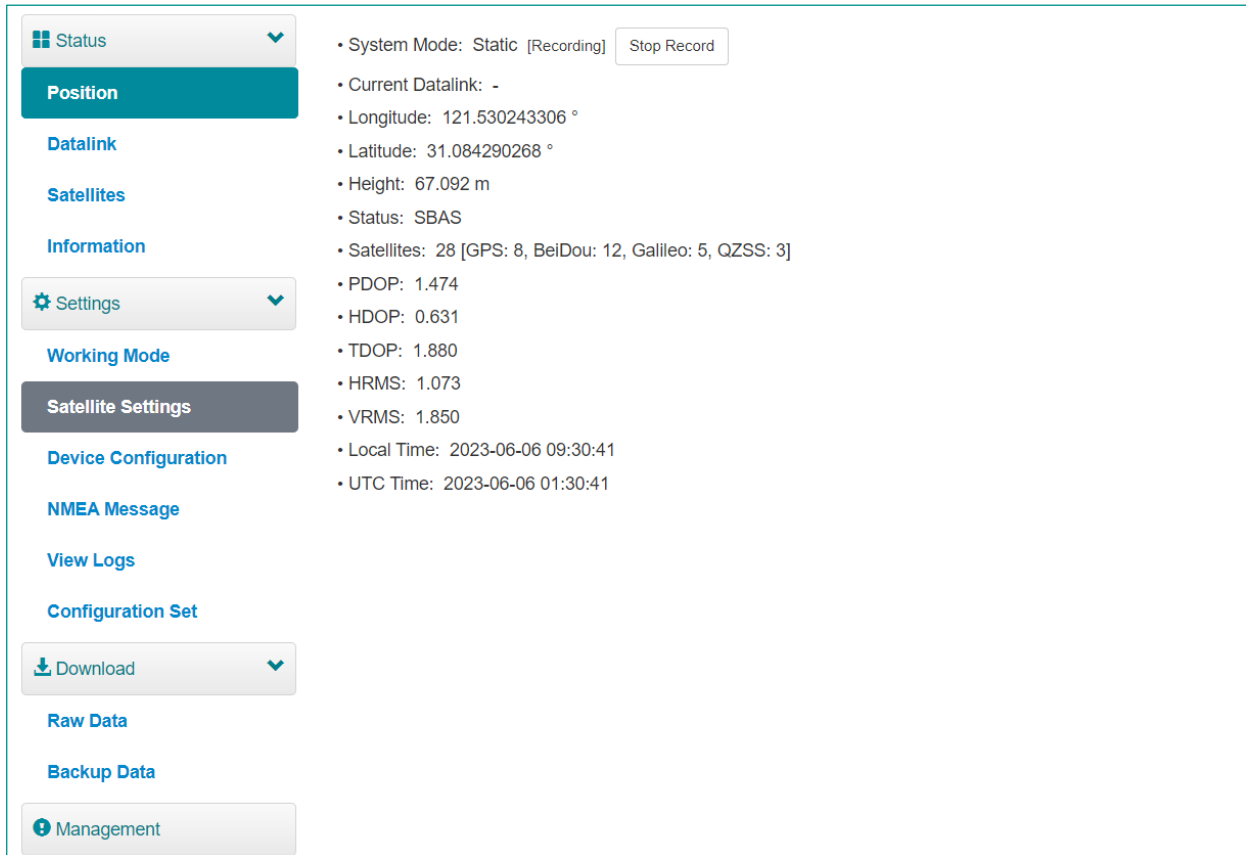


The image shows a web interface for password entry. It features a light gray background with a white rectangular input field at the top containing the text "Password:". Below the input field is a teal-colored button with the word "Submit" written in white text.

3. Enter the password.
Default: password

3.1 Position

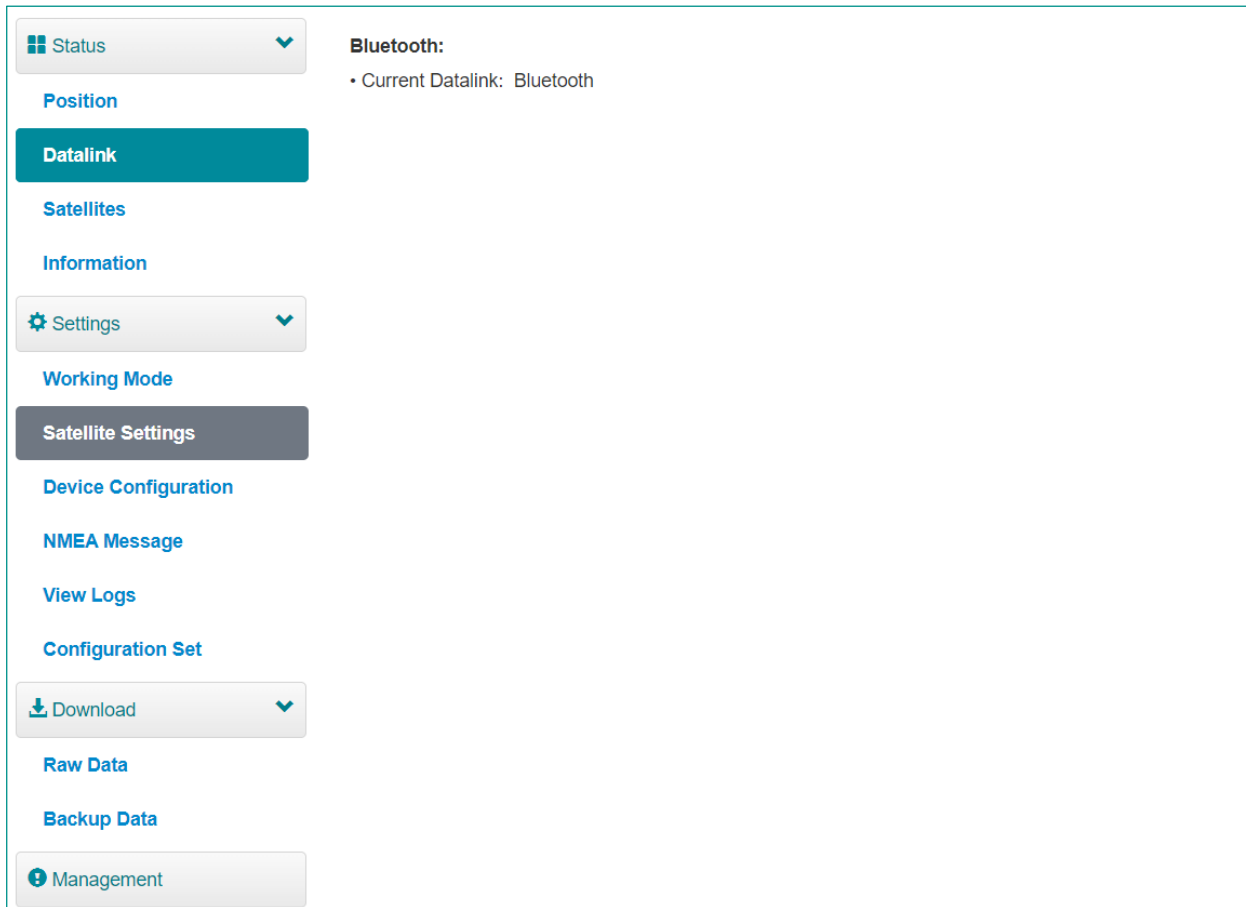
In **Position** page, you can view the following, and start and stop recording in static mode:



