

User Guide



eRTK60

Full-Featured Visual GNSS Receiver



e-survey

Shanghai eSurvey GNSS Co., Ltd.

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Certificate



FCC Warning Statements

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.

Caution: Any changes or modifications to this device not explicitly approved by manufacturer could void your authority to operate this equipment.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

The device has been evaluated to meet general RF exposure requirement. This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment.

This equipment should be installed and operated with minimum distance 50cm between the radiator & your body.

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1 Before You Start

Dear customers,

Thank you for purchasing our product. Before starting your work, please carefully read the following:

- This user guide is for your product only. If the actual situation does not match with the situation in the user guide, the actual situation shall prevail.
- Improper use of the product can lead to death or injury to persons, damage to property and/or malfunction of the product. For safety and instructions on how to use this product, please carefully read the precautions for safe operation, disclaimers and instructions in the user guide and at all times comply with the same. **Remember that YOU are the key to safety.**
- The information in this user guide is subject to change without notice. We reserve the right to change or improve the product 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

Precautions in this part are intended to minimize the risk of personal injury and/or damage to property, and all indicate **ATTENTION! BECOME ALERT! YOUR SAFETY IS INVOLVED!**

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

 Caution	<i>Indicates a potentially hazardous situation that, if not avoided, may result in INJURY OR PROPERTY DAMAGE OR IRRETRIEVABLE DATA LOSS.</i>
 Warning	<i>Indicates a potentially hazardous situation that, if not avoided, could result in SERIOUS INJURY OR EVEN DEATH.</i>
 Note	<i>Indicates supplementary information that can have an effect on system operation, system performance and measurements.</i>

1.1.1 Caution

The following outlines the cautions that you must avoid when operating the GNSS receiver and any of its components.

- To avoid accidental damage, please only use original supplied parts. Otherwise, damage to the receiver may occur.
- When transporting, please try your best to lighten libration on the receiver.
- Please do not touch the receiver with wet hand. Otherwise, electric shock may occur.
- Please do not obstruct the camera and ensure the camera lens is clean. Otherwise, it will affect the quality of the photos and the success rate of resolution of the coordinates.

1.1.2 Warning

The following outlines the warnings that you must avoid when operating the GNSS receiver and any of its components.

- Please do not disassemble the receiver. Otherwise, fire or electric shock may occur. Only **eSurvey** authorized distributors can disassemble or reassemble the receiver.
- Please avoid charging the receiver if it appears to be damaged or leaking.
- Please use the charger for **eSurvey** equipment that is specified to use it.
- Use the battery only for its intended use and according to the instructions in the user guide.
- Please do not cover the charger when charging the batteries. Otherwise, fire may occur.
- Please do not use wet chargers, defective power cable, socket or plug, and power cable not specified by **eSurvey**. Otherwise, fire or electric shock may occur.
- Please do not put the receiver close to burning gas or liquid, and do not put it in the fire or high temperature condition. Otherwise, explosion may occur.
- Please avoid disturbance of severe electrostatic discharge. Otherwise, the receiver may have some degradation of performance like switching on/off automatically, etc.

1.2 Exemptions from Responsibility

It is your responsibility to exercise common sense and navigational judgment while using the GNSS receiver.

We assume no responsibility or liability for any damages to property (including direct or indirect damage), personal injuries or death caused by the following conditions:

- Damages caused by both physical and mental conditions of the operator, including alcohol, drugs, drug anesthesia, dizziness, weakness, nausea and other physical or mental conditions.
- Personal injuries or property loss caused by the operator's subjective intention, and any compensation related to moral damage followed by such condition.
- Damages caused by failure to assemble or operate the GNSS receiver in accordance with the proper guidance in this guide.
- Damages caused by refitting or replacing the original accessories or parts with that not produced by **eSurvey** so as to make the GNSS receiver operate badly.
- Damages caused by use of products not produced by **eSurvey** or imitation of our products.
- Damages caused by the operator's operation error or subjective judgment error.
- Damages caused by collision, capsizing, fire, explosion, lightning, storm, tornado, heavy rain, flood, tsunami, land subsidence, ice subsidence, avalanche, hailstorm, mudslide, landslide, earthquake, etc.
- Damages caused by using unauthorized chargers.
- Losses caused by illegal operations (not compliant with the local regulation and legislation requirements).
- Damages or losses resulting from installation or operation not in accordance with the precautions and instructions in this user guide.
- A change of data, loss of data, etc.
- Wrong transportation.
- Use of non-original parts.
- Usage not explained in the user guide.
- Any purpose other than the intended purpose.

2 eRTK 60 at a Glance

The **eRTK60 Full-Featured Visual GNSS Receiver** (hereinafter referred to as **eRTK60**) main body is designed with magnesium alloy material to provide durable usage and better heat dispersion. And when it's fully charged, it can continuously work for 10 hours as UHF base and 17 hours as rover and with dual batteries.

Its visual survey technology enables you to measure the point without physically reaching the point which improves flexibility in the field and maximises productivity.

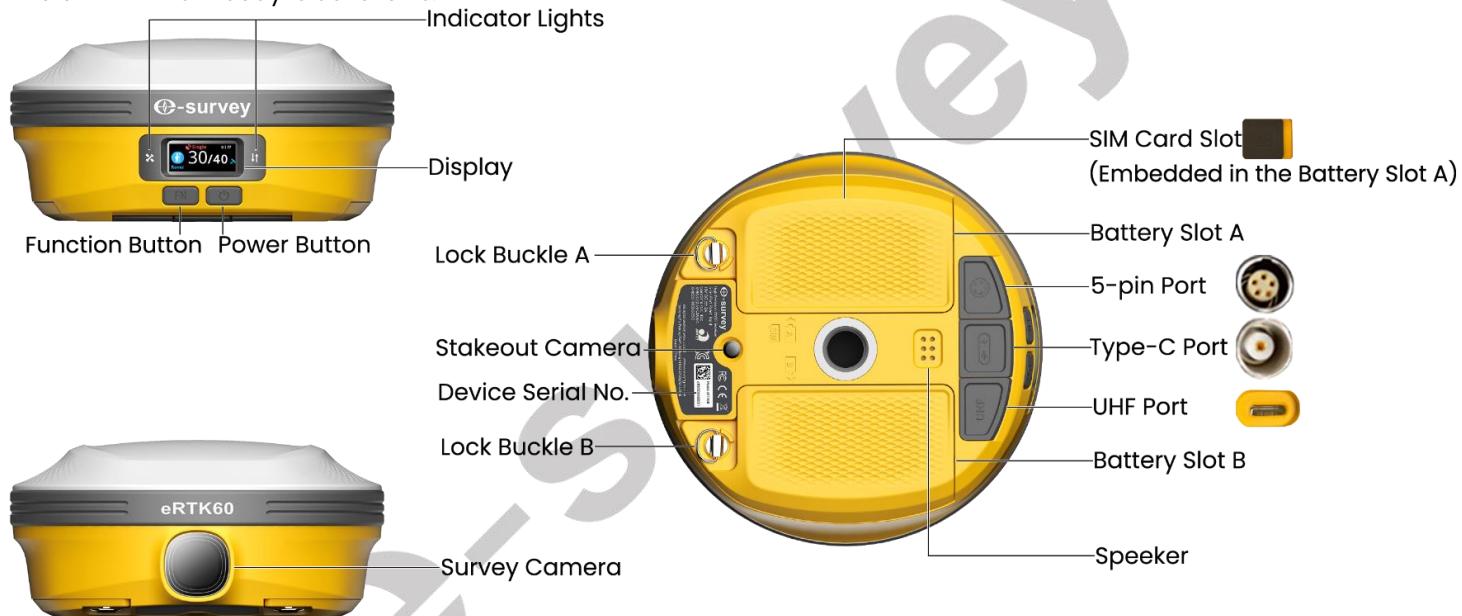
It also supports immersive AR stakeout which makes the stakeout more convenient and improves the working efficiency.

It is integrated with the TRM230 built-in radio which supports standard radio protocols and FARLINK/Geotalk_Ultra/elink_Ultra which achieves a maximum communication range of 15 km with 2W transmitting power in urban environments.

It is equipped with a symmetric battery compartment and hot-swappable battery power system which ensures continuous operation and eliminates downtime due to power issues.

2.1 Appearance

The eRTK60 main body is as follows:



2.2 Power Button

Through the power button, you can achieve the following:

- Power on the receiver: long press the button until you hear the beep sound and release it. All indicator lights will be on. After the receiver is initialized, the screen will light up.
- Power off the receiver: long press the button, 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 and release it until you hear the voice *Power off?*, and long press the button until you hear the voice *Self-check*.

2.3 Function Button

Through the function button, you can switch the working mode, including rover, base and static.

2.4 Indicator Lights

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

-  Satellite status
 - Off: no receiving satellites.
 - Green: fixed solution.
 - Flashing green: have the solution but not fixed.
 - Flashing red: receiving satellites without solution status.
 - Flashing red and green alternately: the mainboard abnormal.
-  Datalink/Bluetooth status

Datalink status:

- Green: datalink connected, but no data transmitted.
- Flashing green: data in transmitting.
- Flashing blue: recording the raw data in static mode.

If the collecting interval is greater than 1 second, it flashes according to the set static collecting interval. Otherwise, it flashes at 1 second intervals.

Bluetooth status:

- Green: no Bluetooth communication with the handheld.
- Blue: Bluetooth communication with the handheld normal.
- Flashing blue: Bluetooth connected and the data in transmitting.

2.5 Display

Through the main display of the eRTK60, you can know the following:



- Solution status:
 -  : single solution.
 -  : fixed solution.
 -  : no solution status.
- Working mode:
 -  : rover mode.
 -  : base mode.
 -  : static mode.

To switch to the target working mode, do the following:

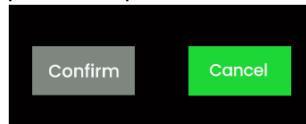
- a. Power on the receiver:



b. To enter the display of working mode selection, press the function button:



c. To select a working mode, press the function button to switch to the target working mode, and press the power button:



d. To confirm your selection, press the function button to switch to **Confirm** selection, and press the power button.

The display returns to the main display, and the target mode shows in the main display.

- Satellite status:



- 30 indicates the number of satellites used.
- 40 indicates the number of satellites tracked.

