

HIGH PRECISION POSITIONING EMPOWERS A DIGITAL ERA

COMNAV TECHNOLOGY

XP300 Piling System User Guide



- ① Hardware Installation
- ② System Registration
- ③ Datalink
- ④ System modeling
- ⑤ System Configuration
- ⑥ Create project
- ⑦ Main interface introduction
- ⑧ Piling procedure
- ⑨ Handling of common problems



Hardware Installation

Main hardware components

Tablet and components:



P300 PLUS GNSS Tablet × 1



Power Cable × 1



Tablet Bracket × 1



Radio Antenna × 1



4G Antenna × 1

Main hardware components

GNSS antenna and components:



GNSS Antenna × 2

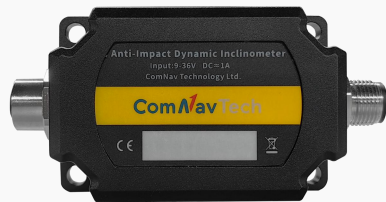


GNSS Antenna Cable × 2



Antenna holder × 2

Sensor and components:



Sensor × 4



Sensor Cable(3m) × 3

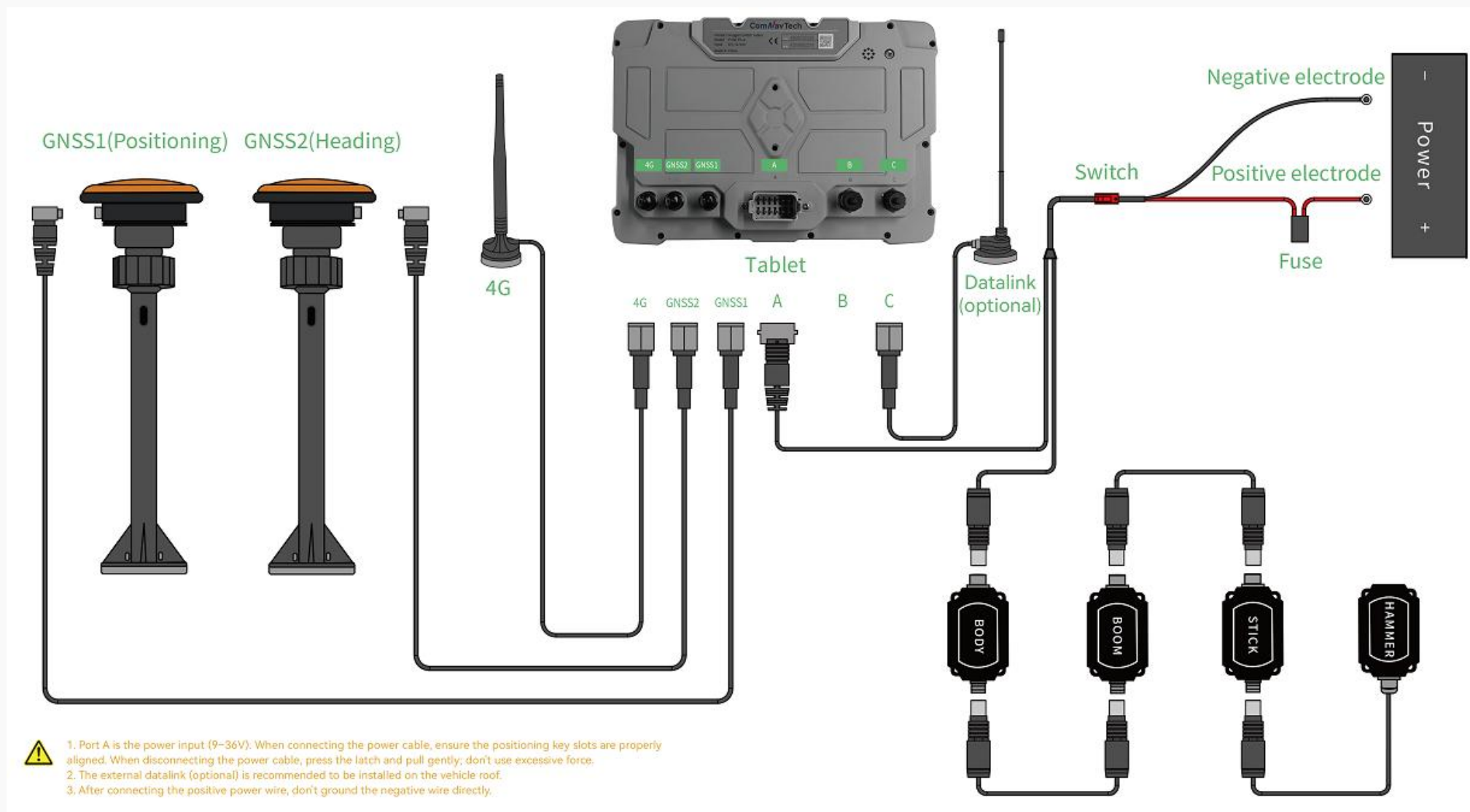


Sensor Cable(6m) × 1

Hardware installation (Excavator-mounted Pile Driver)



Wiring diagram (Excavator-mounted Pile Driver)



1.1 GNSS antenna installation



1. Location selection

The antenna installation location should avoid being blocked or damaged by the high temperature of the engine outlet. The distance between the two antennas should be greater than 1 m. The installation platform should be stable and not shake.

2. Install antenna holder

Fix the GNSS antenna holder to the rear of the driver's cab by super glue or welding.

3. Install GNSS antennas

Install 2 GNSS antenna on the holder and fix them.

4. Cable Connection

Connect one end of the cable to the GNSS antenna firmly, and the other end to the antenna interface of the tablet (note the markings of the left and right antennas and interface protection). Lead the cable into the cab, and make the cable routing as concealed as possible, avoiding high temperature, extrusion, and sharp objects.

1.2 Hammer sensor installation



1. Location selection

The hammer sensor should be installed vertically on the left or right side of the pile hammer with respect to the cab. The installation position should be stable and avoid high temperature.

2. Install sensor mounting space

Fix the sensor mounting space by super glue or welding. If installing by super glue, the installation location should be cleaned before installation to ensure the firmness of the paste.

3. Install hammer sensor

Fix hammer sensor to sensor mounting space.

4. Cable connection

Connect the cable of the hammer sensor to the next sensor or tablet, arrange and fix the cable. A certain length of cable should be reserved at the rotating part of the pile machine to avoid damage to the cable when the machine is running.

1.3 Stick sensor and boom sensor installation



1. Location selection

With the cab as a reference, the sensor is installed vertically on the left or right side of the robot arm. The installation position should be stable to avoid high temperature and strong vibration.

2. Install sensor mounting space

Fix the sensor mounting space by super glue or welding. If installing by super glue, the installation location should be cleaned before installation to ensure the firmness of the paste.

3. Install hammer sensor

Fix sensor to sensor mounting space.

4. Cable connection

Connect the cable of the sensor to the next sensor or tablet, arrange and fix the cable. A certain length of cable should be reserved at the rotating part of the pile machine to avoid damage to the cable when the machine is running.

1.4 Body sensor installation



1. Location selection

With the cab orientation as a reference, the sensor is installed as shown in the figure. The sensor male head is oriented to the left, based on the forward direction. The installation position should be stable and avoid high temperatures.

2. Install sensor mounting space

Fix the sensor mounting space by super glue or welding. If installing by super glue, the installation location should be cleaned before installation to ensure the firmness of the paste.

3. Install hammer sensor

Fix sensor to sensor mounting space.

4. Cable connection

Connect the cable of the sensor to the tablet, arrange and fix the cable. A certain length of cable should be reserved at the rotating part of the pile machine to avoid damage to the cable when the machine is running.

1.5 Power cable connection

1. Method selection

The system supports 9V~36V DC power supply, and users can access the power supply through the car battery or cigarette lighter interface.

2. Car battery

Connect the red and black terminals of the power cable to the car battery. The red terminal is connected to the positive pole and the black terminal is connected to the negative pole. After the connection is completed, turn on the power switch and the button indicator light will light up.

3. Cigarette lighter interface

Connect the red and black terminals of the power cable to the cigarette lighter cable, and insert the cigarette lighter into the cigarette lighter interface. Turn on the switch button, and the button indicator light will light up.

1.6 Tablet installation



1. Location selection

Choose a location that is easy to fix and convenient for the operator to see the screen while working.

2. Install tablet Bracket

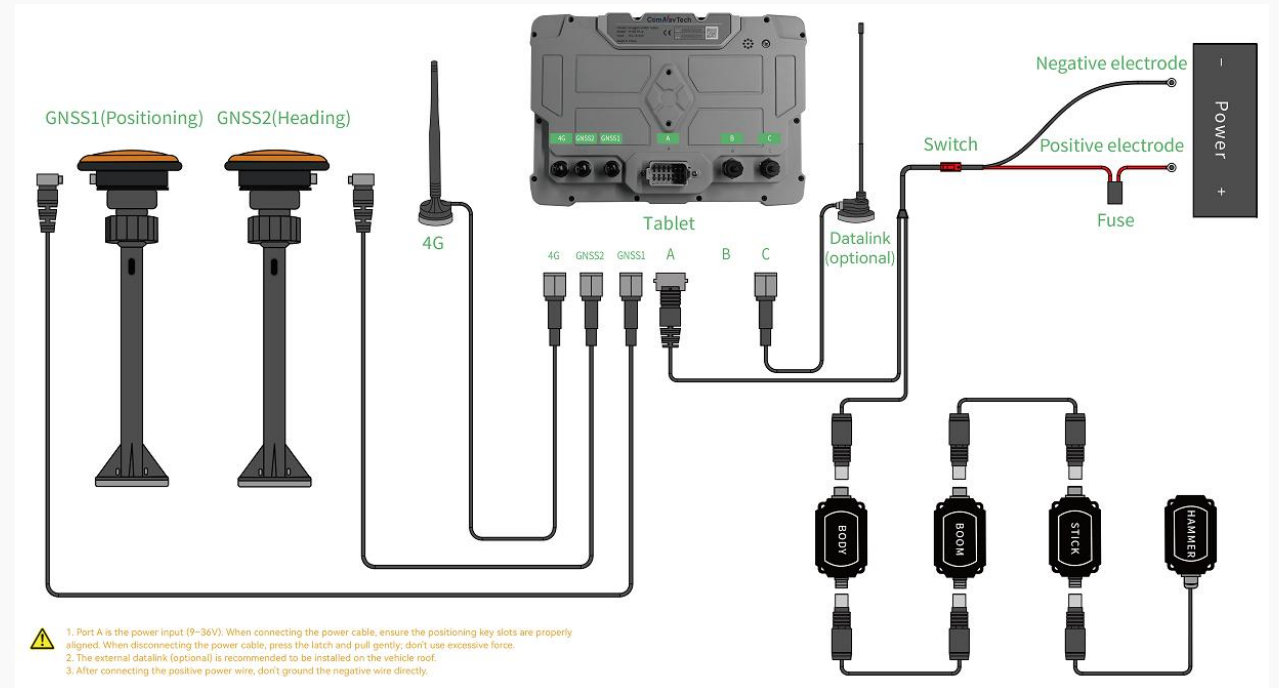
Fix the tablet bracket in the pre-selected position with screws and adjust the tablet to a suitable viewing angle.

3. Cable connection

Connect the power cable, GNSS antenna cable, and 4G antenna cable to the corresponding ports on the tablet.

1.7 Tablet interface

- The GNSS left antenna is connected to the GNSS1 interface.
- The GNSS right antenna is connected to the GNSS2 interface.
- The power interface is connected to port A.
- The 4G cable port is connected to the 4G interface.
- The external datalink is connected to port C.
- Port B is a reserved interface.

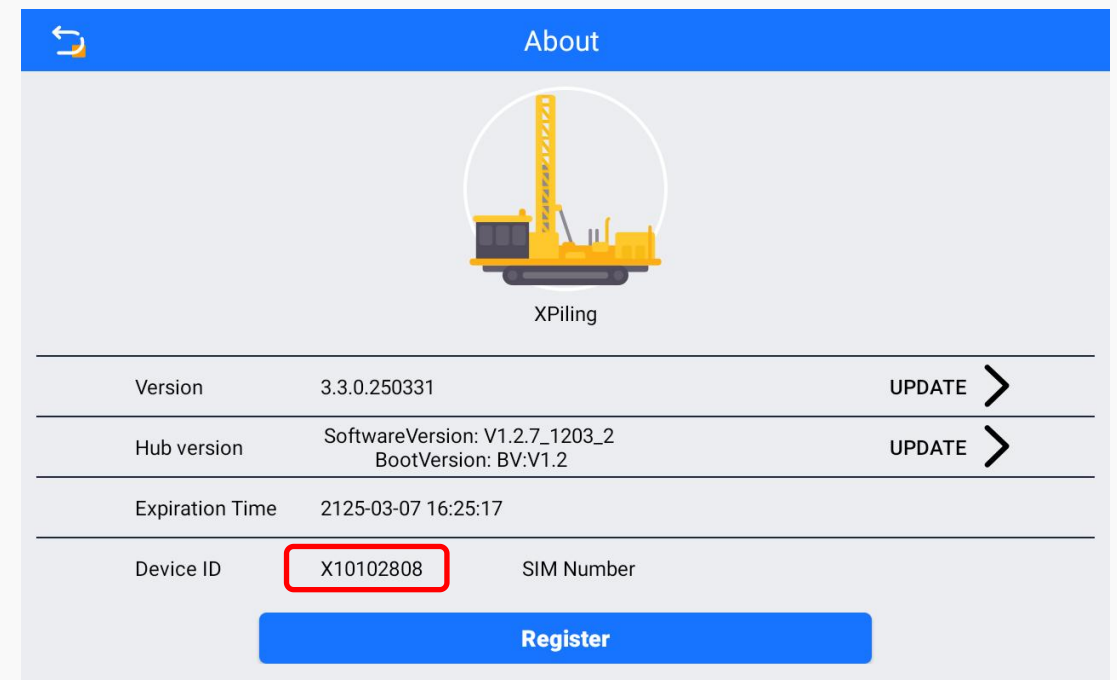
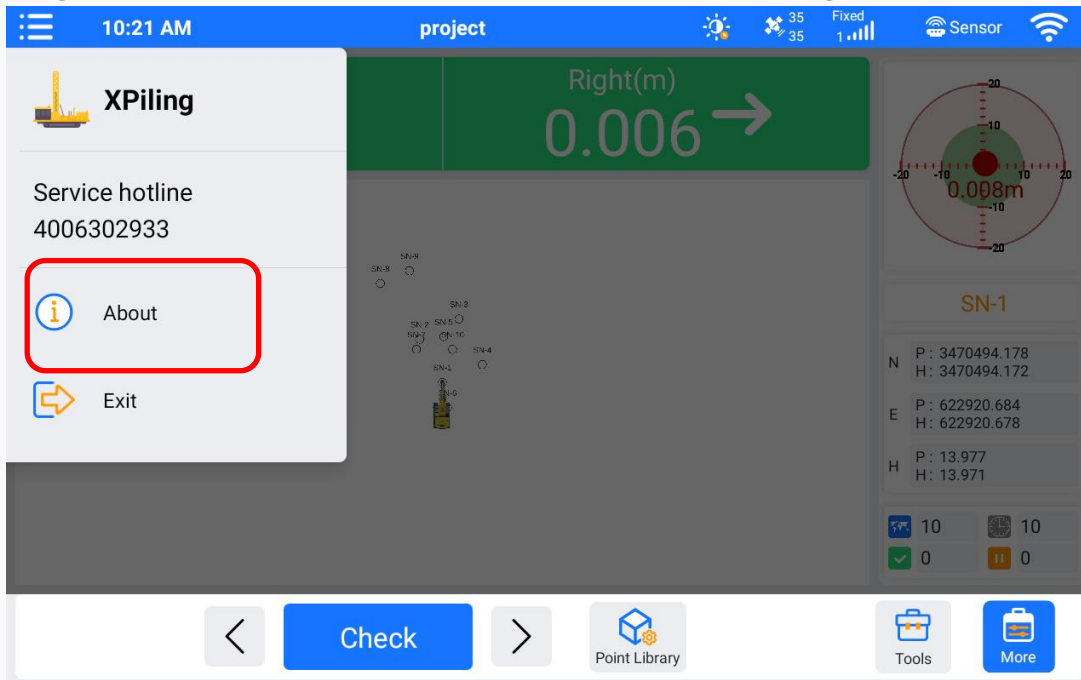




System Registration

2.1 System Registration

- Click  in the upper left corner of the main interface, select "About". Get Device ID, and inform ComNav support team of the device ID for registration:
- Online registration: Connect the tablet to the Internet. Run the software and inform ComNav support team of the device ID. Support team can perform remote registration.
- Offline registration: ComNav support team give the registration file to the customer, and the customer can click "Register" button to import the file for registration



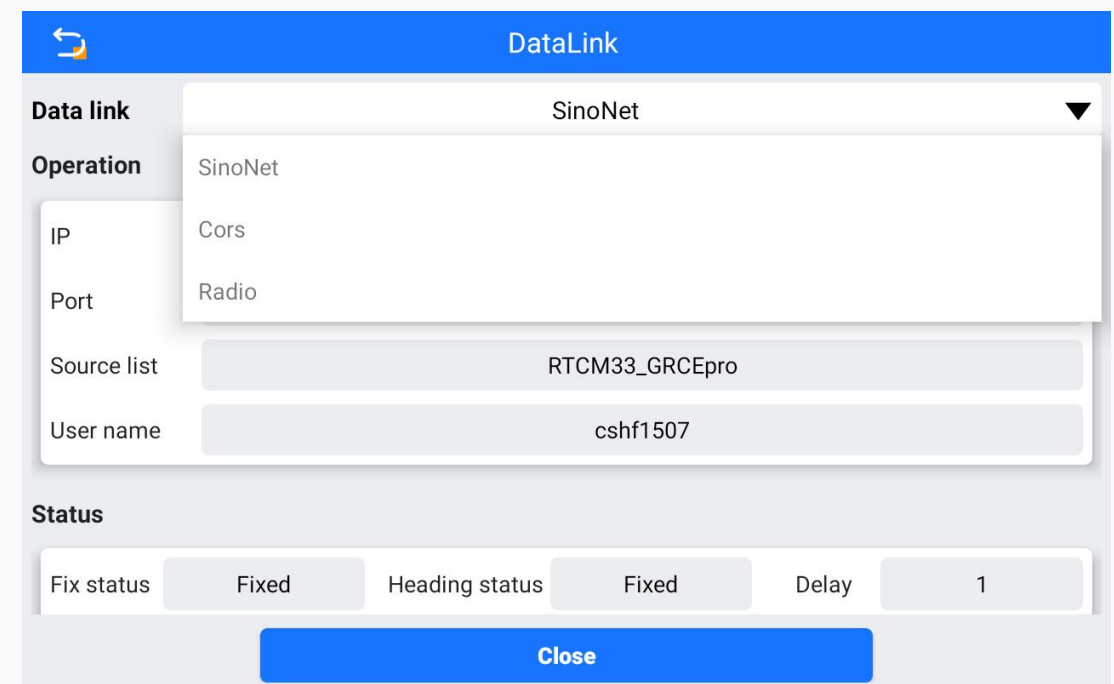
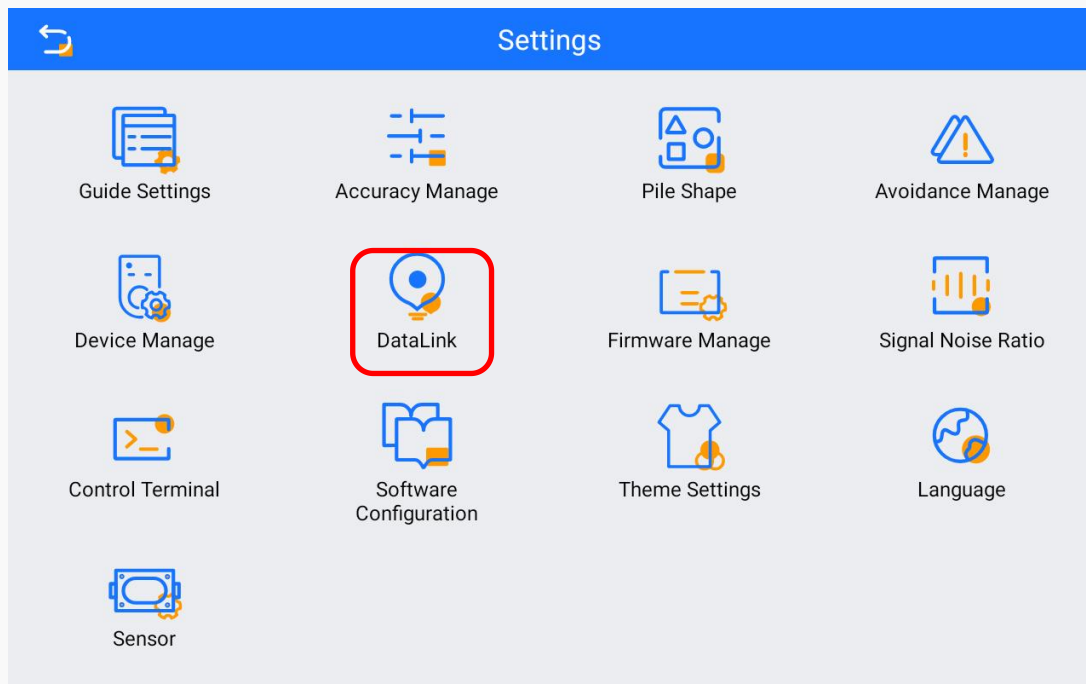


Datalink

3.1 Method

There are two ways to receive differential signals:

- CORS: Connect local CORS.
- Radio: Setup a Radio base



3.1.1 CORS

- Enter the IP address, port, source list, user name, password, and click "Open" to receive the network base station differential signal. At this time, the positioning status and orientation status are both displayed as "Fixed solution", which is normal.

DataLink

Data link

Cors

IP

114.111.30.88

Port

8003

Source list

RTCM33BDS

User name

qx1786

Password

.....

Status

Fix status

Fixed

Heading status

Fixed

Delay

1

Open

DataLink

Data link

Cors

IP

114.111.30.88

Port

8003

Source list

RTCM33BDS

User name

qx1786

Password

.....

Status

Fix status

Fixed

Heading status

Fixed

Delay

1

Close

3.1.2 Radio

- This mode requires the installation of a radio base station, and then the channel and frequency in the data link are set to the same as the base station, so that the base station differential signal can be received. At this time, the positioning status and orientation status are both displayed as "Fixed solution", which is normal.

 **DataLink**

Data link

Radio

▼

Airborne baud rate

4800

▼

Base station

HX

▼

Forward error correction

☐

Channel

6

▼

Frequency(Hz)

−

460.0500

+

Status

Fix status

Fixed

Heading status

Fixed

Delay

1

Open

 **DataLink**

Data link

Radio

▼

Airborne baud rate

4800

▼

Base station

HX

▼

Forward error correction

☐

Channel

6

▼

Frequency(Hz)

−

460.0500

+

Status

Fix status

Fixed

Heading status

Fixed

Delay

1

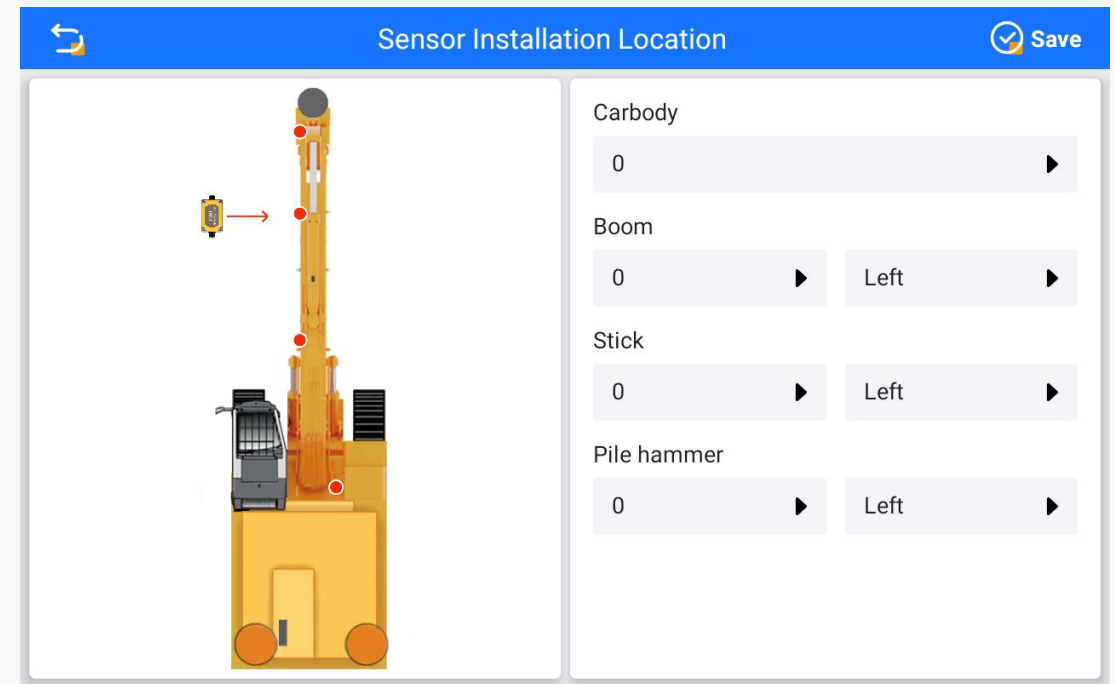
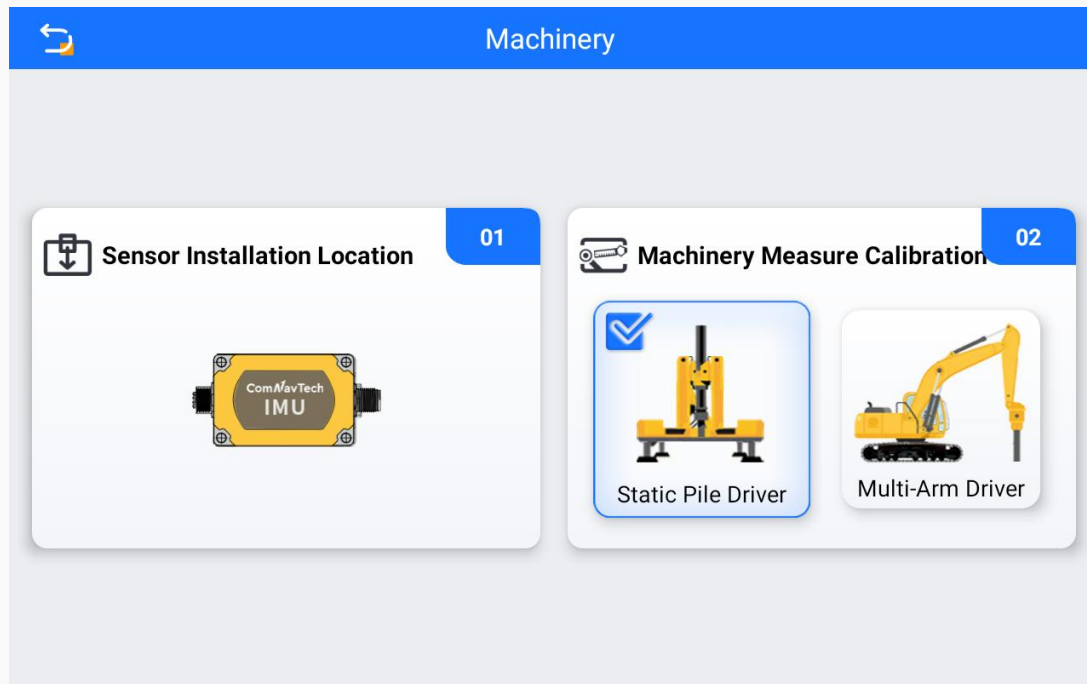
Close



System Modeling

4.1 Sensor Installation Location

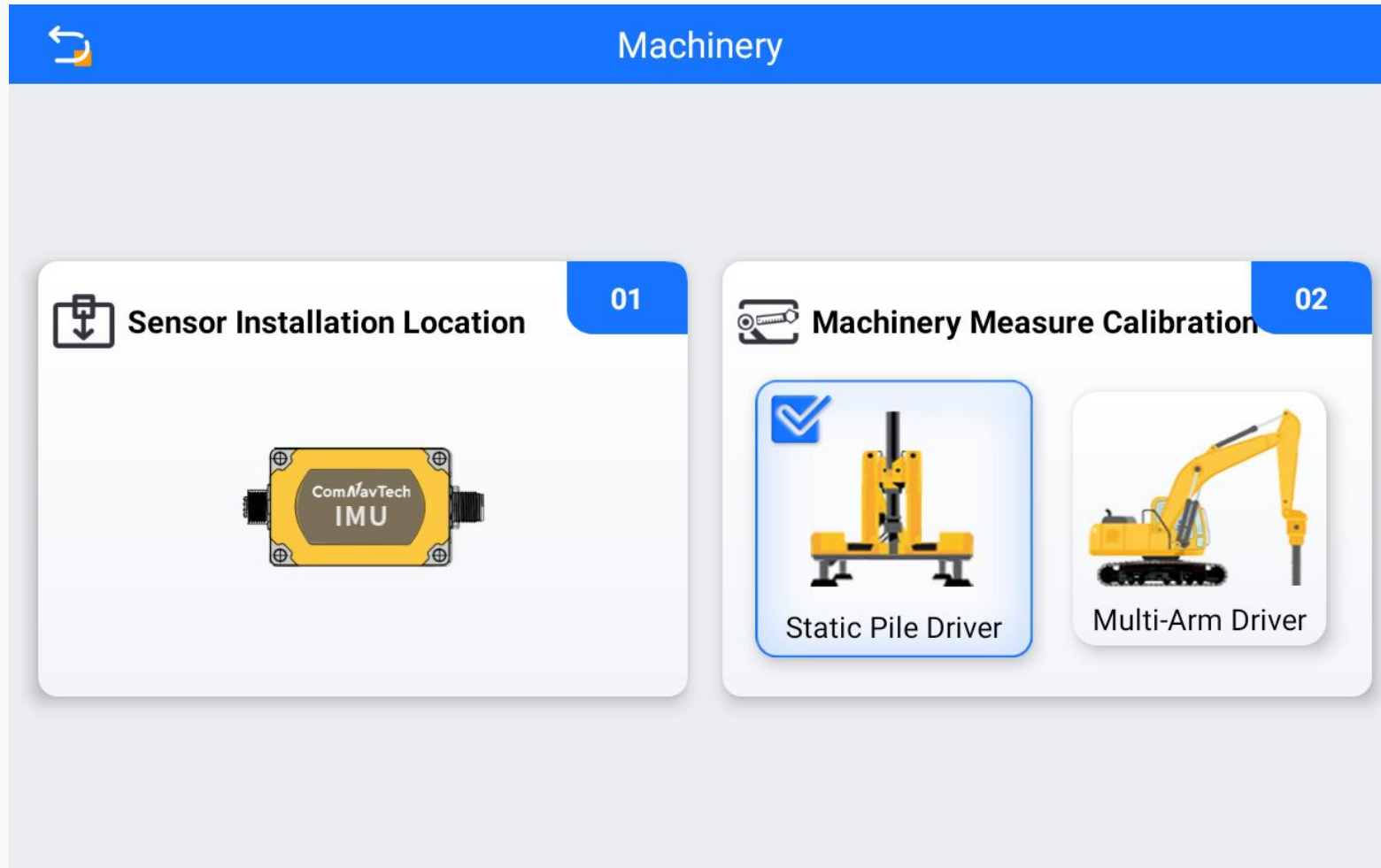
- Click on the icon  in the bottom right corner of the main interface, select "Machinery".
- Click "Sensor Installation Location" and select the sensor installation location.