- System mode
- Coordinates: longitude, latitude, and height
- Solution status
- Satellite number
- PDOP
- HDOP
- TDOP
- HRMS
- VRMS
- Local time
- UTC time

3.2 Datalink

In **Datalink** page, you can check the current datalink:



The screenshot shows the Datalink page interface. On the left is a sidebar menu with the following items: Status (with a grid icon and a dropdown arrow), Position, Datalink (highlighted in teal), Satellites, Information, Settings (with a gear icon and a dropdown arrow), Working Mode, Satellite Settings (highlighted in dark grey), Device Configuration, NMEA Message, View Logs, Configuration Set, Download (with a download icon and a dropdown arrow), Raw Data, Backup Data, and Management (with an information icon). The main content area on the right shows 'Bluetooth:' followed by a list item '• Current Datalink: Bluetooth'.

3.4 Information

In **Information** page, you can view the following information:

| | | |
|---|---|--|
| <ul style="list-style-type: none"> Status Position Datalink Satellites Information Settings Working Mode Satellite Settings Device Configuration NMEA Message View Logs Configuration Set Download Raw Data Backup Data Management | <p>Receiver:</p> <p>Device Model: eRTK10 Hardware Version: V1.1 Firmware Version: 0.24.230416 MCU Version: 0.01 Battery Power: 94% Data Memory: Internal Storage Total 5.23 GB; Free 5.20 GB</p> <p>Antenna:</p> <p>Antenna Type: ESVCAM114 H: 386 HL2: 265</p> <p>UHF:</p> <p>Radio Model: CRM100 Channel: 8 [441.0000 MHz]</p> | <p>Serial No.: ER104A23000013 BOOT Version: 1.05 OS Version: 1.04 Sensor Version: 3.09 Power Source: battery Manufacture Date: 2023-04-07</p> <p>R: 760 HL1: 346</p> <p>Firmware Version: CRM4.00.04 Radio Protocol: TrimMark III</p> |
|---|---|--|

- Receiver
- Antenna
- UHF

3.5 Working Mode

In **Working Mode** page, you can configure the working mode, including rover and static:

Status ▼

[Position](#)

[Datalink](#)

[Satellites](#)

[Information](#)

Settings ▼

Working Mode

[Satellite Settings](#)

[Device Configuration](#)

[NMEA Message](#)

[View Logs](#)

[Configuration Set](#)

Download ▼

[Raw Data](#)

[Backup Data](#)