2.6 Camera

There are two cameras:



- Survey camera
- Stakeout camera

Through the cameras, you can achieve the following operations:

- Visual survey: it is used to obtain coordinates of target point by observing and analyzing images captured by camera.
- AR stakeout: it is used to guide you to find the targets based on prompts from the actual scene.
- CAD AR stakeout: it is used to guide you to find the stakeout target by integrating CAD drawings directly into the stakeout interface.
- Points library stakeout: it is used to select multiple points from the points library and tap target point on the interface to do AR stakeout.

2.7 Speaker

Through the speaker, you can hear including but not limited the following:

- Power on the receiver: *please press the power button to connect the computer.*
- Power off the receiver: *power off?*
- Check the current mode: *rover Bluetooth/static recording/base Bluetooth.*
- Switch to the the static mode: *static, start recording.*
- Set the Bluetooth:*Bluetooth connected/Bluetooth disconnected.*
- Do the self check :*self check, GPS selfcheck ok, radio selfcheck ok, network selfcheck ok, Wi-Fi selfcheck ok, Bluetooth selfcheck ok, sensor selfcheck ok, base/rover/static.*

2.8 Battery Slot

There are two battery slots.

The dual battery slot design makes it possible to replace battery without interrupting the working. It is recommended to remove batteries if the receiver is not in use for a long time.

To insert a battery, do the following:

1. Turn the lock buckle A / B to unlocked status.
2. Remove the cover of battery slot A / B.
3. Insert the battery and slide it as follows:



4. Put the cover back, and turn the lock buckle A / B to locked status.

The battery is installed successfully when the battery level shows in the display of the receiver.

To charge the battery, see [Charge the Batteries](#) for details.

2.9 UHF Port

The UHF port is used to connect a UHF antenna.

The receiver is equiped with a UHF antenna (QT440A) with frequency from 430 MHz to 450 MHz. Alternatively, you can select other eSurvey models of UHF antennas:

- QT410A: 410~430MHz
- QT450A: 450~470MHz
- QT400-T: 410~470MHz

The UHF antenna and the built-in radio (transmission) work together, so as to strengthen the signal of the built-in radio.

The built-in radio is 1/2 W. You can freely select low(1W) and high(2W) transmission power through the [Working Mode Setting](#) interface of Web UI. The radio supports 8 channels and frequencies from 410 MHz to 470 MHz.

Channels 1 to 7 respectively correspond to frequencies 441 MHz to 447 MHz, and channel 8 is customized:

The supported radio protocols include TrimTalk 450S, PCC-GMSK,PCC-4FSK, Satel, Satel_ADL, HITARGET, HZSZ, Trimmark III, South, GEOTALK, GEOMARK, PCCFST, PCCFST_ADL, FARLINK, Geotalk_Ultra, and elink_Ultra.



Note Some of the protocols may require firmware updating.

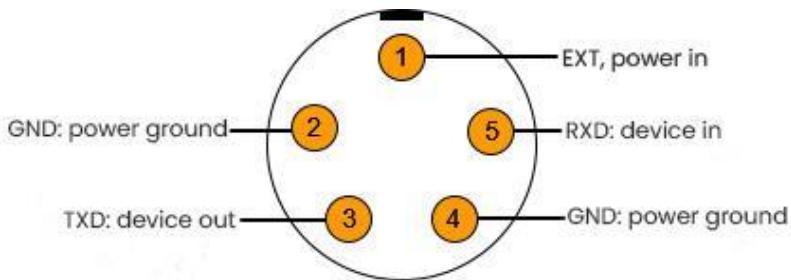
2.10 Type-C Port

Through the type-C port, you can transmit the data.

2.11 5-pin Port

Through the 5-pin port, you can connect an external radio and external power.

The pin definition is as follows:



2.12 SIM Card Slot

To use the device internet, you can insert the SIM card in the SIM card slot.



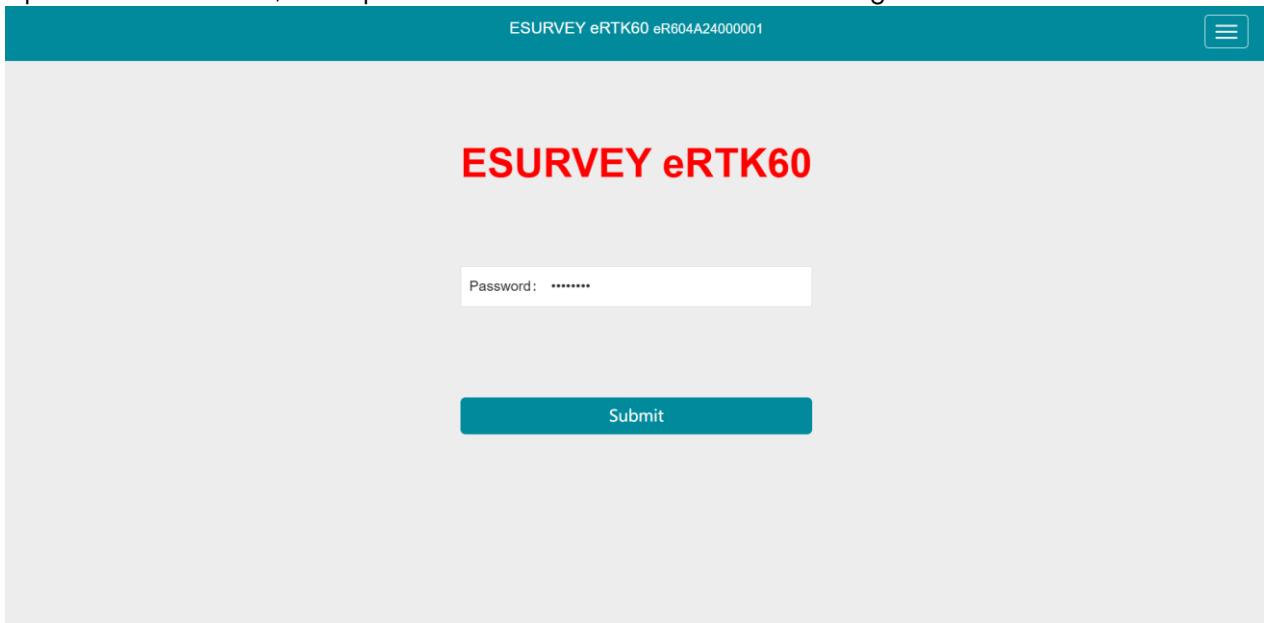
3 Web UI

The receiver Wi-Fi can be used as a hotspot. You can connect to the hotspot with your PC, smartphone, handheld or tablet.

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

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

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



3. **Optional:** To change the language of the web UI, the language in display of the receiver, and the language of the speaker in receiver, click  at the top right corner and select the target language. The supported languages include Chinese, English, Korean, Portuguese, Russian, Turkish, and Japanese. English is the default language.



Note

You can freely change the language of the receiver in every interface of the web UI at the top right corner.

4. Enter the password: password.
5. Click **Submit**. The main interface (**Position** interface) of the web UI shows:

ESURVEY eRTK60 eR604A24000001

English ▾
male voice
female voice

Status

Position

Datalink

Satellites

Information

Settings

- System Mode: Rover [Recording] Stop Record
- Longitude: 121.530227195 °
- Latitude: 31.084319478 °
- Height: 64.803 m
- Status: Single
- Satellites: 30 [GPS: 6, BeiDou: 15, GLONASS: 3, Galileo: 6]
- PDOP: 1.361
- HDOP: 0.748
- TDOP: 0.931
- HRMS: 2.655
- VRMS: 2.569
- Local Time: 2024-12-25 17:46:54
- UTC Time: 2024-12-25 09:46:54

[Working Mode](#)

[Satellite Settings](#)

[Device Configuration](#)

[NMEA Message](#)

[View Logs](#)

[Configuration Set](#)

Download

Raw Data

Backup Data

Management

6. **Optional:** To change the gender for broadcasting, click **male voice** or **female voice** at the top of the corner.

Note You can freely change the gender in every interface of the web UI at the top right corner.

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3.1 Position

In the **Position** interface, you can view the following:

ESURVEY eRTK60 eR604A24000001
English ▾
male voice
female voice

Status
▼

- System Mode: Rover [Recording] Stop Record
- Longitude: 121.530227195 °
- Latitude: 31.084319478 °

Position
▼

- Height: 64.803 m
- Status: Single
- Satellites: 30 [GPS: 6, BeiDou: 15, GLONASS: 3, Galileo: 6]

Datalink
▼

- PDOP: 1.361
- HDOP: 0.748
- TDOP: 0.931
- HRMS: 2.655
- VRMS: 2.569

Satellites
▼

- Local Time: 2024-12-25 17:46:54
- UTC Time: 2024-12-25 09:46:54

Information
▼

- Device Configuration
- NMEA Message
- View Logs
- Configuration Set

Settings
▼

- Working Mode
- Satellite Settings
- Device Configuration

Download
▼

- Raw Data
- Backup Data

Management
▼

- System mode: including rover, base and static.
- Stop record: to stop the current work of the receiver.
- Coordinates: including longitude, latitude, and height.
- Solution status: including single, float, DGNSS, fixed, and PPP Fixed.
- Satellite number: the number of the satellites used, the type of the satellites, and the number of satellites used for each type including GPS, BeiDou, GLONASS and Galileo.
- PDOP
- HDOP
- TDOP
- HRMS
- VRMS
- Local time
- UTC time

3.2 Datalink

In the **Datalink** interface, you can view the current datalink:

- When the **Current Datalink** is set to **UHF**, you can view and set the channel and radio protocol. See [UHF Setting in Current Datalink](#) for details.

ESURVEY eRTK60 eR604A24000010

English ▾ male voice female voice

Status 

Position

Datalink

Satellites

Information

Settings 

Working Mode

Satellite Settings

Device Configuration

NMEA Message

View Logs

Configuration Set

Download 

Raw Data

Backup Data

Management

UHF:

- Channel: [441.0 MHz]
- Radio Protocol:
- Radio Power:

Channel Detection

Channel Detection: to view the channels and frequencies.



- When the **Current Datalink** is set to **Network**, you can view the current datalink type - Network. See [Network Setting in Current Datalink](#) for details.