- **Note:** 1. The sensor should be installed on the left or right side of the robotic arm (based on the forward direction);
2. The sensor numbers are 5, 6, 7, and 8 in sequence from the vehicle body to the pile hammer.

4.2 Machinery Measure Calibration

- Choose a static pile driver or a multi-arm driver according to the actual model for corresponding machinery measure calibration.



4.3 Machinery Measure Calibration of Static Pile Driver

- The coordinates of the master and slave antennas can be directly collected by clicking the "Collect" button;
- The coordinates of the pile hammer position need to be collected and input using RTK;
- Select the installation direction based on the actual installation situation of the equipment.

The screenshot displays the ComNavTech software interface for machinery measure calibration. The interface is divided into several sections:

- Antenna Coordinates:** This section contains a blue button labeled "Collect", which is highlighted with a red rectangular box.
- Pile Coordinates:** This section contains two blue buttons labeled "Collect" and "Select". Below these buttons are three input fields for coordinates, each with a unit "m":
 - N 0.000 m
 - E 0.000 m
 - H 0.000 m
- Mounting Direction:** This section contains two icons representing different mounting directions: "Perpendicular" and "Parallel".

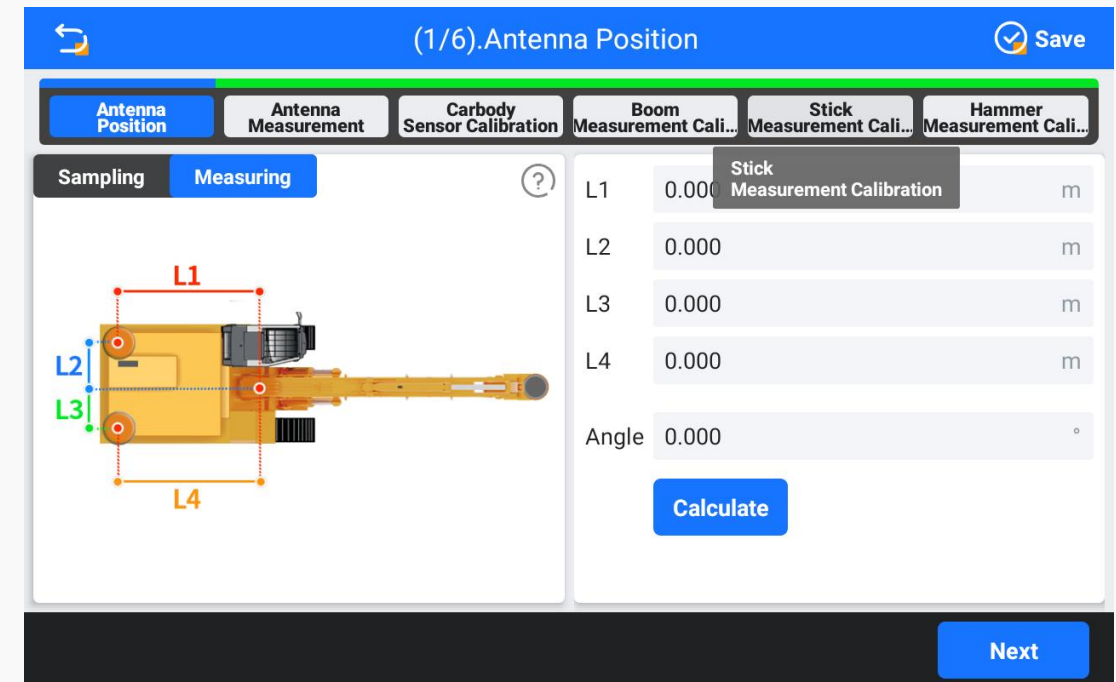
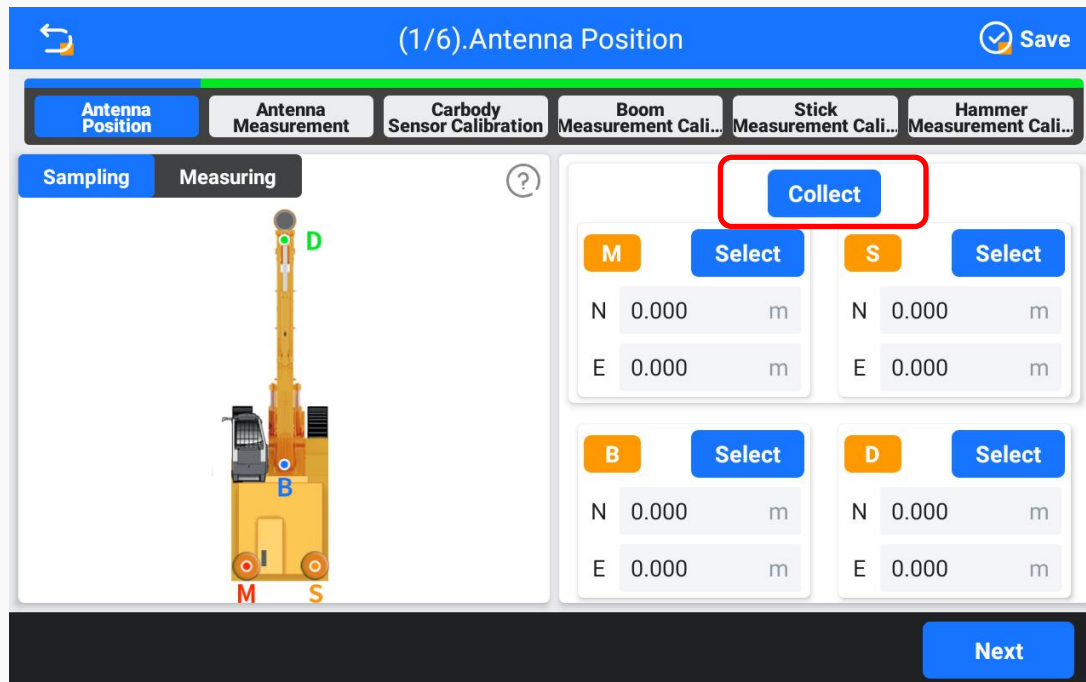
On the left side of the interface, there is a top-down view of a yellow pile driver. A red arrow points upwards from the center of the driver, labeled "Forward". Below the driver, there are two circular icons labeled "Main Antenna" and "Slave Antenna".

- Note:** 1. Vertical and horizontal directions refer to the positional relationship between main and slave antenna lines and the pile hammer;
- 2、 M: Main antenna (left); S: Slave antenna (right);
- 3、 When collecting coordinates with RTK, ensure the rover's coordinate system matches the tablet's.

4.4 Machinery Measure Calibration of Multi-Arm Driver

4.4.1 Antenna position

- The master/slave antenna coordinates can be collected by clicking "Collect" button.
- For boom pivot B and arm pivot D, use RTK or a total station for measurement.
- Captured coordinates can be manually entered or imported as a point file into the pile location library for selection.
- After collection, the ranging interface will automatically generate the corresponding distances.



- **Note:** When collecting coordinates with RTK, ensure the rover's coordinate system matches the tablet's.

4.4.2 Antenna Measurement

- Measure the distance between H1 and H2 according to the diagram, accurate to millimeters.
- Then click "Save" and click "Next".

(2/6).Antenna Measurement

Save

Antenna Position Antenna Measurement Carbody Sensor Calibration Boom Measurement Cali... Stick Measurement Cali... Hammer Measurement Cali...

H1 0.000 m

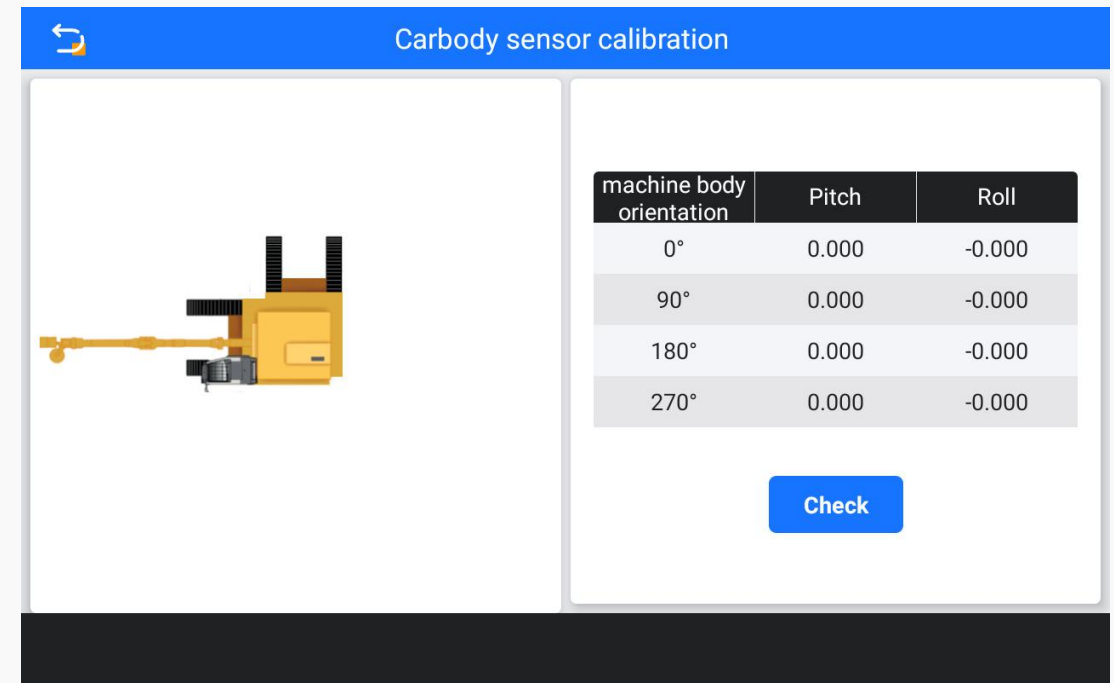
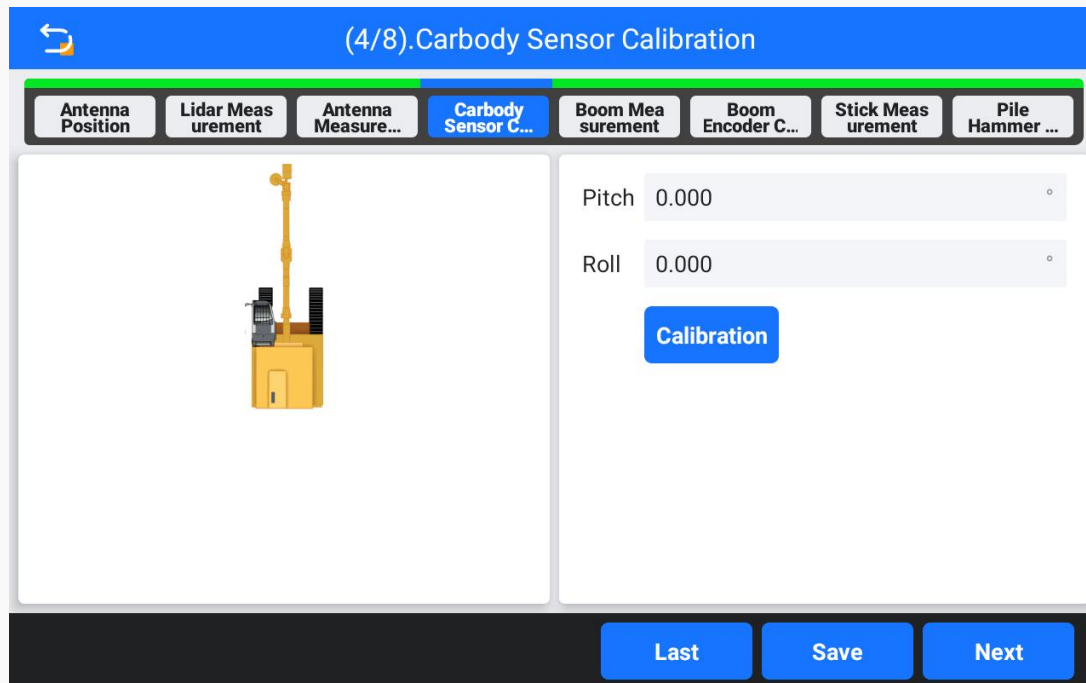
H2 0.000 m

Last Next

- **Note:** H1 is the distance from the main antenna to the bottom of the track; The distance from the pivot point of the H2 boom to the bottom of the track.

4.4.3 Carbody Sensor Calibration

- Park the excavator pile driver on a flat surface, click the "Calibration" button, and enter the calibration process.
- According to the software guidance, click "Calibration" when the vehicle rotates to 0 degrees, 90 degrees, 180 degrees, and 270 degrees respectively, to calibrate a total of four directions.
- Click the "Check", the system will automatically calibrate the carbody sensors. Click the "Next".



4.4.4 Boom Measurement Calibration

- According to the diagram, use RTK or a total station to measure the coordinates of the boom pivot and stick pivot points.
- Calculate and input the L and H values.
- After measuring L and H, click "Calibrate" to calculate pitch and roll angles, then click "Save" and "Next".

(4/6).Boom Measurement Calibration Save

Antenna Position Antenna Measurement Carbody Sensor Calibration **Boom Measurement Cali...** Stick Measurement Cali... Hammer Measurement Cali...



Horizontal Up

L 0.000 m

H 0.000 m

Pitch 0.000 °

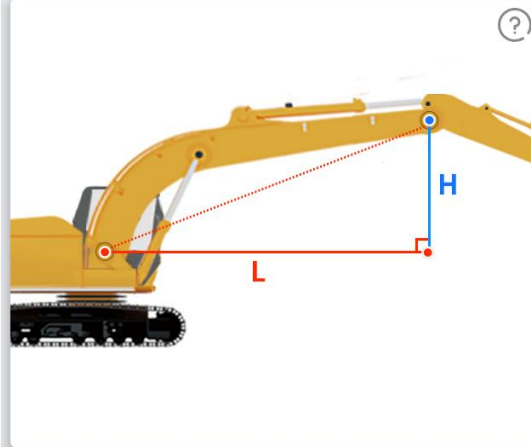
Roll 0.000 °

Calibrate

Last Next

(4/6).Boom Measurement Calibration Save

Antenna Position Antenna Measurement Carbody Sensor Calibration **Boom Measurement Cali...** Stick Measurement Cali... Hammer Measurement Cali...



Horizontal Up

L 0.000 m

H 0.000 m

Pitch 0.000 °

Roll 0.000 °

Calibrate

Last Next

- **Note:**When using RTK to collect coordinates, ensure the rover station's coordinate system matches the tablet's; If the boom is level, only the L value needs to be calculated.

4.4.5 Stick Measurement Calibration

- According to the diagram, use RTK or a total station to measure the coordinates of the stick pivot and hammer pivot points.
- Calculate and enter L & H values.
- After measuring L and H, click "Calibrate" to calculate pitch and roll angles, then click "Save" and "Next".

(5/6).Stick Measurement Calibration

Antenna Position | Antenna Measurement | Carbody Sensor Calibration | Boom Measurement Cali... | **Stick Measurement Cali...** | Hammer Measurement Cali...

Vertical | Down

L 0.000 m

H 0.000 m

Pitch 0.000 °

Roll 0.000 °

Calibrate

Last Next

(5/6).Stick Measurement Calibration

Antenna Position | Antenna Measurement | Carbody Sensor Calibration | Boom Measurement Cali... | **Stick Measurement Cali...** | Hammer Measurement Cali...

Vertical | Down

L 0.000 m

H 0.000 m

Pitch 0.000 °

Roll 0.000 °

Calibrate

Last Next

- **Note:**When using RTK to collect coordinates, ensure the rover station's coordinate system matches the tablet's; If the stick is vertical, only the L value needs to be calculated.

4.4.6 Hammer Measurement Calibration

- According to the diagram, use RTK or a total station to measure the coordinates of the hammer pivot and the pile hammer pivot points.
- Calculate and enter L & H values.
- After measuring L and H, click "Calibrate" to calculate pitch and roll angles, then click "Save".

(6/6).Hammer Measurement Calibration

Save

Antenna Position Antenna Measurement Carbody Sensor Calibration Boom Measurement Cali... Stick Measurement Cali... Hammer Measurement Cali...

L 0.000 m

H 0.000 m

Pitch 0.000 °

Roll 0.000 °

Calibrate

Last

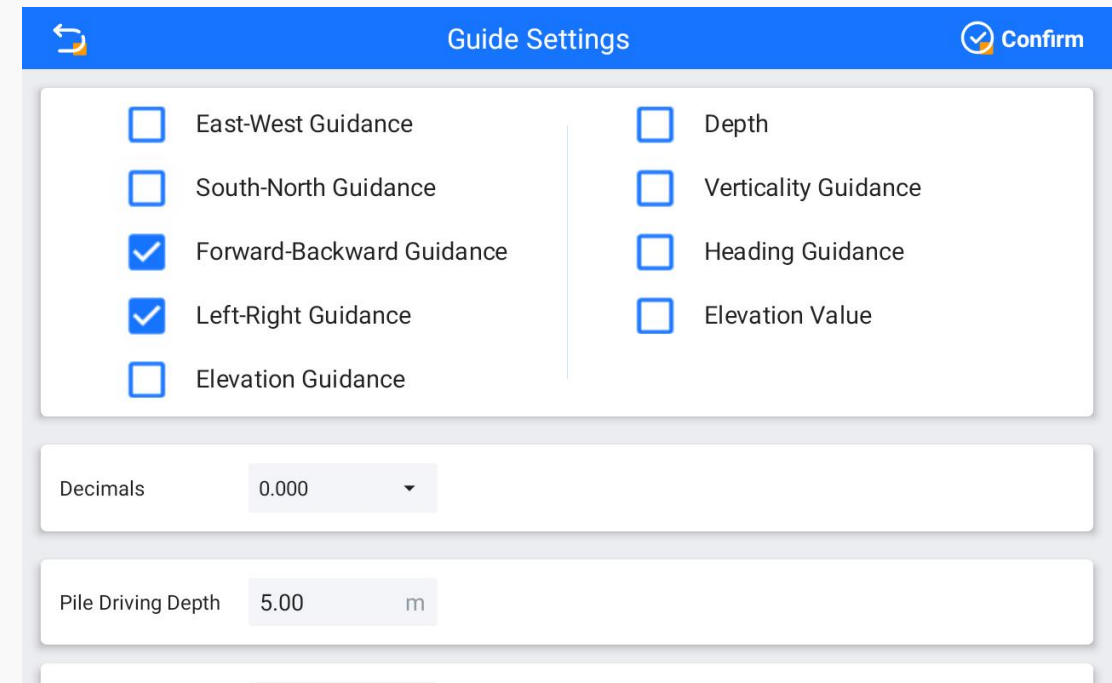
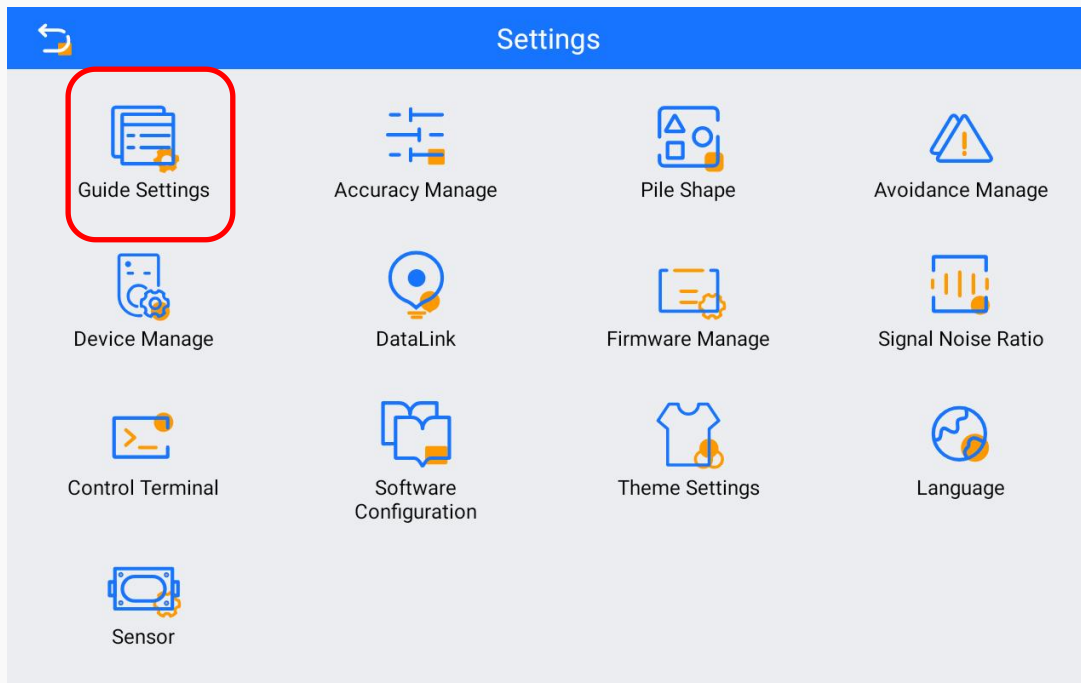
- **Note:** When using RTK to collect coordinates, ensure the rover station's coordinate system matches the tablet's.



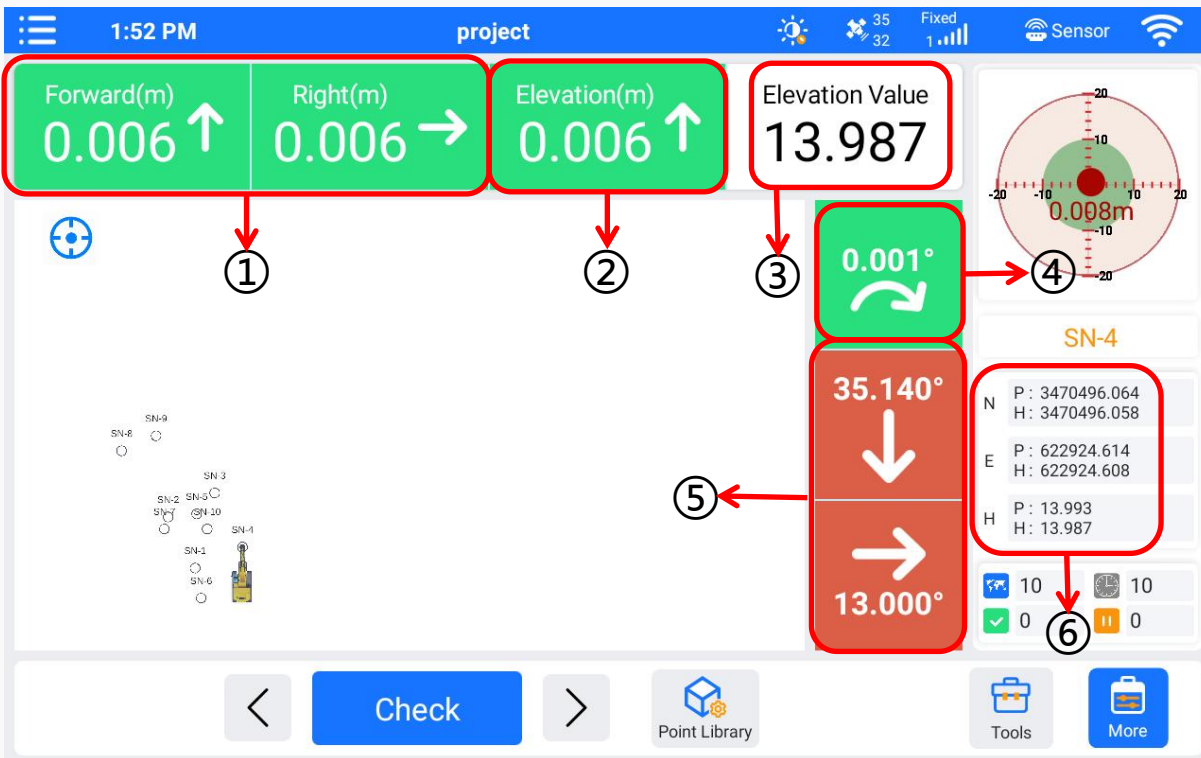
System Configuration

5.1 Guide Settings

- Click on the icon  in the bottom right corner of the main interface, select "Settings", and click on "Guide Settings".
- According to the actual project needs, select the required guidance value options and click "Confirm".



5.1.1 Guide Settings



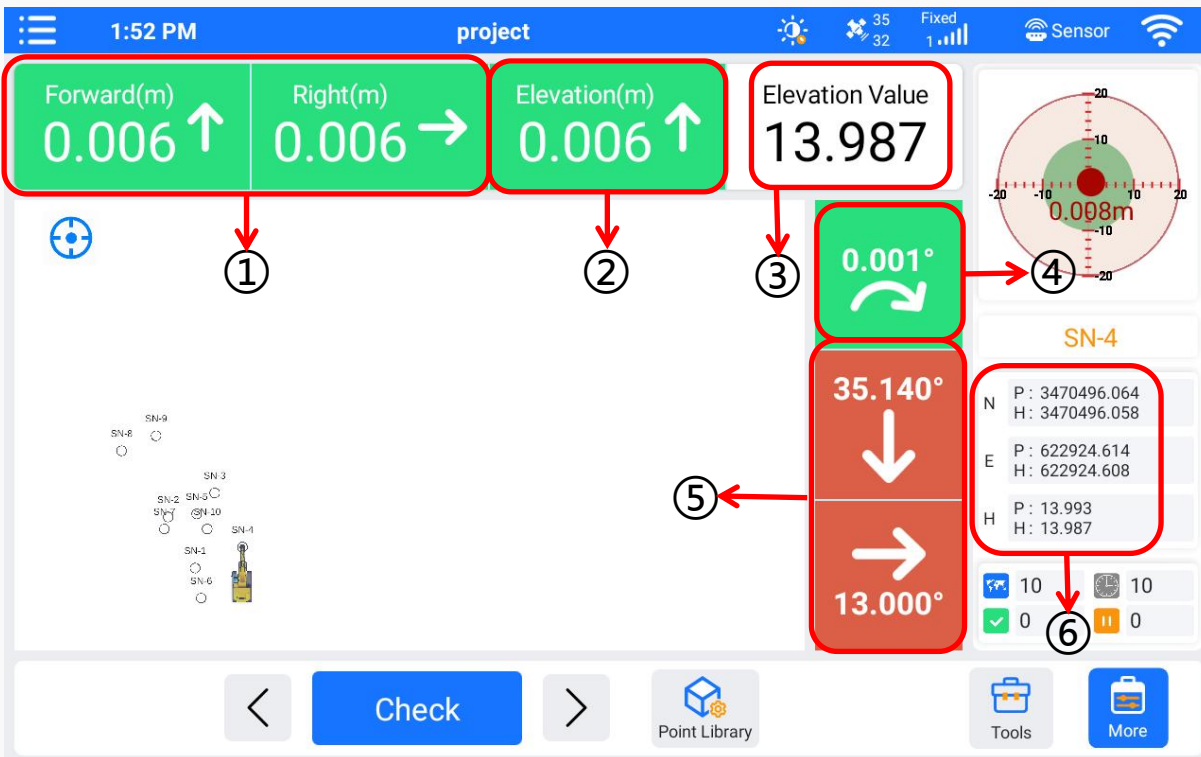
The selected guidance values will be displayed on the main interface, as shown in the red box:

①Plane guidance, after opening the east-west, south-north, forward-backward, and left-right guidance, will guide the plane coordinates of the pile points.

