SingularXYZ

X1-Series GNSS Receiver

User Manual

V1.0, modified on 2023.9.

Corporate Office

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Trademark notice

FCC Notice

SingularXYZ® X1 GNSS receivers comply with the limits for a Class B digital device, pursuant to the Part 15 of the FCC rules when it is used in the Portable Mode.
Operation is subject to the following two conditions:
(1) This device may not cause harmful interference;
(2) It must accept any interference received, including interference that may cause undesired operation.

Copyright Notice

Technical Assistant

If you have any question and can't find the answer in this manual, please contact your local dealer from which you purchased the X1 receiver. Alternatively, request technical support from SingularXYZ .
Website: *www.singularxyz.com* or technical support email: *support@singularxyz.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
- Do not rotate 7-pin Lemo port
- Do not cover the radio, keep a sound ventilation environment
- To reduce radiation, please keep above 2 meters away from the radio station
- Take lighting protection measures when installing antennas
- Change the cable if damaged

Related Regulations

The receiver contains integral Bluetooth wireless technology and UHF. 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

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

Contents

Chapter 1 Introduction

The SingularXYZ X1-Series (hereinafter X1) GNSS Receiver User Guide is aimed to help you get familiar with the X1 receiver and start your project effectively. We highly recommend you to read this manual before surveying, even you have used other GNSS RTK receivers before.

1.1 About the Receiver

With high precision GNSS module inside, X1 GNSS receiver can be applied in RTK mode with all GNSS constellations. X1 receiver 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 SingularXYZ X1 GNSS Receiver key features:

- Ultra small and super light
- Size: Φ133.5 mm × 67 mm
- Weight: 870 g
- 1408 channels of simultaneously tracked satellite signals
- Fast charging via Type-C interface
- Cable-free Bluetooth wireless technology
- LCD Display with easy configure functions
- IP68 waterproof
- Full base/rover interoperability
- Integrated Rx&Tx radio with 12.5KHz frequency interval
- Integrated IMU sensor
- Long distance range radio module
- Integrated 4G module (exclude X1 Lite), support Ntrip and TCP protocols

1.3 X1-Series Packing List

This section provides overall X1 receiver packing list, including basic supplies and customized kits based on your requirements.

1.3.1 *Basic Supply kit*

Standard

X1-Series GNSS Receiver ×1

Type-C to Type-C USB Cable ×1

Transport Case ×1

Battery Charger ×1

Whip Antenna ×1

Options For Rover

Data Collector ×1

Collector Bracket ×1

Centering Pole & Bag ×1

Chapter 2 Setup the X1 Receiver

This chapter provides general information on environmental requirements, setup, power supply and connection of the X1 receiver.

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: -55°C to +85°C
- Out of corrosive fluids and gases
- With a clear view of sky

2.2 Front panel

Receiver front panel contains 4 indicator LEDs, Function button and Power button.

2.3 Lower housing

Receiver lower housing contains a serial port, USB port, UHF radio antenna connector and one sim card slot.

2.4 Power supply

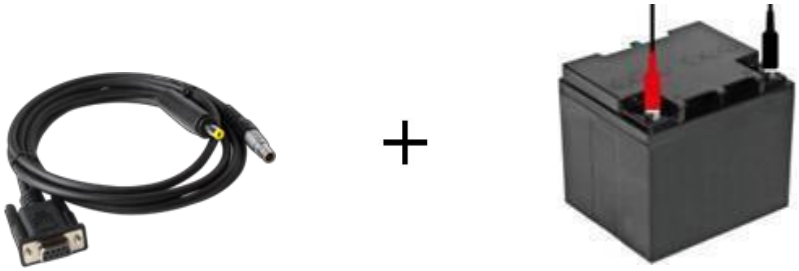
2.4.1 Battery

The receiver is equipped with internal batteries.

- 6700 mAh, over 20 hours working time
- Fast charge of 2.5 hours charging time

2.4.2 External Power Supply

The receiver is connected to an external power supply through a lemo to RS232 cable, and make sure that the red alligator clip is connected to the positive of external power supply, black one to negative. Over- voltage function cannot protect your X1 receiver 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 (7-28 volt DC) for the base station.

Chapter 3 Static Survey

This chapter describes static survey through X1 receiver and SingularXYZ Converter software. For static survey, X1 supports 3 data formats: XYZ, Rinex3.02 and Rinex3.04. XYZ format is raw observation data and you can convert the data from SingularXYZ binary format (*.XYZ) to RINEX format via *SingularXYZ Converter Software* (Contact SingularXYZ support team for the tool).

3.1 Static Data Collection

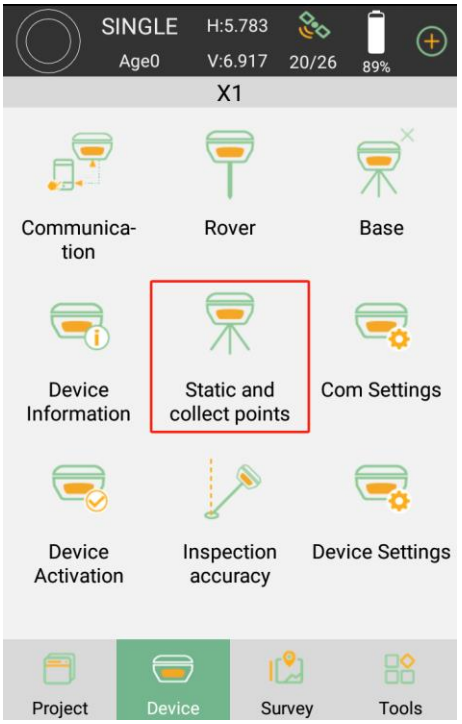
Static survey is mainly used for the control survey. To reach millimeter accuracy, follow as below:

- 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.

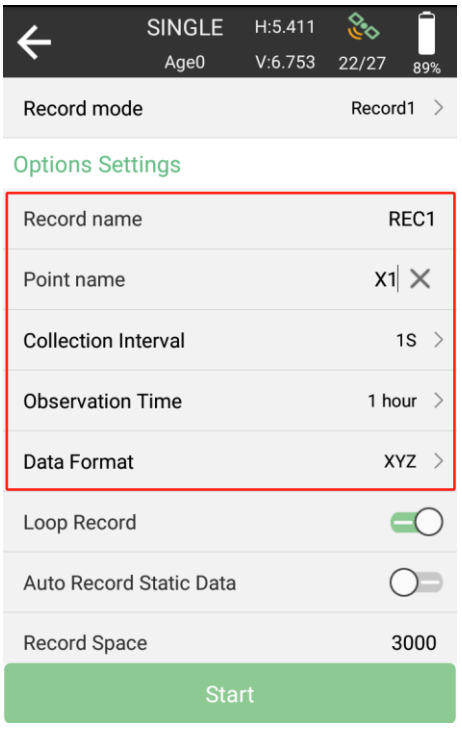
Tip: You can start recording static data in the front panel, it's convenient for you.

The following steps give an example of static survey.

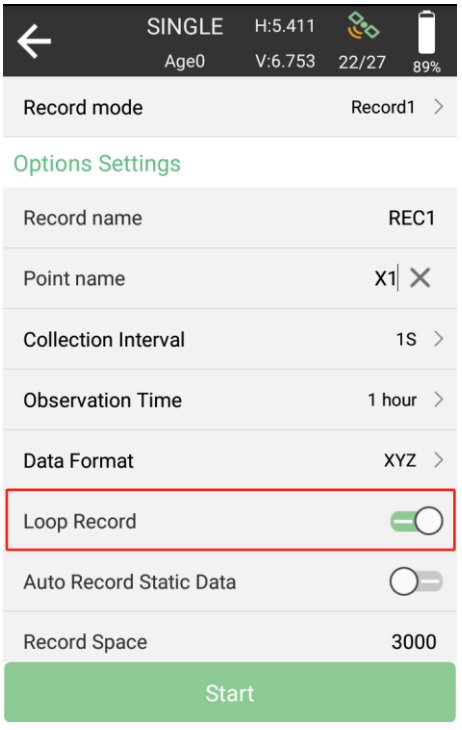
1. Go to ***Device*** >> ***Static and collect points***. Choose the Record mode, there are two record modes and they can work together.



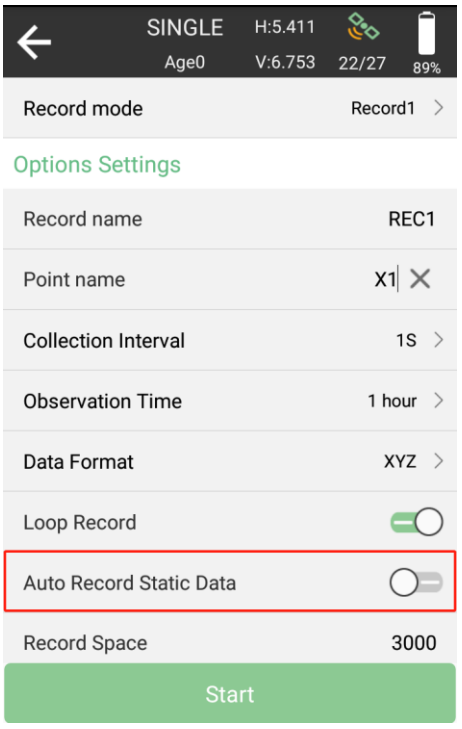
2. Option Settings. Input Record name and Point name. Set the Collection Interval, Observation Time and Data Format.



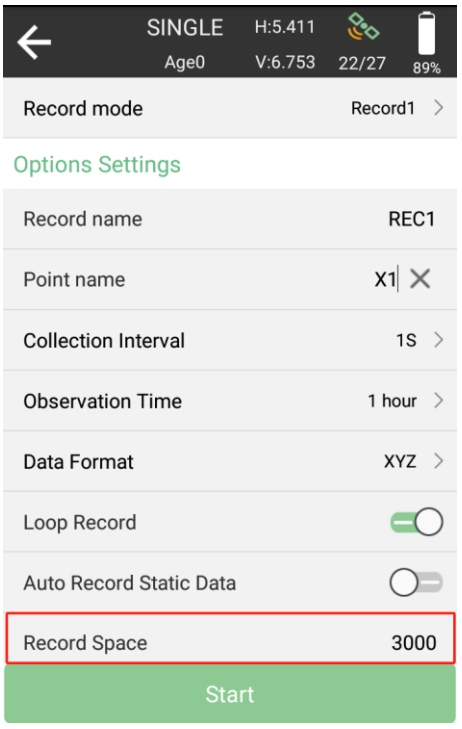
3. Open the ***Loop Record*** according to you needs. If this option is opened, receiver will delete the earliest recorded data to keep recording when the record space is full.



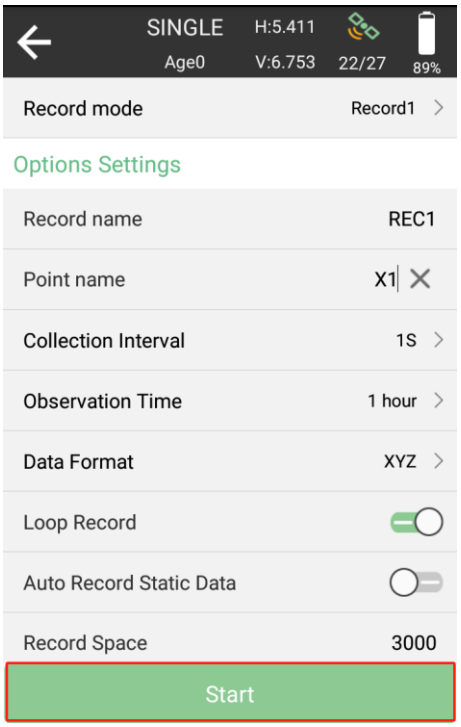
4. Open the ***Auto Record Static*** according to you needs. If this option is opened, the receiver automatically records static data after it is power on.



5. Set the ***Record Space*** in the end. It will limit the amount of data that receiver record.



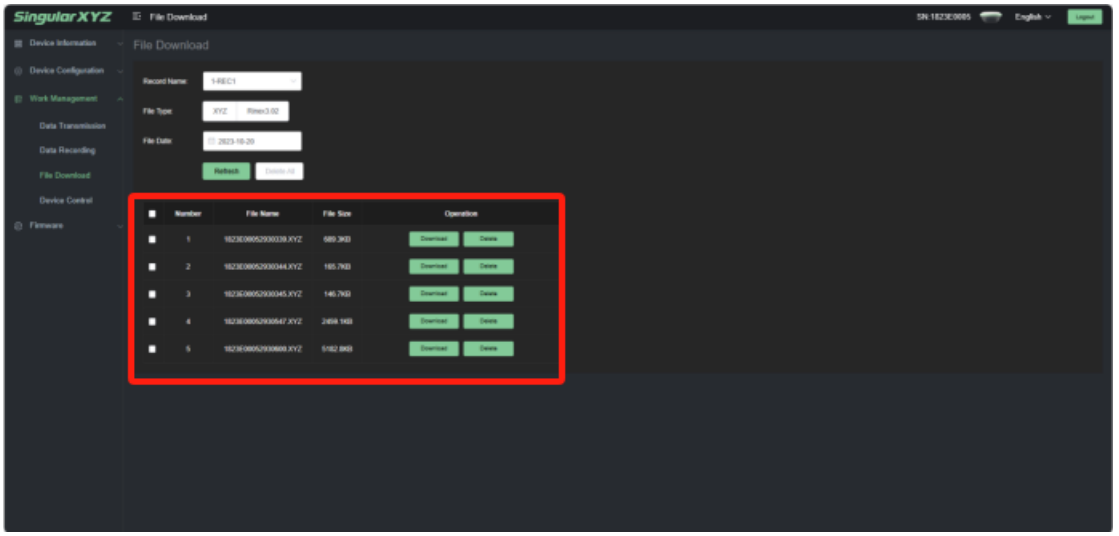
6. Click ***start*** to static survey.



3.2 Static Data Download

The raw observation data is saved in internal memory of X1 receiver, when connected with PC via TYPE-C cable, the X1 receiver can work as a USB Flash Disk – SingularXYZ_DISK, which means you can copy the static data to PC directly.

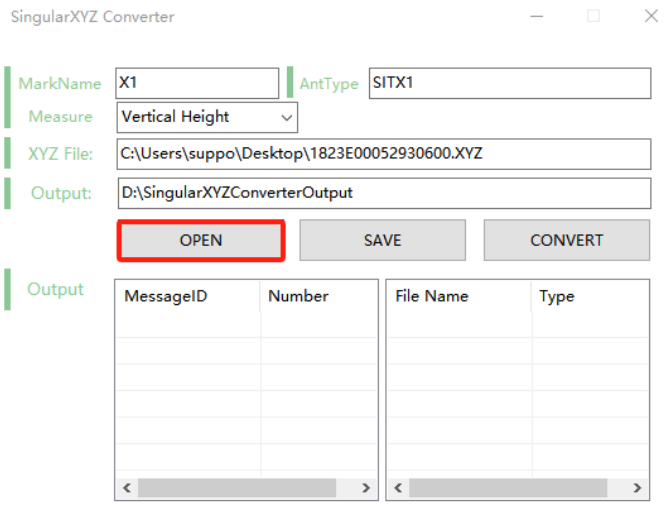
In addition, you can download the static data via WebUI, connect the WiFi of the X1 receiver and log in ***192.168.10.12*** (Username: ***admin***, Passwords: ***admin***) Go to ***Work management*** >> ***File Download*** to download the static data.



