USER MANUAL

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JHXH001
Auto Steering System

Precision Steering for Optimal Farming Results

GNSS Antenna NGP300

ICC531 Integrated Navigation Controller

SteeringWheel Motor ASM07-100A

Electric steering wheel

DP10A High-Definition Display Terminal

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1 Before You Start

Dear customers,

Thank you for purchasing our product. Before starting your work, please carefully read the following, and make sure your operator will carefully read them if you are not the operator:

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

1.1 Precautions for Safe Operation

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

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

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

1.1.1 Warning

- Since there is no obstacle avoidance system, please do not leave the cab while operating the system. It is your responsibility to make the vehicle operate safely and control it in time to avoid people, animals, trees, ditches, buildings, etc.
- Please make sure getting in and out of the vehicle while automatic driving is engaged will not occur, and please always observe the obstacles ahead and judge the potential danger. Sleeping is forbidden.
- Please make sure driving at a safe speed and avoid rolling over or losing control. Because the system cannot control the vehicle speed.
- There may be unpredictable movement for the system will take over control of the vehicle's steering system when the system is doing test, calibration, adjustment and automatic driving. Therefore, before starting the vehicle or before doing the above operations, please make sure that there are no people or obstacles around.
- Please do not engage automatic driving in public areas, or make sure the power for automatic driving is off before driving in public areas.
- When inspecting parts, please keep your distance from the vehicle. The steering mechanism may move suddenly and cause serious injury or death.

1.1.2 Caution

- To avoid accidental damage, please only use original supplied parts. Otherwise, damage to the system may occur.
- When transporting, please try your best to lighten libration on the system.
- Please do not arbitrarily stand or seat on the carrying case, or turn over it. Otherwise, the system may be damaged.
- Please turn off the power supply before installation or maintenance. If you want to do welding, please disconnect the negative battery hitch wire of the whole car.
- Please find a suitable site with enough working space for installation.
- When performing any drilling, cutting or fastening actions, please make sure that no other mechanical parts are present to avoid damage to the wire. Failure to follow this warning may result in bodily injury or damage to the vehicle.
- Please make sure all screws, bolts, nuts and cables are tightly connected before using the system to prevent the equipment from shaking and falling.

1.1.3 Exemptions from Responsibility

As the operator of the vehicle, you have duty to keep it operating safely. The system is not a substitute for the operator of the vehicle.

We assume no responsibility for any damage and loss of profits caused by the following conditions:

- Any damage or losses resulting from installation or operation not in accordance with the precautions and instructions in this user guide or from intentional destruction or damage to the product.
- Any disasters, such as earthquakes, storms, floods etc.
- A change of data, loss of data etc.
- Wrong transport.
- Use of non-original parts.
- Usage not explained in the user guide.

2 JHXH001

JHXH001 is a low-speed driving assistance system based on satellite positioning and body inertia, which is mainly used in agriculture and construction fields.

It will use integrated navigation fusion algorithm for the first time in technology, which can eliminate the interference caused by equipment and environment, output more accurate positioning accuracy and body compensation results, realize the precise control of the vehicle in different scenarios, ensure the operation error is less than 2.5 cm, and realize 24 hours of uninterrupted work in day and night environment;

Based on the technical advantages of integrated navigation, it can meet the automatic operation in the case of short-term GNSS signal loss.

The automatic driving operation of agricultural machinery can cover the whole operation link of "cultivation management and collection", solve the problem of irregular operation, reduce the labor intensity of the driver, and improve the operation efficiency and crop yield

Performance

Integrated Navigation | Anti-Interference Endurance | Slope Compensation | Automatic U-turn | OTA Upgrade · Remote debugging

24 hours operation | CORS Service | Satellite-Based Enhanced | Screenless Operation | Job Share | Single/Dual Antenna

Job accuracy	Dry field 2.5cm (≤ 9km /h); 5 cm(≤ 6 km/h) for paddy field
Working speed range	0.3-15km/h
Differential data source	4G, radio, star based
Way of planning	Linear planning and curve planning
NMEA output	GGA, GSV, VTG, GSA, ZDA, RMC, GST
Data Format	RTCM3.X
Optional accessories	Camera, key panel, front wheel Angle sensor, GNSS antenna

2.1 JHXH001 Optional Accessories

1、Portable handheld micro control panel

1．Portable handheld control panel, supporting error display

2.Basic operations such as AB alignment, deviation, and enabling autonomous drivin

