SinoGNSS®
By ComNav Technology Ltd.

Jupiter Laser RTK

User Guide

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Technical Assistance

If you have any question and can't find the answer in this manual, please contact your local dealer from which you purchased the Jupiter. Alternatively, request technical support from ComNav Technology Website: *www.comnavtech.com* or technical support email: *support@comnavtech.com*. Your feedback about this Guide will help us to improve it with future revisions.

Safety Information

Before using the receiver, please make sure that you have read and understood this User Guide, as well as the safety requirements.

- Connect your devices strictly based on this User Guide
- Install the GNSS receiver in a location that minimizes vibration and moisture
- Avoid falling to ground, or colliding with other items

- Keep a sound ventilation environment
- Change the cable if damaged

Related Regulations

The receiver contains integral Bluetooth® wireless technology. Regulations regarding the use of the datalink vary greatly from country to country. In some countries, the unit can be used without obtaining an end-user license. But in some countries the administrative permissions are required. For license information, please consult your local dealer.

Use and Care

The receiver can withstand the rough treatment that typically occurs in the field. However, the receiver is high-precision electronic equipment and should be treated with reasonable care.

Warning and Caution

An absence of specific alerts does not mean that there are no safety risks involved. A Warning or Caution information is intended to minimize the risk of personal injury and/or damage to the equipment.

WARNING- A Warning alerts you to a potential risk of serious injury to your person and/or damage to the equipment, because of improper operations or wrong settings of the equipment.
CAUTION- A Caution alerts you to a possible risk of damage to the equipment and/or data loss.

Warranty Notice

ComNav Technology does not warranty devices damage because of force majeure (lighting, high voltage or collision).
ComNav Technology does not warranty the disassembled devices.

FCC Warning

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 inte rference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE: 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 interferenceto 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

Contents

1. Introduction

The SinoGNSS Jupiter User Guide is aimed to help you get familiar with the Jupiter laser RTK and start your project effectively. We highly recommend you to read this manual before surveying, even you have used other GNSS receivers before.

1.1. About the receiver

With SinoGNSS® Quantum™ algorithm, Jupiter can be applied in RTK mode with all GNSS constellations. It has ultra-small size and strong anti-interference ability to make it possible to work even in harsh environments. It is the ideal RTK/GNSS product for surveyors.

1.2. Receiver features

The SinoGNSS® Jupiter key features:

- Utra small and super light
  - Size: 13.35 cm × 6.6 cm
  - Weight:810g with internal battery
- 1668 channels of simultaneously tracked satellite signals
- Increased measurement traceability with SinoGNSS® Quantum™ algorithm technology
- Able-free Bluetooth wireless technology
- 2 LEDs, indicating Satellites Tracking and RTK Corrections data
- 1 OLED Display and 2 Function buttons
- IP67 waterproof
- Calibration-free IMU integrated for Tilt Survey
- Up to 120° tilt with 2.5 cm accuracy
- Integrated 50m Laser sensor, laser with 3.5cm accuracy (5m range, ≤60° Tilt in Laser mode)
- With two cameras, surveyors gain a 3D visual view in topo survey and stake work.
- Support SBAS and PPP service
- Support NFC Fast Connection
- Support super datalink, supports a number of protocols, including Transparent /TT450S/South/Mac/SNLonglink. With SNLonglink, 5-15km working range is achievable under ideal conditions.
- Support long baseline E-RTK™ (Beidou B3 signal is included in RTK calculate engine)

1.3. Jupiter parts list

This section provides overall Jupiter parts list, including basic supplies and customized kits based on your requirements.

1.3.1 Basic Supply kit

SinoGNSS® Jupiter Basic Supply kit contains one receivers and related accessories

Optional

Item	Picture
2* Kits Jupiter Receivers	
1*GNSS Connector	
1*Charger adapter (EU/USA/UK)	
1*USB—Type-C cable	
2* Whip Antenna (UHF)	
1*2m-Range Pole with yellow bag	

Accessories:

Item	Picture
R60 Controller	
Controller Battery, Charger and Cable	
Controller Bracket	
Double Bubbles Tribrach with High Adapter	
1* 30cm Extension bar	

2. Setting up the receiver

This chapter provides general information on environmental requirements, setup, power supply and connection of the Jupiter.

2.1. Environmental requirements

To keep the receiver with a reliable performance, it is better to use the receiver in safe environmental conditions:

- Operating temperature: -40°C to 65°C
- Storage temperature: -40°C to 85°C
- Out of corrosive fluids and gases
- With a clear view of sky

2.2. Laser & Cameras Specification

To keep the laser with a reliable performance, It is better to use Jupiter in the conditions that meet the specifications:

Laser specification

- Range: 50m
- Accuracy(room temperature): (3-5)mm + 1ppm
- Measuring Frequency: Classic Value: 3Hz
- Maximum Value: 5Hz
- Laser Injection Power: 0.9mW to 1.5mW
- Working Temperature: -20°C to +50°C
- Storage Temperature: -30°C to +60°C

Cameras specification

- Sensor pixels: 2 cameras with 2 MP global shutter
- Field of view: 75°
- Video frame rate: 30 fps

Image group capture:

- Method: video photogrammetry.
- Rate: typically 2 Hz, up to 25Hz
- Max capture time: 60s with an image group size of 60MB

2.3. Front panel

Receiver front panel contains 2 buttons, Power button and Record button. The LEDs display shows the status of differential, satellite tracking, WIFI/GPRS and battery. For detailed information, see 3.2.

2.4. Lower housing

Receiver lower housing contains a type-c port, UHF radio antenna connector and a threaded insert.

2.5. Power supply

Jupiter supports internal battery and external power input.

2.5.1 Internal battery

The Jupiter receiver adopts the rechargeable Lithiumion battery design that provides you an effective survey workflow. The internal battery typically provide about 16-hour operating time as a rover. However, this operating time varies based on environmental conditions

- Battery Safety

Charge and use the battery only in strict accordance with the instructions below:

- Do not use or charge the battery if it appears to be damaged. Signs of damage include, but are not limited to, discoloration, warping, and leaking battery fluid.
- Do not expose the battery to fire, high temperature, or direct sunlight.
- Do not immerse the battery in water.
- Do not use or store the battery inside a vehicle during hot weather.
- Do not drop or puncture the battery.
- Do not open the battery or short-circuit its contacts.

- Charging the Lithium-ion Battery

Please obey the following instructions when charging your batteries:

- Charge the battery completely before using it for the first time.
- Fully charge takes approximately 6 hours per battery at room temperature.
- If the battery has been stored for a long time, charge it before your field work.
- Re-charge the battery at least every three months if it is to be stored for long time.

- Dispose of the Lithium-ion Battery
  - Discharge a Lithium-ion battery before dispose of it.
  - Dispose of batteries is an environmentally sensitive manner, and adhere to any local and national regulations concerning battery disposing or recycling.

WARNING – Do not damage the rechargeable Lithium-ion battery. A damaged battery can cause an explosion or fire, and can result in personal injury and/or property damage.

2.5.2 External Power Supply

The receiver is connected to an external power supply through a Type-C cable, and make sure that use an external power supply with the correct voltage of Jupiter, such as a 5-9V power bank. Over-voltage function cannot protect your Jupiter if reverse connection.

Tip: The power consumption will be increasing if the base station transmits correction data through internal UHF in the RTK mode; therefore, we strongly suggest using external power (power bank) for the base station

2.5.3 Charge Battery via Jupiter

Jupiter GNSS Receiver can work with a Type-C charger, it means you can charge batteries directly.

- Power off Jupiter receiver with batteries inside;
- Connect Jupiter receiver to 7.2V external power with serial cable;
- Receiver charge the battery, the red power led will flashing during charging and will off when battery full

2.6 Pole-mounted setup

To mount the receiver on a range pole as the figure shown below:

- Thread the receiver onto the range pole
- Mount the controller bracket to the pole
- Install the controller into the bracket

Tip: Do not tightly clamp the controller on the Range Pole.

3. General Operation

This chapter introduces all controls for the general operation, including button functions and all LED behaviors on the front panel.

3.1 Button functions

To turn off the receiver, long press the button for 3-4 seconds until all LEDs off.

There are two buttons on the front panel, power button and record button.

- Power button:

Press the power button for about 1 second to turn on the receiver;

To turn off the receiver, long press the button for 3-4 seconds until all LEDs off.

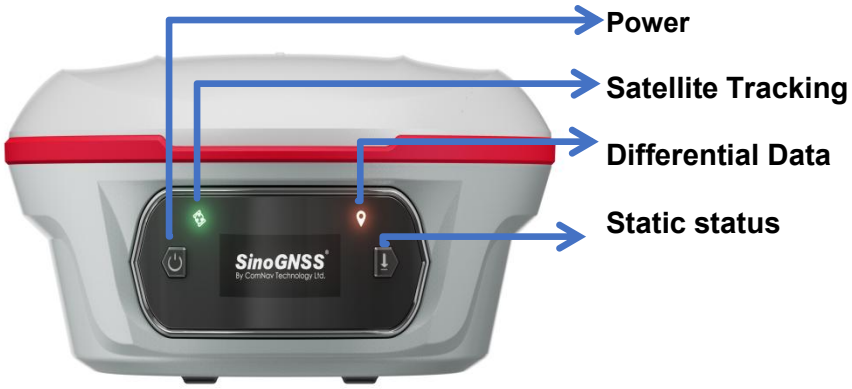
- Record button:

Switch to static mode:Long press the record button for about 2 seconds, release immediately when hearing beep from receiver;

Switch to RTK mode: press the button until Raw Data recording LED off.

3.2 LED behavior

The LEDs on the front panel indicate receiver working status. Generally, a lit or slowly flashing indicates normal operation, and an unlit LED indicates that no operation is occurring. The following table define each possible LED state:



LEDs	States	Description
Power	Lit	Enough power
	Flashing	Low power
Differential Data	Flashes once per second	Receiving/transmitting differentialdata
Satellite Tracking	Fast flashing/ Flashes 1 timeevery 5 seconds	No satellite received
	Flashes N times every 5 seconds	Received N satellite signals
Static button	Flashes according to the selectedsample interval	1) Sample interval varies from20Hz to 60s. 2) Flashing 1/s simultaneously withdifferential light if internal memory is run off

Power LED:

Power supply: 1) Two power LEDs are on if using the external power supply; 2) Only power LED of working battery will be on if using the internal battery.

Low battery: 1) Power LED will flash with beep only with one battery; 2) if with two

batteries, the power LED of low battery will flash, and swapped to another battery when it is run off.

3.3 Receiver Web GUI interface

Step 1: Connect Wi-Fi of Jupiter receiver

Turn on the Jupiter GNSS receiver and wait for the Jupiter serial number to appear under the available Wi-Fi networks on your smart phone or office computer.

For example, Jupiter-J81LXXXXX (where xxxxx represents the last five digits of the receiver serial number).

Enter password: **12345678**

Step 2: Login the Web

Select the receiver, open a web browser and then enter the following IP address:

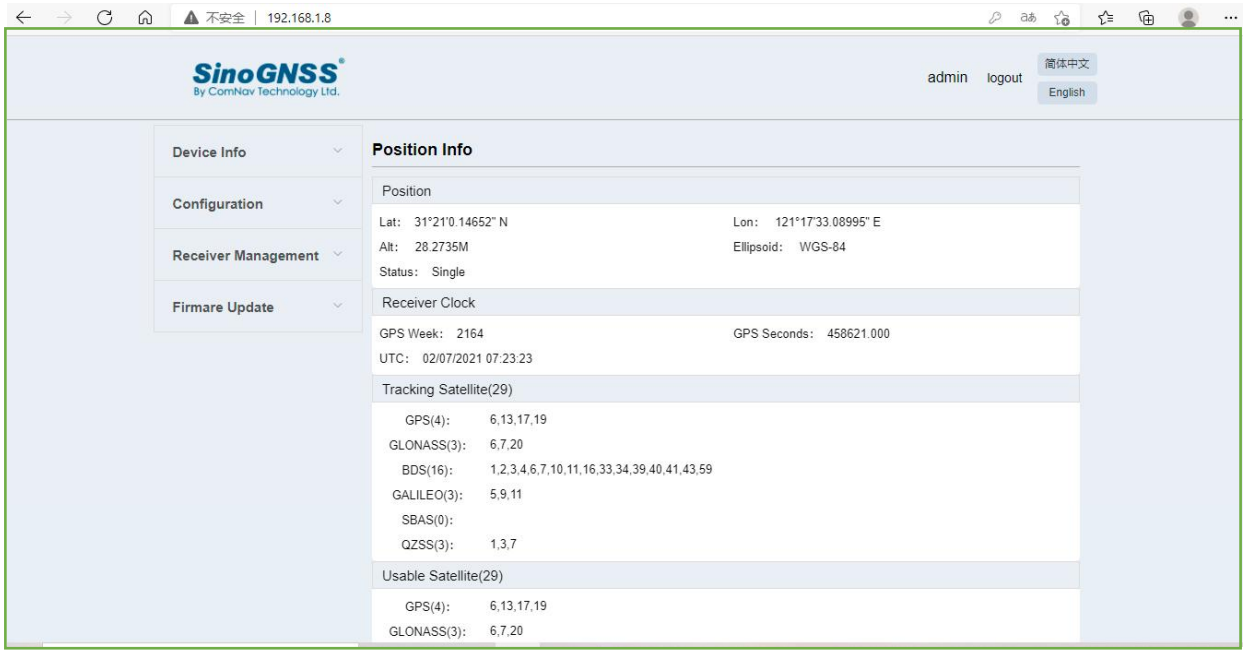
http://192.168.1.8

Tip: Most web browsers for computers / laptops and smart phones / PDAs support the receiver Web GUI

Step 3: Enter the default login settings to access the main page

- Username: admin
- Password: admin

After accessing the main page, configuration menus are listed on the left, and receiver's settings on the right. Each configuration menu will be demonstrated in the following sections.

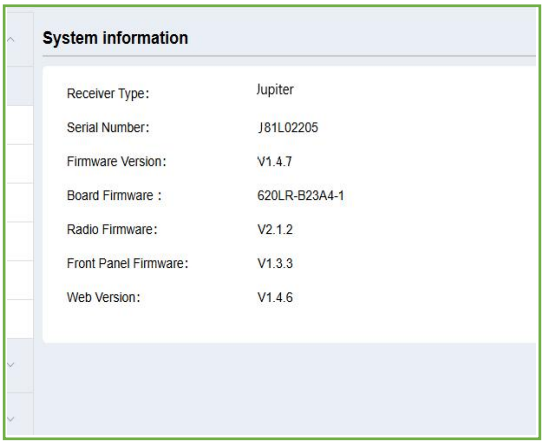


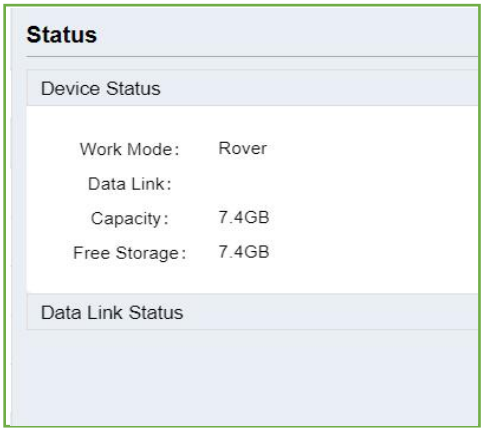
3.3.1 Checking the receiver status

In the section, you can check System information, Status, 4G Network, Bluetooth, Wifi, Position info, satellite info.

(1) System information, includes the basic information includes receiver type, serial number, system firmware version, board firmware version, radio firmware (radio type), front panel firmware (Jupiter doesn't have front LCD panel), Web version.

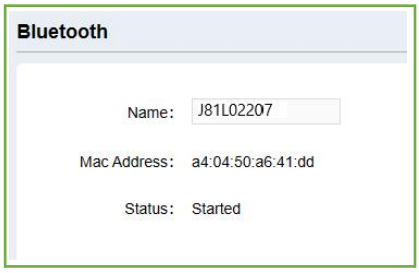
(2) Status: Show the device status and data link status, includes work mode, data link, internal storage capacity and current free storage. The default work mode is rover with the new device, others will be same with the Survey Master settings. Data link status will vary from different work mode, the default is null.

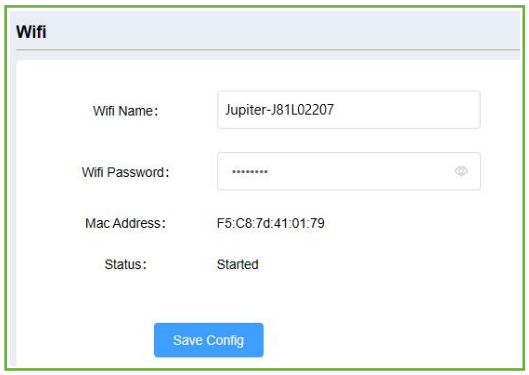




(3) 4G Network, when there is SIM card inside in the receiver, it will start itself, and read the signal intensity, APN, and show started. If there is no SIM card inside, it will show stopped.

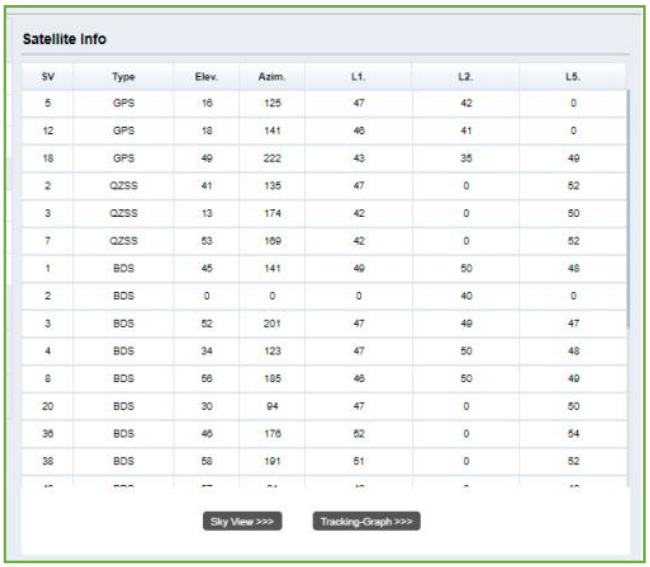
(4) Bluetooth information, shows Bluetooth name and Mac address, Bluetooth name cannot be changed; WIFI information, shows WIFI name, current Wifi password and Mac address. The Wifi password is 12345678, the client can change the password, click **Save config** to save configuration.

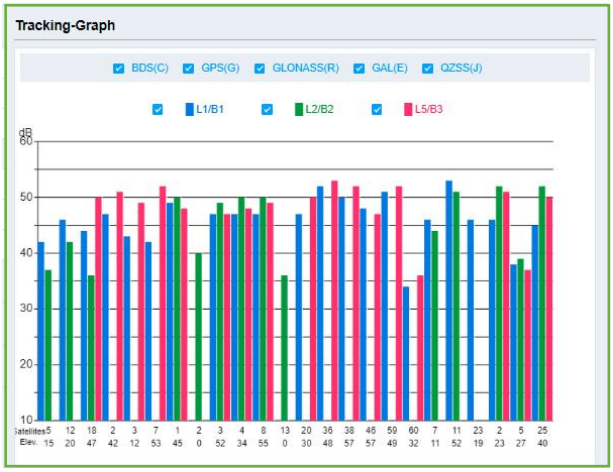


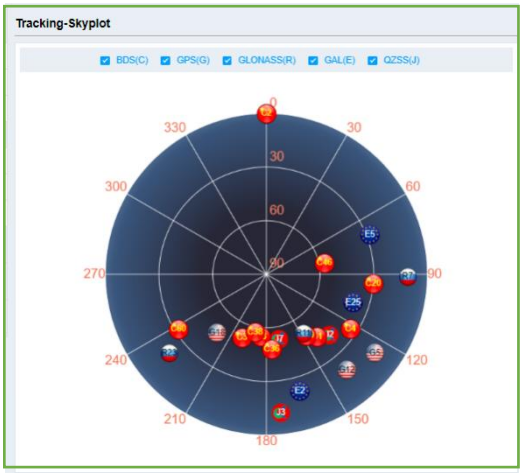


(5) Position info, shows position status, clock status, tracking satellites, used satellites and DOP status.

(6) Satellites Info, includes Tracking graph, Tracking skyplot.





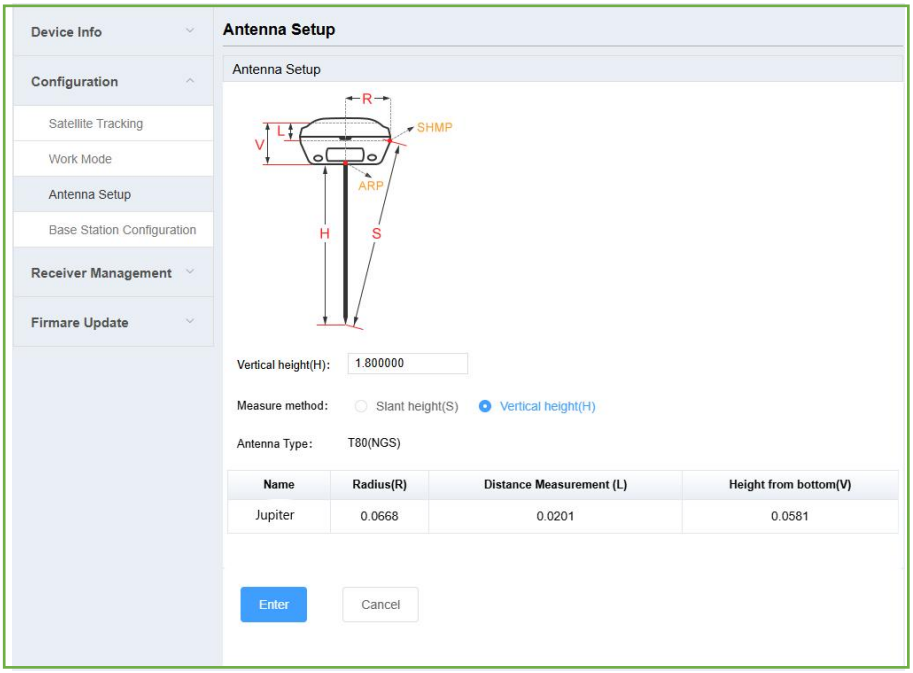


3.3.2 Configuration

This section includes Satellite tracking, work mode, Antenna setup and Base station configuration.

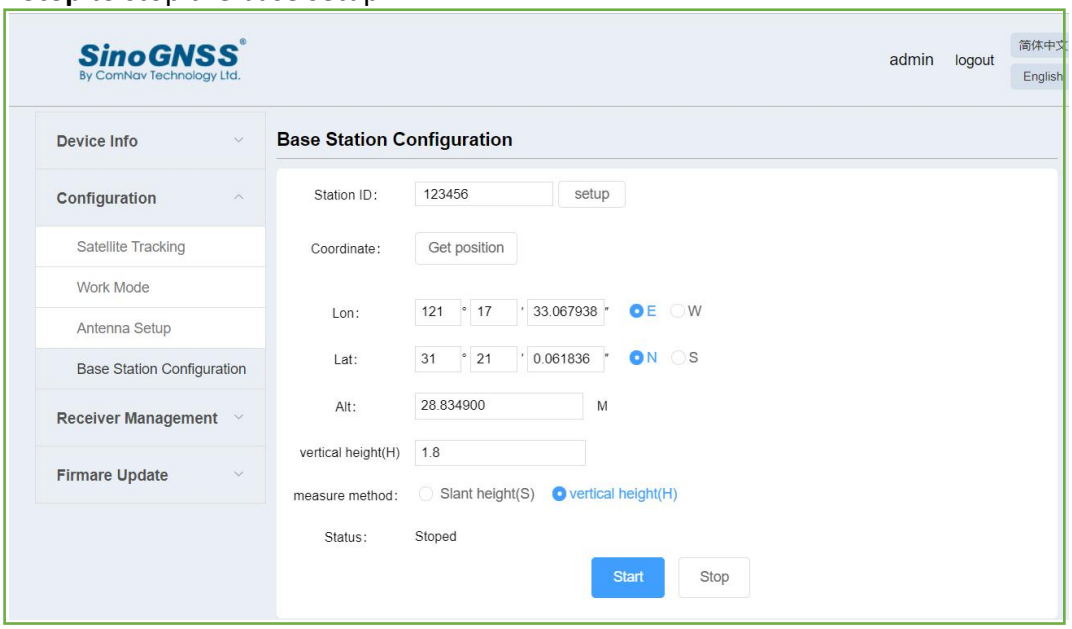
• **Satellite tracking**, includes Smooth Pseudorange, default is OFF; Elevation mask: default is 10 degrees; and every system status, supports to change by customers, click **Enter** to save settings, click **Cancel** to cancel the settings.

• **Antenna setup**: measure method supports Slant height and vertical height, choose Antenna type, and setup antenna height, click Enter to save configuration.



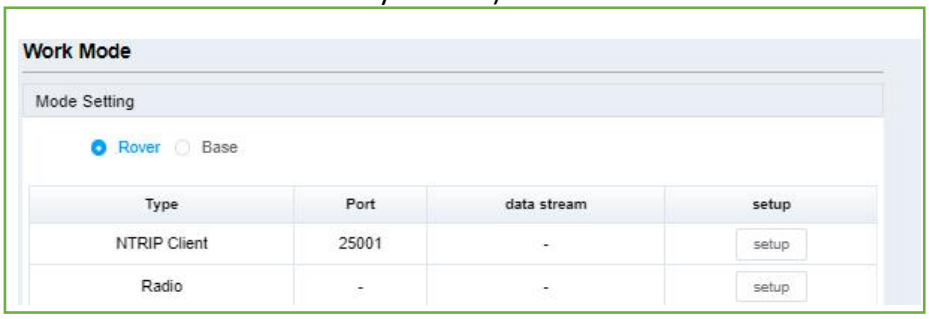
• **Base station configuration**: Setup the station ID, Antenna height, measure method supports slant height and vertical height; then click **Get position** to set the current

position or you can enter the coordinate yourself, click **Start** to start the base setup, click **Stop** to stop the base setup.

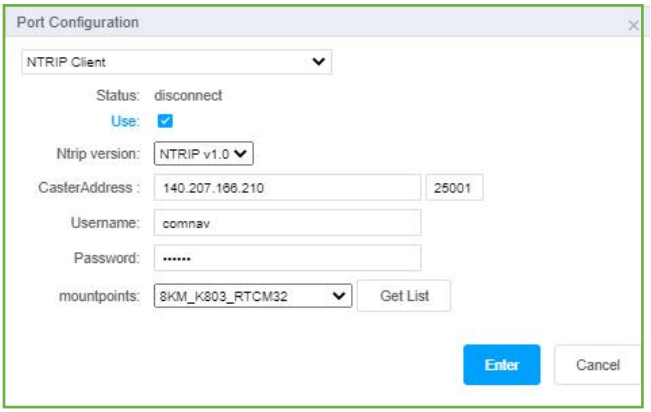


- **Work mode**, includes rover settings and base settings.

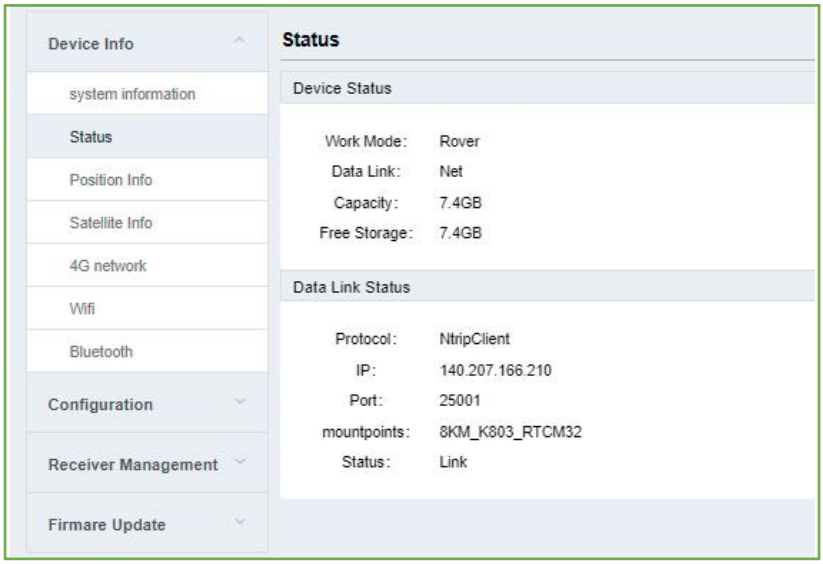
Rover settings include Ntrip Client (Same with internal GSM in Survey Master) and Radio (Same with internal radio in Survey Master).



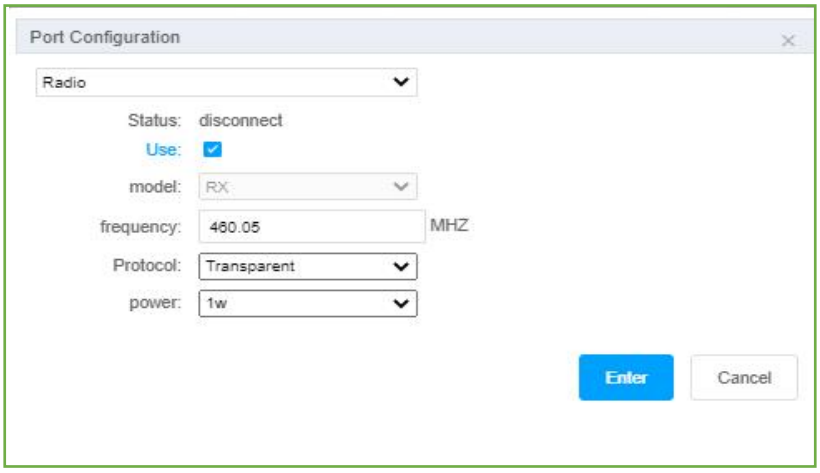
(1) Ntrip Client: Set Ntrip version, includes NTRIP v1.0 and NTRIP v2.0, IP, port, username, password, then click **Get List** and select mountpoint, check on **Use**, click **Enter** to apply the Ntrip Client; Check off **Use**, click **Enter** to cancel the work mode.



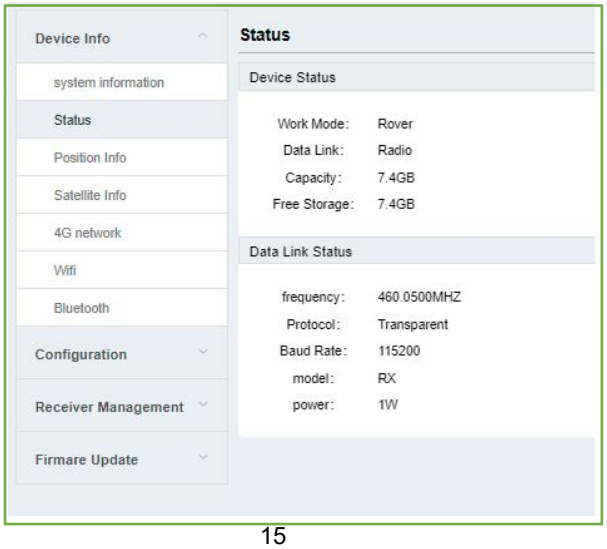
When setup the Ntrip Client, you can go to Device Info->Status to check current device status and datalink status.



(2) Radio: The model is RX, set the frequency, minimum interval is 12.5 KHz; the protocol is Transparent; set the power, supports 0.5w, 1w and 2w; check on **Use**, click **Enter** to apply the internal radio; Check off **Use**, click **Enter** to cancel the work mode.



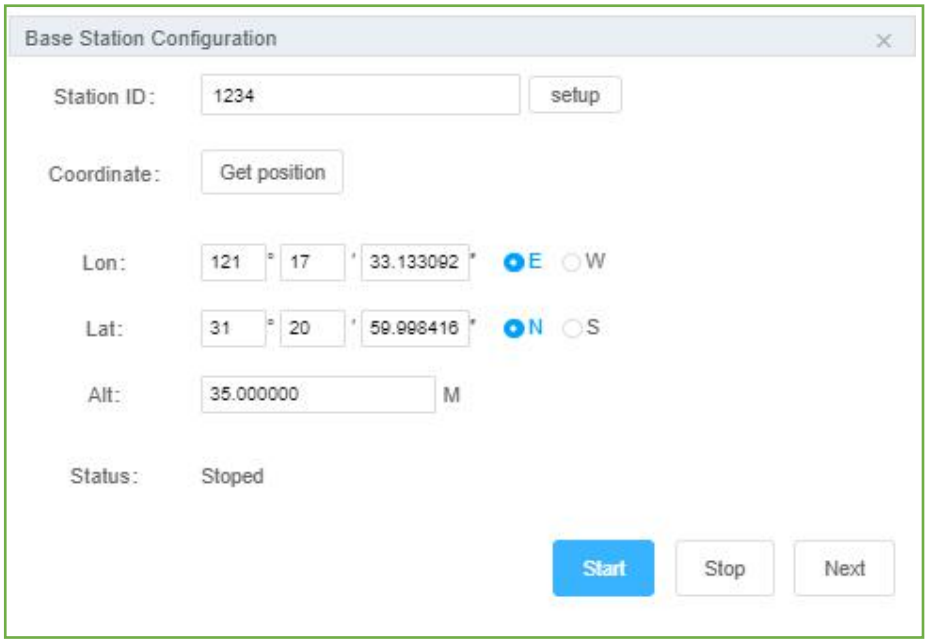
After setup, you can go to Device Info->Status to check device status.



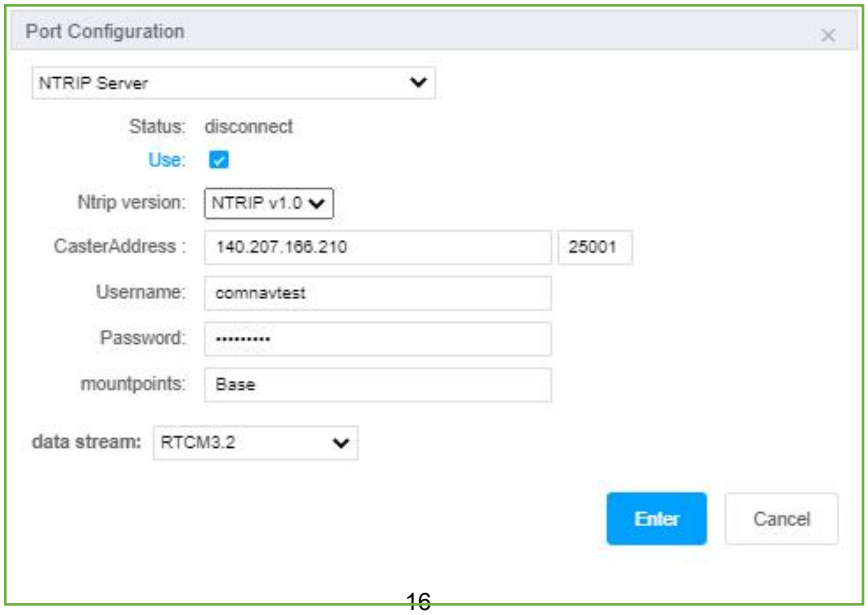
Base settings include Ntrip Server (Same with internal GSM in Survey Master) and Radio (Same with internal radio in Survey Master).

(1) Ntrip Server:

a) Start the base: if you have started the base setup in **Base Station Configuration**, then no need to setup again, just click **Next**; If you have not started base setup, you can go to **Base Station Configuration** to set the base, or you can set the station ID, and set the base coordinate here, then go to **Antenna Setup** to set the base antenna, then start the base, click Next to the Ntrip settings.



b) Ntrip settings: Choose Ntrip version, set IP, port, username, password, mountpoint, and choose data stream, supports RTCM3.2, RTCM3.2(MSM5), RTCM3.0, RTD, CMR. Check on **Use**, and click **Enter** to apply, click **Cancel** to cancel apply; Check off **Use**, and click **Enter** to cancel the previous base setup.



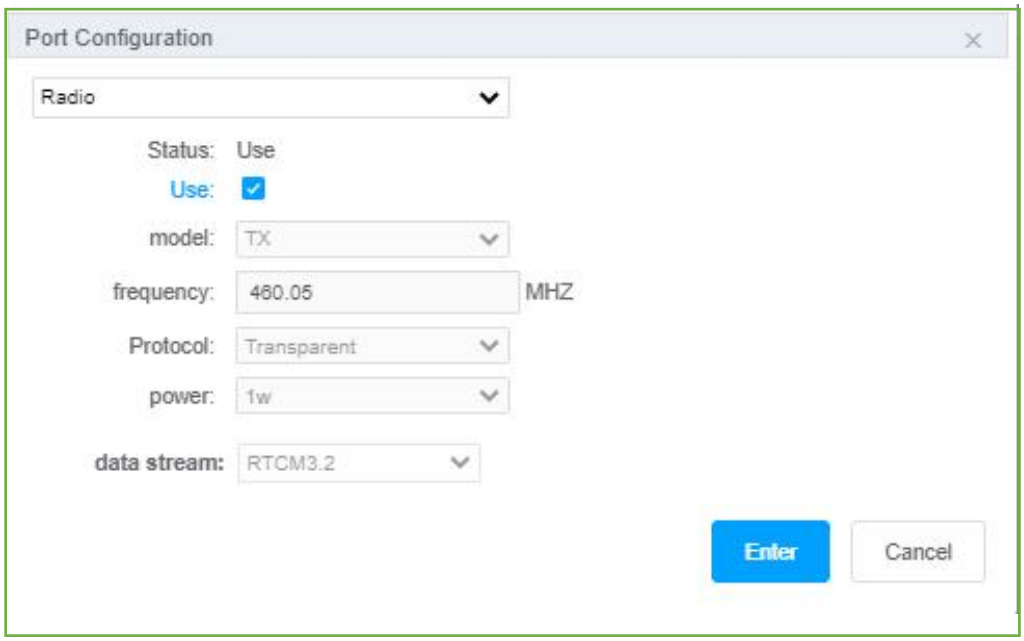
After you setup base using Ntrip server successfully, you can go to Device->Status to check current base settings, and the rover can get the mountpoint from the server you set.

(2) Radio:

a) You need to setup base station coordinate first, refer to the Ntrip Server settings.

b) Setup the radio parameters: The model is TX, set the frequency, minimum interval is 12.5 KHz; the protocol is Transparent; set the power, supports 0.5w, 1w and 2w; choose data stream, supports RTCM3.2, RTCM3.2(MSM5), RTCM3.0, RTD, CMR; check on ***Use***, click ***Enter*** to apply the internal radio; Check off ***Use***, click ***Enter*** to cancel the work mode.

After setup the base, you can go to the Device Info-> Status to check base settings.



3.3.3 Receiver Management

This section includes Data Transfer, Data record, Data Download and Receiver Utility.

3.3.3.1 Data Transfer

Data transfer has five types: Com1, Com2(Bluetooth), TCP Server, TCP Client, Web Ntrip.

- **Com1**: This is setup to transfer the data through com1 port of the OEM board inside.

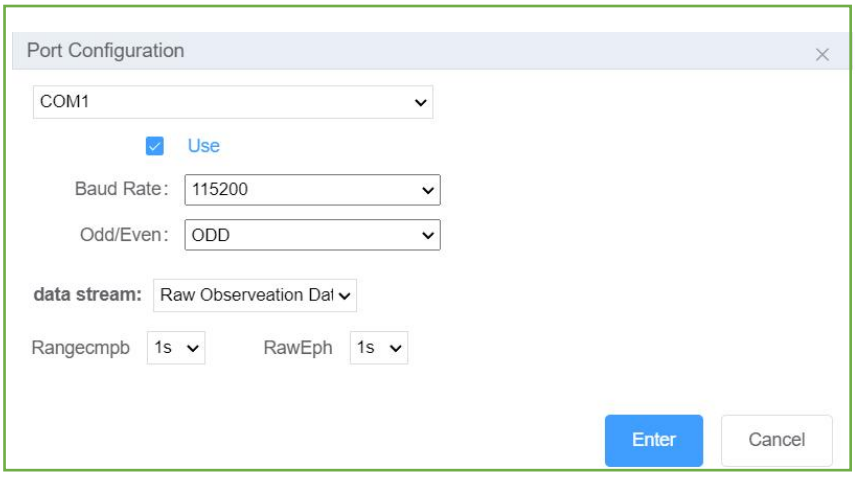
You can use serial port cable to check the data transmission (the lemo port is connected to Com1 of the OEM board inside).

(1) Baud rate supports 115200, 57600, 38400, 19200, 9600, the default is 115200.

(2) The supported file formats include navigation data, raw observation data, RTCM3.2,

RTCM3.2(MSM5), RTCM3.0, RTD, CMR.

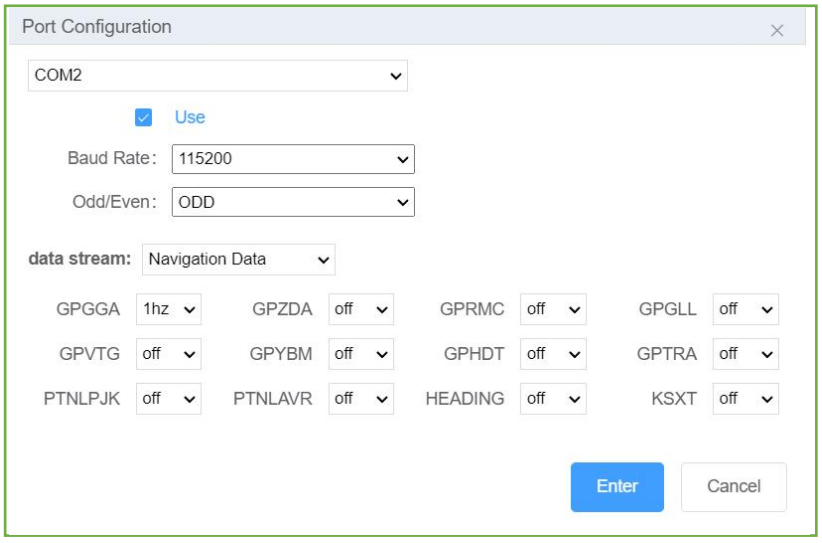
(3) Observation and ephemeris output frequency support 1s, 2s, 5s, 10s and 15s.



- **Com2**: This is used to output data through com2 port of the OEM board (connected to the Bluetooth modem), you can output NMEA data via this port, it is the important step to connect the receiver to other brand software.

(1) Baud rate supports 115200, 57600, 38400, 19200, 9600, the default is 115200.

(2) The supported file formats include navigation data, raw observation data, RTCM3.2, RTCM3.2(MSM5), RTCM3.0, RTD, CMR.



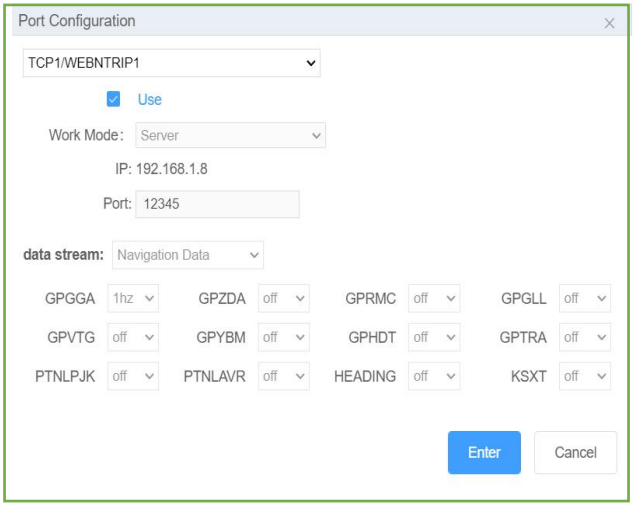
(3) NMEA data output frequency supports 1hz, 2hz, 5hz, 10hz, 15hz.

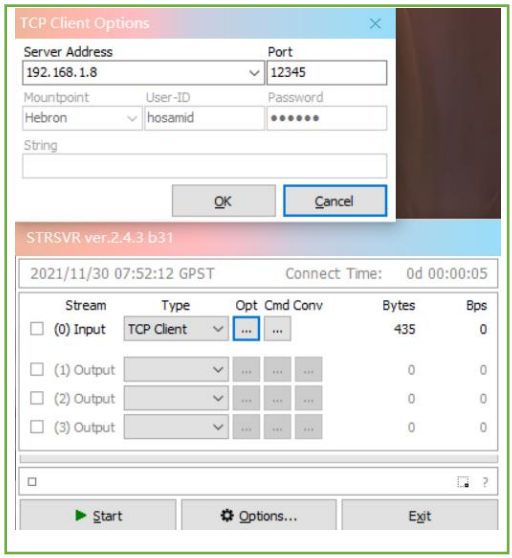
- **TCP Server**: You can output data through TCP server, then use TCP client to get data.

For example, connect your rover or computer and Jupiter receiver in the same LAN, setup Jupiter to output RTCM data via TCP server, and rover receives via TCP Client.

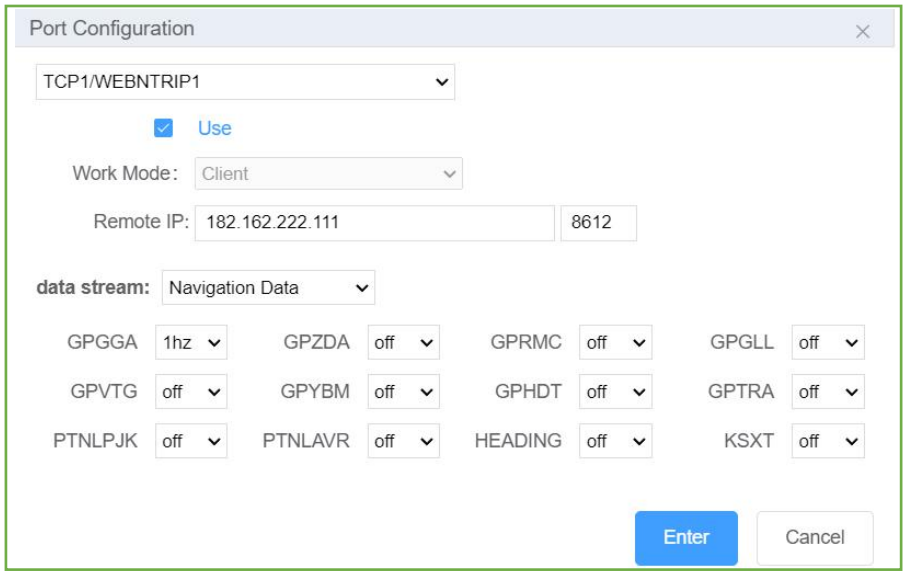
The supported file formats include navigation data, raw observation data, RTCM3.2,

RTCM3.2(MSM5), RTCM3.0, RTD, CMR.