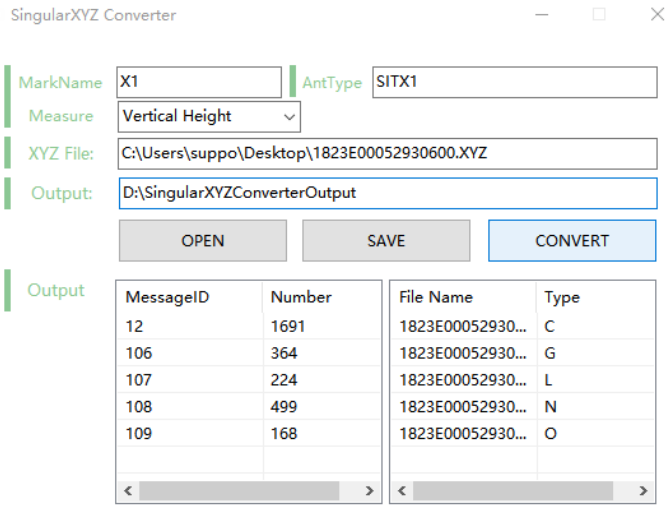
3.3 RINEX Convert

After copy raw observation data to PC, you can convert the data from SingularXYZ binary format (*.XYZ) to Rinex in SingularXYZ Converter software.
The following steps give an example of Rinex convert.

1. Start SingularXYZ Converter software;
2. Click ***open*** and select the path of your XYZ data;



3. Input marker name and choose the measure type, and the antenna type is automatically identified as SITX 1 for X1 receiver;
4. Click ***convert*** to start convert XYZ to Rinex, and the Rinex files will be output to the output file path.


SingularXYZ Converter
MarkName
X1
AntType
SITX1
Measure
Vertical Height
XYZ File:
C:\Users\suppo\Desktop\1823E00052930600.XYZ
Output:
D:\SingularXYZConverterOutput
OPEN
SAVE
CONVERT
Output
MessageID
Number
12
1691
106
364
107
224
108
499
109
168
File Name
Type
1823E00052930...
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Chapter 4 RTK Workflow

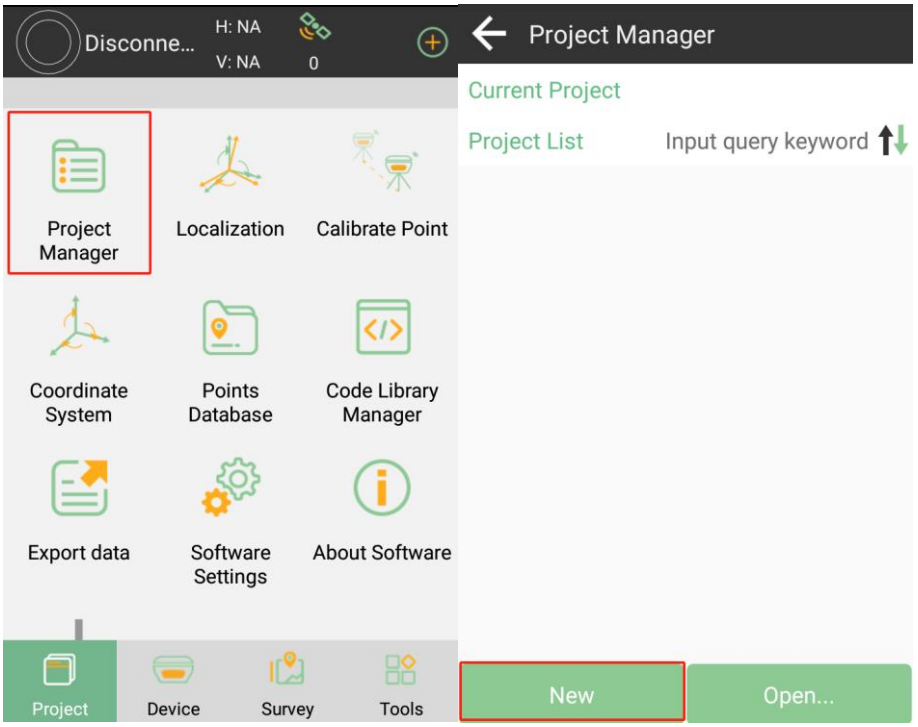
This chapter introduces how to conduct RTK Survey with SingularPad Software. SingularPad is professional Android-based surveying software developed by SingularXYZ team. SingularPad is fully functional as a field surveying software, equipped with complete work modes and necessary functions for surveyors. Projection/datum configuration, GSM/radio/PDA CORS work modes, point survey/stake out/CAD sketch/COGO calculation and etc. can all be found in SingularPad.

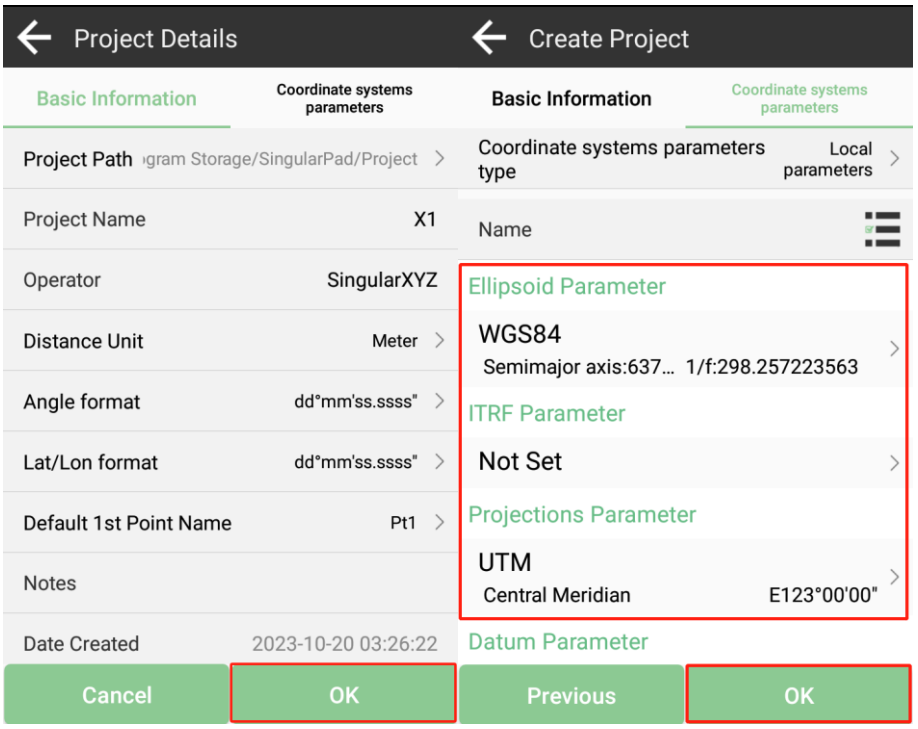
4.1 Installation of SingularPad

SingularPad has been pre-installed on SingularXYZ data collector before shipping, and you can use one month for free, if you want to download on your device, please connect us.

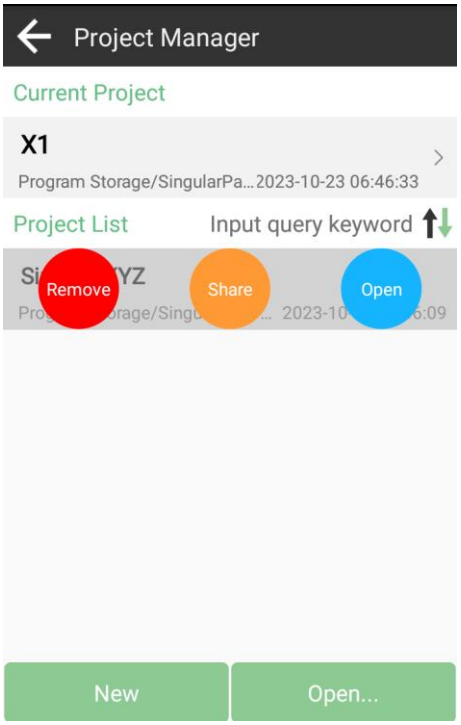
4.2 Create a New Project

Click ***Project Manager***, click the ***New*** button in the lower corner if the screen and input project name, set coordinates systems parameters and click ***OK*** to save the project.





In ***Project Manager interface***, you can click previous projects in the Project List to ***remove*** or ***open*** it. If you have added one project, you can click the project name in the main interface to check the current project details, including Project Name, Project Path and Coordinate systems parameters. And you can edit it.



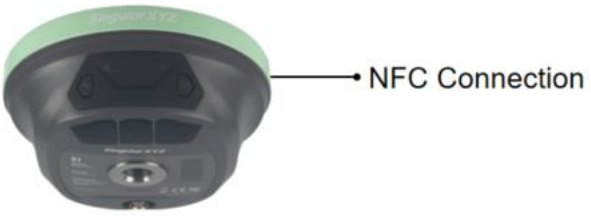
If you can not find the datum you want in the list, follow instructions below to add one: select ellipsoid para, projection para, datum para, and input horizon adjustment,

vertical adjustment and local offsets based on your request. Save and apply it. Meanwhile you can share the coordinate system with your workmates.

4.3 Device connection

4.3.1 *NFC connection*

Equipped with an NFC chip, users can easily connect the X1 receiver and the data collector with just one touch, as shown in the figure below.



4.3.2 Bluetooth connection

After creating a new project, switch to ***Device*** interface, click ***Communication***. You can connect SingularPad with SingularXYZ X1 GNSS receivers. Make sure device Bluetooth turned on, click Find device and select SN number of your X1 receiver. Then allow pair to finish the connection. After connecting X1 receiver, you can check the information of the receiver (like firmware version) in ***Device Information***. After connected successfully, the floating window will show the positioning status.

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

4.4 Quick setup X1 receiver

4.4.1 Start Base Station by SingularPad

When work as a Base station, SingularPad supports transmit the correction data in Internal Radio mode and Device Internet mode.

Internal Radio: This mode uses internal radio to transmit the correction data from Base to Rover. You need to set Base and Rover with same protocol and frequency.

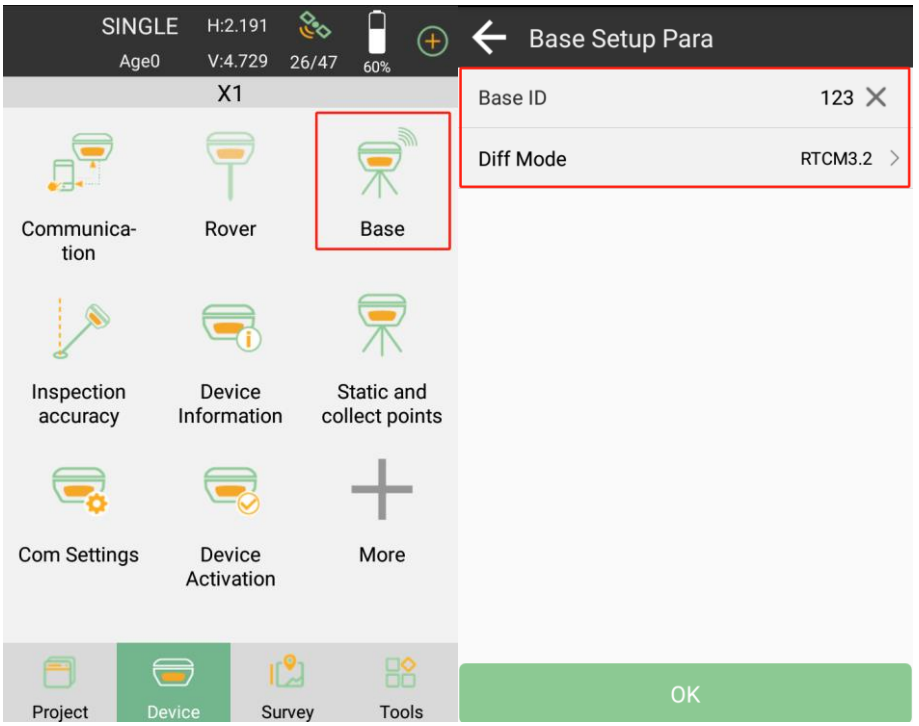
- Protocol: Supports TRIMTALK, TRIMMK3, TT450S, TRANSEOT and SATEL for base transmission
- Frequency: select a channel or customize a frequency, the range of frequency is 410-470MHz
- Baud rate: 4800, 9600 and 19200. This option is to set the baud rate of lemo

port

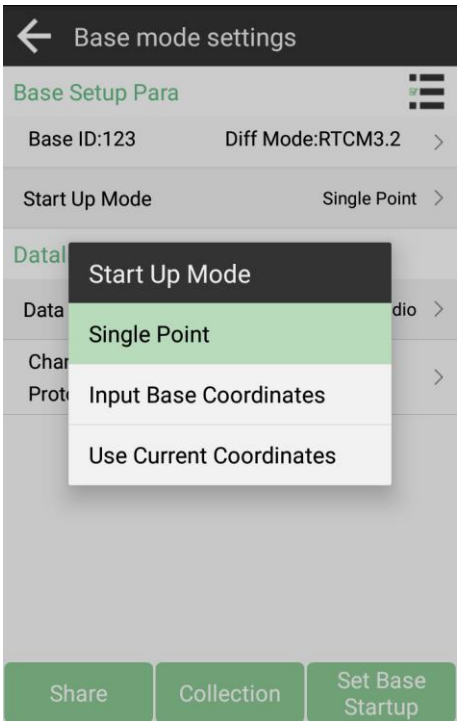
- Power: High and low (low power will reduce the RTK range)

The following steps give an example of internal radio transmission.

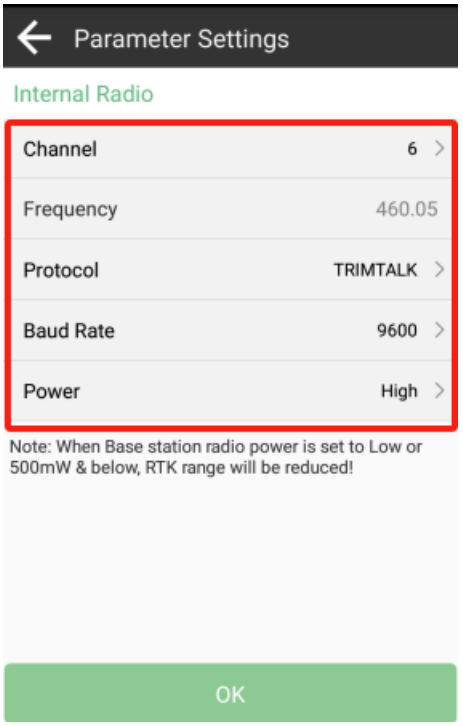
1. Go to ***Device*** >> ***Base***. Set ***Base ID*** and choose the ***Diff Mode*** firstly.



2. Set ***Start up Mode***, SingularPad supports Single Point, Input Base Coordinates and Use Current Coordinates. ***Single Point*** means startup base station in at unknown coordinates. ***Input Base coordinates*** means startup a base station in a known coordinates as need you input the latitude, longitude and the height. ***Use Current Coordinates*** means startup base station in current coordinates automatically.



3. Set ***Data Link*** as ***Internal Radio***. Set parameter settings, Channel, Frequency, Protocol, Baud Rate and Power.