2、Camera NGAHD720A

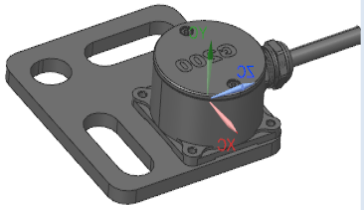
1．Fully automatic electronic shutter, fast imaging response speed;

2．The viewing angle adjustment range is wide, and the viewing angle can be adjusted up and down;

3．8 high-power array white lights。

3、NG200 Angle Sensor

1. **High zero bias repeatability,**
2. **Excellent impact resistance performance，Impact tolerance: 2000g (0.5ms, half sine, 3-axis vibration tolerance: 10g (10-2KHz, 3-axis) 100% magnetic shielding**
3. **Small-volume-45*45*22.8mm.**
4. **-45℃~85℃**



3 Hardware

3.1 Overview

JHXH001 Standard version hardware consists of the following:

1、ICC531 Integrated Navigation Controller

1. Built in receiver, inertial navigation, radio, 4G module;

2. Support the latest Beidou B3 signal and Satellite Based positioning, compatible with multiple satellite navigation systems;

3. Automatic slope compensation ensures operational accuracy in various terrains

2、DP10A High-Definition Display Terminal

1. High brightness display on the large screen, clearly visible under sunlight;

2. Android system, easy to operate;

3. IP67 level protection, not afraid of dust and rain.

3、Steering Wheel Motor ASM07-100A

1. Large disc diameter, small volume motor, comfortable grip;

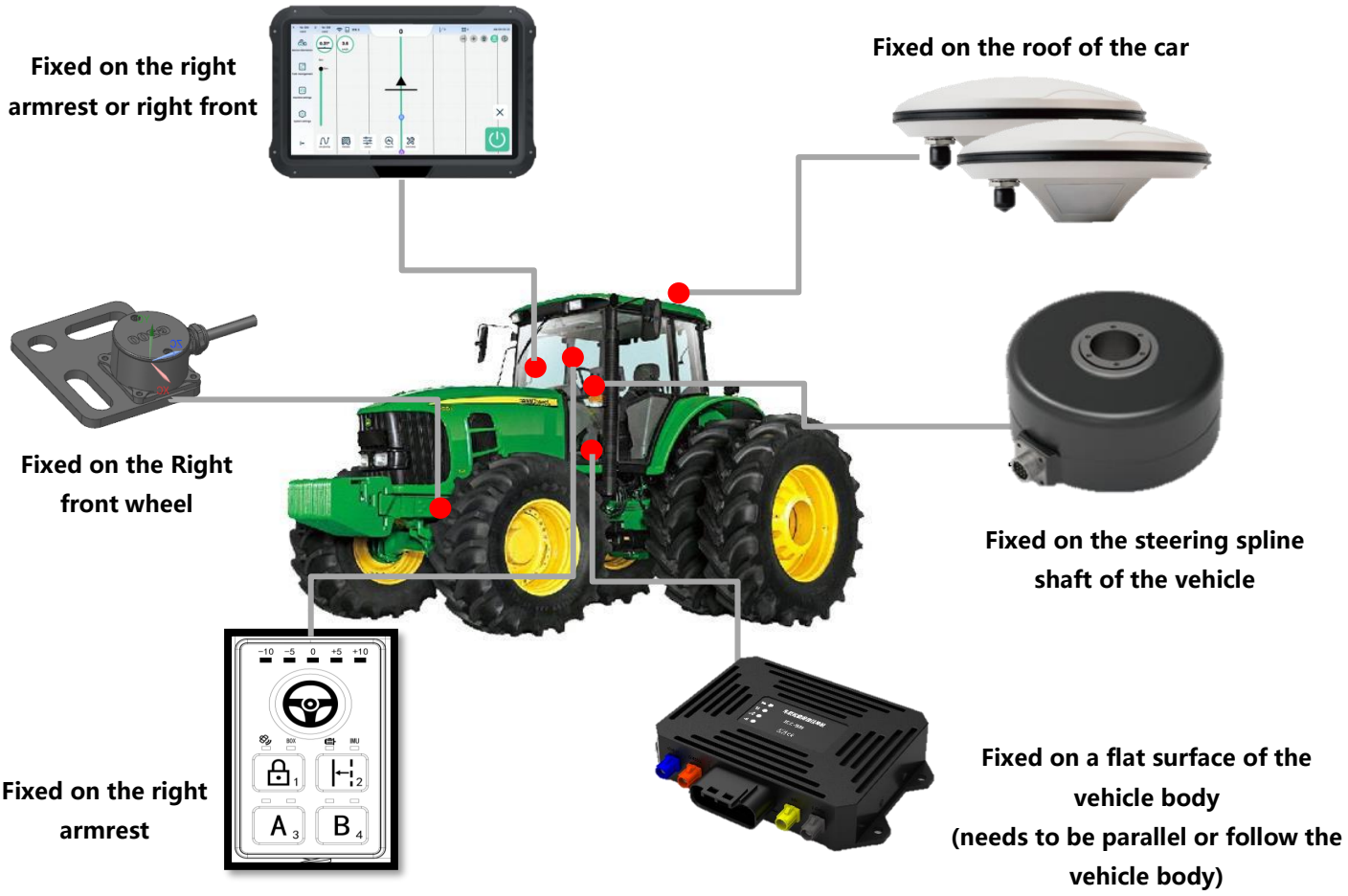
2. The peak torque can reach 15N. m or more, and it is not afraid of complex terrain;