- **TCP Client**: If you have a TCP server with a static IP, you can output the data via TCP Client, then the data will be transmitted to your TCP server. The IP is your PC IP, the port should be mapped. For example, you can output the NMEA data to your TCP Server, then you can check the status of the rover in the office while the rover works in the field.

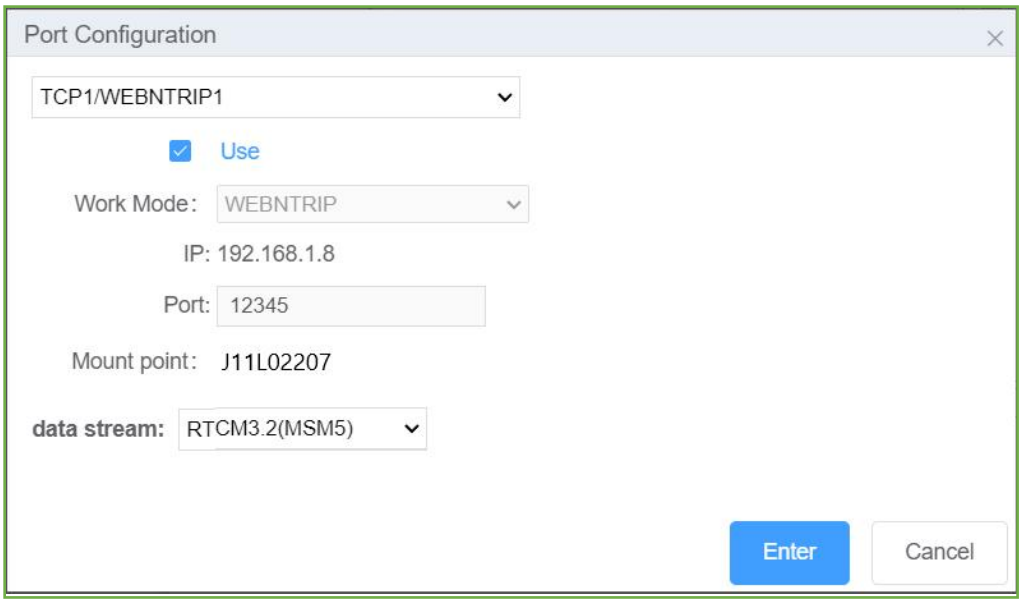


- **WEBNTRIP**: This function can be used to work with Drone via WIFI.

(1) Base setup: setup base coordinate and antenna first.

(2) WEB configuration: setup the IP 192.168.1.8, port 12345, mountpoint J81L0XXXX, and choose RTCM3.2(MSM5), then check on Use, click Enter, it will transfer data through WIFI

(3) Connect your drone remote with the receiver WIFI.



(4) Configure the drone, select Ntrip Client, setup IP 192.168.1.8 and port 12345, get the mountpoint J81L0XXXX, then the drone can do RTK.

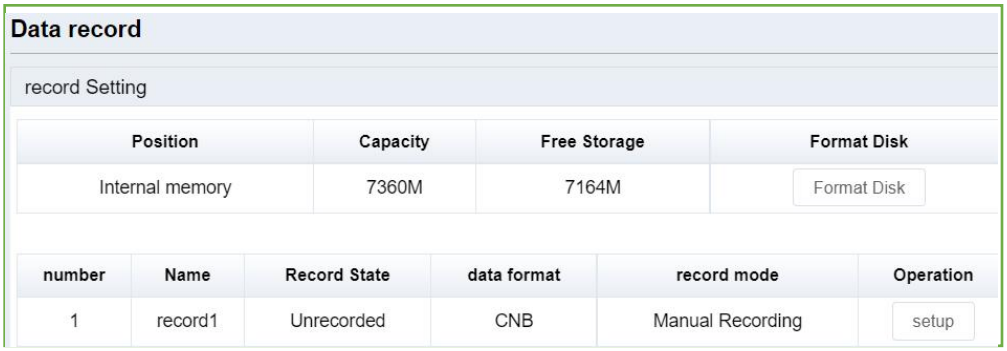
3.3.3.2 Data record

This is used to log static data, the data will be saved in the receive, you can download data via web interface, go to chapter 3.3.3.3 for more information, or you can use USB cable to connect PC and download static data.

In recording setting interface, you can get following information:

- Current internal memory capacity and free storage; you can click Format Disk to format the receiver internal memory;

- Current record state, data format, record mode.



Click **Setup** to configure the static settings:

- **Name**: You can choose record1, then the file will be saved in record1 folder.

- **Sample Interval**: change the sample interval of observations, the maximum data rate is 20 Hz, the minimum is one observation per minute, it supports 0.05/0.1/0.2/0.5/1/2/5/15/30/60 S

- **File Split**: supports every 15 minutes or 1\2\4\24 hours to save a file, or you can choose Manual mode, then it will save a one file when you manually stop the record by pressing on the static button, or click the Stop button. If you select 24 as file split, it will create two data files when it occurs to 24 o'clock (UTC Time). One is from start time to 24 o'clock, another is from 0 o'clock to end time.

- **Data format:** Supports CNB, RINEX 2.10, RINEX 3.02

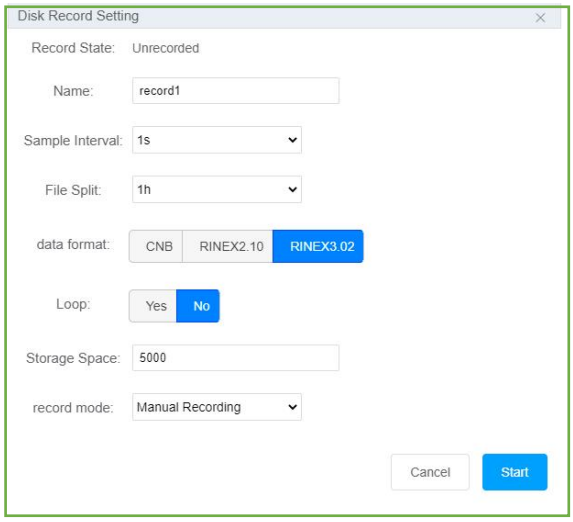
- **Loop**: When storage is full, Yes means delete earliest data and store continually, No means stop recording

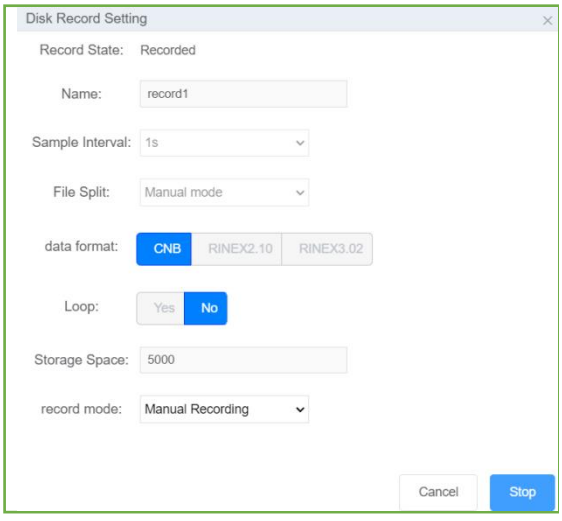
- **Storage Space**: Separate storage space in internal memory

- **Record mode**: logging data manual recording or auto recording.

- **Auto recording**: when you set automatically, it will record static data automatically when the receiver tracks satellites, and you can stop recording by pressing the static button on the receiver;

- **Manual recording**: when you set manually, then it will not record data automatically when the receiver tracks satellites, need to press the static button on the receiver. Click Enter to start the recording, and it will save the configuration, you can stop the recording by pressing the static button or click Stop on the interface.



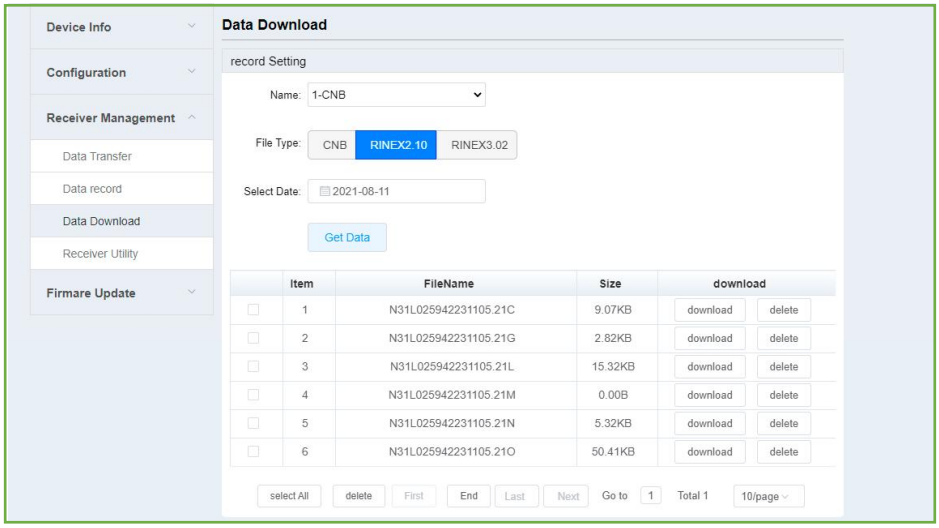


3.3.3.3 Data Download

- Firstly, select record Name, File type (CNB\Rinex3.02\Rinex2.10) and the date.

- Then click **Get Data**, you will see data files.

- Click **Download** icon to download the data file you need; or click **Delete** icon to delete this file; click **Select All**, you can select all the data in the current interface, download and delete them in batches. Rinex files include observations and ephemeris and not are zip files.

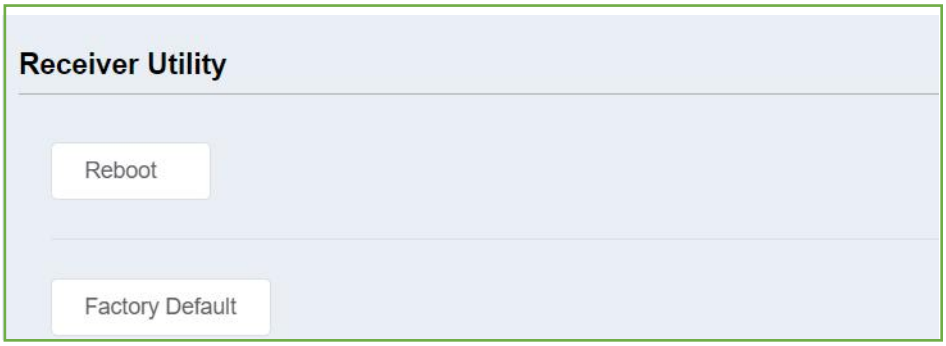


3.3.3.4 Receiver Utility

In this section, you can control Jupiter remotely, including:

- Reboot: Restart the receiver

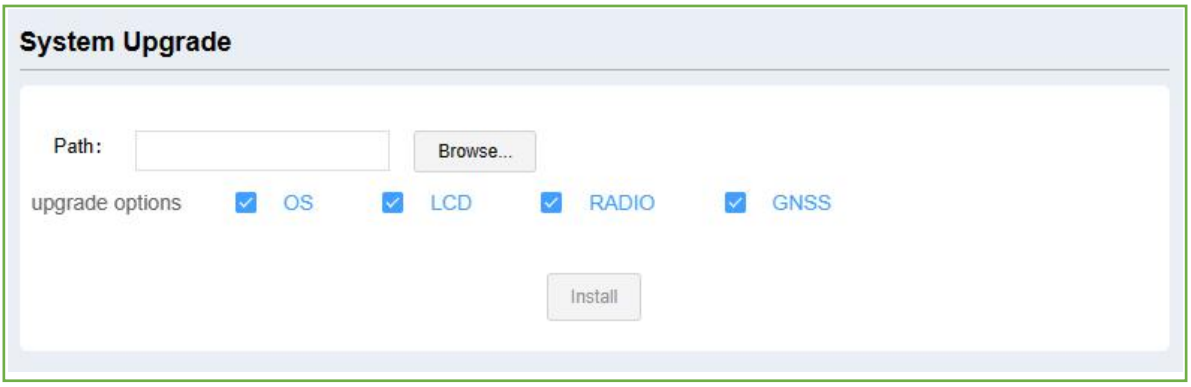
- Factory Default: recover the receiver to factory default setting



3.3.3.5 Firmware update

You can update the system firmware (OS), board firmware (GNSS), front panel firmware (LCD) and radio firmware (RADIO) in this menu. Select system, GNSS, RADIO firmware upgrade according to your demand, then click Browse to select the latest firmware version. Click Install, a progress bar shows 0 to 100% and status will be "Not allowed to do other operations during the upgrade". When completing firmware update, the receiver will restart automatically and information prompted below

Tips:
Jupiter receivers don't have front LCD panel, so LCD firmware will not b e updated.
*The supported firmware file is only *bin format.*



4. Static survey

This chapter describes static survey through Jupiter receiver and CRU software. For static survey, you cannot change settings through front panel, you can configure it via Compass Receiver Utility (CRU): 1) Receiver configuration; 2) check receiver settings and status; 3) convert data to Rinex format.

4.1 Receiver Configuration

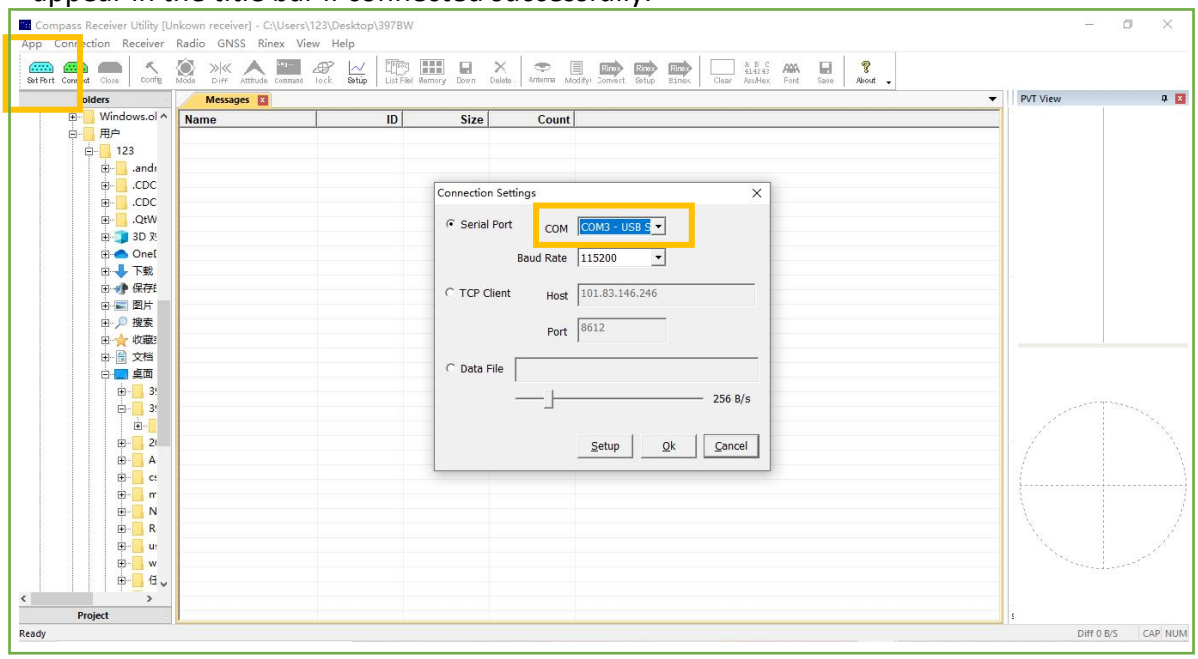
1. Download and install CRU software from the link below (ensure the driver is properly installed in your PC):

http://www.comnavtech.com/download.asp?bigclassid=28

2. Put a battery in the Jupiter receiver and turn it on.

3. Connect the receiver with your PC through type-c cable.

4. Click set port in CRU -> select proper serial port in the serial port option-> enter proper baud rate -> click Ok to complete receiver connection.The SN of receiver will appear in the title bar if connected successfully.



4.2 Static Data Collection

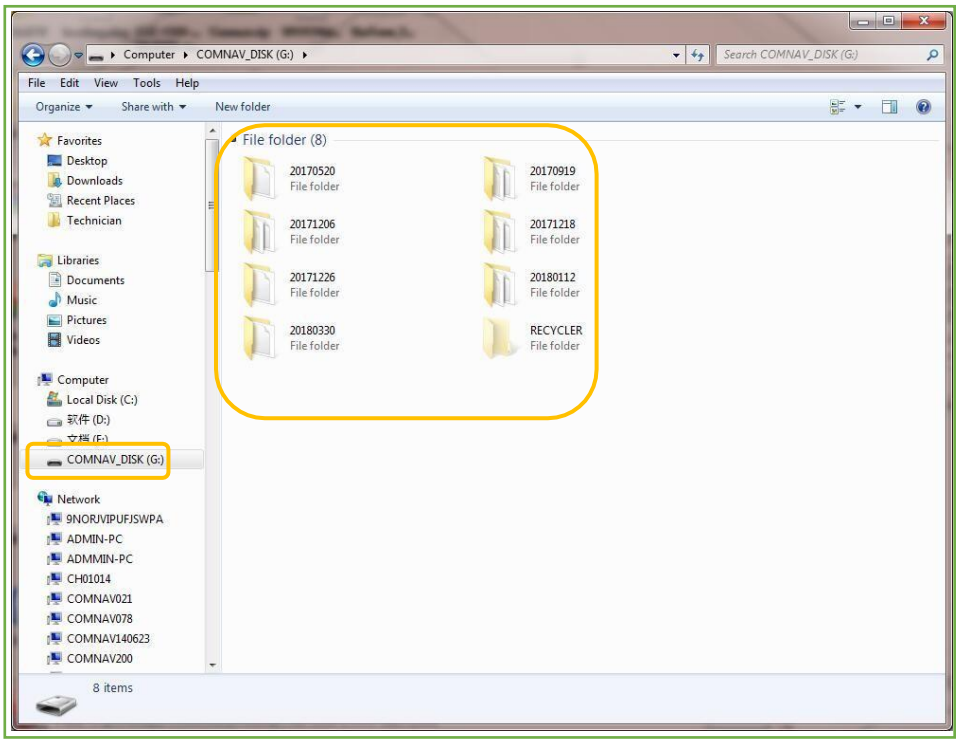
Static survey is mainly used for the control survey. To reach millimeter accuracy, follow as below:

- At least 3 GNSS receivers are required to form a stable triangulation network.
- It is better to set Data Log Session as manual on the known point.
- Power off the receiver before moving to other observation site.
- To quickly post-process static observation raw data, write down the station name, receiver SN, antenna height, start and end time for each observation site.

Tip: You can start recording static data in the front panel, it's convenient for you.

4.3 Static Data Download

The raw observation data is saved in internal memory of Jupiter receiver, when connected with PC via USB cable, the Jupiter receiver can work as a USB Flash Disk, which means you can copy or cut static data to PC directly.



Tips:

1. Default memory for Jupiter receiver is 8GB, and 16GB, 32GB optional.

2. The receiver will stop recording raw data if the internal memory runs out.

4.4 RINEX Convert

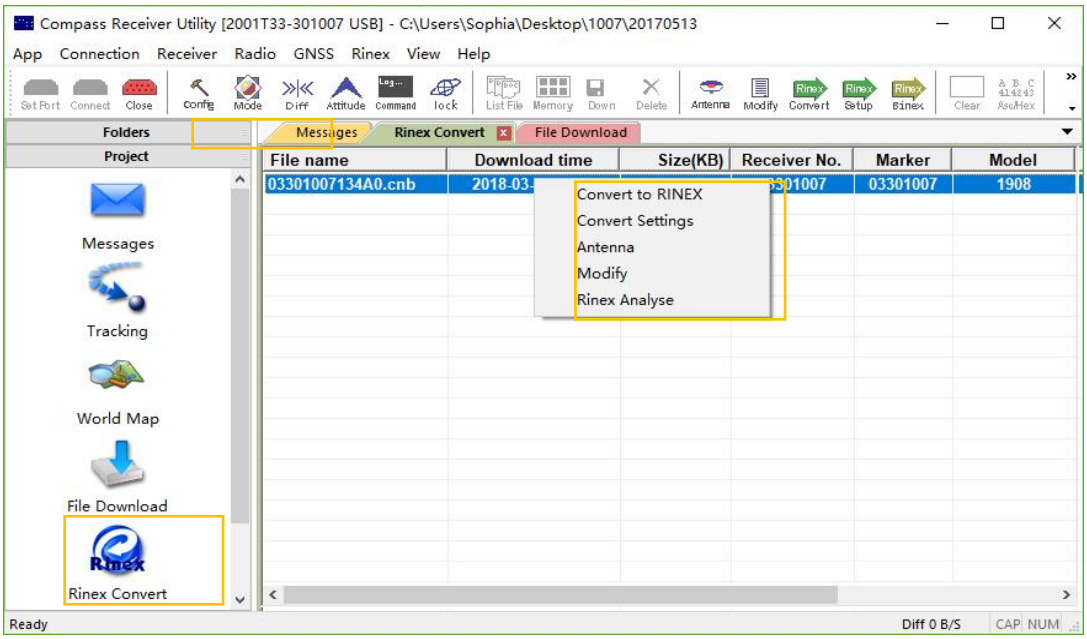
After copy raw observation data to PC, you can convert the data from ComNav binary format

(*.cnb) to RINEX in CRU software.

1. Start CRU software;

2. Click **Folders** and select the path of your CNB data;

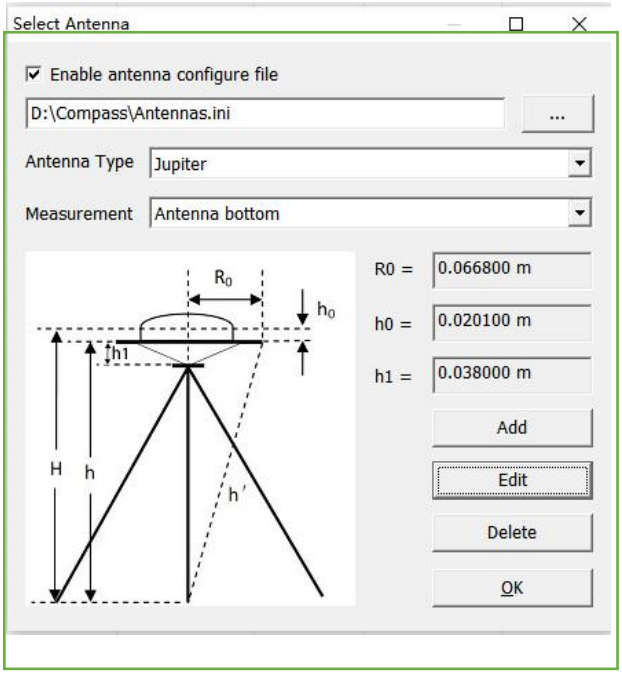
3. Click Rinex Convert to check all raw data on main window. Right click on the file to modify antenna, Convert Settings and Convert to RENIX, or use fast icon in standard bar.



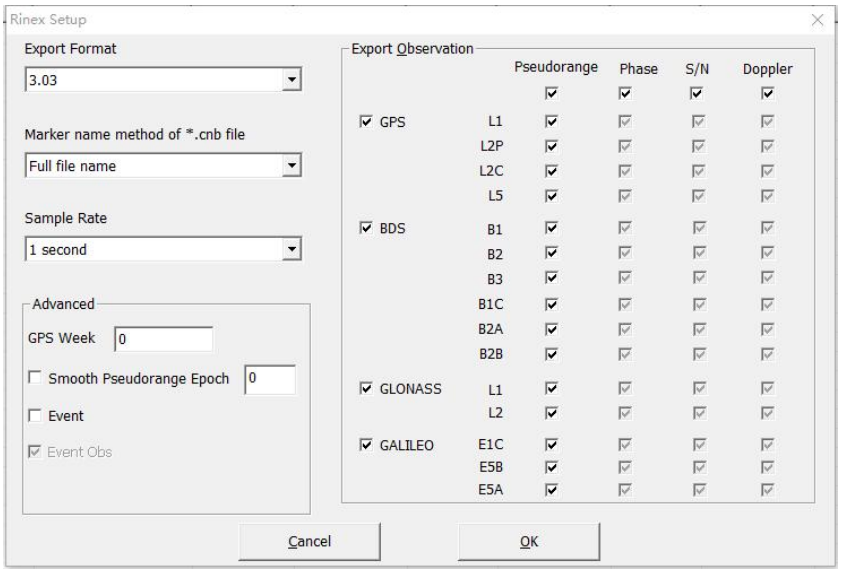
4. Click to select the **Antenna Type** and **Measurement**. If you cannot find Jupiter antenna.

1) Input the value of R0 (horizontal offset from measurement mark to phase center), h0 (vertical offset from measurement mark to phase center) and h1 (vertical offset from measurement mark to receiver bottom). R0 is 0.0615m, h0 is 0.0243m and h1 is 0.0391m respectively for Jupiter receiver;

2) Or check **Enable antenna configure file** to select **Antennas.ini** file to select Antenna type again. You can also add, edit and delete antenna types based on your requirement.



• Click  to change **Convert Settings**, mainly export format and export observation information.



Tip: In some Post Processing software, the BeiDou observations cannot be processed, you can uncheck the BeiDou B1,B2,B3 observations.

• Click  to Convert to RINEX, the RINEX data will be save in the same path as raw observation data.

5. Real-Time Kinematic Survey (RTK)

This chapter introduces how to conduct RTK Survey with Survey Master Software, including software installation, start a new project, receiver connection and RTK working modes (CORS).

5.1 Installation of Survey Master

Survey Master is available on Google play, you can download for free and install the software to SinoGNSS controller R60.

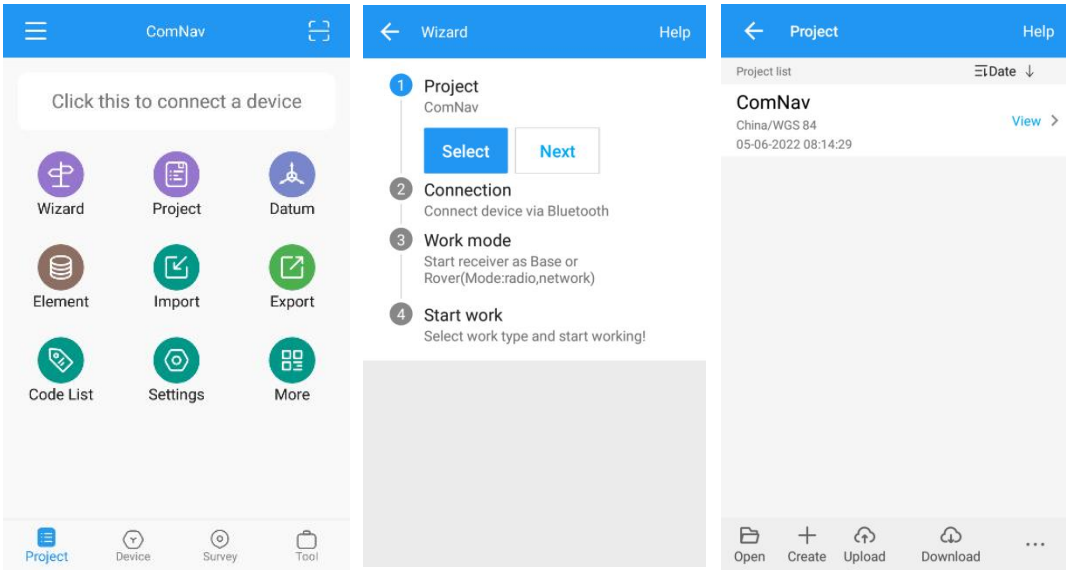
Also you can download the latest version from our website:
https://www.comnavtech.com/

5.2 Wizard function in Survey Master

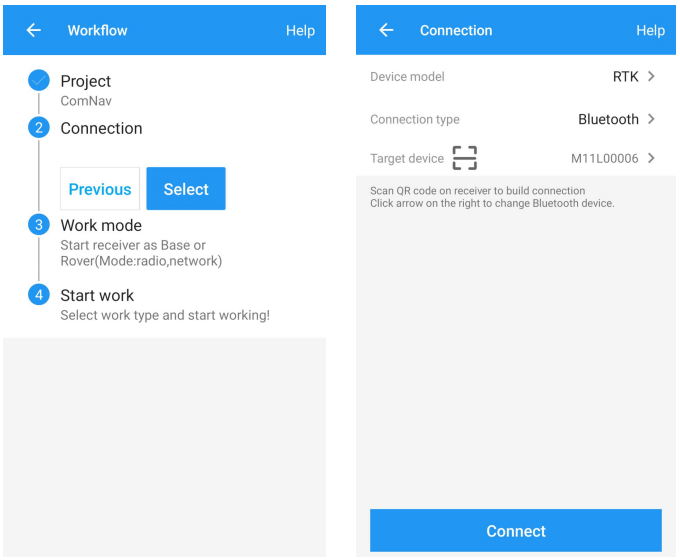
Follow the Wizard, you can quickly learn the general workflow of Survey Master, also you can quick start your survey by this function no matter you are experienced one or new user.

In Project menu, tap Wizard.

1. ***Project***: Click ***Select*** to go into Project interface to create or select a project. For detailed information, you can refer to chapter 5.3.

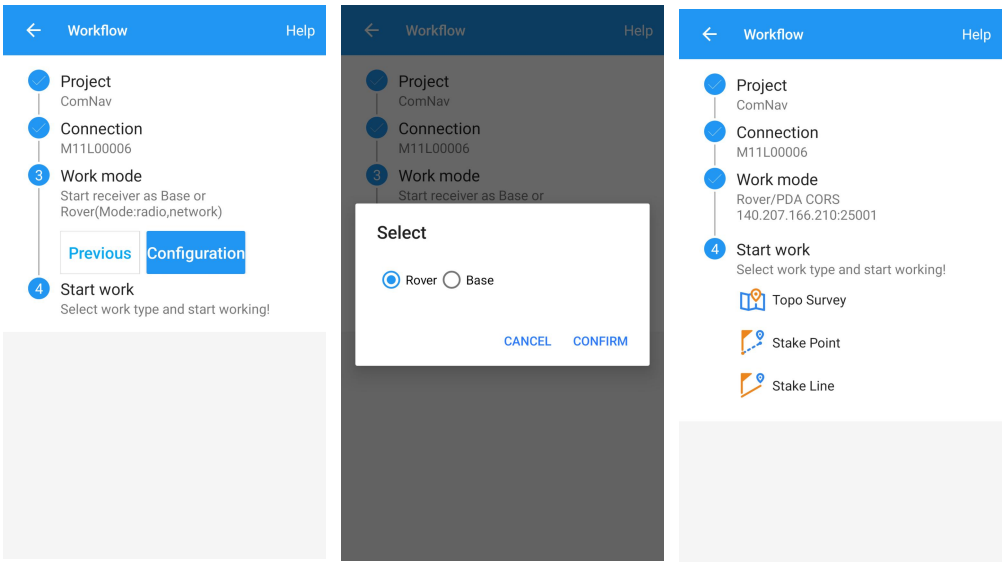


2. ***Connection***: Click ***Select*** to go into connection interface. Because Jupiter has dual cameras,You can choose connect Jupiter with Survey Master via WiFi, For detailed information, you can refer to chapter 5.4.



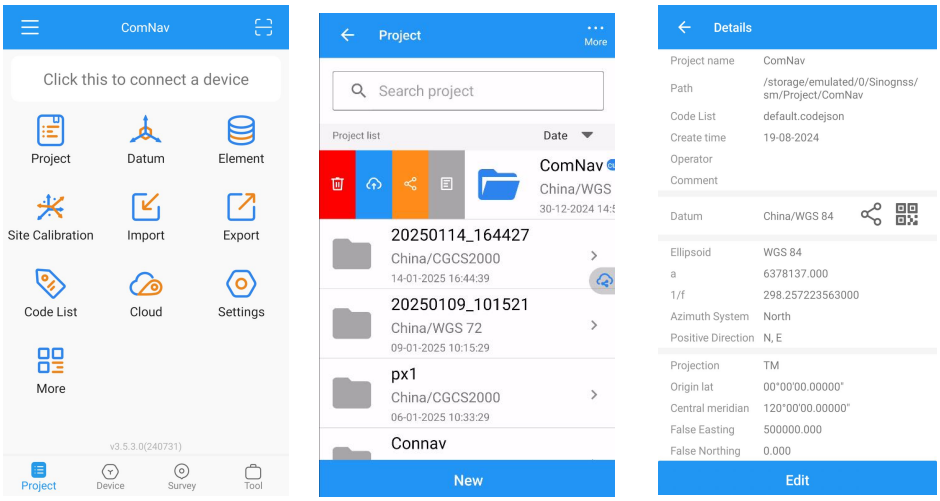
3. ***Work mode***: Click ***Select*** to go into Quick Setup interface to start your receiver as Rover. For detailed information, you can refer from chapter 5.5.

You start your receiver as Rover, then you can start work directly of topo survey or stakeout



5.3 Start a New Project

Click ***Project***, you can use the same Datum with last project, choose a datum in store and scan QR code from other controller to add Datum, even sharing project with cloud.



If you want to start work with receiver, you should select one project with datum information.

In Project interface, you can click ***Create*** to add a new project or click  to open the previous project. It also supports to backup your project file by uploading your Cloud account, and download from it. If you delete the projects accidently, you can recover them from Recycle Bin.

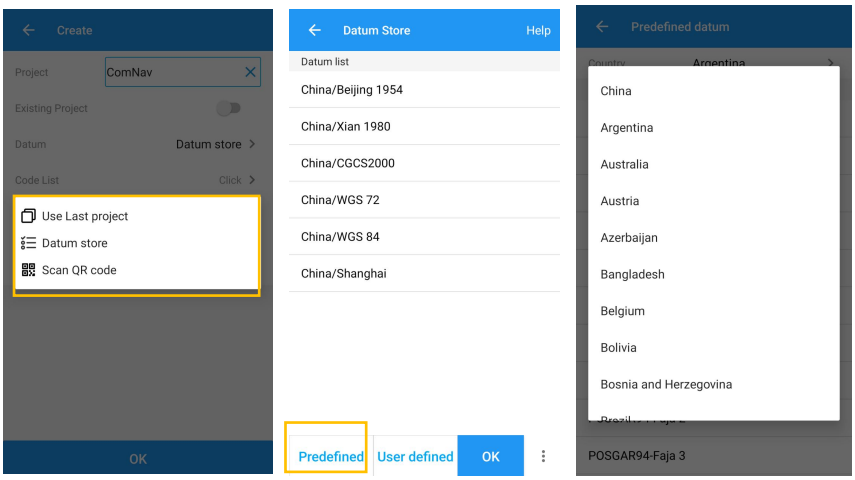
Survey Master supports to order the project by date and name, in order or reverse order.

If you have added one project, you can click ***View*** or click the project name in the main interface to check the current project details, including Project name, store path, and datum parameters. Click the ***QR*** to share your datum information to others. Besides, click Edit to change the datum parameters, also, you can change in the Datum interface.

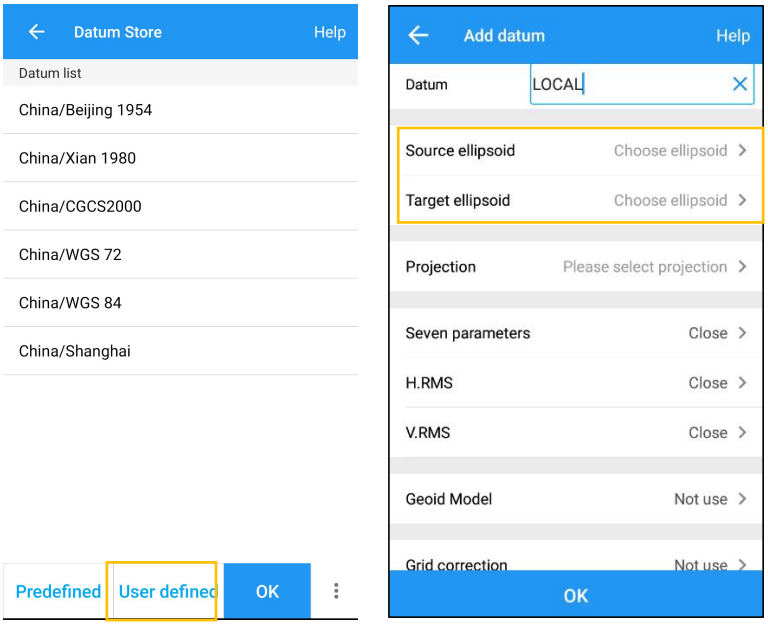
You can select a code list when you create a project, for more information, pls refer to Chapter 5.3.

To edit datum parameters, SM supports three methods: Use last project, Datum store, Scan QR code.

- Select a Predefined datum: You can select datum directly from the list. Survey Master currently has 49 countries datum and will add more afterwards.

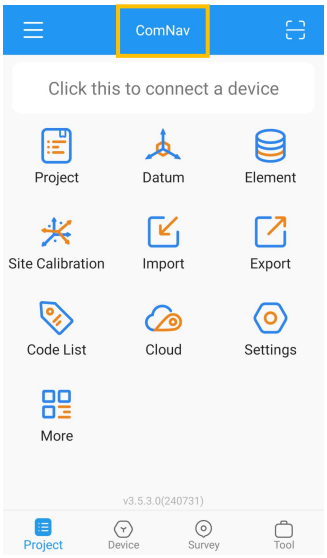


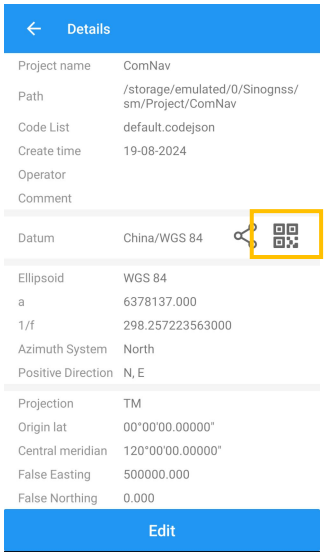
- Create a User defined datum: If you cannot find datum you want in the list, follow instructions below to add one: select Ellipsoid, Projection for your datum, and even seven parameters, geoid model based on your request.



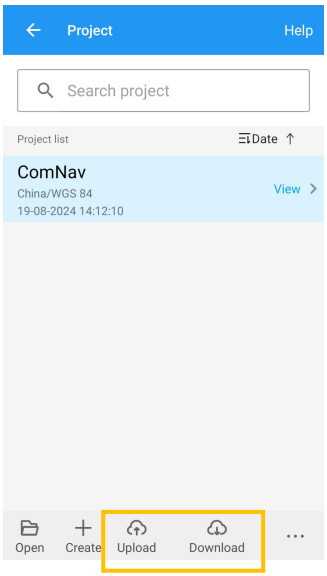
- Share Datum via QR code.

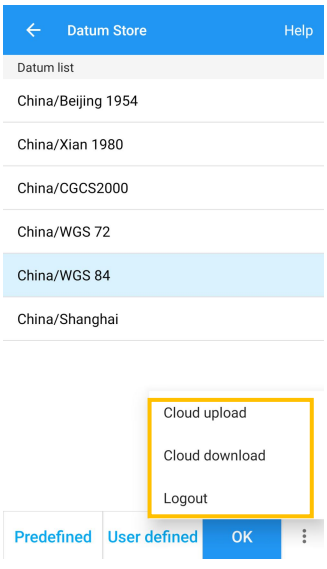
- After you build a project, press the project name, it will generate a QR code. Users can use the Scan function in the main interface to access the coordinate system.





Upload Project/Datum to cloud: sharing project with cloud.



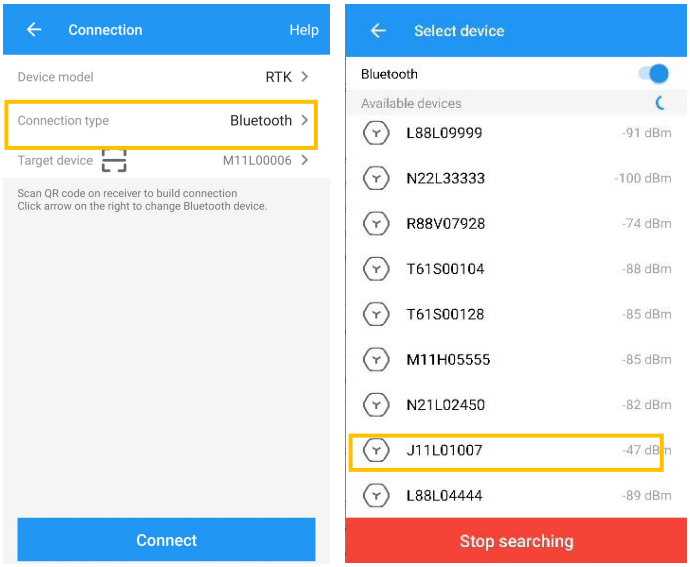


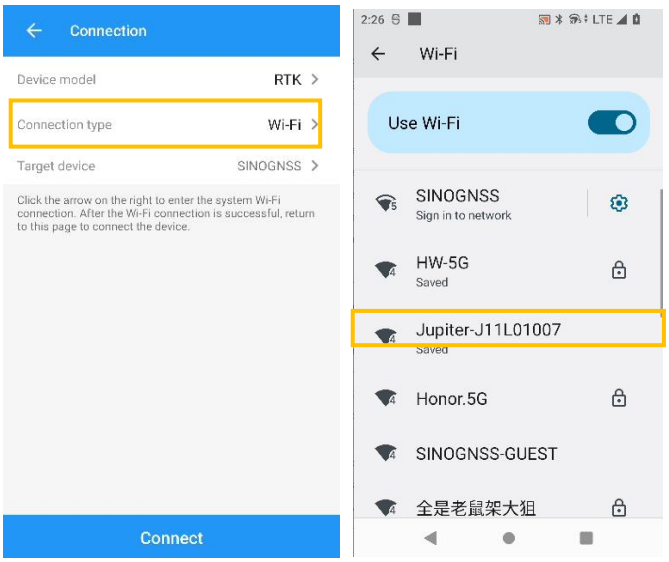
5.4 Connection

To connect Survey Master with Jupiter, switch to ***Device*** interface, tap ***Connection*** to go into WiFi or Bluetooth connection interface.

- Make sure device WiFi or Bluetooth turned on;
- Click Find device—select SN of your Jupiter —allow pair. If you use Bluetooth, you need to pair. If you use WiFi, the password is 12345678.

After connect ComNav receiver, you can check the device version in Device Info.





After connected successfully, the top will show the positioning status.

Tip: If you are failed to connect with receiver through Survey Master, you can just follow prompt info to go into the device Bluetooth setting interface to make sure Bluetooth paired successfully. Sometimes you need restart the receiver or Survey Master Software.

5.5 Work Mode

Jupiter GNSS receiver supports transmit & receive the correction data in internal radio mode. To conduct the RTK survey in internal radio mode, it requires:

①A controller with software installed

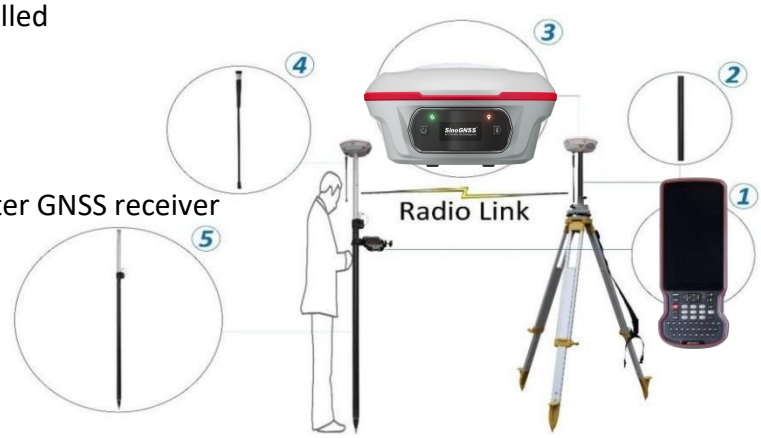
②An extension bar

③one base receiver and one Jupiter GNSS receiver

④Two whip antennas

⑤A range pole with bracket

⑥Tripod and tribrach



Tip: The external power supply is recommended when Jupiter set as a base station.
More: Aim to improve the radius of work field, we can change the base receiver's Whip Antenna to External Antenna. And others no need change.

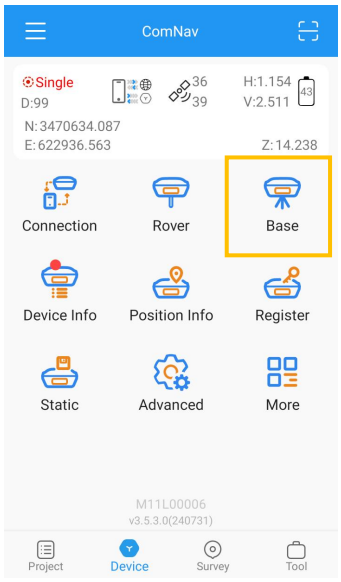
① Jupiter GNSS Receiver
② External Antenna

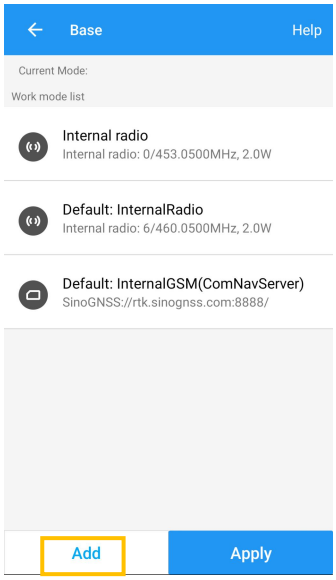
5.5.1 Start Base with internal radio mode

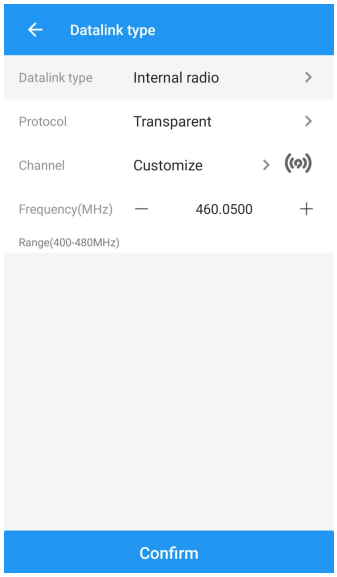
Firstly, build Bluetooth connection between the Jupiter receiver and your controller as shown in Chapter 5.4.