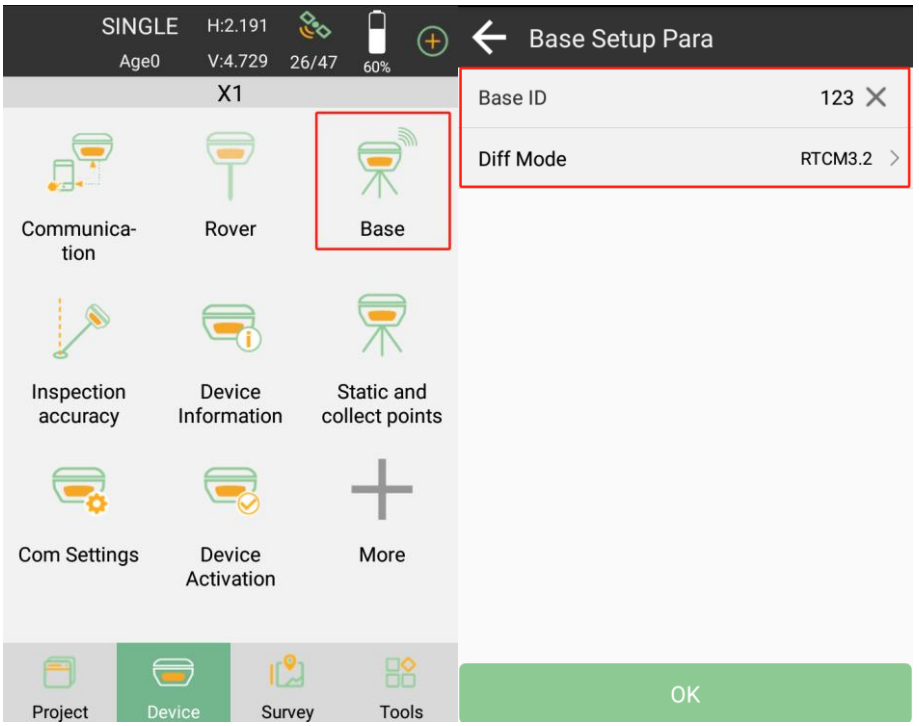
4. When start Base succeed, it will show as below in SingularPad.

Device Internet: This mode uses GPRS (internet data) to transmit the correction data from Base to Rover. You need to insert a SIM card to Base, set the Base to log

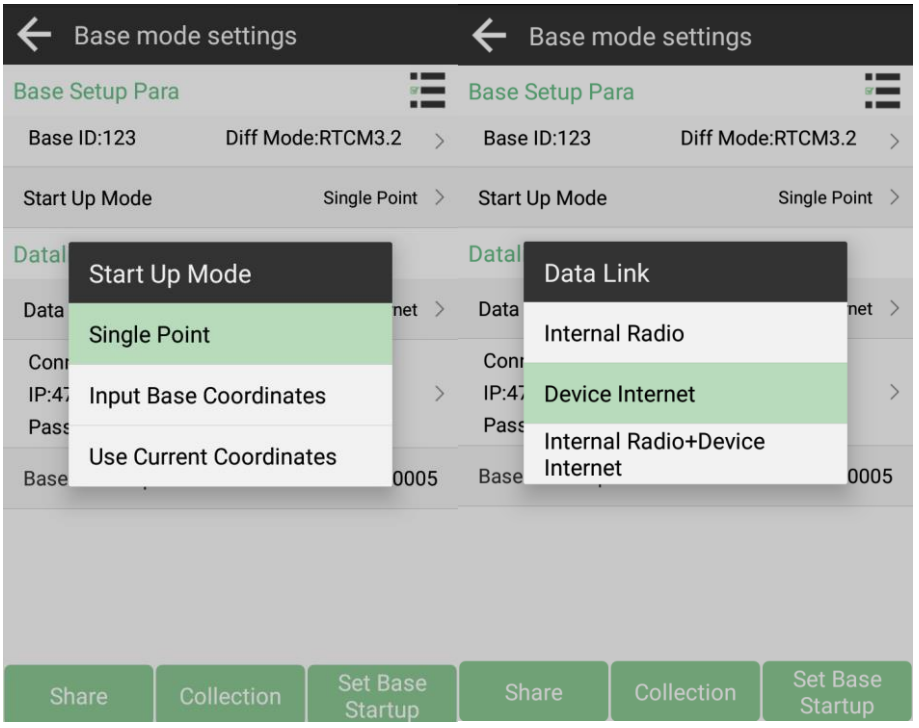
on the server (with static IP address), and the Rover receives the correction data by Ntrip protocol.

The following steps give an example of device internet transmission.

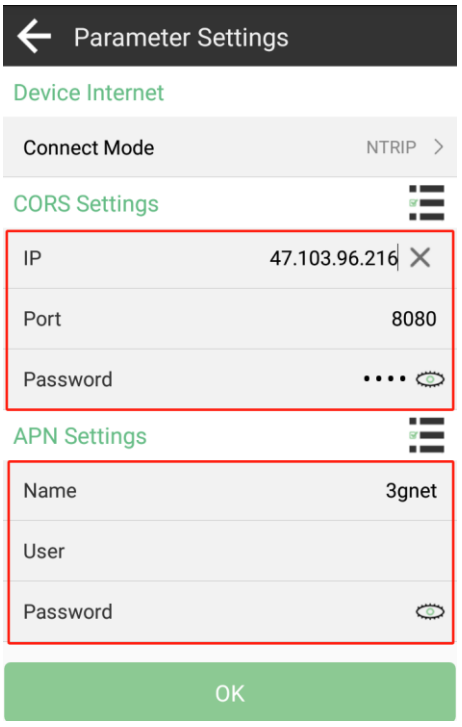
1. Insert a SIM card to the X1 receiver and then turn on the receiver.
2. Go to ***Device*** >> ***Base***. Set Base ID and choose the Diff Mode firstly.



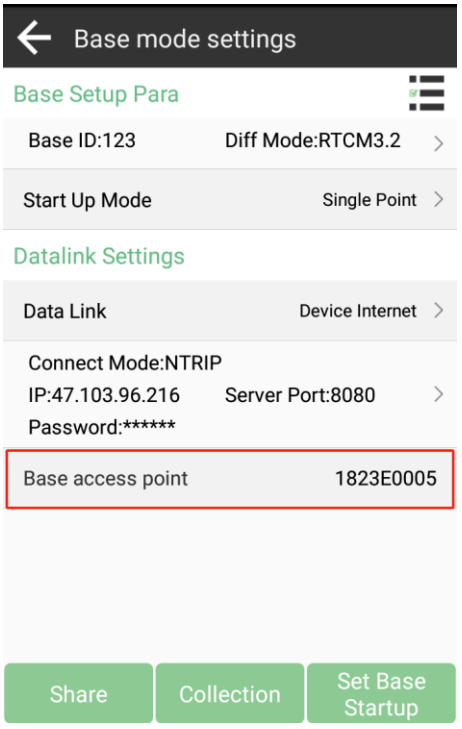
3. Set ***Start up Mode***. And choose ***Device Internet*** in ***Data Link***.



4. ***Parameter Settings***. Choose NTRIP in Connect Mode. Input the server IP, Port, Password in the CORS Settings. ***APN Settings*** (Access point number, acquire from the mobile service provider). Input Name, User and Password.



5. Set the ***Base access point*** in the end.



6. When start Base succeed, it will show as below in SingularPad.

Tip: X1 receiver does not support hot swap, please shut down the X1 receiver then insert the SIM card. If you turn on the receiver and insert the SIM card, please reboot the receiver.

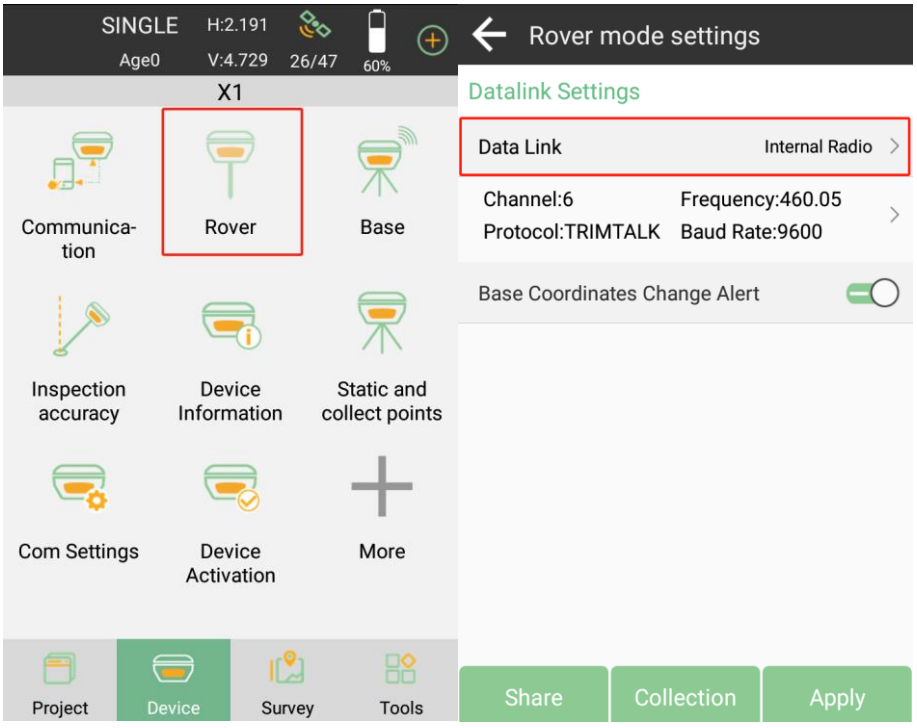
4.4.2 Start Rover Station by SingularPad

When work as a Rover station, SingularPad supports receive the correction data in Internal Radio mode, Device Internet mode and Phone Internet Mode.

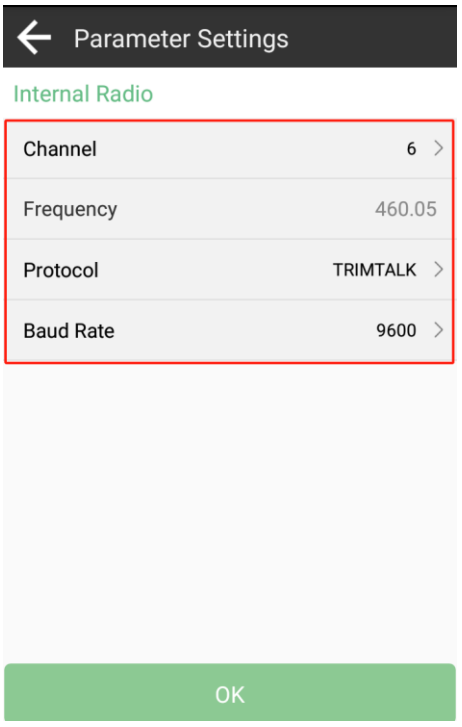
Internal Radio: Select the same protocol and frequency with the Base receiver, and then the receiver status will turn single to be fixed. The following steps show an example of internal radio.

The following steps give an example of internal radio transmission.

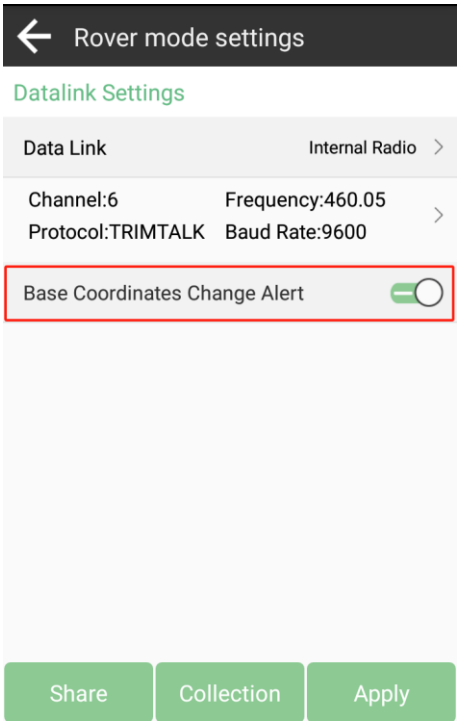
1. Go to ***Device*** >> ***Rover***. Set ***Data Link*** as ***Internal Radio***.



2. ***Parameter Settings***. Set Channel, Frequency and Protocol same with the Base.



3. ***Base Coordinates Change Alert***: SingularPad will alert when you connect with different base station. When the Base station is VRS, please don't open this.

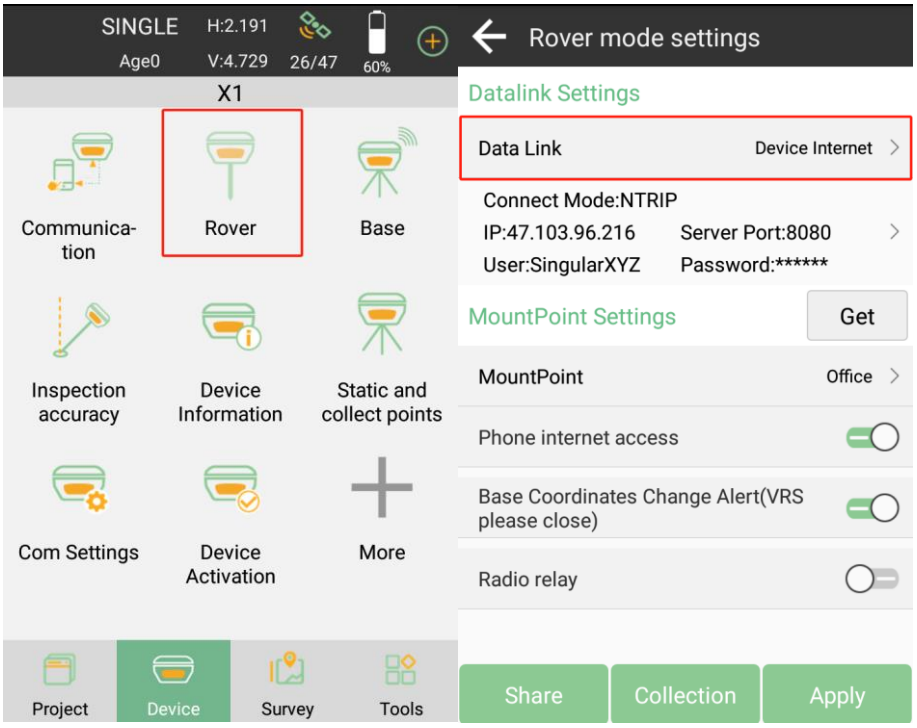


4. Click ***Apply*** to start the Rover mode. When start Rover succeed, it will show as below in SingularPad.

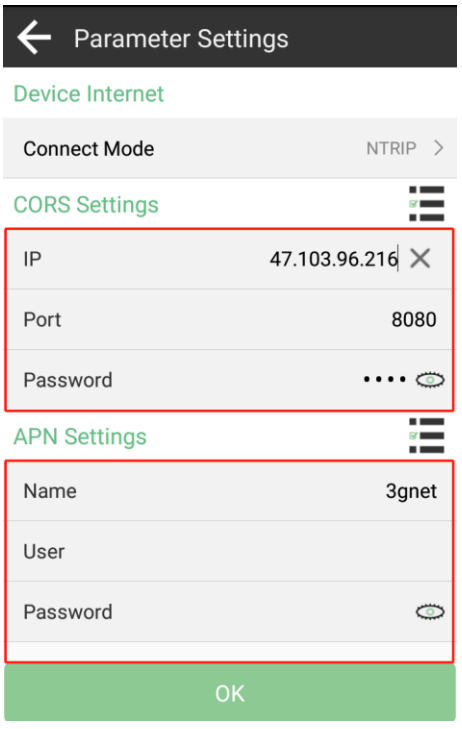
Device Internet: Same with start Base station, you need to insert a SIM card to Rover,

set the server IP and port, and receives the correction data by Ntrip protocol. The following steps give an example of device internet transmission.