3. High quality die cast metal shell, sturdy and durable, fearless of wind and rain;

4、GNSS Antenna NGP300

SUPPORT:
BDS B1/B2/B3
GPS L1/L2/L5
GLONASS L1/L2/L3
GALILEO E1/E5a/E5b/E6L-Band
IP67 level protection。

The typical installation location is as follows:



3.2 Before Installation

3.2.1 Check

Before installation, please make sure that the vehicle to be installed meets the following basic conditions:

- The pressure of the front tires is enough.
  If it is too low, please inflate the tires to reach the required tire pressure.
- The space between connecting rods responsible for the steering of the front tires is not too large.
  If it is too large, please adjust it.
- The vibration produced by the engine is not too strong when the vehicle is started.
- The battery voltage is normal.
  The voltage is 12 V (off status), and 12 - 16V (on status).
- The steering wheel is light during working and there is no gap in the combination of the steering shaft and the steering wheel.
- The installation spaces of the steering wheel, Y-clamp and C-clamp are enough.

3.2.2 Preparation

Before installation, please prepare the following tools:

Name	Specification
Screwdriver	1
Socket head screw wrench	1
Open-end wrench	1
Diagonal pliers	1
Three-jaw gear puller	1
Tape	1
Knife	1
Electric drill	1
Socket wrench	1

3.3 ICC531 Integrated Navigation Controller

ICC-531 is a MEMS sensor signal with full frequency and full constellation capabilities

A combined navigation terminal that combines GNSS/RTK/PPP and chassis data information,

Support single/dual antenna positioning and orientation; Combination navigation algorithm for construction machinery and agriculture

Targeted optimization has been carried out for industrial machinery application scenarios, particularly suitable for low-speed autonomous driving scene.

AND This series integrates T-BOX on the basis of the integrated navigation system.

It has the ability to accurately provide attitude, heading, sensor data, speed, centimeter level dynamic high precision, as well as positioning and other information

3.3.1 About ICC531

Advantages

- Built in automotive grade high-performance 6-axis IMU sensor, throughFusion and calculation of GNSS and INS information to achieve precision and stabilityOutput of attitude, heading, speed, position and other data.
- Built in 4G, Radio, Bluetooth and other communication modules for the entire network, supporting multiple Link communication, with only internal devices ensuring the implementation of multiple methods Separate services and data upload and download, which can be achieved by changing 4G modeThe group supports overseas network communication.
- The system integrates 8GB of memory, which can be guaranteedStore device data and support breakpoint upload
- Linear accuracy ± 2.5cm, directly interacts with other devices through protocols. meanwhile encapsulated multiple differential service protocols, such as NTRIP, SDK, and Star Basic services.