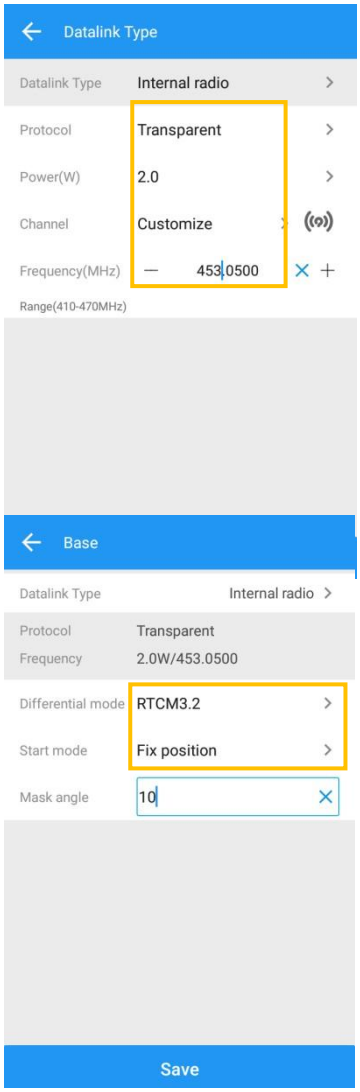
Secondly, modify parameters including correction format, antenna type and communication protocols:

- Click Device-> Base ->Add, select Internal radio.







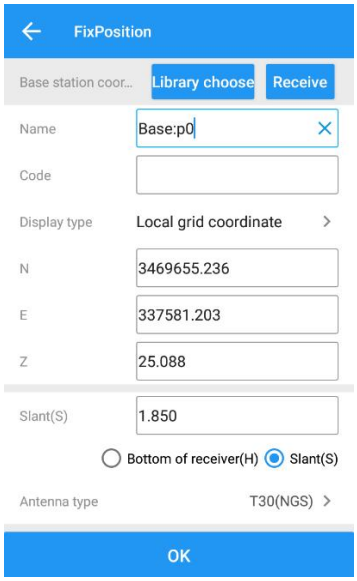


- Protocol and channel: Set protocol and frequency for the radio; Jupiter supports Transparent /TT450S/South/Mac/SNLonglink protocol, It can work with some other brands' RTK.

Tips: Jupiter need to work with latest OS firmware 1.4.7, and Survey Master 4.0.1, Please confirm with us if you have problems

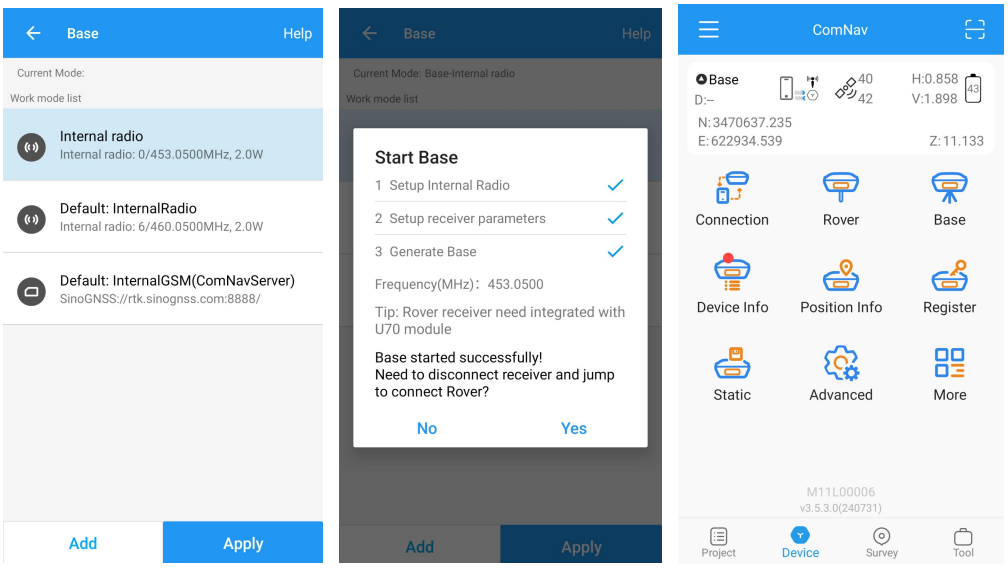
- Start mode: Fix position means you have a known coordinate for base, or get a point from GNSS;

- Differential mode: Support RTCM32, RTCM32(MSM5), RTD, CMR, CMR+(GPS only)



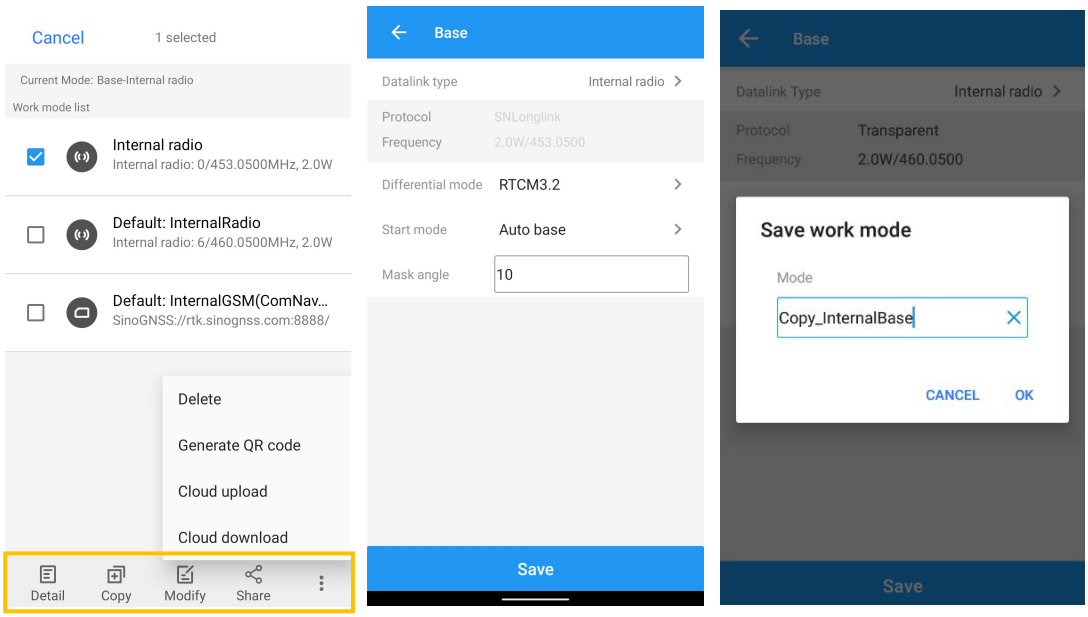
- Library choose: Choose a known point from Element;
- Receive: Receive a point from GNSS;

When start Base succeed, it will show as below in Survey Master.



After start base successfully, there will be a prompt, click ***Yes*** to disconnect the receiver and jump to the connection function or click ***No*** to back to Device interface.

Choose one work mode and long press, then you can do the following functions.

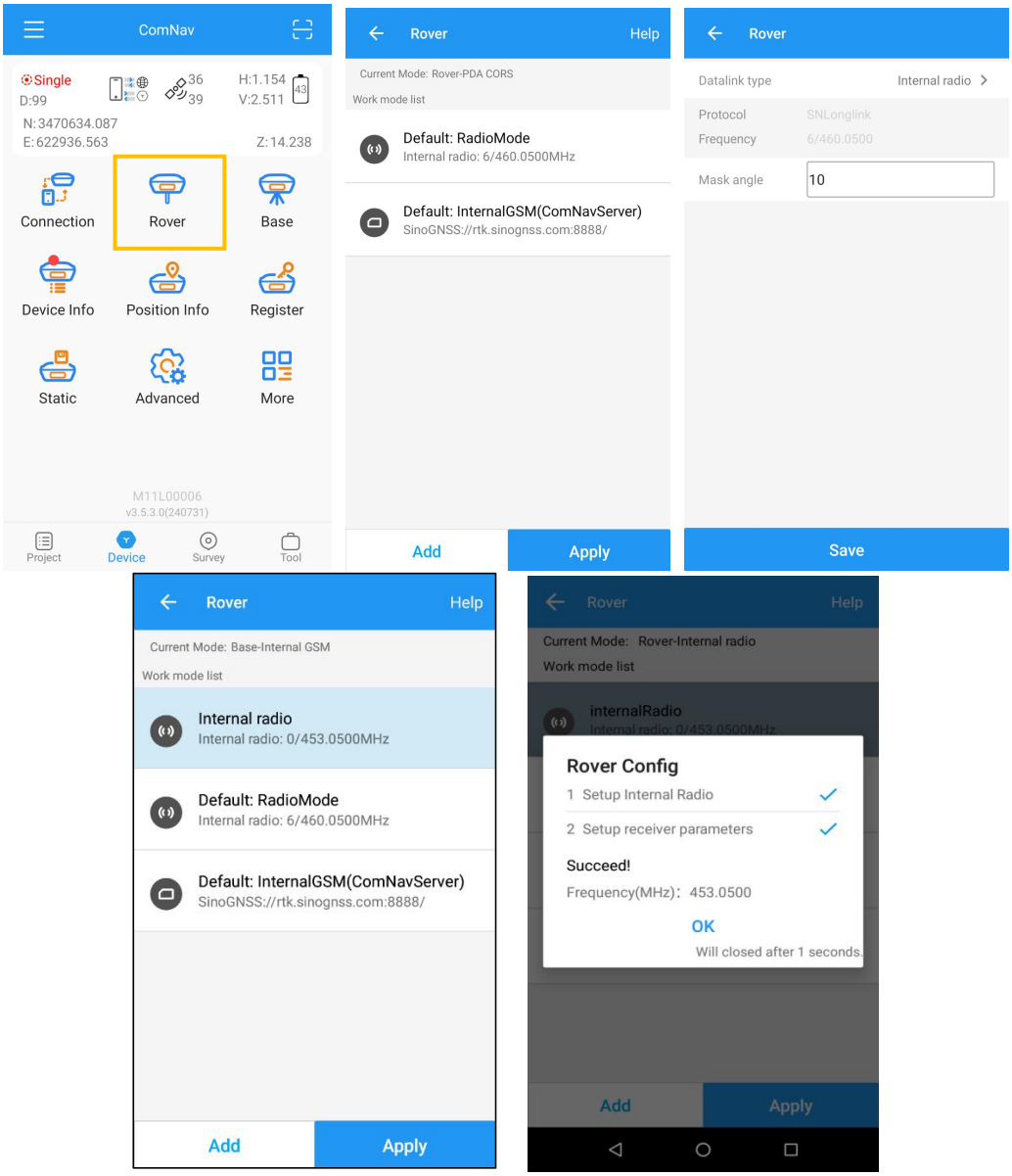


- ***Detail***: You can check the detail information of the work mode.
- ***Copy***: Copy the existed work mode, and paste to rename it.
- ***Modify***: If you find that the work mode you added has some error or just want to change based on the current work mode, you can click Modify button to change it.
- ***Share***: Share the work mode by sharing code
- ***Delete***: You can delete the work mode that you don't need.
- ***Generate QR code***: This is used to share the work mode QR code to other people or you can save the QR code picture for backup, users can use the Scan function to get the work mode.
- ***Cloud upload***: Upload your work modes to Cloud for backup.
- ***Cloud download***: Download the work modes from Cloud.

Tip: Delete and Modify are not available for default work modes.

5.5.2 Start Rover with internal radio mode

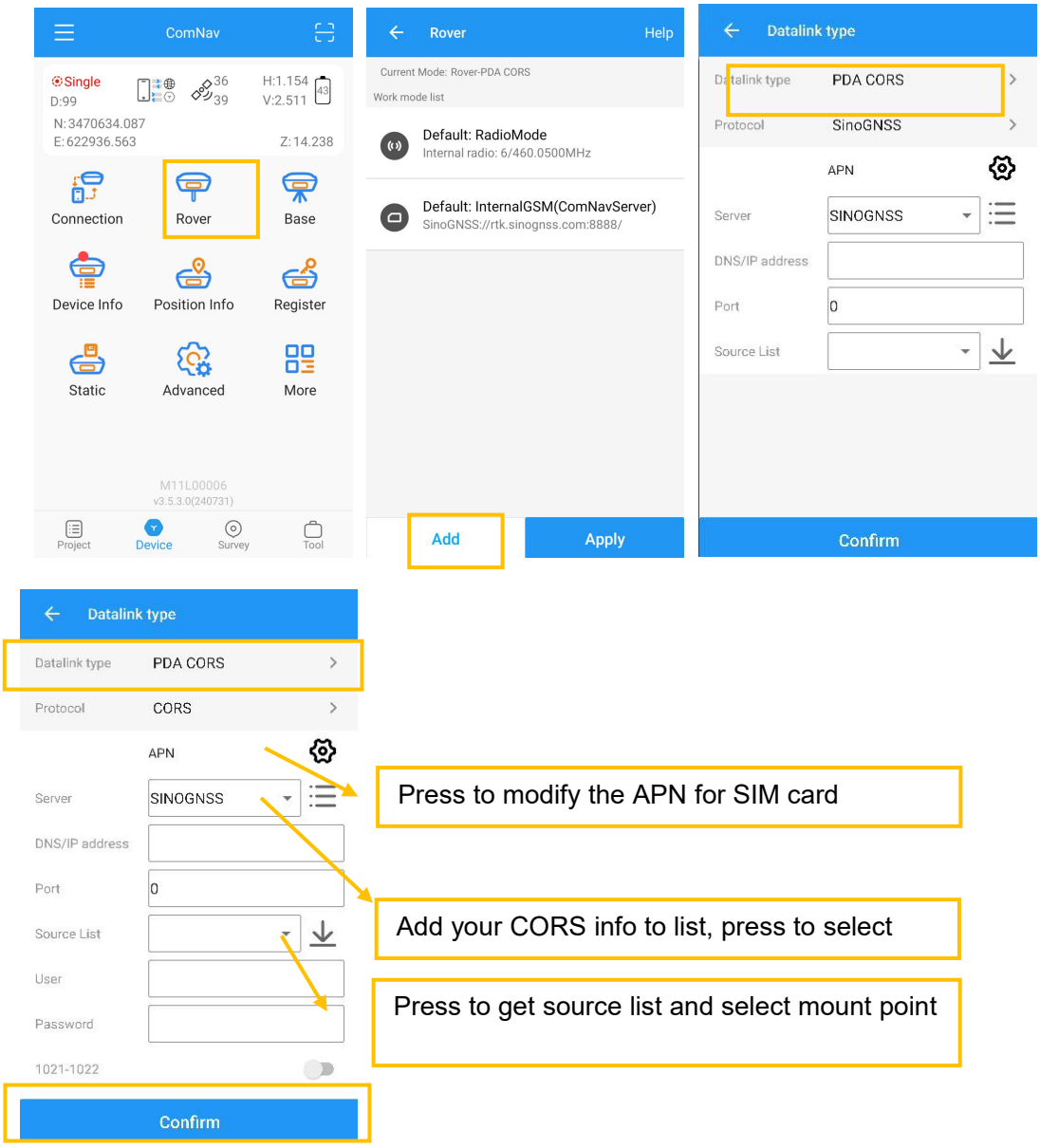
- Connect Survey Master with Jupiter receiver via WiFi or Bluetooth based on Chapter 5.4.
- Set same protocol and frequency with Base receiver.
- The current status on the bottom will change from Single to Fixed.



5.5.3 PDA CORS mode

For internal GSM need insert a SIM card to receiver, for PDA CORS need make sure controller can access to Internet.

You should enter the server IP and Port. In addition, enter User (login name) and Password to get Source List.



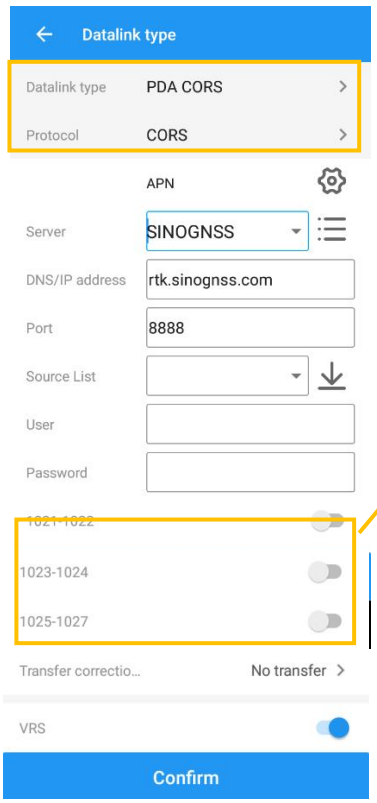
The protocol supports CORS, SinoGNSS, TCP.

SinoGNSS: This is the exclusive Ntrip protocol of ComNav, if you choose this protocol, then you will not be asked to enter the username and password.

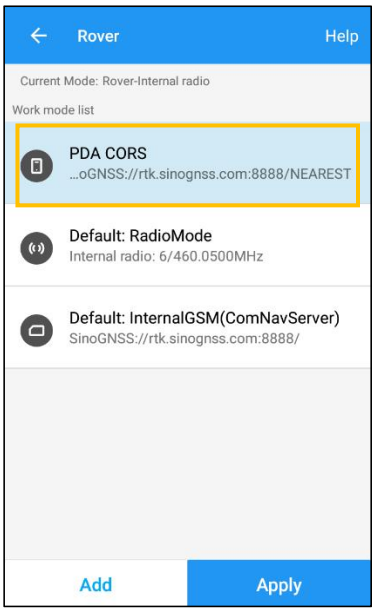
CORS: This is a common Ntrip protocol, you need to set the username and password.

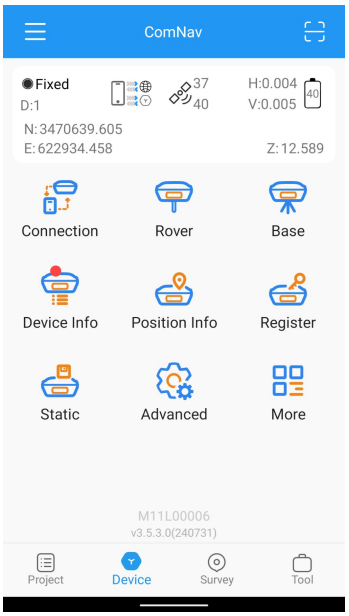
TCP: This is used to directly obtain the corrections transmitted by TCP protocol.

Transfer corrections: This function can only be used for N5 (K7 platform), T30 IMU. You can use this function to transmit the corrections from the base via internal radio, which needs you to install the whip antenna on your current receiver and another rover.



1021-1027 message is only available for PDA CORS mode, the message is used for datum correction for CORS.





Tip: L-Band is only for PPP function, using PPP function can get the station coordinates directly, and there is no limit with the distance of stations, the accuracy can be up to 3-5cm.

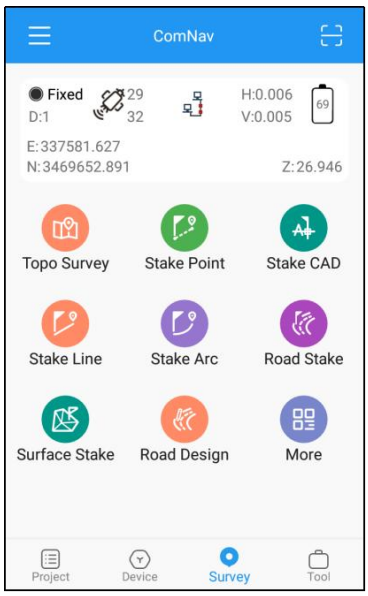
6. Basic Survey Functions

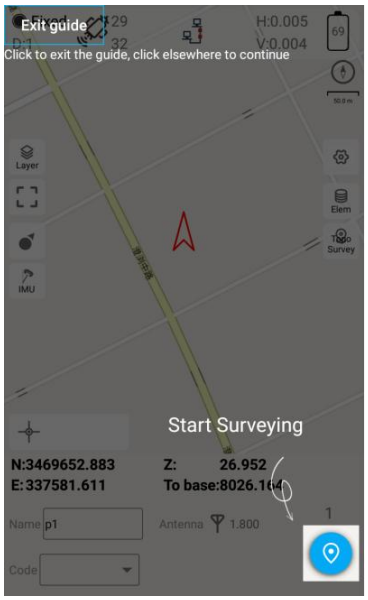
This section describes the basic survey functions of Survey Master, including point measurement, Topo survey, Auto survey, Area survey, Static, PPK, staking, site calibration, import and export measured points. You should make sure your Survey Master version supports to connect Jupiter.

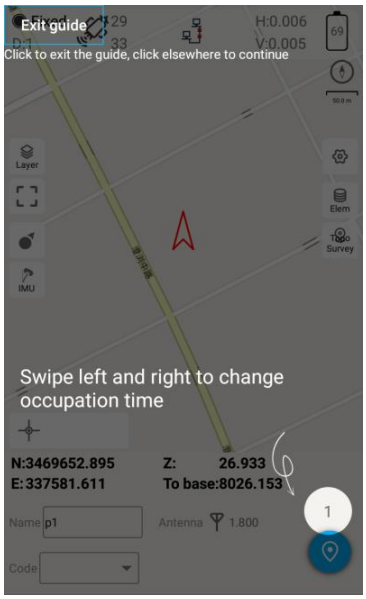
6.1 Topo survey

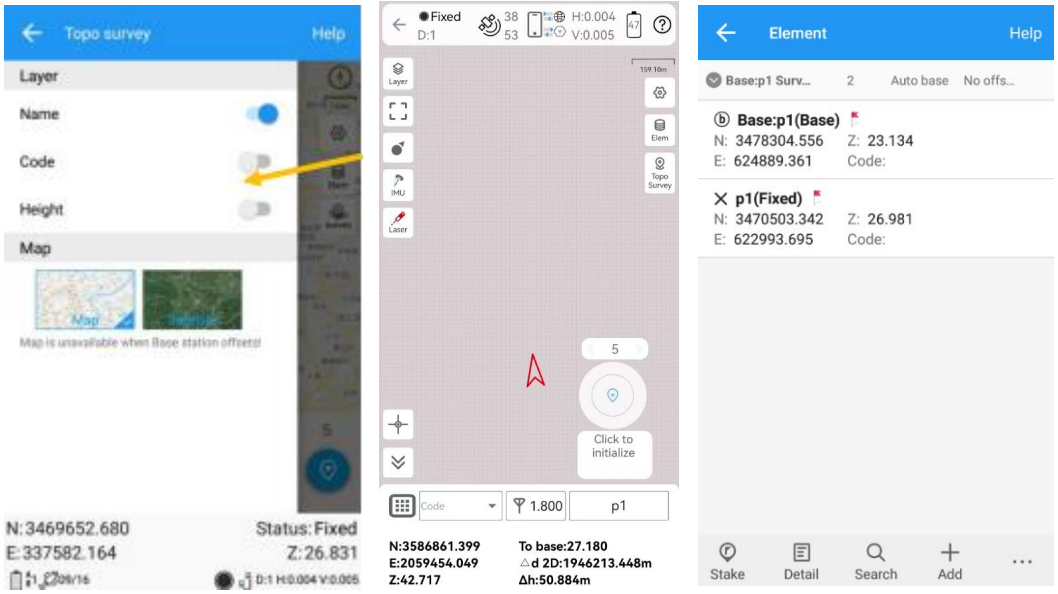
Click Topo Survey-> enter point name, ->click  to start or stop collecting data.

- You can quickly change antenna height in the survey interface.
- Tap Elem to check point coordinates.
- Tap Layer to show the layers you want display on map





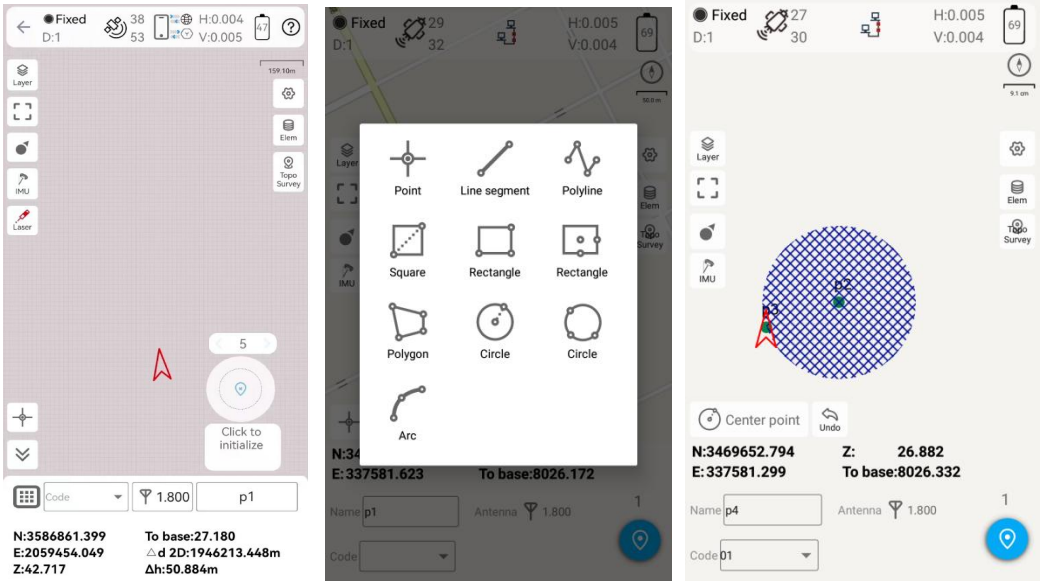




: Click this to show the whole points on the interface.

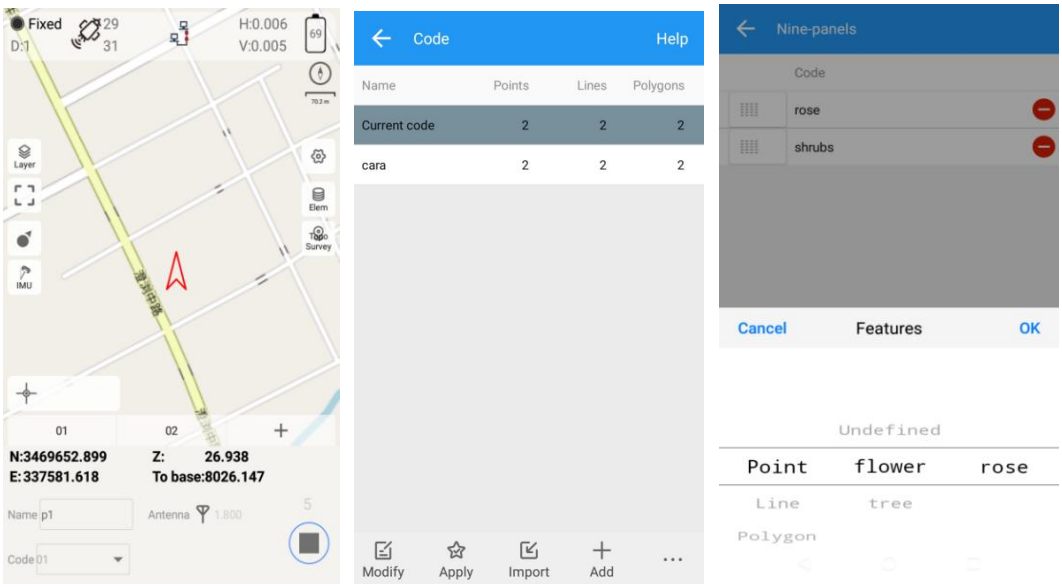
: If the arrow is out of sight on the interface, you can click this to locate the receiver position, then the arrow will be shown on the interface.

- Graphic survey: Tap the graphic button, after completing survey, will directly show the graphic on the map, you can export the graphic survey results as *.dxf format in Export interface.

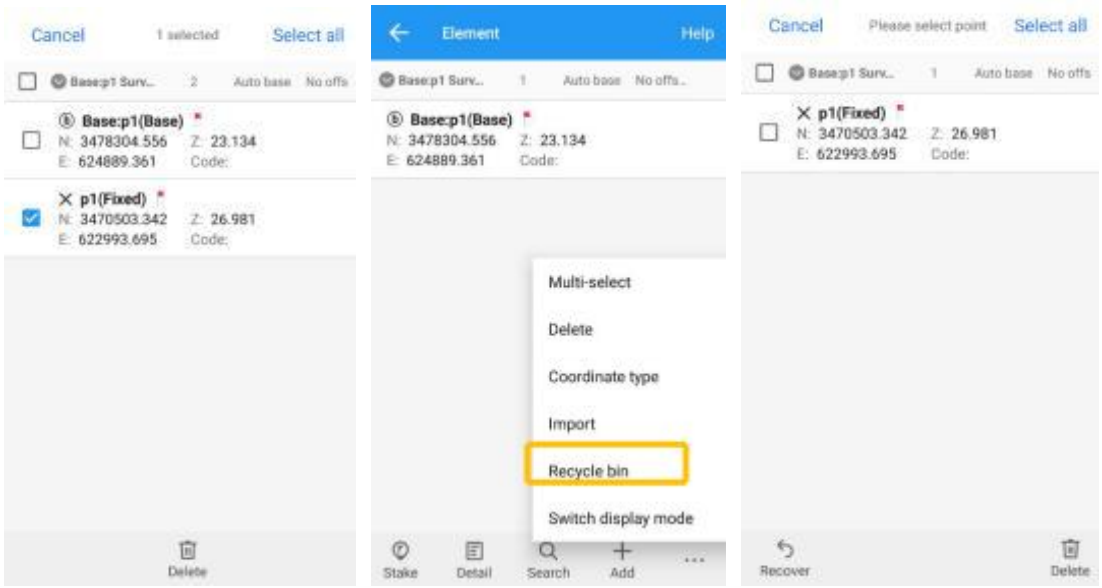


- Fast survey by pressing Code: Tap the code in nine panels, will survey the point directly.

- Go into code management interface to modify code list, then you can choose code to use in nine panels.

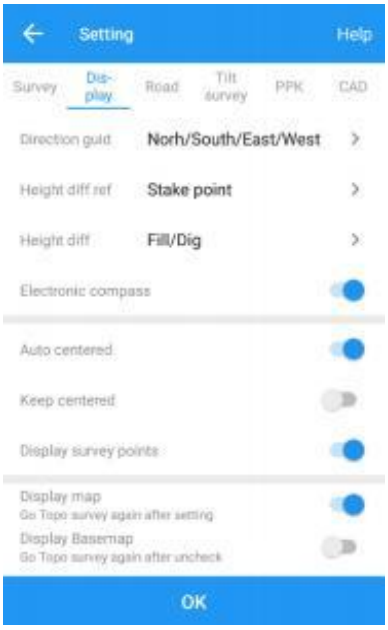


- Recover deleted points in Recycle Bin.



6.1.1 Survey settings

- Fixed: only fixed result can be saved;
- Duplicate name: allow point name same;
- RMS: point accuracy need higher than the value;
- Offset radius: point cannot offset bigger than the value during measure;
- Occupation time: measure times for one point;
- Point stepsize: for point name;
- Stake range: show circle when close to target point;



- Direction guide: 3 methods showing guide for stake out;
- Electronic compass: Use controller compass during stake out;
- Auto centered: Map will go to current location after 5 seconds;
- Keep centered: Map will go to current location after 1 second;
- Display survey points: will show all survey points on map;
- Display Basemap: for showing DXF/SHP file on map

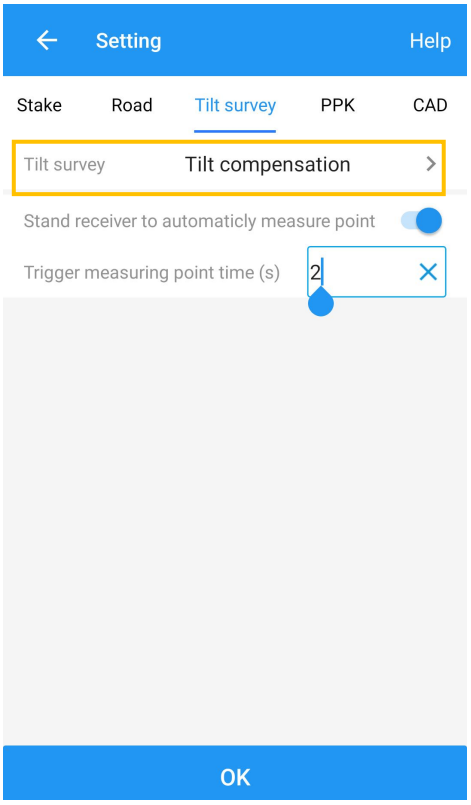
6.1.2 IMU Measurement

Tilt survey option will appear when receiver supports for tilt survey, it is available for ComNav Technology Jupiter Laser RTK, use IMU sensor.

There are two mode you can choose: Tilt compensation or Laser measurement.

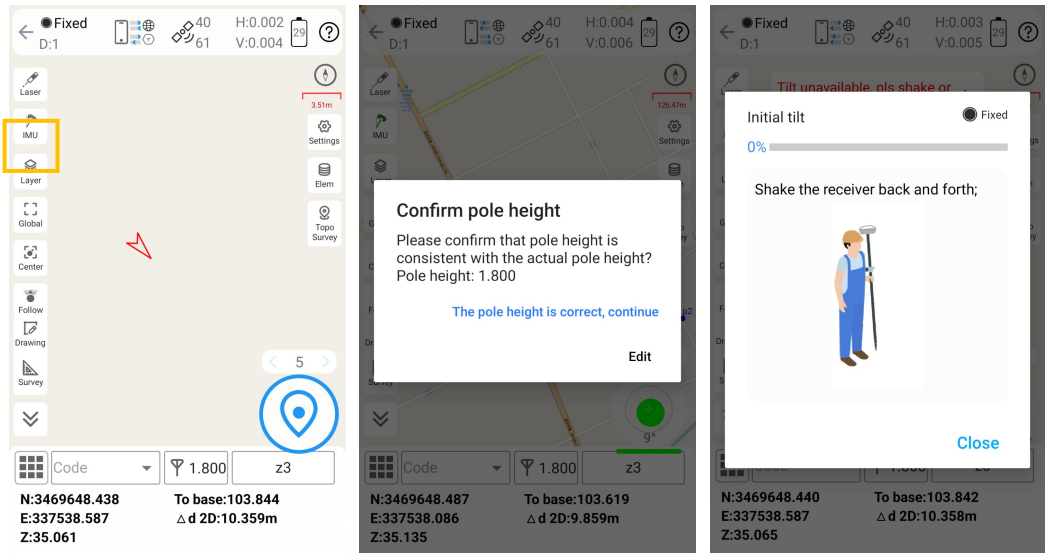
According to the IMU sensor, Jupiter can meet the requirement of high precision measurement. When the tilts within 60°, the built-in sensor based IMU precisely calculates the actual offset, which accuracy can up to 5.5 cm.

① Open Tilt compensation from Tilt survey in setting



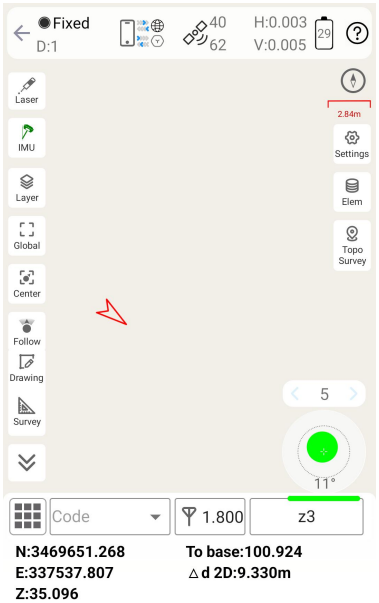
② Initialization

If you power off the receiver or freset it, need to initialize again. After open IMU button, you can follow the guidance in interface to complete it. During operation, make receiver can search the satellites and get a fixed solution.



Keep the receiver stationary Confirm pole height shake the receiver

In survey interface, you can find the bubble and angle value shows the pole you tilt. For more accuracy, angle less than 60°will be better.

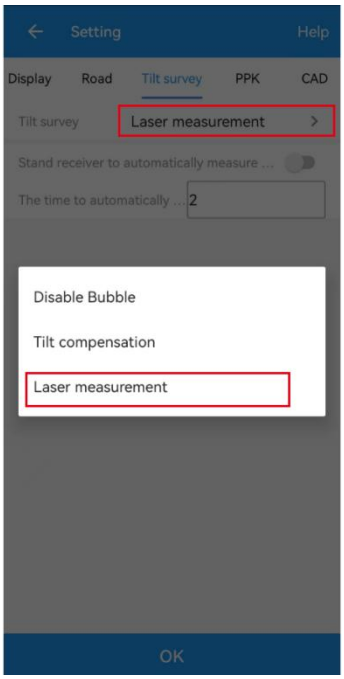


Tip: Do not shake or rotate the receiver violently, otherwise you need to re-initialize.

6.1.3 Laser Measurement

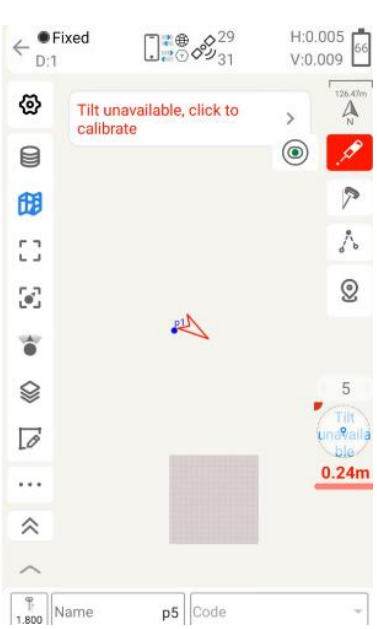
① Open Laser measurement from Tilt survey in setting

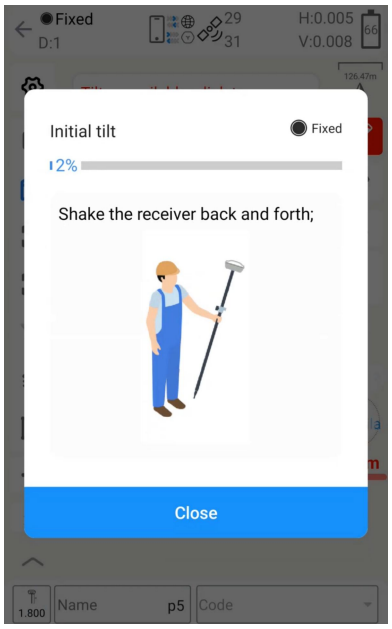
If you want to use Laser Measurement, you need go to Topo survey >> Setting>> tilt survey, change tile compensation to laser measurement.



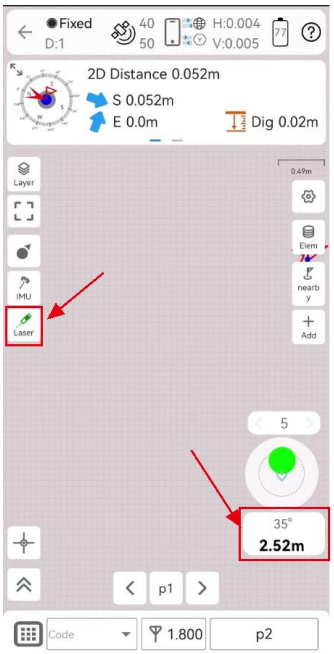
② Initialization

When you first time or long time no use, It may need to you initialize the laser. Go to topo survey, you will find laser button turn red. Make the receiver get fix and click it and do the Initialization.

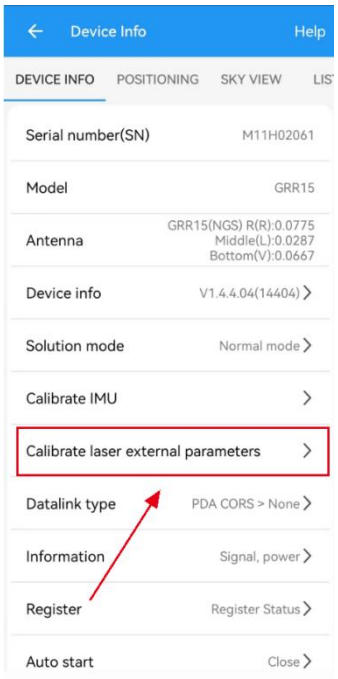


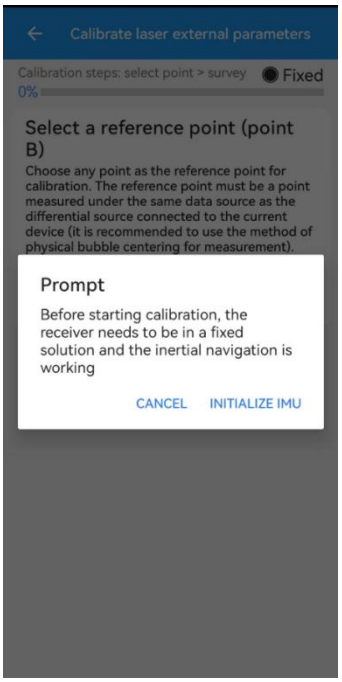


When you finish the Initialization, it will turn green. You can go to point stake to stake point B out to check laser accuracy.



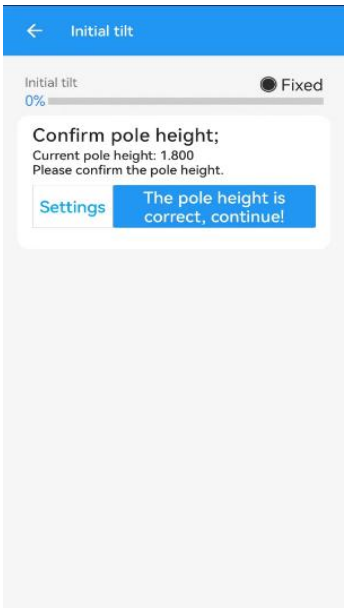
If you feel the accuracy of laser is not good, you need to go to Device >> Device info >> Laser initialization, start tile mode in survey interface and follow the steps to initialize the IMU. During operation, make receiver can search the satellites and get a fixed solution.

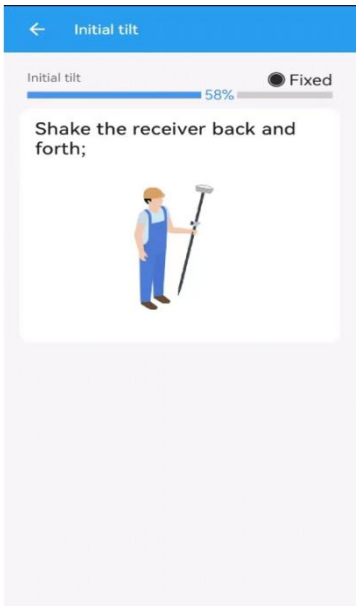




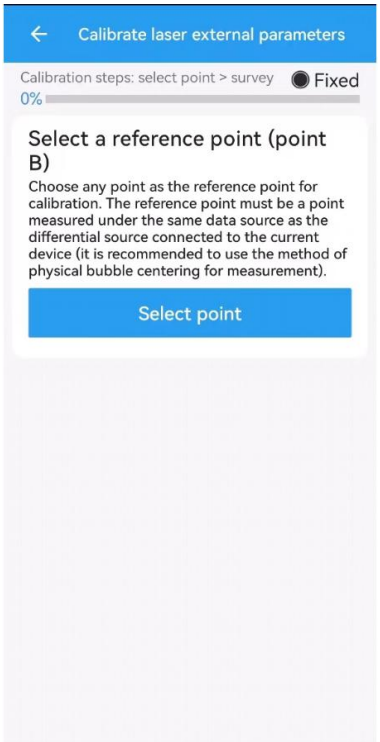
a) Making sure it gets fixed status

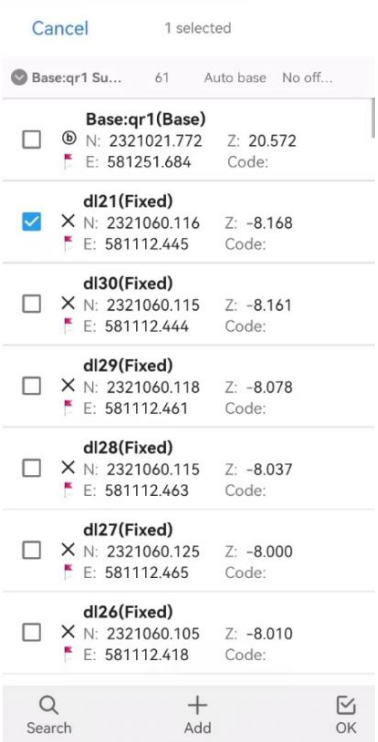
b) Because laser measurement is based on IMU module, you need to initialize IMU first, shake the receiver back and forth and finish IMU initialization.

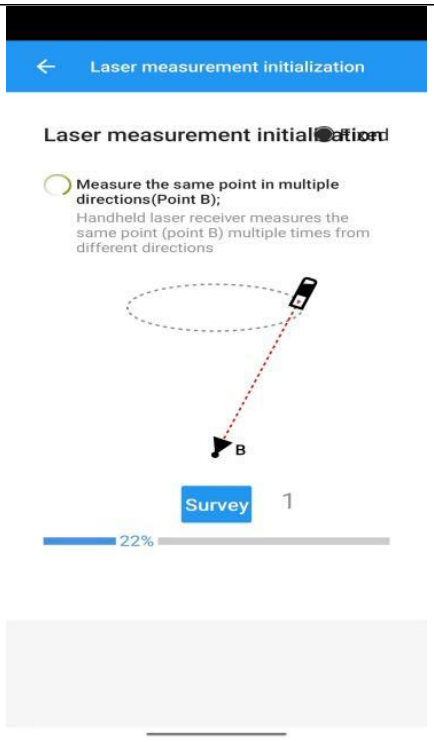


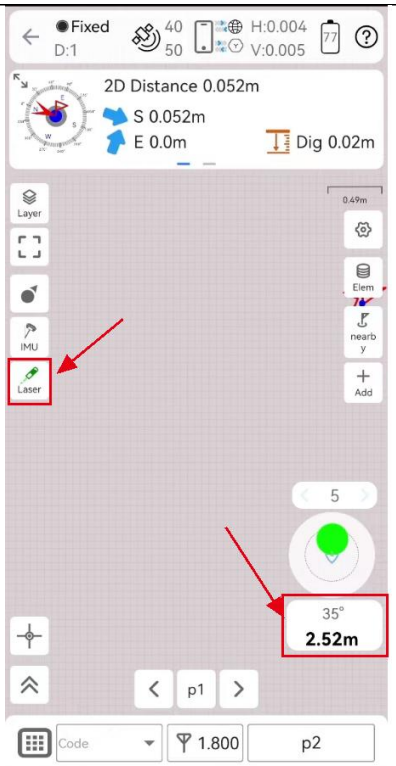


c) Then choose a base point B, handle the Laser receiver to measure the same point B 5 times from different directions. You'd better do laser initialization within 3 meters to decrease laser offset.