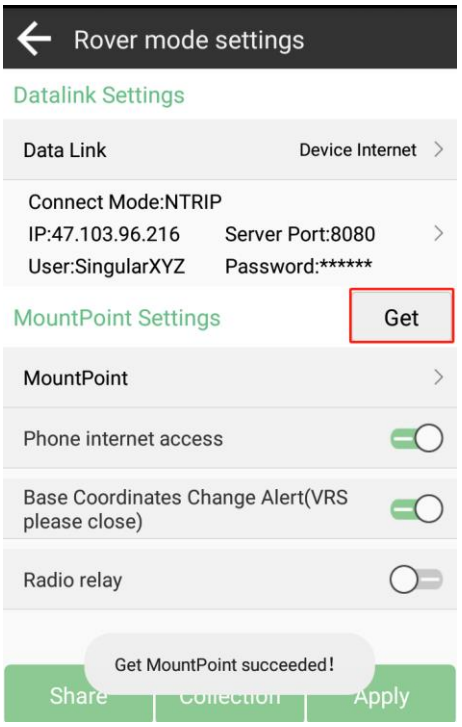
1. Go to ***Device*** >> ***Rover***. Set ***Data Link*** as ***Device Internet***.



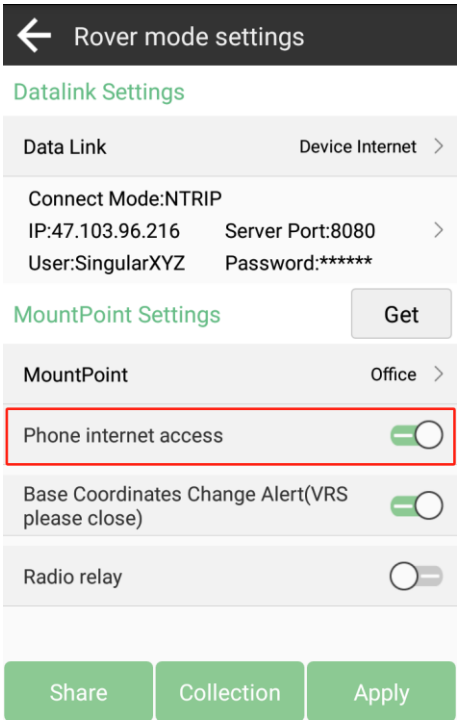
2. ***Parameter Settings***. Choose NTRIP in Connect Mode. Input the server IP, Port, User and Password in the CORS Settings. ***APN Settings***. Input Name, User and Password.



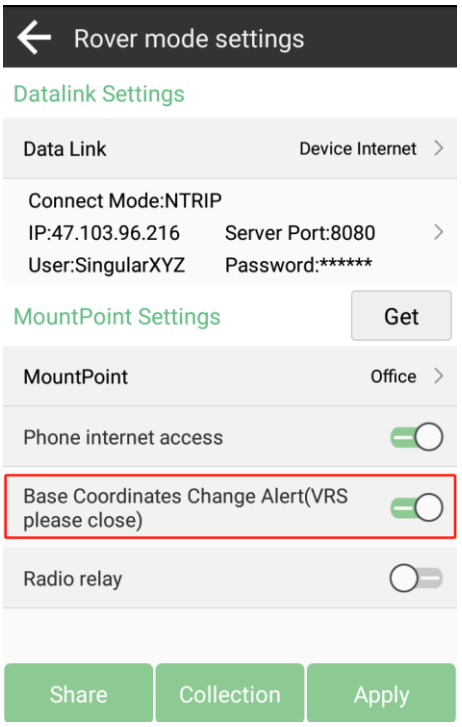
3. Click ***Get*** button on the right and “Get MountPoint succeeded” will be displayed below. Then choose the mountpoint.



4. ***Phone internet access***: Rover station will access the mountpoint via phone internet, you need to make sure controller have access to Internet. If don’t open this, rover station will access the moutpoint via device internet.



5. ***Base Coordinates Change Alert***: SingularPad will alert when you connect with different base station. When the Base station is VRS, please don't open this.

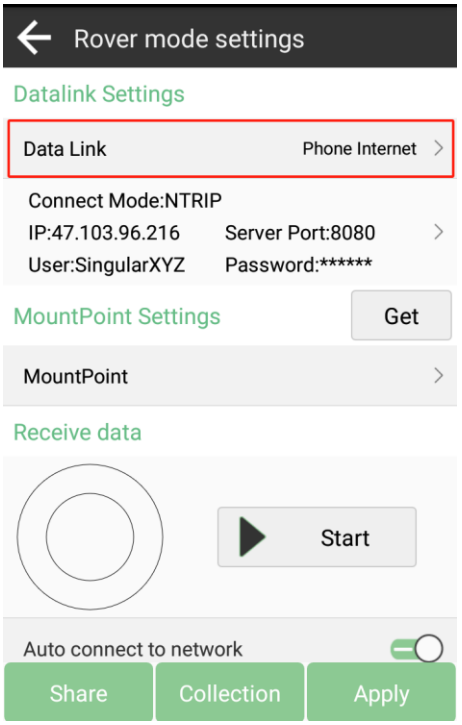


6. Click ***Apply*** to start the Rover mode. When start Rover succeed, it will show as below in SingularPad.

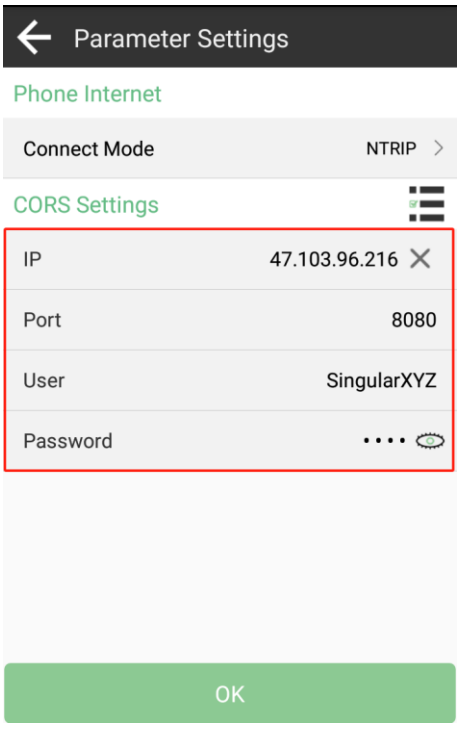
Phone Internet: This mode uses the phone internet to transmit the correction data from Base to Rover. Please make sure the PDA device is in good network conditions, such as 4G, WiFi or hot spot.

The following steps give an example of device internet transmission.

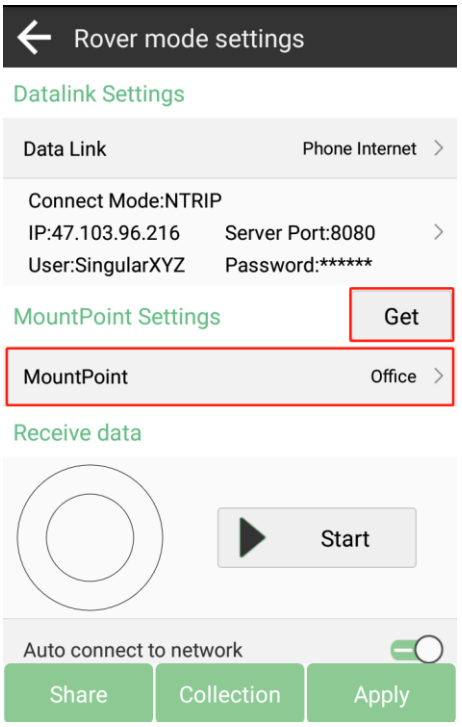
1. Go to ***Device*** >> ***Rover***. Set ***Data Link*** as ***Phone Internet***.



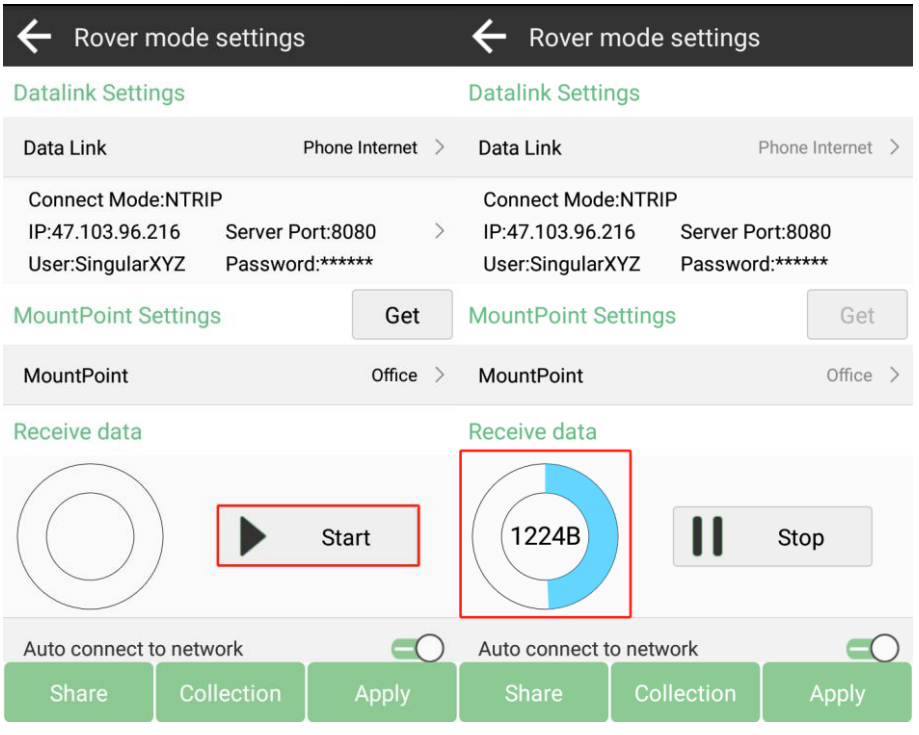
2. Set ***Connect Mode***, for X1 receiver supports NTRIP and TCP Client. ***CORS Settings***. Input the server IP, Port, User and Password in the CORS Settings.



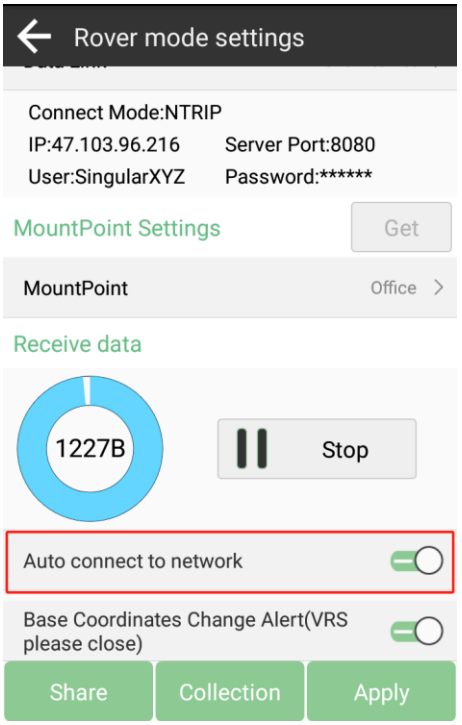
3. Click ***Get*** button on the right to get the mountpoint list and choose the mountpoint.



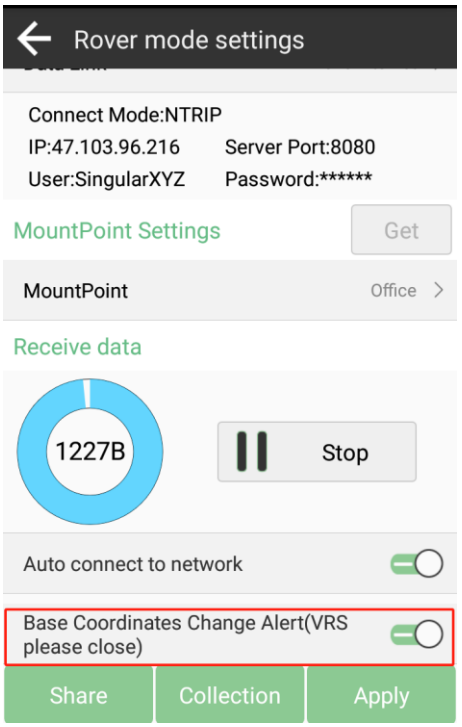
4. Click ***Start*** button on the right to receive data from Base station. Then you can see the rover station is receiving data.



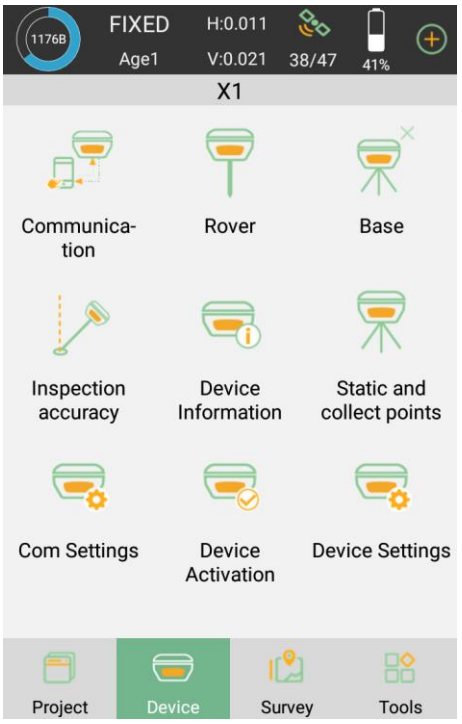
5. ***Auto connect to network***: When this option is opened, SingularPad will connect to network automatically so that user don't need to click start to connect network.



6. ***Base Coordinates Change Alert***: SingularPad will alert when you connect with different base station. When the Base station is VRS, please don't open this.