ESURVEY eRTK60 eR604A24000010

English male voice female voice

Status Position Network: Connect Disconnect Restart Set Parameter

Datalink

- Current Status: Transmitting
- APN: cmnet
- APN User:
- APN Password:
- Network Provider: CHINA MOBILE CMCC
- Local IP: 10.74.85.173
- Network Type: 4G
- Signal Level: 88%
- User: eR604A24000010
- IP Address/Port: 119.4.128.1/2101
- Mountpoint: JSJD_RTCM32 Get Mountpoint Change

Satellites

Information

Settings

Working Mode

Satellite Settings

Device Configuration

NMEA Message

View Logs

Configuration Set

Download

Raw Data

Backup Data

Management



- When the **Current Datalink** is set to **Bluetooth**, you can view the current datalink type - Bluetooth. See [Bluetooth Setting in Current Datalink](#) for details.

ESURVEY eRTK60 eR604A24000010

English ▾ male voice female voice

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

Bluetooth:
• Current Datalink: Bluetooth



3.3 Satellites

In the **Satellites** interface, you can do the following information:

- Set the cutoff angle: to set the minimum elevation angle of a satellite relative to a GNSS receiver.
- View the tracked satellites in table or skyplot:



Note

Gray: the satellites not involved in resolution.

- In satellites table:

ESURVEY eRTK60 eR604A24000010

English  male voice female voice

Status

Position

Satellites

Information

Settings

Working Mode

Satellite Settings

Device Configuration

NMEA Message

View Logs

Configuration Set

Download

Raw Data

Backup Data

Management

Satellites Table Satellites Skyplot

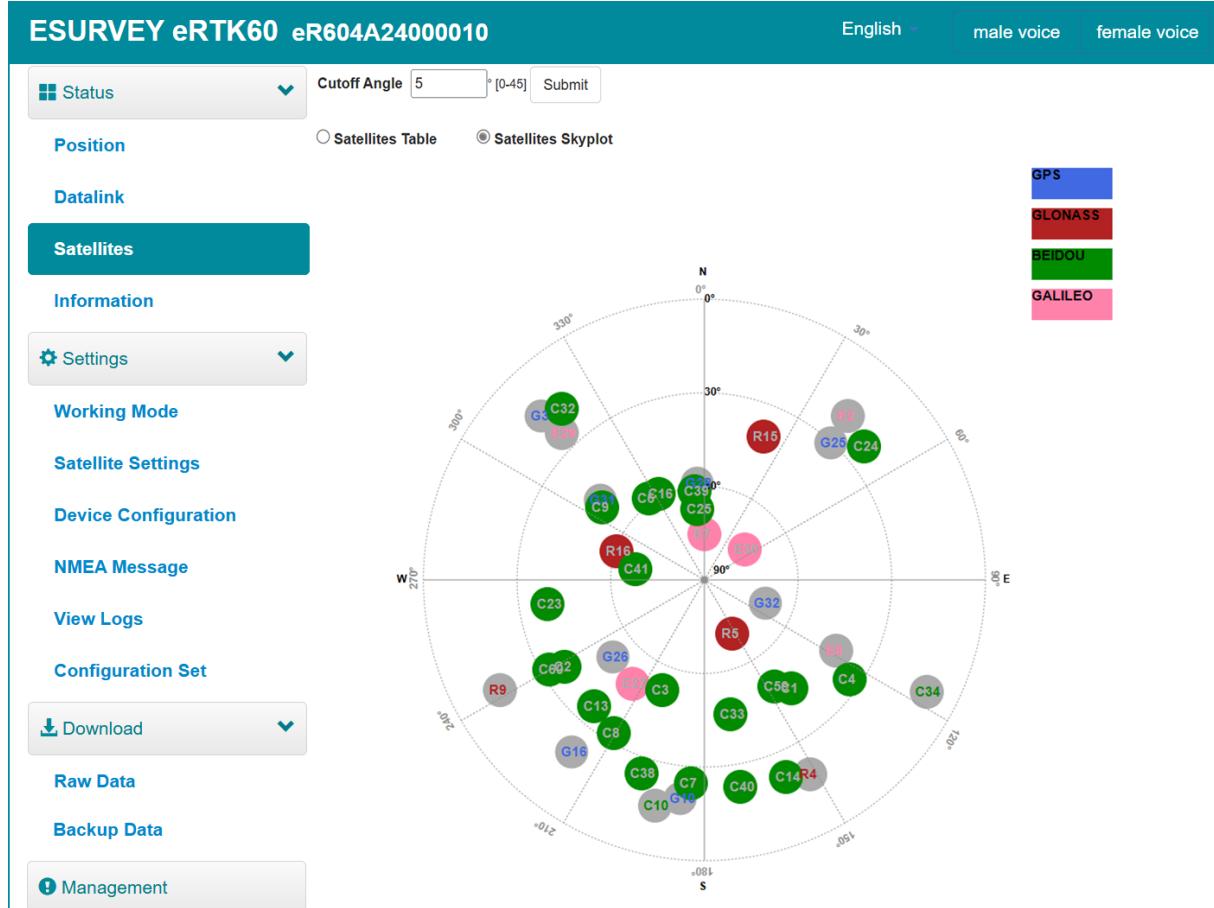
Type	Satellite number	Elev.[Deg]	Azim.[Deg]	B1/L1[dBHz]	B2/L2[dBHz]	B3/L5[dBHz]
BEIDOU	C1	45.47	141.34	39	0	33
BEIDOU	C2	37.35	238.25	35	0	31
BEIDOU	C3	52.14	200.76	39	0	34
BEIDOU	C4	33.79	124.39	36	0	32
BEIDOU	C6	58.27	324.98	40	33	36
BEIDOU	C7	24.35	183.74	34	25	29
BEIDOU	C8	33.67	210.67	35	28	31
BEIDOU	C9	49.89	304.69	39	31	34
BEIDOU	C10	15.63	192.31	31	23	26
BEIDOU	C13	36.98	221.21	38	29	32
BEIDOU	C14	22.60	157.24	35	29	34
BEIDOU	C16	58.88	331.47	42	31	34
BEIDOU	C23	38.67	260.03	41	31	37
BEIDOU	C24	24.00	49.59	38	26	35
BEIDOU	C25	67.87	352.01	45	33	41
BEIDOU	C40	22.57	170.07	37	21	29
BEIDOU	C41	67.45	279.68	47	32	38
BEIDOU	C59	49.10	146.64	44	0	34
BEIDOU	C60	32.70	239.98	41	0	31
GPS	G3	15.72	315.48	25	29	23
GPS	G10	19.97	186.48	27	29	24
GPS	G16	19.87	217.38	29	0	
GPS	G25	30.78	42.74	31	31	28
GPS	G26	51.27	229.25	35	35	31
GPS	G28	58.76	354.89	35	38	32
GPS	G29	29.15	94.09	31	30	
GPS	G31	48.00	306.85	35	34	
GPS	G32	69.52	110.16	39	38	32
GLONASS	R4	19.46	151.26	28	28	
GLONASS	R5	71.06	151.66	38	37	
GLONASS	R9	15.37	241.23	30	28	
GLONASS	R15	40.63	22.12	37	34	
GLONASS	R16	60.41	286.73	38	37	
GALILEO	E2	20.56	41.18	28	23	28
GALILEO	E7	75.03	0.06	36	31	36
GALILEO	E8	42.15	117.88	33	27	32
GALILEO	E27	49.21	214.36	34	29	33
GALILEO	E29	24.23	315.76	29	23	28
GALILEO	E30	74.00	54.17	36	31	36

Satellites Used(30): BeiDou(19), GPS(6), GLONASS(3), GALILEO(2)

Satellites Tracked(44): BeiDou(24), GPS(9), GLONASS(5), GALILEO(6)

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○ In satellites skyplot:

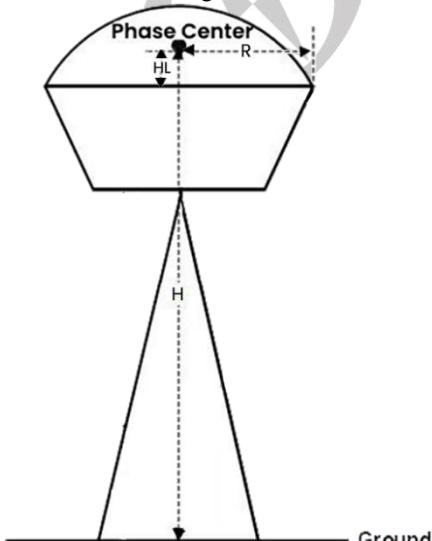


3.4 Information

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

ESURVEY eRTK60 eR604A24000010		
 Status	Receiver:	
	Device Model: ESURVEY eRTK60	Serial No.: eR604A24000010
Position	Hardware Version: V1.00	BOOT Version: 1.26
Datalink	Firmware Version: 0.26.241021	OS Version: 1.10
Satellites	MCU Version: 0.01	Sensor Version: 3.12
	Battery 1: No_Battery	Battery 2: 100%
Information	Power Source: battery	Data Memory: Internal Storage Total 5.29 GB; Free 5.21 GB
	Manufacture Date: 2024-09-14	
 Settings	Antenna: Unit: 0.1 mm	R: 770
	Antenna Type: ESVeRTK60 NONE	HL1: 239
Working Mode	H: 388	
Satellite Settings	HL2: 255	
	Network:	
Device Configuration	NETWORK Model: EG25-G	IMEI: 867652071873038
	Firmware Version: EG25GGBR07A08M2G_30.200.30.200	Local IP:
NMEA Message	Network Provider: Undefined	Network Type:
View Logs	Signal Level:	Protocol: NTRIP
	Caster Address: 119.45.59.192:2101	Mountpoint: QPDS_RTCM32
Configuration Set	UHF:	
	Radio Model: TRM230	Serial: TRM23024080010
 Download	Firmware Version: G002.00.03	Channel: 1 [441.0 MHz]
	Radio Protocol: elink_Ultra	Link Speed: 19200
Raw Data	Radio Power: HIGH	
Backup Data	IM:	
	Model: IM19	Version: IM19_H2_B2.2_A6.7_6e2109367e962f0521ac3
 Management	ID: 88066369ABC477BCF768AEA56FB9472E	Functionality: 33791
	Calibrated: YES	

- Receiver:** the information of receiver mode, serial number, hardware version, boot version, firmware version, OS version, MCU version, sensor version, battery power, power source, data memory, and manufacture date.
- Antenna:** the information of antenna type, R (unit: 0.1 mm), H (unit: 0.1 mm), HL1 (unit: 0.1 mm), and HL2 (unit: 0.1 mm). The diagram is as follows:



H: the vertical height from the phase center to the ground.

R: the radius of the external antenna.

HL1: the distance from the bottom of the antenna to the phase center of L1.