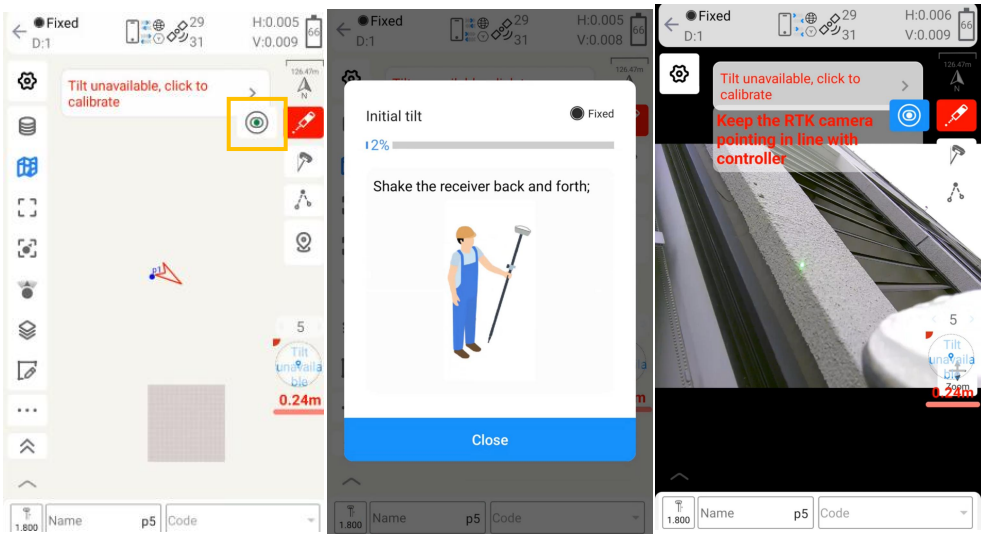
d) When you finish laser initialization, you can go to point stake to stake point B out to check laser accuracy.

In survey interface, you can find the bubble and angle value shows the pole you tilt, also laser distance. For more accuracy, angle should less than 60° , it will be better. And the laser icon will turn green, it means laser is ready to work.

Tip: Do not shake or rotate the receiver violently, otherwise you need to re-initialize IMU.

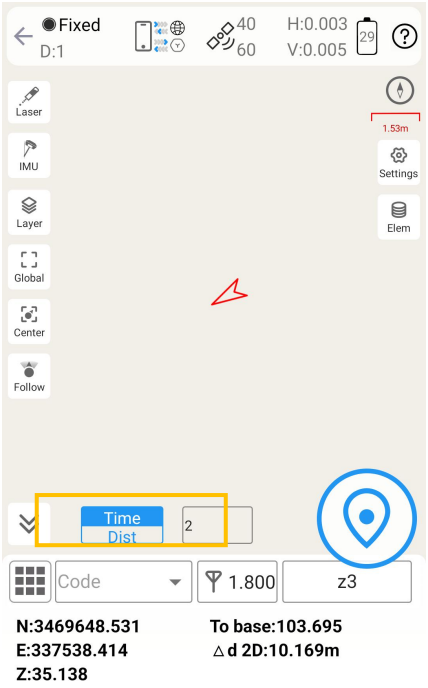
6.1.4 Visual Measurement

When you finish IMU and laser calibration, you can click camera button to start visual measurement. Camera can be switched on to help during measurement.



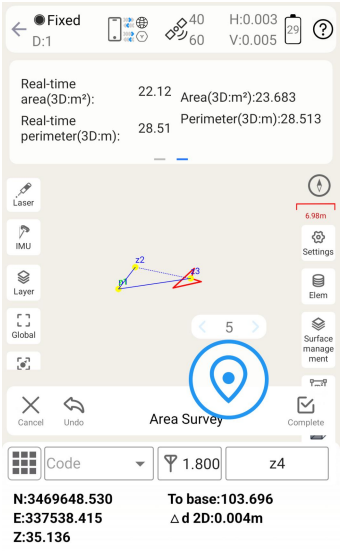
6.2 Auto survey/Area survey

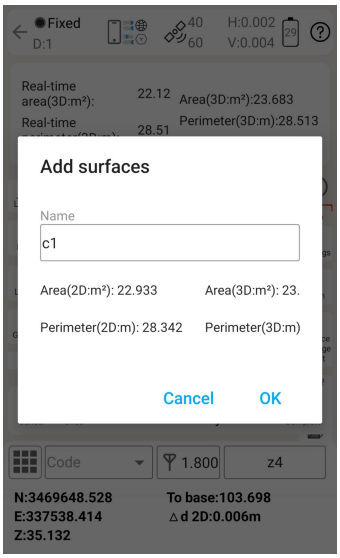
For Auto survey, it supports automatic and continuous survey according to Time or Distance.

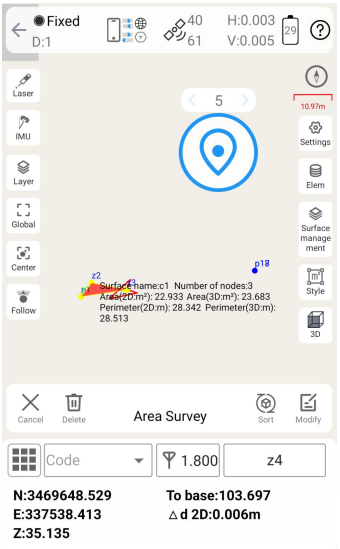


For Area survey, it can compute area directly after getting points.

Press , it will show the coordinate information, press , it will show the area result, press Shape , it will show the shape on map.



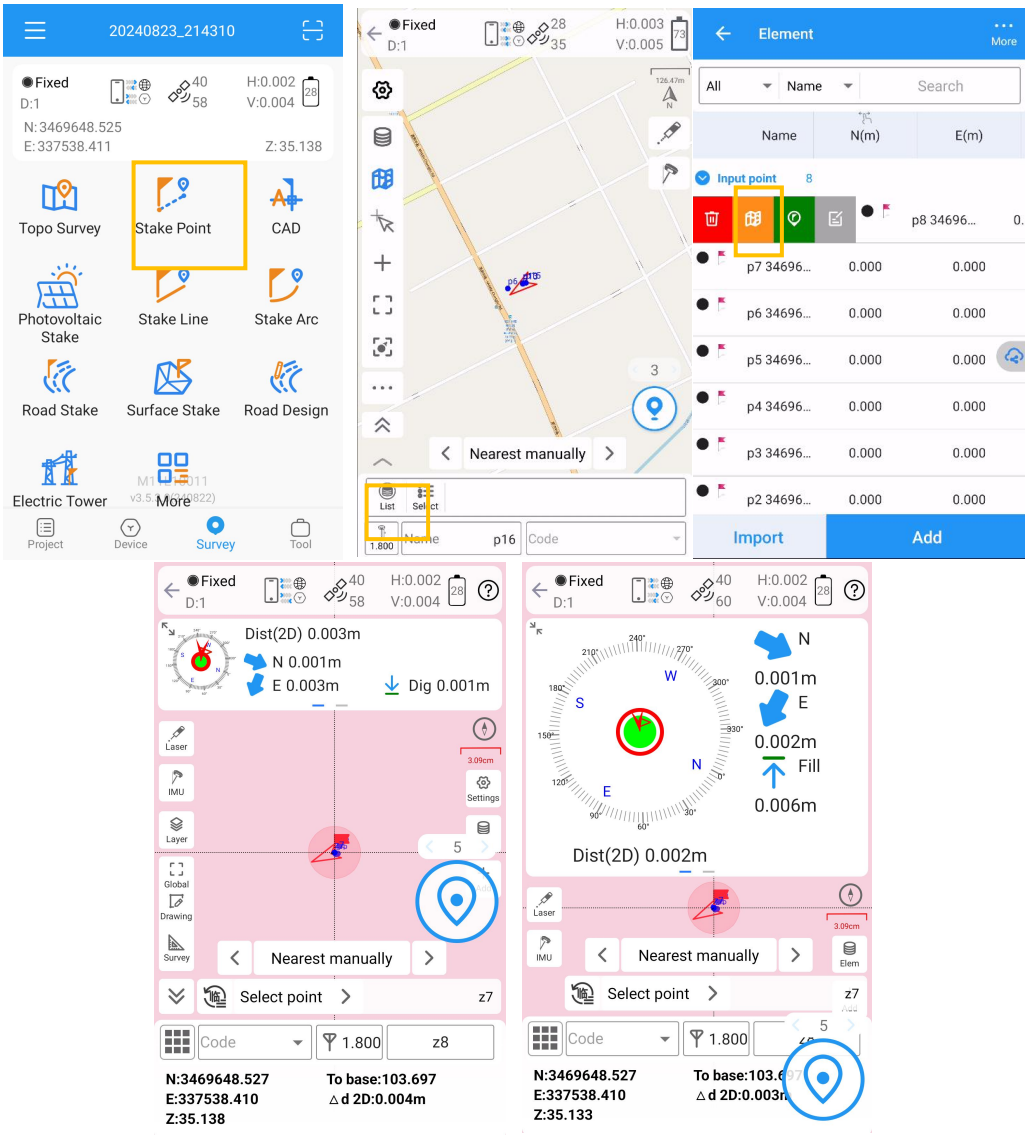




6.3 Stake Points/Lines

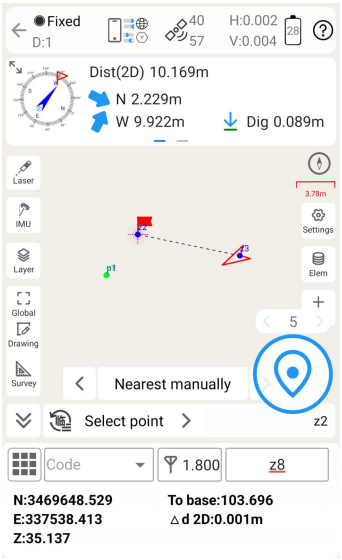
6.3.1 Stakeout Points

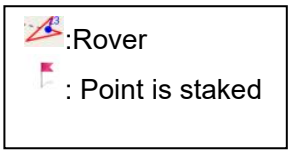
Go into Stake point interface, click to choose a point and tap Stake. Survey Master provides a navigation map when staking points/lines. If you are close to the target point enough, it will alarm you based on the alarm range you set.



Various navigation info choices

Tip: Survey Master supports to select the point on the screen directly, including the surveyed points and points from the background layer, when you click the point on the map, it will change to this point automatically, so you can stake it. For the points selected from background layer, they will be saved to the Element as the ***Map Selected Point*** *type*





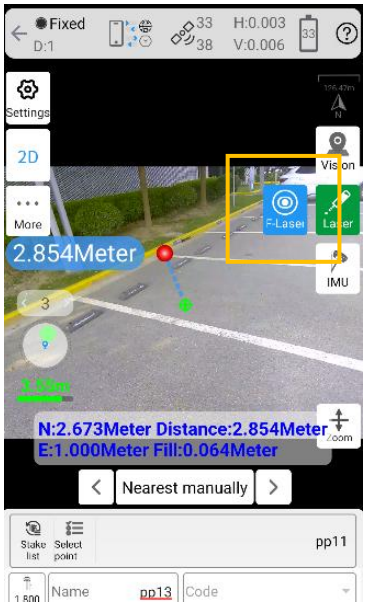
Tip: keep your receiver vertical to the ground.

For N5 receiver, T30 IMU receiver you can use IMU staking function. In the IMU staking, you can open IMU function, and don’ t need to keep the receiver vertical to the ground, and the tilt angle supports maximum to 60 degrees.

For Mars receiver, Mars pro receiver and Venus receiver, you can use laser staking function. In the laser staking, you can open laser function, and no need to keep the receiver vertical to the ground

6.3.2 Visual Stakeout

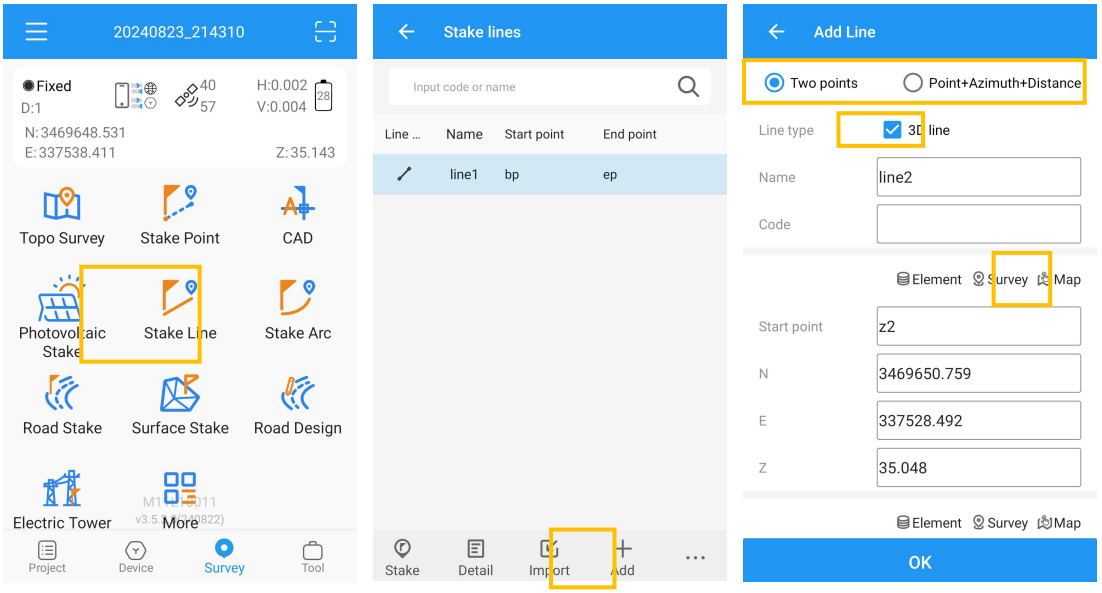
Visual Stake: Connect the Jupiter and click on the Visual icon to enter visual stake mode. It support 2D/3D stake. And it will switch from front camera to bottom camera according to the distance to target coordinate.

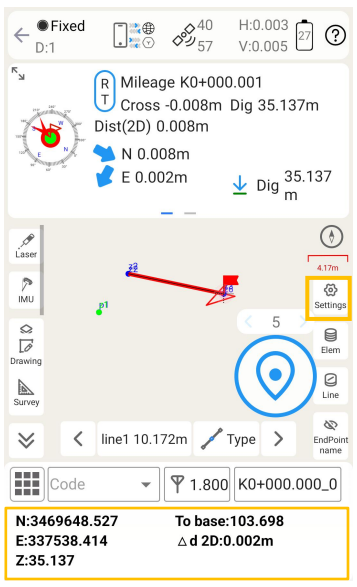


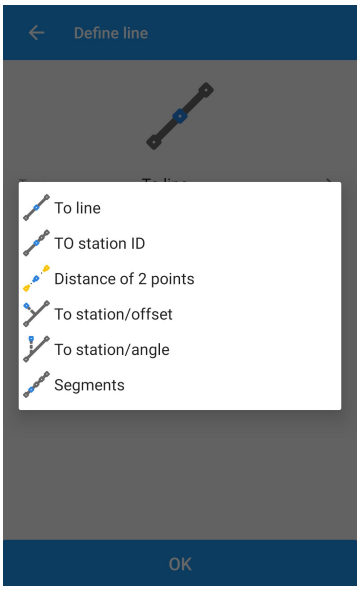
6.3.3 Stake line

For staking line, click Add -> add line (Two points or Point + Azimuth + Distance) -> click OK -> Choose one line and click Stake. It will show all the lines you added. The default method to stake is “To line”, press method to choose a method you want.

Survey Master supports to select the line which is from the background layer, the selected from the background layer will be saved to the line library.





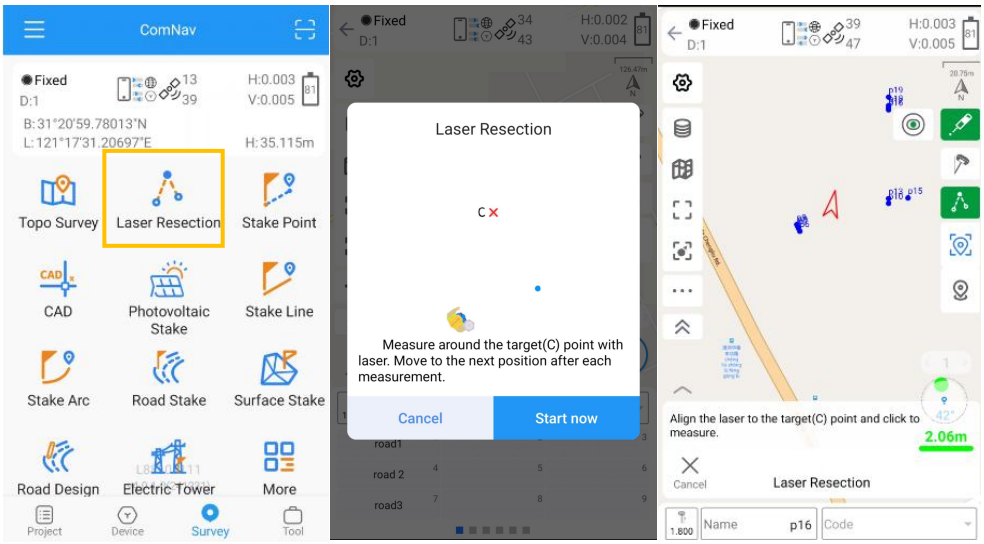


- To line: show shortest way to find a point on line;
- To station ID: stake points on line by defined interval;
- Distance of 2 points: show distance of current location to the line’s start point and end point;
- Segment: Stake

6.4 Laser Resection

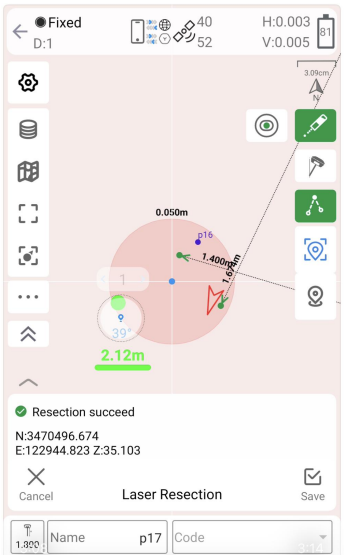
When Connect a device that supports laser, and the Laser Resection function will appear in the survey interface.

The Laser Resection icon will appear in the right sidebar of the Topo survey.

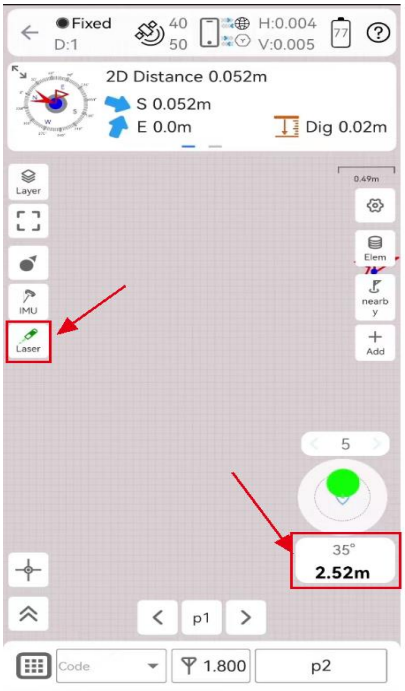


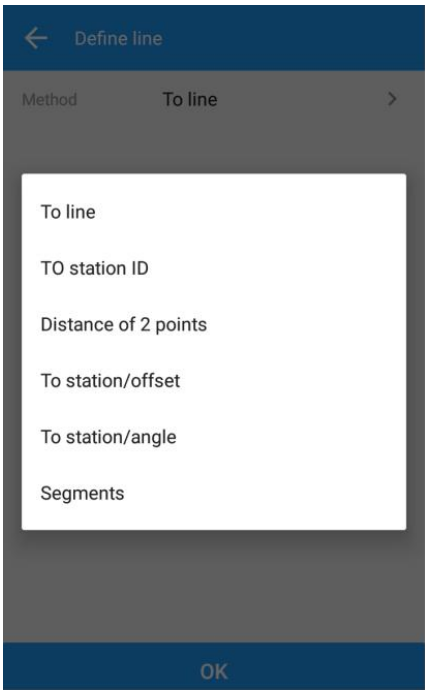
Click on the Laser Resection button to automatically turn on the laser and initialize the tilt, after initialization is complete you can click on the survey button to measure points.

Each measurement point should be moved to the next position, unqualified measurement points will not be recorded, at least two points need to be recorded to save the results of the intersection.



You can view the current accuracy result by checking the accuracy bar of the intersection point below, when the intersection result is not satisfactory, it cannot be saved, you need to continue to measure and improve the accuracy bar to save the measurement result.



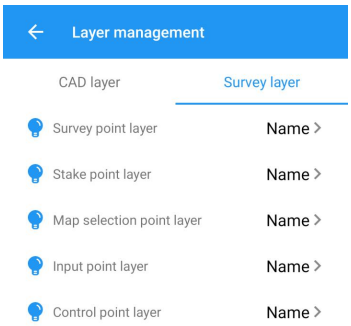


- To line: show shortest way to find a point on line;
- To station ID: stake points on line by defined interval;
- Distance of 2 points: show distance of current location to the line's start point and end point;
- Segment: Stake on line by defined segment value.

7. CAD

In survey master, we can import CAD file to do survey and stake out work.

Survey layer： Modify the colour and font size of measured points, release points, map points, visible status of the input points layer, point symbols, point names, elevation and code labels in the measurement layer.



Global: All elements on the diagram are centred.

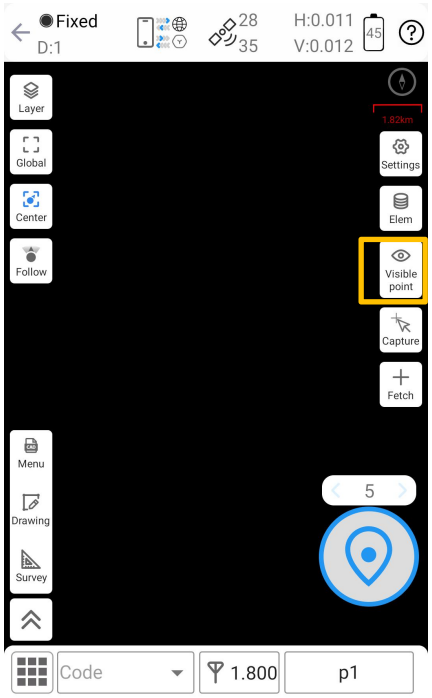
Center: Click to turn on real-time centering, and the current position is centred in the middle of the CAD interface.

Follow: Click to turn on the view mode, the CAD drawing orientation changes according to the handbook orientation.

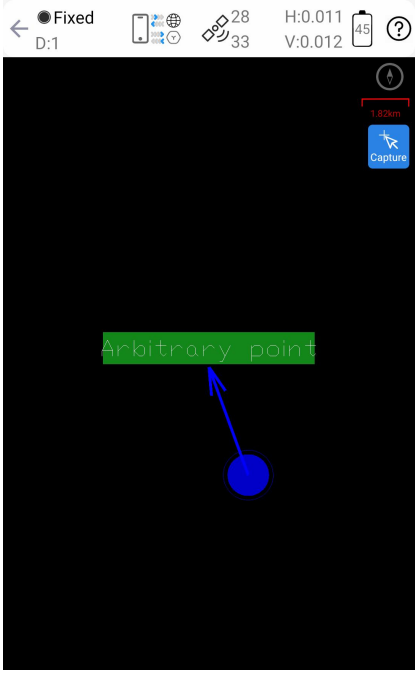
Settings: Go to Setup Options for Measurement, Sampling, Road, PPK, CAD, and Information Fields.

Elem: Access to the point library to view measured point information.

Invisible point: There are two modes: visible point mode and hidden point mode. In visible point mode, all the points in the CAD interface will be displayed, while in hidden point mode, all the points in the CAD interface will not be displayed.



Capture:Click the Snap button to display the type of point currently being snapped.



Fetch: Extract feature points from CAD drawings, providing: points, centres, nodes.

Vision: After connecting the vision receiver and the CAD enters the release mode, after selecting the release target on the CAD, the vision image is switched on and the virtual points are displayed on the image.

CAD function support measure and stakeout.

Stake points: Use arrow to select points

Measure point：Click measure icon to save current coordinate

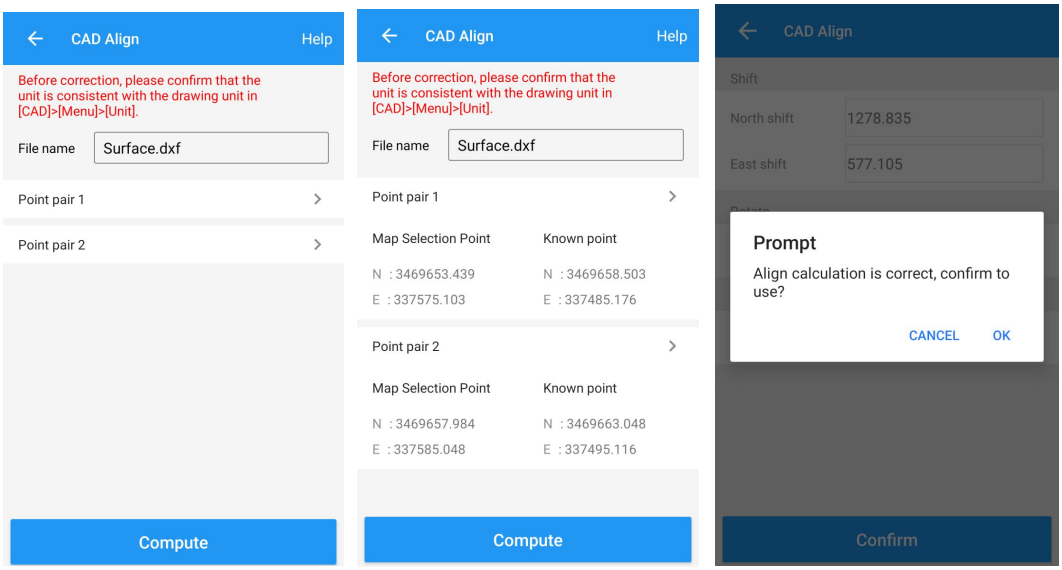
7.1 CAD Menu

Open: When you click Open, it will browse all dxf &dwg files in the controller, you can enter the file name and search the file quickly;

Save as: When you edit the dxf file, you can save the file as a new file;

Align: This is used to calibrate the dxf file coordinate, you need two pairs of the coordinate, we usually use two sets of points on the diagonal.

Firstly, specify a source point on the graph, use the graph selection function to select it, enter the correct coordinates (or click on the text of the coordinates on the graph), and then use the same method to determine the coordinates of the second source point, which will appear as shown in the figure The prompts indicate that the correction is correct, and then click to confirm it.



Unit: Some users use non-metric units when drawing CAD drawings, so when you use Stake CAD, you should select the corresponding unit to stake out, Survey Master supports meter, international feet, US Survey feet, centimeter, millimeter.

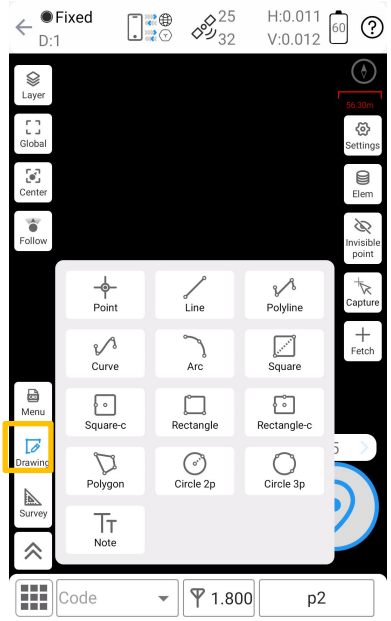
Background: Edit background color, supports white, black, gray, black is by default, after you change the color, it will not change when you restart the software or switch project;

CAD Datum: In most cases, the user uses the world coordinate system by default. If the user coordinate system is set, for example, for the convenience of drawing, the coordinate system is moved to the plan view of an object. In this case, the user should select User coordinate system in Survey Master.

Capture mode: After you check on these items, when the selection tool approached you can capture them easily.

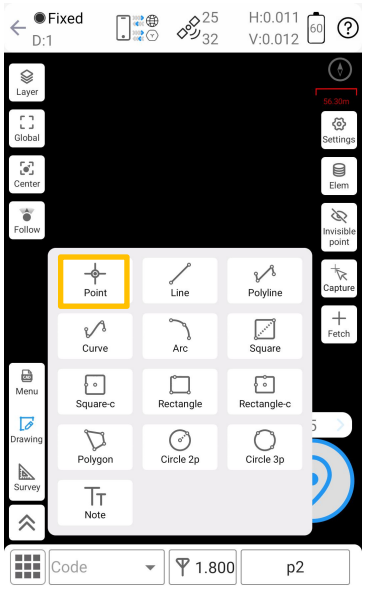
Redraw: When the CAD file is not refreshed at the real time, you can click Redraw to refresh file.

7.2 CAD Drawing



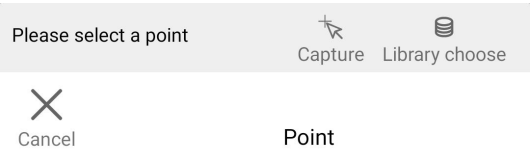
7.2.1 Point

Points can be drawn by clicking on the map, selecting points with the Capture tool, or selecting points from Element, and entering the point name.

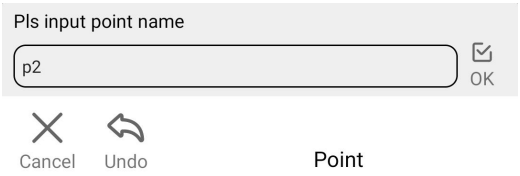


The drawing steps are as follows:

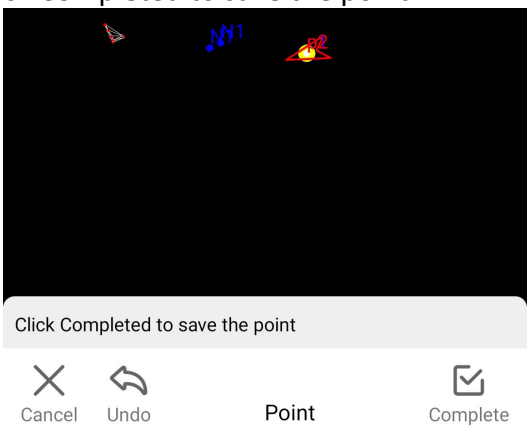
1) You can select points by clicking on the map, selecting points with the Capture tool, or selecting points from Element. The selected points will be displayed in yellow. Click Cancel can exit the point drawing operation.



2) The bottom prompts "Pls input point name". Enter the name of the drawing point. Click Undo to return to the previous step.



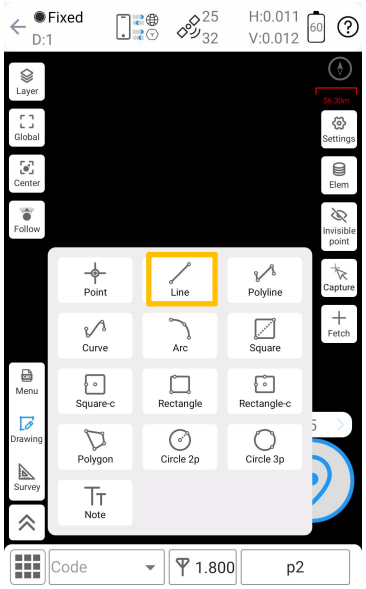
3) Click OK, a red point name will appear on the selected point, and the bottom of the interface will prompt "Click Completed to save the point".



4) Click Completed to complete the point drawing operation.

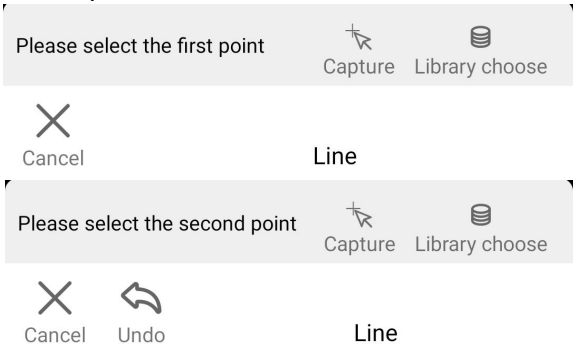
7.2.2 Line

You can select two points by clicking on the map, selecting 2 points with the Capture tool, or selecting 2 points from Element, and automatically connect them to draw a line.

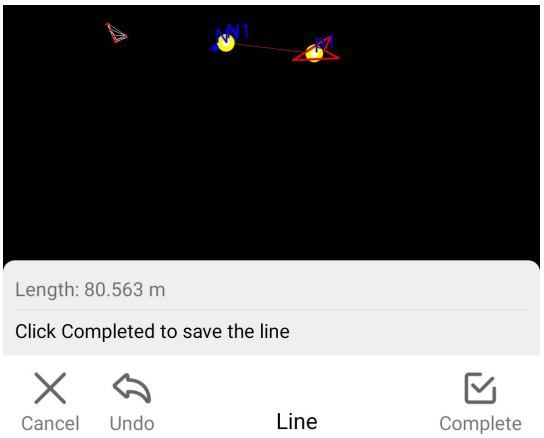


The drawing steps are as follows:

1) Select the first point by clicking on the map, selecting points with the Capture tool, or selecting points from Element. The selected point will be displayed in yellow and will not be saved to Element. You can click Cancel, which will exit the drawing mode. Clicking Undo will cancel the selected point.



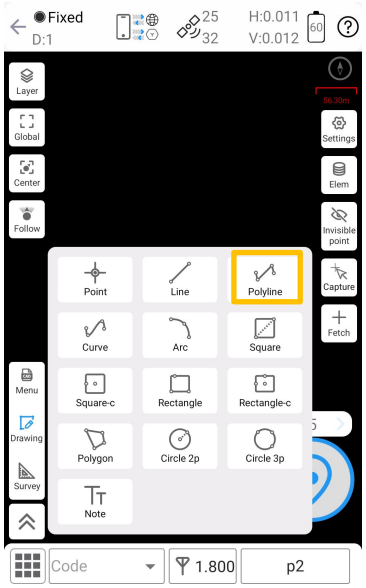
2) After completing the first point, you will be prompted to select the second point, which is the same as the first point. After completing the point selection, you will be prompted below to click Completed to save the line.



3) After clicking Completed, the line is successfully created.

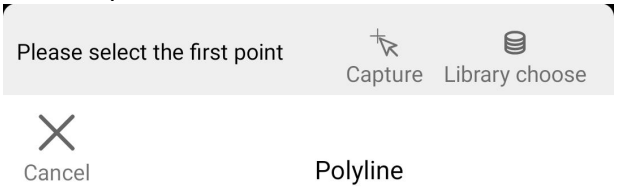
7.2.3 Polyline

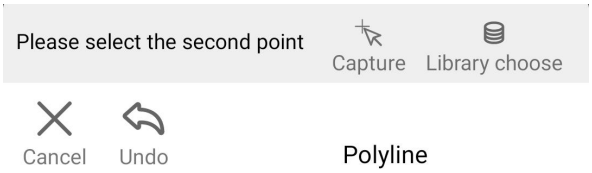
You can select multiple points by clicking on the map, selecting points with the Capture tool, or selecting points from Element. They will be automatically connected into polyline in the order of selection.



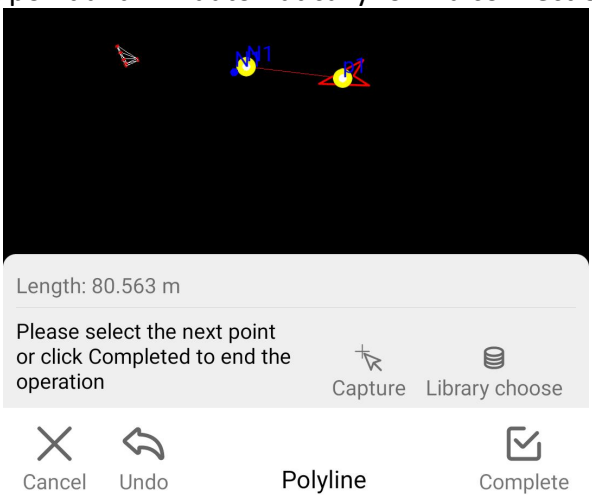
The drawing steps are as follows:

1) Select the first point by clicking on the map, selecting points with the Capture tool, or selecting points from Element. The selected point will be displayed in yellow and will not be saved to Element. You can click Cancel, which will exit the drawing mode. Clicking Undo will cancel the selected point.

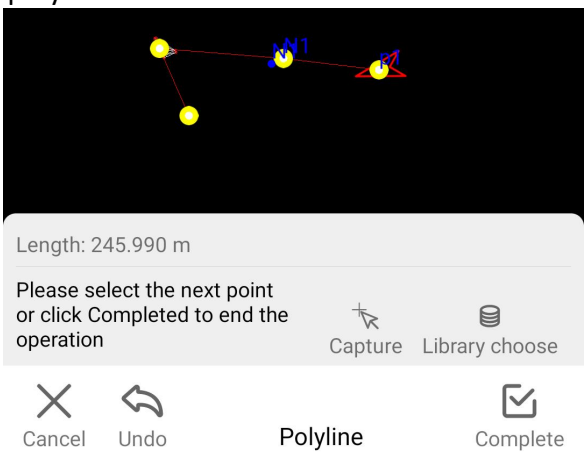




2) After completing the first point, you will be prompted to select the second point, which is the same as the first point and will automatically form a connection with the first point.

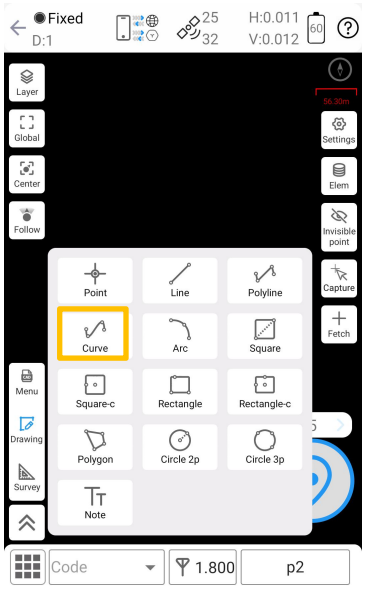


3) After completing the selection of the second point, you will be prompted below to select the next point or click Completed. You can continue to select points or click Completed to save the polyline.



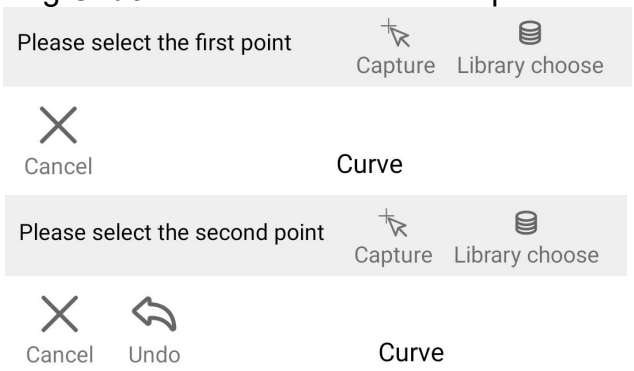
7.2.4 Curve

You can select multiple points by clicking on the map, selecting points with the Capture tool, or selecting points from Element. They will be automatically connected into curve in the order of selection.

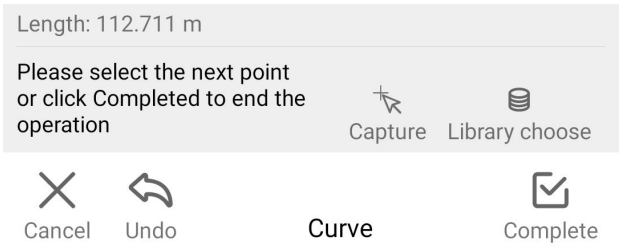


The drawing steps are as follows:

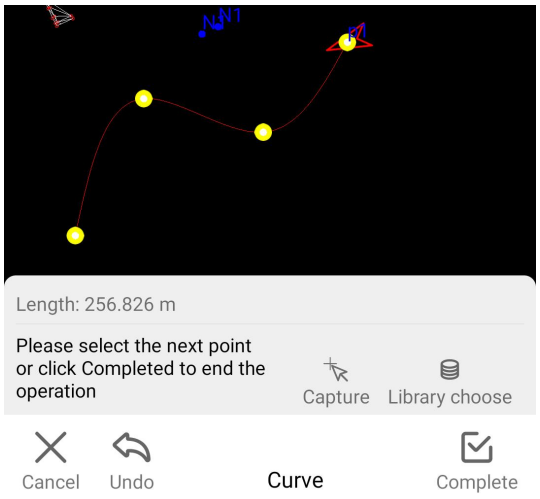
1) Select the first point by clicking on the map, selecting points with the Capture tool, or selecting points from Element. The selected point will be displayed in yellow and will not be saved to Element. You can click *Cancel*, which will exit the drawing mode. Clicking *Undo* will cancel the selected point.



2) After completing the first point, you will be prompted to select the second point, which is the same as the first point and will automatically form a connection with the first point.

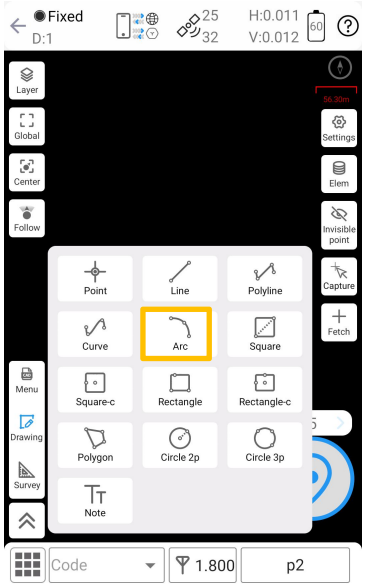


3) After completing the selection of the second point, you will be prompted below to select the next point or click *Completed*. You can continue to select points or click *Completed* to save the polyline.



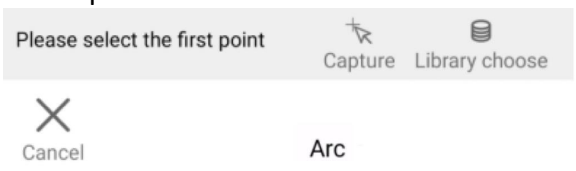
7.2.5 Arc

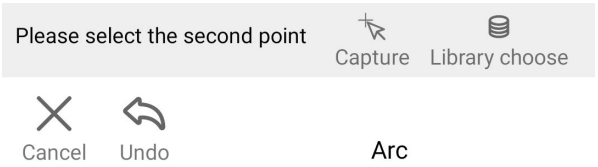
You can select multiple points by clicking on the map, selecting points with the Capture tool, or selecting points from Element. They will be automatically connected into Arc in the order of selection.



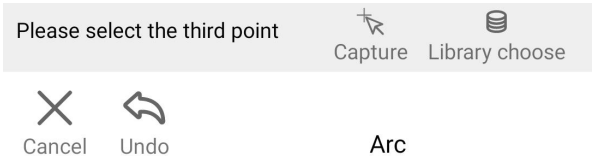
The drawing steps are as follows:

1) Select the first point by clicking on the map, selecting points with the Capture tool, or selecting points from Element. The selected point will be displayed in yellow and will not be saved to Element. You can click Cancel, which will exit the drawing mode. Clicking Undo will cancel the selected point.

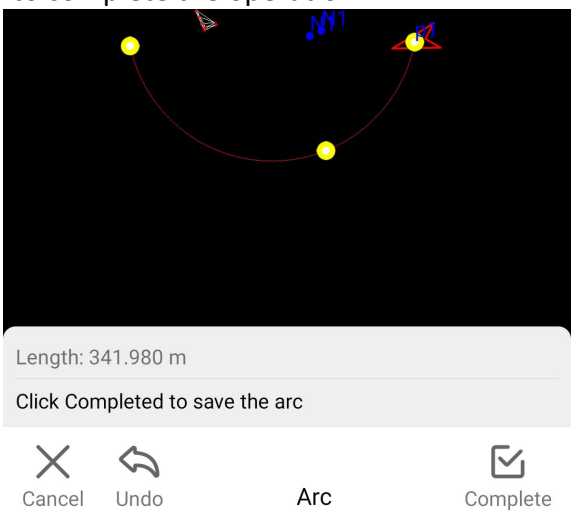




2) After completing the first point, you will be prompted to select the second point, which is the same as the first point.

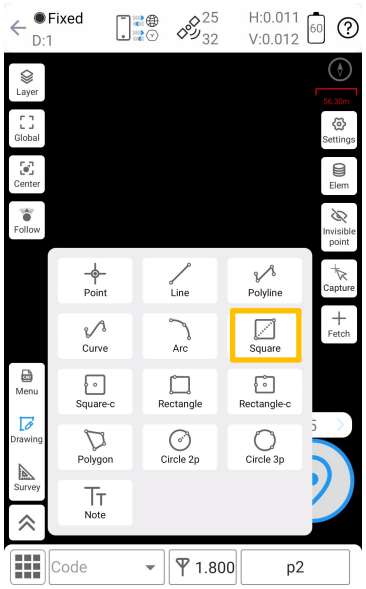


3) After completing the selection of the second point, you will be prompted below to select the third point. After selecting the point, connect it with the first two points to form an arc. Click Completed to complete the operation.



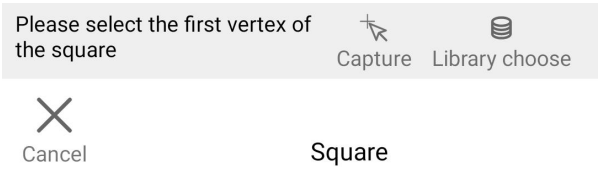
7.2.6 Square

You can select the first vertex and the second vertex of the square to complete the square by clicking on the map, selecting points with the Capture tool, or selecting points from Element.

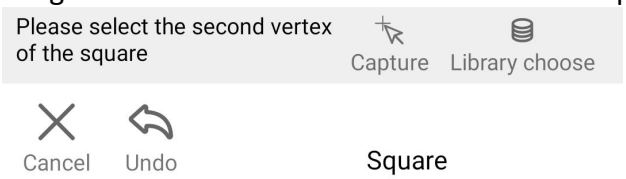


The drawing steps are as follows:

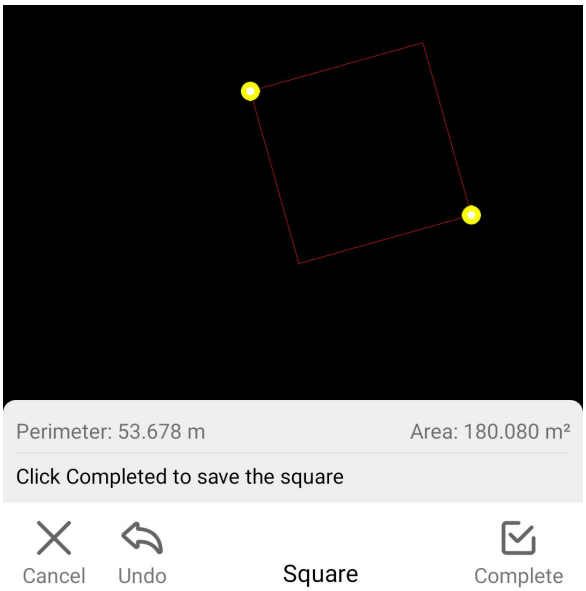
1) Select the first vertex of the square by clicking on the map, selecting points with the Capture tool, or selecting points from Element. The selected point will be displayed in yellow and will not be saved to Element. You can click Cancel to exit the drawing mode.