7. Click ***Apply*** to start the rover mode. When start Rover succeed, it will show as below in SingularPad.


1176B
FIXED
Age1
H:0.011
V:0.021
38/47
41%
X1
Communica-tion
Rover
Base
Inspection accuracy
Device Information
Static and collect points
Com Settings
Device Activation
Device Settings
Project
Device
Survey
Tools

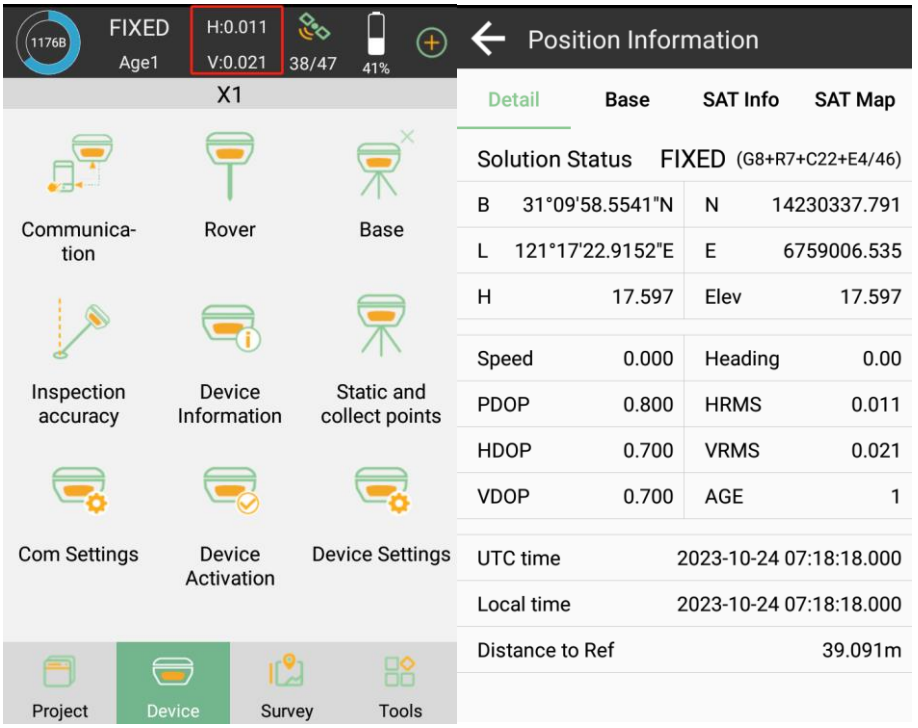
Chapter 5 RTK Survey-field Data collect

This section describes the basic survey functions of SingularPad, including Point Survey, Detail Survey, Control Point Survey, Point Stakeout, CAD Mapping and etc. Before RTK survey, you need to connect to the receiver and get a fixed solution.

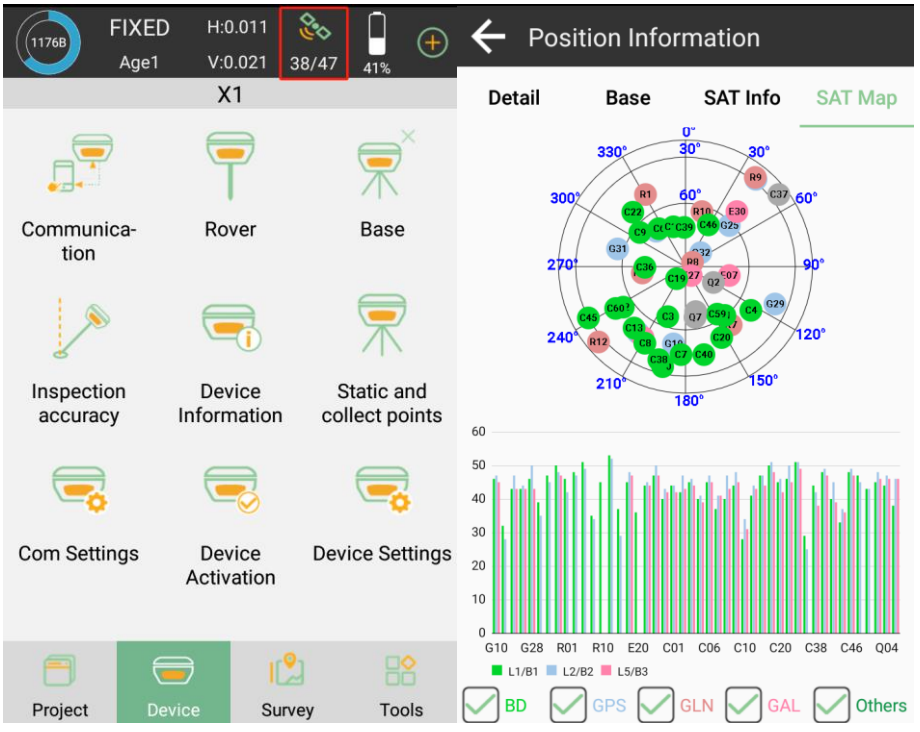
5.1 Point Survey

Before RTK survey, please make sure that receiver is receiving the correction data and get a fixed solution, age means the time since the last differential data was received, please check if this number keeps growing.

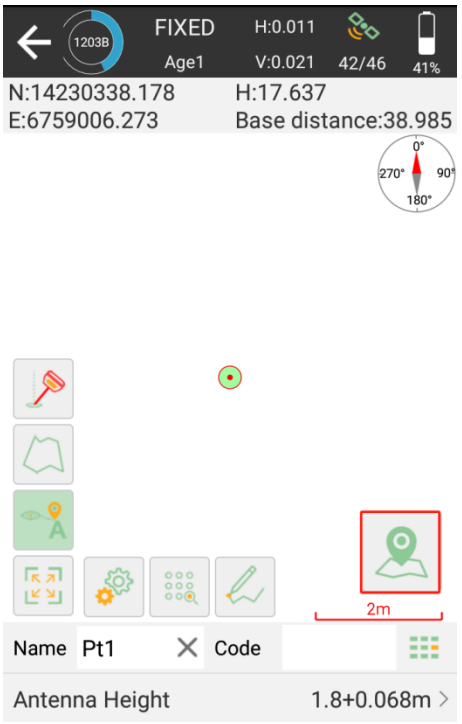
There are HRMS and VRMS on the top of the interface, click it you can check more details.



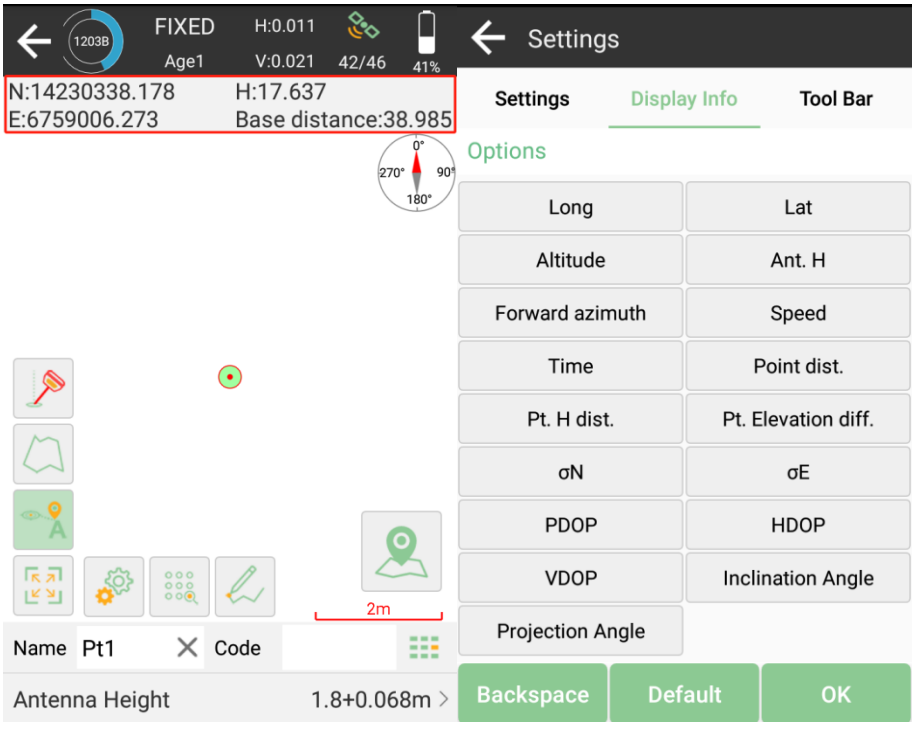
The satellites number is on the top of the interface, click it you can check the satellite map and information.



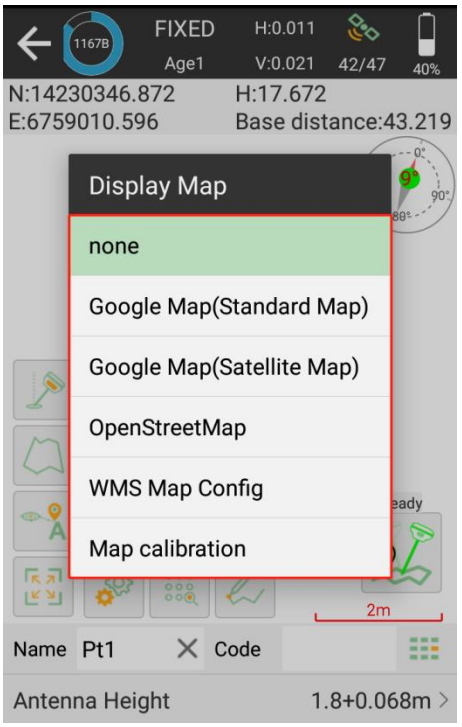
In the Survey interface, click Point Survey and enter point name, code and antenna height, then click  to start or stop collecting data.



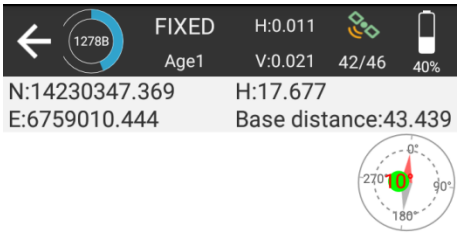
In the floating window of the survey interface, you can see the display information. The default display information is NEH and Base distance, and click the floating window you can set them as you need. Except default display information, SingularPad supports Longitude, Latitude and Altitude etc.

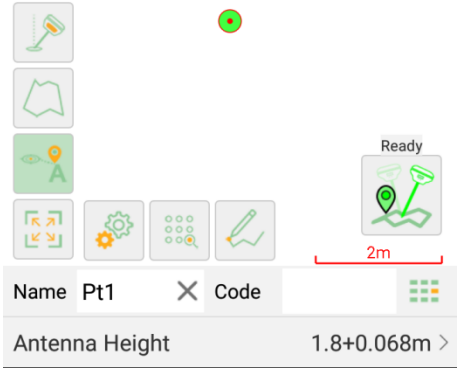


- Click  to select the map or calibration: Google Map (Standard Map/ Satellite Map), OpenStreetMap, WMS Map Config and Map calibration

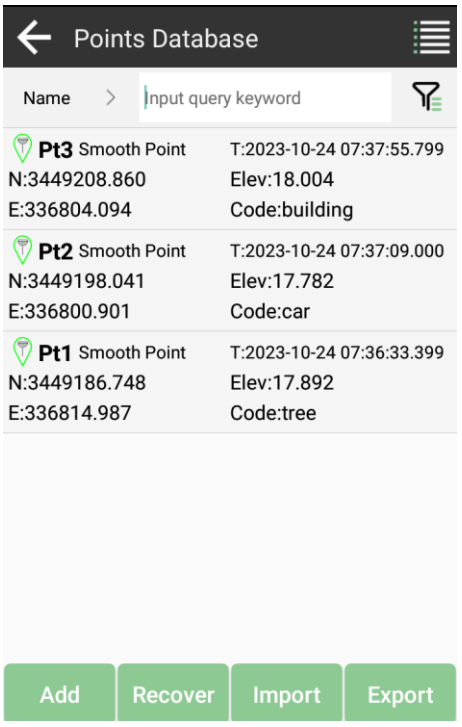


- Click  to jump to map center

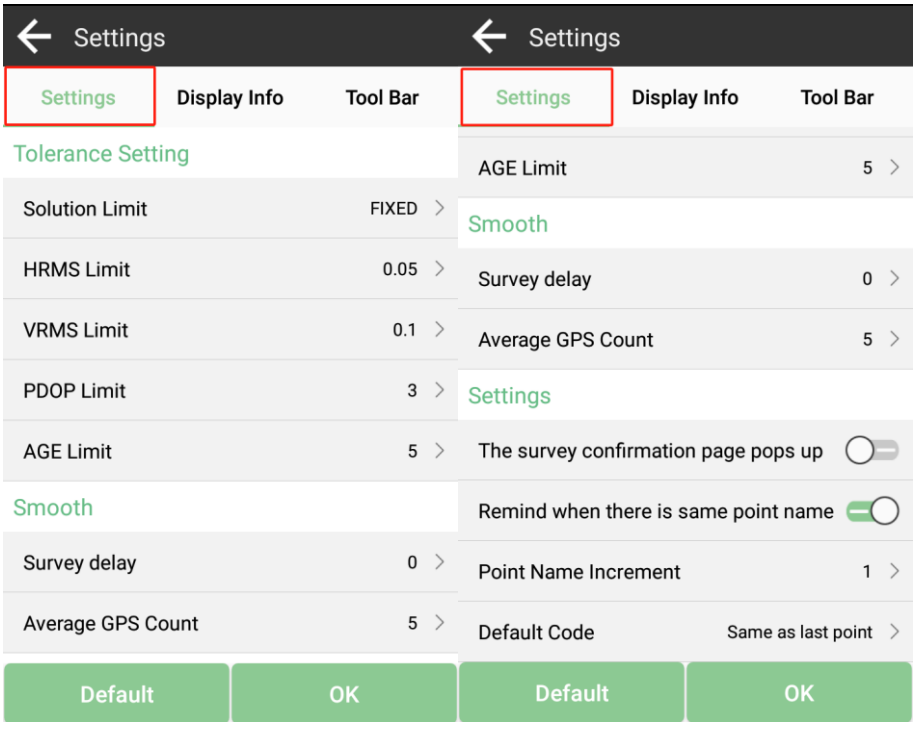




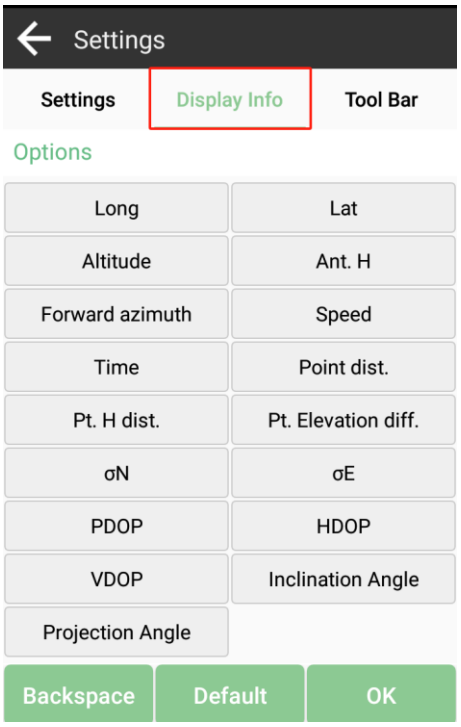
- Click  to show the whole points on the interface
- Click  to check the point coordinates, you can add, recover, import, and export the data. After you choose a point, you can check the details and take notes or photos.



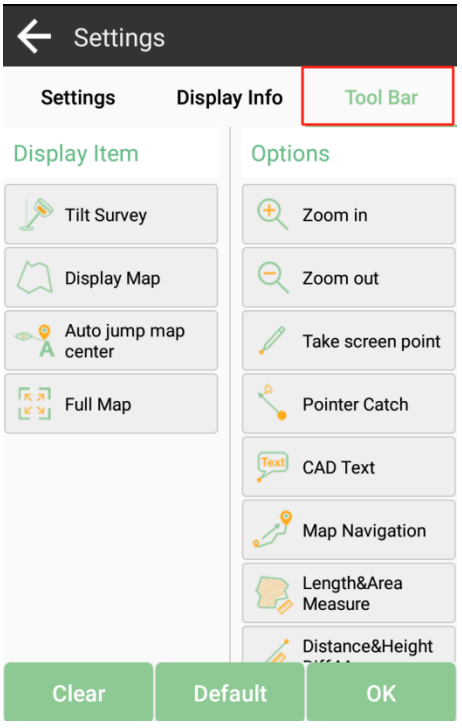
- Click  to set settings, in settings interface, you can edit receiver parameter, for tolerance setting such as solution limit, HRMS limit, VRMS limit and etc., for smooth you can set survey delay and average GPS count and for settings you can set other options.