Management

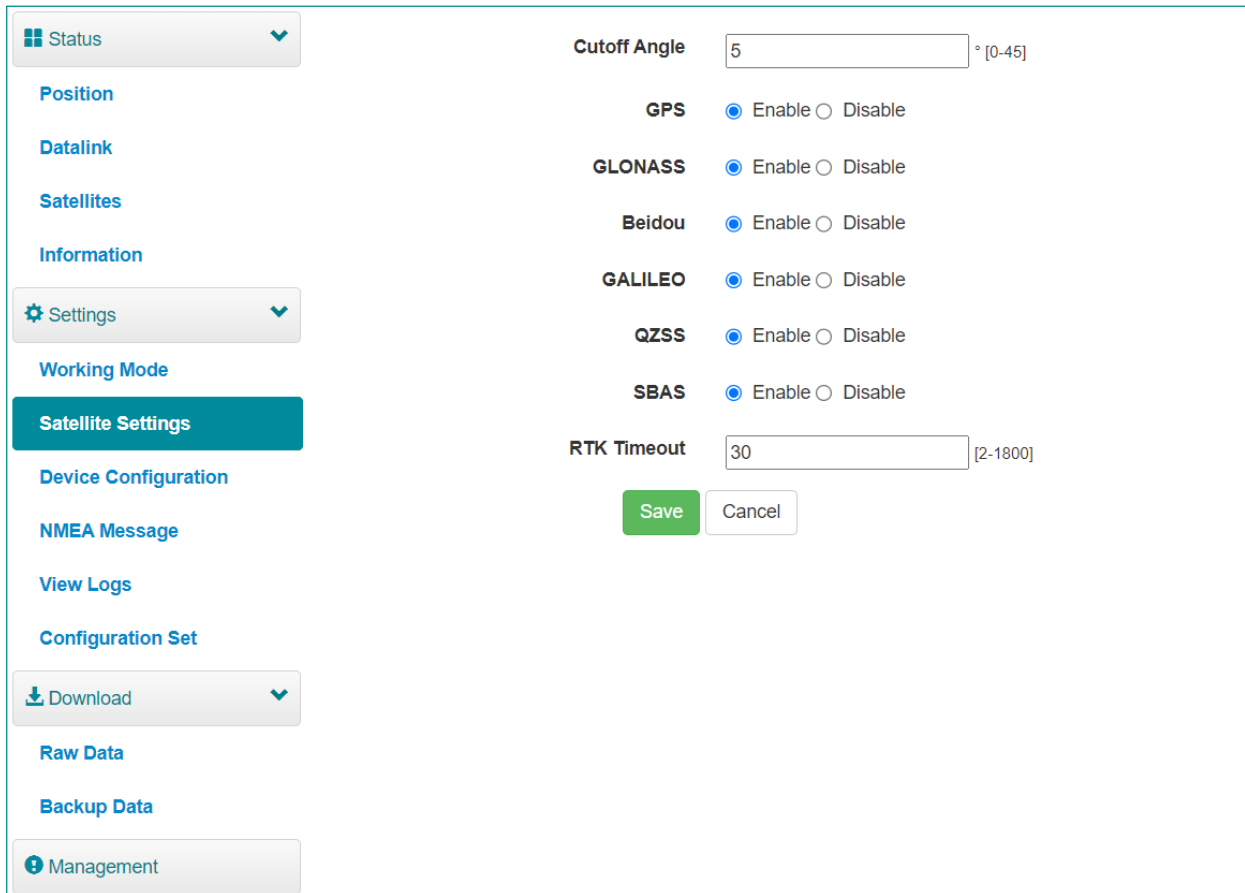
System Mode Static Rover

Current Datalink UHF Bluetooth

Record Raw Data NO YES

3.6 Satellite Settings

In **Satellite Setting** page, you can do the following:



Status ▾

Position

Datalink

Satellites

Information

Settings ▾

Working Mode

Satellite Settings

Device Configuration

NMEA Message

View Logs

Configuration Set

Download ▾

Raw Data

Backup Data

Management

Cutoff Angle ° [0-45]

GPS Enable Disable

GLONASS Enable Disable

Beidou Enable Disable

GALILEO Enable Disable

QZSS Enable Disable

SBAS Enable Disable

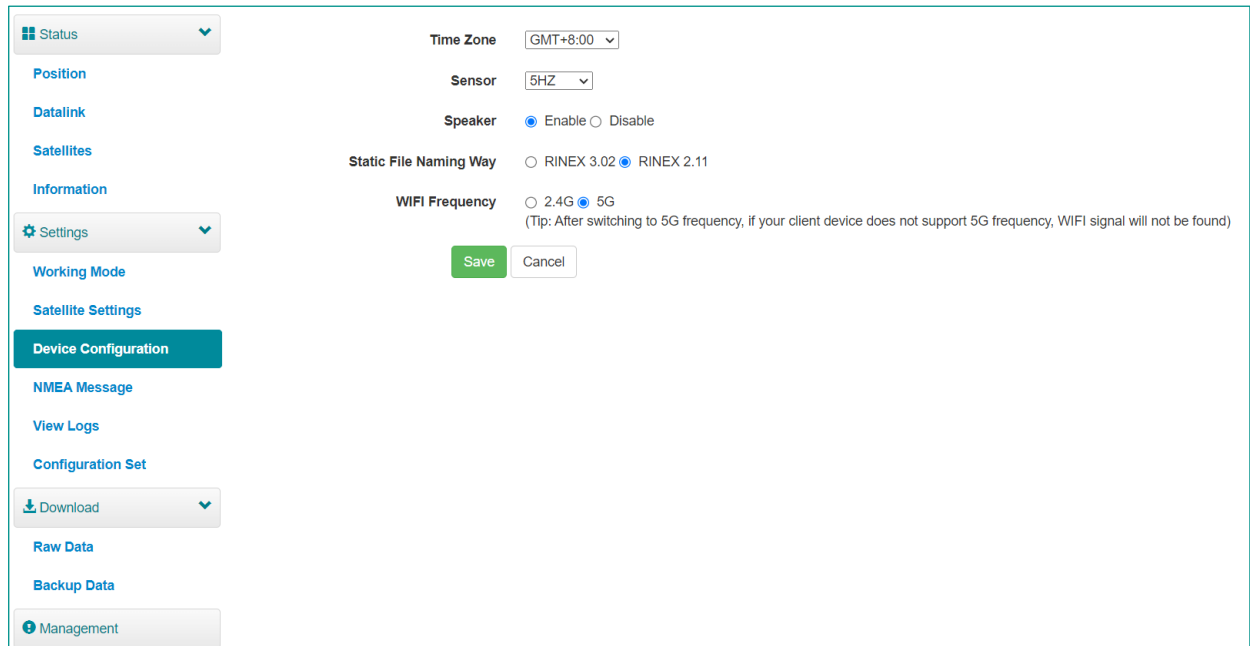
RTK Timeout [2-1800]

Save Cancel

- Configure the cutoff angle.
- Configure the satellites to be used, including GPS, GLONASS, Beidou, GALILEO, SBAS and QZSS.
- Set RTK timeout: high accuracy can be still kept within the set timeout even if correction data loses.