2) After completing the first point selection, select the second vertex by clicking on the map, selecting points with the Capture tool, or selecting points from Element. The selected point will be displayed in yellow and will not be saved to Element. You can click Cancel to exit the drawing mode. Click Undo will cancel the selected point.

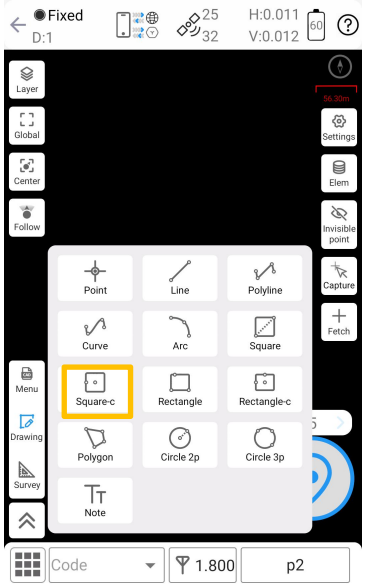


3) After completing the selection of the second vertex, the bottom prompts "Click Completed to save the square". Click Completed to complete the square drawing.



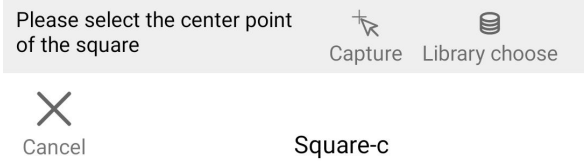
7.2.7 Square-c

You can select the center point and the border points to form a square by clicking on the map, selecting points with the Capture tool, or selecting points from Element.

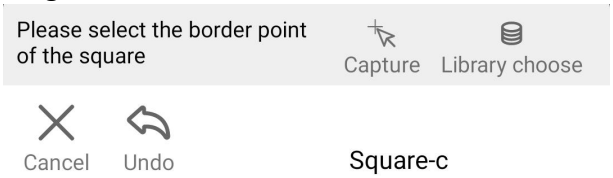


The drawing steps are as follows:

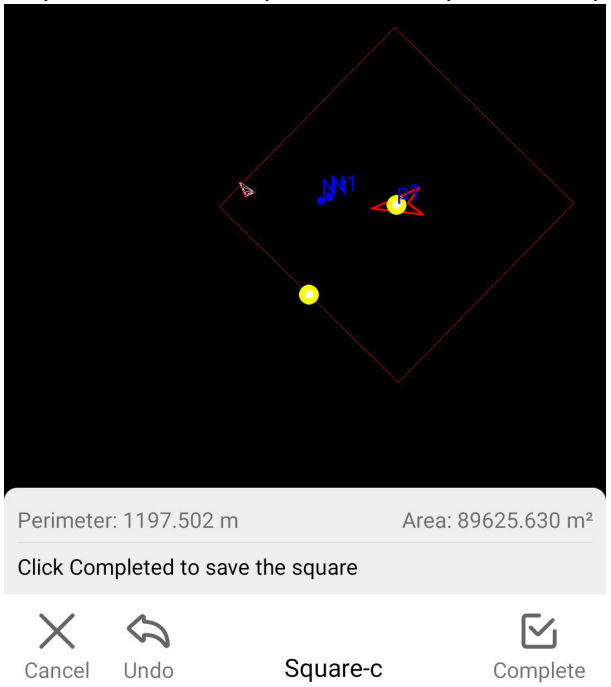
1) Select the center point of the square by clicking on the map, selecting points with the Capture tool, or selecting points from Element. The selected point will be displayed in yellow and will not be saved to Element. You can click Cancel to exit the drawing mode.



2) After completing the center point selection, select the square border point by clicking on the map, selecting points with the Capture tool, or selecting points from Element. The selected point will be displayed in yellow and will not be saved to Element. You can click Cancel to exit the drawing mode. Click Undo will cancel the selected point.

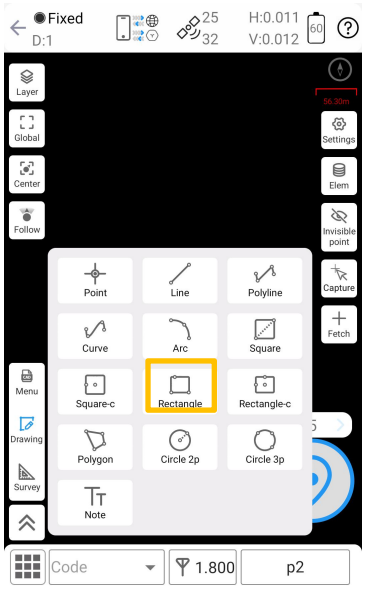


3) After completing the selection of the square border point, the bottom prompts "Click Completed to save the square". Click Completed to complete the square drawing.



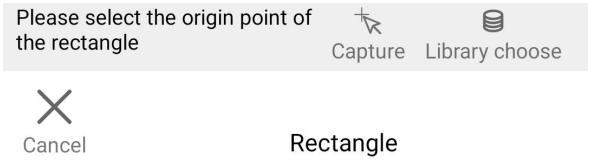
7.2.8 Rectangle

You can select the origin point of the rectangle, the width limit point and the height limit point to complete the rectangle by clicking on the map, selecting points with the Capture tool, or selecting points from Element.

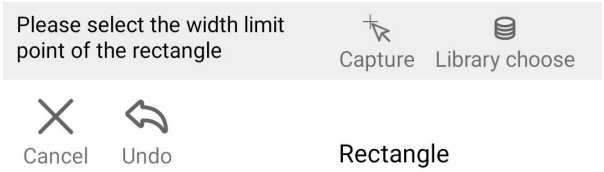


The drawing steps are as follows:

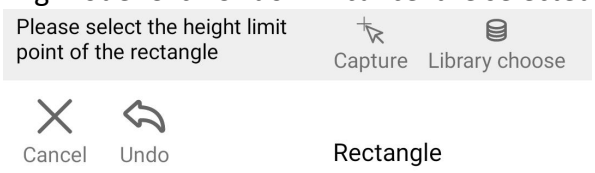
1) Select the origin point of the rectangle by clicking on the map, selecting points with the Capture tool, or selecting points from Element. The selected point will be displayed in yellow and will not be saved to Element. You can click Cancel to exit the drawing mode.



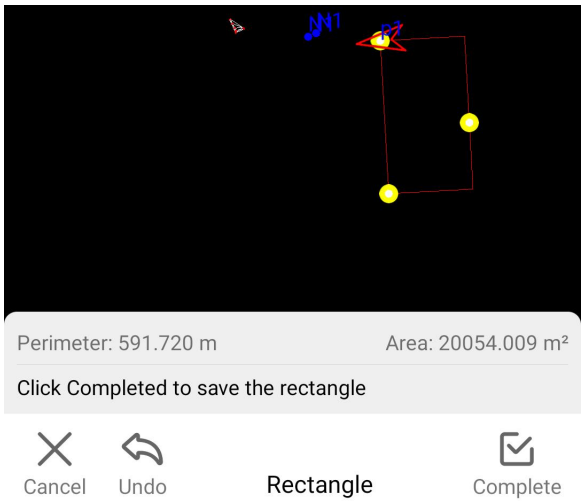
2) After completing the origin point selection, select the width limit point by clicking on the map, selecting points with the Capture tool, or selecting points from Element. The selected point will be displayed in yellow and will not be saved to Element. You can click Cancel to exit the drawing mode. Click Undo will cancel the selected point.



3) After completing the width limit point selection, select the height limit point by clicking on the map, selecting points with the Capture tool, or selecting points from Element. The selected point will be displayed in yellow and will not be saved to Element. You can click Cancel to exit the drawing mode. Click Undo will cancel the selected point.

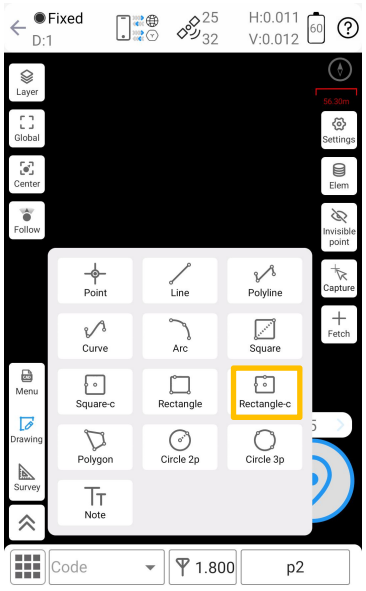


4) After completing the selection of the height limit point, the bottom prompts "Click Completed to save the rectangle". Click Completed to complete the rectangle drawing.



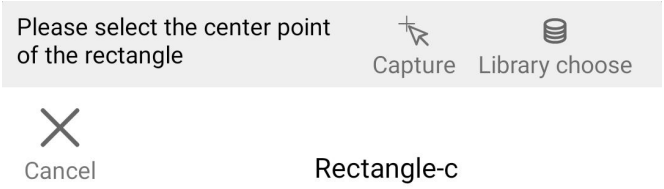
7.2.9 Rectangle-c

You can select the center point of the rectangle, the width limit point and the height limit point to complete the rectangle by clicking on the map, selecting points with the Capture tool, or selecting points from Element.



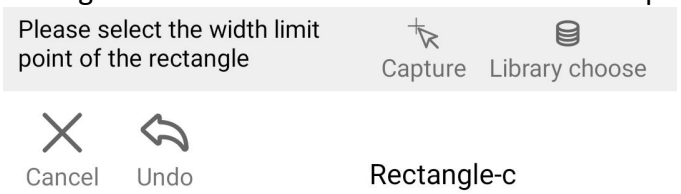
The drawing steps are as follows:

1) Select the center point of the rectangle by clicking on the map, selecting points with the Capture tool, or selecting points from Element. The selected point will be displayed in yellow and will not be saved to Element. You can click Cancel to exit the drawing mode.

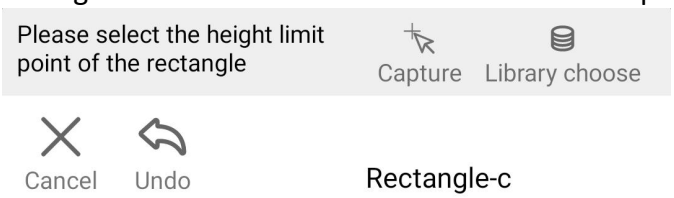


2) After completing the center point selection, select the width limit point by clicking on the map, selecting points with the Capture tool, or selecting points from Element. The

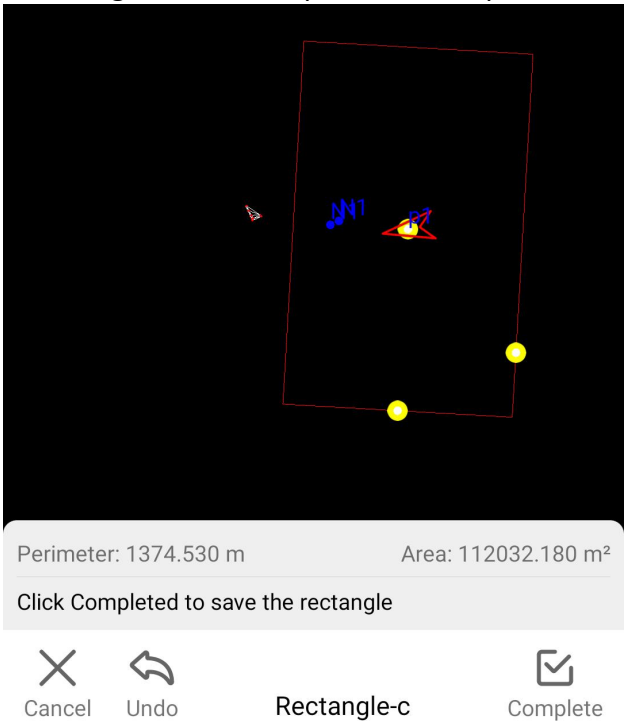
selected point will be displayed in yellow and will not be saved to Element. You can click Cancel to exit the drawing mode. Click Undo will cancel the selected point.



3) After completing the width limit point selection, select the height limit point by clicking on the map, selecting points with the Capture tool, or selecting points from Element. The selected point will be displayed in yellow and will not be saved to Element. You can click Cancel to exit the drawing mode. Click Undo will cancel the selected point.

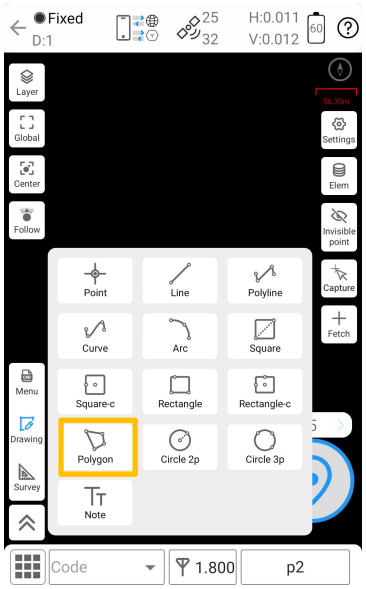


4) After completing the selection of the height limit point, the bottom prompts "Click Completed to save the rectangle". Click Completed to complete the rectangle drawing.



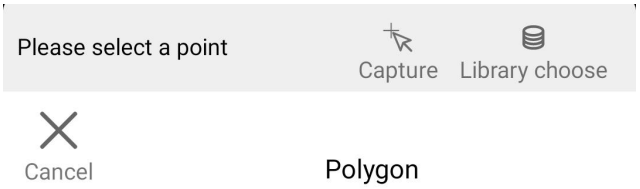
7.2.10 Polygon

You can select multiple points by clicking on the map, selecting points with the Capture tool, or selecting points from Element. They will be automatically connected into polygon in the order of selection.

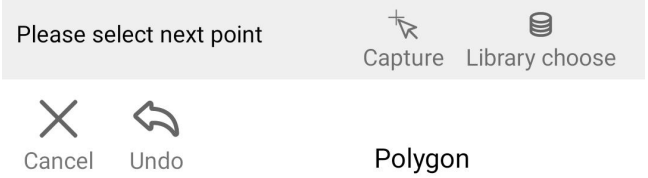


The drawing steps are as follows:

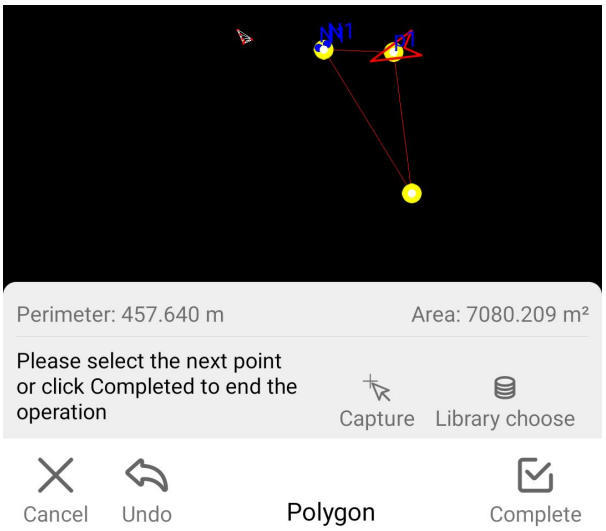
1) Select the first point by clicking on the map, selecting points with the Capture tool, or selecting points from Element. The selected point will be displayed in yellow and will not be saved to Element. You can click Cancel, which will exit the drawing mode. Clicking Undo will cancel the selected point.



2) After completing the first point, you will be prompted to select the next point, which is the same as the first point and will automatically form a connection with the first point.

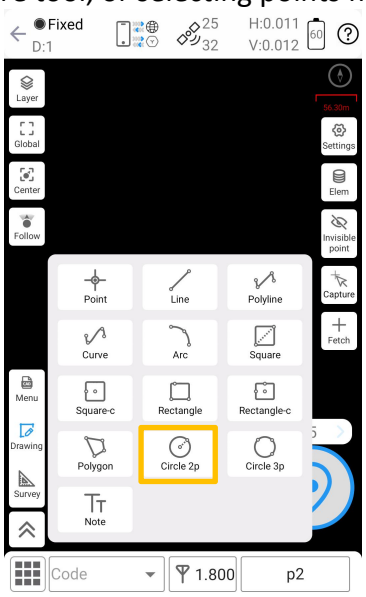


3) Repeat the second step. The bottom prompts "Please select the next point or click Completed to end the operation" Click Completed to complete the drawing of the polygon.



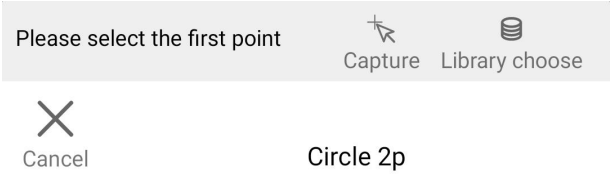
7.2.11 Circle 2p

Draw a circle with the distance between two points as the radius by clicking on the map, selecting points with the Capture tool, or selecting points from Element.



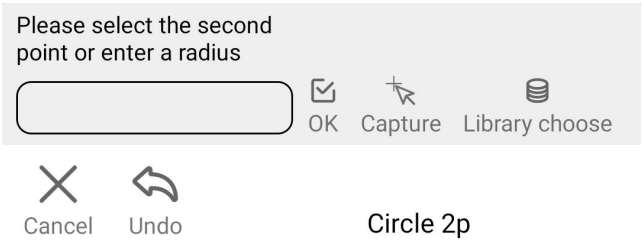
The drawing steps are as follows:

1) Select the center point of the circle by clicking on the map, selecting points with the Capture tool, or selecting points from Element. The selected point will be displayed in yellow and will not be saved to Element. You can click Cancel to exit the drawing mode.

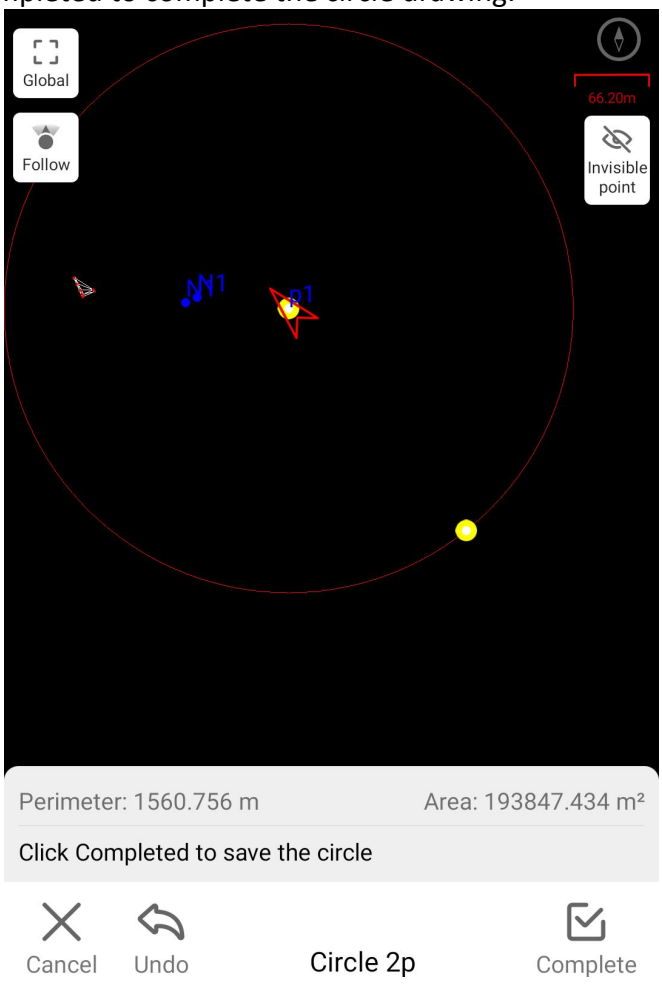


2) After completing the first point selection, enter a radius or select the second point by clicking on the map, selecting points with the Capture tool, or selecting points from

Element. You can click Cancel to exit the drawing mode. Click Undo will cancel the selected point.

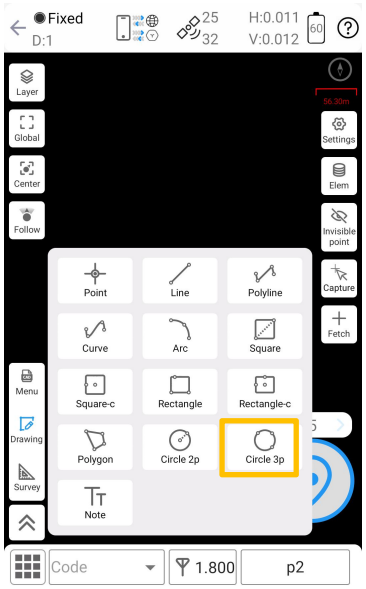


3) After completing the selection of radius, the bottom prompts "Click Completed to save the circle". Click Completed to complete the circle drawing.



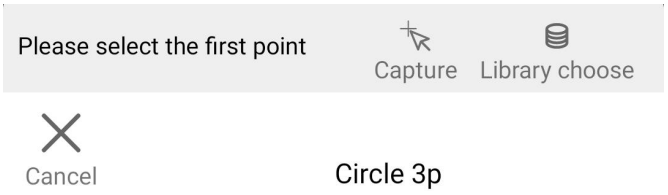
7.2.12 Circle 3p

Draw a circle with 3 points on the circle by clicking on the map, selecting points with the Capture tool, or selecting points from Element.

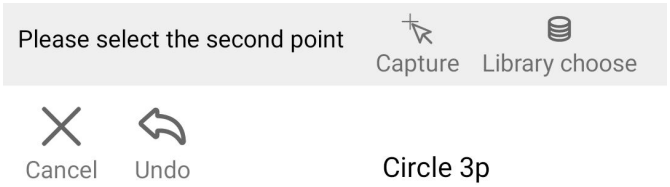


The drawing steps are as follows:

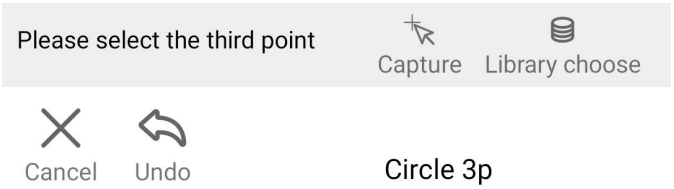
1) Select the first point of the circle by clicking on the map, selecting points with the Capture tool, or selecting points from Element. The selected point will be displayed in yellow and will not be saved to Element. You can click Cancel to exit the drawing mode.



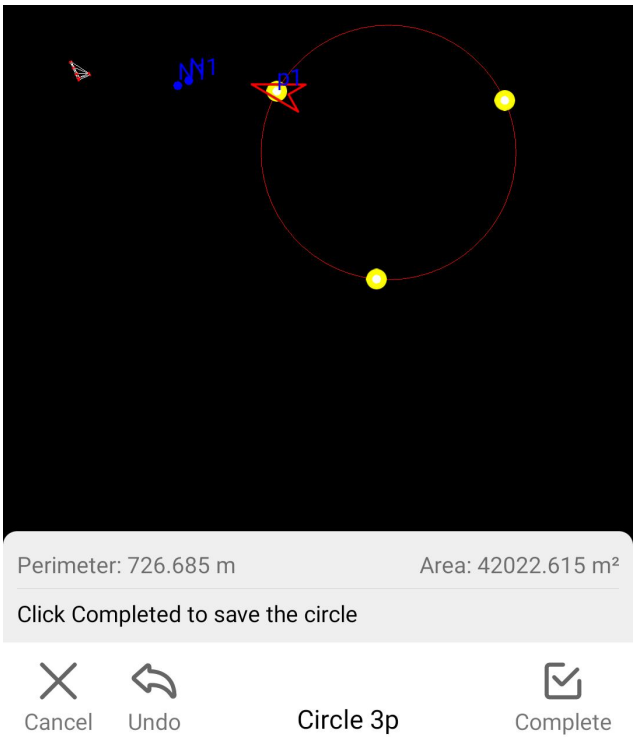
2) After completing the first point selection, select the second point by clicking on the map, selecting points with the Capture tool, or selecting points from Element. You can click Cancel to exit the drawing mode. Click Undo will cancel the selected point.



3) Repeat the second step and select the second point and the third point.

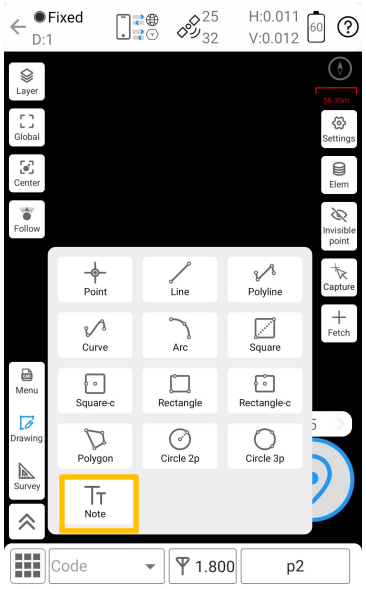


4) After completing the selection of 3 points, the bottom prompts "Click Completed to save the circle". Click Completed to complete the circle drawing.



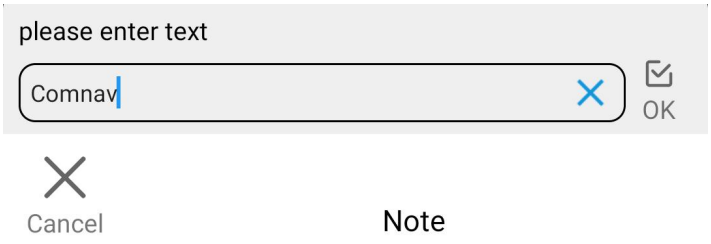
7.2.13 Note

Text can be added to drawings.

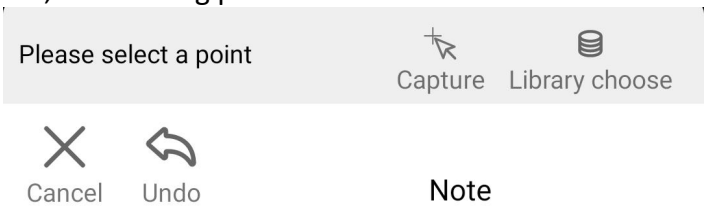


The drawing steps are as follows:

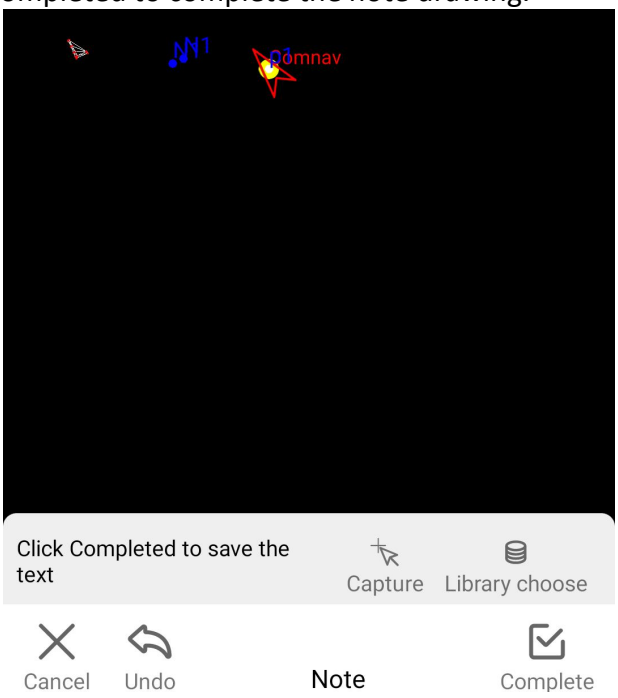
1) Enter text content. Click OK.



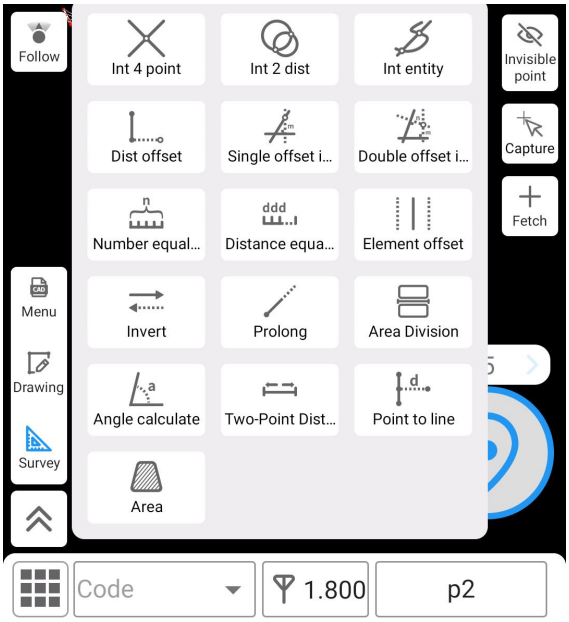
2) After entering text content, select the point by clicking on the map, selecting points with the Capture tool, or selecting points from Element.



3) After completing the selection of Note point, the bottom prompts "Click Completed to save the test". Click Completed to complete the note drawing.

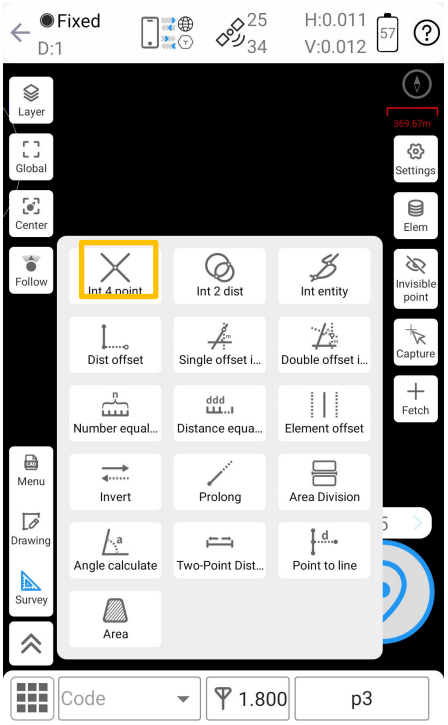


7.3 CAD Survey



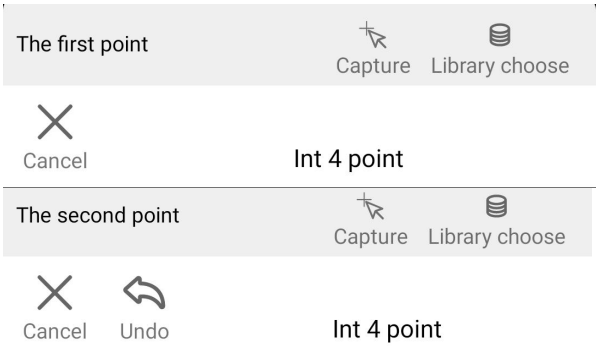
7.3.1 Int 4 point

Select four points to form two lines and then calculate the intersection point of the two lines or their extensions. Click Finish to save the intersection point to Element.

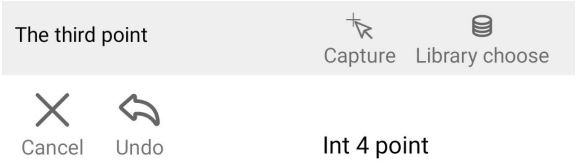


The steps are as follows:

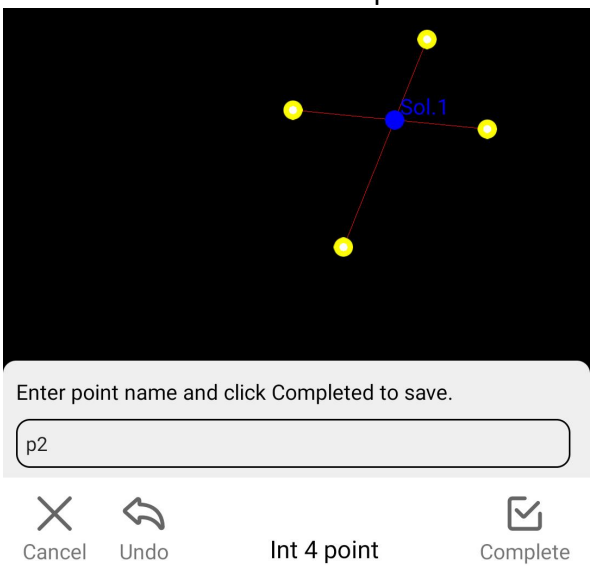
1) Select the first point by clicking on the map, selecting points with the Capture tool, or selecting points from Element. The selected point will be displayed in yellow and will not be saved to Element. You can click Cancel and the function will exit.



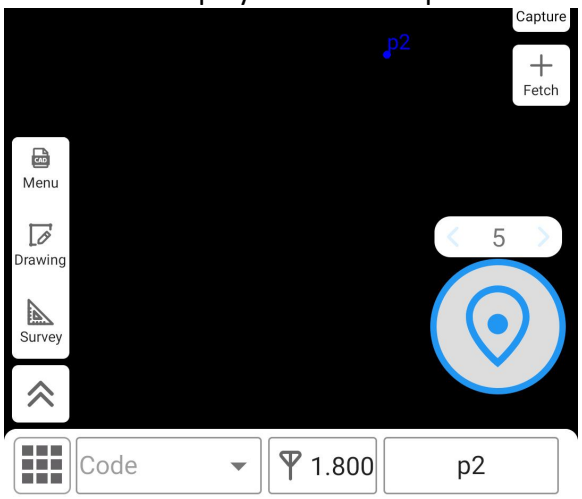
2) The prompt below is to select the second point, which is the same as the first point. After completing the point selection, a line will be automatically formed with the first point.



3) The selection method for the third and fourth points is the same as above. After the point selection is completed, the intersection point of the two lines will be automatically calculated. If there is no intersection between the two lines, an extension of the two lines will be automatically made to find the intersection point.

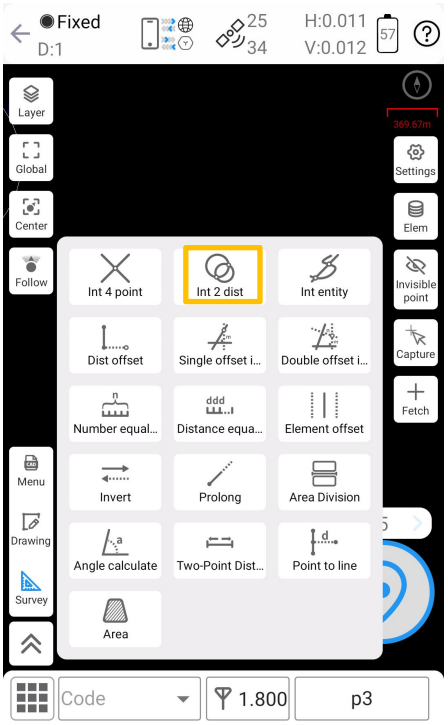


4) After obtaining the intersection point, set the point name. After clicking Completed, the point will be saved to Element and displayed on the map.



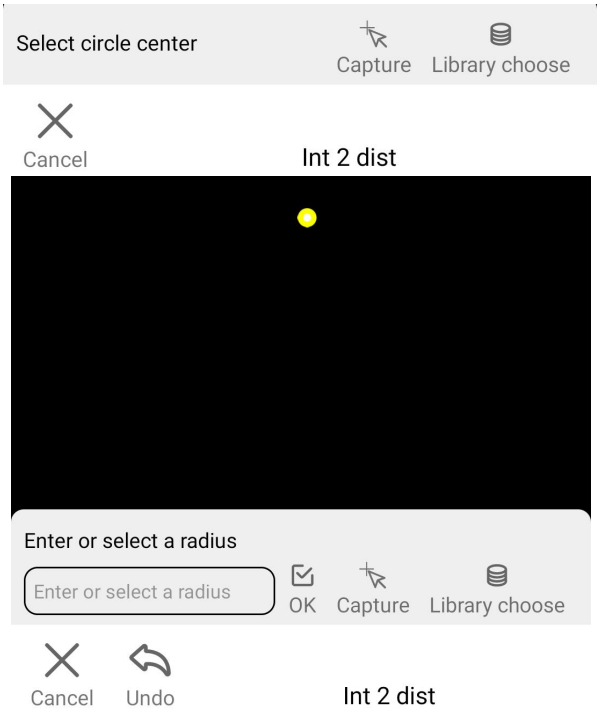
7.3.2 Int 2 dist

Select the center and radius to draw two circles and calculate the intersection point of the two circles. Click Completed to select the intersection point and save it to Element.

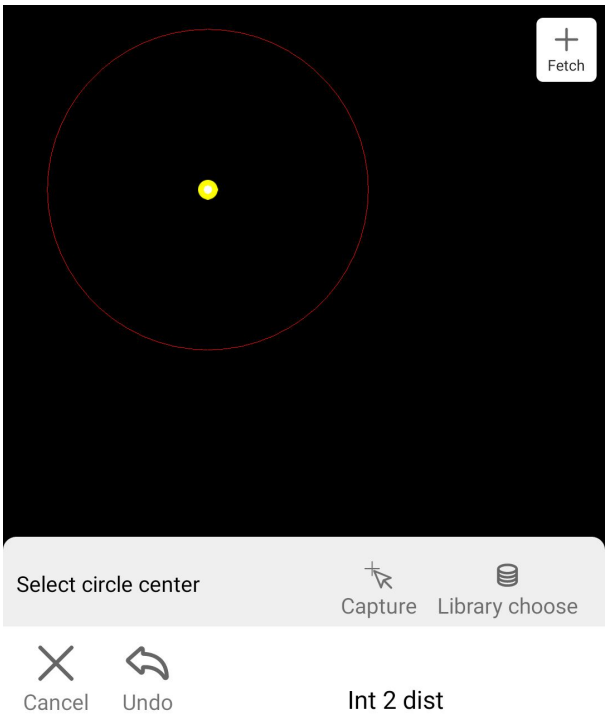


The steps are as follows:

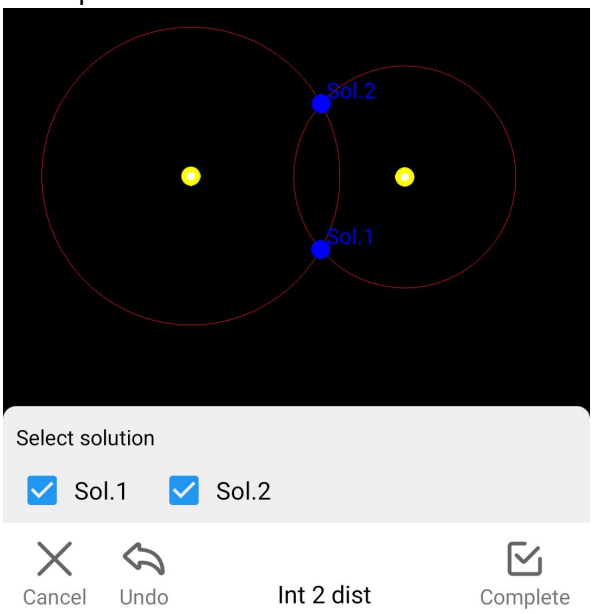
1) Select circle center by clicking on the map, selecting points with the Capture tool, or selecting points from Element. The selected point will be displayed in yellow and will not be saved to Element. You can click Cancel and the function will exit.



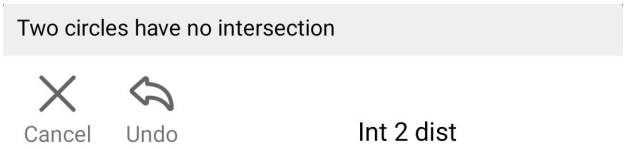
2) After completing the first point selection, enter a radius or select the second point by clicking on the map, selecting points with the Capture tool, or selecting points from Element. After completing the radius selection, a circle will be automatically formed with the first point.



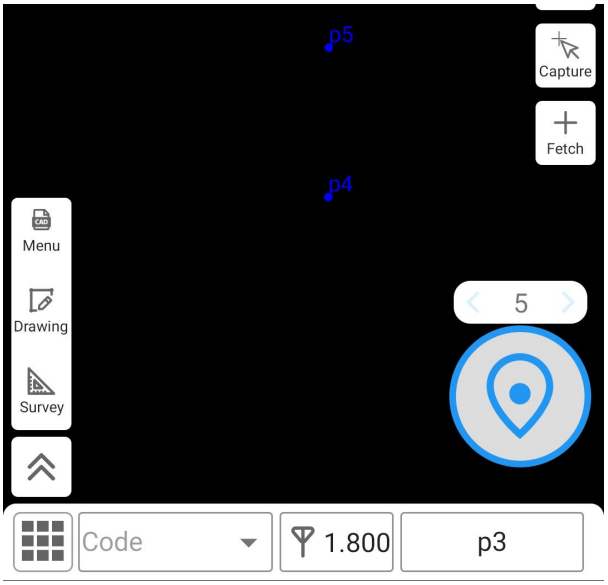
3) The selection method for the second circle is the same as above. After 2 circles completed, the intersection point of the two circles will be automatically calculated.



If there is no intersection between the two circles, the bottom prompts "Two circles have no intersection".

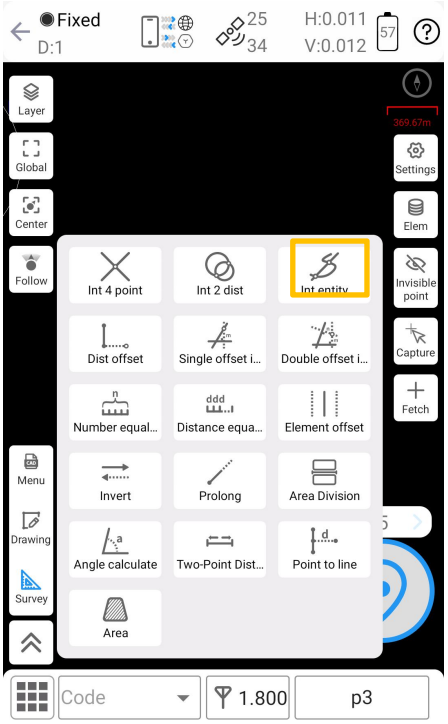


4) After obtaining the intersection point, select the intersection point which you want to save. After clicking Completed, the point will be saved to Element and displayed on the map.



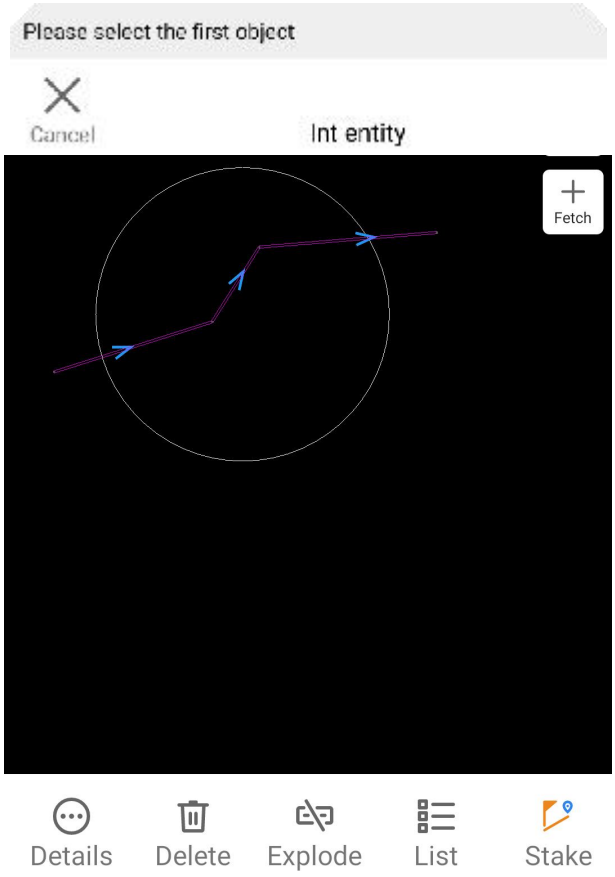
7.3.3 Int entity

Select 2 objects and calculate the intersection point of these two objects. Click Completed to select the intersection point and save it to Element.

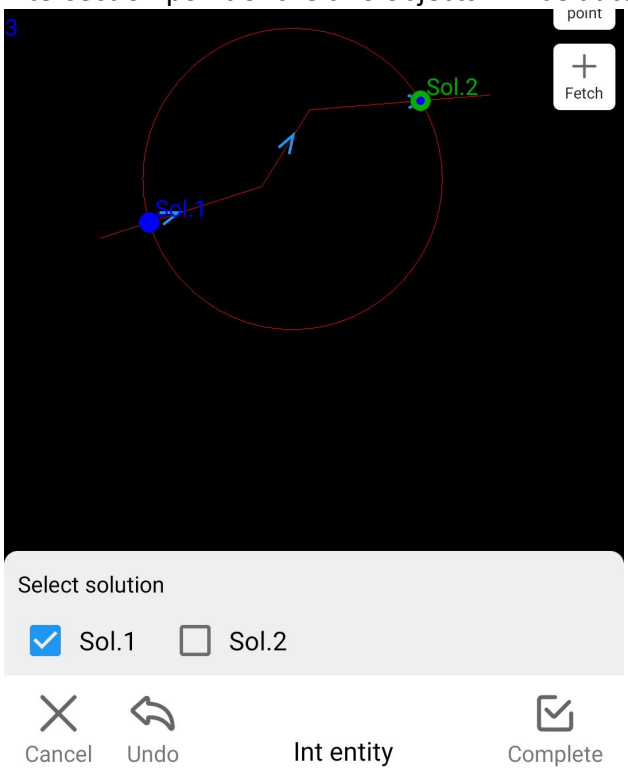


The steps are as follows:

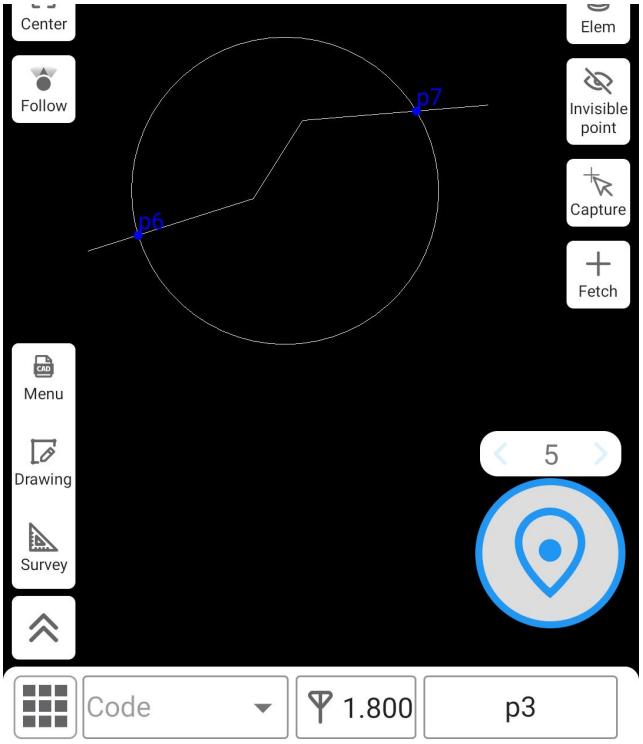
1) Select the first object by clicking on the map. You can click Cancel and the function will exit.