- Click  to set display info, in display info interface, you can set the display information to the floating window, such as longitude, latitude, altitude and etc.



- Click  to set tool bar, in tool bar interface, you can add or delete options to point survey interface. You can customize the interface to meet whatever layout needs you might have.



5.1.1 *Tilt survey*

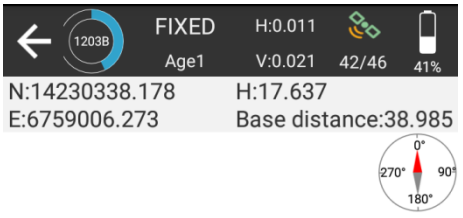
Tilt survey option will appear when receiver supports for tilt survey, it is available for SingularXYZ X1 GNSS receiver. When the pole tilts within 60°, the built-in sensor based tilt measurement system precisely calculates the actual offset according to angle, which can not only meets the requirement if high precision measurement, but also relieves the users from continually checking whether the pole is plumb.

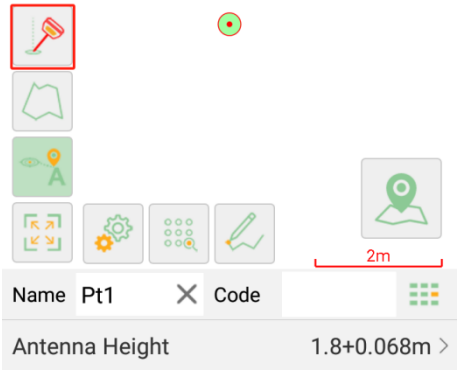
When using it for the first time or the calibration expired, you should confirm that the antenna parameters and pole height are correct and then follow the interface prompts to initialize the IMU module; it will take you a few seconds. During operation, make sure that receiver can search the satellites and get fixed RTK solution.

The following steps give an example of tilt survey.

1. Open IMU: Go to survey >> Point Survey >> click the  button to open.

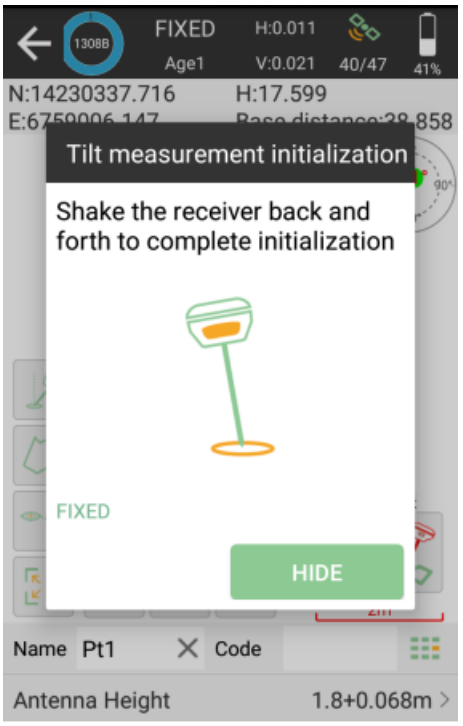
After you click IMU button, it will give you one prompt to check the antenna information and you need the antenna height is correct.



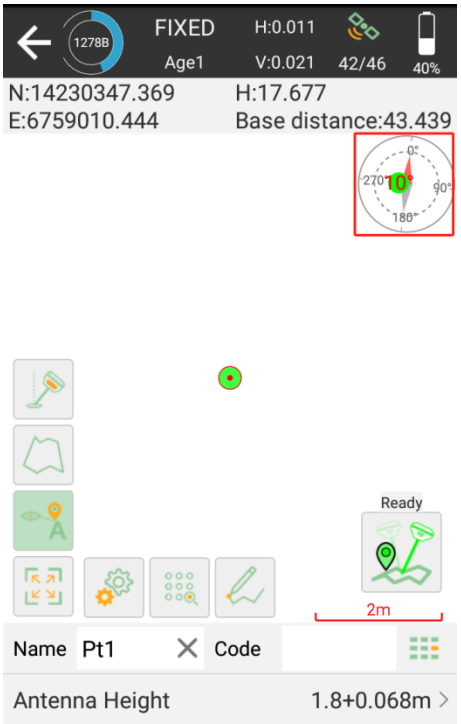


2. Initialization

If you power off the receiver or reset 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 RTK solution.



In survey interface, you can find the bubble and angle value shows the pole you tilt. To ensure the accuracy, please keep the tilt angle less than 60°. When the pole tilts within 60°, the built-in sensor based IMU precisely calculates the actual offset, the accuracy of which can be accurate to ±2.5cm.

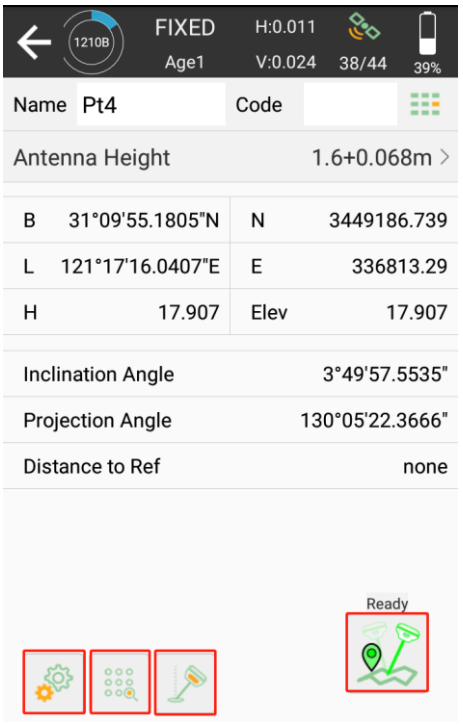


Tip: Do not shake or rotate the receiver violently, otherwise you need to re-initialize.

5.2 Detail survey

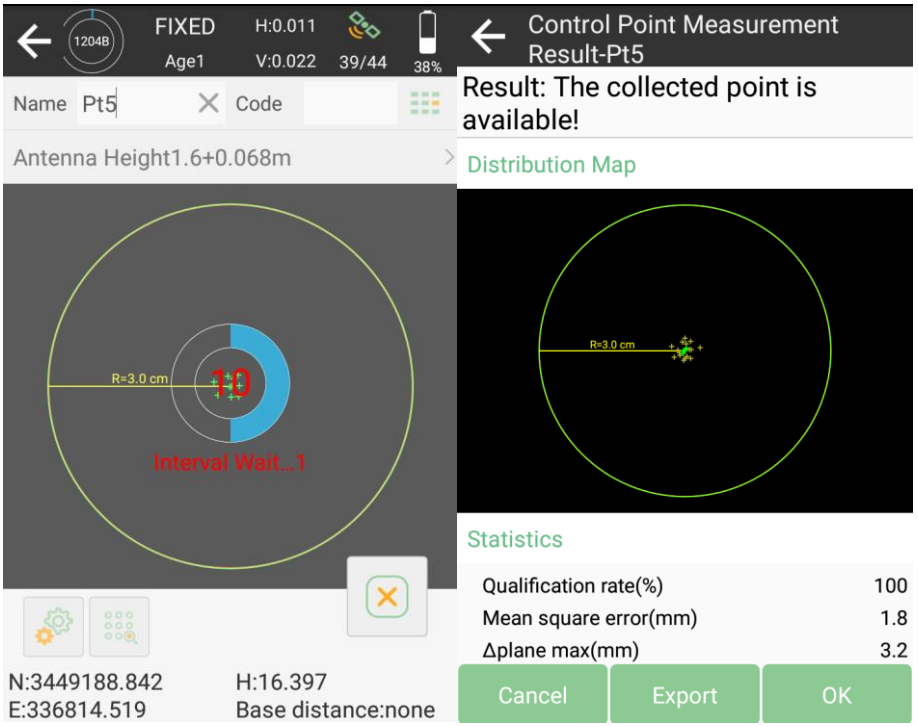
Show both local coordinates and Latitude/Longitude when measuring.

- Click  to start or stop collecting data
- Click  to set settings, display info and tool bar.
- Click  to check point coordinates; you can add note, info, arrow drawing and photo.
- Click  to open IMU to do tilt survey.



5.3 Control point survey

By measuring the coordinates of the same point several times, an accurate coordinate is obtained.

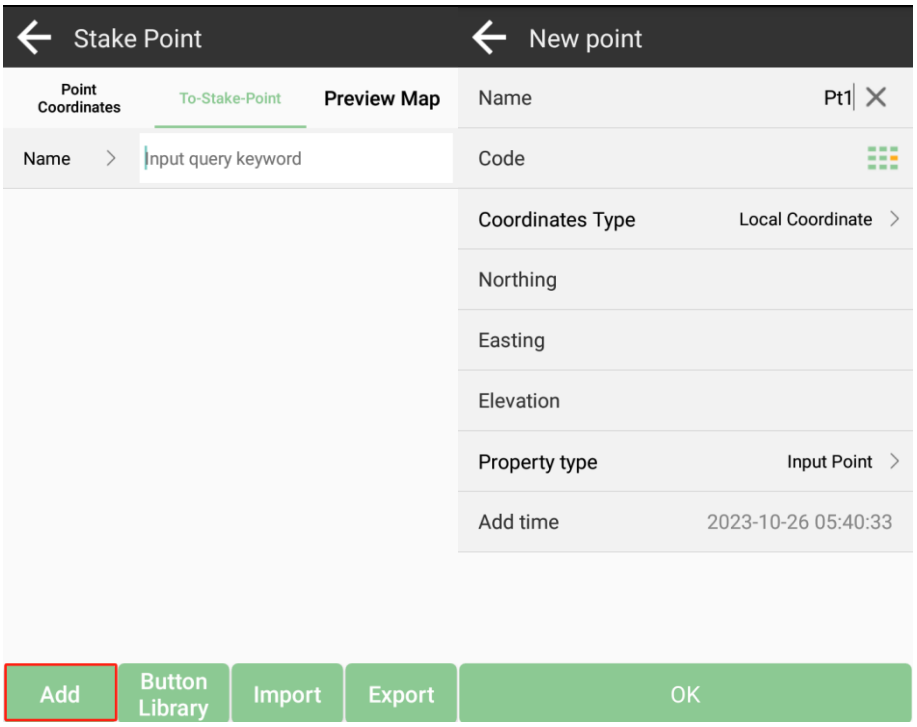


- Click  to start or stop collecting data
- Click  to set settings, display info and tool bar.
- Click  to check point coordinates; you can add note, info, arrow drawing and photo.

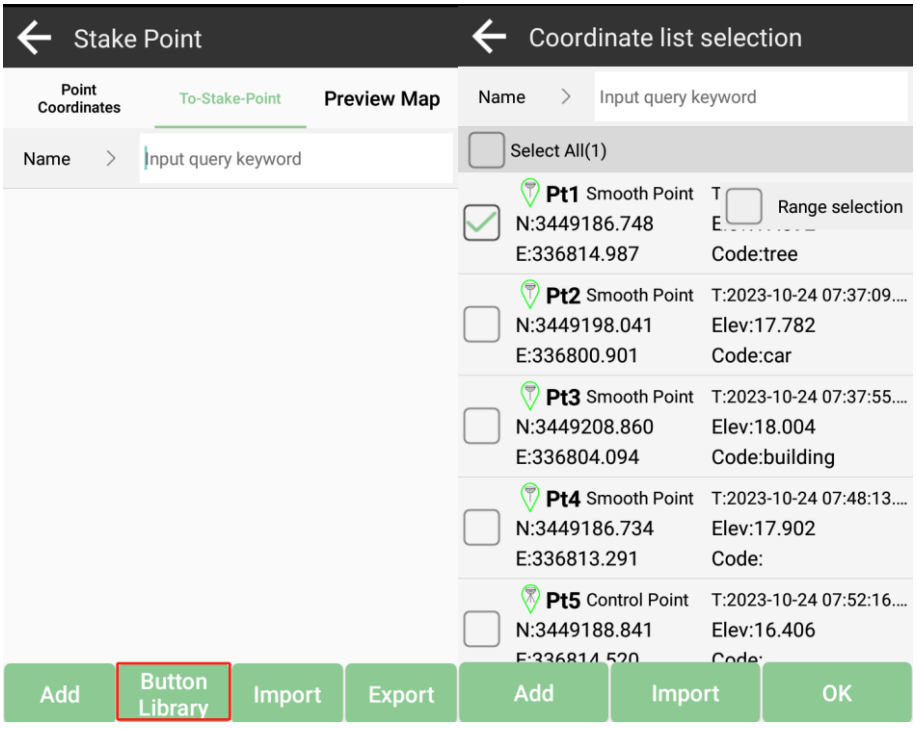
5.4 Point stakeout

Go to ***Stake point*** interface, add or import the point coordinates you need to stake out, of course you can choose from button library.