3.7 Device Configuration

In **Device Configuration** page, you can do the following:



The screenshot displays the 'Device Configuration' page. On the left sidebar, the 'Device Configuration' menu item is highlighted. The main content area contains the following settings:

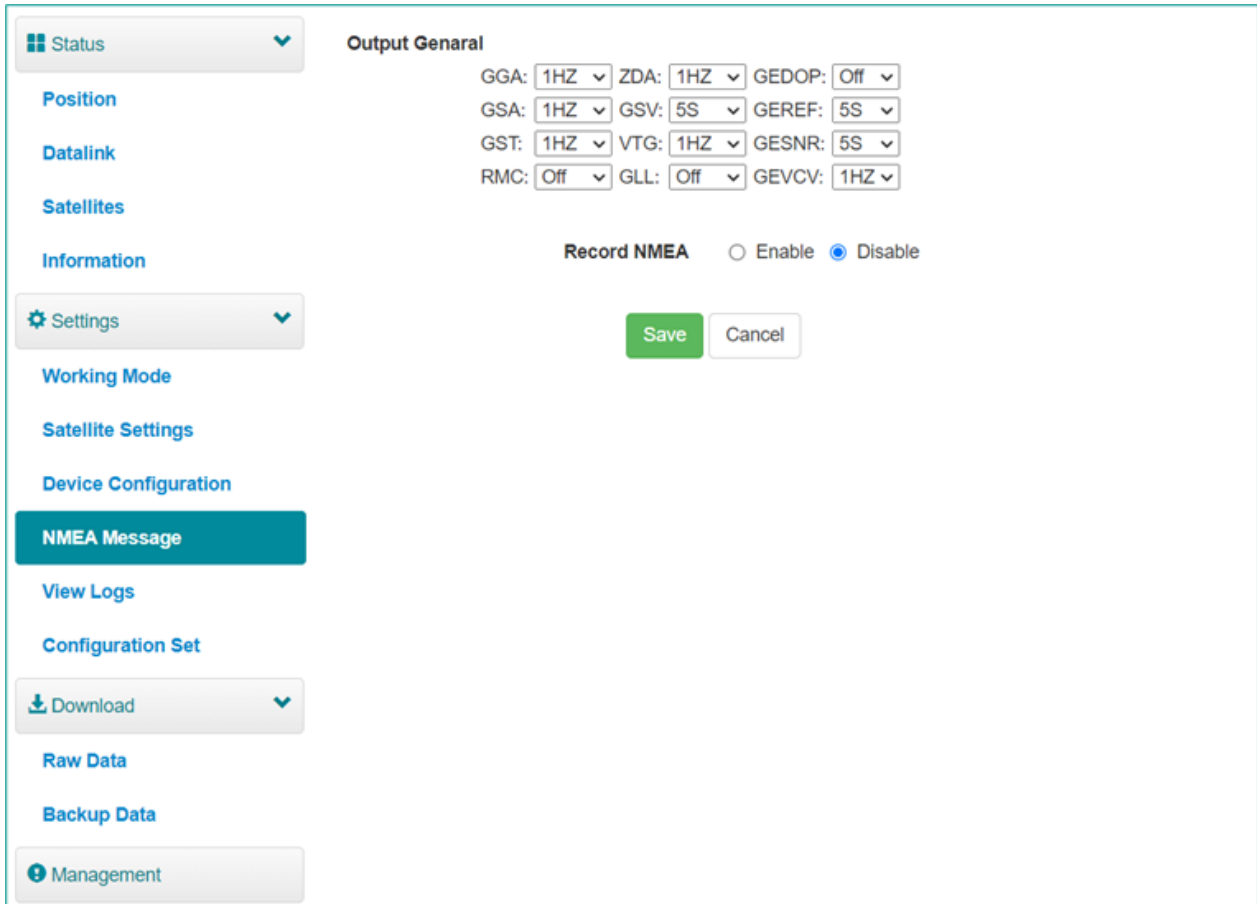
- Time Zone:** GMT+8:00
- Sensor:** 5HZ
- Speaker:** Enable Disable
- Static File Naming Way:** RINEX 3.02 RINEX 2.11
- WIFI Frequency:** 2.4G 5G
(Tip: After switching to 5G frequency, if your client device does not support 5G frequency, WIFI signal will not be found)

At the bottom of the settings, there are two buttons: 'Save' and 'Cancel'.

- Set time zone.
- Select whether to enable IMU sensor data output.
- Select whether to enable speaker (smart voice broadcast).
- Set naming method of static files.
- Set WIFI frequency.

3.8 NMEA Message

In **NMEA Message** page, you can do the following:



Output General

GGA: 1HZ ZDA: 1HZ GEDOP: Off

GSA: 1HZ GSV: 5S GEREf: 5S

GST: 1HZ VTG: 1HZ GESNR: 5S

RMC: Off GLL: Off GEVCV: 1HZ

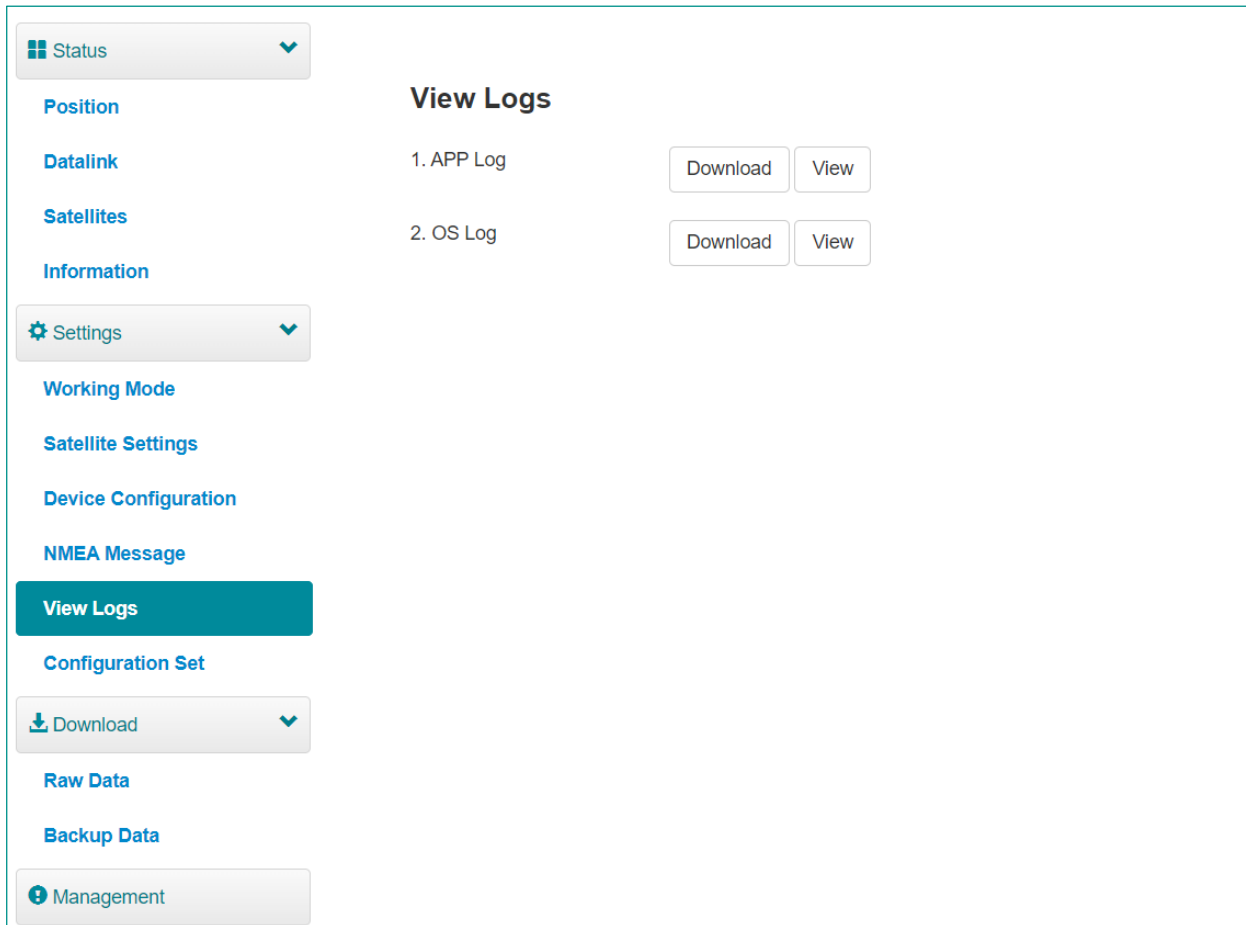
Record NMEA Enable Disable

Save Cancel

- Select data output.
- Select whether to enable external port output NMEA.

3.9 View Logs

In **View Logs** page, you can do the following for troubleshooting:



View Logs

| | | |
|------------|----------|------|
| 1. APP Log | Download | View |
| 2. OS Log | Download | View |

- View App logs and OS logs.
- Download files of App logs and OS logs.

3.10 Raw Data

In **Raw Data** page, you can do the following:

| Select | Name | Size (MB) | Antenna Height (m) | Start Time | End Time | Operation |
|--------------------------|---------------------|-----------|--------------------|---------------------|---------------------|------------------------------|
| <input type="checkbox"/> | 12341431.dat | 5.97 | 1.800 | 2023-05-23 15:40:34 | 2023-05-23 16:31:23 | Convert Download Delete Edit |
| <input type="checkbox"/> | 12341432.dat | 0.228 | 1.800 | 2023-05-23 16:31:31 | 2023-05-23 16:33:07 | Convert Download Delete Edit |
| <input type="checkbox"/> | 12341433.dat | 1.738 | 1.800 | 2023-05-23 16:33:17 | 2023-05-23 16:46:12 | Convert Download Delete Edit |
| <input type="checkbox"/> | 12341434.dat | 1.559 | 1.800 | 2023-05-23 16:46:20 | 2023-05-23 16:57:37 | Convert Download Delete Edit |
| <input type="checkbox"/> | 12341435.dat | 3.82 | 1.800 | 2023-05-23 16:57:45 | 2023-05-23 17:30:02 | Convert Download Delete Edit |
| <input type="checkbox"/> | 12341441.dat | 7.548 | 1.800 | 2023-05-24 08:57:39 | 2023-05-24 09:45:47 | Convert Download Delete Edit |
| <input type="checkbox"/> | 12341442.dat | 1.828 | 1.800 | 2023-05-24 09:45:56 | 2023-05-24 09:57:11 | Convert Download Delete Edit |
| <input type="checkbox"/> | 12341531.dat | 0.507 | 0.548 | 2023-06-02 11:35:49 | 2023-06-02 11:38:53 | Convert Download Delete Edit |
| <input type="checkbox"/> | 12341571.dat | 1.029 | 1.800 | 2023-06-06 09:26:53 | 2023-06-06 09:33:04 | Convert Download Delete Edit |
| <input type="checkbox"/> | 12341572.dat | 0.534 | 1.800 | 2023-06-06 09:36:05 | 2023-06-06 09:39:17 | Convert Download Delete Edit |
| <input type="checkbox"/> | 20230523172640.nmea | 0.222 | - | - | - | Download Delete |
| <input type="checkbox"/> | 20230524085727.nmea | 11.358 | - | - | - | Download Delete |
| <input type="checkbox"/> | 20230524140625.nmea | 0.134 | - | - | - | Download Delete |
| <input type="checkbox"/> | selftest.log | 0.001 | - | - | - | Download Delete |

- Download raw data and NMEA data.
- Convert data to RINEX format.
- Download multiple files by checking the target files and clicking **Package**.