②Elevation guidance: After opening elevation guidance, the elevation coordinates of the pile points will be guided.

③The elevation value refers to the elevation coordinates of the pile hammer.

5.1.1 Guide Settings



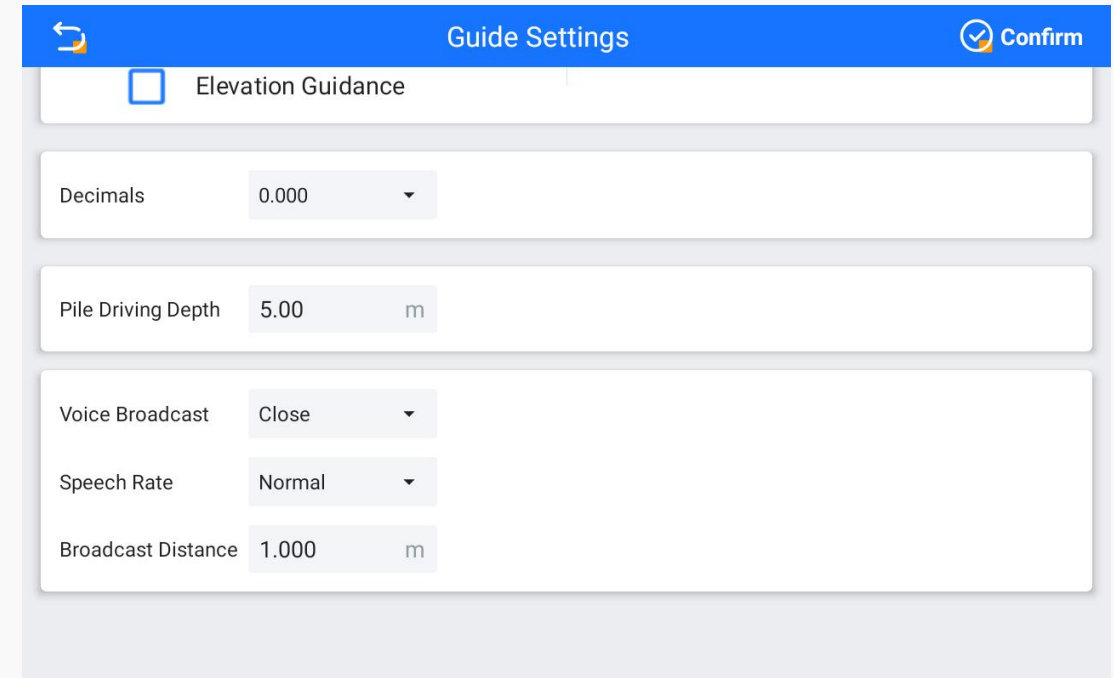
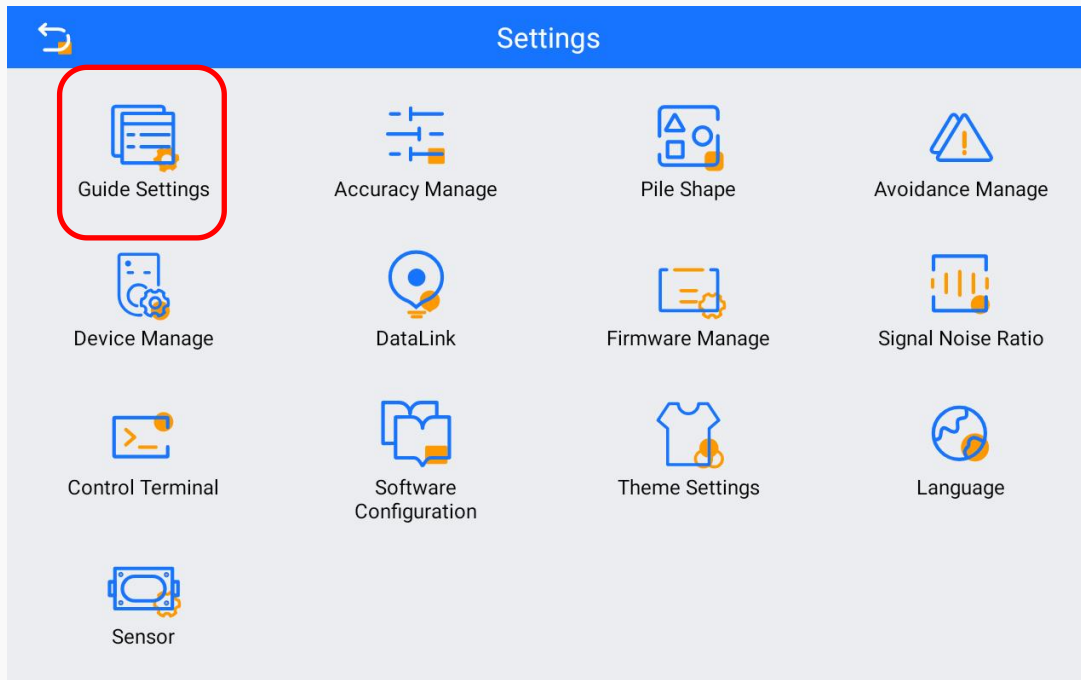
④Azimuth guidance (only used in inclined pile operations), adjust the inclination angle of the pile hammer according to the guidance value prompts.

⑤Verticality guidance, adjust the pile hammer to a vertical state (perpendicular to the relative pile point position) according to the guidance value prompt.

⑥H is the real-time coordinate of the pile hammer; P is the coordinate of the pile point.

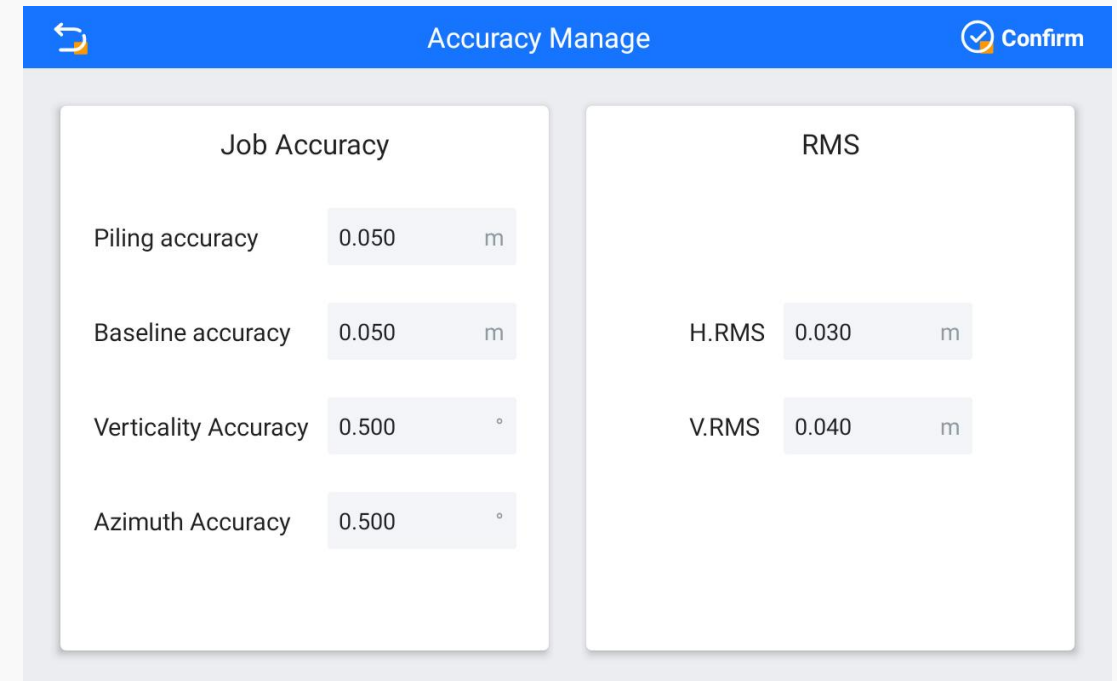
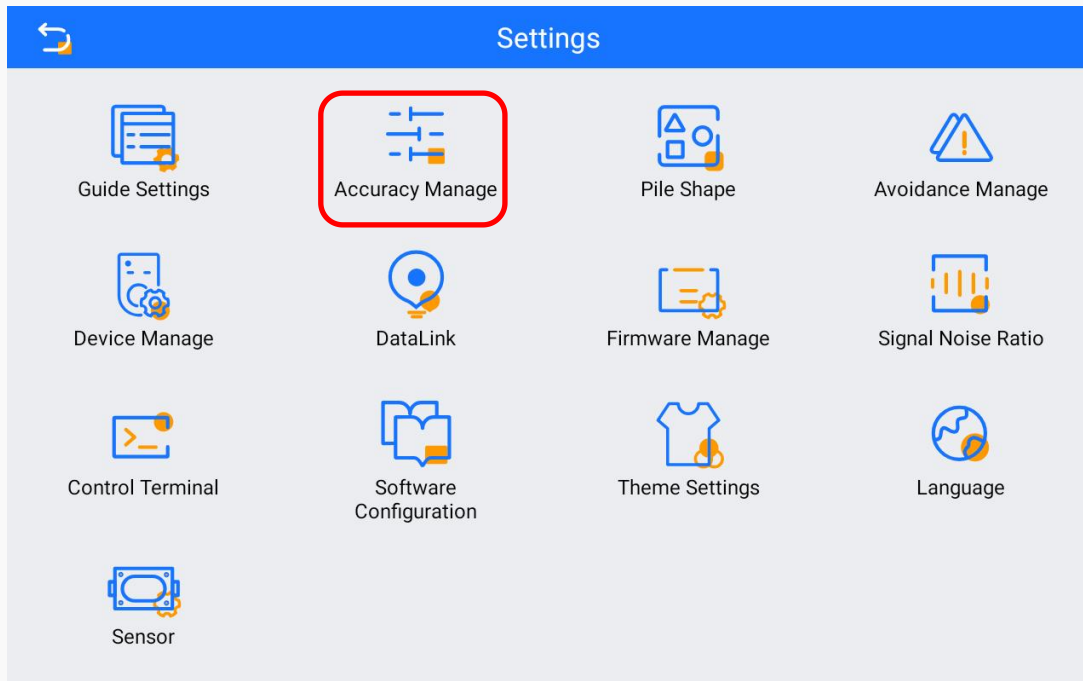
5.1.2 Guide Settings

- In the guide settings interface, you can set the number of decimal places displayed for the guide value according to your needs;
- According to the job requirements, input the piling depth;
- The voice announcement switch can be turned on or off according to your needs; after turning on the voice announcement, you can adjust the speed and distance of the voice announcement.



5.2 Accuracy Manage

- Click on the icon  in the bottom right corner of the main interface, select "Settings", and click on "Accuracy Manage".



5.2.1 Accuracy Manage

- Piling accuracy refers to the positional accuracy of the pile hammer relative to the pile point. When the pile hammer reaches the set accuracy range, a voice prompt will be given;
- Baseline accuracy refers to the accuracy range of the positions of the master and slave antennas;
- Vertical accuracy refers to the accuracy range of the vertical state of the pile;
- Azimuth accuracy refers to the range of accuracy for the azimuth angle during batter pile operations;
- H.RMS: Threshold value of coordinate plane accuracy;
- V.RMS: The threshold for coordinate elevation accuracy.

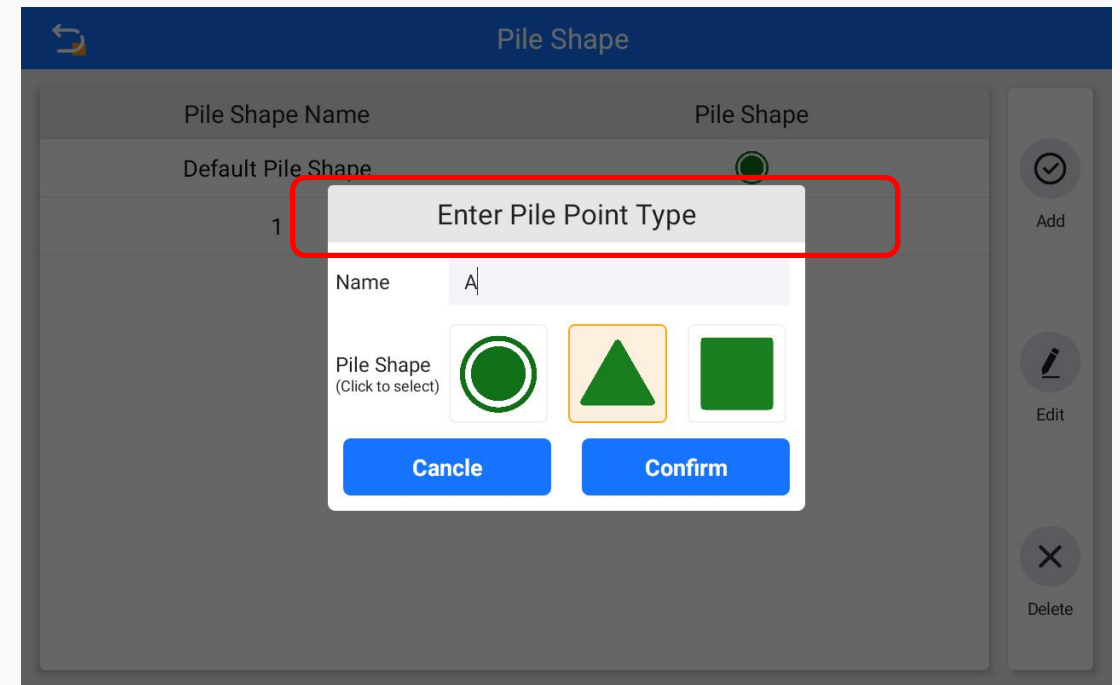
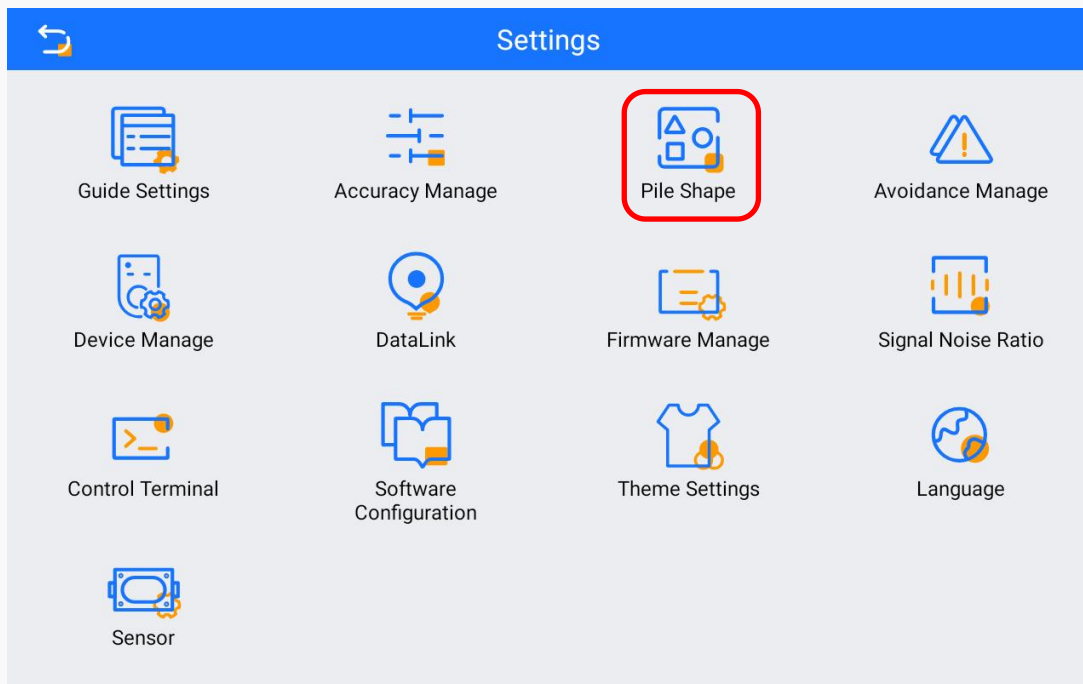
The screenshot displays the 'Accuracy Manage' interface with a blue header bar containing a back arrow, the title 'Accuracy Manage', and a 'Confirm' button with a checkmark icon. Below the header, there are two white panels with red borders. The left panel, titled 'Job Accuracy', contains four rows of settings: 'Piling accuracy' (0.050 m), 'Baseline accuracy' (0.050 m), 'Verticality Accuracy' (0.500 °), and 'Azimuth Accuracy' (0.500 °). The right panel, titled 'RMS', contains two rows: 'H.RMS' (0.030 m) and 'V.RMS' (0.040 m). Each value is displayed in a light blue input field.

Job Accuracy		
Piling accuracy	0.050	m
Baseline accuracy	0.050	m
Verticality Accuracy	0.500	°
Azimuth Accuracy	0.500	°

RMS		
H.RMS	0.030	m
V.RMS	0.040	m

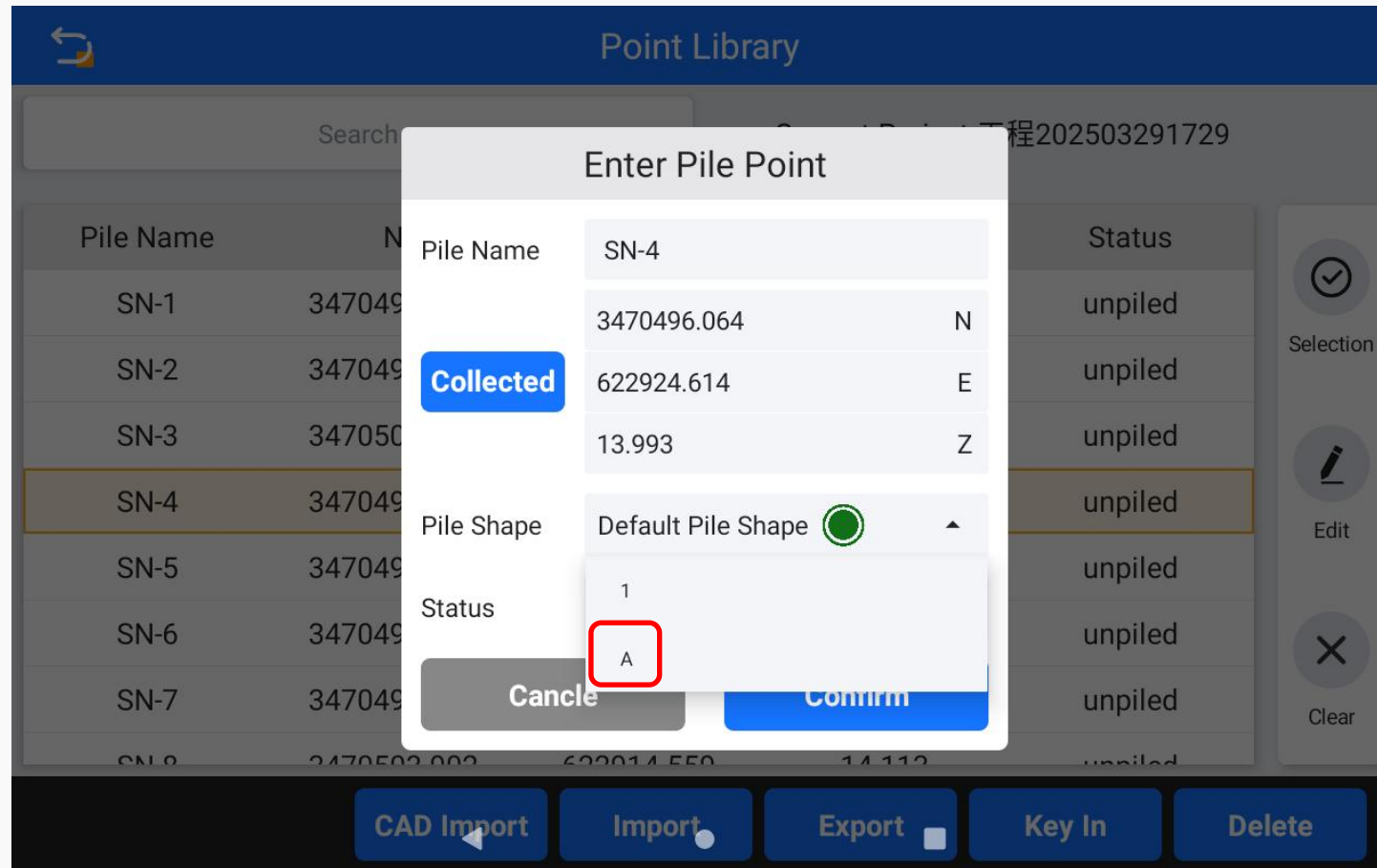
5.3 Pile Shape

- Click on the icon  in the bottom right corner of the main interface, select "Settings", and click on "Pile Shape", enter the pile type selection button.
- Click "Add", select different pile shapes according to the project needs, enter the pile type name, and create a new pile type.



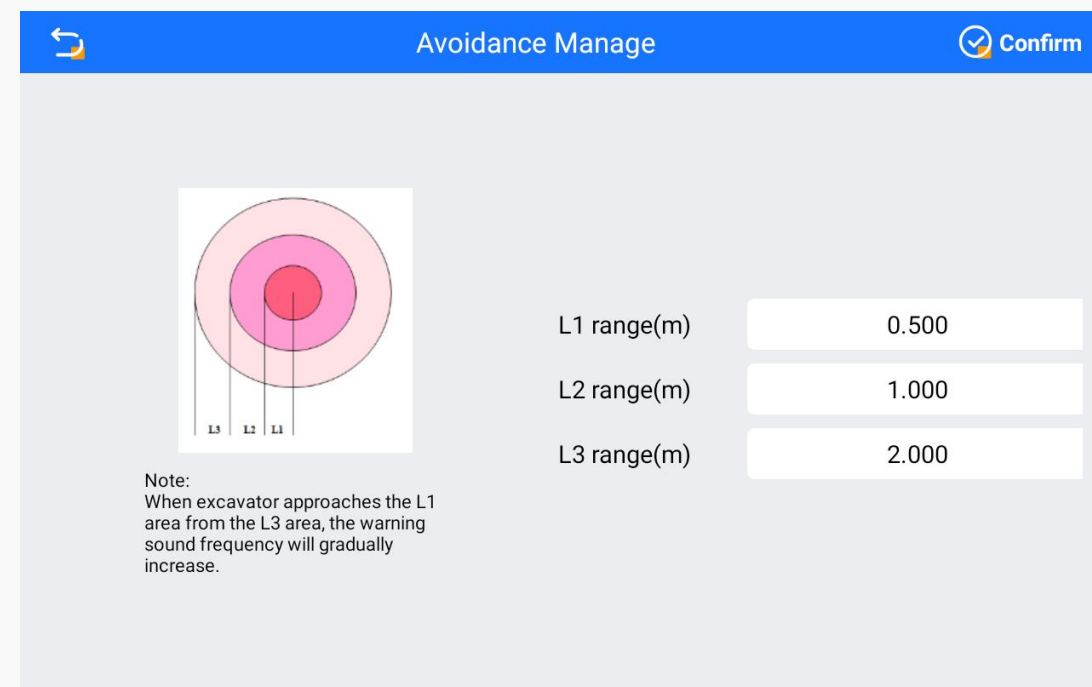
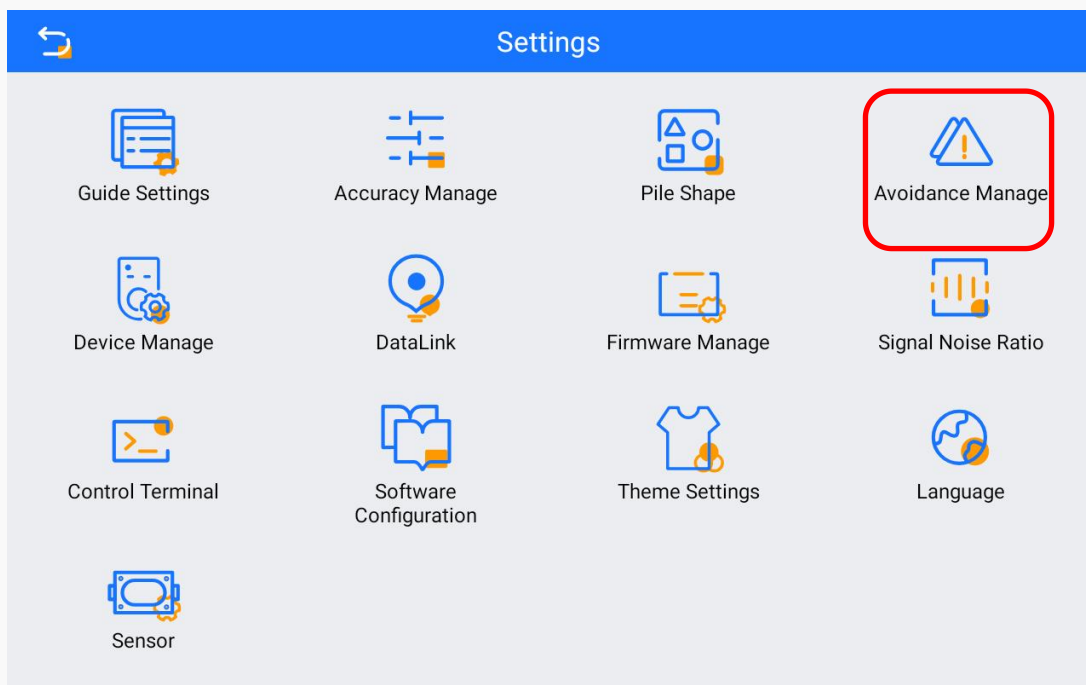
5.3 Pile Shape

- Click on the "Point Library" icon, select the point where you want to change the pile type, click "Edit", select the new pile type, and change the pile type of that point.



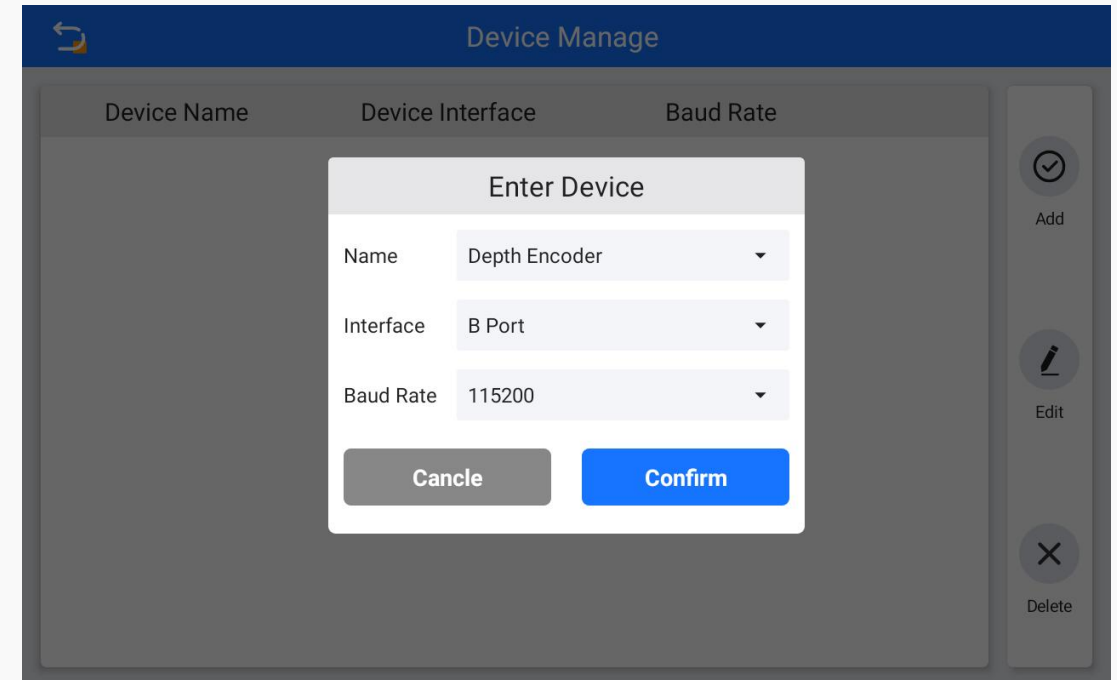
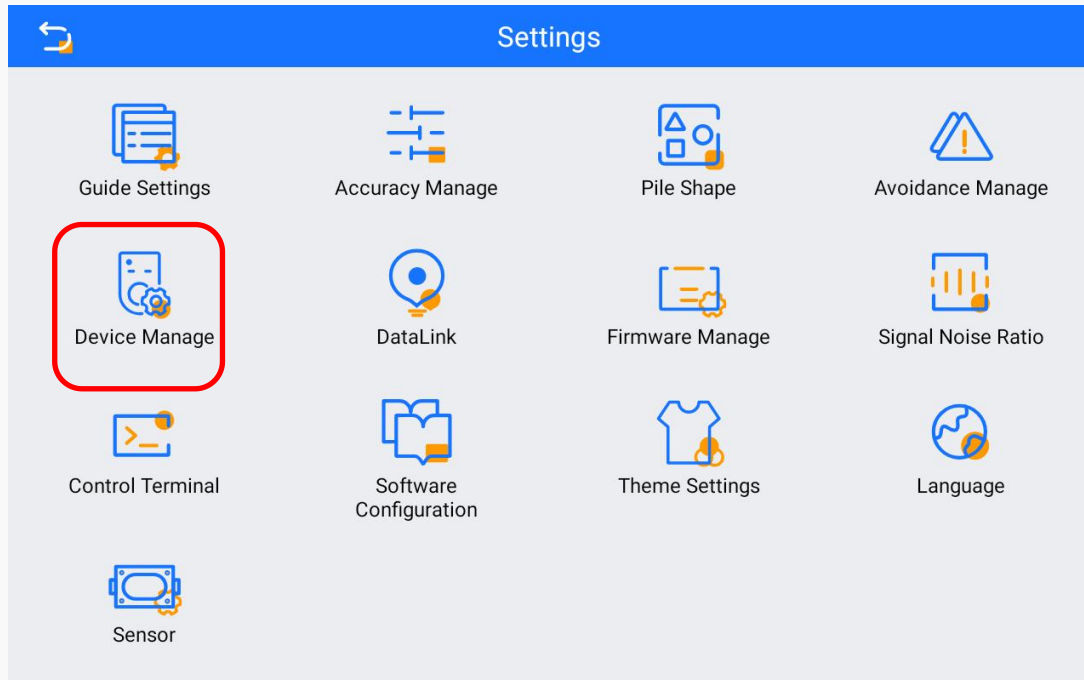
5.4 Avoidance Manage

- Click on the icon  in the bottom right corner of the main interface, select "Settings", and click on "Avoidance Manage".
- According to the actual project needs, set the range interval of the avoidance zone (values of L1, L2, L3).