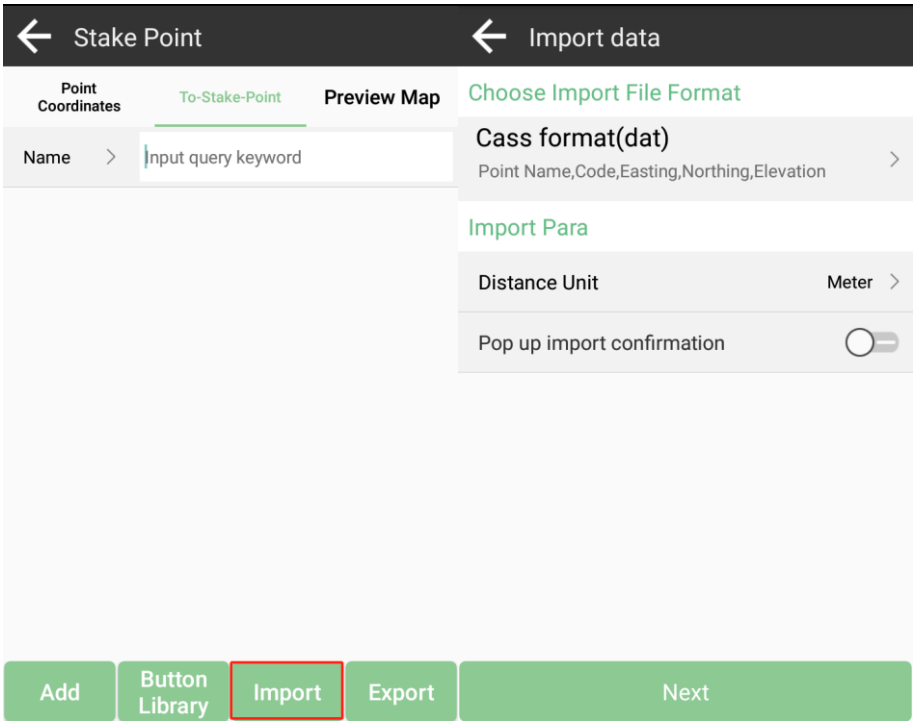
- Click Add to input coordinates



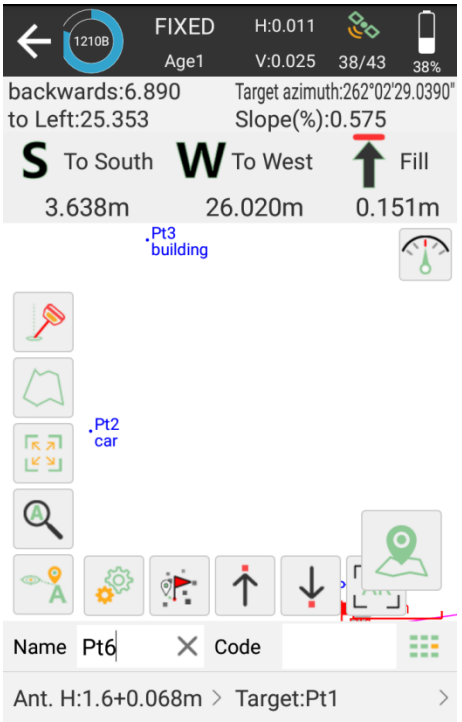
- Click button library to choose one



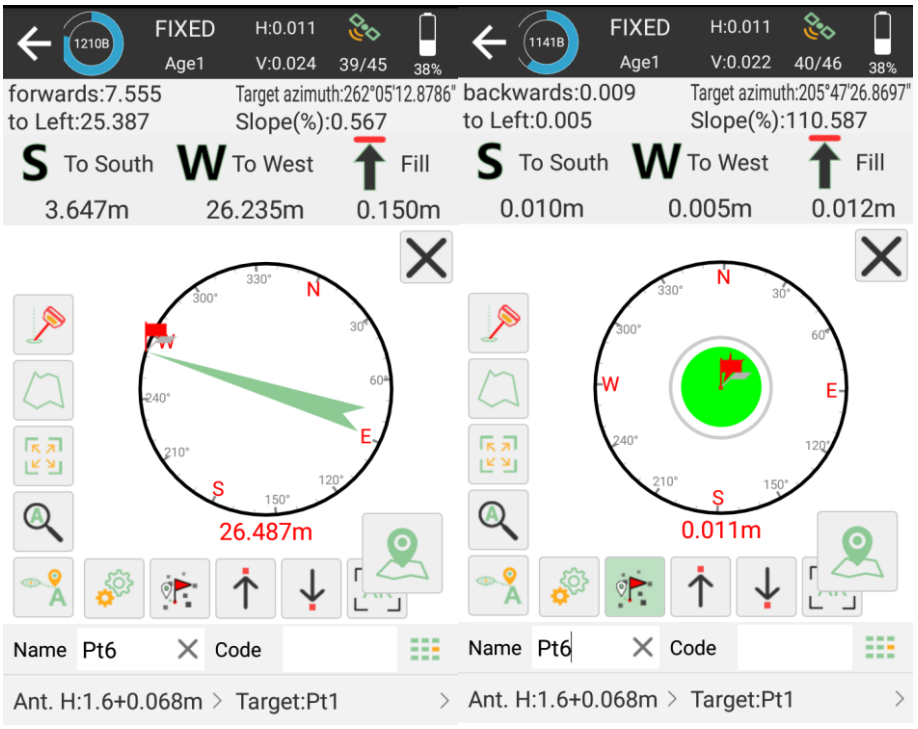
- Click Import to get coordinates with different kinds of files, you can also define a new form



Choose a point to stake, SingularPad 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. For X1 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°

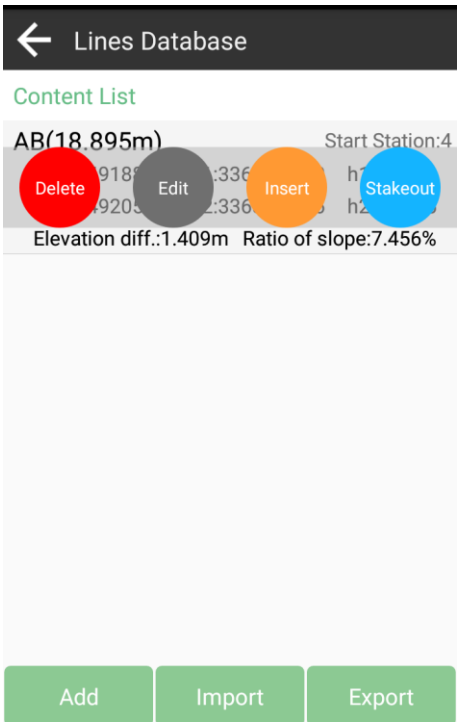


- There is a direction prompt on the floating window
- Click  to start or stop stake points
- Click  to open or close IMU
- Click  to scale automatically
- Click  to jump to lasted point
- Click  to jump to next point
- Click  to jump to previous point
- Click  to set skate out settings, display info and tool bar, you can edit the prompt range and range error
- Click  to open compass

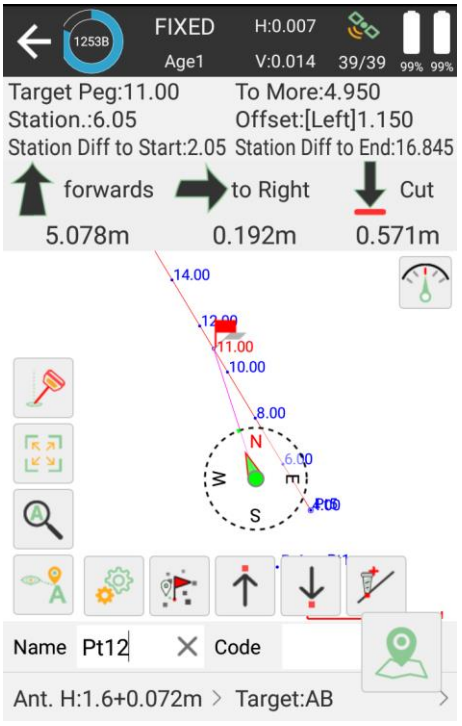


5.5 Line stakeout

Go into Stake line interface, add or import lines you need to stake out.



- Click Add to input line parameters, there are two types you can choose
- Click Import to get coordinates with different kind of files, you can also define a new format



Choose a line to stake, set calculation mode and interval.

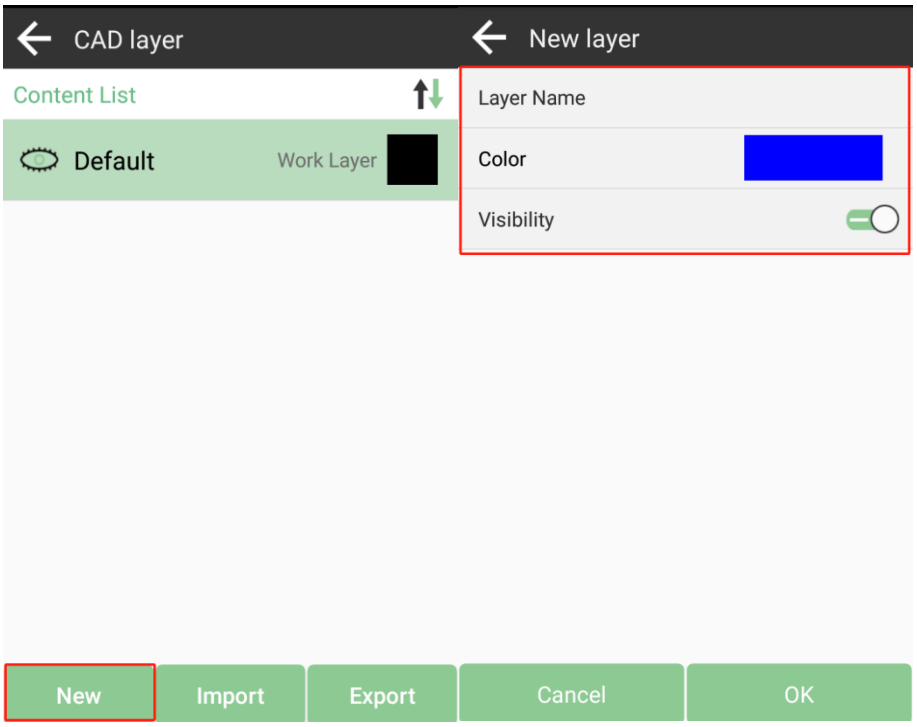
- Click  to jump to next line

- Click  to jump to previous line
- Click to add stake

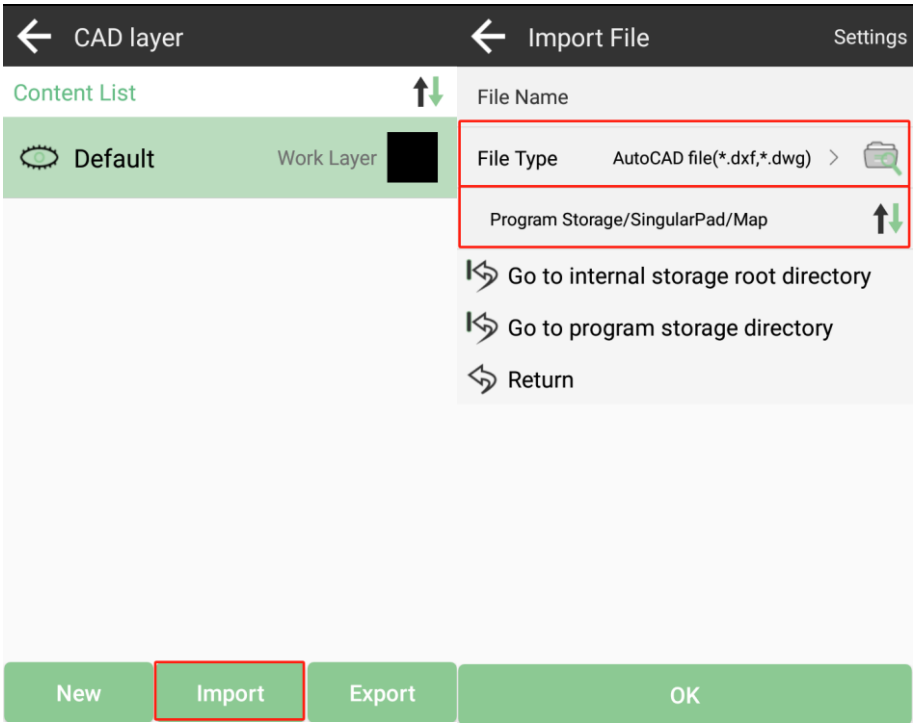
5.6 CAD mapping and stakeout

When using for the first time, the CAD interface has no layers and floating window to display the features you need to stake.

- Click  to create or import a CAD file, supporting *.dxf, *.dwg format



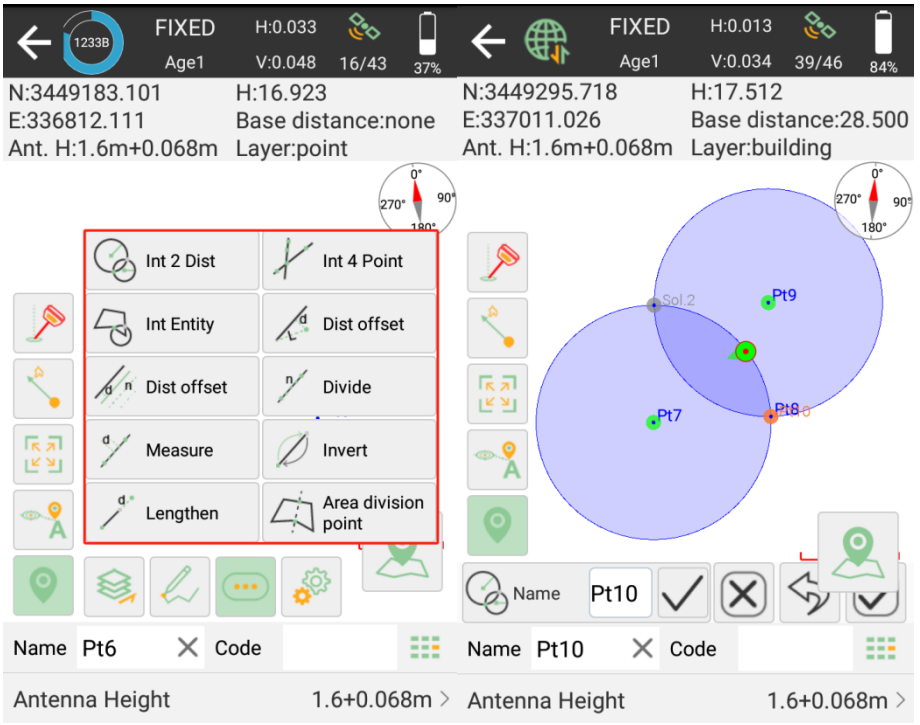
Input parameters and save it



Find the file you want to stake and import it. After create or import one, you can scan and edit in the CAD layer.

- Click  to draw features, there are 12 types and methods you can choose, follow the prompts and draw.

- Click  to find tools; they can help you to work smoothly, For example, to find the intersection points of neighboring circles.



In the CAD interface, you can choose a feature you want to stake, it will show up in blue. You can know the details about it, including length, start point, end point and center point. And choose the way to stake.

In the CAD interface, you can choose a feature you want to stake, it will show up in

blue. You can obtain the details about it, including length, start point, end point and center point. And choose the way to stake.

- Setting: Set the method of stake out, offset distance, interval etc.
- Start station: If you set the start station as 5m, then the final mileage will plus 5m.
- Offset: If you set the offset 5m, then you will stake the line 5m away from the line you choose. The plus and minus represent different sides of the line.
- Setting out by pile by coordinate: including station number, station distance and segment

Station distance: Stake the line at a specified distance, for example, if the line is 40m, you set the specified distance as 8m, then you will stake the line at 8m distance every segment.

Segment: For example, if you set the segment as 4, then you will stake the line at 4 segments, every segment length is the same.

Station number: You will stake the line at the station at each interval point. You can stake it out according to the direction.

Key node: It will stake out the line with starting point, ending point, midpoint, fold point, etc.

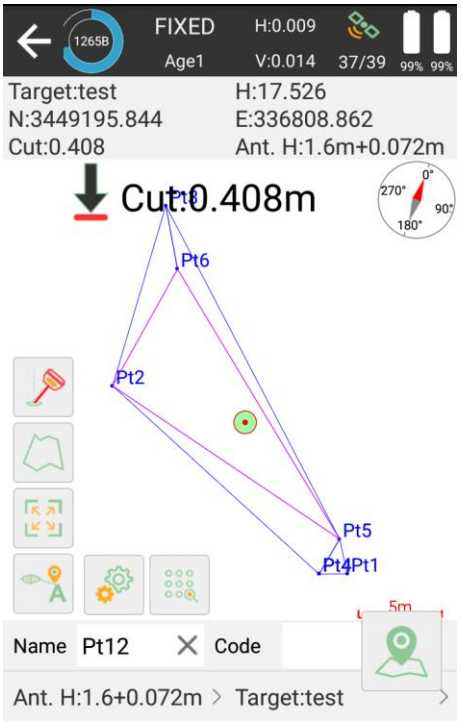
Click to find tools; they can help you to work smoothly. For example, to find the intersection points of neighboring circles.

5.7 DSM stakeout

You can stake the elevation using the design surface, if you don't open a surface before, then you need to add one by adding, importing coordinates or choosing from the button library.

You can get a preview map after adding points and don't forget save it.