HL2: the distance from the bottom of the antenna to the phase center of L2.



Note

The distance from the bottom of the antenna to the phase centers of different frequencies, such as L1, L2, and L5. Since dual-frequency receivers are commonly used for positioning, only L1 and L2 are usually mentioned.

- **Network:** the information of network model, IMEI, firmware version, local IP, network provider, network type, signal level, protocol, caster address, and mountpoint.
- **UHF:** the information of radio model, serial number, firmware version, channel, radio protocol, and radio power.
- **IM:** the sensor related to visual survey.



3.5 Working Mode

In the **Working Mode** interface, you can configure the following information:

ESURVEY eRTK60 eR604A24000001
English 
male voice
female voice

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 Base

Current Datalink UHF Network External Bluetooth

Record Raw Data NO YES

Frequency 410-470 MHz

Radio Channel MHz Default Frequency

Radio Protocol [KHZ] bps

Save
Cancel

- **System mode:** to select the working mode, including static, rover, and base.
- **Current datalink:** to select the way of datalink, including UHF, Network, External and Bluetooth for details.
- **Record raw data:** to select whether to enable recording raw data.



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3.5.1 UHF Setting in Current Datalink

When the **Current Datalink** is set to **UHF**, you can configure the following information:

ESURVEY eRTK60 eR604A24000001
English ▾
male voice
female voice

Status

Position

Datalink

Satellites

Information

System Mode
 Static
 Rover
 Base

Current Datalink
 UHF
 Network
 External
 Bluetooth

Record Raw Data
 NO
 YES

Frequency
 410-470 MHz

Working Mode

Radio Channel

1

MHz
Default Frequency

Satellite Settings

Radio Protocol

TrimTalk 450S

Channel Spacing:25
[KHZ]

BAUD:9600

FEC:OFF

Device Configuration

View Logs

Save
Cancel

NMEA Message

Configuration Set

Download

Raw Data

Backup Data

Management

- **Frequency:** the supported frequency range of internal radio is from 410 MHz to 470 MHz.
- **Radio channel:** to select the radio channel.
- **Radio protocol:** to select the radio protocol, including TrimTalk 450S, PCC-GMSK, PCC-4FSK, Satel, Satel_ADL, HITARGET, HZSZ, Trimmalk III, South, GEOTALK, GEOMARK, PCCFST, PCCFST_ADL, FARLINK, Geotalk_Ultra, and elink_Ultra. FARLINK/Geotalk_Ultra/elink_Ultra can achieve a maximum communication range of 15 km with 2W transmitting power in urban environments.

Please make sure the channel and protocol of the base station and rover station are same when setting the UHF in receiver.

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3.5.2 Network Setting in Current Datalink

When the **Current Datalink** is set to **Network**, you can configure the following information:

ESURVEY eRTK60 eR604A24000001

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 Base

Current Datalink UHF Network External Bluetooth

Record Raw Data NO YES

Relay Mode Enable Disable

Network Link WIFI CLIENT SIM CARD NETWORK

English  male voice female voice

APN: cmnet

APN User:

APN Password:

Network Type: Auto GSM CDMA1x

Connect Mode: NTRIP 

Caster Address: 119.***.***.***

Caster Port: 2101

Mountpoint: MHSZ_RTCM32

 Get Mountpoint

Upload GGA: 5  s

User: eR604A24000001

Password:

Auto Connect: NO YES

 Save

 Cancel

- **Network link:** to select the method for connecting to the network.
 - If you use Wi-Fi, select **WIFI CLIENT**.
 - If you use SIM card, select **SIM CARD NETWORK**.
- **SSID(Wi-Fi):** to set the Wi-Fi account in if you use Wi-Fi .
- **Password:** to set the password of Wi-Fi account in if you use Wi-Fi.
- **APN:** the Access Point Name, to provide the necessary information for a receiver to connect to the Internet.
- **APN User:** to set the name of user.
- **APN password:** to set the password.
- **Network Type:** to select the network type, including Auto, GSM, and CDMA 1X. It is recommended to use Auto.
- **Connect Mode:** to select connect mode.
- **Caster Address:** to set the caster address of CORS.
- **Caster Port:** to set the port of CORS.
- **Get Mountpoint:** to get the latest mount-point list.
- **Upload GGA:** to set the time interval for uploading GGA data.
- **Auto Connect:** to select whether to automatically enable connecting the network.

3.5.3 External Setting in Current Datalink

When the **Current Datalink** is set to **External**, you can configure the following information:



When you use external radio antenna to receive the differential signal, select the **External** in current datalink.

ESURVEY eRTK60 eR604A24000001
English 
male voice
female voice

Status
System Mode

Static Rover Base

Position
Current Datalink

UHF Network External Bluetooth

Datalink
Record Raw Data

NO YES

Satellites
External Serial Port Baud Rate

38400 

Information
Save 
Cancel 

Settings
Working Mode

Working Mode
Satellite Settings

Device Configuration
NMEA Message

View Logs
Configuration Set

Download
Raw Data

Raw Data
Backup Data

Management

External serial port baud rate: to select the corresponding external serial port baud rate of the external radio antenna.



3.5.4 Bluetooth Setting in Current Datalink

When the **Current Datalink** is set to **Bluetooth**, you can check your setting (Bluetooth as the current datalink):

ESURVEY eRTK60 eR604A24000001

English male voice female voice

Status	System Mode <input type="radio"/> Static <input checked="" type="radio"/> Rover <input type="radio"/> Base
Position	Current Datalink <input type="radio"/> UHF <input type="radio"/> Network <input type="radio"/> External <input checked="" type="radio"/> Bluetooth
Datalink	
Satellites	Record Raw Data <input checked="" type="radio"/> NO <input type="radio"/> YES
Information	<input type="button" value="Save"/> <input type="button" value="Cancel"/>

Settings

Working Mode

- [Satellite Settings](#)
- [Device Configuration](#)
- [NMEA Message](#)
- [View Logs](#)
- [Configuration Set](#)

Download

- [Raw Data](#)
- [Backup Data](#)

Management



3.6 Satellite Setting

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

ESURVEY eRTK60 eR604A24000001
English male voice female voice

Status

Cutoff Angle ° [0-45]

Position

GPS Enable Disable

Datalink

GLONASS Enable Disable

Satellites

Beidou Enable Disable

Beidou PPP

Information

Settings

Working Mode

Satellite Settings

Device Configuration

NMEA Message

View Logs

Configuration Set

RTK Timeout [2-1800]

Download

Raw Data

Backup Data

Management

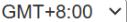
- Set the cutoff angle: to set the minimum elevation angle of a satellite relative to a GNSS receiver.
- Configure the satellites to be used, including GPS, GLONASS, Beidou, GALILEO, QZSS, SBAS and IRNSS.
- Set the RTK timeout: to set the duration of maintaining a fixed solution status when satellite signal is lost.



3.7 Device Configuration

In the **Device Configuration** interface, you can configure the following:

ESURVEY eRTK60 eR604A24000001
English 
male voice
female voice

Status
Time Zone  GMT+8:00

Position
Sensor  Disable

Datalink
Speaker  Enable Disable

Satellites
Base Alert  Enable Disable

Information
Network Enable  Enable Disable

Settings
WIFI Hotspot Share Network  Enable Disable

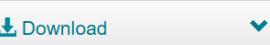
Working Mode
Static File Naming Way  RINEX 3.02 RINEX 2.11

Device Configuration
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)

NMEA Message
Base Transmission site info  Enable Disable

View Logs
Save  Cancel

Configuration Set
Download 

Raw Data
Management 

Backup Data

- **Time zone:** to set time zone.
- **Sensor:** to select whether to enable IMU sensor when you need to use IMU tilt measurement function.
- **Speaker:** to select whether to enable speaker.
- **Base alert:** to select whether to enable base alert, which is used to send an alarm *Base moved* when the base station moves.
- **Network enable:** to select whether to enable network.
- **Wi-Fi hotspot share network:** to select whether to enable Wi-Fi Hotspot Share Network. With a SIM card inserted and it enabled, the PC, smartphone, handheld or tablet connected to the hotspot of the receiver can surf the internet by using SIM data.
- **Static file naming way:** to select the naming method of static files, including RINEX 3.02 and RINEX 2.11.
- **Wi-Fi frequency:** to select 2.4G/5G.

Note If you need to use the camera, please select 5G.

- **Base transmission site info:** to select whether to enable transmitting all the information of the receiver to the eSurvey rover station when the receiver is working as a base station.

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3.8 NMEA Message

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

ESURVEY eRTK60 eR604A24000001
English 
male voice
female voice

Status
▼

Output General

Position	GGA: <input type="button" value="5HZ"/> ZDA: <input type="button" value="1HZ"/> GEDOP: <input button"="" type="button" value="1HZ"/> GSV: <input type="button" value="5S"/> GEREFL: <input button"="" type="button" value="1HZ"/> VTG: <input type="button" value="1HZ"/> GESNR: <input button"="" type="button" value="Off"/> GLL: <input type="button" value="Off"/> GEVCV: <input 10px;"="" margin-top:="" type="button" value="1HZ</input></td> </tr> </table> </div> </div> <div style="/> <div style="display: flex; justify-content: space-between;"> <div style="width: 150px; border: 1px solid #ccc; padding: 5px; margin-right: 10px;"> Settings ▼ </div> <div style="flex-grow: 1;"> <p>Record NMEA <input type="radio"/> Enable <input checked="" type="radio"/> Disable</p> <p>Upload NMEA <input type="radio"/> Enable <input checked="" type="radio"/> Disable</p> </div> </div>
----------	--

Working Mode

Satellite Settings

Device Configuration

Save
Cancel

NMEA Message

View Logs

Configuration Set

Download
▼

Raw Data

Backup Data

Management

- **Output general:** to select data types of NMEA message.
- **Record NMEA:** to select whether to enable saving the NMEA message to receiver.
- **Upload NMEA:** to select whether to enable uploading the NMEA message to the user-defined server.

You can set the **Caster Address** and **Caster Port** and enable uploading SN based on your requirements.



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3.9 View Logs

In the **View Logs** interface, you can download or view logs for troubleshooting:

ESURVEY eRTK60 eR604A24000001

English  male voice female voice

Status 

Position

Datalink 1. APP Log  

Satellites 2. OS Log  

Information

Settings 

Working Mode

Satellite Settings

Device Configuration

NMEA Message

View Logs 

Configuration Set

Download 

Raw Data

Backup Data

Management

- **App log:** the logs about App.
- **Os log:** the logs about OS.