3.11 Backup Data

The points collected in SurPad software will be automatically backed up in receiver storage to avoid data loss. You can download the data for later use.

In **Backup Data** page, you can do the following:

| Select | Name | Size (MB) | Operation |
|--------------------------|-----------------------------------|-----------|-----------------|
| <input type="checkbox"/> | 20230506@20230506.RTK | 0.003 | Download Delete |
| <input type="checkbox"/> | 20230601test11@20230601test11.RTK | 0.009 | Download Delete |
| <input type="checkbox"/> | 20230602@20230602.RTK | 0.003 | Download Delete |
| <input type="checkbox"/> | ertk10-function@ertk10-static.RTK | 0.012 | Download Delete |
| <input type="checkbox"/> | test-andrio@test-andrio.RTK | 0.003 | Download Delete |

- Download point data.
- Delete point data.

3.12 Management

In **Management** page, you can do the following:

- Status
- Position
- Datalink
- Satellites
- Information
- Settings
- Working Mode
- Satellite Settings
- Device Configuration
- NMEA Message
- View Logs
- Configuration Set
- Download
- Raw Data
- Backup Data
- Management

Local Upgrade ?

Select File No files selected Upload File

Registration

Expire Date: 20230813

Function: L1+L2,GPS+Glonass+BeiDou+Galileo+Qzss,50Hz,TiltOn,CAMERA

AuthCode: Submit

GNSS Registration

GNSS Functionality: HRPT00-S10C-P ()

AuthCode: Submit

Security

Enable Login Authentication

Old Password:

New Password:

Confirm Password:

Change

Enable WIFI Connect Authentication The length of the wifi password must be greater than 7.

Change

Format Internal Disk OK

Self Test OK

Restore Factory Settings OK

Reset OK

- Install new firmware.
- Register the device.
- Register the GNSS.
- Set security: to set password of web UI (192.168.10.1) and receiver WIFI.
- Format the internal disk.
- Do self-testing.
- Restore factory settings.
- Reset: to restart the receiver.

4 Basic Operations

4.1 Charge the Battery

The device is equipped with Type-C charger which supports maximum 20W PD quick charge.

It takes about 5 hours to fully charge the battery:

- Flashing Green: connected to the charger and is charging.
- Green: connected to the charger and fully charged.

To charge the battery, open the cover of type-C, and connect one end of the cable to the type-C interface and another end of the cable to the charger.


4.2 Install the Radio Antenna

The antenna is required when the datalink is set to internal radio.

To insert radio antenna, open the cover of UHF radio, and install the radio antenna.

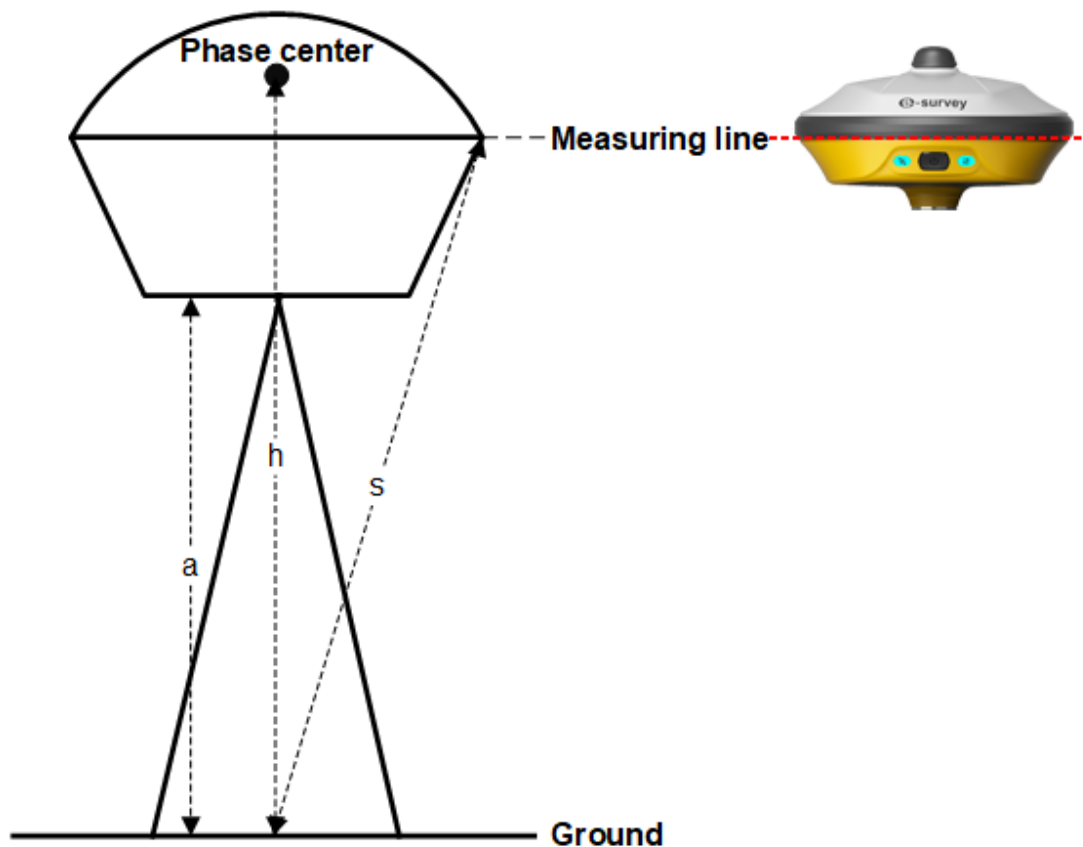
4.3 Measure Antenna Height

Antenna height refers to the vertical distance between the phase center and the ground. Since the antenna height cannot be directly measured, it is automatically calculated by SurPad software based on the measured height you input and measurement type you select.