5.5 Device Manage

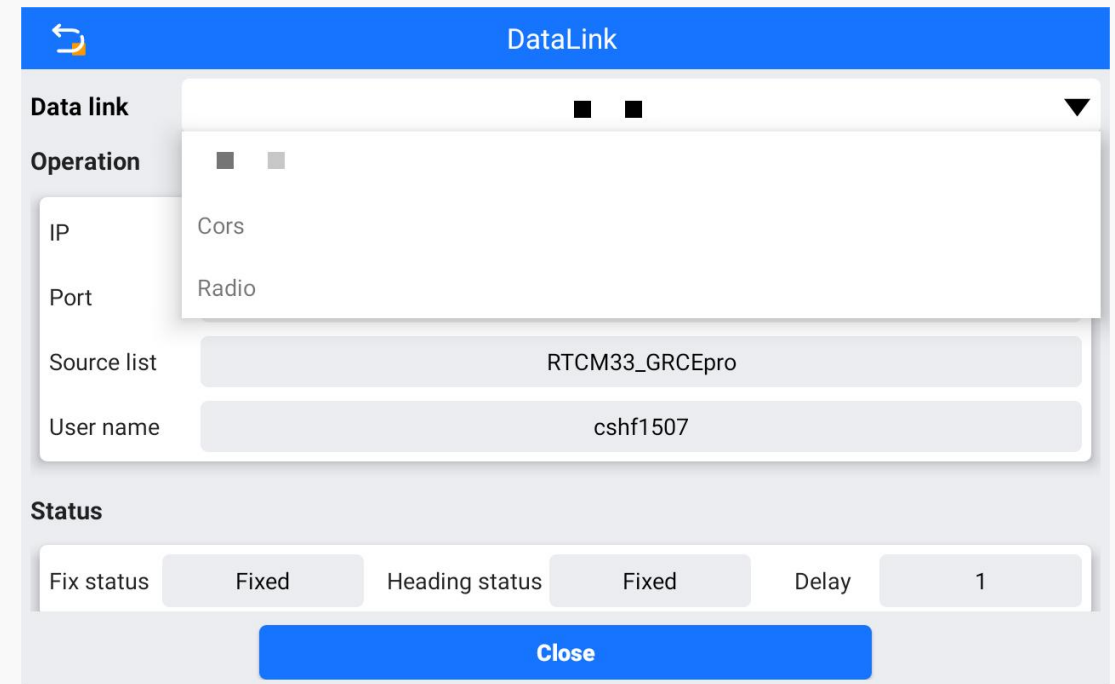
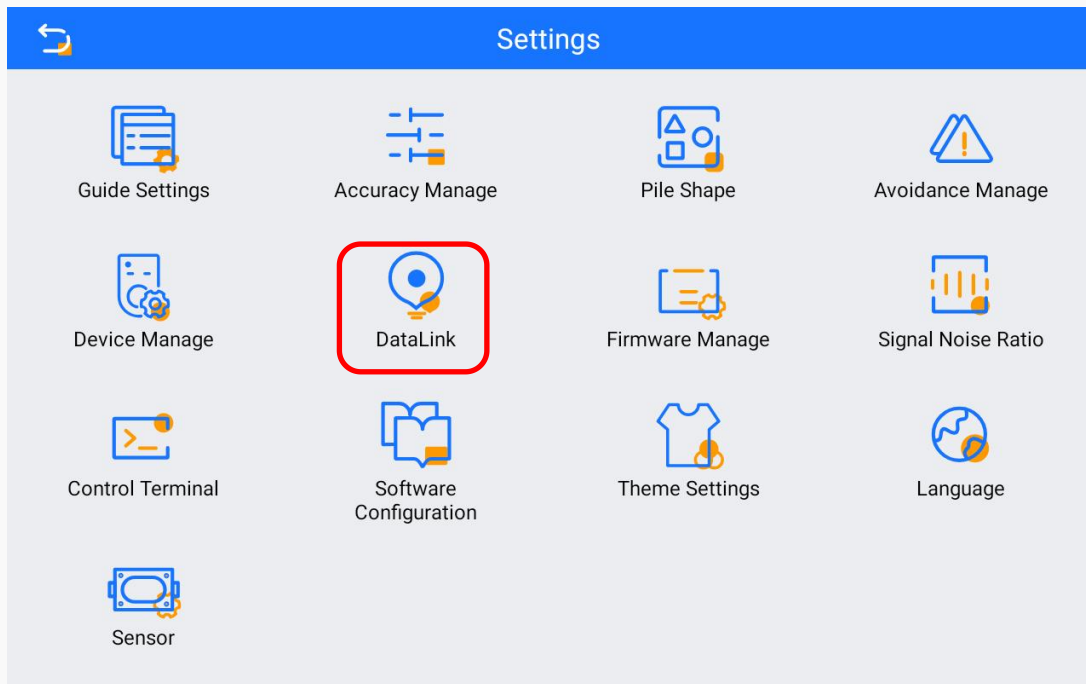
- Click the icon  in the lower right corner of the main interface, select "Device Manage", click "Add", and then select to add a Depth Encoder/Boom Encoder/Laser Rangefinder/Lidar based on the actual machine models on site.



- Note: 1. When selecting a new device, choose the correct baud rate (baud rate is set to 115200).
2. When adding new equipment, the interface selection should correspond to the actual situation.

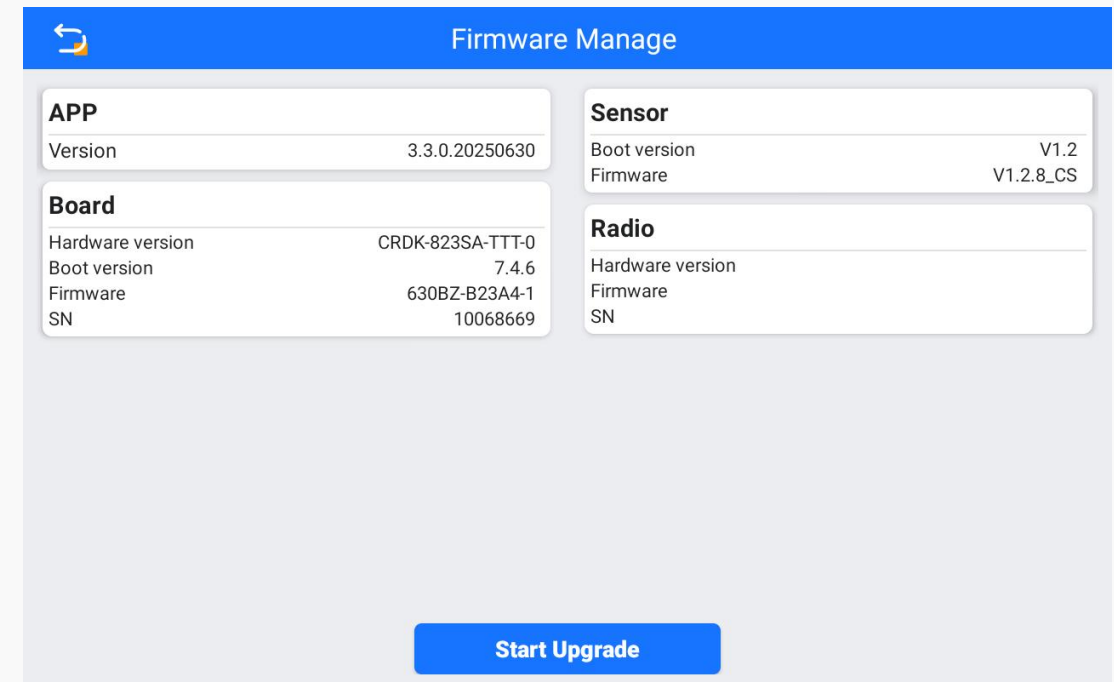
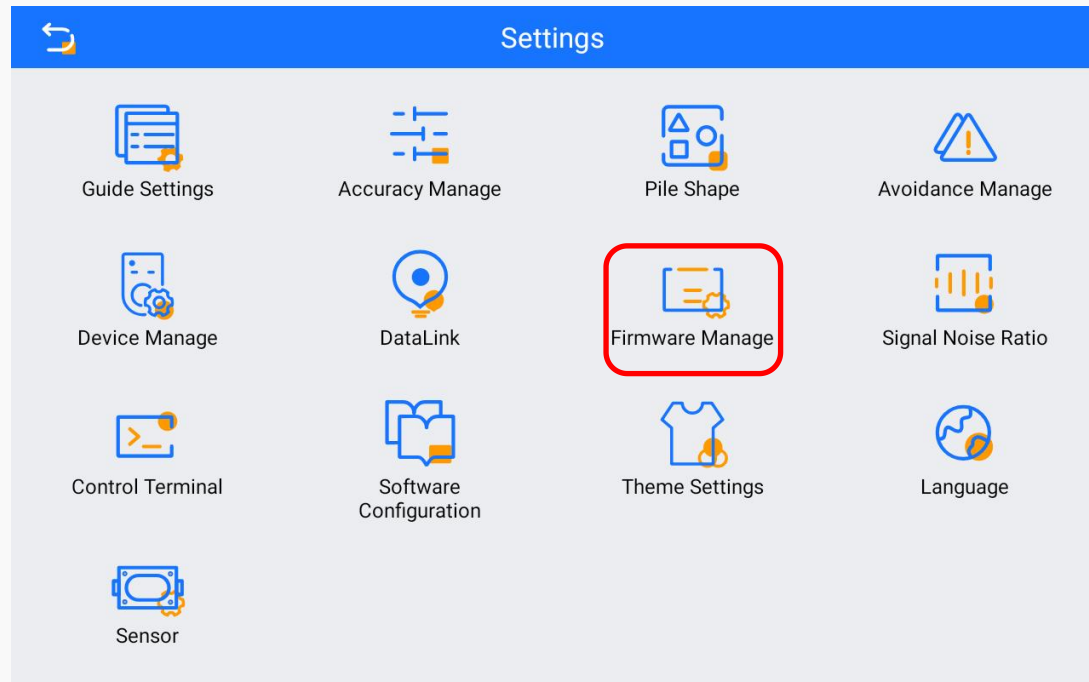
5.6 Datalink

- Click the icon  in the lower right corner of the main interface, select "Settings", click "Datalink", and choose to use cors, or radio; for specific operations, refer to the data link section.



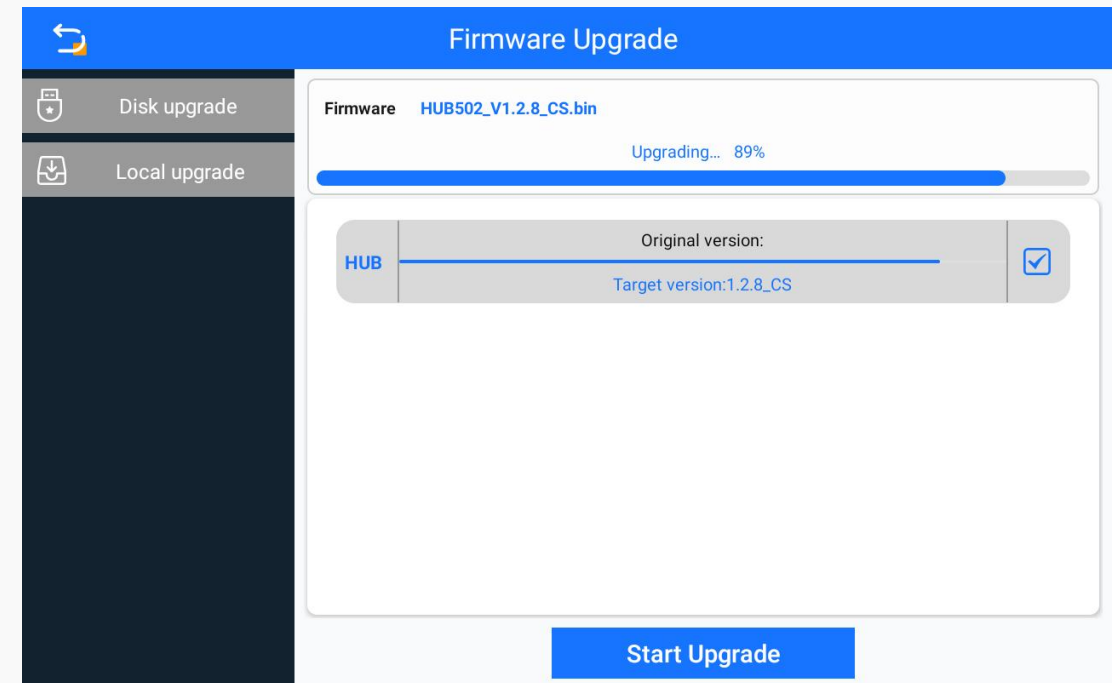
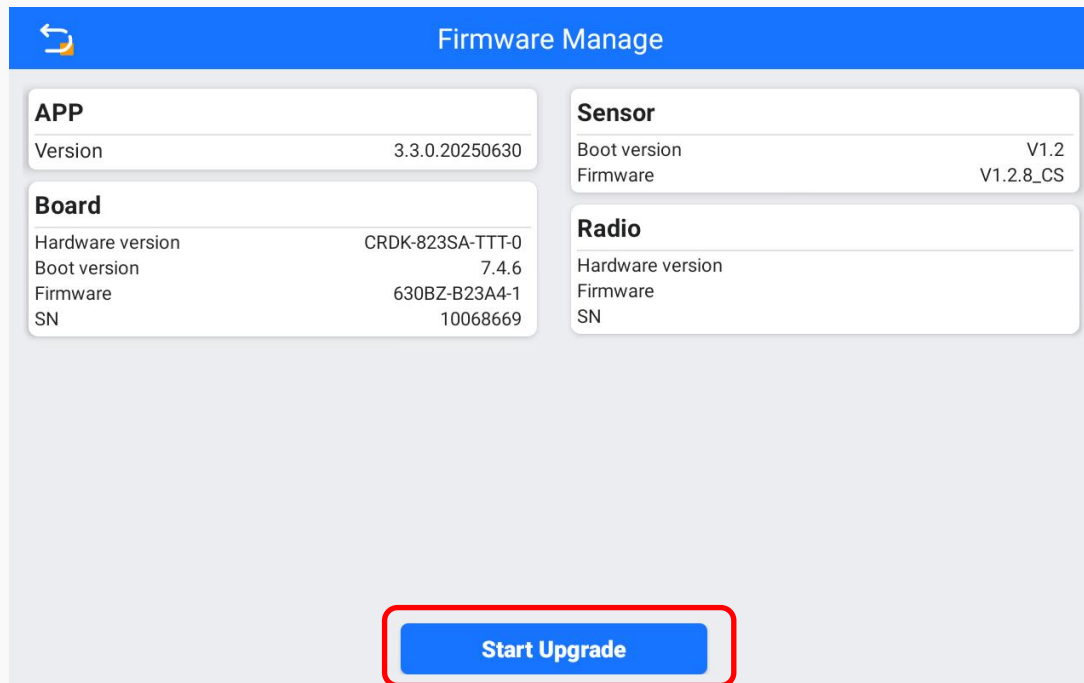
5.7 Firmware Manage

- Click the icon  in the lower right corner of the main interface, select "Settings", and then click "Firmware Manage";
- You can check the APP version, Hub firmware version, board information, and radio information on this interface;
- You can also choose the corresponding firmware for firmware upgrade.



5.7.1 Firmware upgrade

- Click "Start Upgrade" and choose between local upgrade or USB disk upgrade;
- Select the firmware package for Hub firmware upgrade based on the storage path where the firmware file is located.



5.7.2 Board Firmware Upgrade

- Click "Start Upgrade" and choose between local upgrade or USB disk upgrade;
- Select the firmware package for board firmware upgrade based on the storage path where the firmware file is located.

 **Firmware Manage**

APP

Version	3.3.0.20250630
---------	----------------

Board

Hardware version	CRDK-823SA-TTT-0
Boot version	7.4.6
Firmware	630BZ-B23A4-1
SN	10068669

Sensor

Boot version	V1.2
Firmware	V1.2.8_CS

Radio

Hardware version	
Firmware	
SN	

Start Upgrade

 **Firmware Upgrade**

 Disk upgrade

 Local upgrade

Firmware [K823_630BZ_a_05_20250304_Compress.bin](#)

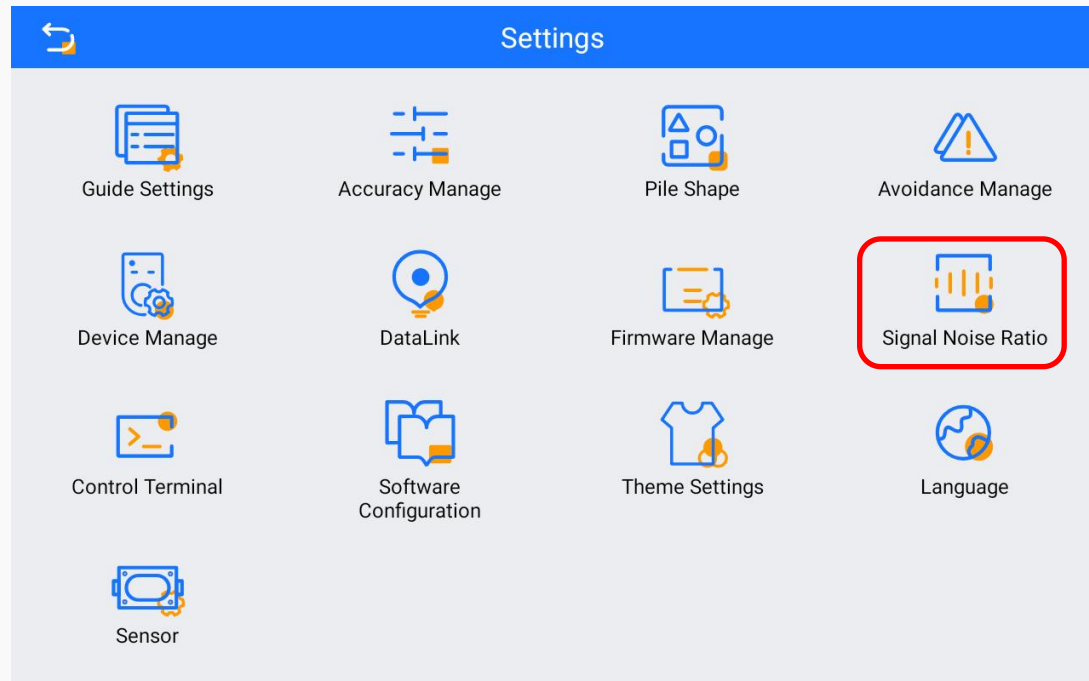
Upgrading... 2%

Board	Original version:630BZ	☒
	Target version:630BZ	

Start Upgrade

5.8 Signal Noise Ratio

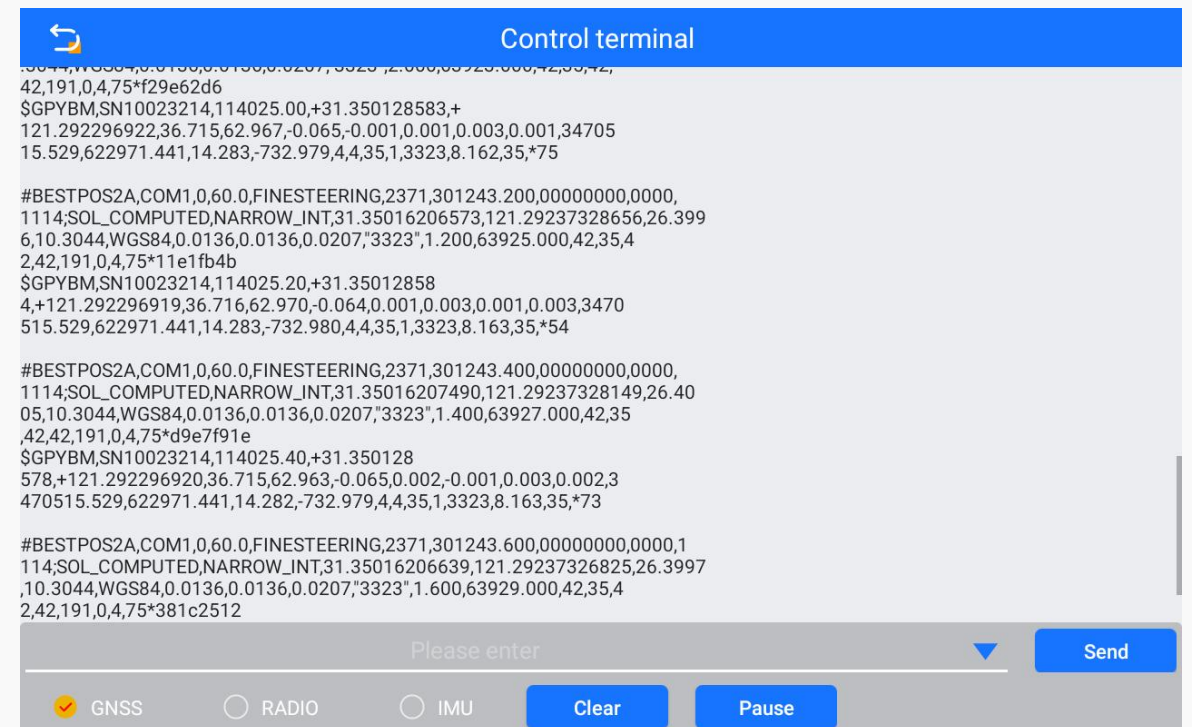
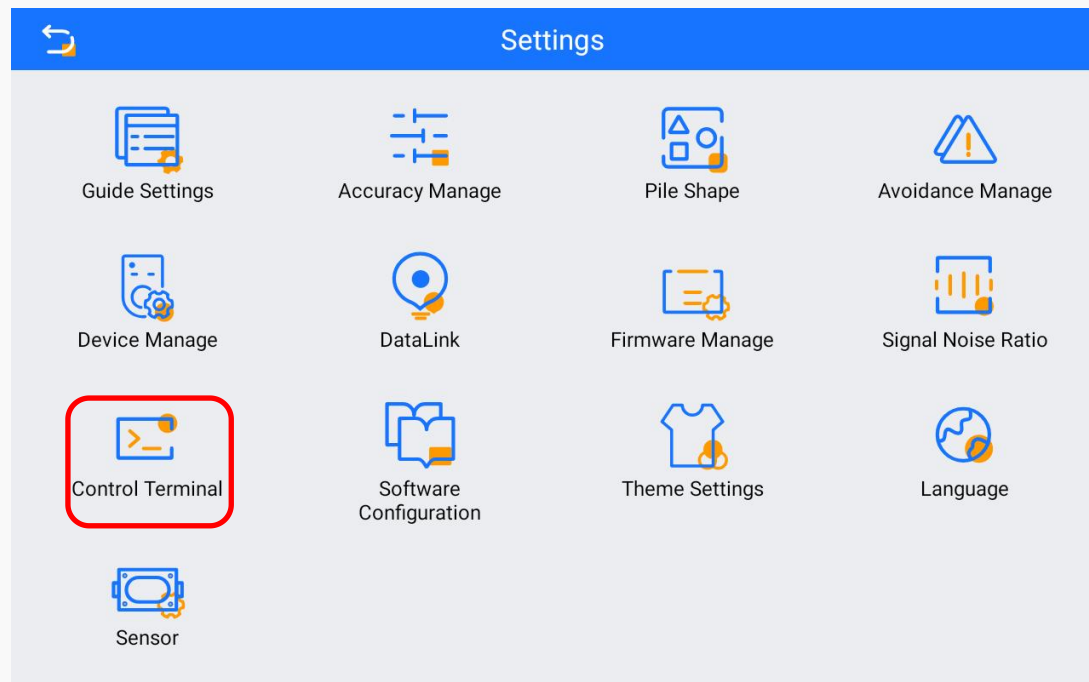
- Click the icon  at the bottom right corner of the main interface, select "Settings", and then click "Signal Noise Ratio";
- View satellite information retrieved from the tablet (including: SV, azimuth, pitch, and frequency band).