3.10 Configuration Set

In the **Configuration Set** interface, you can do the following:

ESURVEY eRTK60 eR604A24000001

English  male voice female voice

Status		Select File	No files selected	Upload Configuration
Position	Name	Create Time		Operation
Datalink	eSurvey.cf	2024-12-25		 Download  Delete  Apply
Satellites				
Information	 Save Current Settings			
Settings				
Working Mode				
Satellite Settings				
Device Configuration				
NMEA Message				
View Logs				
Configuration Set				
 Download				
Raw Data				
Backup Data				
 Management				

- **Save current settings:** to store the current configuration settings in the receiver.
- **Select file:** to select the file of the configuration setting data stored in the computer, mobile phone, tablet, and handheld. The file should be in cf. format.
- **Upload configuration:** to upload the file of the configuration setting data in the computer, mobile phone, tablet, and handheld. The file should be in cf. format.
- **Download:** to download the current configuration setting.
- **Delete:** to delete the current configuration setting.
- **Apply:** to apply the current configuration setting.

3.11 Raw Data

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

ESURVEY eRTK60 eR604A24000010
English
male voice
female voice

Status
Select
Name
Size (MB)
Antenna Height (m)
Start Time
End Time
Operation

Position	<input type="checkbox"/>	Name	Size (MB)	Antenna Height (m)	Start Time	End Time	Convert	Download	Delete	Edit
Datalink	<input type="checkbox"/>	00102731.dat	0.013	1.800	2024-09-29 15:39:10	2024-09-29 15:39:20	Convert	Download	Delete	Edit
Satellites	<input type="checkbox"/>	00103551.dat	0.009	1.600	2024-12-20 13:50:14	2024-12-20 13:50:20	Convert	Download	Delete	Edit
Information	<input type="checkbox"/>	00103552.dat	0.045	1.600	2024-12-20 13:59:37	2024-12-20 13:59:50	Convert	Download	Delete	Edit
	<input type="checkbox"/>	selftest.log	0.001	-	-	-		Download	Delete	

Select All
Package
Delete Selected

Settings
Working Mode
Satellite Settings
Device Configuration
NMEA Message
View Logs
Configuration Set

Download
Raw Data
Backup Data
Management

- **Download:** to download raw data.
Taking the name of the raw data 00123132 as an example:
 - 0012: point name.
 - 313: the 313th day of the current year.
 - 2: the 2nd project.
- **Convert:** to convert data to RINEX format.
- **Package:** to download multiple files by checking the target files and clicking **Package**.
- **Delete/Delete Selected:** to delete the target file or selected files.
- **Edit:** to edit the information of raw data.
- **Select all:** to select all files.

3.12 Backup Data

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

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

ESURVEY eRTK60 eR604A24000001

English
male voice
female voice

■ Status

Position

Datalink

Satellites

Information

Settings

Working Mode

Satellite Settings

Device Configuration

NMEA Message

View Logs

Configuration Set

Download

Raw Data

Backup Data

Management

Select	Name	Size (MB)	Operation
<input type="checkbox"/>	20230310@20230310.RTK	0.017	Download Delete
<input type="checkbox"/>	Y20241224@Y20241224.RTK	0.005	Download Delete

Select All
Package
Delete Selected

- **Download:** to download point data.
- **Delete/Delete selected:** to delete the target file or selected files.
- **Package:** to download multiple files by checking the target files and clicking Package.
- **Select all:** to select all files.

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3.13 Management

In the **Management** interface, you can configure the following:

ESURVEY eRTK60 eR604A24000010

Status

Install New Firmware
?

Firmware Type: **HOST** ▼

Current Version: 0.26.241021

Check Update

Position

Local Upgrade

Select File
No files selected
Upload File

Satellites

Registration

Expire Date:
20250202

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

AuthCode:

Submit

Information

GNSS Registration

GNSS Functionality:
HRPT00-S10C-P ()

AuthCode:

Submit

Settings

IM Registration

Activate:
33791

Functionality:

Submit

Working Mode

Security

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

Old Password:

New Password:

Confirm Password:

Change

Format Internal Disk

Restore Factory

Self Test

Settings

- **Local upgrade:** to install new firmware.
- **Registration:** to register the receiver.
- **GNSS Registration:** to register the GNSS receiver board.
- **IM:** to register the sensor related to visual survey. It is registered in the factory settings.
- **Security:** to set password of web UI (192.168.10.1) and receiver Wi-Fi.
- **Format internal disk:** to select whether to enable formatting the internal disk in the receiver.
- **Self test:** to do self-test when the receiver fails, including radio failure, Bluetooth connection failure, restore factory settings, and so on.
- **Restore factory settings:** to restore factory settings.
- **Reset:** to restart the receiver.

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4 Basic Operations

4.1 Charge the Batteries

The receiver is equipped with two batteries and you can charge one battery or the two batteries at the same time.

You can press the battery button on the battery to check the battery level:



Number of green indicator	Battery level
4	75% - 100%
3	50% - 75%
2	25% - 50%
1	0% - 25%

It takes 4 hours to fully charge the battery:

- Red indicator in the battery: the battery is in charging.
- Green indicator in the battery: the battery is fully charged.

To charge the battery, do the following:

1. Put the charger plug on the switching adapter, and connect the switching adapter and the charger.
2. Put the battery into the charger.
3. Put the power plug into the power supply.

4.2 Connect to the External Power

Power supply from 5-pin port is supported, and the external battery within 9-28VDC is required.



Caution It cannot be used for charging. Please use the original cable provided by us.

To connect to the external power, open the cover of 5-pin port and connect one end of the power cable to the 5-pin port and another end of the cable to the external battery.

4.3 Install the Radio Antenna

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

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

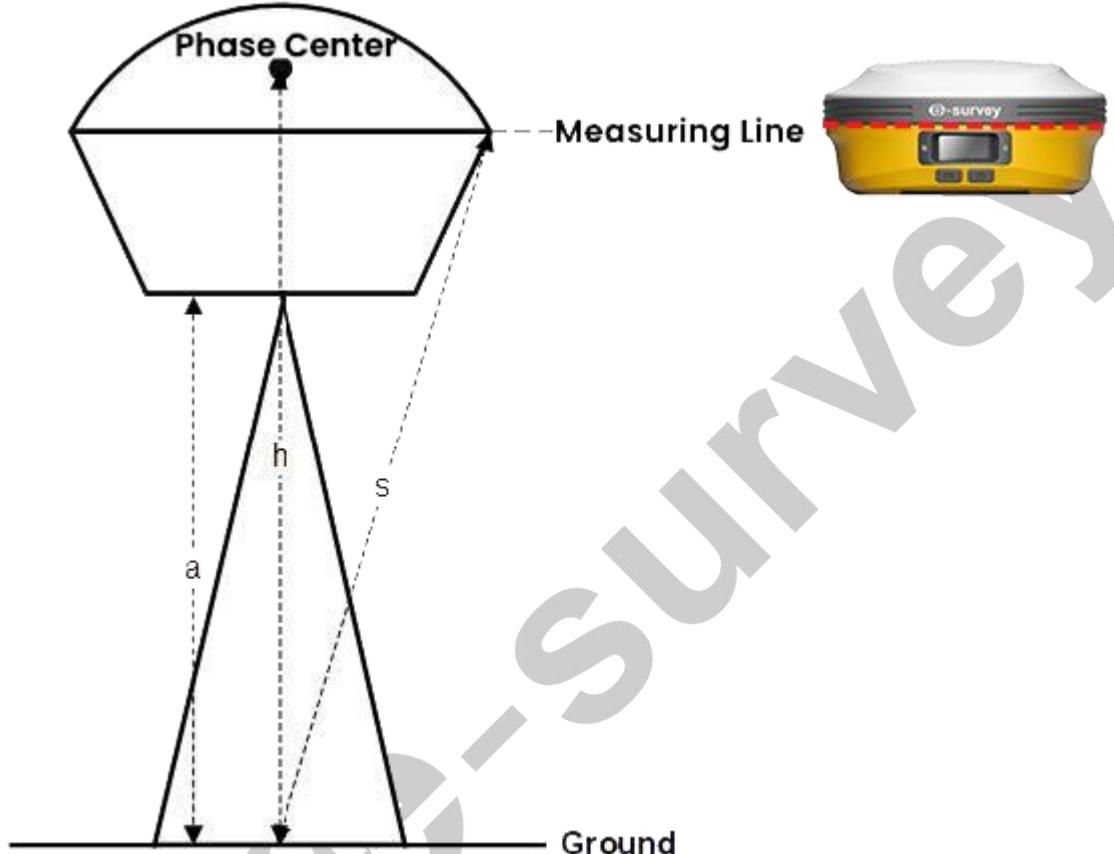
4.4 Measure Antenna Height

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 the SurPad software based on the measured height you input and measurement type you select.



Note 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 length of the pole.

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.

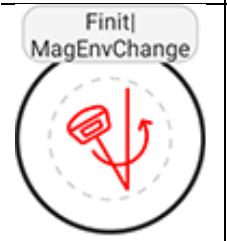
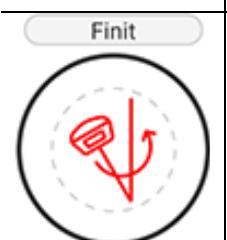
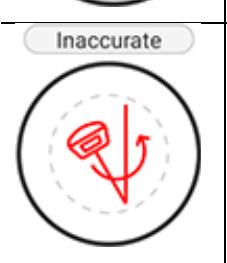
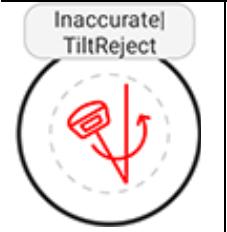
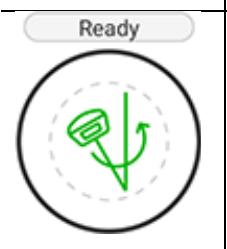
4.5 Start IMU Tilt Measurement

The receiver supports IMU tilt measurement, which is determined by the activation code and service you purchase.

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

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

To start IMU tilt measurement in the SurPad software, tap main menu **Survey**→**Point Survey** to enter **Point Survey** interface, 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 according to the prompt.
	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.

4.6 Start Visual Survey

It is used to obtain coordinates of the target point by observing and analyzing images captured by the camera.



Note The visual survey function is only applicable to the Surpad software.