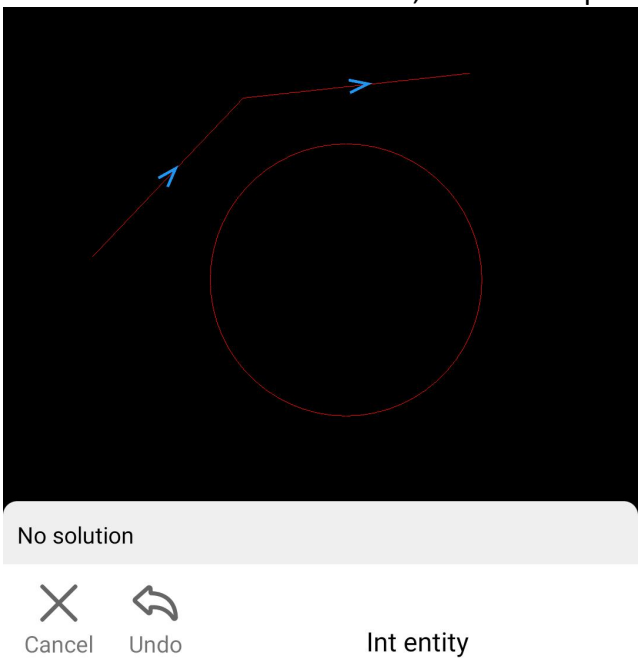
2) After the first object selection, select the second object by clicking on the map. After 2 objects selected, the intersection point of the two objects will be automatically calculated.



3) After obtaining the intersection point, select the intersection point which you want to save. After clicking Completed, the point will be saved to Element and displayed on the map.

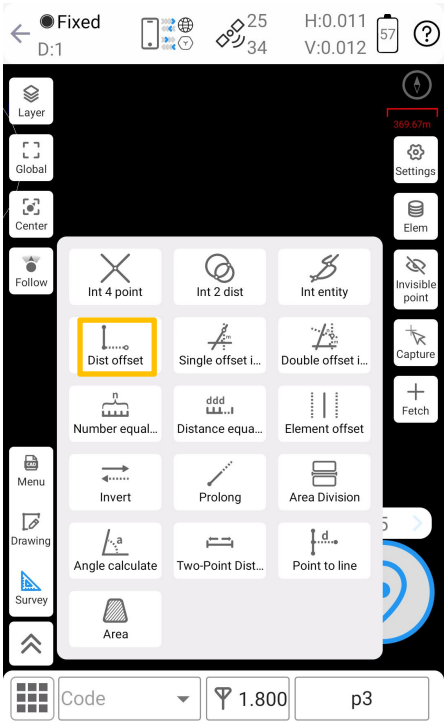


4) If there is no intersection between the two circles, the bottom prompts "No solution".



7.3.4 Dist offset

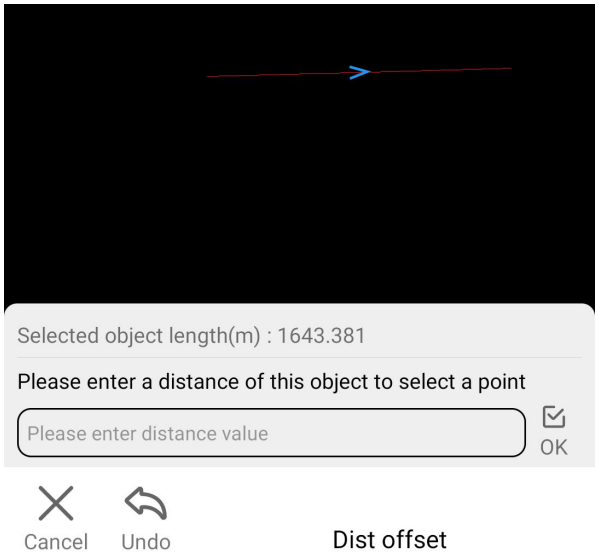
After selecting the graphic, input the mileage and offset distance to calculate two offset points.



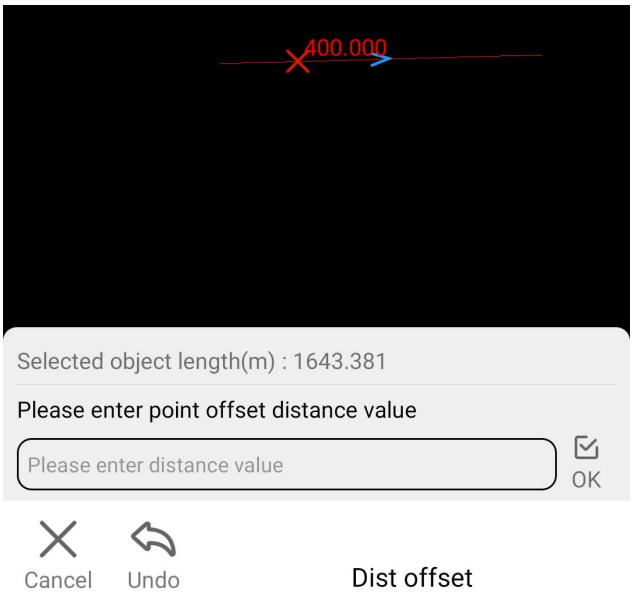
The steps are as follows:

1) Select a graphic by clicking on the map. You can click Cancel and the function will exit.

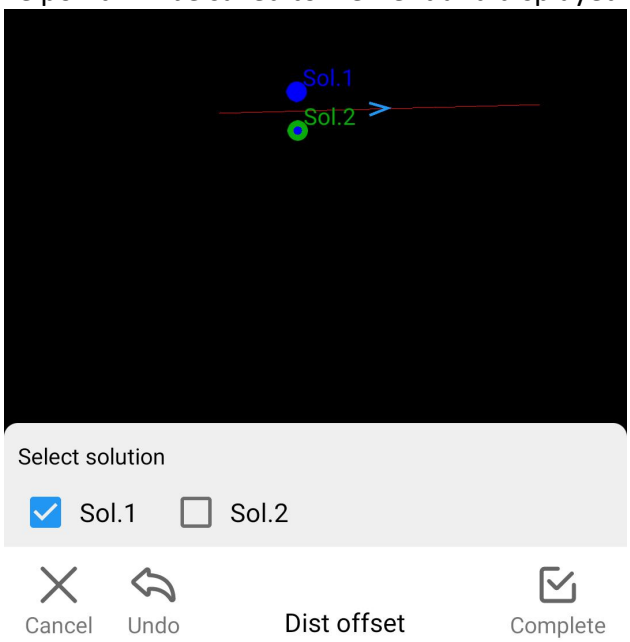
2) After selecting a graphic, the length of the selected graphic is displayed at the bottom. Enter the mileage to start the offset.

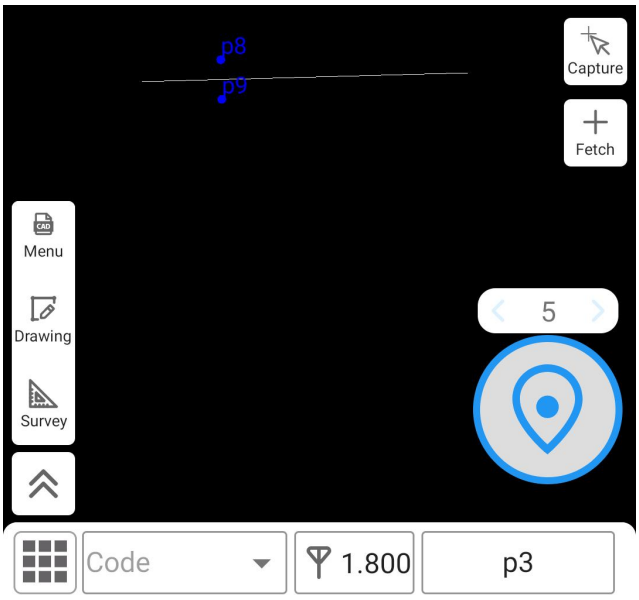


3) After entering a distance, you can see a red mark on the graphic. This red mark is the mileage point which will not save in Element. Then you can enter point offset distance value.



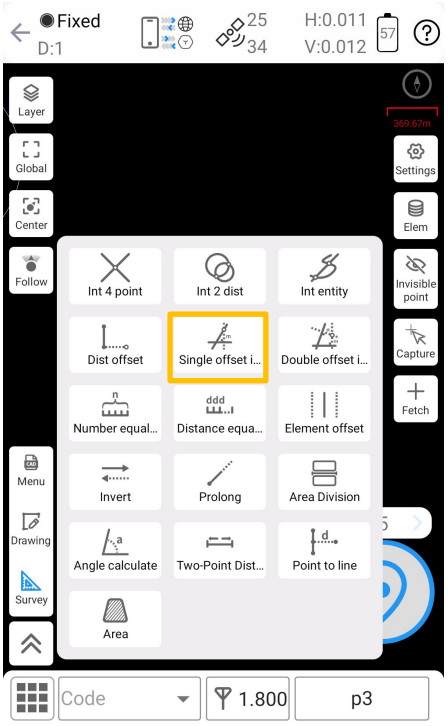
4) After obtaining the offset point, select the offset point which you want to save. After clicking Completed, the point will be saved to Element and displayed on the map.





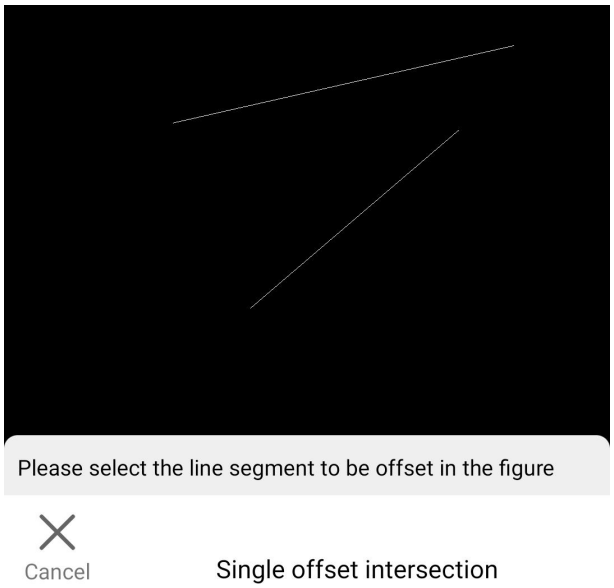
7.3.5 Single offset intersection

Calculate the intersection point of the current line with another line after offset. (i.e. a point on a line that is a certain distance from another line)

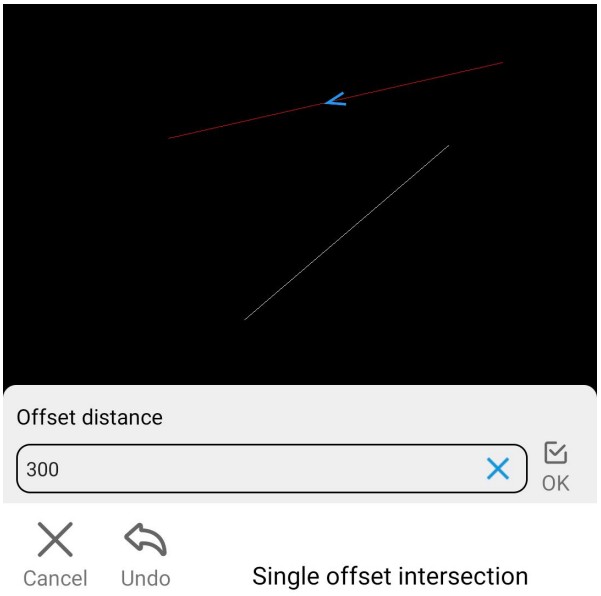


The steps are as follows:

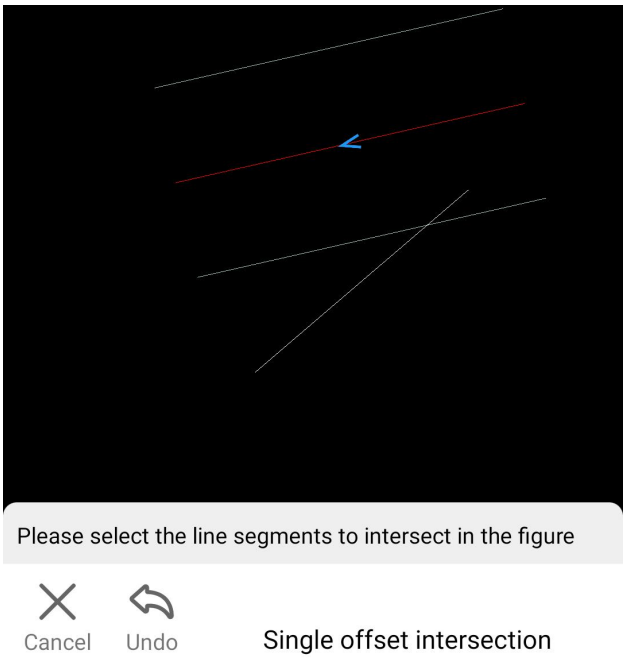
1) Select the line segment to be offset by clicking on the map. You can click Cancel and the function will exit.



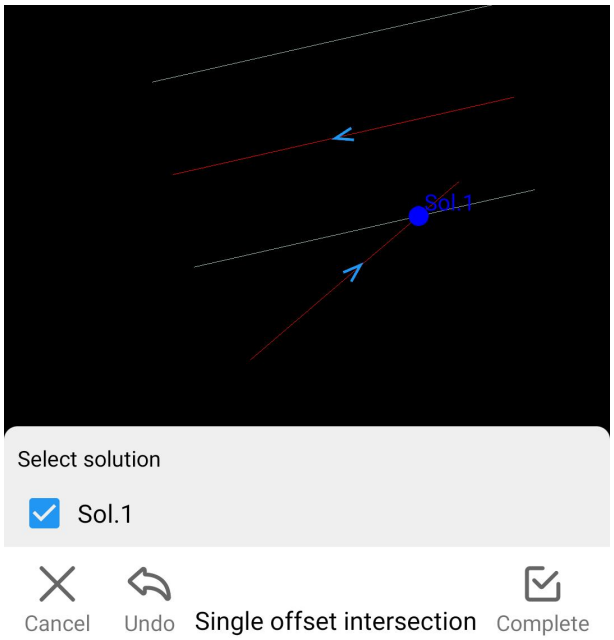
2) After selecting, enter the offset distance of this line. This distance is a certain distance that a point on a line that is from another line.



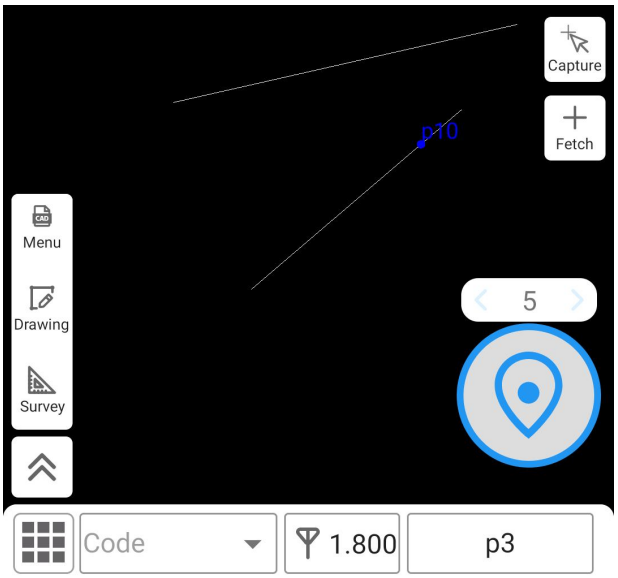
3)After enter an offset value, this line will form two offset lines. But the offset lines are not saved. You can clearly see whether the offset point intersects with other lines, thereby obtaining the offset point on the line.



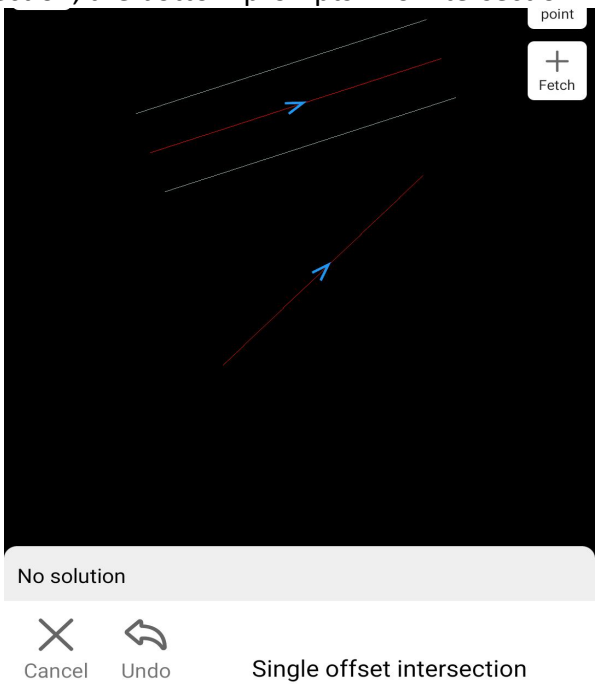
3) Select another line to intersect.



4) After obtaining the intersection point, select the intersection point which you want to save. After clicking Completed, the point will be saved to Element and displayed on the map.

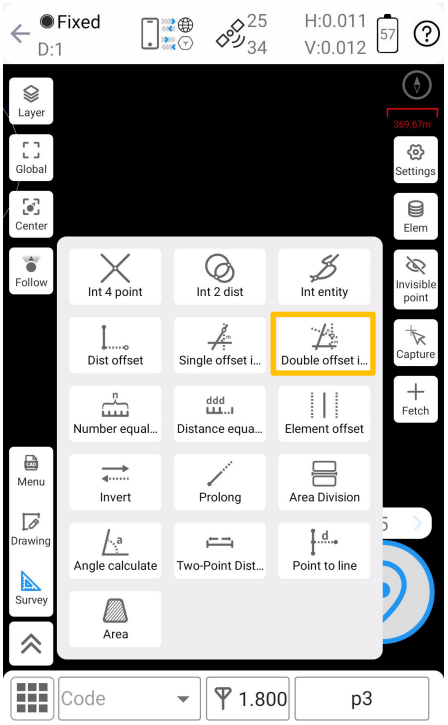


5) If there is no intersection, the bottom prompts "No intersection".



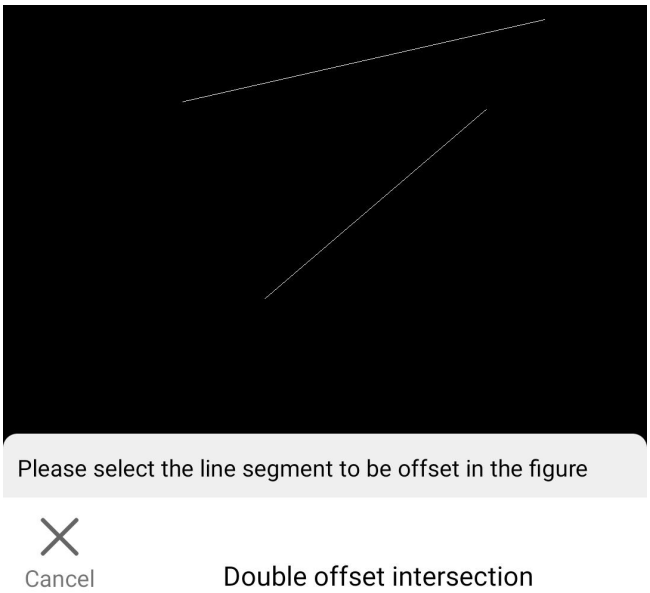
7.3.6 Double offset intersection

Select two lines in turn, enter the offset distance, and generate lines on the left and right sides of the line segment that are translated to the line ends. The intersection of the two parallel lines is obtained and can be saved to the Element. (i.e. Points that are a certain distance from two line segments)

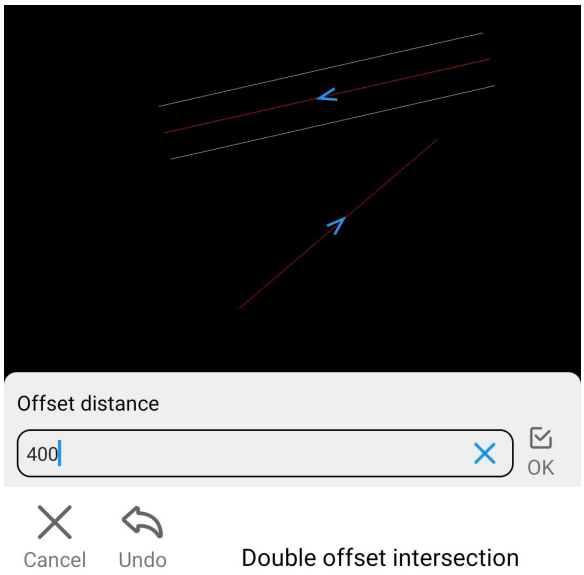


The steps are as follows:

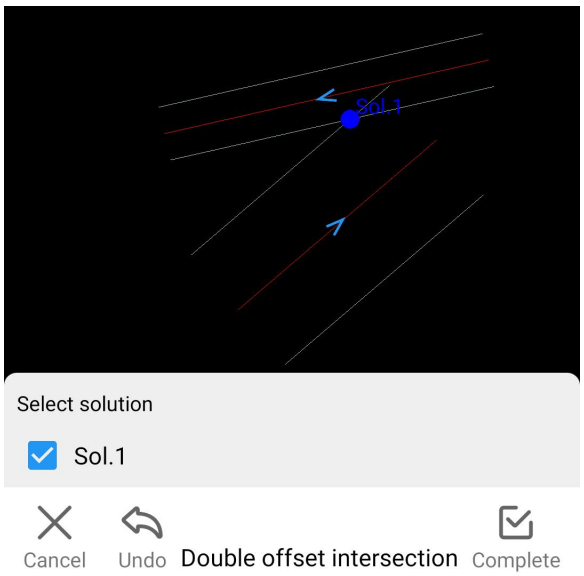
1) Select the line segment to be offset by clicking on the map. You can click Cancel and the function will exit.



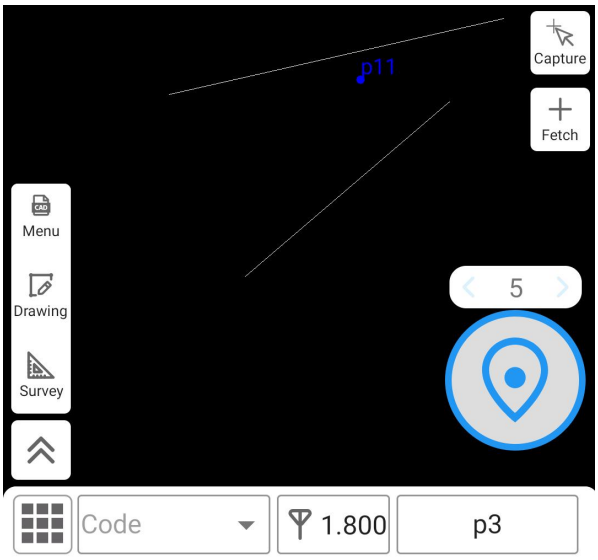
2) After selecting, enter the offset distance of this line.



3) After enter an offset value, this line will form two offset lines. But the offset lines are not saved.

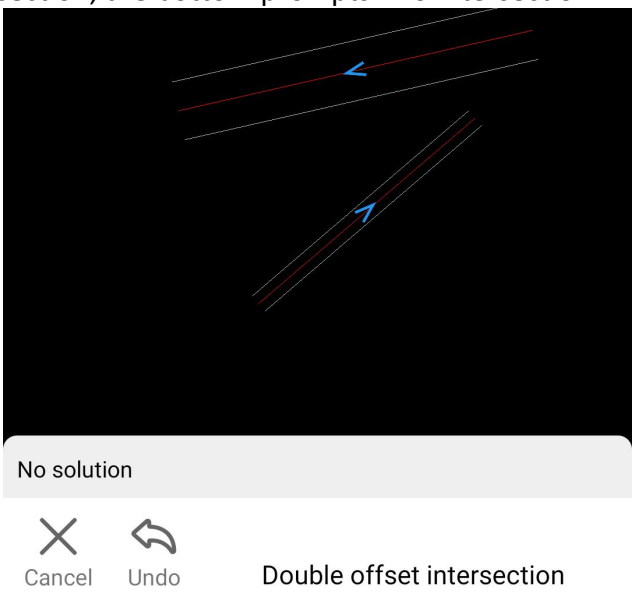


4) The selection method for the second line is the same as above.



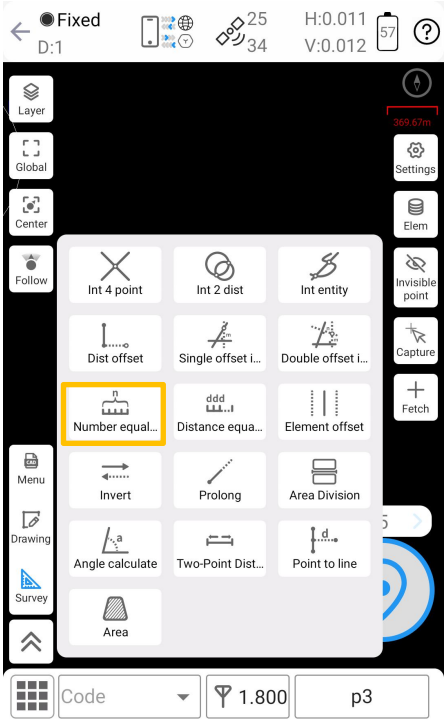
5) After obtaining the intersection point, select the intersection point which you want to save. After clicking Completed, the point will be saved to Element and displayed on the map.

6) If there is no intersection, the bottom prompts "No intersection".



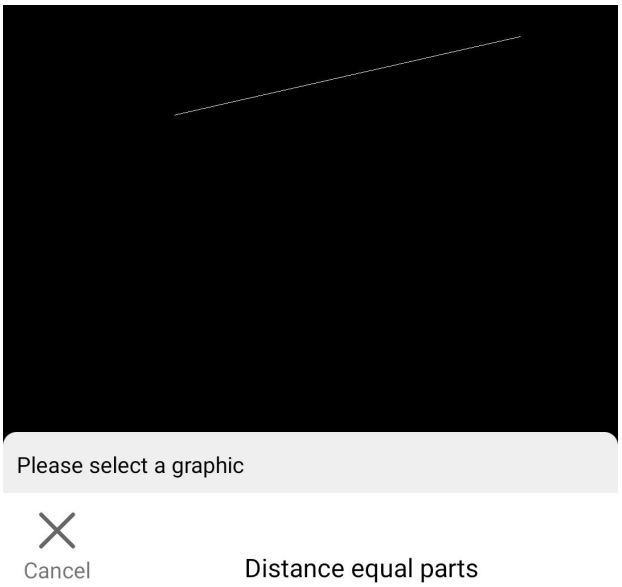
7.3.7 Number equal parts

Select the graphic, enter the number of divisions required, divide the selected graphic into equal parts, generate corresponding points and save them to Element.

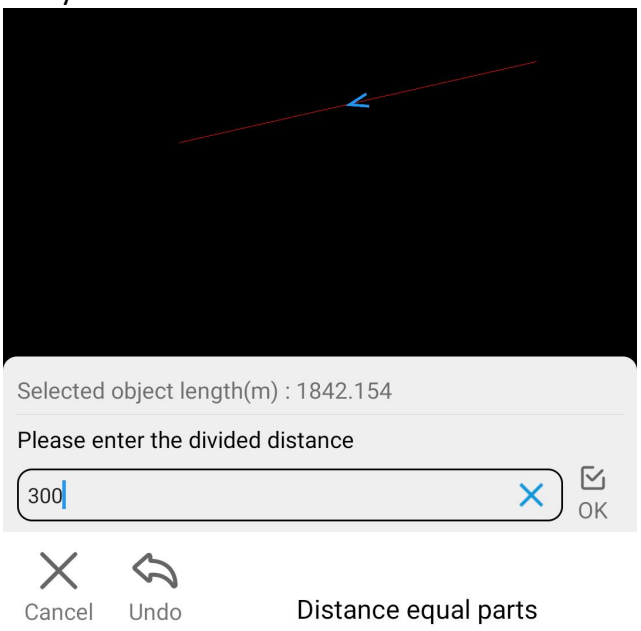


The steps are as follows:

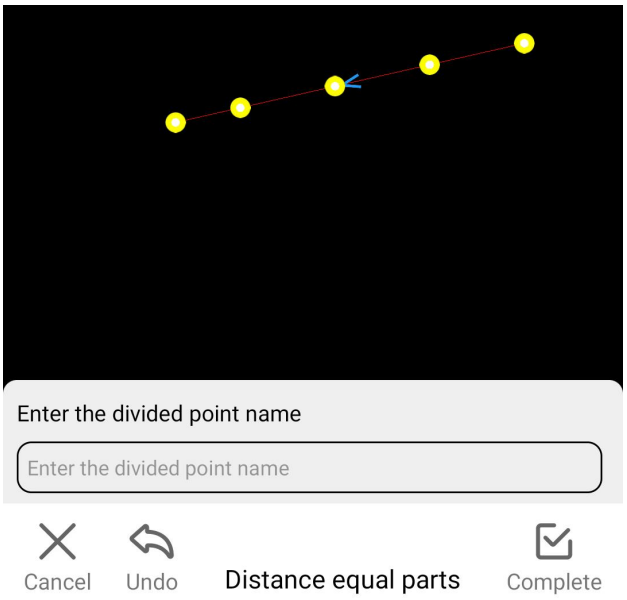
1) Select a graphic by clicking on the map. You can click Cancel and the function will exit.



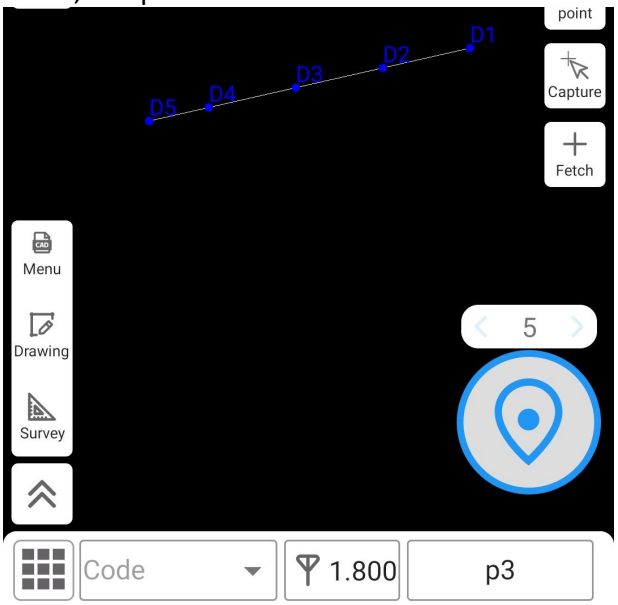
2) After selecting a graphic, the length of the selected graphic is displayed at the bottom. Enter the divided quantity.



3) After entering the divided quantity, you can see marks on the graphic. These marks are the divided point which will save in Element. Then you can enter the divided point name.

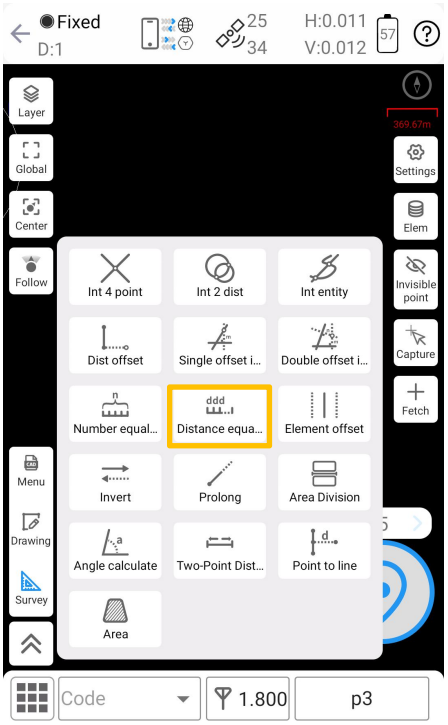


4) After clicking Completed, the point will be saved to Element and displayed on the map.



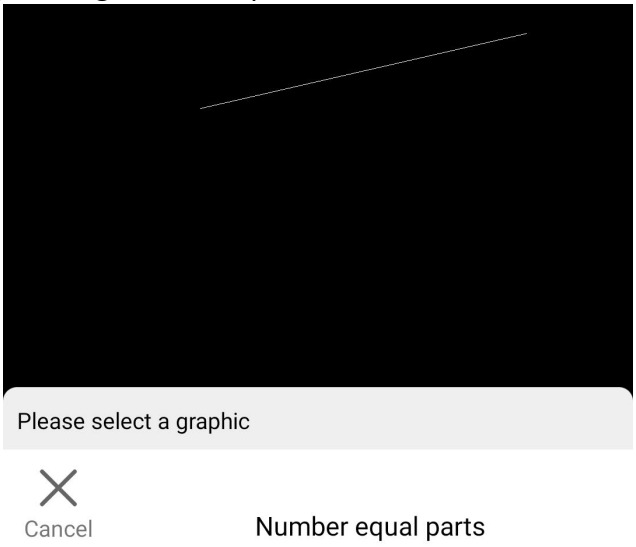
7.3.8 Distance equal parts

Select the graphic, enter the distance to be divided, divide the selected graphic into equal parts, generate corresponding points and save them to Element.

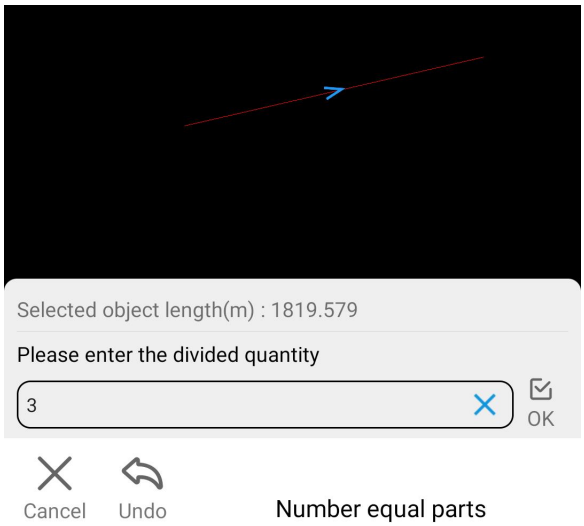


The steps are as follows:

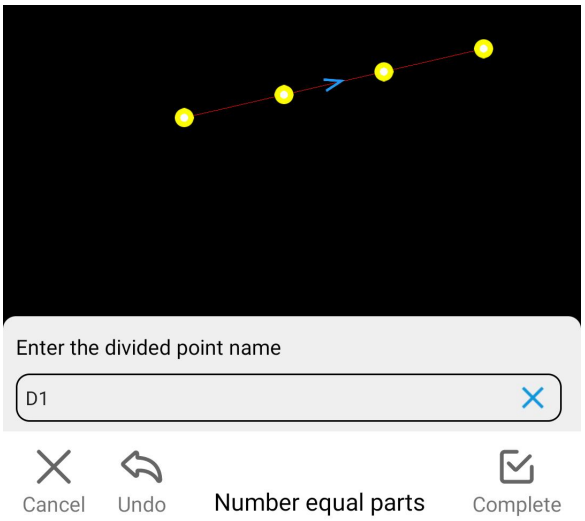
1) Select a graphic by clicking on the map. You can click Cancel and the function will exit.



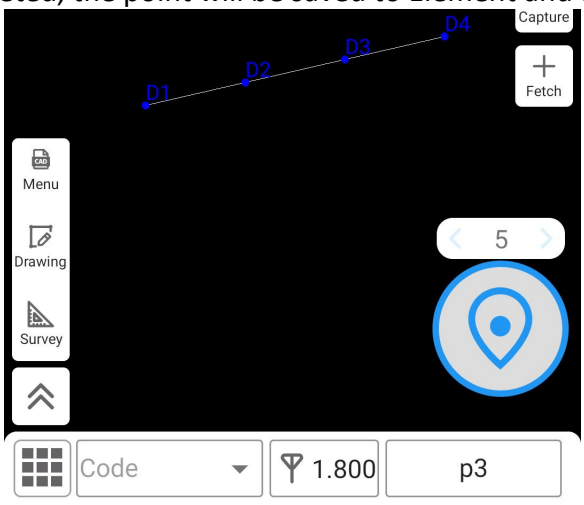
2) After selecting a graphic, the length of the selected graphic is displayed at the bottom. Enter the divided distance.



3) After entering the divided distance, you can see marks on the graphic. These marks are the divided point which will save in Element. Then you can enter the divided point name.

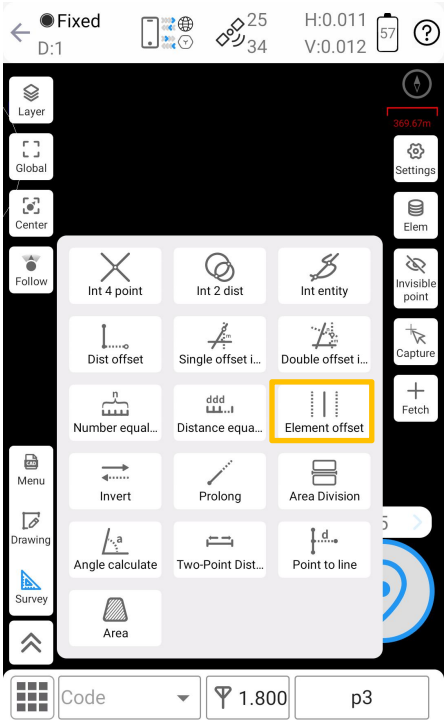


4) After clicking Completed, the point will be saved to Element and displayed on the map.



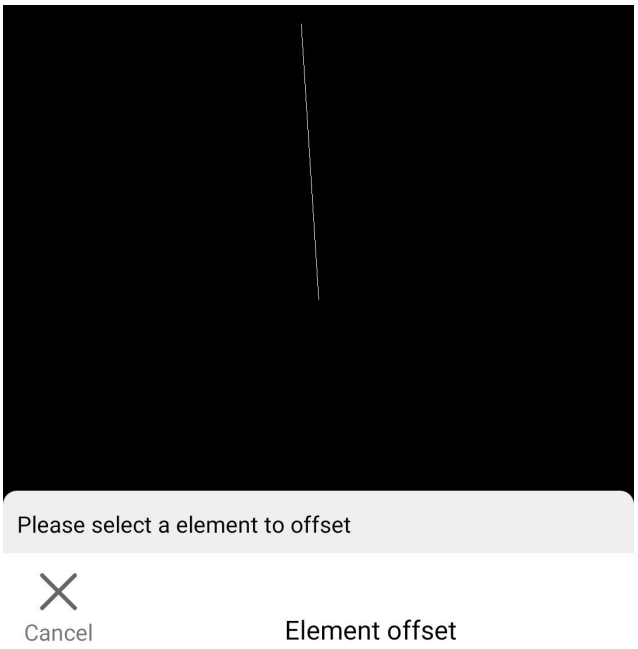
7.3.9 Element offset

Select the element, generate new element parallel to the element.

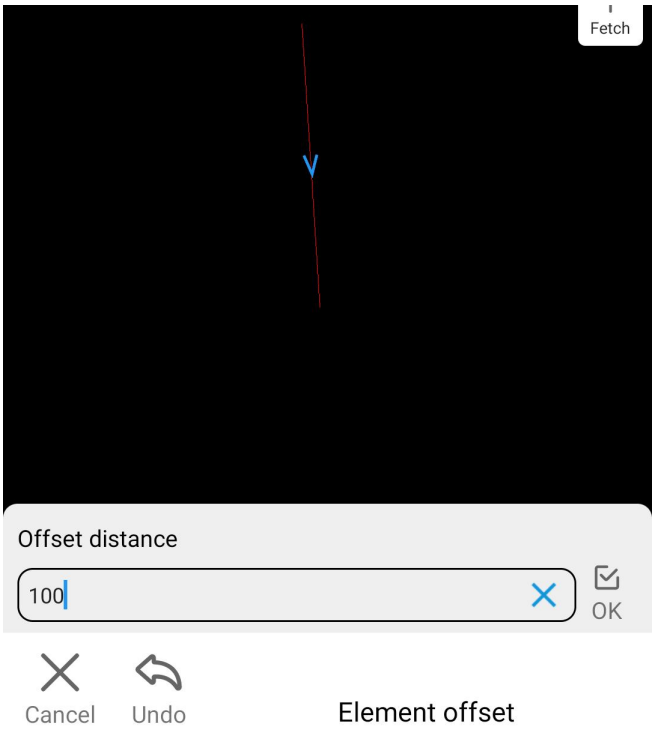


The steps are as follows:

1) Select the element to be offset by clicking on the map. You can click Cancel and the function will exit.

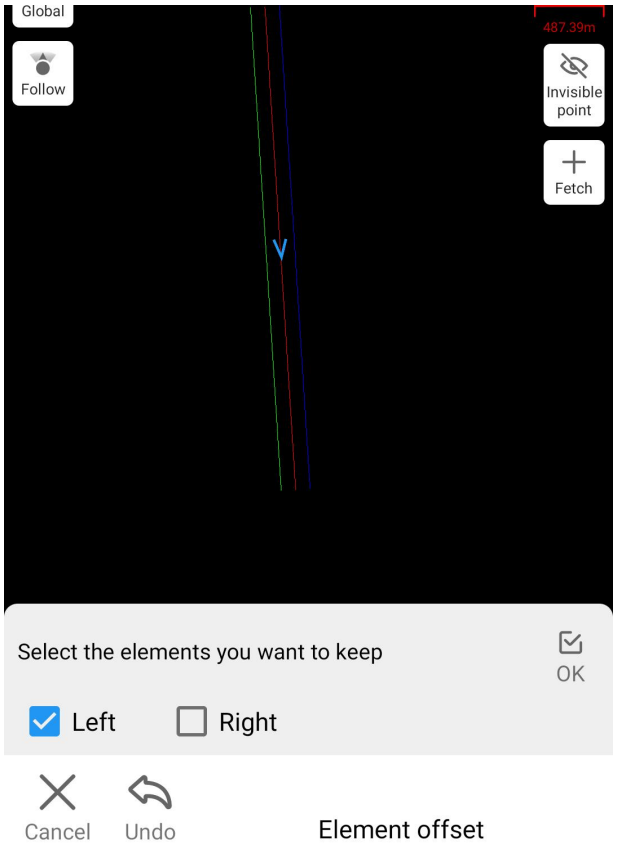


2) After selecting, enter the offset distance.



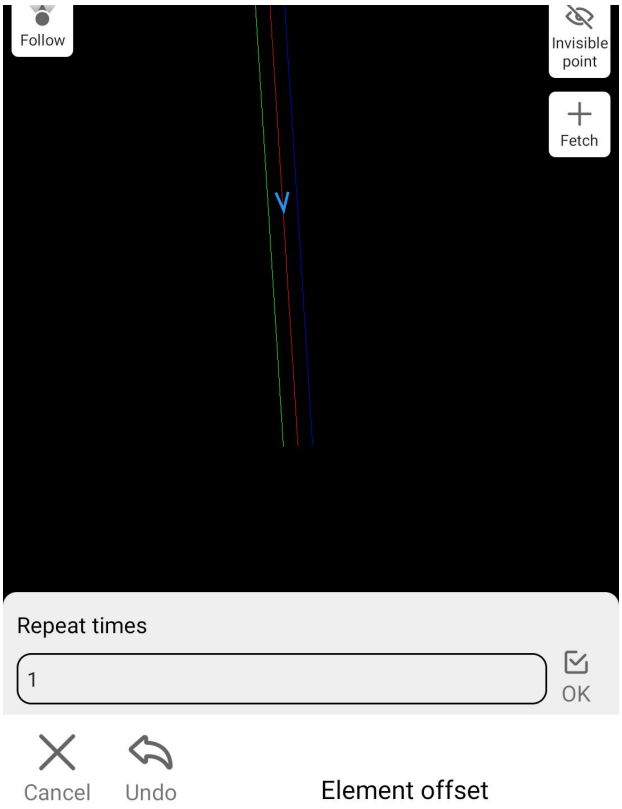
Element offset

3) After enter an offset value, this line will form two offset lines. Select the elements you want to keep.