Signal noise ratio								
No.	SV	Azimuth	Pitch	L1	L2	L5	B1C	B2A
1	G10	320	57	49	31	0	-	-
2	G12	108	41	44	0	0	-	-
3	G15	90	19	37	0	0	-	-
4	G18	198	18	40	0	0	-	-
5	G23	147	74	47	34	0	-	-
6	G24	43	38	43	28	0	-	-
7	G25	154	37	42	0	0	-	-
8	G28	235	23	39	0	0	-	-
9	G32	303	34	46	0	0	-	-
10	S13	139	29	40	29	0	-	-
11	S14	179	25	40	0	0	-	-
12	S15	95	75	45	33	0	-	-
13	S18	169	53	38	32	0	-	-
14	C01	140	46	43	38	36	0	0
15	C02	239	39	39	37	33	0	0
16	C03	201	53	44	39	36	0	0
17	C04	122	35	40	37	33	0	0
18	C05	257	16	36	35	31	0	0
19	C06	240	62	45	39	38	0	0
20	C08	90	87	46	41	39	0	0
21	C09	232	48	43	39	35	0	0
22	C13	323	77	48	40	39	0	0

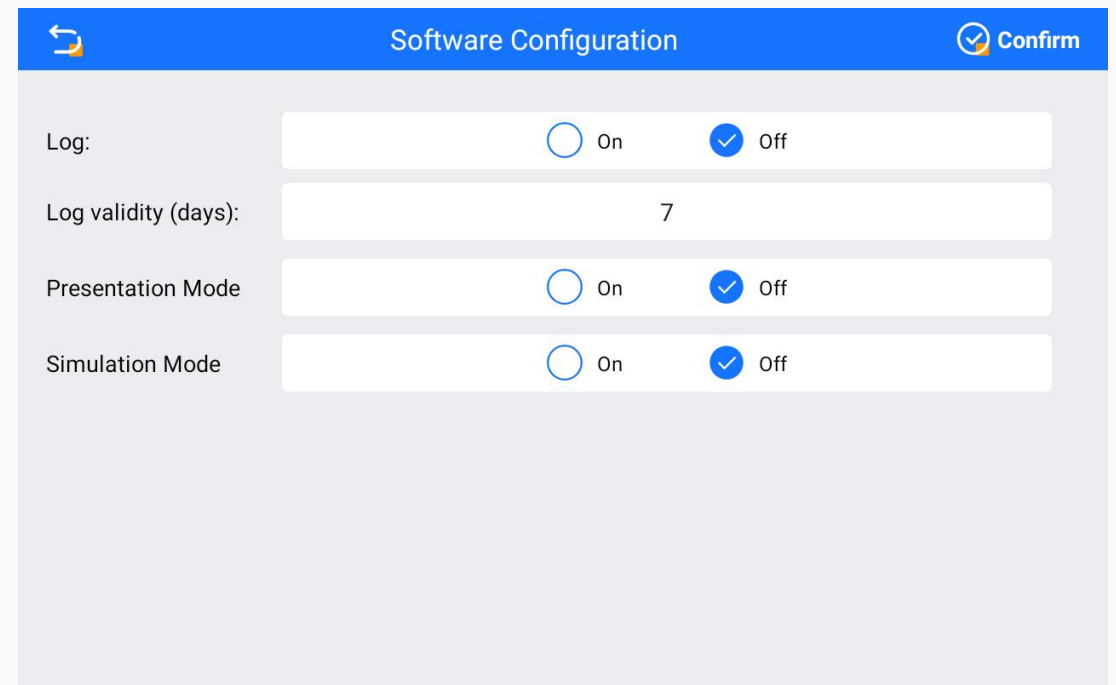
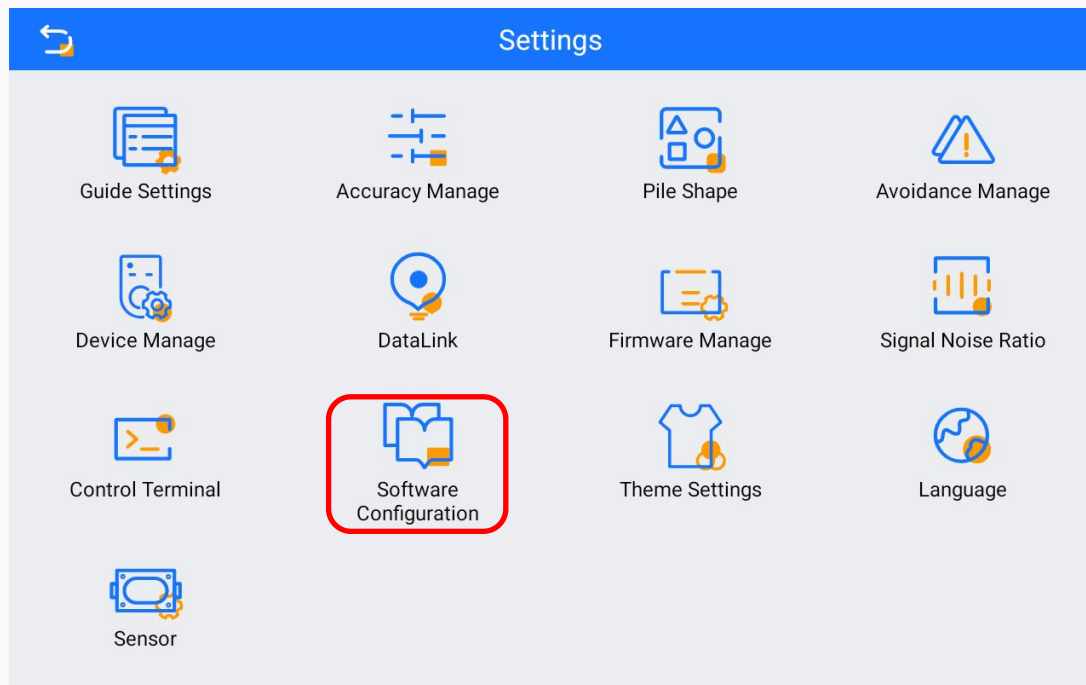
5.9 Control Terminal

- Click the icon  at the bottom right corner of the main interface, select "Settings", and then click "Control Terminal";
- The "Control Terminal" function allows for the viewing of message data or the sending of command instructions to the tablet.



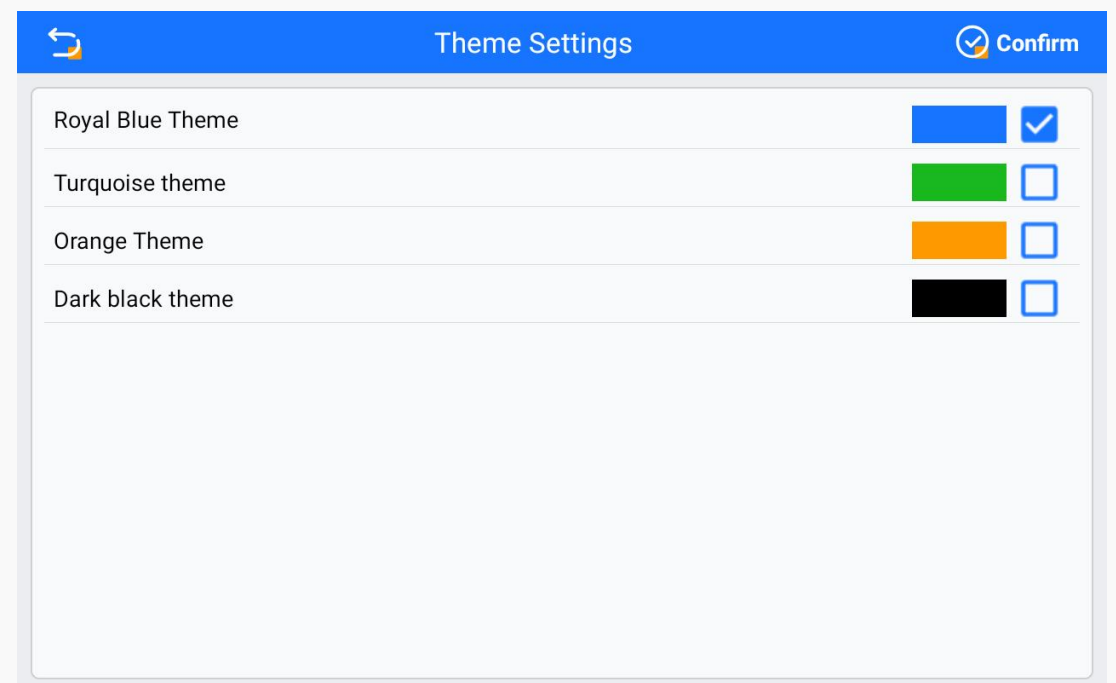
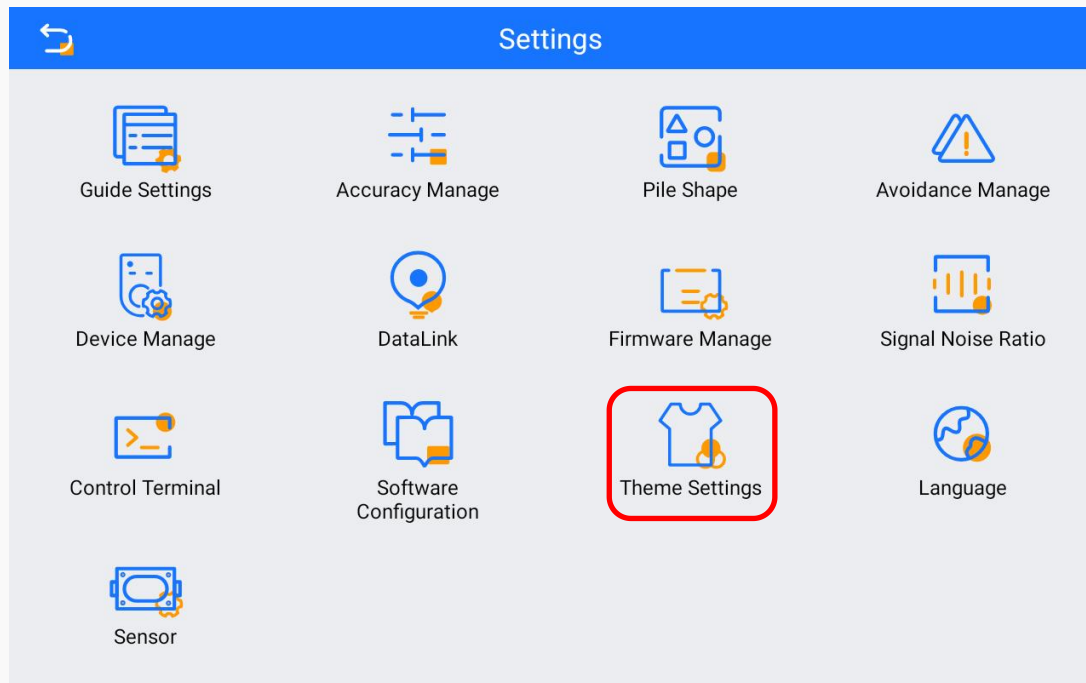
5.10 Software Configuration

- Click the icon  at the bottom right corner of the main interface, select "Settings", and then click "Software Configuration";
- You can choose to turn on the presentation mode and simulation mode switches on this interface for simulation demonstration;
- Turn on the log switch to record the programs used by the software for checking or fixing vulnerabilities, with a default recording period of 7 days.



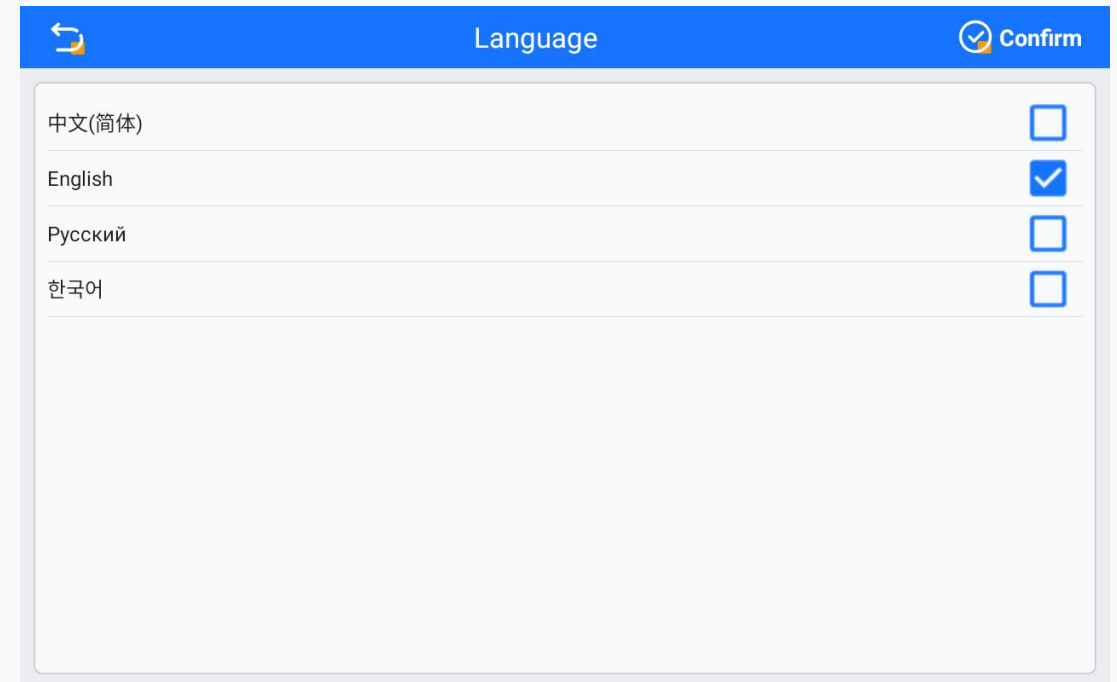
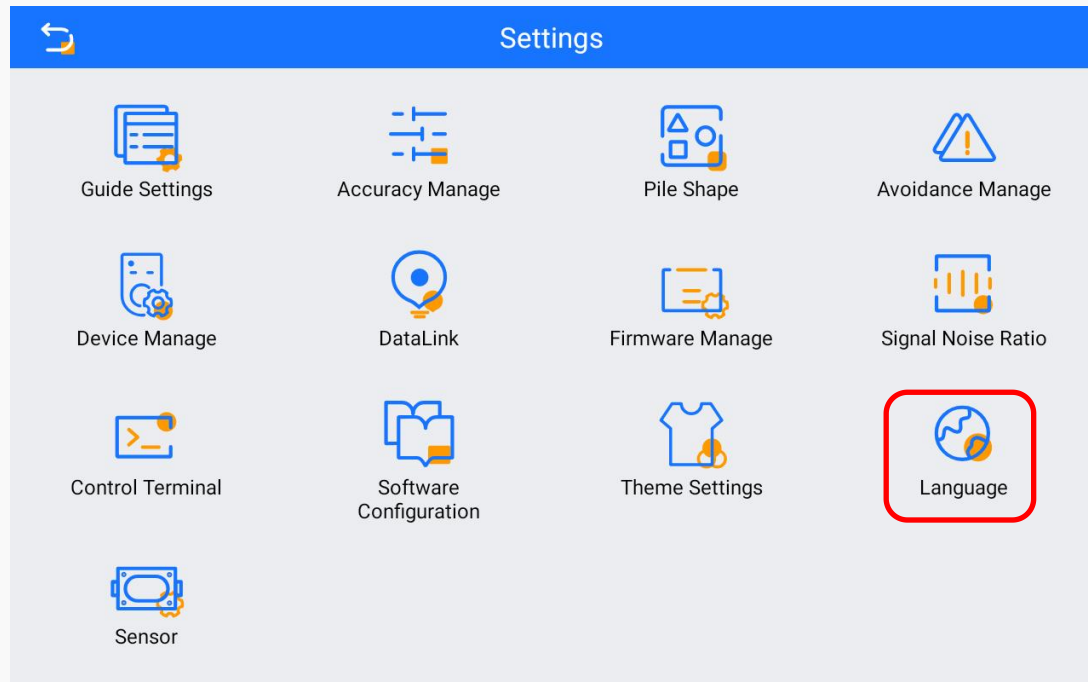
5.11 Theme Settings

- Click on the icon  in the bottom right corner of the main interface, select "Settings", and click on "Theme Settings" and select the corresponding theme according to your needs.



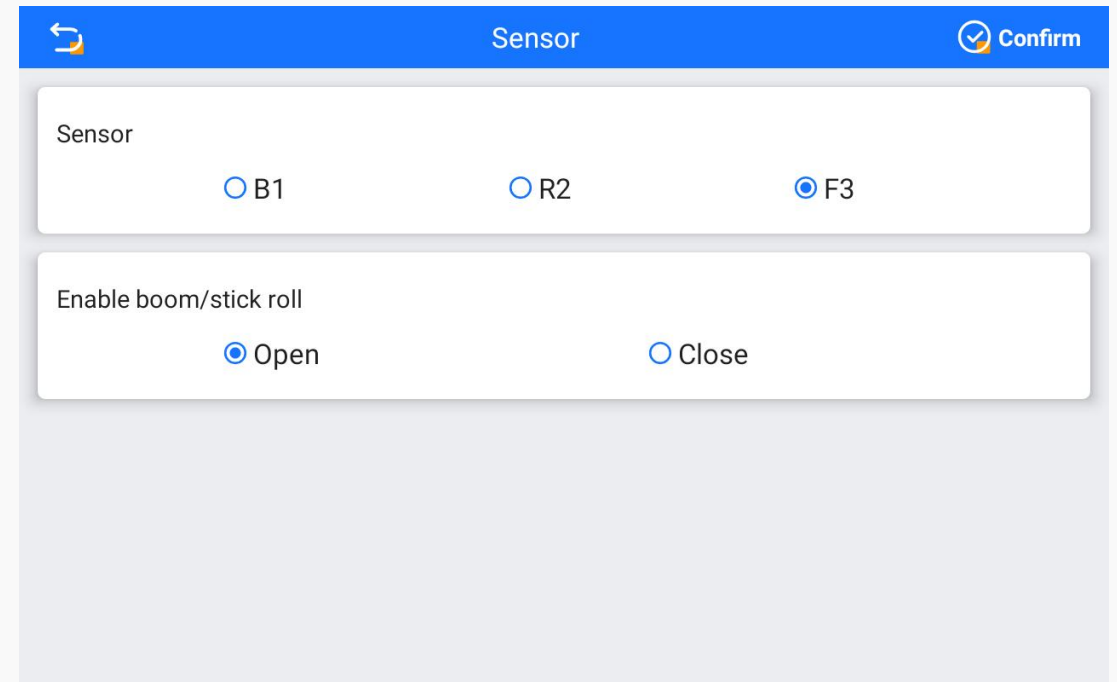
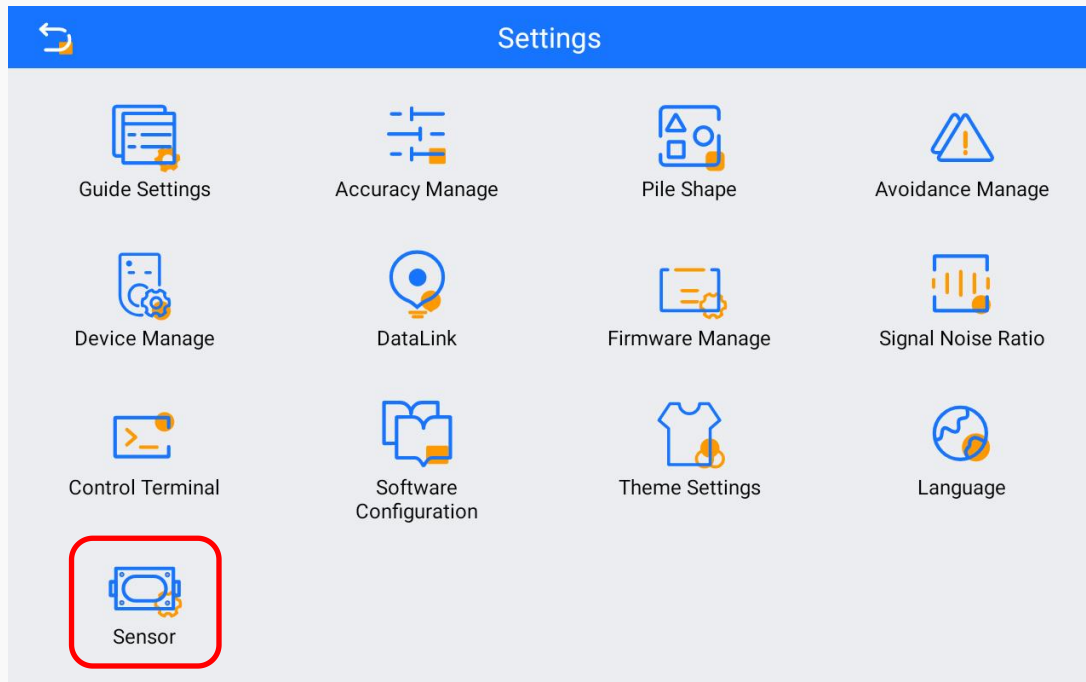
5.12 Language

- Click on the icon  in the bottom right corner of the main interface, select "Settings", and click on "Language" and select the corresponding language according to your needs.



5.13 Sensor

- Click on the icon  in the bottom right corner of the main interface, select "Settings", click on "Sensor", and choose the corresponding sensor type based on the actual sensor. (Note: Set B1, R2, F3 to correspond with the actual sensor).

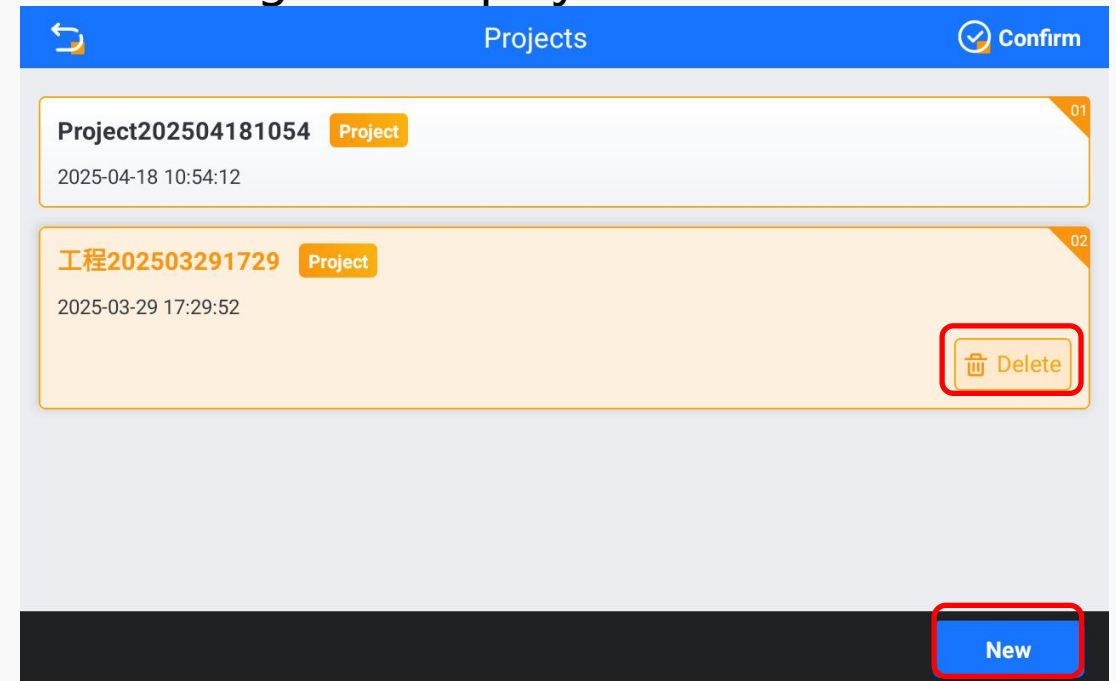
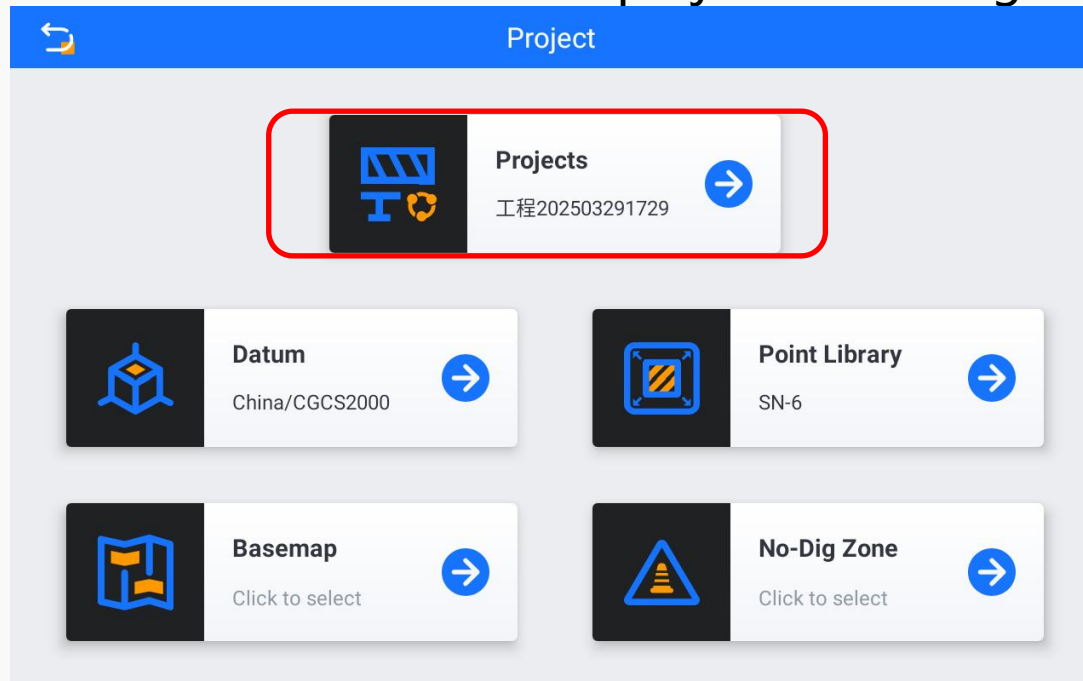




Create Project

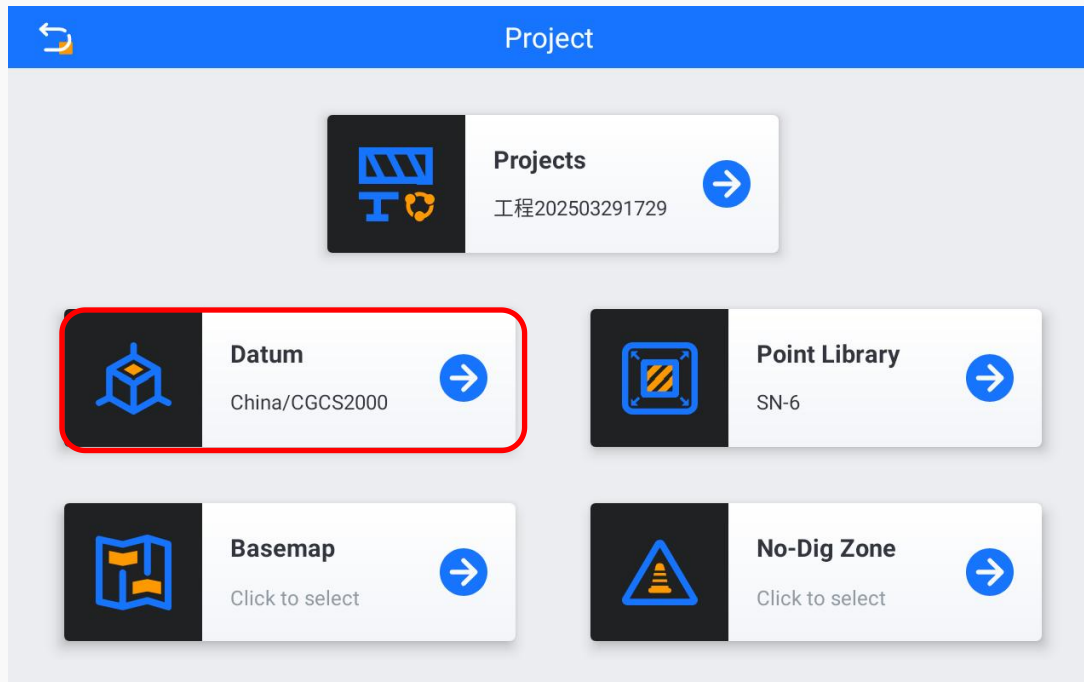
6.1 Project Management

- Click the icon in the lower right corner of the main interface  and select "Project", enter the project management page.
- Click on "Projects" to select and enter the project list page.
- On the project list page, you can create, delete, and apply projects.
- When selecting a project, the coordinate system, point library, base map, No-Dig zone and other information related to the project will change with the change of the project



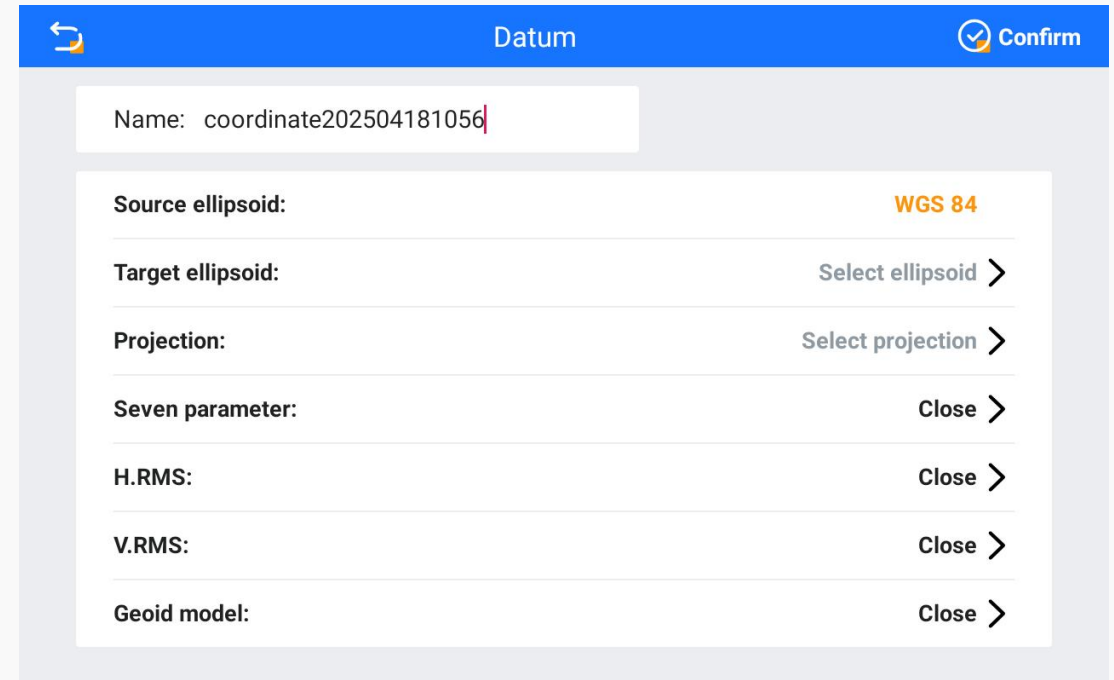
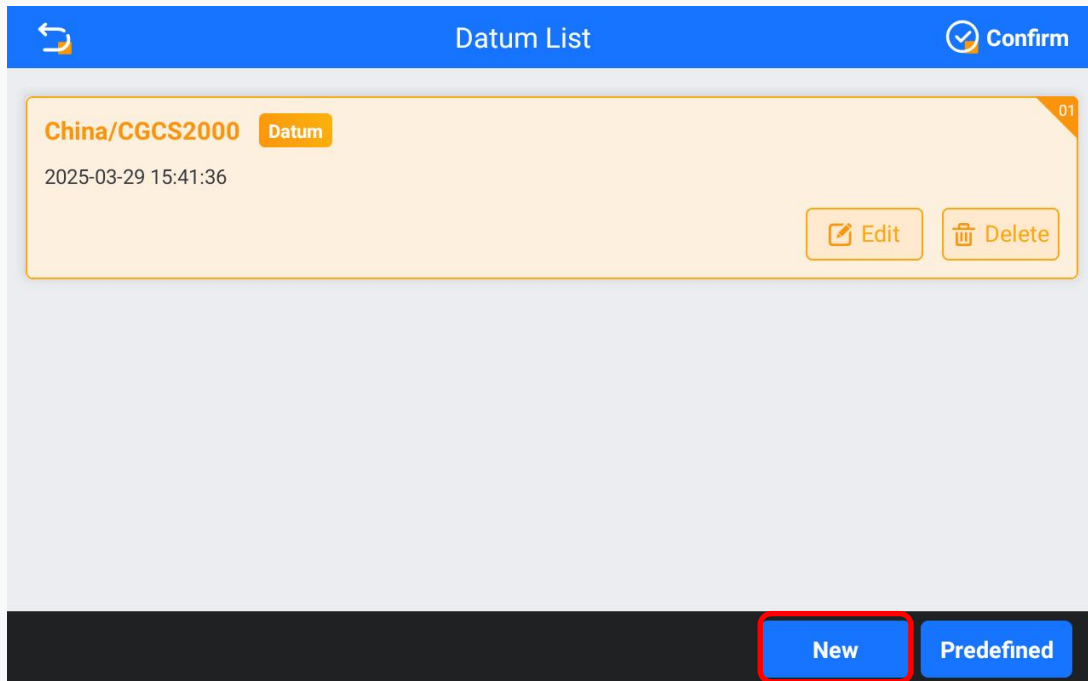
6.2 Coordinate System

- Select "Project", and click on "Datum" to edit the datum parameters according to the job requirements.
- The red box in the figure shows the datum applied in the current project;
- Click on "Datum Store" to create a new datum or select a predefined datum.