Common scenarios for visual survey include:

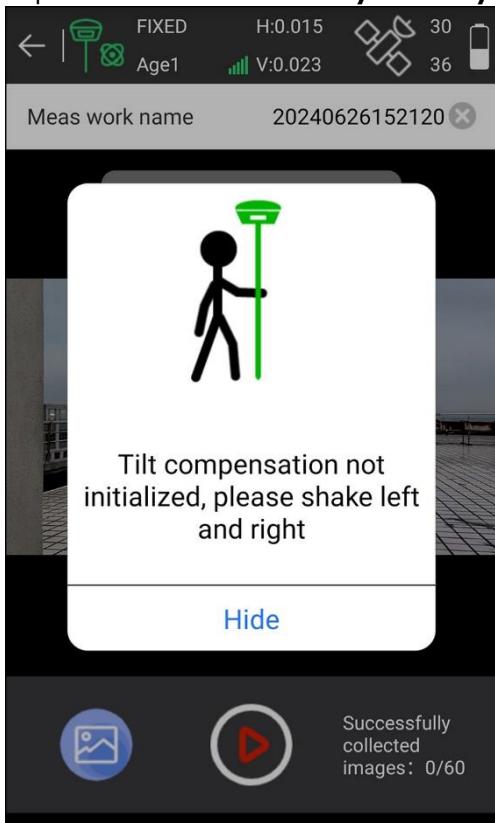
- For the environment where satellite signals are blocked.
- For non-contact measurement in hazardous, fenced areas.
- For building facade measurement, earthwork measurement, etc.
- For the supplement of ground image data with UAV air-ground integrated modelling.

Before starting visual survey, do the following:

- Select 5G instead of 2.4G in Wi-Fi. See [Device Configuration](#) for details.
- Enable the IMU tilt Measurement function. See [Start IMU Tilt Measurement](#) for details.

To start visual survey, do the following:

1. Tap main menu **Visual Survey** in **Survey** menu to enter **Visual Survey** interface:

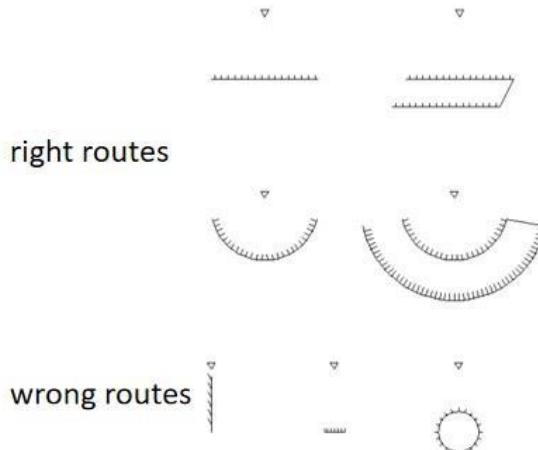


2. Keep shaking the pole according to the prompt until the tilt compensation is initialized successfully. Set the **Meas work name**.
3. Make sure the survey camera face the target point. Tap  to take photos.
4. Hold the pole stably and slowly walk around the target point according to the recommended shooting locations. The software starts continuously and automatically collecting images.

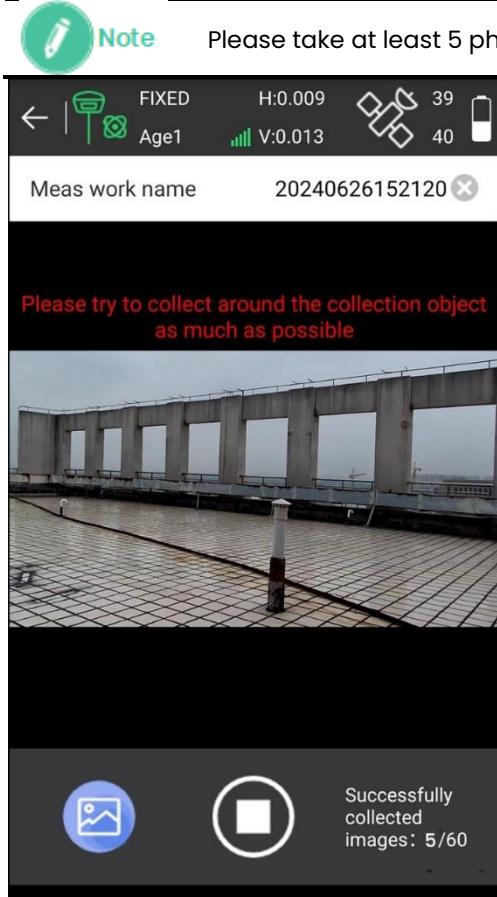


- Please do not use the target point on the object with a smooth interface or strong reflections. Otherwise, there is no solution in the result.
- To obtain the best solution, please take photos as clearly as possible and use the recommended shooting location.

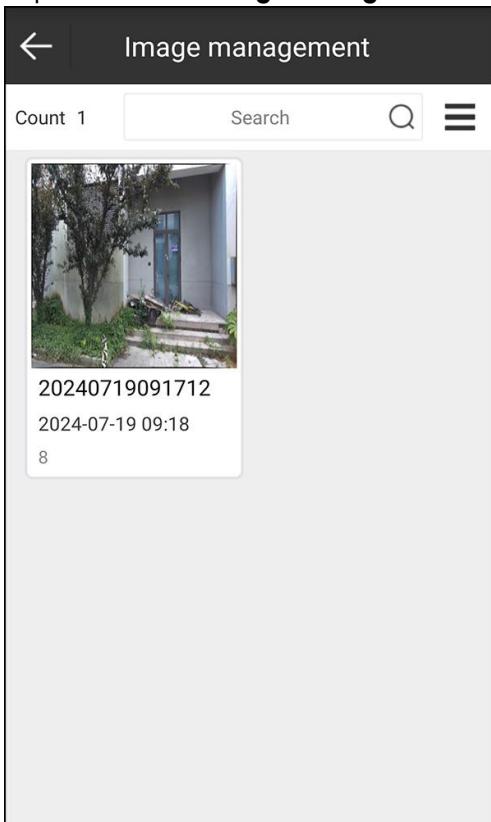
It is recommended to use the following walking route to take photos of the target object:



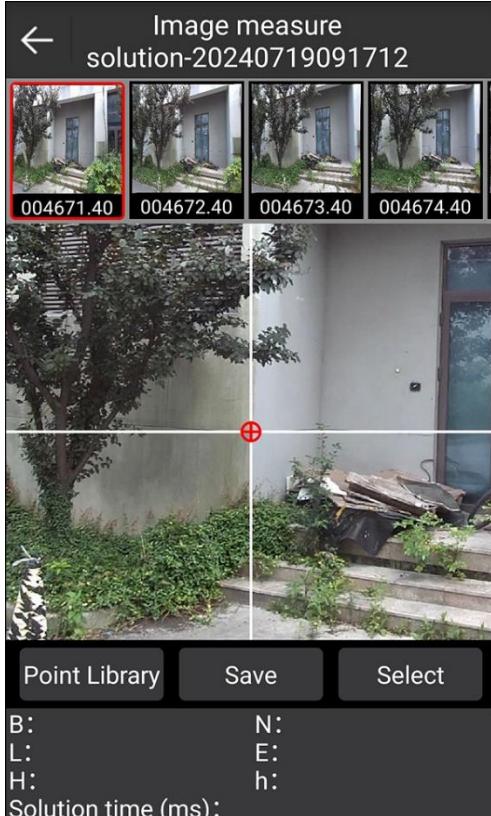
5. Tap  when you get a sufficient number of images:



6. Tap  to enter **Image Management** interface:



7. Select the image collection. Tap a point on the image based on your requirements:



8. Tap **Select**. The software automatically calculates the coordinates of the point, and the result displays at the bottom of the interface:



- When the coordinates of the target point are resolved successfully, the prompt *Solved successfully* shows.
- When the accuracy of calculated coordinates does not meet the requirement, the prompt *Success with polar line* shows.
You can mark the same position in adjacent images to recalculate the coordinates of the *target point*.
- When the calculation fails, the prompt *No solution results* shows.
The target point in the image is not distinct enough. The success rate of the calculation depends on the photography position and the quality of the image.
At this time, change the image or take new images. Then, repeat step 6 - step 8 to recalculate the coordinates of the target point.

9. Tap **Save**:

You can rename the target point based on your requirements.

New point	
Name	VR-P-20240626155209
Coordinates Type	Local Coordinate
Northing	3439871.81
Easting	359819.471
Elevation	57.694
Property type	Calculate Point

OK

10. Tap **OK**.

4.7 Start AR Stakeout

It is used to guide you to find the targets based on prompts from the actual scene. You can simply follow directions on the screen to find the targets. Compared to the traditional stakeout, you can more quickly and conveniently find the targets based on prompts from the actual scene.



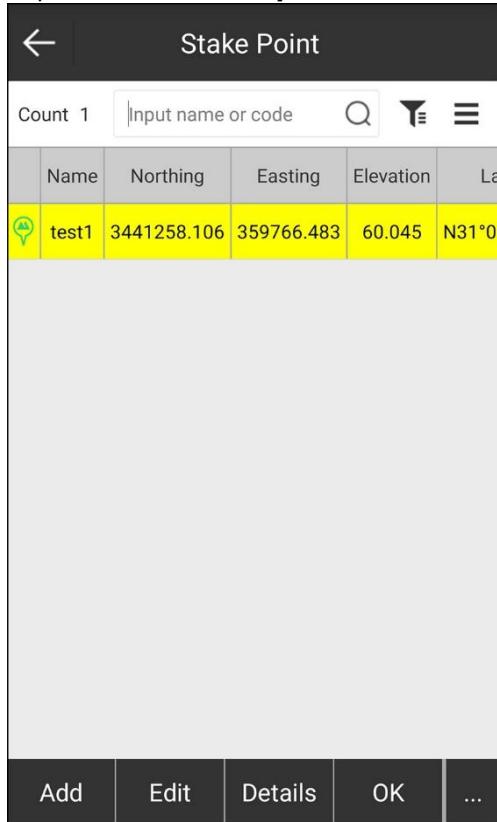
Note The AR stakeout function is only applicable to the Surpad software.