CAUTION: No matter what the value of measured height you input and what kind of measurement type you select, the value of antenna height is unique.

The principle is as follows:



- **h**: the vertical height from the phase center to the ground.
- **s**: the slant height from the measuring line to the ground.
- **a**: the pole height, that is, the vertical height from the ground to the device bottom.

To measure antenna height, do one of the following:

- Set the measured height to the slant height and measurement type to slant height.
- Set the measured height to the pole height and measurement type to pole height.

The SurPad software automatically calculates the antenna height.






4.4 Start Tilt Measurement

The device support IMU function, which is determined by the activation code and service you purchase.

It is required when tilt measurement is used and IMU is used.

Before starting IMU tilt measurement, to enable IMU tilt measurement, in SurPad software, press main menu **Device**→**Device Setting**, and set tilt survey to **Pole Tilt Correction**.


To start IMU tilt measurement in SurPad software, press main menu **Survey**→**Point Survey** to enter the main interface of point survey, and do as the prompt in the interface:

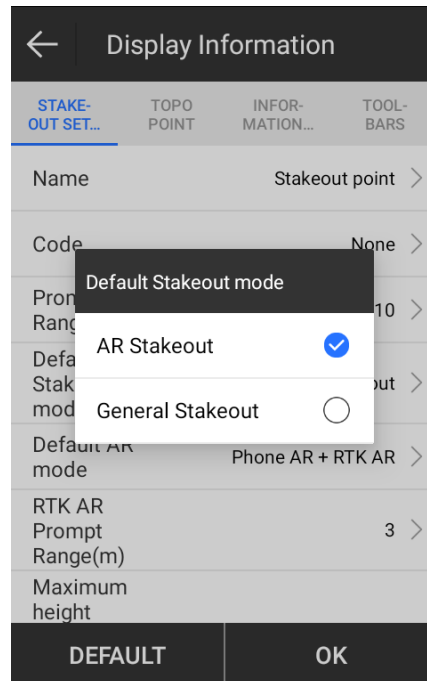
| Status | What it means | What to do |
|---|---|---|
|  | Magnetic calibration is required. | Take the pole and draw a circle towards the ground. |
|  | Initialization is required. | Shake the pole or walk around. |
|  | The accuracy of tilt measurement is not enough. | Wait for better signals. |
|  | The tilt angle exceeds 60°. | Make sure the tilt angle is within 0° - 60°. |
|  | Tilt measurement is successfully enabled. | Start survey. |

5 Point Stakeout

Two modes of point stakeout are supported by SurPad: general stakeout and AR stakeout.

AR stakeout will be available only used in SurPad software.

Press main menu **Survey**→**Point Stakeout**, Press the icon  to enter **Display Information**, set the **Default Stakeout Mode**.








5.1 General Stakeout

Before General Stakeout, please make sure the eRTK10 is set rover and under fixed solution.

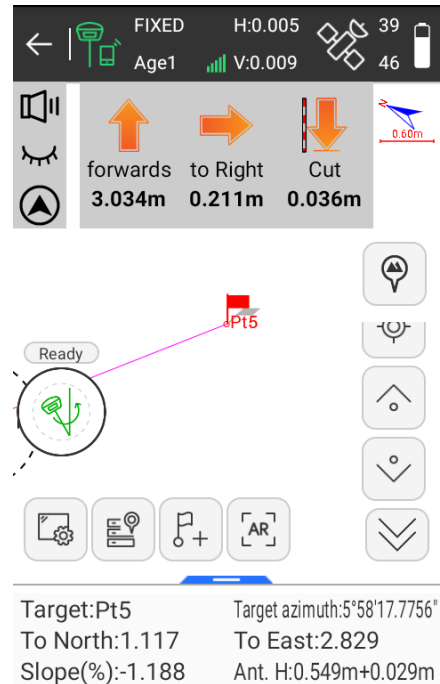
Press main menu **Survey**→**Point Stakeout** to enter **General Stakeout** page.



Press the icon to select **Stake Point**. Then the selected point will be displayed in the following page. Do the stakeout according to the direction and distance.

| Stake Point | | | | |
|---|------|-------------|------------|-----------|
| Count 5 <input type="text" value="Input name or code"/> | | | | |
| | Name | Northing | Easting | Elevation |
|  | Pt5 | 3439872.576 | 359802.952 | 55.510 |
|  | Pt4 | 3439872.561 | 359802.940 | 55.511 |
|  | Pt3 | 3439872.563 | 359802.947 | 55.509 |
|  | Pt2 | 3439882.307 | 359818.969 | 51.395 |
|  | Pt1 | 3439883.322 | 359816.051 | 51.354 |

Add Edit Details OK ...



FIXED H:0.005 39
Age1 V:0.009 46

↑ forwards 3.034m
→ to Right 0.211m
↓ Cut 0.036m

Ready

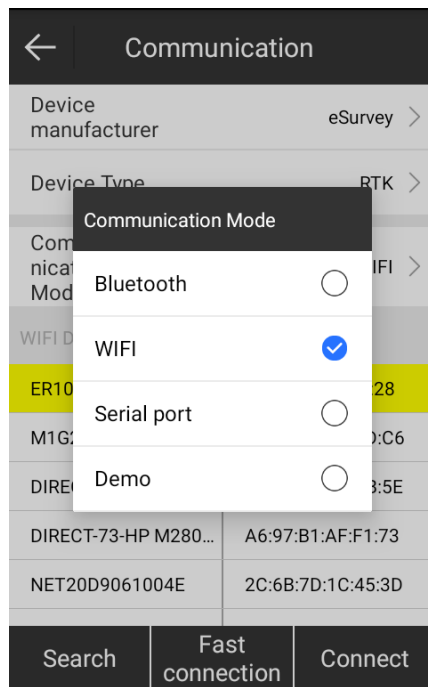
Target:Pt5
To North:1.117
Slope(%):-1.188