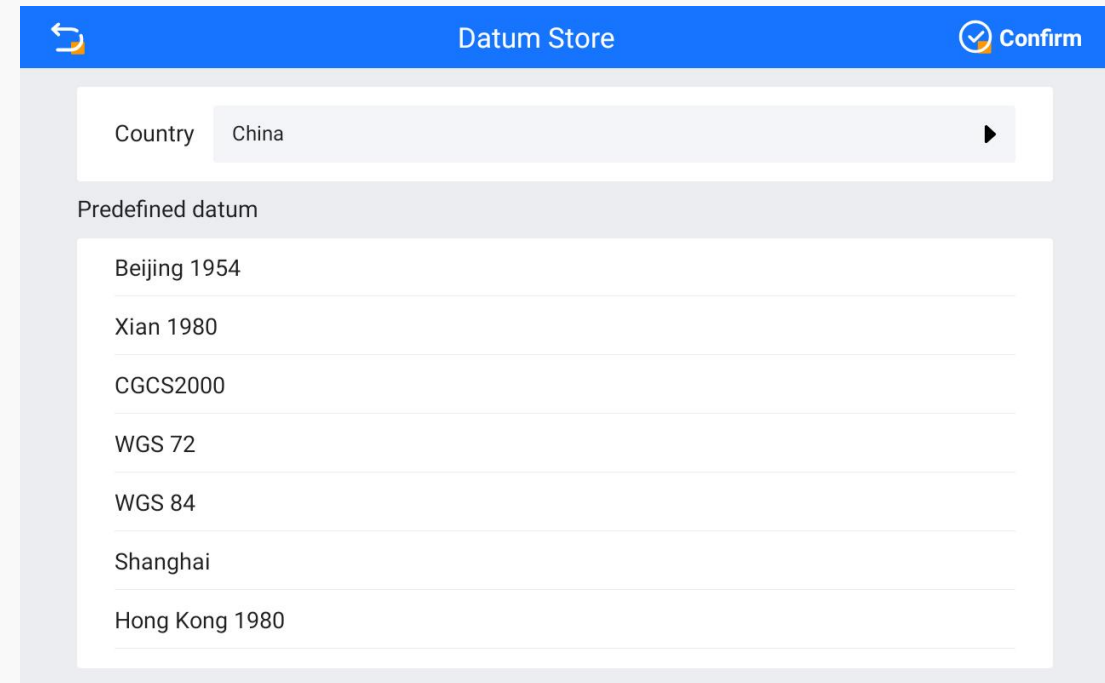
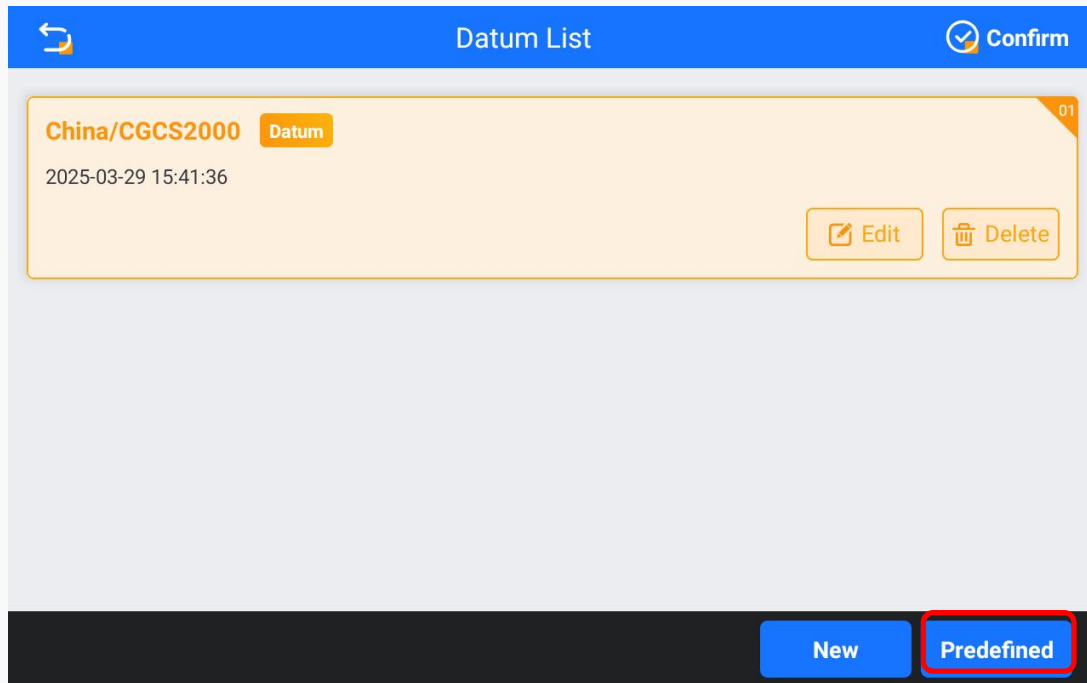
6.2.1 Create Datum

- Select "Project", and click on "Datum";
- Click on "Datum List" again and select 'New';
- According to the actual project requirements, set parameters such as target ellipsoid and projection, click "Confirm", and complete the creation of a new datum.



6.2.2 Select Predefined Datum

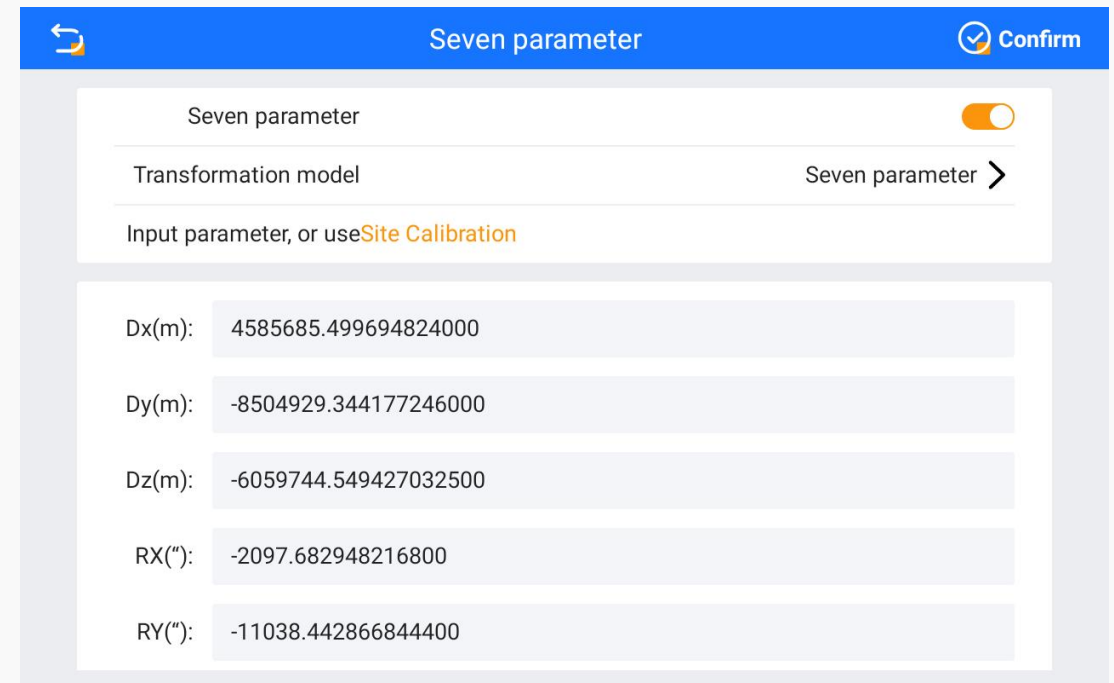
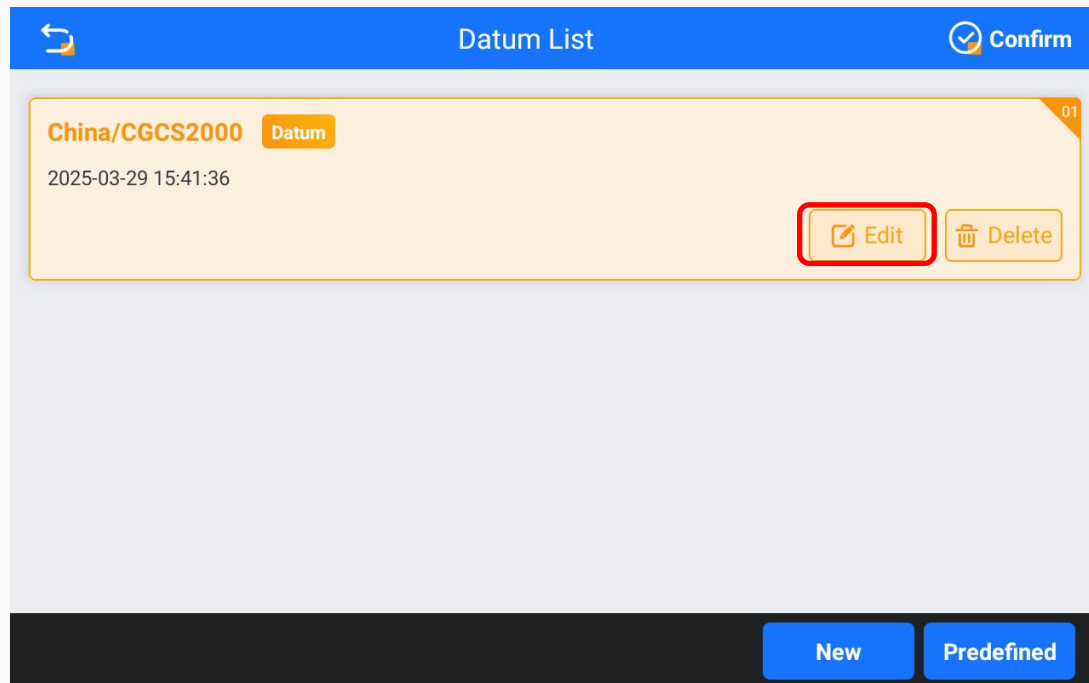
- Select "Project", and click on "Datum";
- Click on "Datum List" again and select "Predefined";
- Select the corresponding datum for different regions according to the actual project requirements, and click "Confirm" to complete the creation of a new datum.



Note: The datum generated by creating and selecting predefined will appear in the datum list and can be selected when creating a new project.

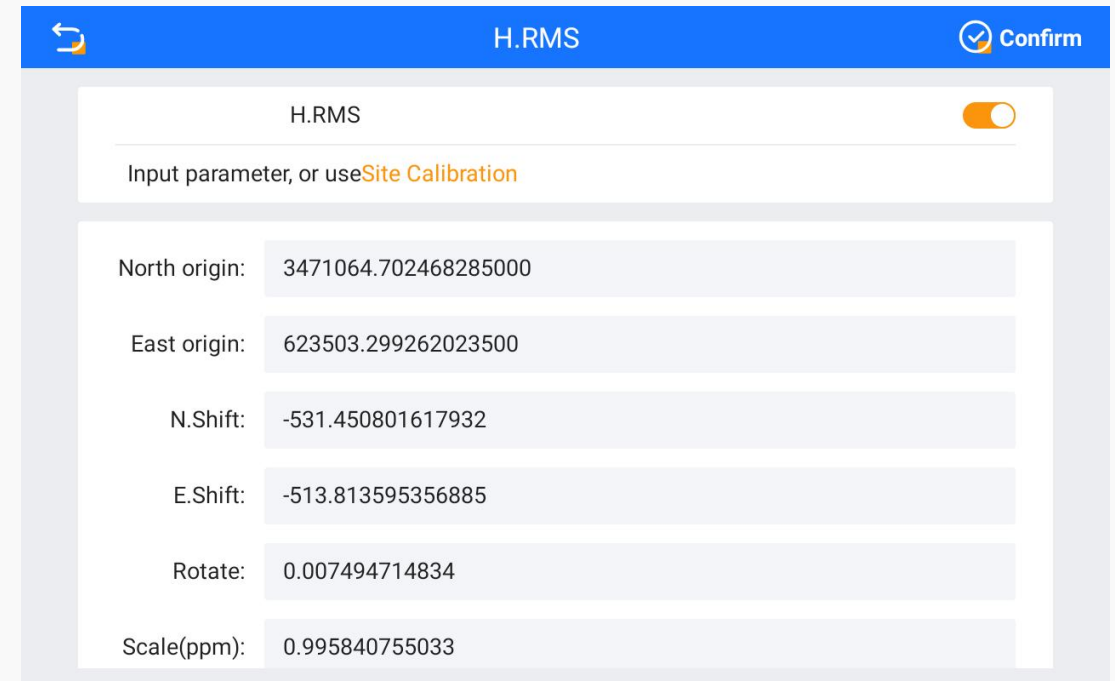
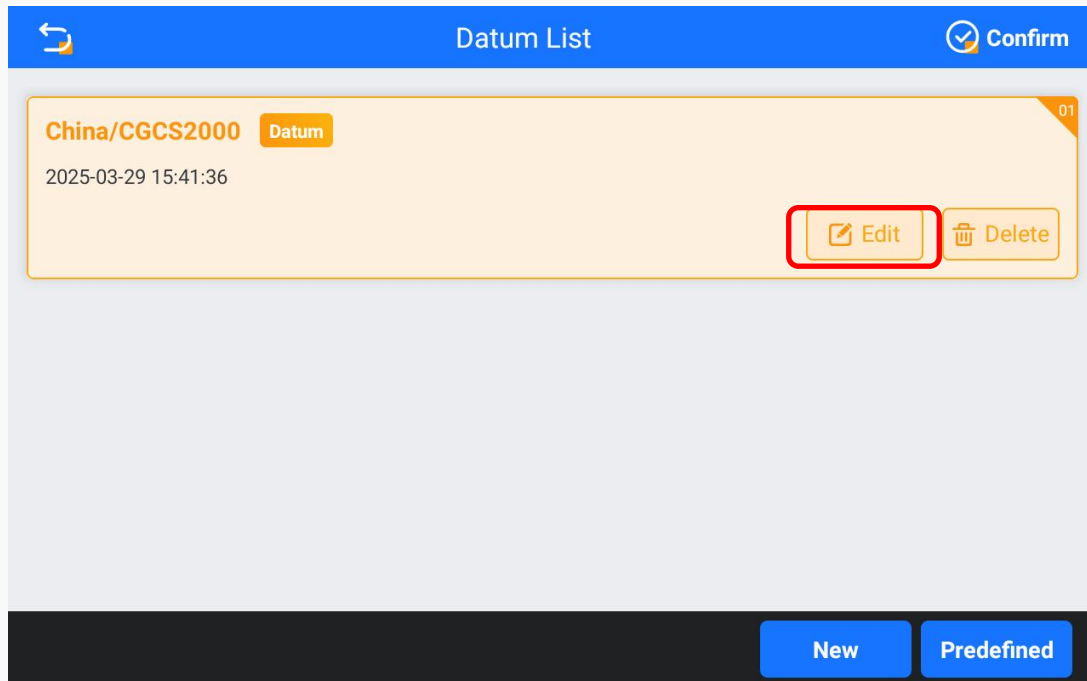
6.2.3 Seven Parameter

- Select "Project", and click on "Datum"; click on "Datum List" again and select "Predefined";
- Click "Edit" to open the seven parameter switch, where you can directly input the calculated parameters or select parameter calculation;
- Click on "Seven Parameter" to add at least three pairs of control points and measurement points. Click "Calculate" to complete the parameter calculation, and click "Confirm" to apply it to the project.
- The seven parameters are suitable for large-scale coordinate conversion, generally greater than or equal to 30 square kilometers.



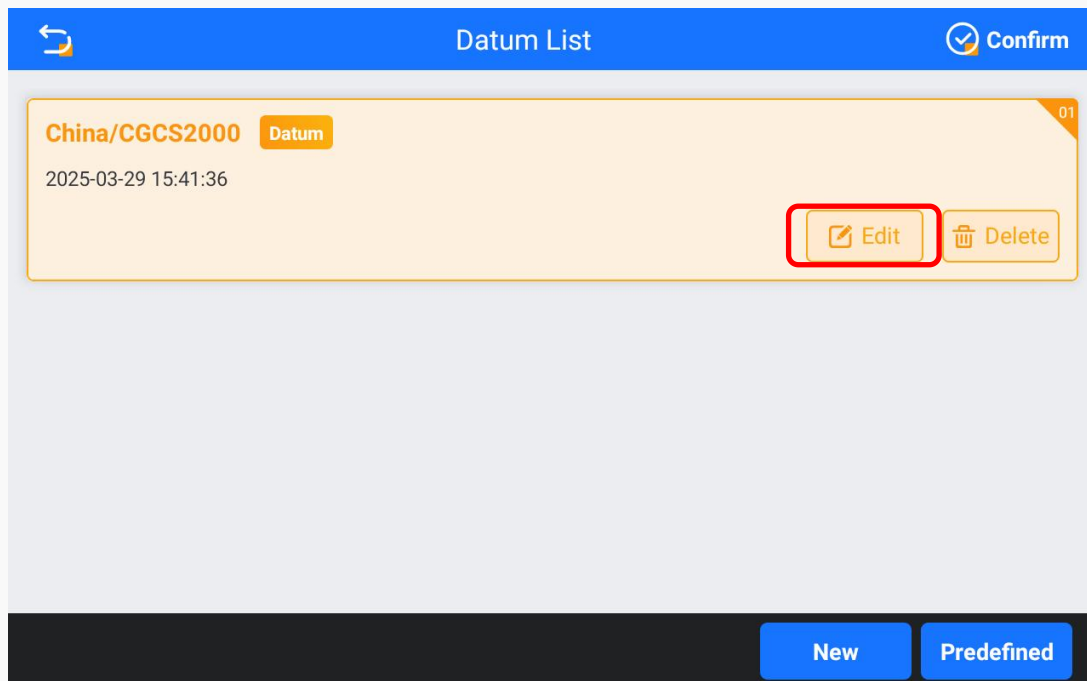
6.2.4 Plane Correction

- Select "Project", and click on "Datum"; click on "Datum List" again and select "Predefined";
- Click "Edit" to open the plane correction switch, where you can directly input the calculated parameters or select parameter calculation;
- Click on "H.RMS" to add at least three pairs of control points and measurement points. Click "Calculate" to complete the parameter calculation, and click "Confirm" to apply it to the project.
- Plane correction is suitable for small-scale coordinate conversion, generally not exceeding 30 square kilometers.



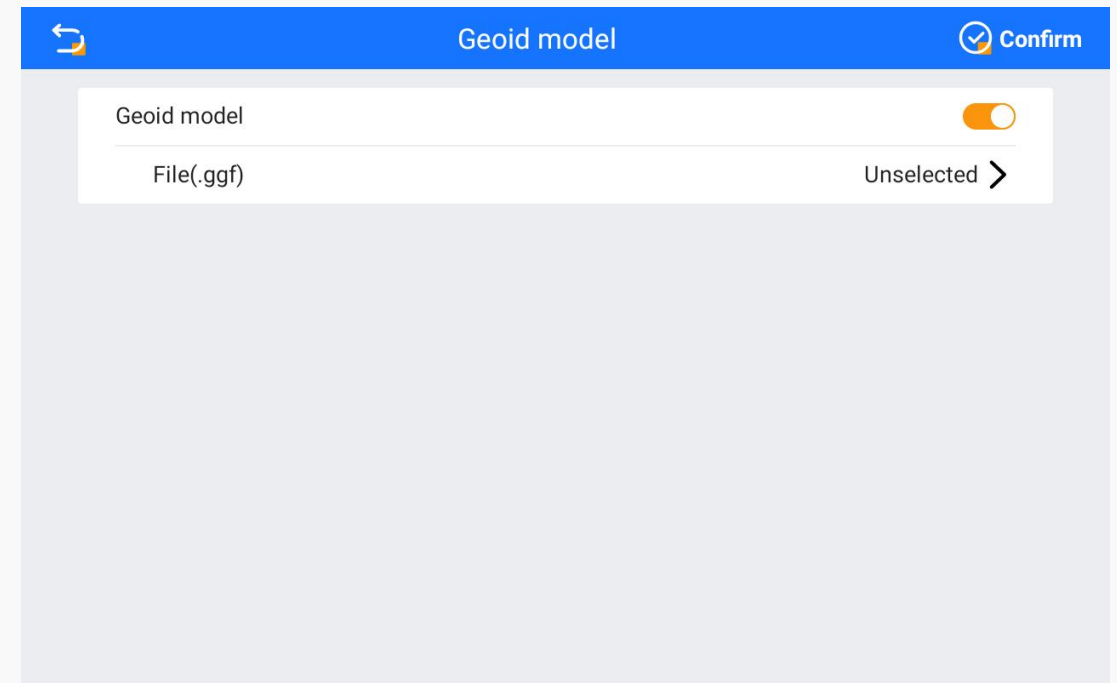
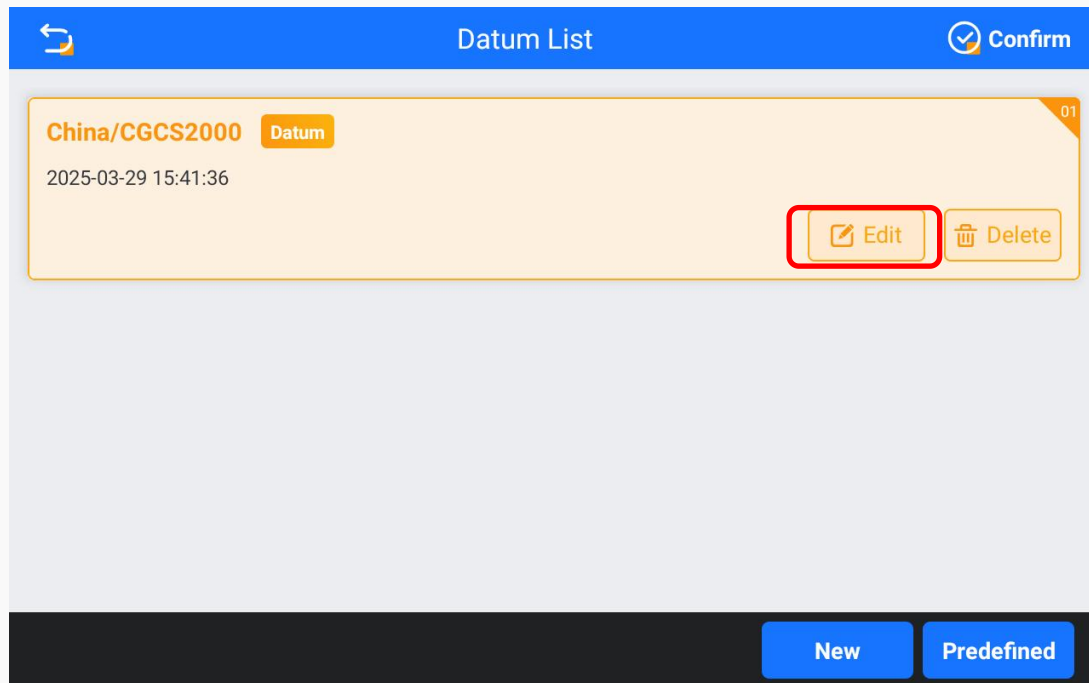
6.2.5 Elevation Fitting

- Select "Project", and click on "Datum"; click on "Datum List" again and select "Predefined";
- Click "Edit" to open the elevation fitting switch, where you can directly input the calculated parameters or select parameter calculation;
- Click on "V.RMS" to add at least three pairs of control points and measurement points. Click "Calculate" to complete the parameter calculation, and click "Confirm" to apply it to the project.



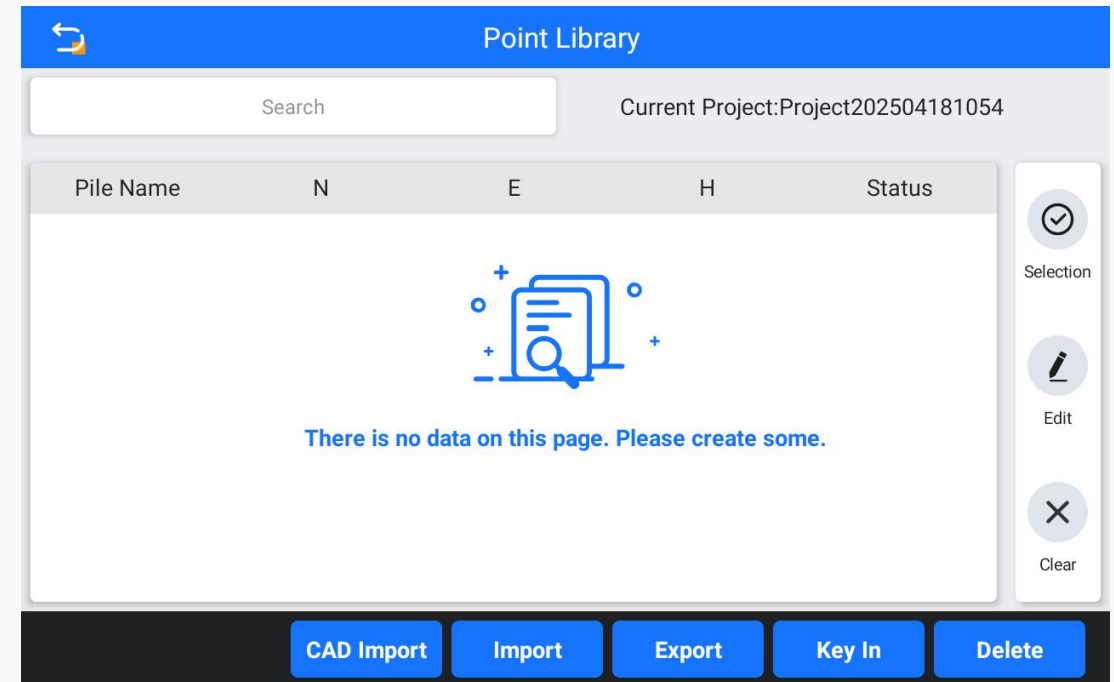
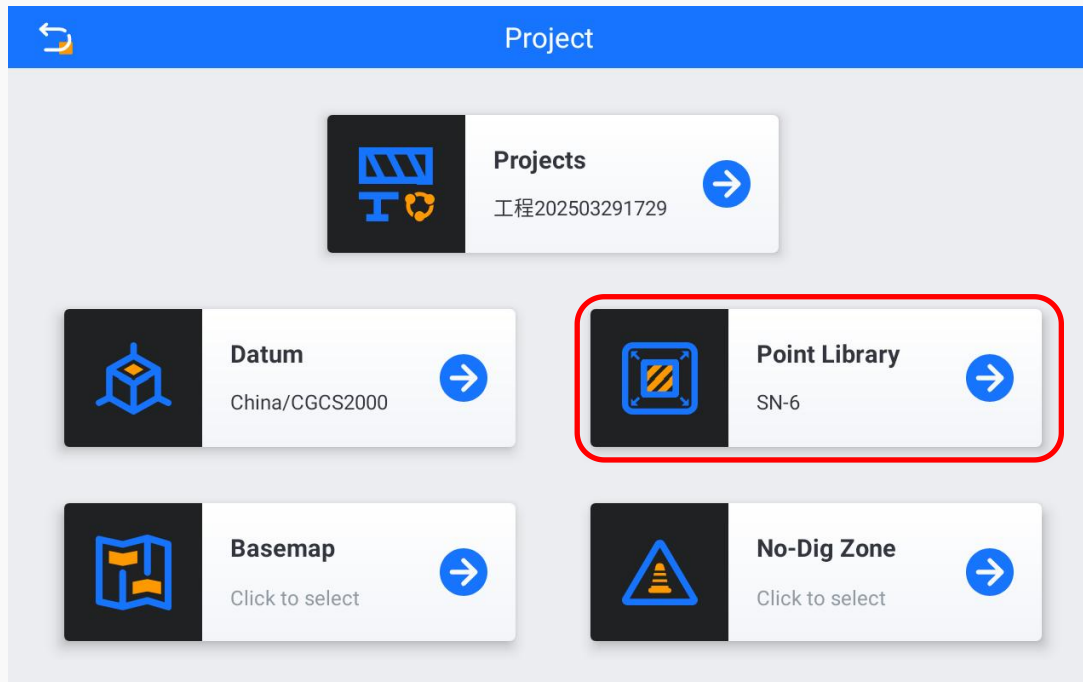
6.2.6 Geoid Model

- Select "Project", and click on "Datum"; click on "Datum List" again and select "Predefined";
- Click "Edit" to open the geoid model switch;
- Select the geoid model file based on the storage path of the geoid model file; Click "Confirm" to apply to the current project.
- The geoid model is a ggf file.