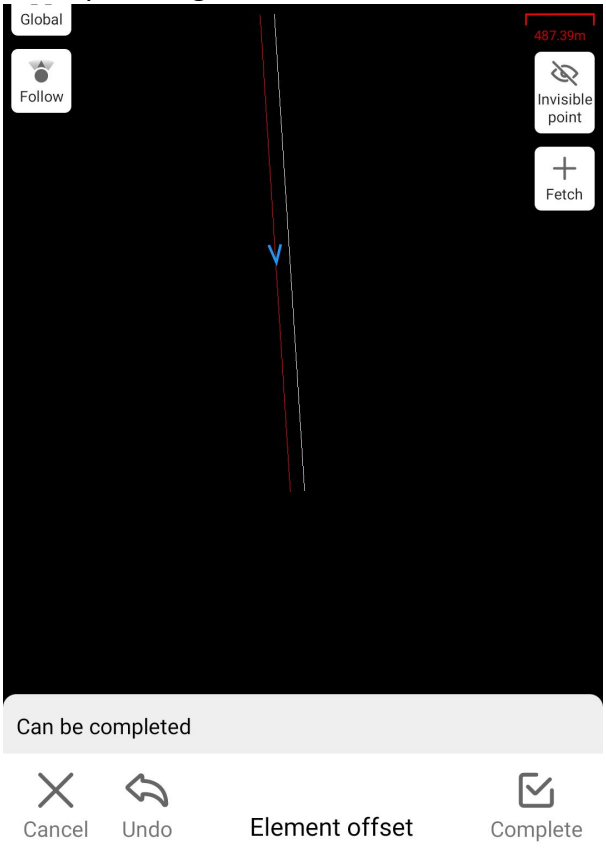


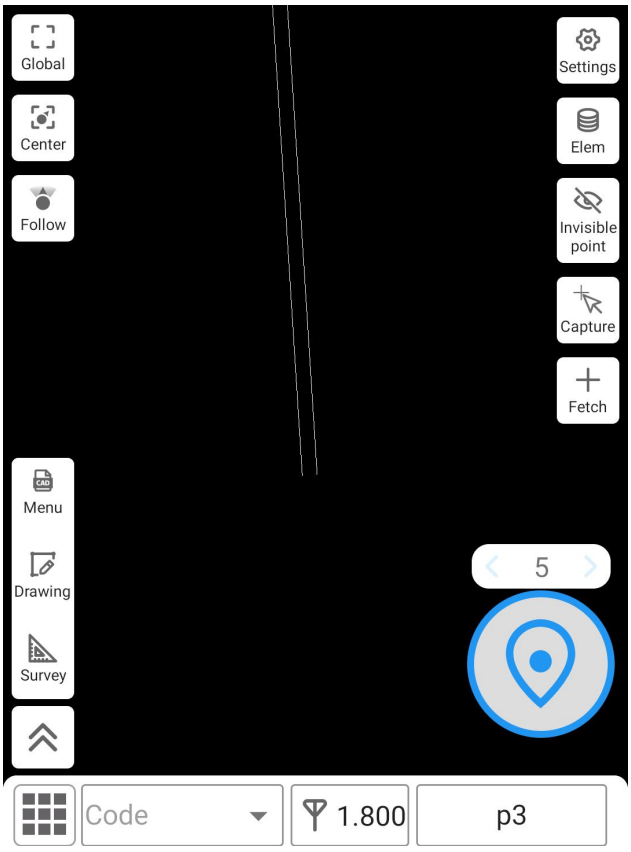
Element offset

4) Then enter the number of times to perform the offset operation.



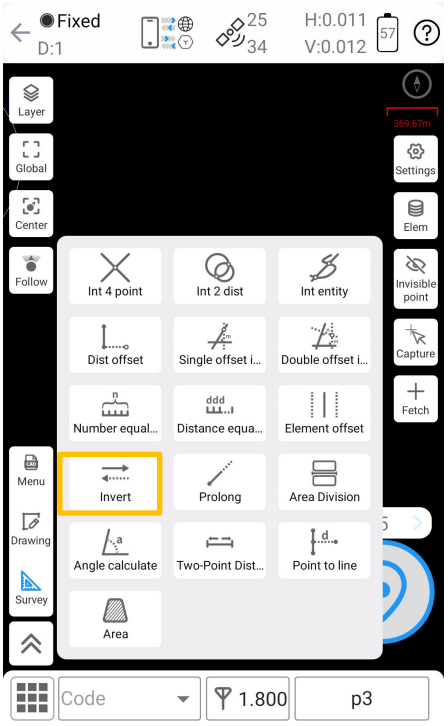
5) After clicking Completed, you can get the results.





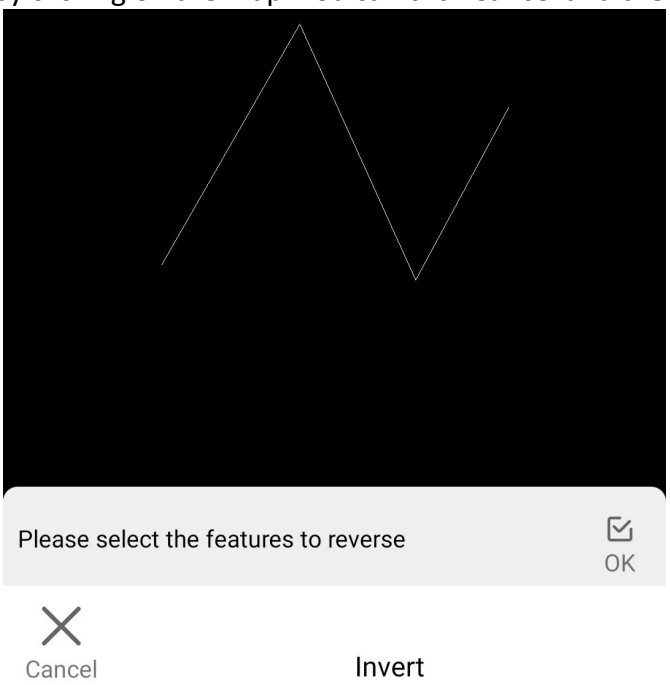
7.3.10 Invert

Select the graph to reverse the progressive direction of the graph's nodes, that is, exchange the starting and end positions of the graph.

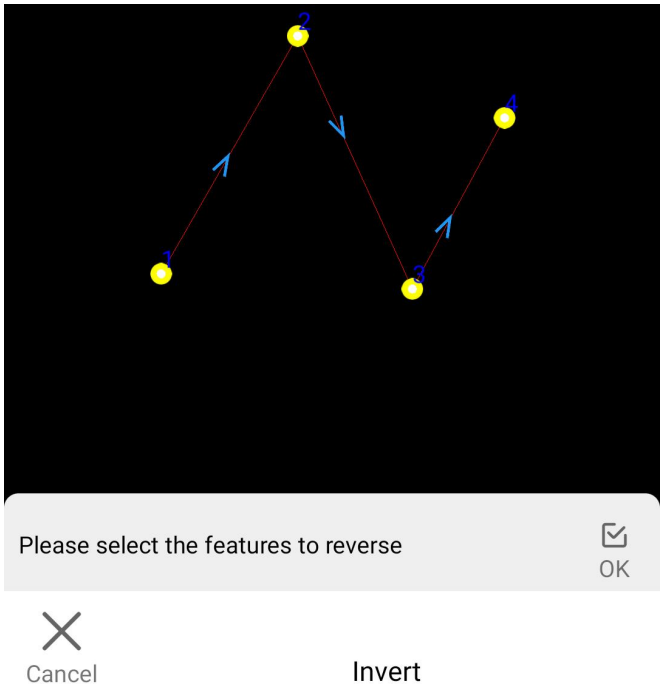


The steps are as follows:

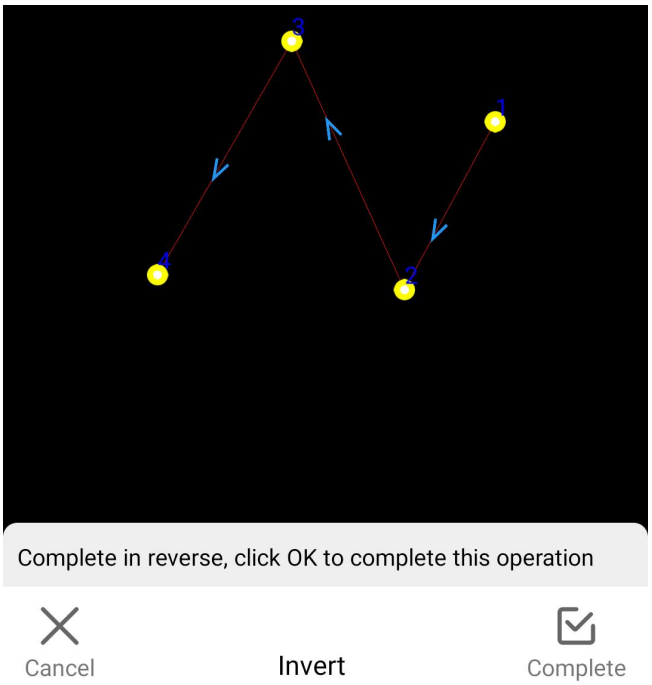
1) Select a graphic by clicking on the map. You can click Cancel and the function will exit.



2) Select the graphic to be reversed. The yellow highlight effect of its node is displayed on the selected graphic interface, and the arrow shows the progressive direction of the current graphic.

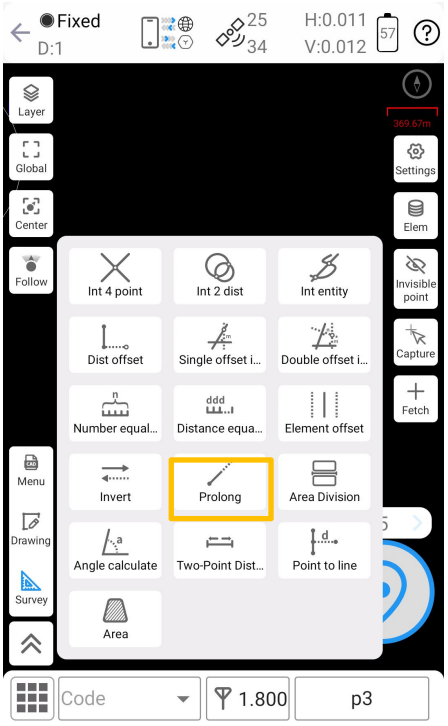


3) After clicking Completed, completed in reverse, the graphic progression direction is changed.



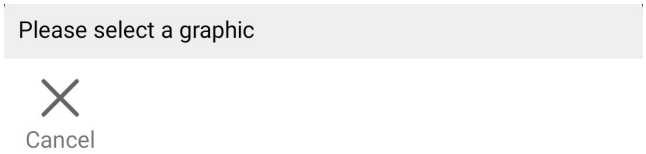
7.3.11 Prolong

Select the graphic, enter the distance to be extended, and it will be extended at the end point of the graphic.

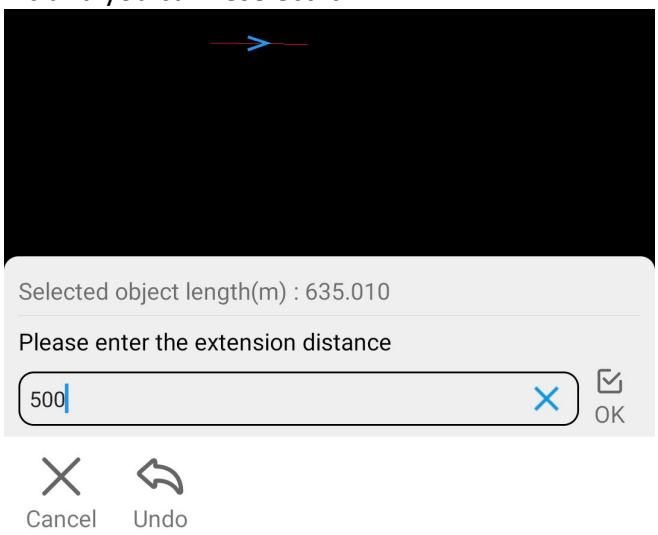


The steps are as follows:

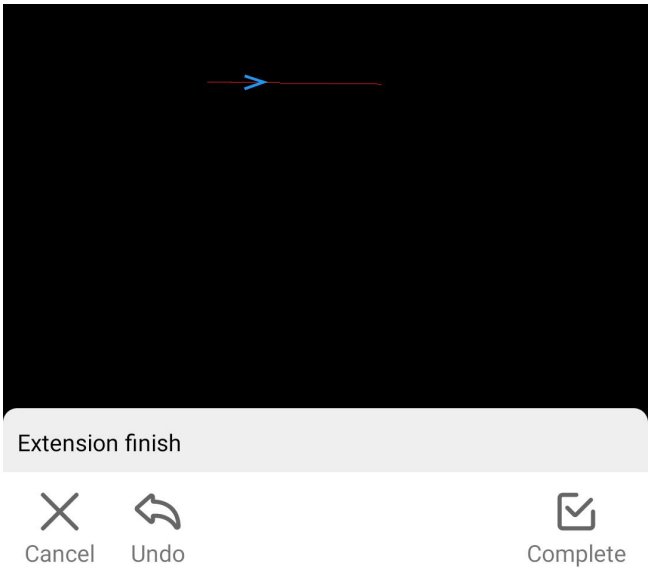
1) Select the graphic that needs to be extended. You can click Cancel and the function will exit.



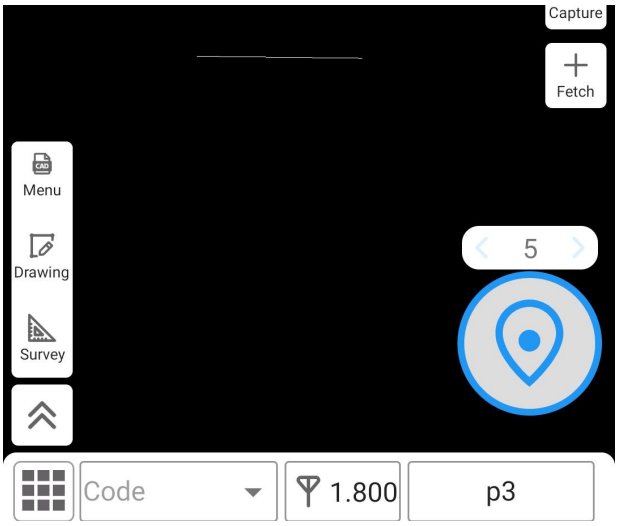
2) The bottom prompts "Please enter the extension distance" and the length of the currently selected graphic is displayed above. Click Cancel to exit the function. Click Undo to uncheck the graphic and you can reselect it.



3) Enter the extension distance, click OK and then extend the graphic at the end point according to the input distance.

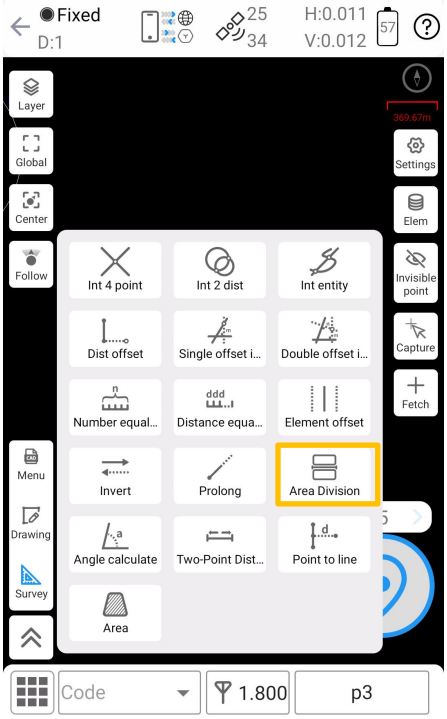


4) After the extension is completed, click Completed to save the extension results.



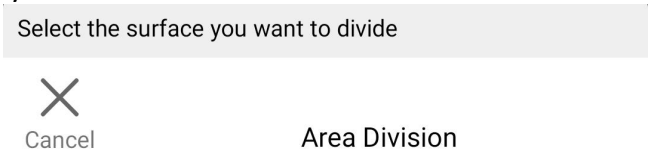
7.3.12 Area Division

Divide and save the intersection points according to the input area.

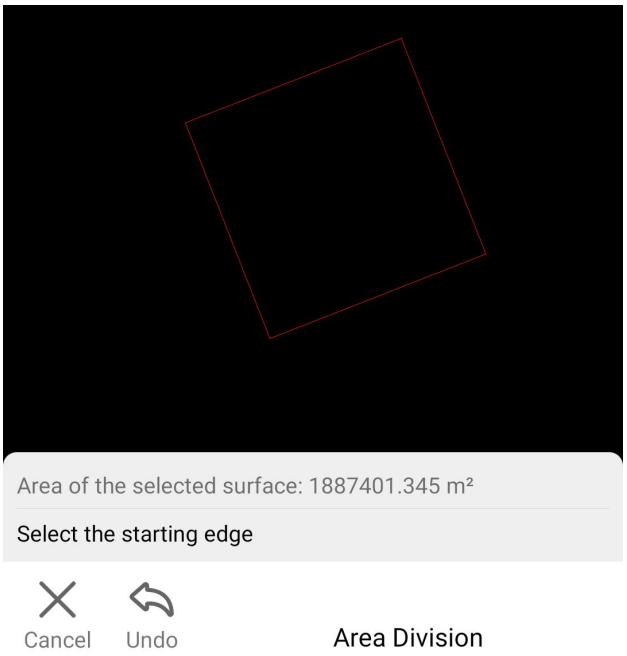


The steps are as follows:

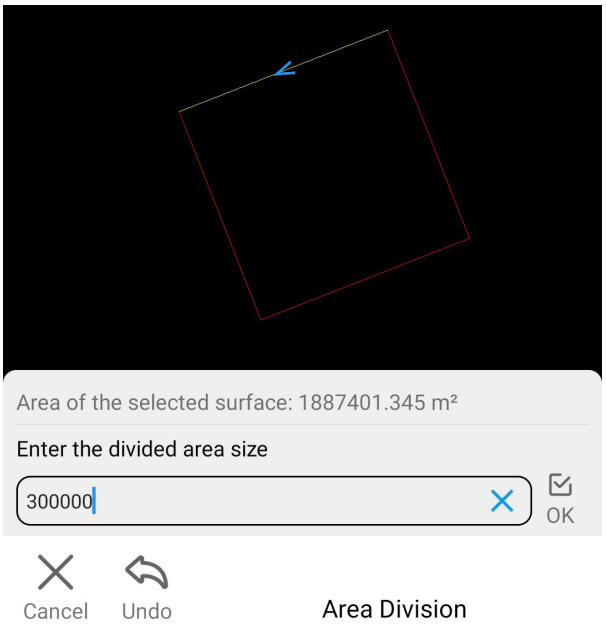
1) Select the surface you want to divide. You can click Cancel and the function will exit.



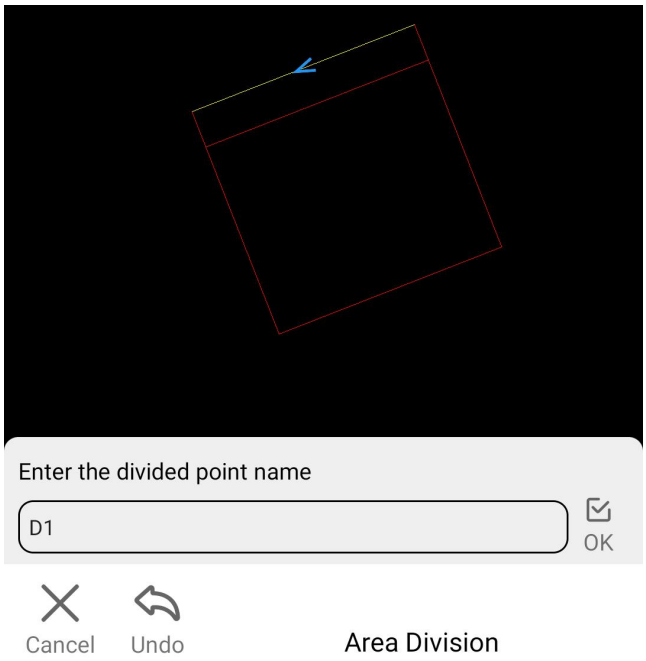
2) The bottom prompts "Select the starting edge" and the area of the currently selected surface is displayed above. Click Cancel to exit the function. Click Undo to uncheck the surface and you can reselect it.



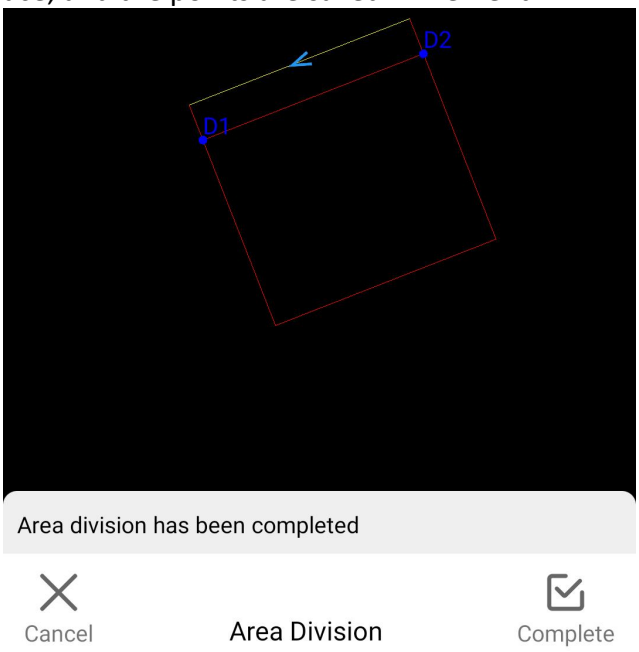
3) Select the starting edge which you want to divide this surface and enter the divided area size.

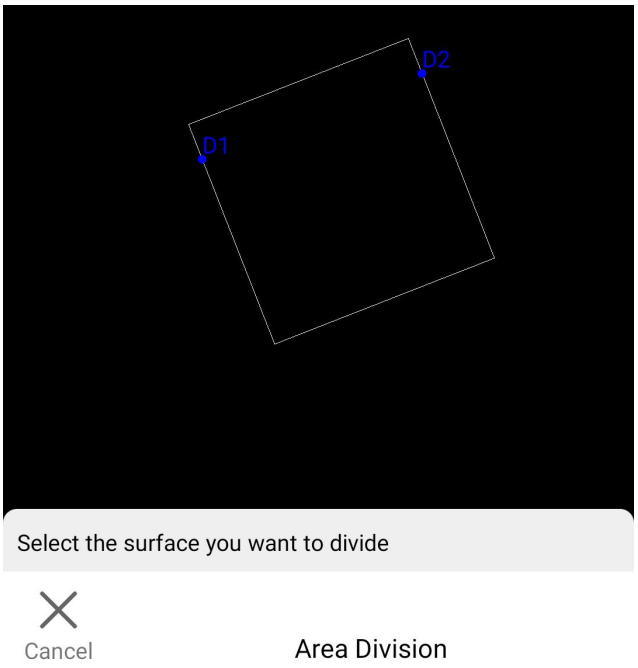


4) After clicking OK, the area from the starting edge to the generated dividing line is the area set by the division.



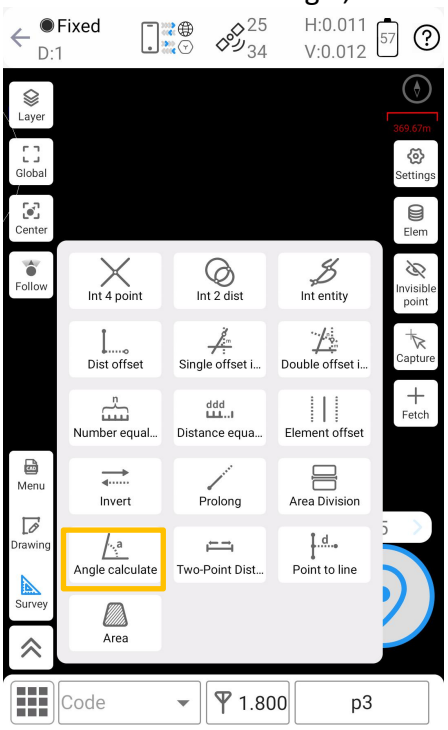
5) Enter the division point name. After clicking OK, the area division is completed, the divided points are generated at the intersection of the generated dividing line and the original selected surface, and the points are saved in Element.





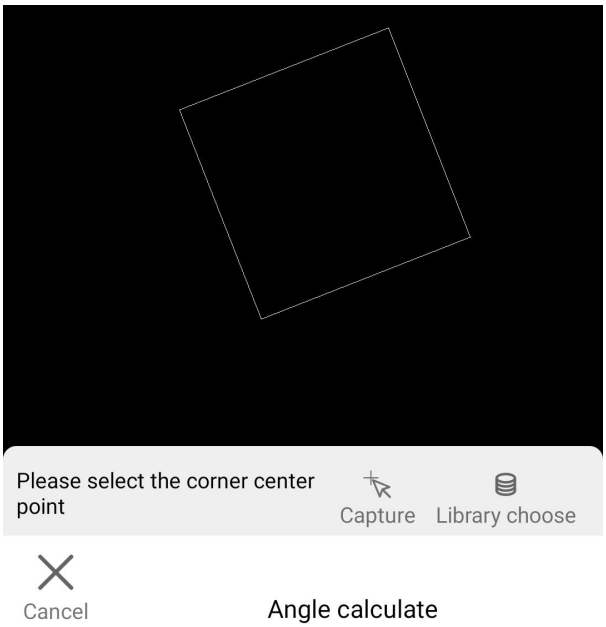
7.3.13 Angle calculate

After selecting three points to form the included angle, the current angle is displayed.

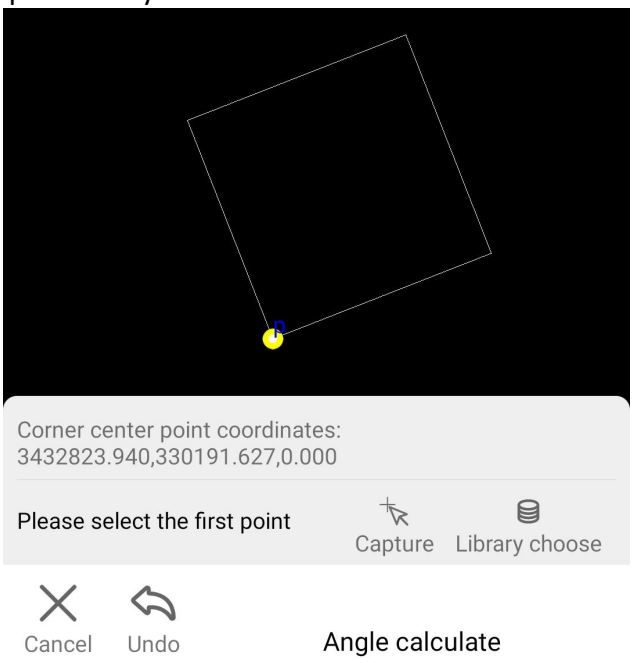


The steps are as follows:

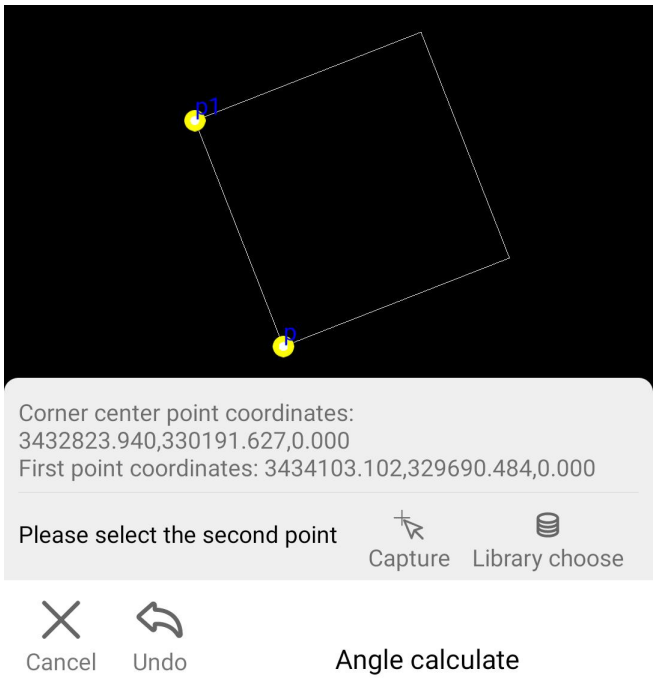
1) Select the corner center by clicking on the map, selecting points with the Capture tool, or selecting points from Element. You can click Cancel and the function will exit.



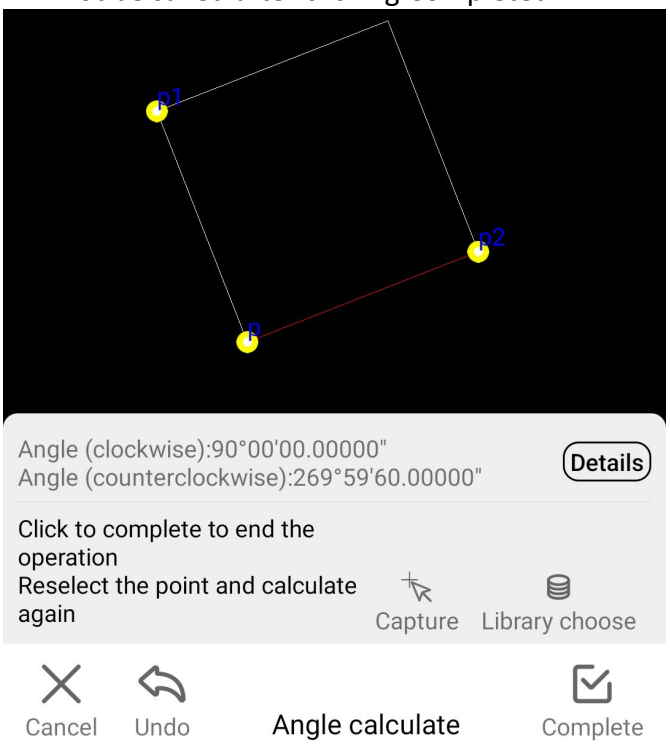
2) After the center point selection, the coordinates of the selected point will be displayed. The bottom prompts "Please enter the first point". Click Cancel to exit the function. Click Undo to uncheck the point and you can reselect it.



3) After the first point selection, the coordinates of the selected point will be displayed. The center point will be connected to the first point. The bottom prompts "Please enter the second point". Click Cancel to exit the function. Click Undo to uncheck the point and you can reselect it.

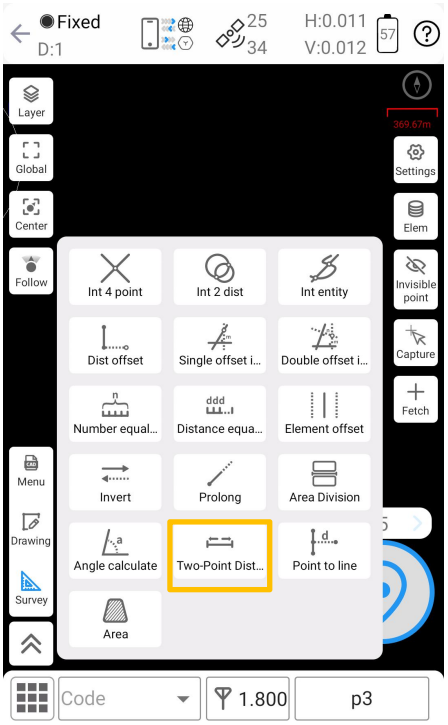


4) After the second point selection, the center point will be connected to the second point. The clockwise and counterclockwise angles of the current included angle will be displayed. You can click Details to enter the angle calculate interface to view or modify. The selected points and graphics will not be saved after clicking Completed.



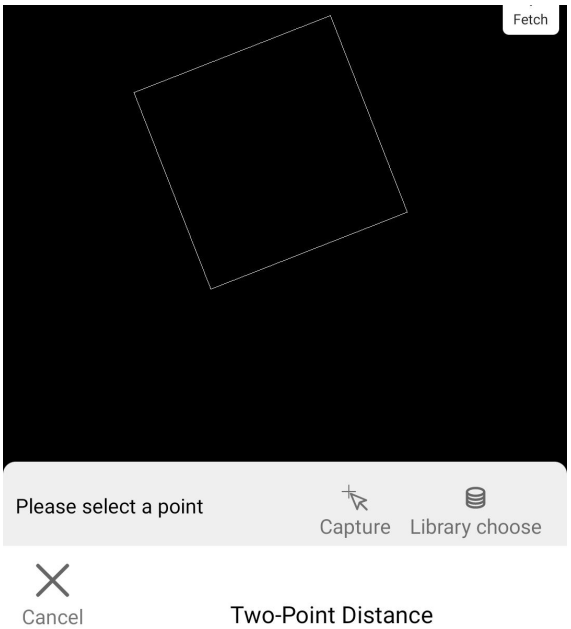
7.3.14 Two-Point Distance

Select two points and automatically calculate the horizontal distance (2D) and slope distance (3D).

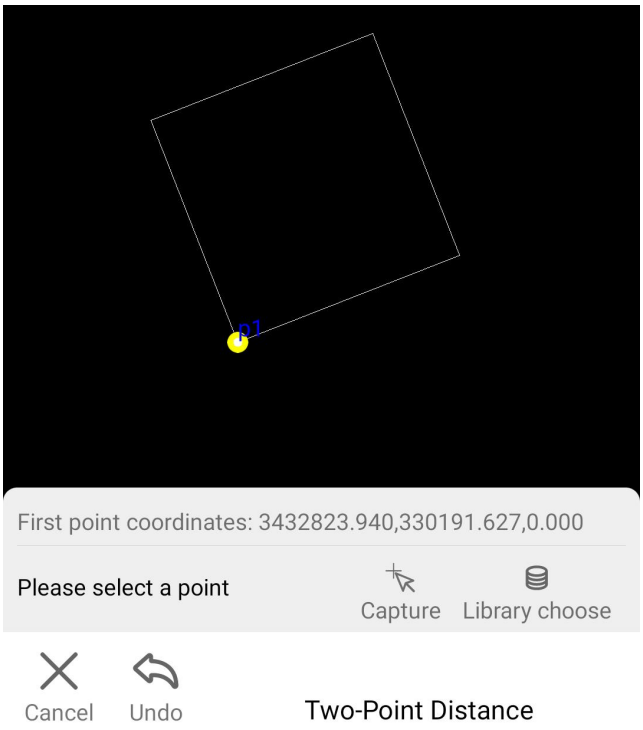


The steps are as follows:

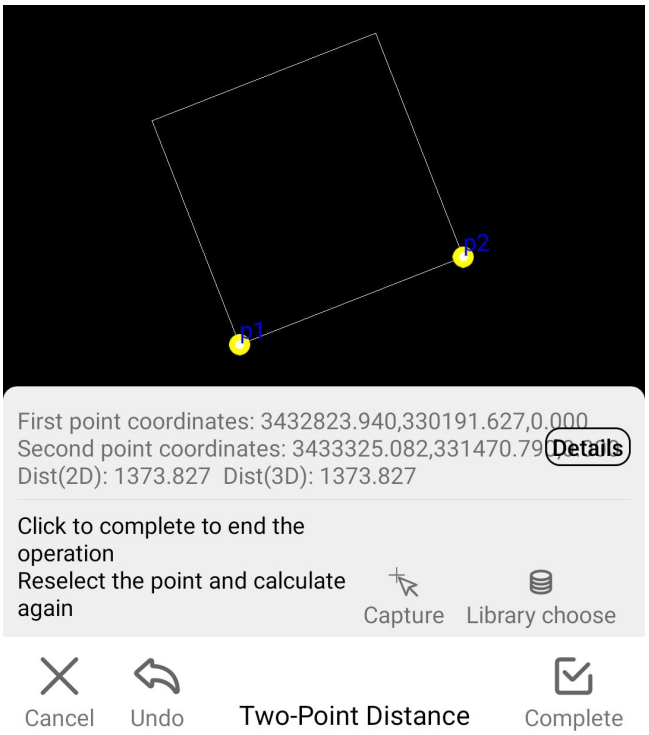
1) Select a point by clicking on the map, selecting points with the Capture tool, or selecting points from Element. You can click Cancel and the function will exit.



2) After the first point selection, the coordinates of the selected point will be displayed. The bottom prompts "Please select a point". Click Cancel to exit the function. Click Undo to uncheck the point and you can reselect it.

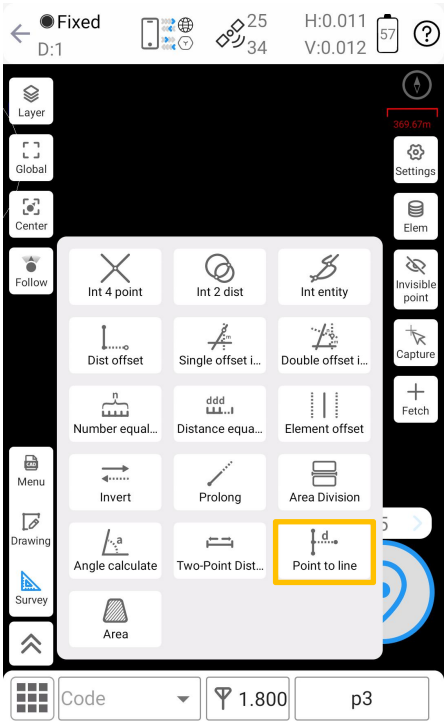


3) After the second point selection, the first point will be connected to the second point. The 2D distance and 3D distance will be displayed. You can click Details to enter Two Point interface to view or modify. The selected points and graphics will not be saved after clicking Completed.



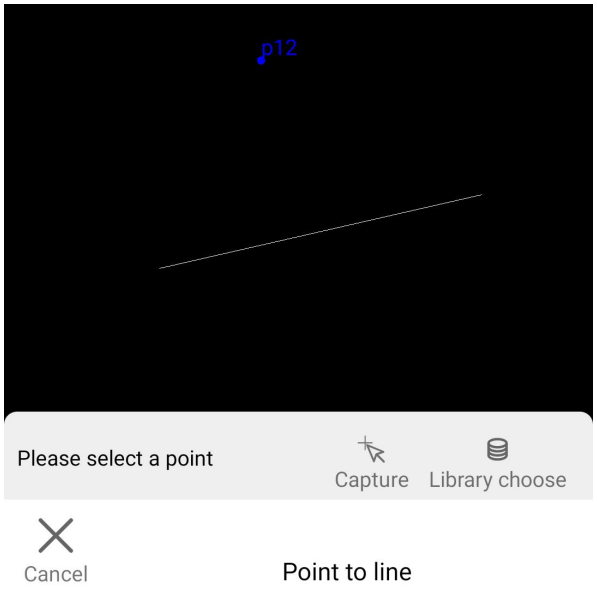
7.3.15 Point to Line

Select a point and a line and calculate the vertical distance from the point to the line.

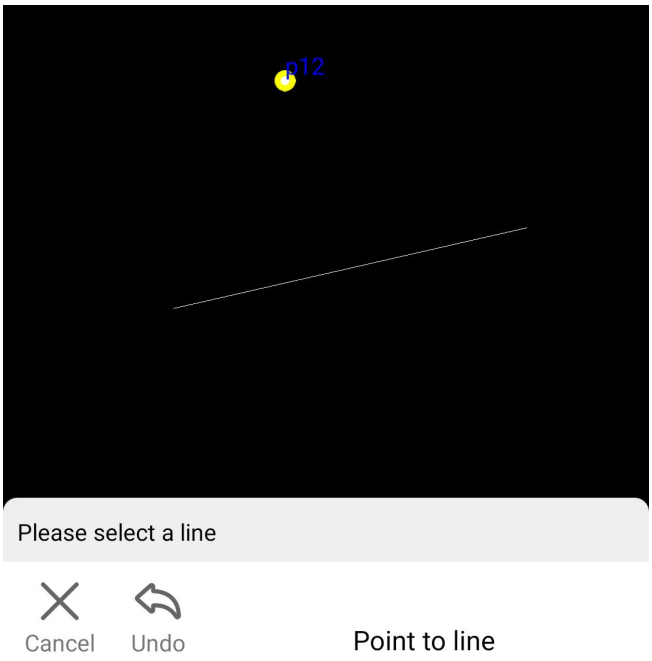


The steps are as follows:

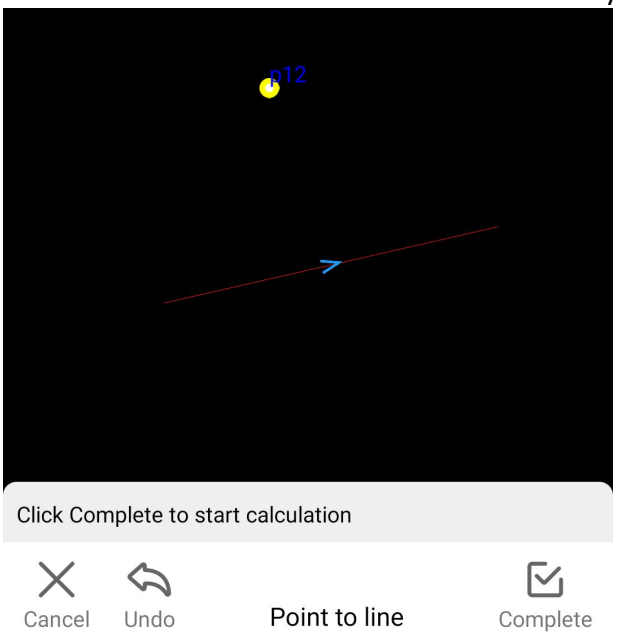
1) Select a point by clicking on the map, selecting points with the Capture tool, or selecting points from Element. You can click Cancel and the function will exit.



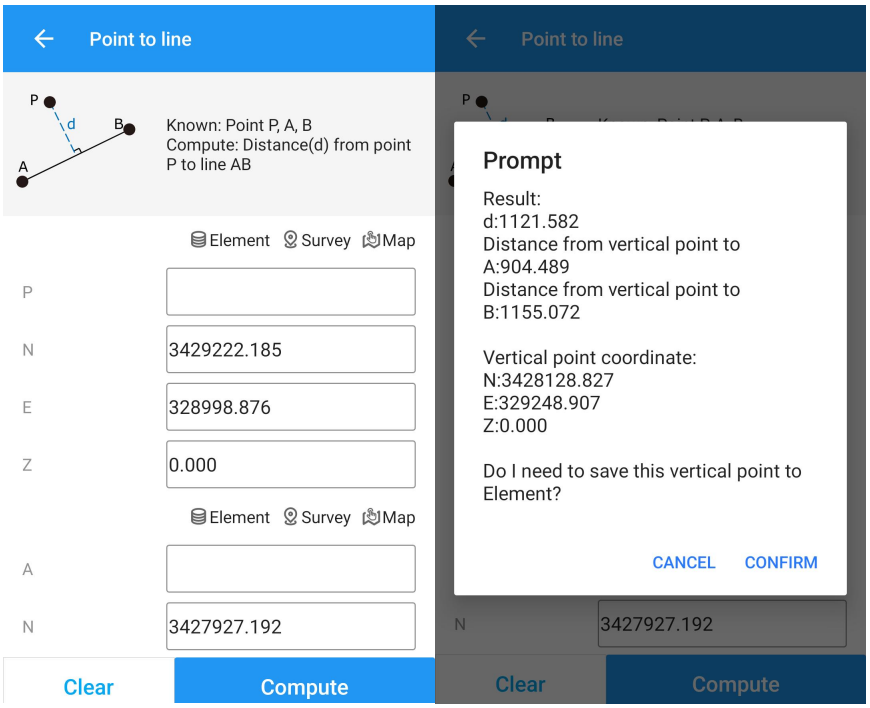
2) After the first point selection, the bottom prompts "Please select a line". Click Cancel to exit the function. Click Undo to uncheck the point and you can reselect it.



3) After the line selection, the bottom prompts "Click Completed to start calculation". Click Cancel to exit the function. Click Undo to uncheck the line and you can reselect it.

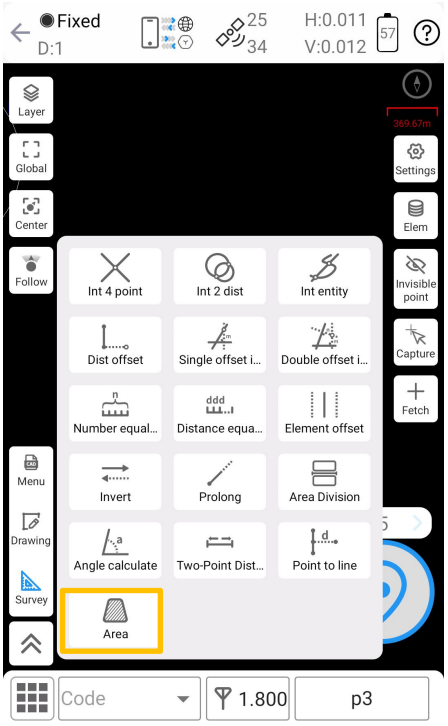


4) After clicking Completed, you can enter Point to line interface to view or modify. Click Compute you can save this vertical point to Element.



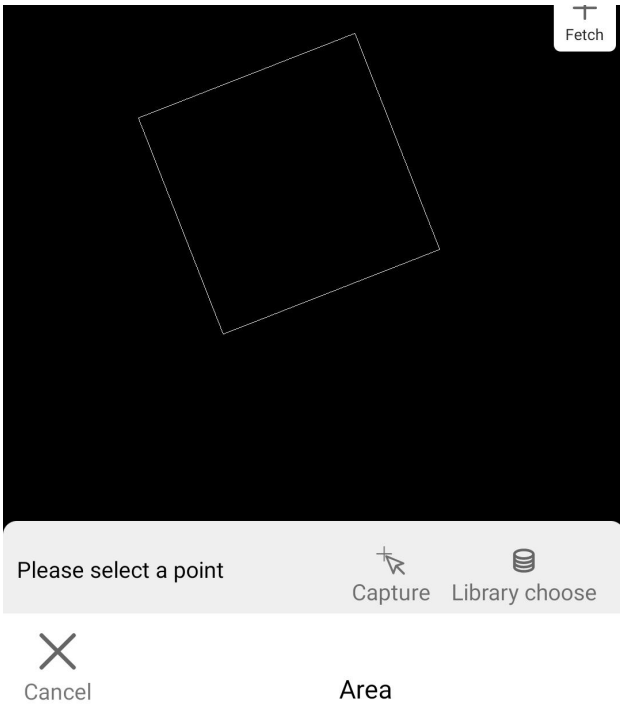
7.3.16 Area

Select the nodes that make up the graph, automatically calculate the area of the graph, and label the value.