Before starting AR stakeout, do the following:

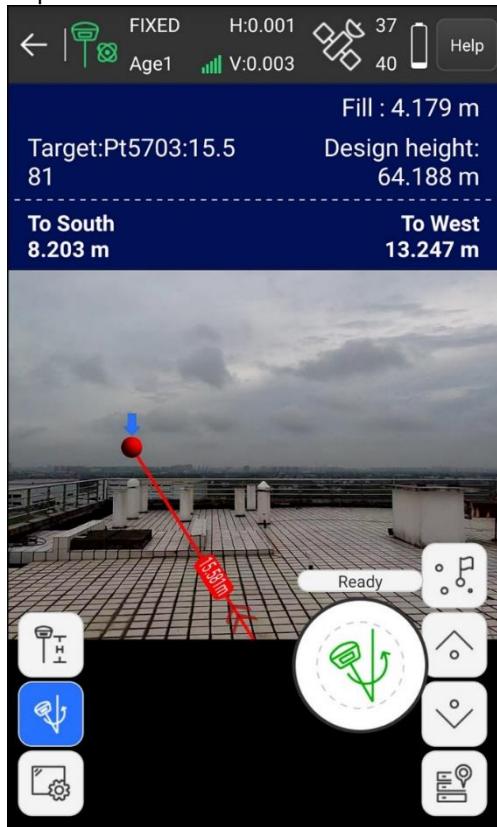
1. Select Wi-Fi as communication mode. See Set the Communication in the Surpad user guide for details.
2. Make sure the working mode is rover and the receiver is under fixed solution.
3. Enable IMU tilt measurement. See Start IMU Tilt Measurement for details.

To start AR stakeout in the Surpad software, do the following:

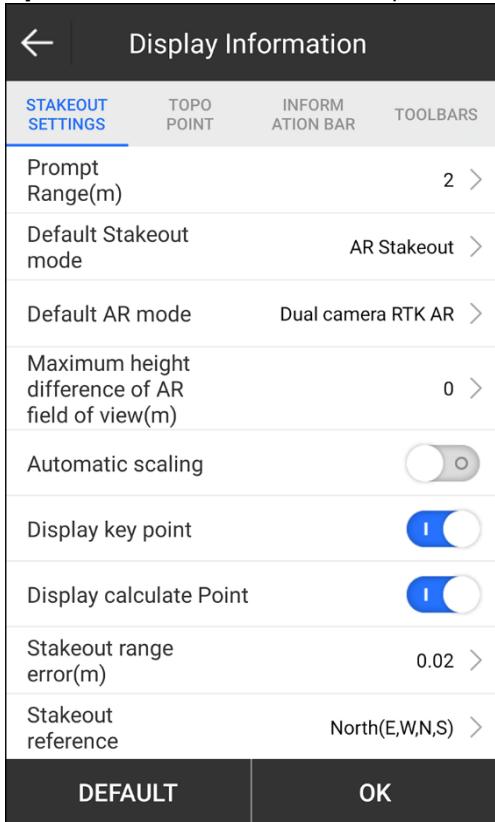
1. Tap main menu **Survey** → **Point Stakeout**. Select the stakeout point:



2. Tap **OK** to enter **AR stakeout** interface:



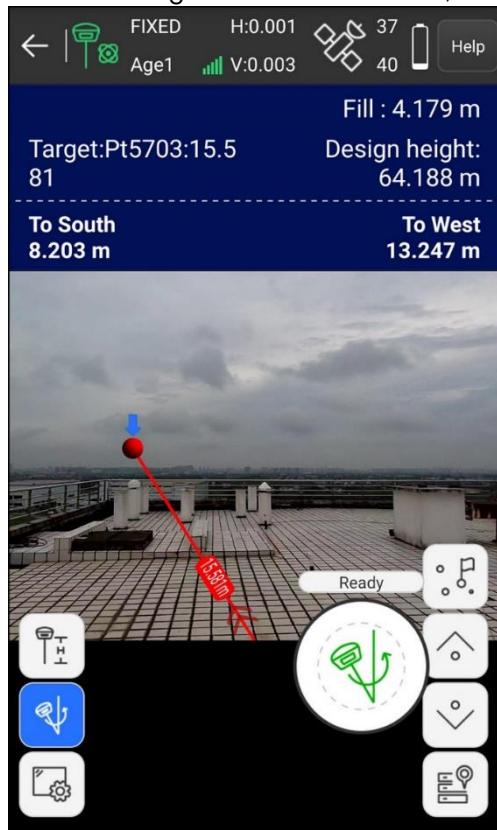
3. **Optional:** To set the AR mode, tap  to enter **Display Information** interface:



- **Close AR Prompt range:** to set the distance when the working camera changes from the survey camera to the stakeout camera during the AR stakeout.
- **Default AR mode:**
 - **Phone AR + 3D AR:** to use the camera of the phone and the 3D image generated automatically by the Surpad software.
 - **Dual camera RTK AR:** to simultaneously use the survey camera and stakeout camera of the receiver.

4. Walk slowly with the pole, making sure the direction of the handheld on the line of the direction of the red ball. Find the stakeout point according to the prompt in the interface:

a. When entering AR stakeout interface, survey camera is working. The interface is shown as follows:



b. When the distance from the handheld to the stakeout point is less than the value of prompt range, the working camera automatically switches to the stakeout camera. The interface is shown as follows:



4.8 Start CAD AR stakeout

It is used to guide the users to find the stakeout target by integrating CAD drawings directly into the stakeout interface.

The CAD AR stakeout includes CAD drawing point and point library stakeout.



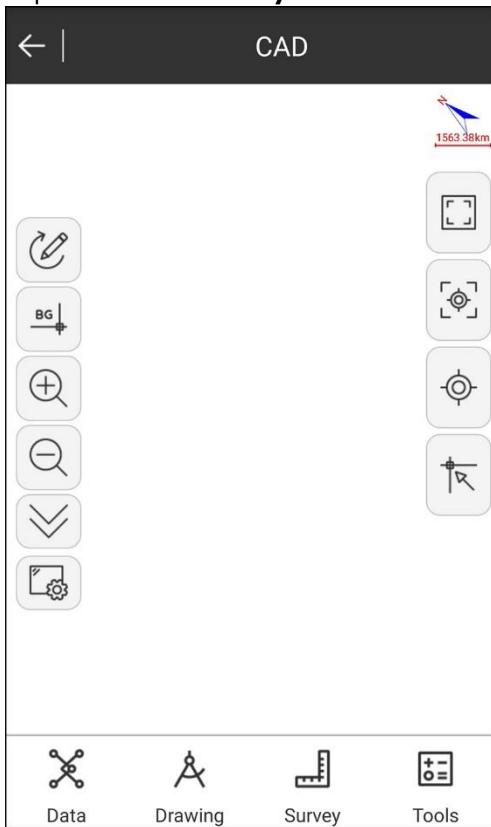
Note The CAD AR stakeout function is only applicable to the Surpad software.

Before starting CAD AR stakeout, do the following:

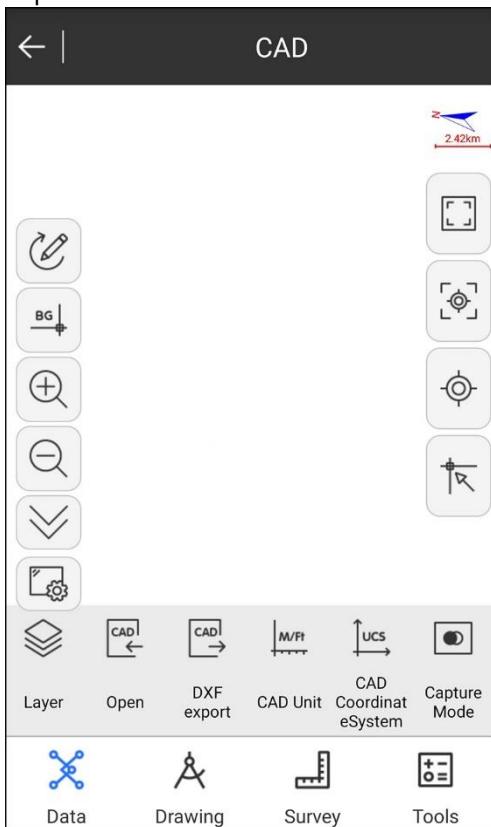
1. Select Wi-Fi as communication mode. See Set the Communication in the Surpad user guide for details.
2. Make sure the working mode is rover and the receiver is under fixed solution.
3. Enable the IMU tilt measurement function. See Start IMU Tilt Measurement for details.

To start CAD drawing stakeout, do the following:

1. Tap main menu **Survey** → **CAD** to enter **CAD** interface:

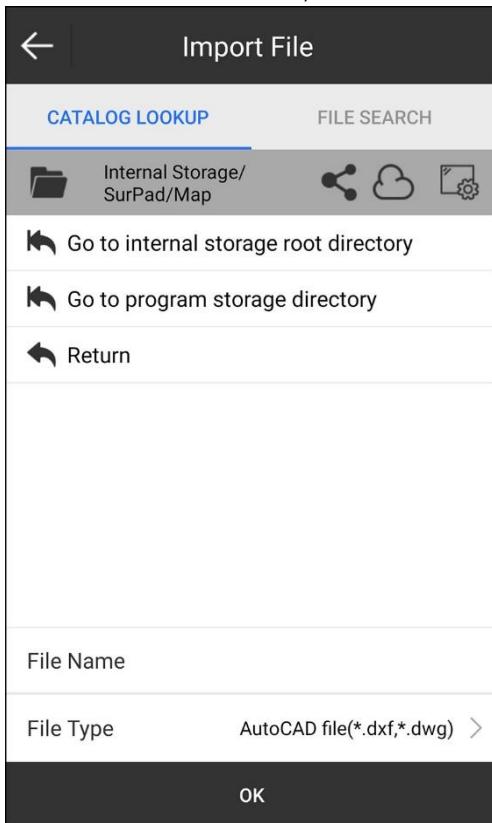


2. Tap **Data** on the bottom of the **CAD** interface:

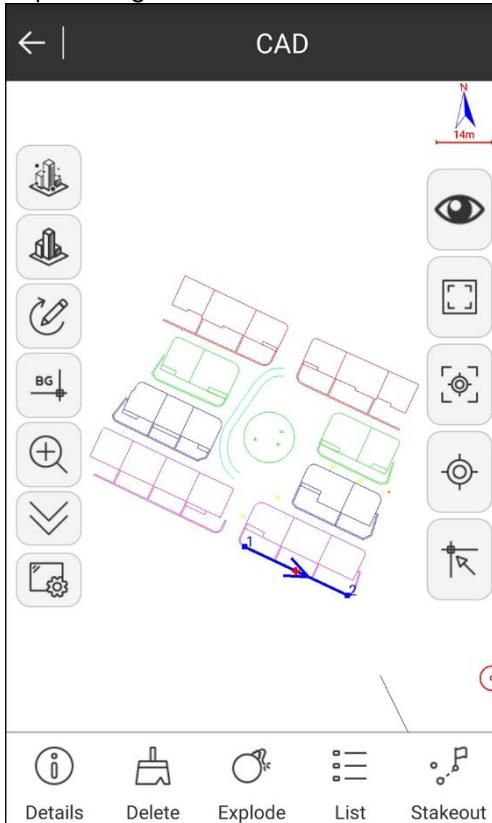


3. Tap **Open** and select the file:

The file should be in DXF*, DWG format.