6.3 Pile Point Library

- Click the "Point Library" button to import, export, key in, edit, delete and other operations on pile point files.



6.3.1 CAD Import

- Click the "CAD Import" button to enter the pile point CAD file selection interface.
- When importing CAD, you can choose between two file formats: DXF and DWG, and the DXF file can be displayed as a base map.
- Users can import a single point or all points.
- The imported pile points will be displayed in the pile point library and the main interface.

Point Library

Search

Current Project: Project202504181054

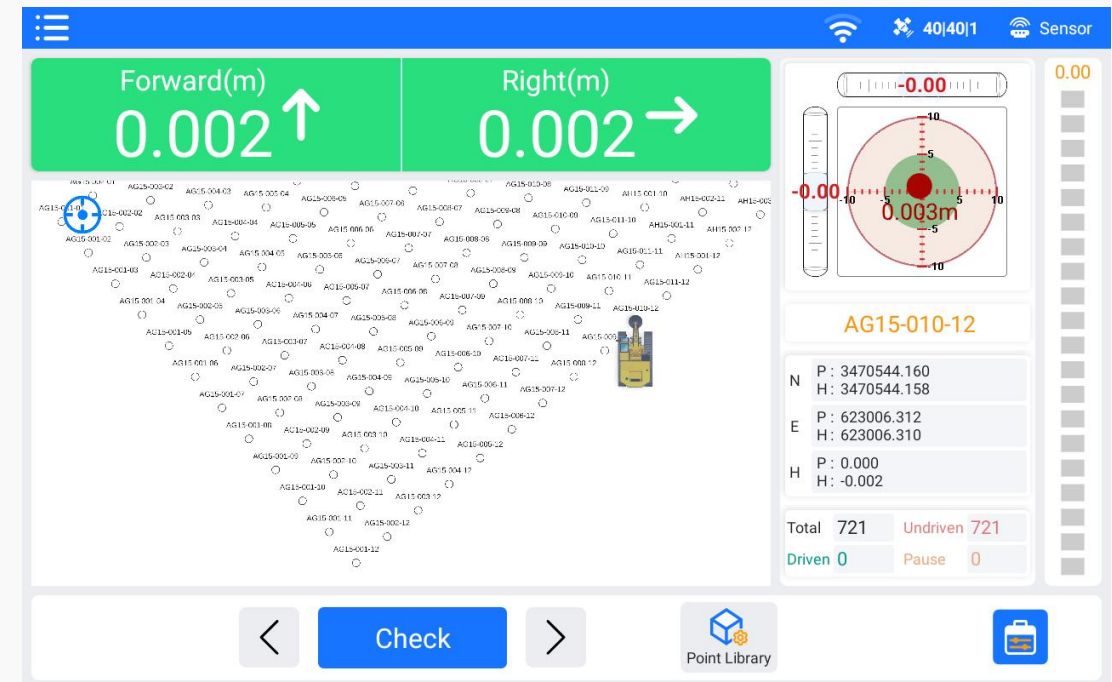
Pile Name	N	E	H	Status
AG15-001-01	3470554.706	622946.114	0.000	unpiled
AG15-001-02	3470551.449	622948.922	0.000	unpiled
AG15-001-03	3470548.193	622951.731	0.000	unpiled
AG15-001-04	3470544.937	622954.539	0.000	unpiled
AG15-001-05	3470541.680	622957.347	0.000	unpiled
AG15-001-06	3470538.424	622960.155	0.000	unpiled
AG15-001-07	3470535.168	622962.964	0.000	unpiled
AG15-001-08	3470531.911	622965.772	0.000	unpiled

Selection

Edit

Clear

CAD Import Import Export Key In Delete



6.3.2 Text Import

- Click the "Import" button to enter the selection interface of the pile point text file.
- When importing, you can choose between two file formats: CSV and TXT.
- The imported pile points will be displayed in the pile point library and main interface

Point Library

Search

Current Project:Project202504181054

Pile Name	N	E	H	Status
AG15-001-01	3470554.706	622946.114	0.000	unpiled
AG15-001-02	3470551.449	622948.922	0.000	unpiled
AG15-001-03	3470548.193	622951.731	0.000	unpiled
AG15-001-04	3470544.937	622954.539	0.000	unpiled
AG15-001-05	3470541.680	622957.347	0.000	unpiled
AG15-001-06	3470538.424	622960.155	0.000	unpiled
AG15-001-07	3470535.168	622962.964	0.000	unpiled
AG15-001-08	3470531.911	622965.772	0.000	unpiled

Selection

Edit

Clear

CAD Import

Import

Export

Key In

Delete

Data import

Data format

Name,Code,N,E,Z(.csv)

Name,Code,N,E,Z(.txt)

Name,Code,E,N,Z(.csv)

Name,Code,E,N,Z(.txt)

Name,N,E,Z(.csv)

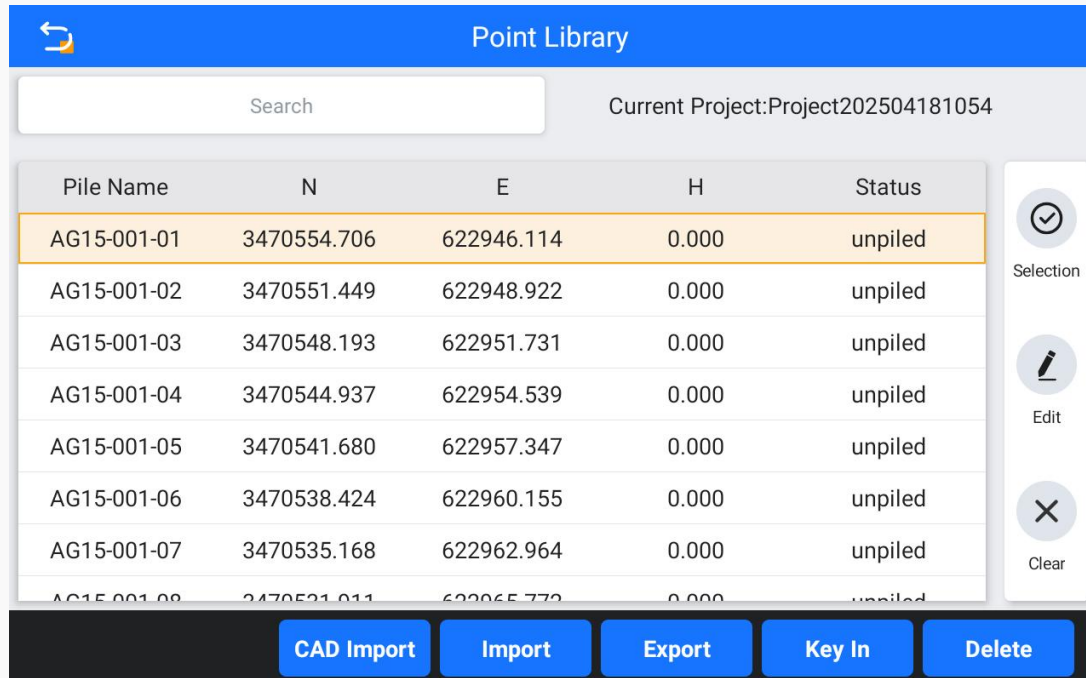
Name,N,E,Z(.txt)

Name,E,N,Z(.csv)

Name,E,N,Z(.txt)

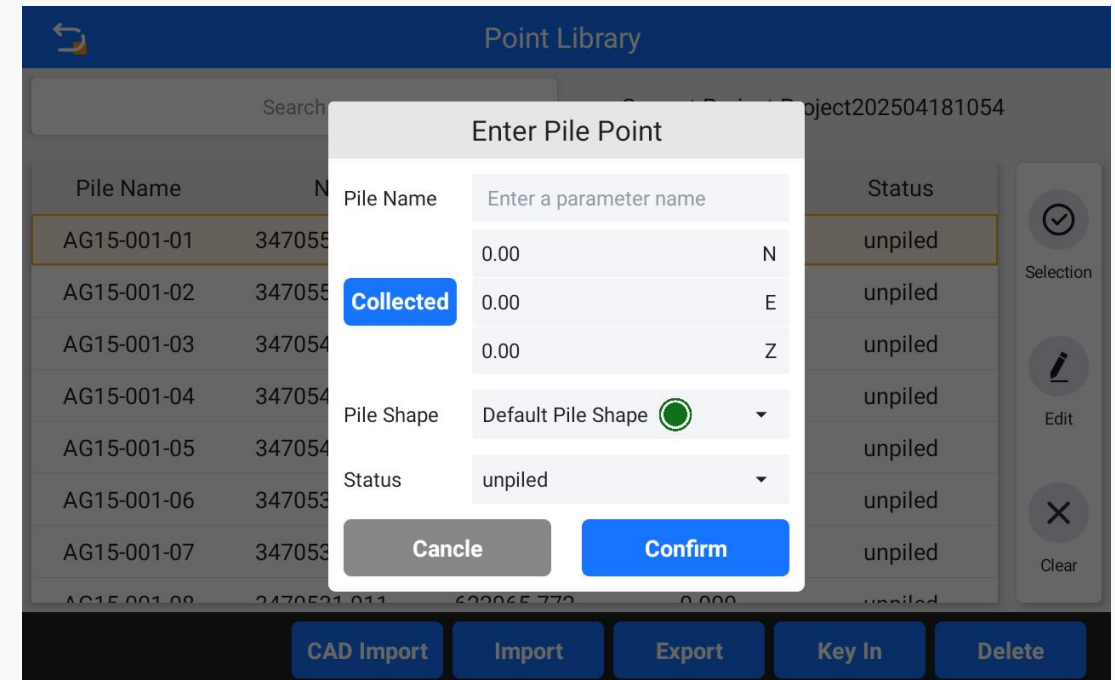
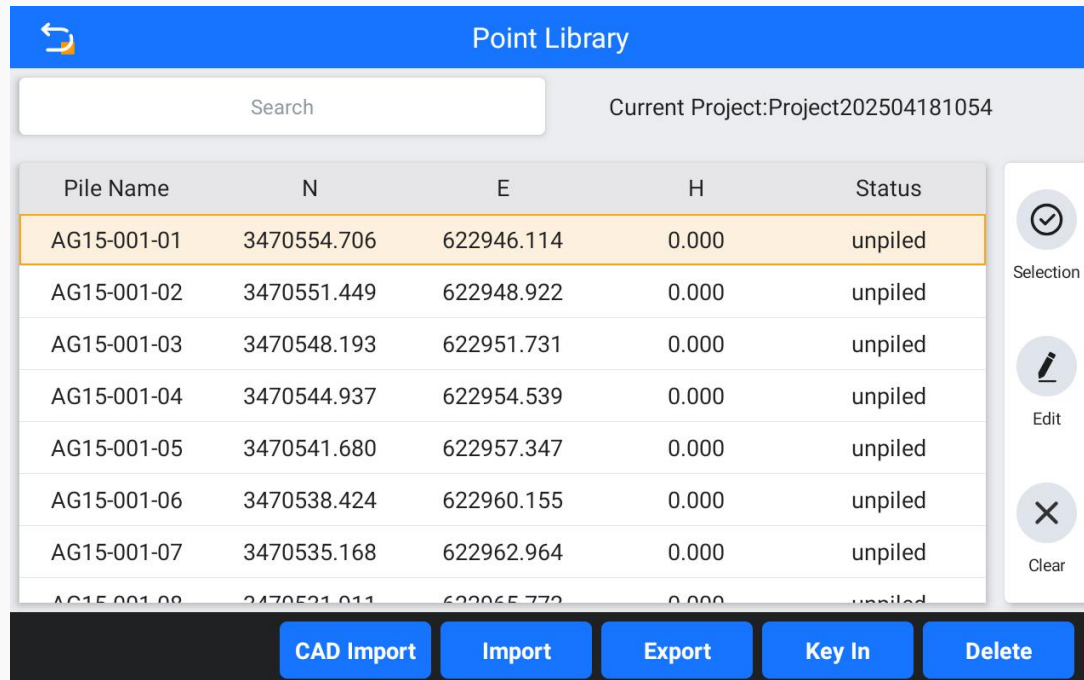
6.3.3 Export

- Click the "Export " button to enter the pile driving result data time selection interface.
- Users can choose between two export formats: "Export All" and "Export by Time".
- "Export All" can export all the pile point information.
- "Export by Time" defaults to exporting result data in days.



6.3.4 Key in

- Click "Key in" and enter the pile name, pile point coordinates, pile shape, and pile point status (piled/unpiled) in sequence. Click 'Confirm' to complete the pile point typing.
- The typed pile point information is displayed in the last column of the pile point library.
- When entering the coordinate information of the pile point, you can choose to manually input or click "Collected" to directly collect the coordinates of the point where the main antenna is located.



6.3.5 Delete

- Click the "Delete" button to enter the pile point deletion interface.
- Select the pile point to be deleted and click the "Delete" button to delete the pile point.
- Click "Undo" can cancel the selected points, but deleted pile points cannot be restored.

Point Library					
Search		Current Project:Project202504181054			
Pile Name	N	E	H	Status	
AG15-001-01	3470554.706	622946.114	0.000	unpiled	Selection
AG15-001-02	3470551.449	622948.922	0.000	unpiled	
AG15-001-03	3470548.193	622951.731	0.000	unpiled	
AG15-001-04	3470544.937	622954.539	0.000	unpiled	Edit
AG15-001-05	3470541.680	622957.347	0.000	unpiled	
AG15-001-06	3470538.424	622960.155	0.000	unpiled	
AG15-001-07	3470535.168	622962.964	0.000	unpiled	
AG15-001-08	3470531.911	622965.772	0.000	unpiled	
AG15-001-09	3470528.655	622968.580	0.000	unpiled	

CAD Import

Import

Export

Key In

Delete

Pile position database delete					
Search		Current Project:Project202504181054			
	Pile Name	N	E	H	Status
☒	AG15-001-01	3470554.706	622946.114	0.000	unpiled
☐	AG15-001-02	3470551.449	622948.922	0.000	unpiled
☐	AG15-001-03	3470548.193	622951.731	0.000	unpiled
☐	AG15-001-04	3470544.937	622954.539	0.000	unpiled
☐	AG15-001-05	3470541.680	622957.347	0.000	unpiled
☐	AG15-001-06	3470538.424	622960.155	0.000	unpiled
☐	AG15-001-07	3470535.168	622962.964	0.000	unpiled
☐	AG15-001-08	3470531.911	622965.772	0.000	unpiled
☐	AG15-001-09	3470528.655	622968.580	0.000	unpiled

Undo

Delete

6.3.6 Selection, Edit, and Clear

Point Library

Search

Current Project:Project202504181054

Pile Name	N	E	H	Status
AG15-001-01	3470554.706	622946.114	0.000	unpiled
AG15-001-02	3470551.449	622948.922	0.000	unpiled
AG15-001-03	3470548.193	622951.731	0.000	unpiled
AG15-001-04	3470544.937	622954.539	0.000	unpiled
AG15-001-05	3470541.680	622957.347	0.000	unpiled
AG15-001-06	3470538.424	622960.155	0.000	unpiled
AG15-001-07	3470535.168	622962.964	0.000	unpiled
AG15-001-08	3470521.811	622965.772	0.000	unpiled

Selection

Edit

Clear

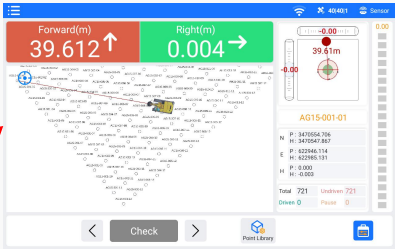
CAD Import

Import

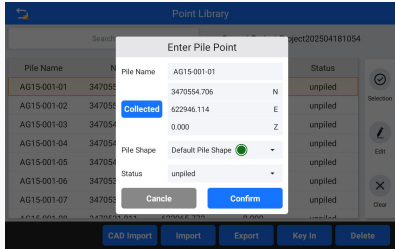
Export

Key In

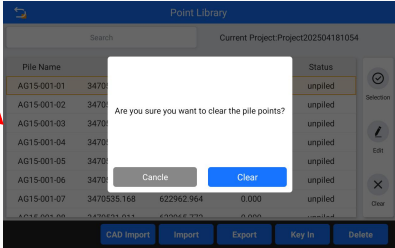
Delete



Selection: After selection, the pile driver will be directly guided to the selected pile point. (The selected pile point is the pile point shown in the red box)



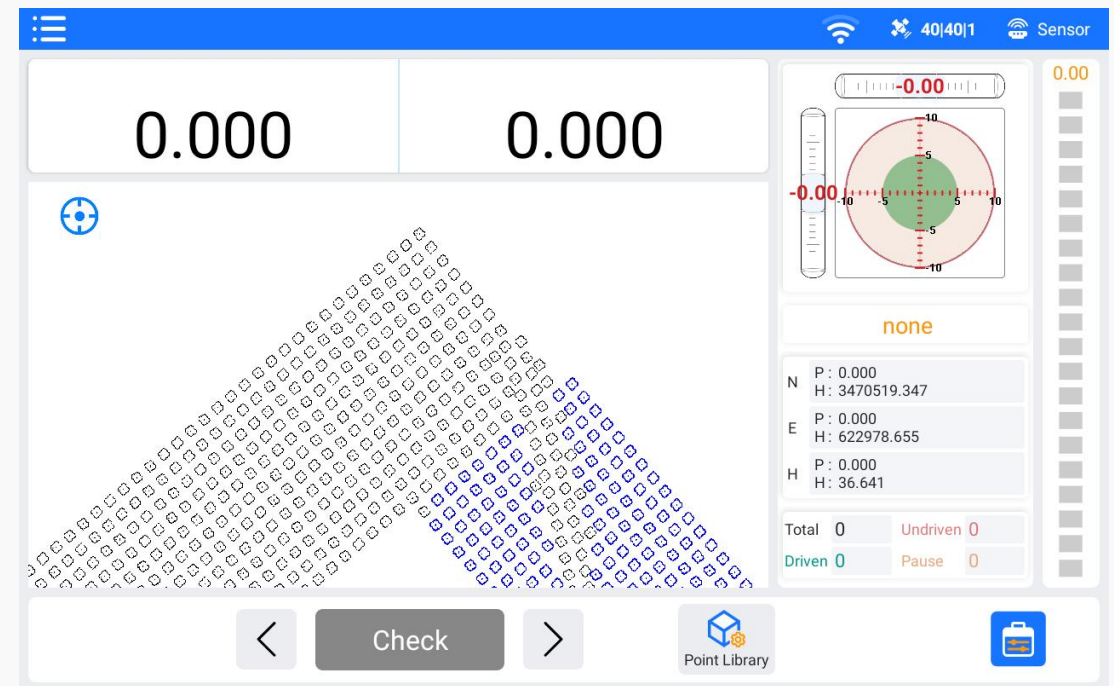
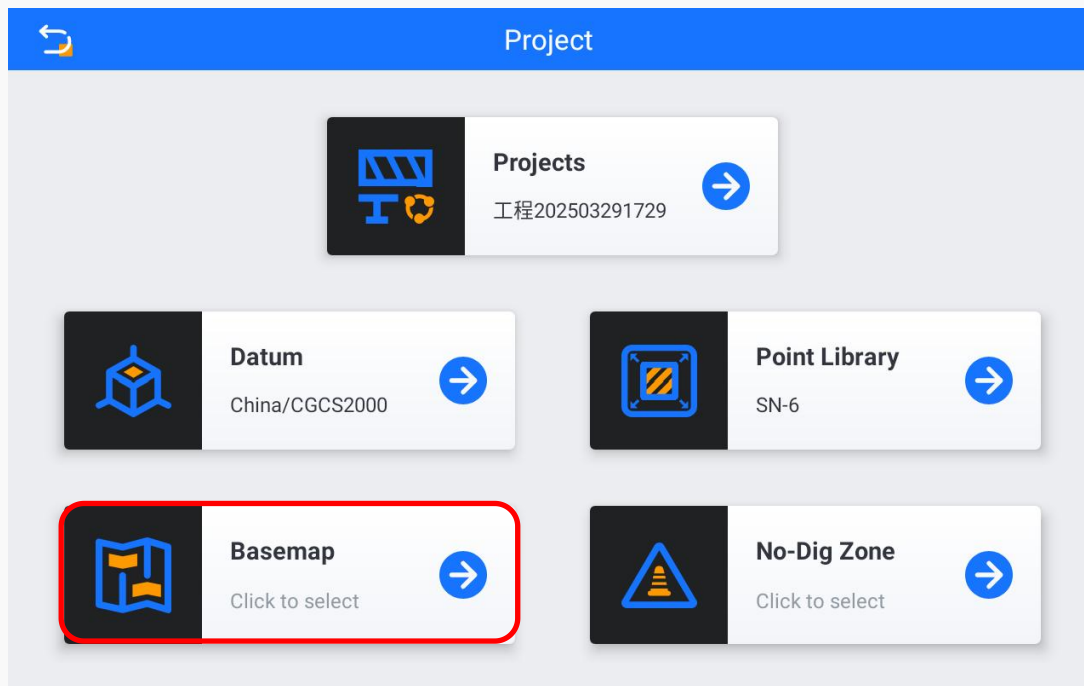
Edit: You can edit and modify the information of the pile points. (The selected pile point is the pile point shown in highlight)



Clear: Delete all pile points from the pile point library.

6.4 Basemap

- Click on "Basemap", select "Import", and choose the folder where the base map file (dxf) is located to import.
- The imported base map will be displayed on the main interface.

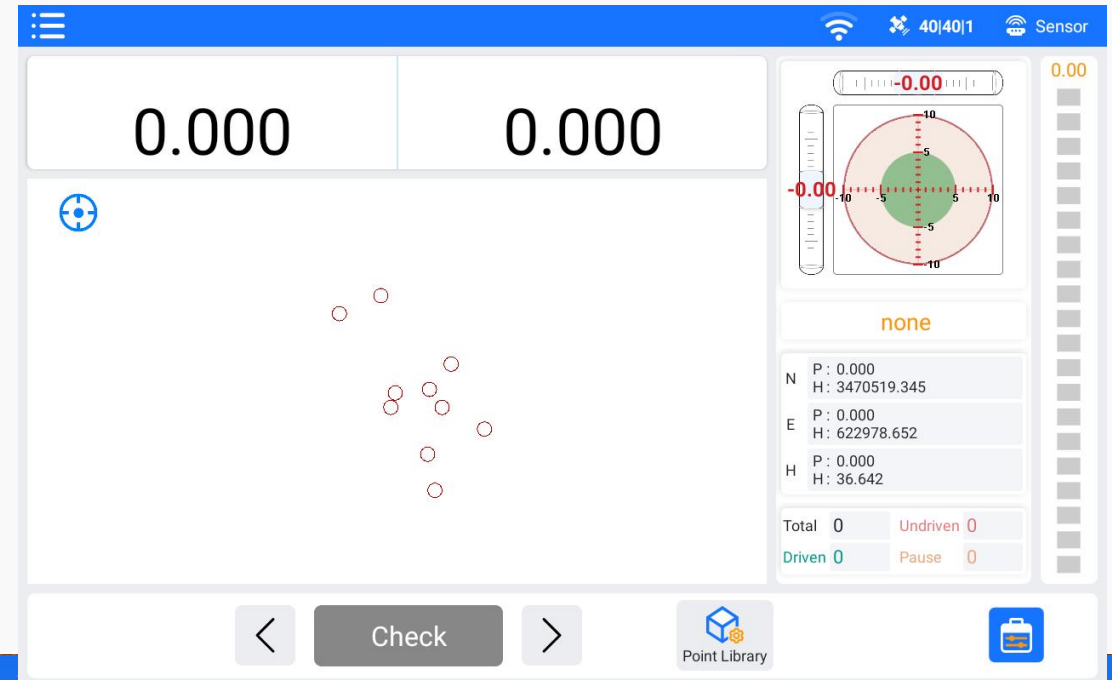
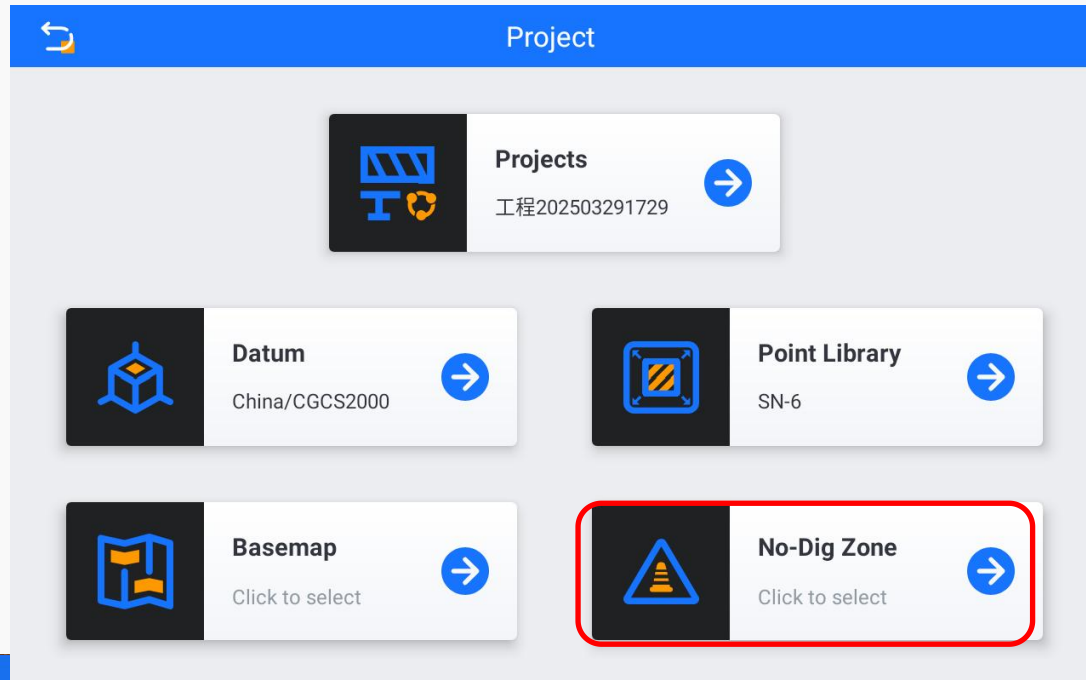


6.5 No-Dig Zone

- Click on "No-Dig Zone", select "Import", and choose the folder where the no-dig zone file is located to import.
- The imported no-dig zone will be displayed on the main interface.
- When the pile driver enters the no-dig zone, an alarm will be triggered.