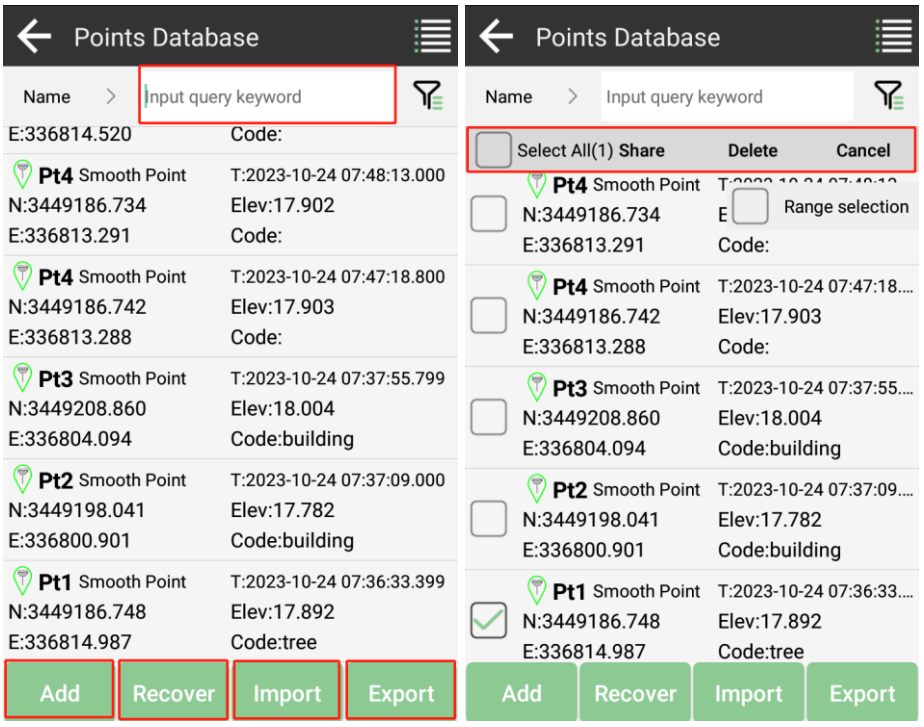
At the content list interface, you can find the surfaces you made, and you can edit, share and stake them.



If the current position is not within the range if 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.

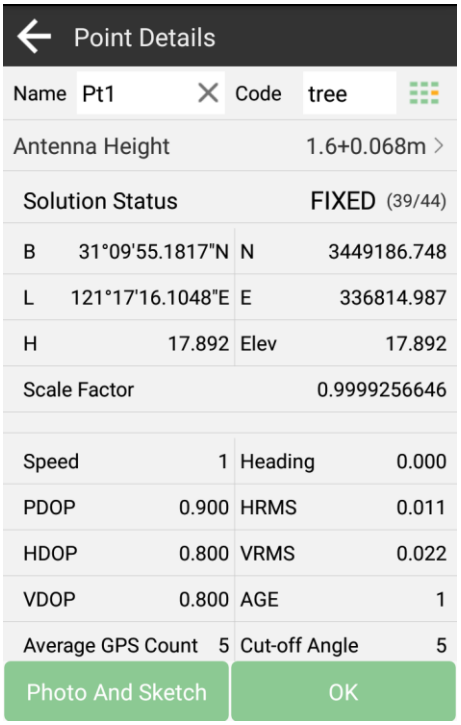
5.8 Points Database

The points, which are surveyed, staked, added, imported, and input from display map, will be stored in point database. The surveyed points will be shown under one base while surveying. Also, no matter where you need to select a point, all the points of the database are available.



- Add: Supports to add Input Point, and Display type Supports Local coordinate and geodetic coordinate
- Recover: After delete the points, you can recover them in deleted points interface
- Import: Import points by different formats of files
- Export: Export points by different formats of files
- Search: Enter the name of the point you want share or delete

Tap a point to check the information about the base coordinate. The information includes antenna height, solution status, WGS84 Coordinate, local grid coordinate, base id and measure time. If you had calibrated the point, it will display offset parameters.

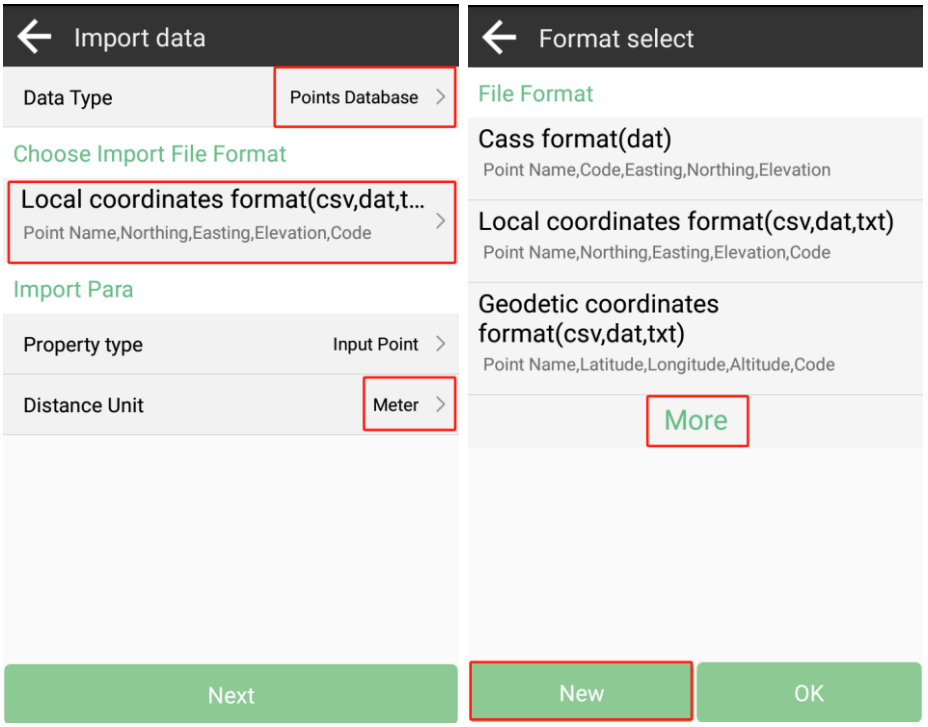


5.9 Data export/ import

SingularPad supports to export/ import data including grid coordinate, Lat/Lon coordinate with various data format, support import *.dat/*.csv/*.kml file and export result of *.dxf/*.kml/*.shp/*.xls/*.csv.

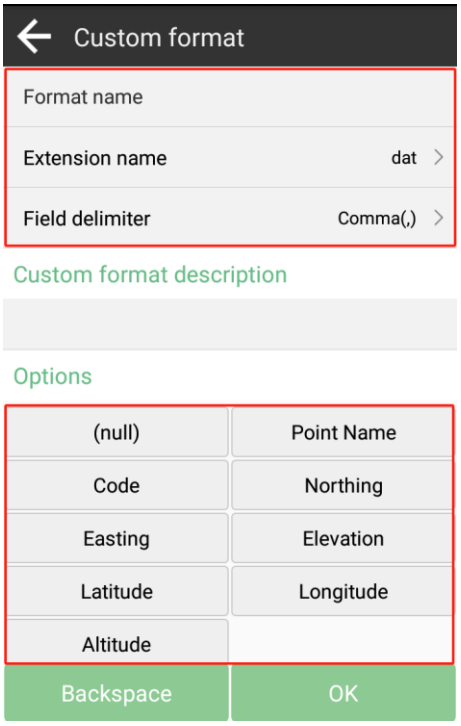
5.9.1 *Import points data*

Tap Import data in project interface, there are some predefined data formats, click More to get more predefined formats.



- Data Type: support point database, transformation parameters file and code library
- Import File Format: support *.csv, *.dat, *.txt, *.kml format etc.
- Distance Unit: support meter, US survey feet and international feet

Besides, you can click now to create a User defined type.

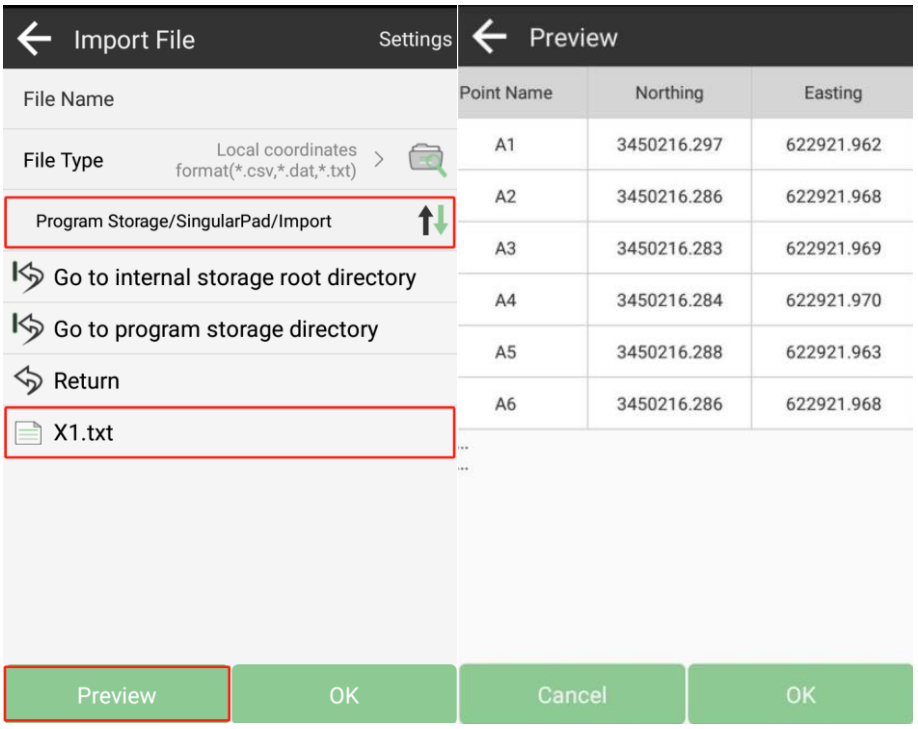


- Format name: Enter the name for the format
- Extension name: support *.csv, *.dat, *.txt, *xlsx format
- Delimiter: support comma (,), semicolon (;), space ( ), tab (Tab)

Click to choose elements in the options list, click backspace to eliminate the previous

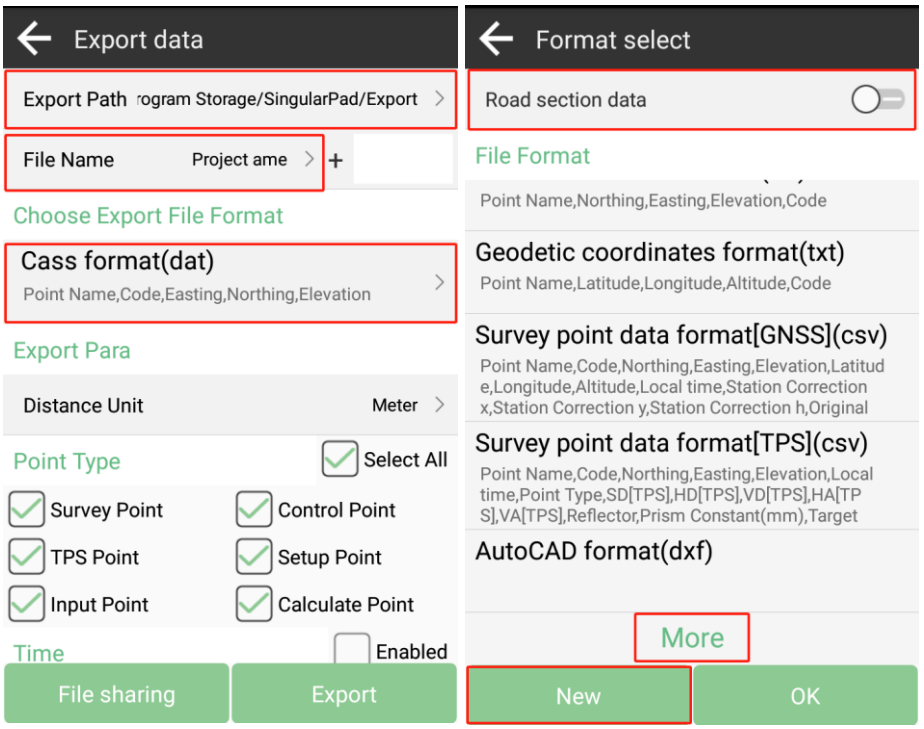
element selected. The elements include: code, northing, easting, elevation, latitude, longitude, altitude.

Choose one format to import data. The default export path is internal storage/ SingularPad/import. You can also change to any other path where the file is. Click preview to take an inspection whether the format is right.



5.9.2 *Export points data*

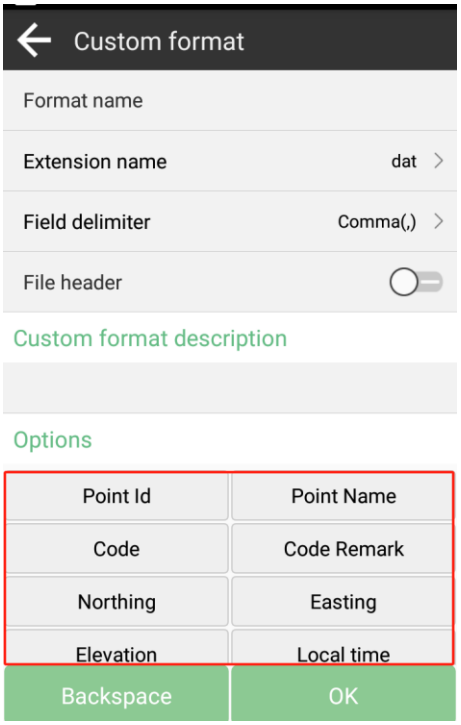
Tap Export in Project interface to export simple data of survey points. Also, click More formats to export the survey points with detailed information or other formats like stake points/ lines, DXF, SHP, KML, RAW, RW5, HTML, CASS feature result.



- Export Path: the default export path is internal storage/SingularPad/export; you can also change to any other path where the file is
- File Name: support project name, operator,data, data time
- Export File Format: support *.csv, *.dat, *.txt, *kml format etc.
- Distance Unit: support meter, US survey feet and international feet
- Road section data: open to export road section data

Besides, you can click New to create a user defined type. The elements include: id, name , code, latitude, longitude, altitude, northing, easting, elevation, N, E, Z, type, local time, UTC time, solution status, AGE, max delay, min delay, use satellites, tracked satellites, cut-off angle, mount point, measurement method, repeat, start data, end time, RMS, HRMS, VRMS, PDOP, VDOP, speed, heading, antenna type, measuring type, measuring height, antenna height, base id, base latitude, base longitude, base altitude, distance to ref, original latitude, original longitude, original altitude, undulation height, station correction h, inclination correction, pitch, roll, yaw, inclined angle, projected angle, stakeout type, target, station, offset, north diff, east diff, elevation diff.

For the points, lines and polygons you surveyed in point survey, you can export dxf file, then you can edit them in third party CAD software, or import to base map to check, or import to CAD to stake. Choose the data that you want to export including survey point, input point, control point, stake point, line and polygon, and the layer properties includes name, code and height.


Custom format
Format name
Extension name
dat
Field delimiter
Comma(,)
File header
Custom format description
Options
Point Id
Point Name
Code
Code Remark
Northing
Easting
Elevation
Local time
Backspace
OK