4. Tap **OK** to go back to the **CAD** interface. Select the target figure on the CAD map:



5. To enter **CAD AR stakeout** interface, do one of the following:



- To enter **CAD AR stakeout** interface, tap to enter **CAD Drawing Stakeout** interface directly.
- To enter **CAD AR stakeout** interface, tap **Stakeout** to enter **Stakeout Settings** interface, then tap **OK**:



6. **Optional:** To set the AR mode, tap to enter **Display Information** interface:



Display Information

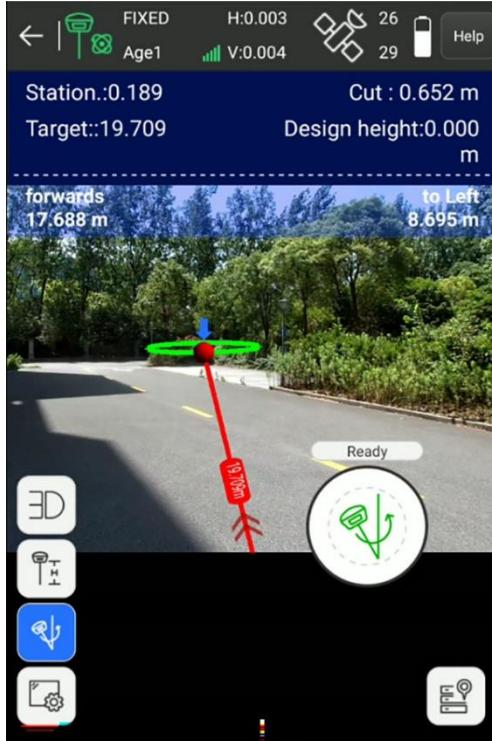
STAKEOUT SETTINGS	TOPO POINT	INFORMATION BAR	TOOLBARS
Prompt Range(m)	2 >		
Default Stakeout mode	AR Stakeout >		
Default AR mode	Dual camera RTK AR >		
Maximum height difference of AR field of view(m)	0 >		
Automatic scaling	<input type="checkbox"/>		
Display key point	<input checked="" type="checkbox"/>		
Display calculate Point	<input checked="" type="checkbox"/>		
Stakeout range error(m)	0.02 >		
Stakeout reference	North(E,W,N,S) >		

DEFAULT **OK**

- **Close AR Prompt range:** to set the distance when the working camera changes from survey camera to the stakeout camera during the AR stakeout.
- **Default stakeout mode:**
 - Phone AR + 3D AR: to use the camera of the phone and the 3D image generated automatically by the Surpad software.
 - Dual camera RTK AR: to simultaneously use the survey camera and stakeout camera of the receiver.

7. Hold the pole with the receiver and find the location of the target figure on the CAD drawing according to the prompt on the stakeout interface:

a. When entering AR stakeout interface, survey camera is working. The interface is shown as follows:



b. When the distance from the handheld to the stakeout point is less than the value of prompt range, the working camera automatically switches to the stakeout camera. The interface is shown as the follows:

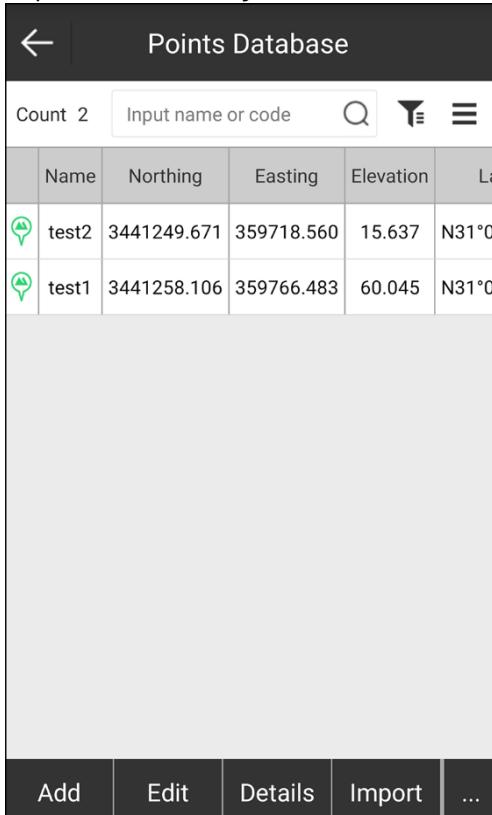


4.9 Start Points Library Stakeout

It is used to select multiple points from the points library and tap target point on the interface to do AR stakeout.

To start the points library stakeout, do the following:

1. Tap main menu **Project → Point Database** to add the target point:



	Name	Northing	Easting	Elevation	La
	test2	3441249.671	359718.560	15.637	N31°0
	test1	3441258.106	359766.483	60.045	N31°0

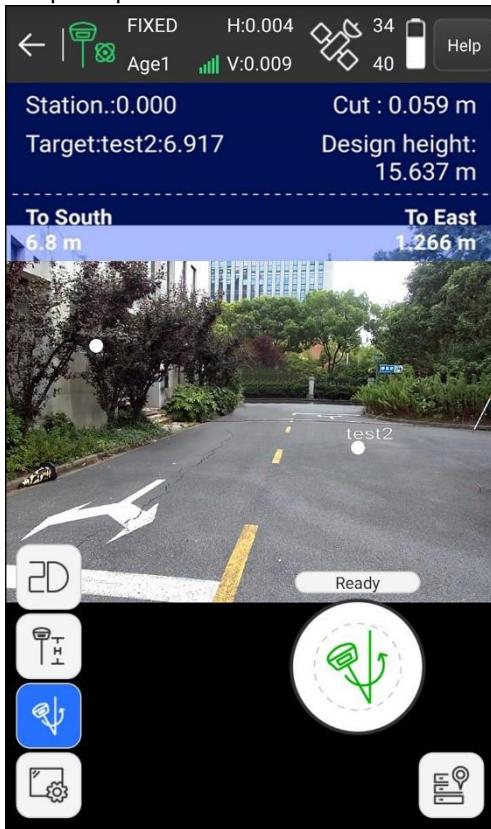
Buttons at the bottom: Add, Edit, Details, Import, ...

2. Tap main menu **Survey → CAD** to enter **CAD** interface:

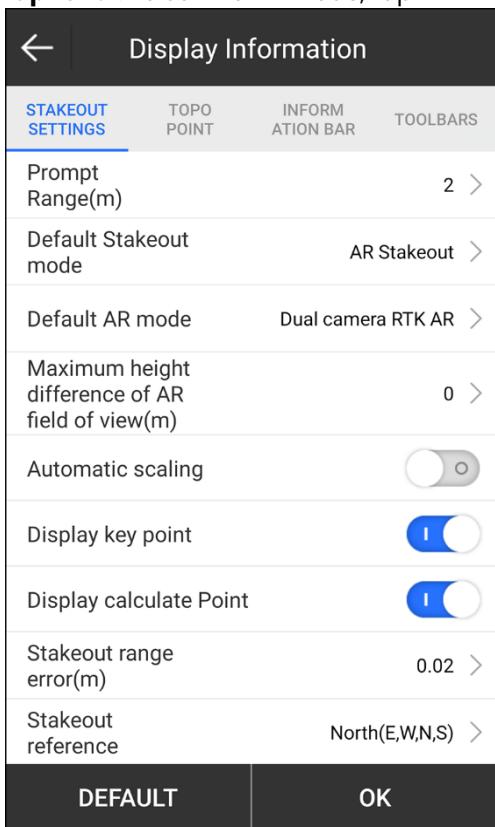




3. Tap  to enter **AR Stakeout** interface. Select the target point and find the target point according to the prompt in **AR Stakeout** interface:



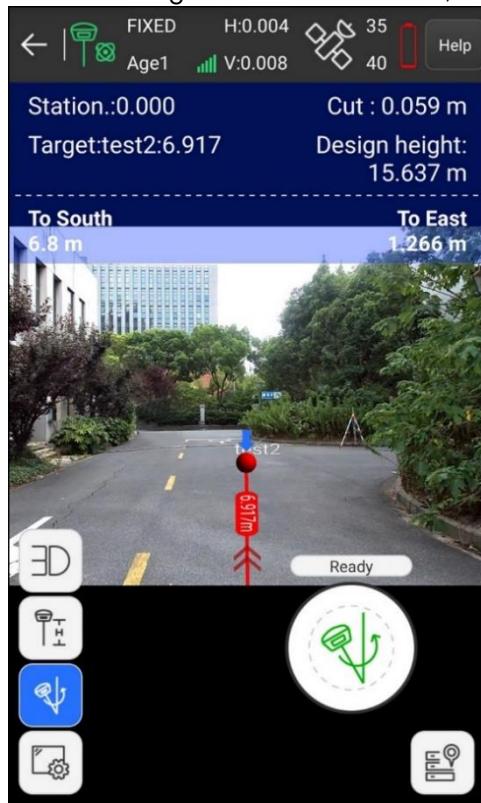
4. **Optional:** To set the AR mode, tap  to enter **Display Information** interface:



- **Close AR Prompt range:** to set the distance when the working camera changes from survey camera to the stake out camera during the AR stakeout.
- **Default AR mode:**
 - **Phone AR + 3D AR:** to use the camera of the phone and the 3D image generated automatically by the Surpad software.
 - **Dual camera RTK AR:** to simultaneously use the survey camera and stakeout camera of the receiver.

5. Tap the target point and hold the pole with receiver to find the location of the target point on the CAD drawing according to the prompt on the **AR Stakeout** interface:

a. When entering AR stakeout interface, survey camera is working. The interface is shown as follows:



b. When the distance from the handheld to the stakeout point is less than the value of prompt range, the working camera automatically switches to the stakeout camera. The interface is shown as follows:





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