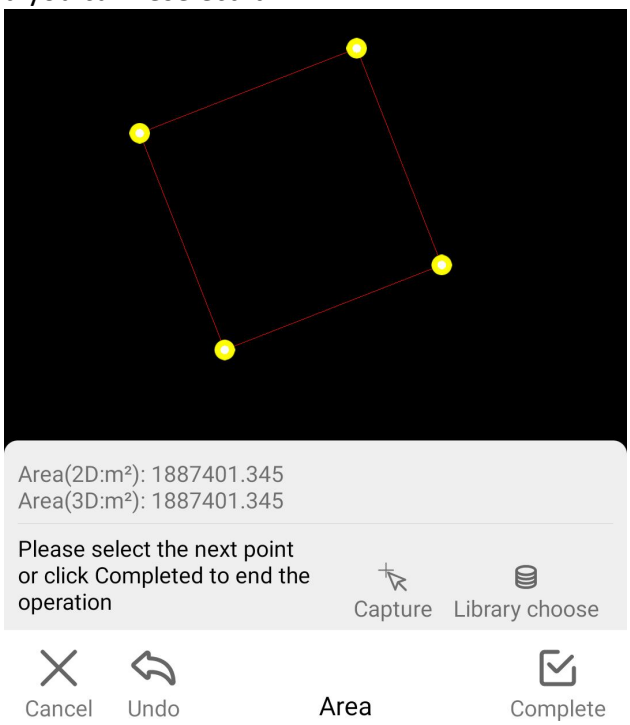


The steps are as follows:

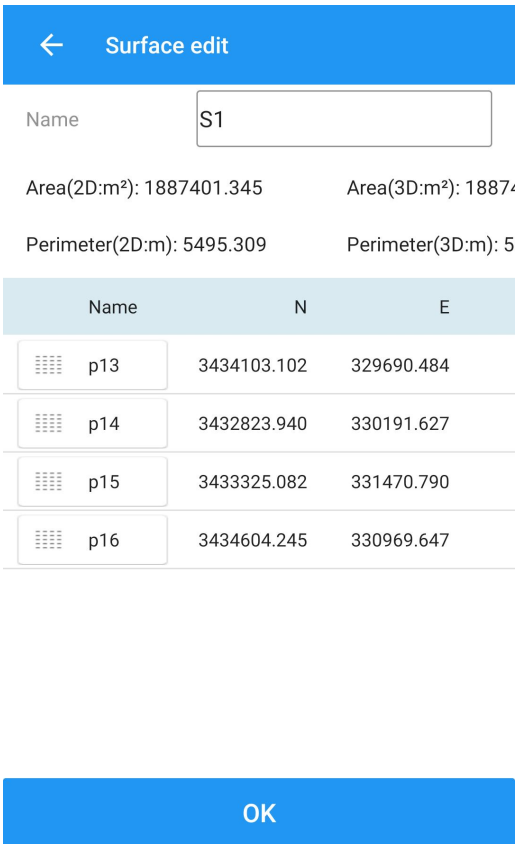
1) Select points by clicking on the map, selecting points with the Capture tool, or selecting points from Element. These points will make up a graph. You can click Cancel and the function will exit.



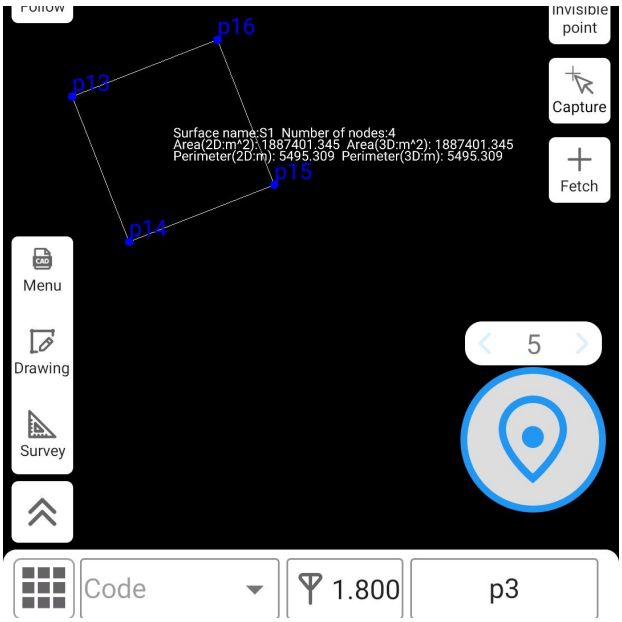
2) After all points selection, the 2D area and 3D area will be displayed. Click Undo to uncheck the point and you can reselect it.



3) After Clicking Completed, you can enter Surface edit interface to view or modify. Click Cancel to exit the function. Click Undo to uncheck the line and you can reselect it.



4) After clicking OK, the area annotation is displayed in the center of the interface, and the 2D/3D perimeter and area of the graph are displayed. The graph selection points are generated at the nodes and saved to Element.

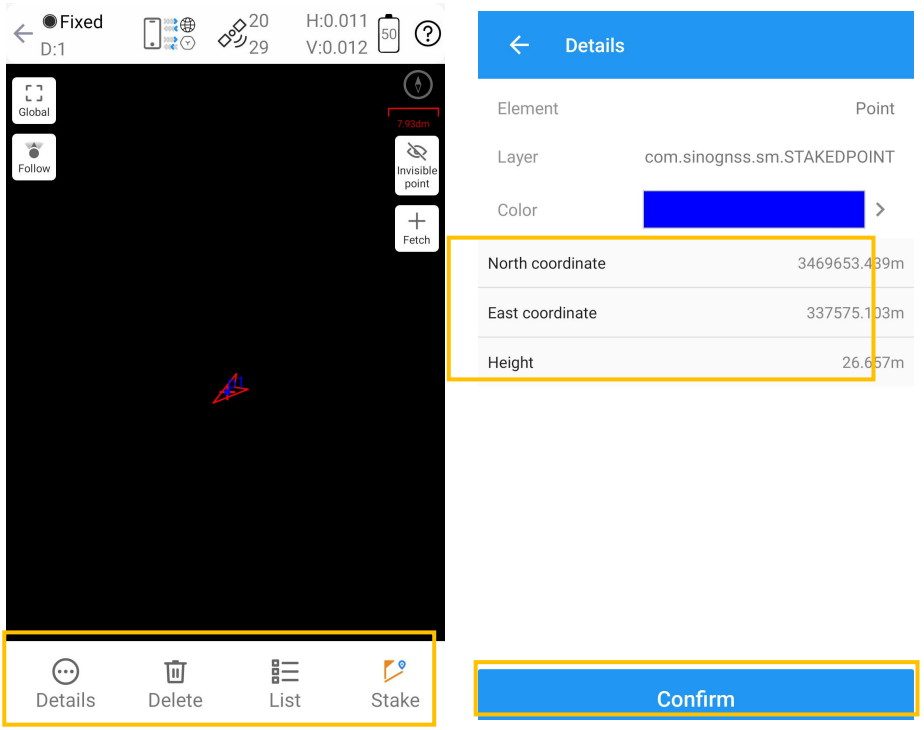


7.4 CAD Stake

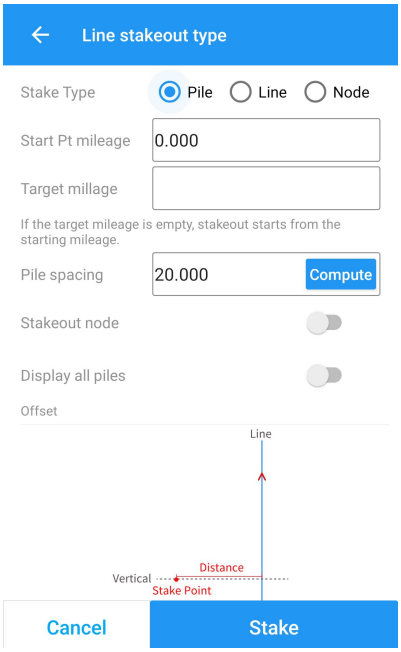
When you choose one point or line of the CAD file, you can do the followings:

Delete: Delete this point or line, then click Save to save as a new file. When you exit the Stake CAD, the delete operation will not be saved to this current file.

Detail: Check more information of the line what you selected



Stake: Enable pile-by-pile co-ordinate sampling, and you can set the key nodes, deviation, calculation method and interval in the expanded setting items.



Release key node: When selecting ‘Specify distance’ or Equal segment’, an option ‘Release key node’ will be added to the calculation, which is enabled by default. When this function is on, the nodes will be added to the release, and the piles will be added to the nodes, just like the current one. If it is off, the key nodes of the folded line will be blocked, and only the calculated pile numbers will be kept.

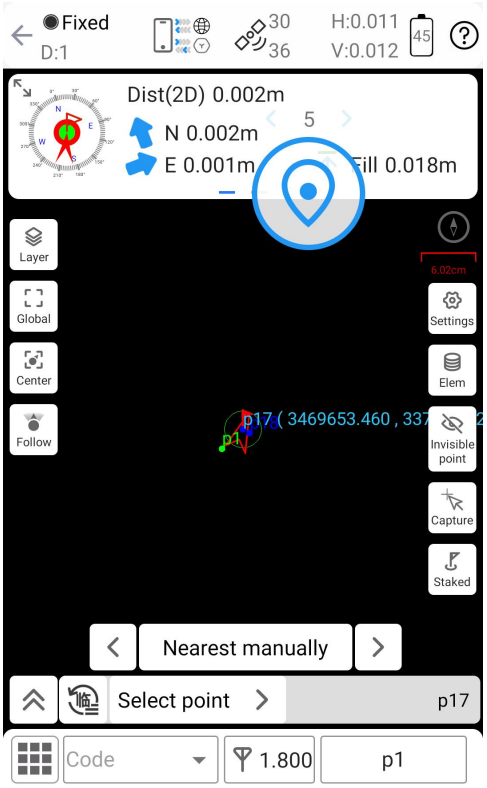
Setting the offset: when the offset value is set to a positive value, pan the line to the right to release the sample, and when the offset value is set to a negative value, pan the line to the left to release the sample.

Calculations can be made for specified distance (i.e., the distance between specified line segments), line segment splitting (splitting line segments into a set number of segments), and key points (i.e., clicking on key points in the sampled line segment, such as the ‘start point’, ‘end point’, etc.).

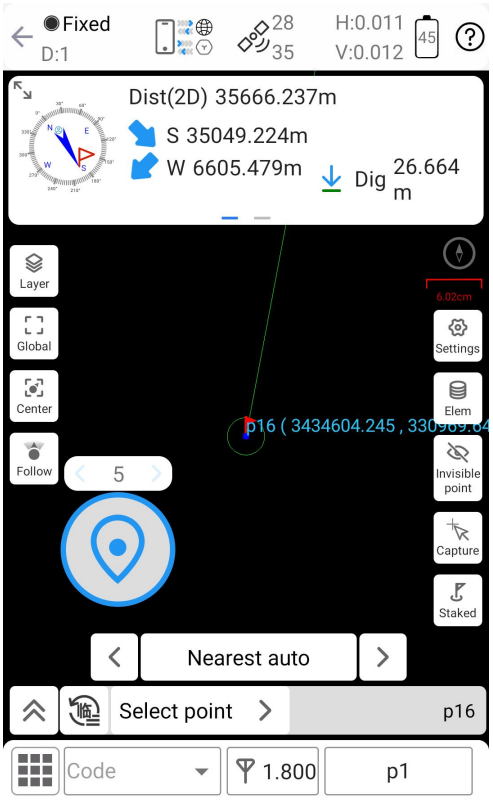
The interval defaults to 20

Nearest point mode:

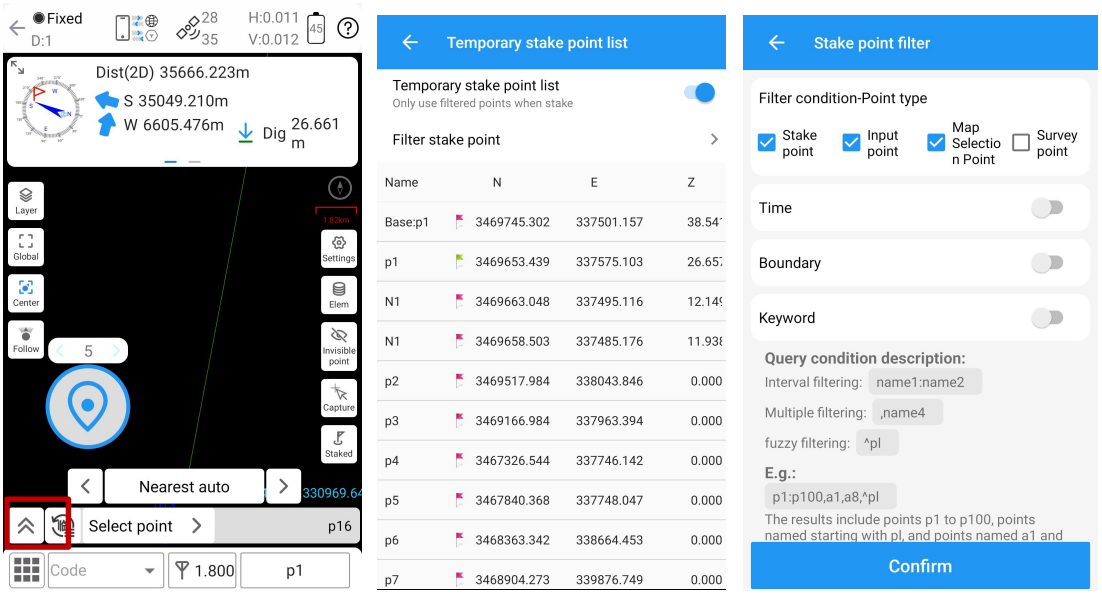
1） Manual Nearest: Click Manual Nearest once to calculate the nearest unplaced point to the current position.



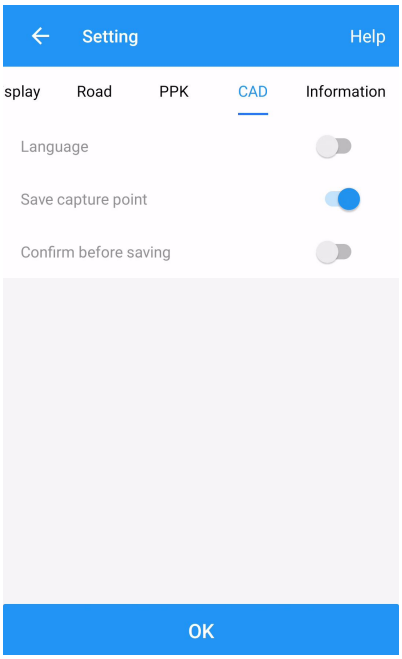
1) Auto nearest: Automatically select the nearest point for sampling, and automatically switch to the next nearest point after point sampling is completed.



Temporary release point library: Click to enter the temporary release point library, the default temporary release point library is closed, after opening the lower part of the display point library in all the points, you can filter the release point.



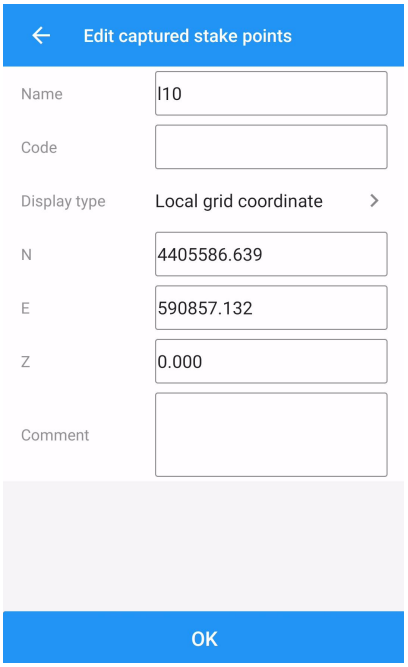
7.5 CAD Setting



Language: Turn on the button, it can support any language

Save capture point: It is turned off by default. After turning it on, the CAD interface will save the captured points to Element. After turning it off, the captured points only support stake and will not be saved to Element.

Confirm before saving: It is enabled by default. This option will be displayed when the save capture point function is enabled. After it is enabled, the captured points can be edited. After the editing is completed, click OK to save it to Element. After it is disabled, the captured points can be saved without secondary confirmation.



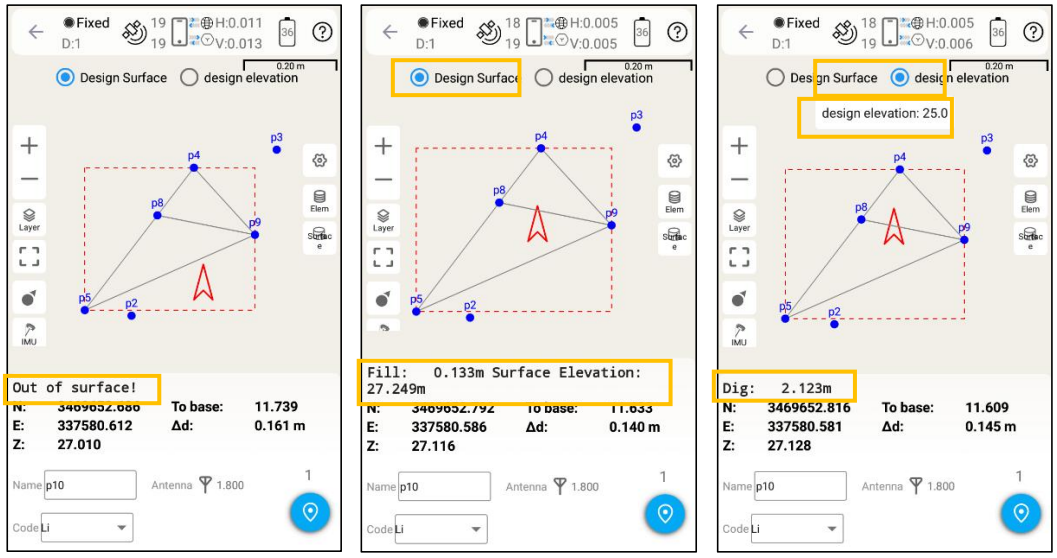
8. Stake Surface

You can stake the elevation using the design surface, then you can choose the fill or excavate according the stake result.

Go to ***Survey***->***Surface Stake***, if you don’t open a surface before, then it will jump to the Surface interface;

If the current position is not within the range of the design surface, it will show “***Out of Surface!***”; if the current position is within the range of the design surface, it will show the fill or excavation value;

There are two methods to stake the elevation, you can use the elevation from the ***Design surface***, or you can use the ***Design elevation*** to get the fill or excavation value;



9. PPK

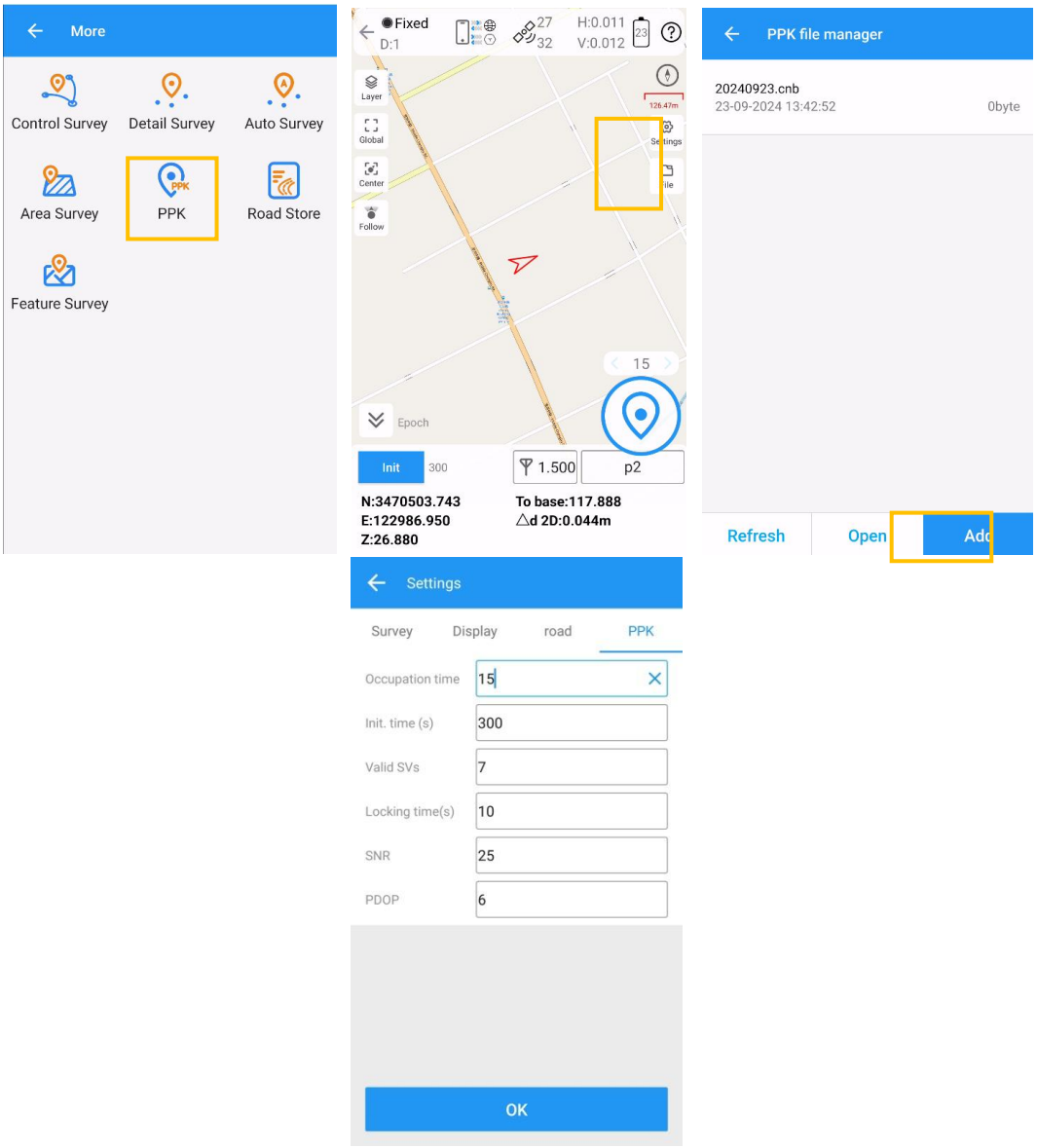
PPK (post processing kinetic) is the unique function of survey master, which is used for post-processing dynamic measurements.

It also needs two receivers to work together, one work as Base to record static data, and Jupiter work as Rover as shown below.

1) Click PPK in survey interface -> choose or create a PPK file.

2) Go to settings, configure PPK settings based on your requirements.

3) To get stable epoch, click  to initialize ->  to start PPK survey.

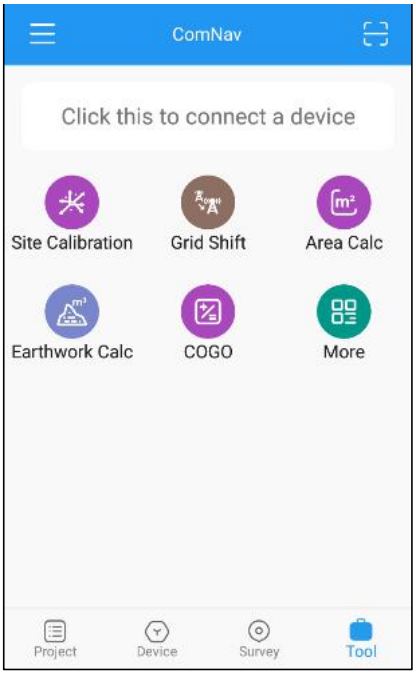


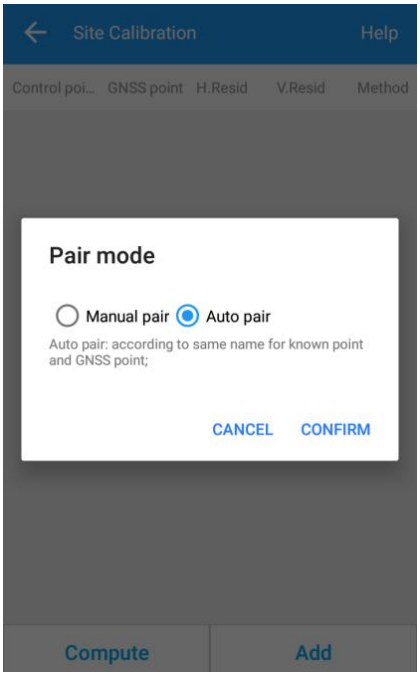
10.Site Calibration/Grid Shift

10.1 Site calibration

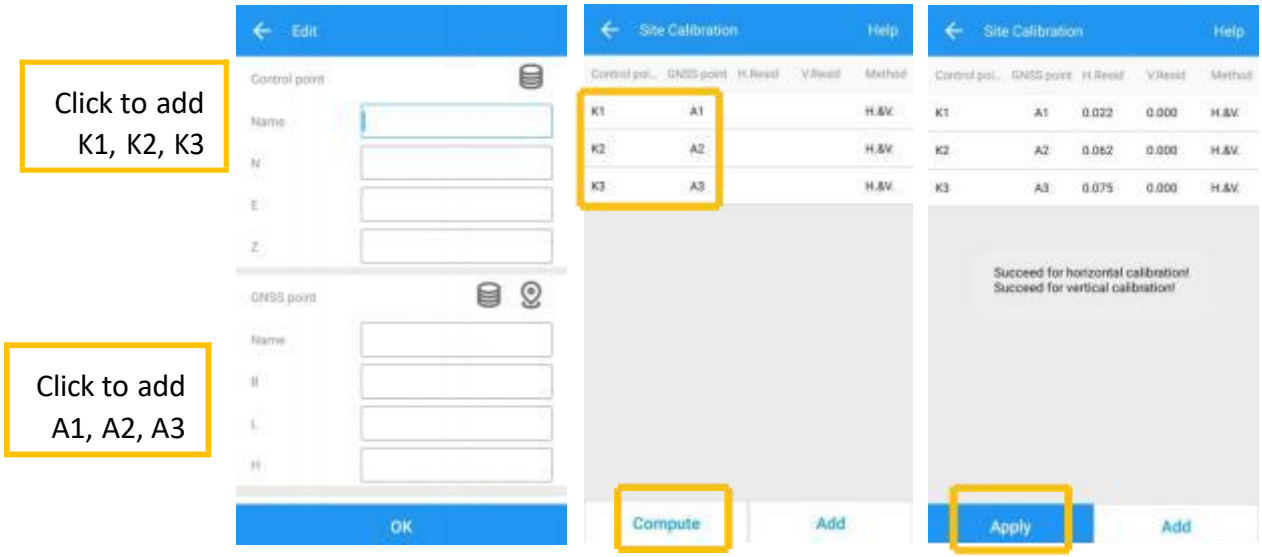
Site calibration is commonly needed once in one project, and all the points will be collected based on calibrated datum system.

1) Choose manual pair or auto pair.

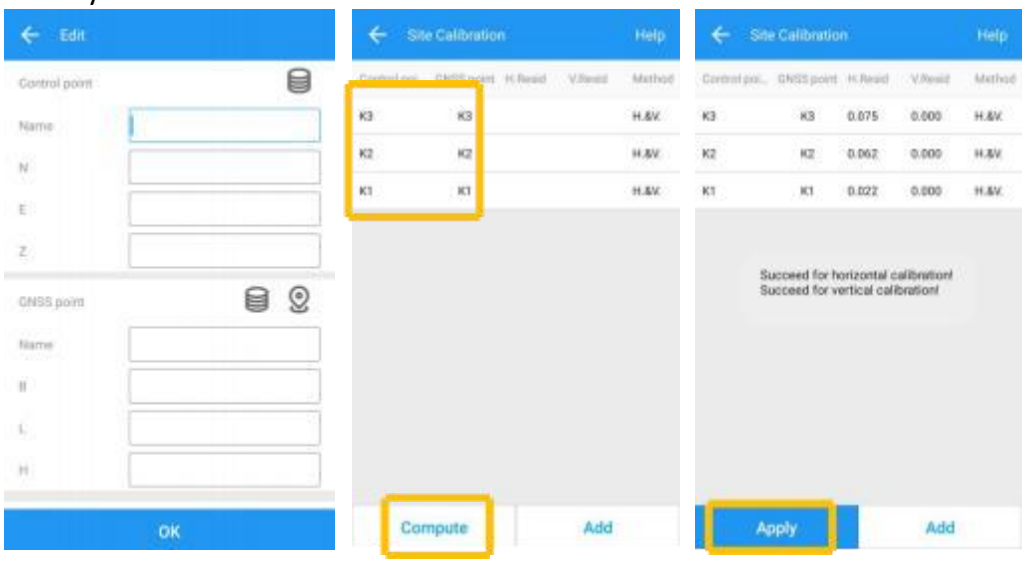




2) If you choose manual pair, you can directly enter at least three groups' point to compute. (for example, take K1,K2,K3 as known points, take A1,A2,A3 as measured points) After click Compute to calculate, the software will calibrate automatically.



3) If you choose auto pair, it will auto compute according to the same name for known point and measured point. After click Compute to calculate, the software will calibrate automatically.

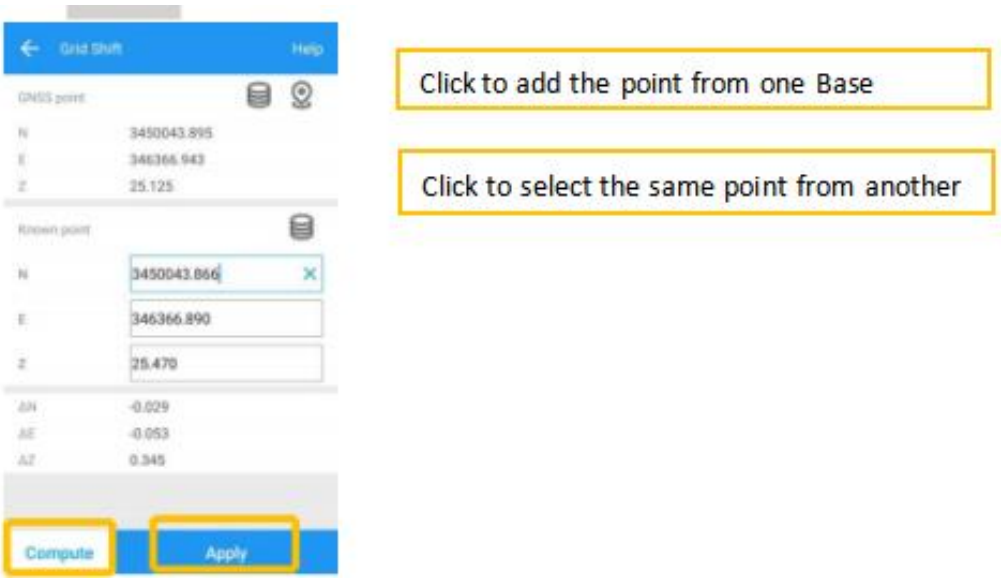


4) Click ***Apply*** to confirm to replace datum. The value of H.Resid and V.Resid should meet the requirement (H.Resid $\leqslant$ 0.015m, and V.Resid $\leqslant$ 0.02m).

10.2 Grid Shift

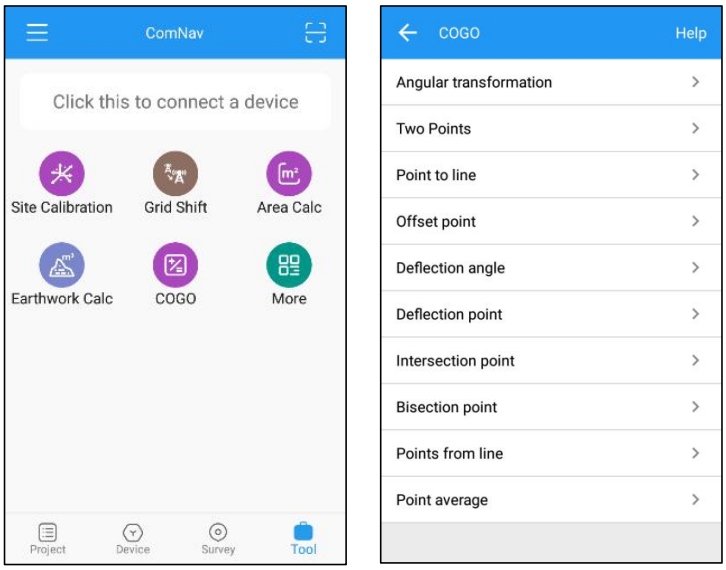
Grid reset function is applied when you need to change the position of Base station in the same project.

Click Grid Shift in Survey interface -> add current Base point and target Base point -> Click Compute -> Apply to complete grid shift.



10.3 COGO

With COGO function, you can calculate points/lines/angle directly on field.



- Angular transformation: Angular type transform;
- Two points: Calculate two points distance;
- Point to line: Distance from point to one line;
- Offset point: Calculate point with azimuth and distance;
- Deflection angle: Calculate angle of two lines;
- Deflection point: Calculate point with angle and distance;
- Intersection point: Calculate intersection points from two lines;
- Bisection point: Calculate point from angle bisector;
- Points from line: Calculate points on line by distance or segment;
- Point average: Calculate average from points;

11.Data Export/Import

Survey Master supports to import/export data including grid coordinate, Lat/Lon coordinate with various data format, support import DXF/DWG file and export result of DXF/KML, etc.

11.1 Import

Tap ***Import*** in project interface, there are some predefined data formats, click ***More*** formats to get more predefined formats. Besides, you can click ***Add*** to create a User-defined type.

Long press the predefined data format that you don’ t use often, you can move this format to the More formats page; also, you can move the data format of More formats page to the previous page where stored the formats you usually use.

- Name: Enter the name for the format
- Delimiter: support Comma(,), Space( ), Semicolon(;)
- File format: support *.csv, *.dat, *.txt format

Click Select all to choose all elements, Click Clear to eliminate all elements selected.

The elements include: code, name, N, E, Z, B, L, H, X RMS, Y RMS, V.RMS, status, start time, occupation time, diff age, base ID, total AntHgt, Antenna height, measure type, antenna name, ending time, comment, RMS, PDOP, HDOP, VDOP, TDOP, GDOP, total SV, used SV, elevation, tilt offset, tilt angle, tilt distance

Tip: The format you defined will also be saved to Export interface.

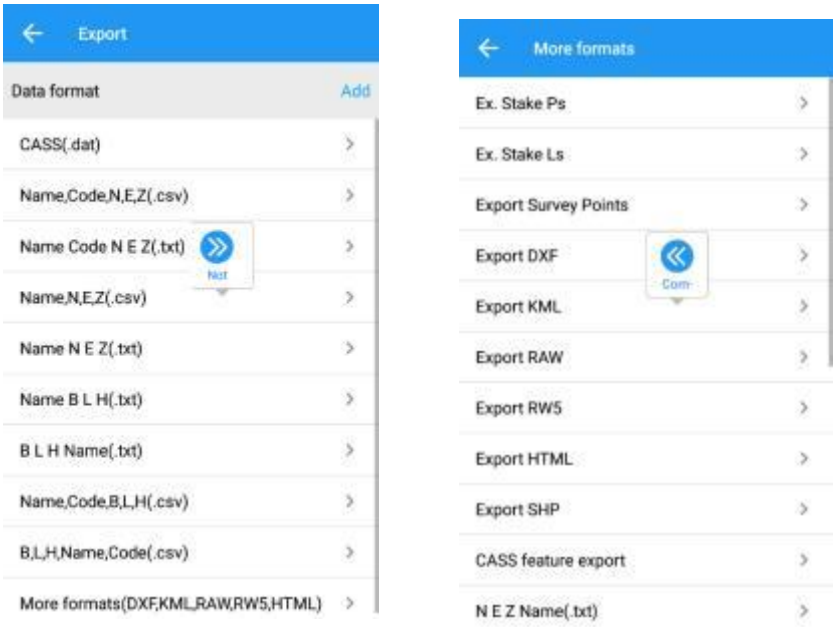
Choose one format to import data.

- The default export path is …/Sinognss/sm/data, you can also click Upperfolder to change to any other path where the file is.
- Point type: support Input point, Control point, Stake point

11.2 Export

Tap ***Export*** in Project interface to export simple data of survey points. Also, click ***More*** formats to export the survey points with detailed information or other formats like stake points/lines, DXF, SHP, KML, RAW, RW5, HTML, CASS feature result.

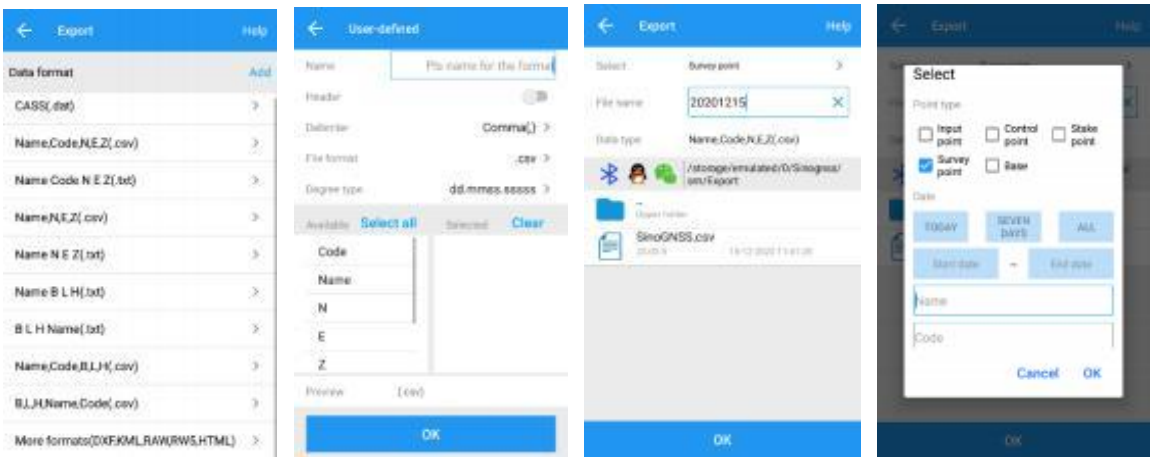
Same with Import result, long press the predefined data format to select the interface you want to place.



File format: support *.csv, *.dat, *.txt format choose one format to export data.

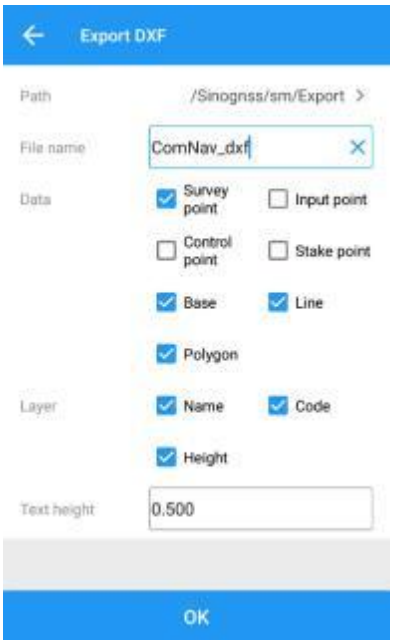
Select: support Survey point, Control point, Input point, Stake point, Base, also,you can set the data, name, code of data to specific export.

The default export path is ⋯/Sinognss/sm/export, and the previous saved file will be shown below, you can also click ***Upper*** folder to change to any other path.



For the points, lines and polygons you surveyed in Topo survey and Feature survey, you can click ***Export DXF*** to export dxf file, then you can edit them in third party CAD software, or import to ***Basemap*** to check, or import to ***Stake CAD*** to stake.

Choose the data that you want to export including survey point, input point, control point, stake point, base, line and polygon, and the layer properties includes name, code and height, the default text height is 0.5.

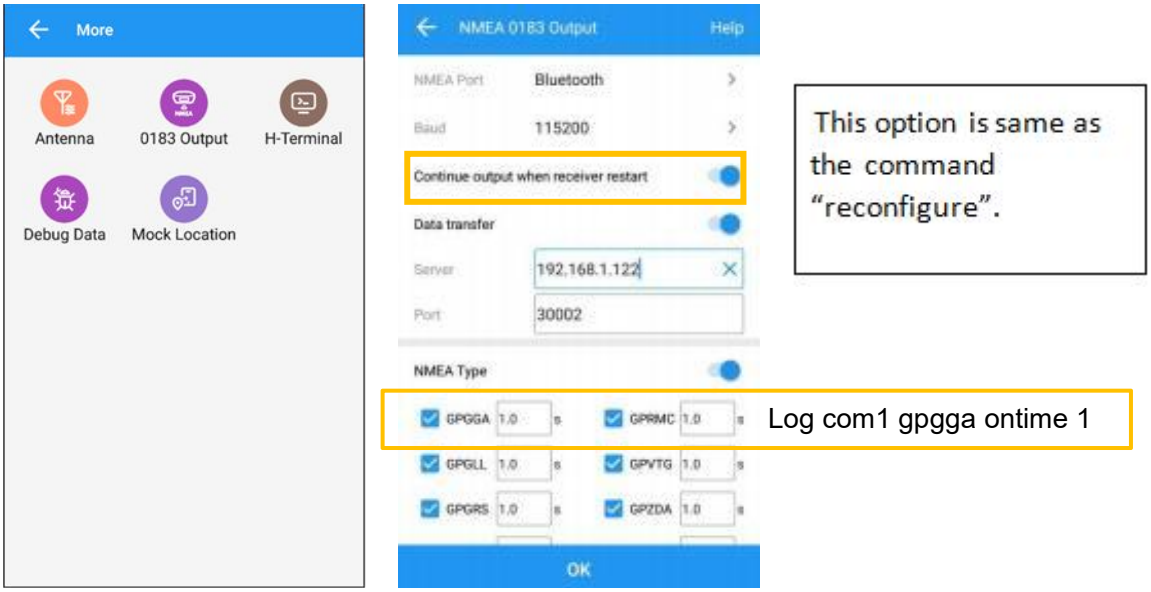


12.Export Result

12.1 NMEA 0183 output

With ***NMEA 0183*** function, you can quickly set to output NMEA data from lemo port or Bluetooth. In fact, this function is same as enter commands “log comX gpXXX ontime X”.

Choose NMEA Port -> Baud -> check commands you want to output.



Data transfer: for transmit all the BT output to the address.

12.2 Register Jupiter via Survey Master

Normally, the register code is like this:

ID:03401012 $$:49-0B-79-23-00-00-00-95-85

FUNCTIONREG:2207453726-3851620954-0949162572-0697504466-0613618189-0027539229

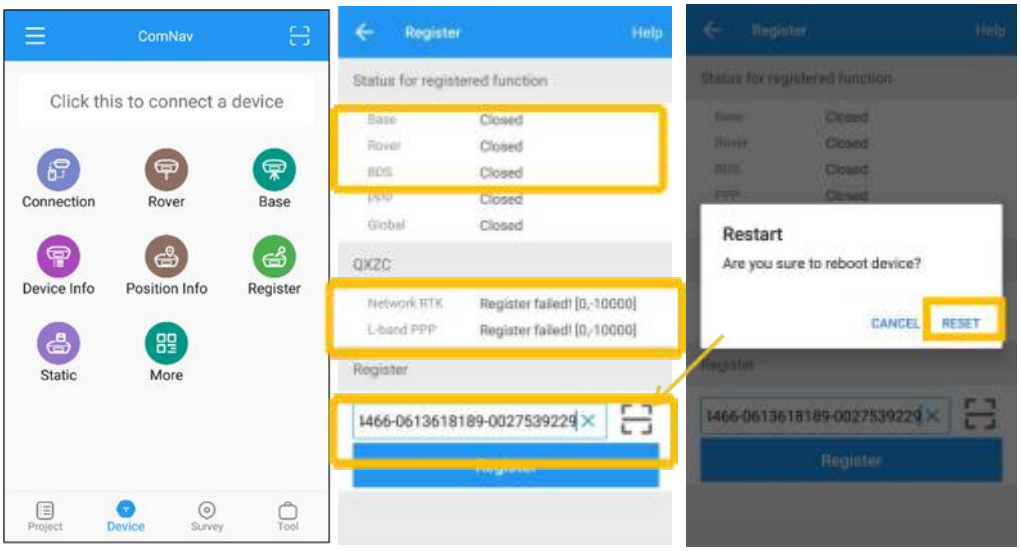
Note: The length of code may different according to different requirements.

Following shows two methods to register the receiver.

➢ **Register function**

For Register function, you need only enter the number:

2207453726-3851620954-0949162572-0697504466-0613618189-0027539229

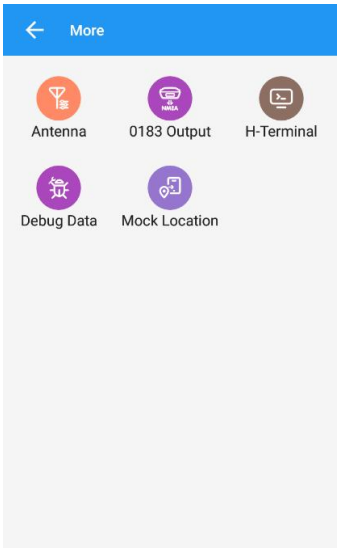


➢ **Register via commands**

You need copy the whole code, include the word ‘FUNCTIONREG:’

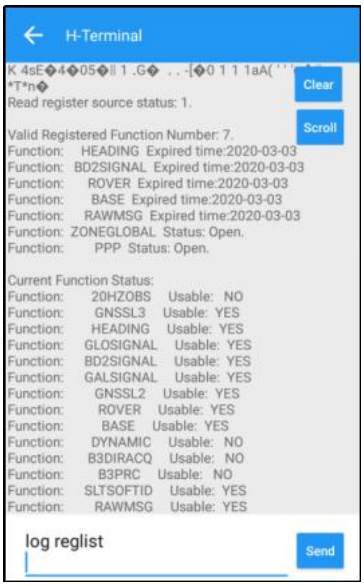
FUNCTIONREG:2207453726-3851620954-0949162572-0697504466-0613618189-0027539229

Copy the whole code, and enter the cursor to next line, then send.



Send command: LOG REGLIST

To check receiver register status.



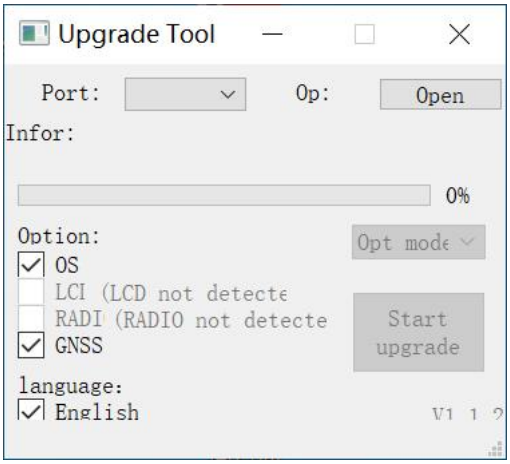
13.Firmware Upgrade

Prepare a USB-TypeC cable. And download a Driver of USB recongnition. It’ s important.

Jupiter adopts the latest chip, integrated system and board, which shall be distinguished during upgrading. The latest version of the OS is 1.4.4, and the GNSS is 610QR.

Copy the firmware software to your PC, connect Veuns to your PC via type-c cable and turn on the receiver.

Open the firmware program, select proper port to connect with receiver, click "***Open"***, only choose" ***OS***" and "**GNSS**" and then click "***Start Update***". Wait for a minute, it will be successful. It means that the system has been upgraded to 1.1.0, 610QR



When the progress bar is full, and "**Completed**!" appear below, it seems the update has been completed and then you can disconnect it and wait for 1 minute to finish the update

Appendix: Physical Parameter of Modules inside of Jupiter

Radio:

Radio parameter	Specifications
Frequency range	410-470MHz
Protocol	Transparent/TT450S/South/MaC/SNLonglink
Airlink rate	9600 / 19200/11000 adjustable
Bandwidth	25kbps
Power	0.5, 1, 2 Watt adjustable
Work distance	3-5 km, depends on power supply and environment condition
Modulation	GMSK

Bluetooth:V 4.0 protocol, compatible with Windows OS and Android OS

Frequency Range: 2.402Ghz-2.480Ghz

RF Power (Max): 4dBm

Band Widh: 2Mh