Note: 1. When importing the no-dig zone, the no-dig zone files are CSV and XML;

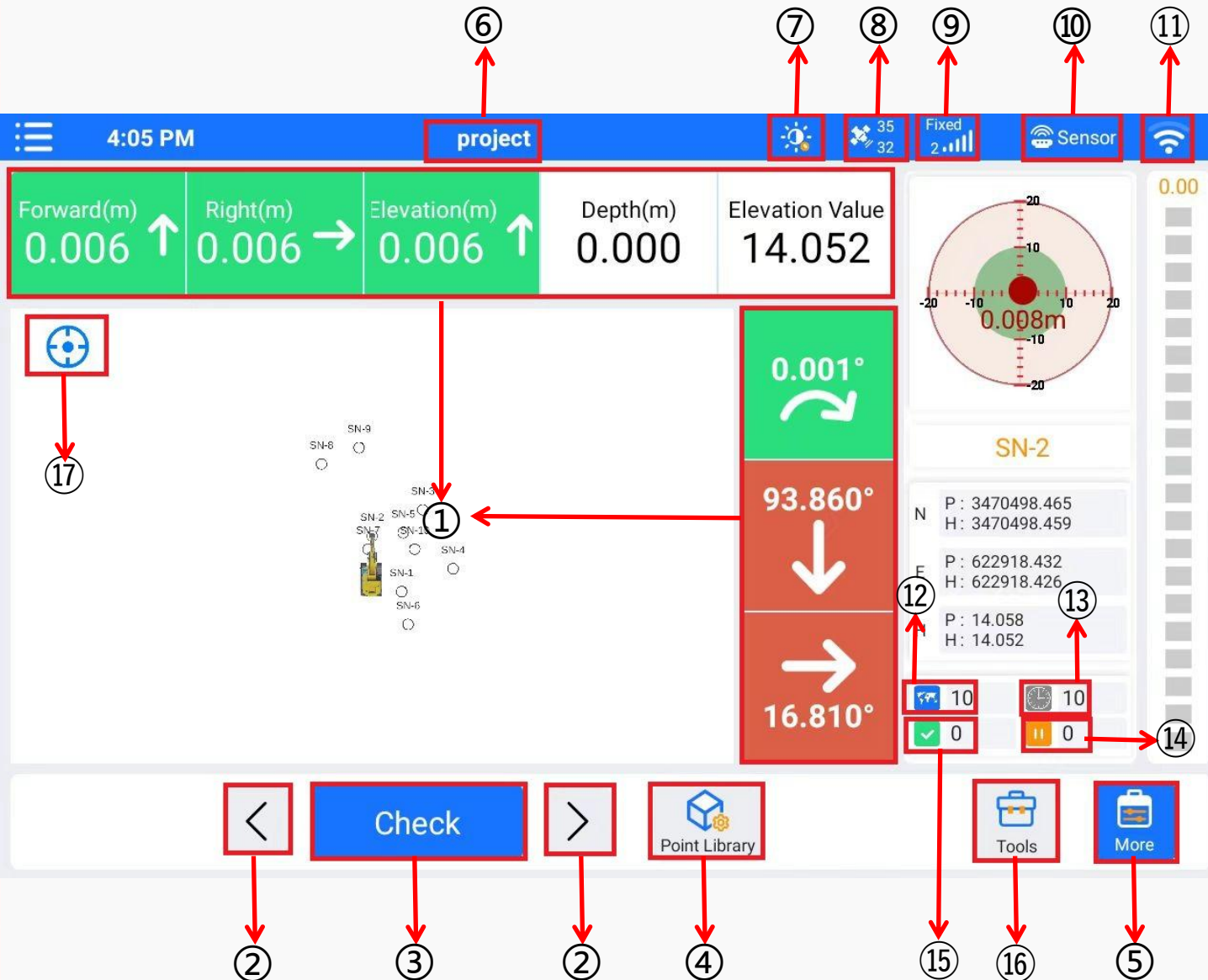
2. There are three forms of no-dig zones, namely point no-dig zones, linear no-dig zones, and planar no-dig zones (as shown in the figure, point no-dig zones).





Main Interface Introduction

7 Main Interface Introduction



①Location guidance value configuration display

②The selection of one pile position and the next pile position at the non pile driving point.

③Check button, used to check the reliability of the positioning antenna.

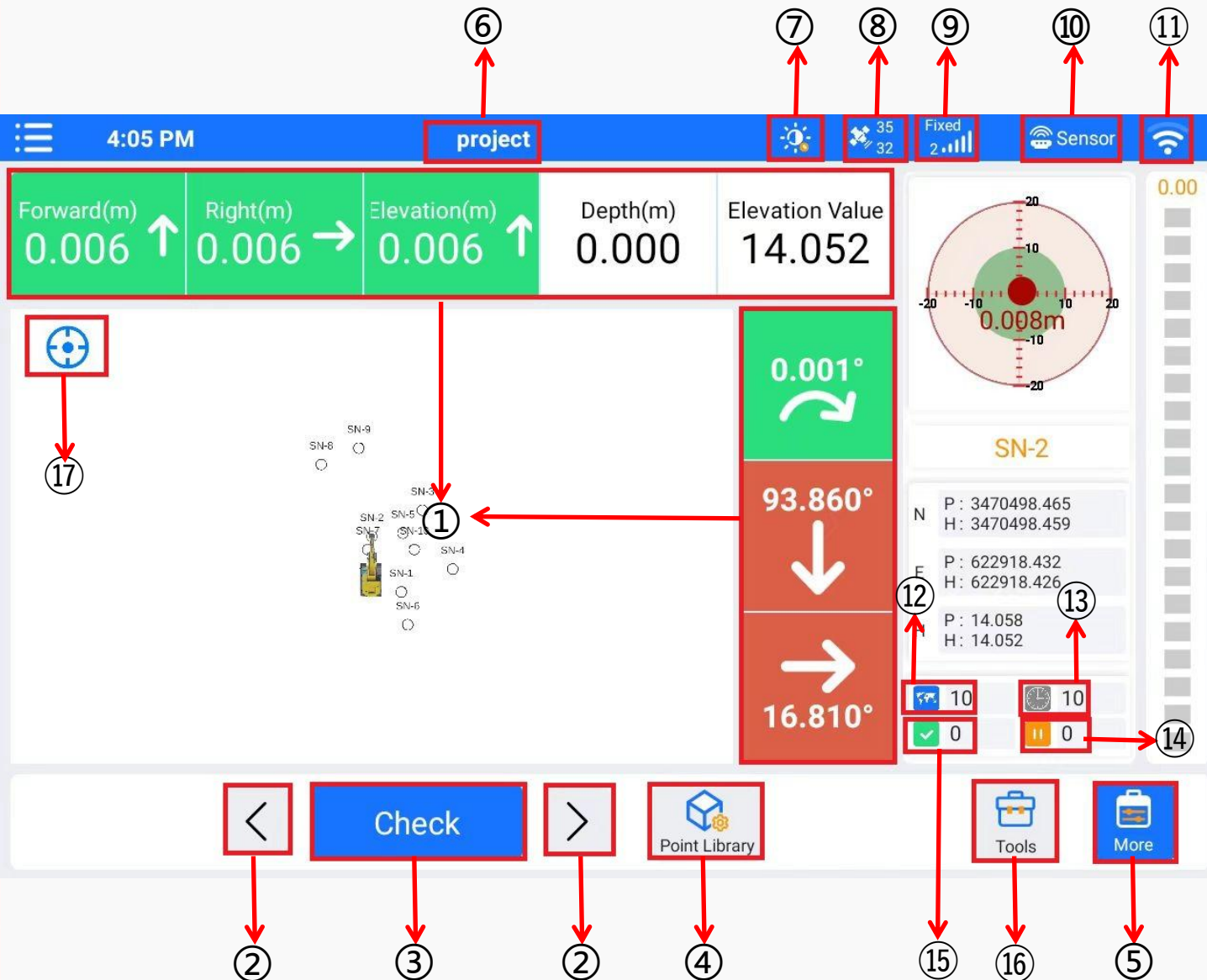
④The pile point library is used to import and edit pile point coordinates.

⑤Menu bar, click to select engineering configuration, mechanical management, and configuration management.

⑥ Current project name;

⑦ Screen brightness adjustment, with low, medium, and high levels;

7 Introduction to the Main Interface



⑧ Number of satellite searches for master and slave antennas (with the top being the main antenna and the bottom being the slave antenna);

⑨ Position status and diff value;

⑩ Display data information of GNSS antennas and sensors;

⑪ Tablet network signal strength;

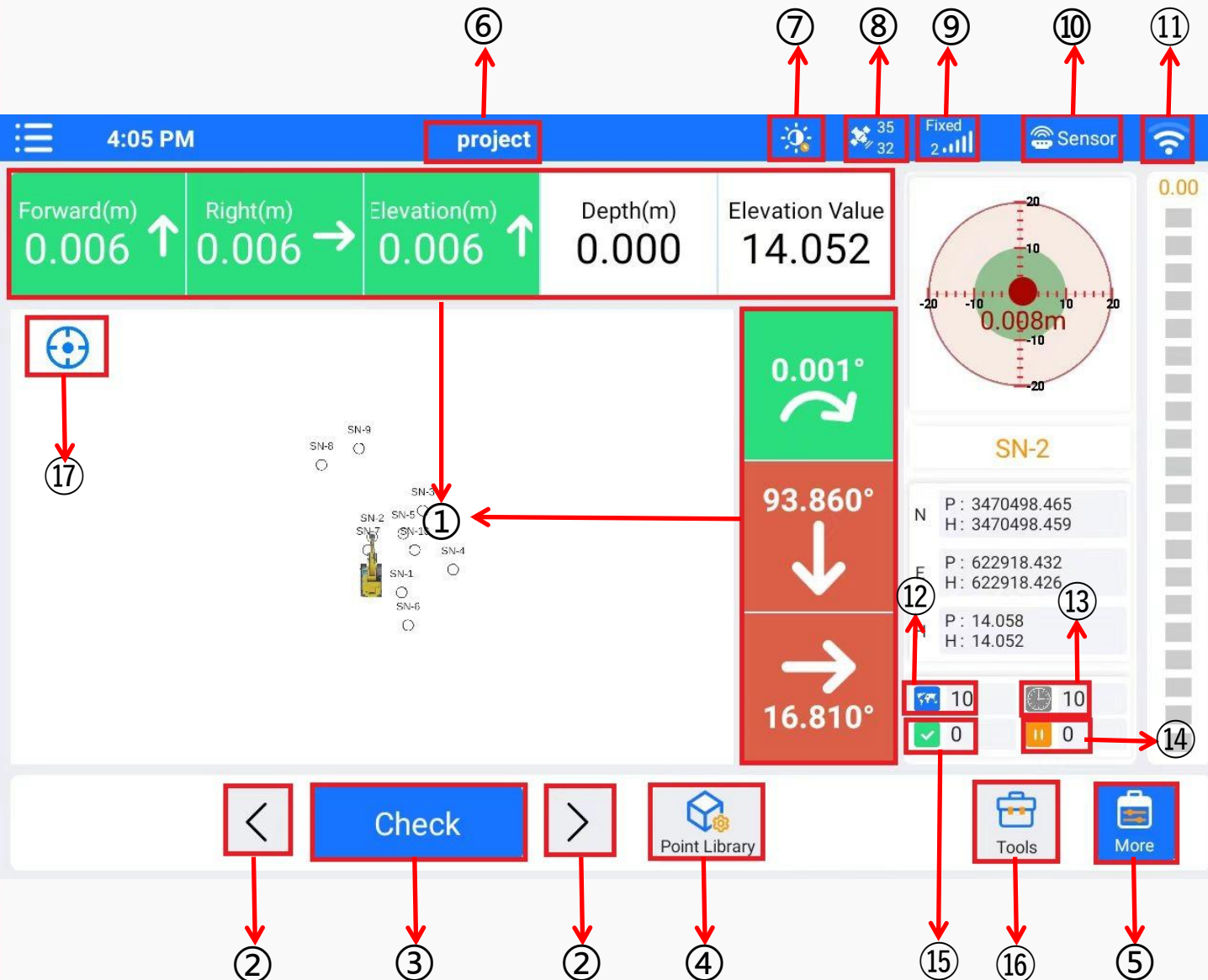
⑫ The number of all pile points in the pile point database;

⑬ Number of non pile driving points;

⑭ Number of suspended pile driving points;

⑮ The number of completed pile driving points;

7 Introduction to the Main Interface



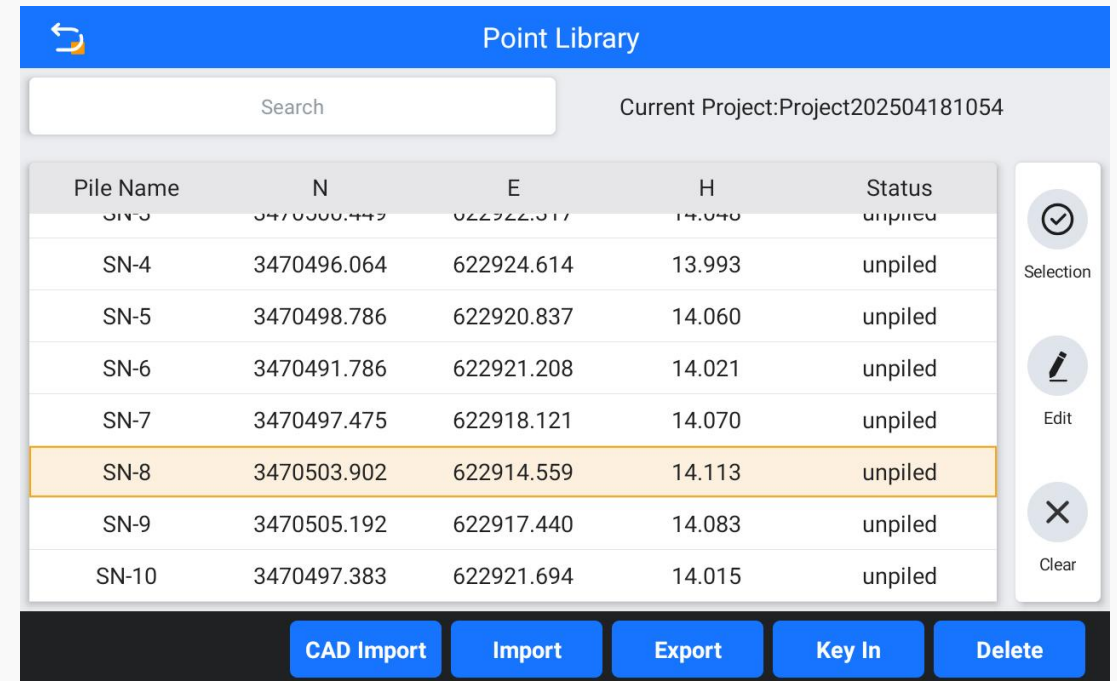
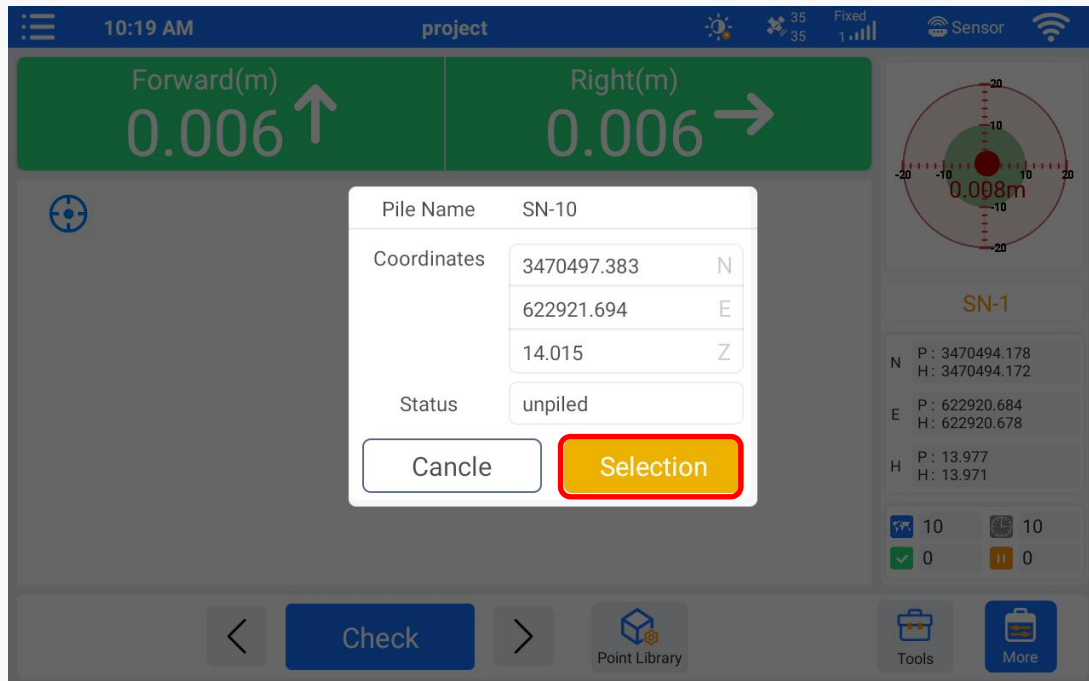
- ①⑥ Tool button, click to open one click height and pile hammer length tool;
- One click height setting: Click on one click height setting to determine the elevation of the pile top. In subsequent operations, the elevation of the pile top will be used as the reference for the operation;
- Pile length setting: Click the pile length setting button, enter the pile length according to the actual situation, and click "OK" to apply;
- ①⑦ Locate button to position the screen to the location of the pile driver model.



Piling procedure

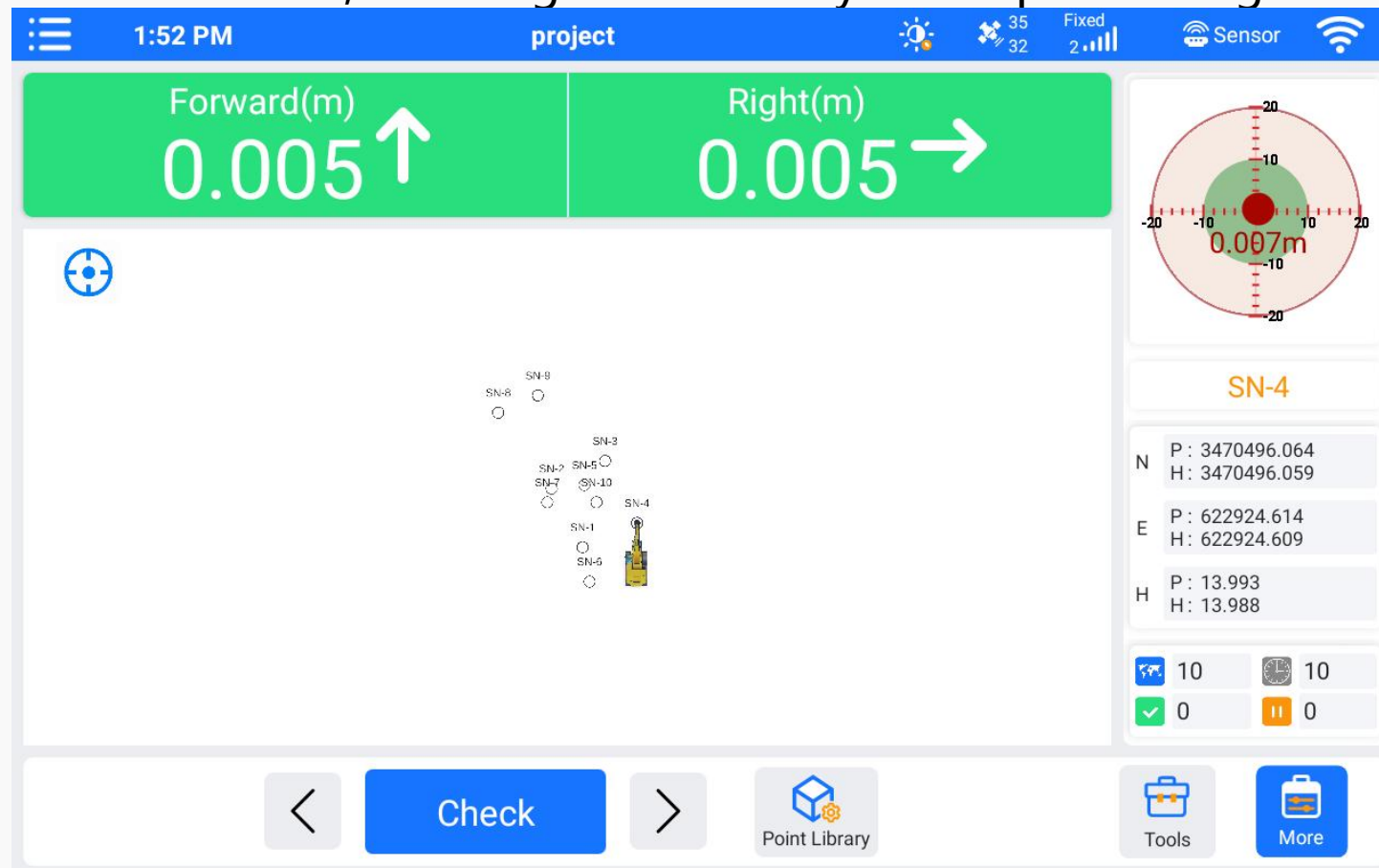
8.1 Select Pile Point

- Click on the pile point icon or select the desired pile point in the pile point library.
- After selecting the pile point, follow the guidance on the screen to move the pile driver to the selected pile point and proceed to the next step.



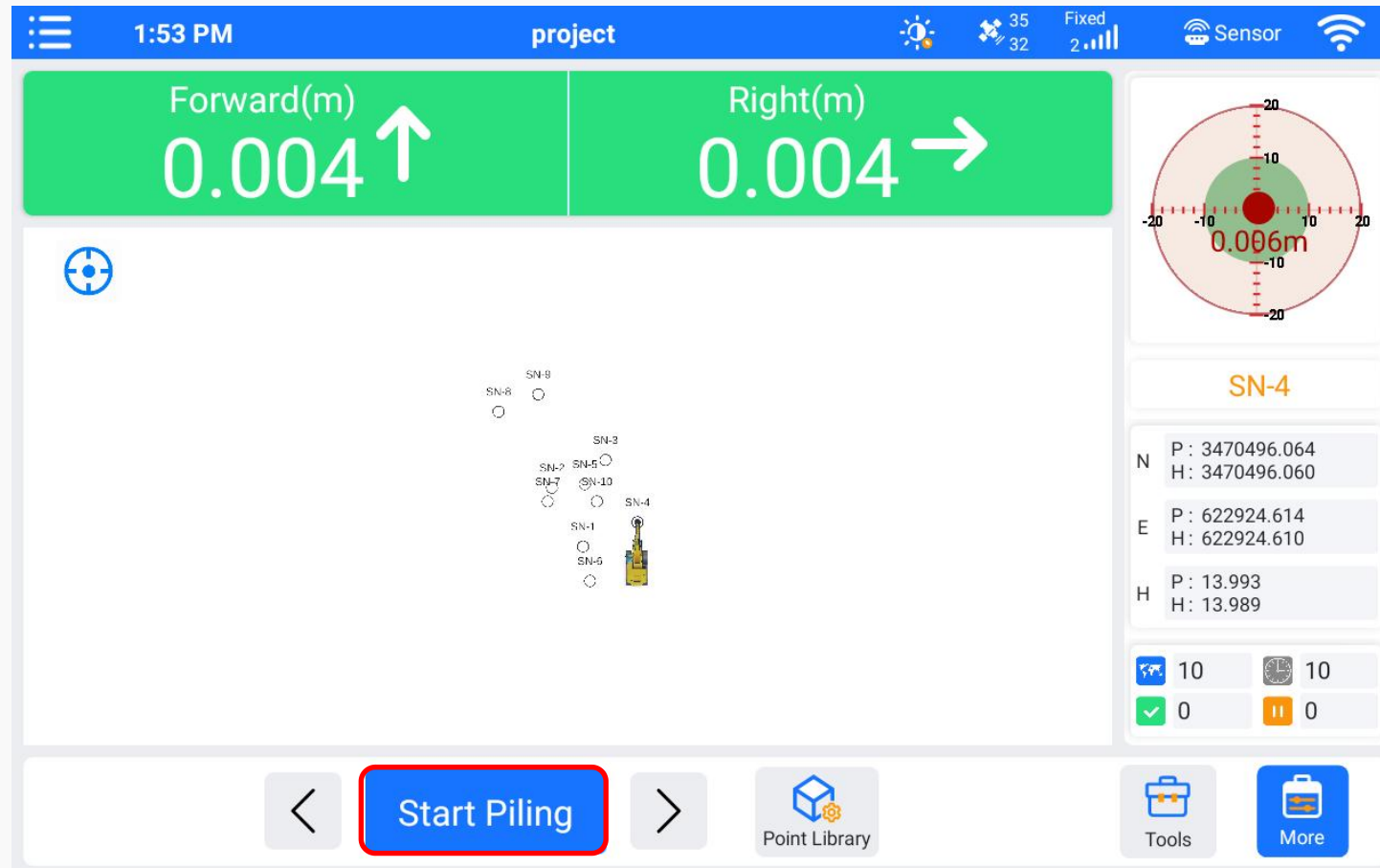
8.2 Check

- When the pile driver moves to the pile position to be driven and reaches the set pile driving accuracy, it sends a voice prompt. Click "Check", and the system resets the board to check the reliability of the positioning antenna coordinates, ensuring the reliability of the positioning accuracy.



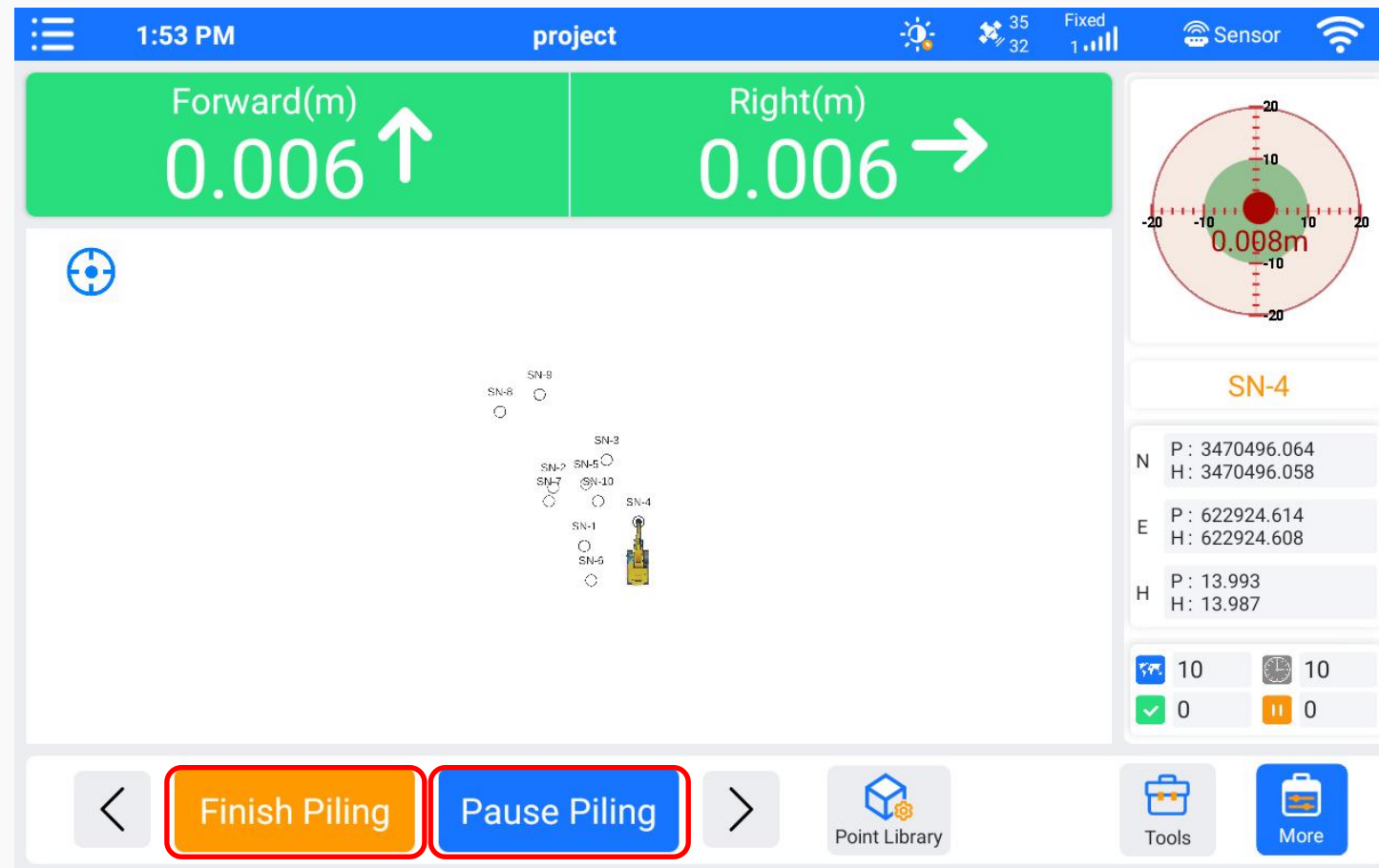
8.3 Start piling

- After passing the verification, click "Start Piling" to proceed with the piling operation.



8.4 Finish Piling

- After piling, click "Finish Piling", the piling point will become green solid, which means this piling point has been completed, and then automatically select the next piling position to be driven.





Handling of Common Problems

Common problem	Solution
The system doesn't search satellites	1. Check if the antenna is obstructed. 2. Check whether the 2 GNSS antenna ports, the corresponding 2 GNSS ports on the tablet are loose and whether the cables between them are intact. 3. Check that the 2 GNSS ports on the tablet have a voltage output of about 5V.
No differential signals to reach a fixed solution	1. Check if CORS account has expired. 2. Check if the tablet has a network signal.
No network signal from the system	1. Whether the 4G antenna on the tablet is connected properly. 2. Whether the SIM card in the tablet is normal.
Tablet cannot boot up	1. Check whether the power cord of the tablet is supplied normally.
System software jamming	1. Exit the system software and re-enter.
Under normal hardware conditions, the system accuracy error is large	1. Check whether the measurement of each dimension in the modeling process is correct or the error is large. 2. Is the sensor's attitude calibrated correctly.
No data from sensor	1. Check whether the joints of each sensor are loose and whether the cables connecting each sensor are intact. 2. Check if the Hub firmware version is updated.