Target azimuth:5°58'17.7756"
To East:2.829
Ant. H:0.549m+0.029m

5.2 AR Stakeout

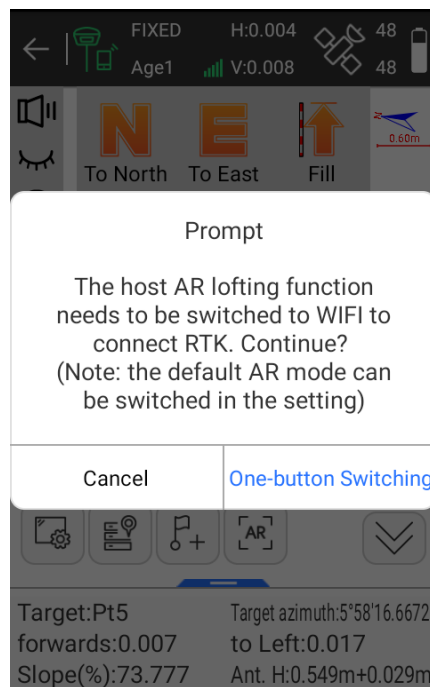
Before AR stakeout, please pay attention to the following configurations:

- The **Communication mode** for the phone and the eRTK10 is **WIFI**.
- The eRTK10 is set as rover and under fixed solution.
 - If datalink is set **Phone Internet**, make sure the phone can access the internet.
 - If datalink is set **Internal Radio**, make sure the radio configuration is correct.
- IMU tilt measurement is successfully enabled.

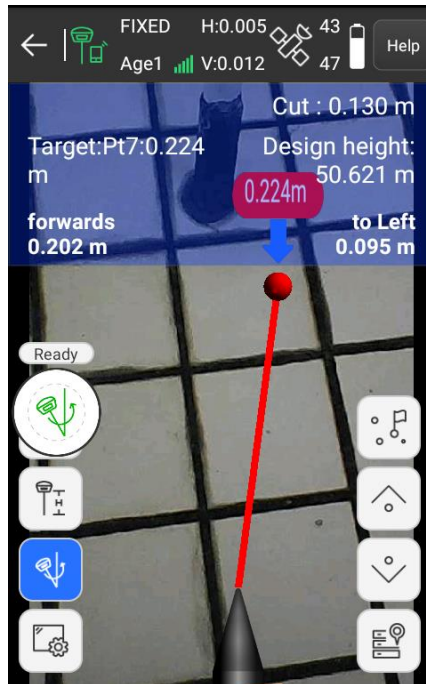


If General Stakeout mode is set default, you need to press the icon  to enter **AR Stakeout** mode.


If the current communication mode is Bluetooth, SurPad will prompt "The host AR lofting function needs to be switched to WIFI to connect RTK".

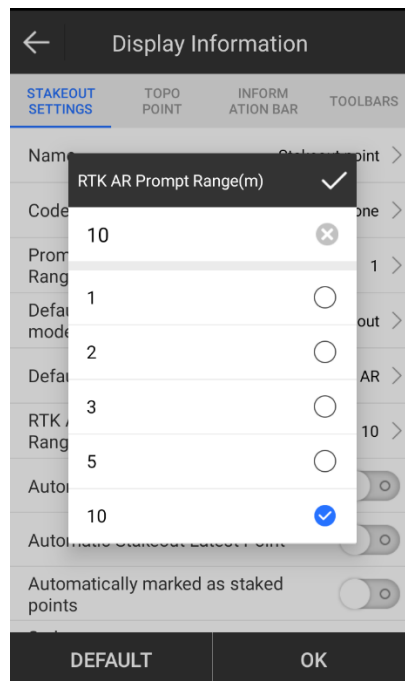


In AR stakeout page, do the stakeout according to the direction line, distance, and the ball mark.



Make sure that the eRTK10 camera and the phone camera is in the same direction, so as to avoid inaccurate direction displayed and the screen being blocked by the arm.

The eRTK10 camera will be used automatically when the distance from the receiver to the stakeout point is smaller than the RTK AR Prompt Range. Otherwise, the phone camera is used. Press the icon  to set **RTK AR Prompt Range**.



6 Internal Radio

The device is equipped with 1 W internal radio. You can select the transmission power from 0.5 W or 1 W. There are 8 default channel frequency in which channel 8 is changeable. With firmware updated, lots of protocols in survey industrial are supported.

The default channel frequency is as follows:

| Channel | Frequency (Unit: MHz) |
|---------|-----------------------|
| 1 | 441 |
| 2 | 442 |
| 3 | 443 |
| 4 | 444 |
| 5 | 445 |
| 6 | 446 |
| 7 | 447 |
| 8 | 448 (Changeable) |

The supported radio protocol includes the following:







- Satel
- PCC-4FSK
- PCC-GMSK
- TrimTalk 450S
- South 9600
- HiTarget(9600)
- HiTarget(19200)
- Trimmark III
- South 19200
- TrimTalk(4800)
- GEOTALK
- GEOMARK
- HZSZ
- Satel_ADL
- PCCFST
- PCCFST_ADL



CAUTION: Some of the protocols may require firmware updating.

7 Standard Accessories

The standard accessories are as follows:

| Items | Description | Picture |
|--------------------------|--|---|
| Soft Bag (1) | - |  |
| eRTK10 GNSS Receiver (1) | - |  |
| Charger (1) | Type-C port, UK/America/Europe/Australia |  |
| Power Cable (1) | Type-C to Type-C |  |
| UHF Antenna (1) | 420~450 MHz |  |
| Measuring tape (1) | |  |



CAUTION: Standard accessories may change, and the actual accessories shall prevail.

e-survey



Website



Social media



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