Dimension

- Host size: L x W x H = 130 mm x 100 mm x 30 mm
- Operating voltage: -9 - +36 V Rated voltage: 12V dc

  Operating temperature: -40℃ - +70℃

3.3.1.1 Interface Definition

The interface definition is as follows:

3.3.1.1.1 Interface

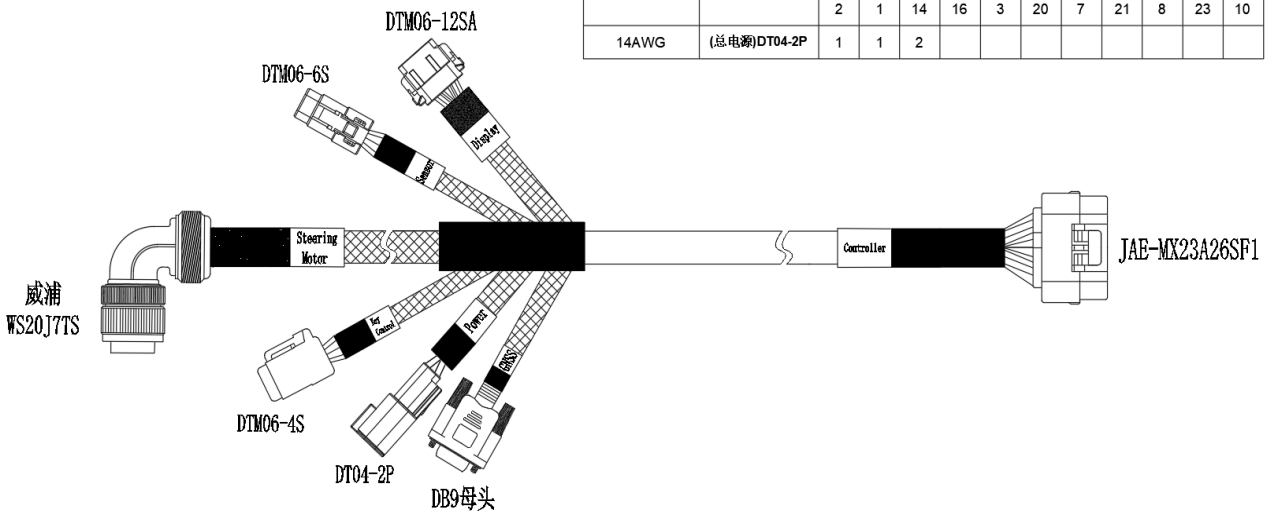
The pin definition of interface is as follows(Partially unused)
The right of interpretation belongs to the manufacturer:

Connector	Name	Describe	Connector	Name	Describe
1	POW	Power-In-7~36V	14	GND	GND
2	ACC	ACC	15	PPS	PPS-1Sec-Out
3	CAN1_H		16	CAN1_L	
4	CAN2_H		17	CAN2_L	
7	G232RX	GNSS-RX	20	G232TX	GNSS-TX
8	M232RX1	MCU-RX	21	M232TX1	MCU-TX1
9	M232RX2	MCU-RX2	22	M232TX2	MCU-TX2
10	5VOUT	5V-Power-Out	23	GND	GND

3.3.1.1.2 Cable Definition

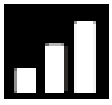
The cable definition is as follows:

18AWG	DTM06-12SA	1	12	2	3	10	4	9	6	7		
20AWG	DTM06-6S			2	4	3						1
20AWG	DTM06-4S		1	3	4	2						
电源部分 14AWG 其余18AWG	威浦WS20J7TS		1	2+5黑	7	6						
22/24/26AWG	DB9母头						2	3			5	
20AWG	JAE-MX23A26SF1	ACC	PWR+	PWR-	CANL	CANH	GTXD	GRXD	TXD2	RXD2	GND	5V+
		2	1	14	16	3	20	7	21	8	23	10
14AWG	(总电源)DT04-2P	1	1	2								



3.3.2 Indicator Light

After connecting all the cables, you can turn on the power button to start the MC5. When it starts up, you can judge the startup by observing the color of indicator light:

Pilot Lamp	Function or Status
	Power light is green and always on when powered on
	The data light is green, flashes once every 1 second during communication, and the fault turns red and stays on.
	The satellite light is green,Single point and floating-point solutions flicker at 1-second intervals,The green light remains on when the solution is fixed.Invalid solution: lights below 4 stars turn off
	The 4G communication light is green, and it stays on during normal communication,The red light represents abnormality,When the device is not connected to the network, the light is turned off

The meaning of different flashing lights:

	LIGHT	Status 1	Status 2	Status 3	Status 4
	DATA	Green light flashing 1Hz	Red light flashing 0.5Hz	Red light flashing 1Hz	/
		Data can be received and sent normally The monitor can receive controller data, and the controller can receive monitor data	Abnormal data reception and transmission Controller can receive display data: display cannot receive Controller data	The controller did not receive any data (it is necessary to ensure that there is a flashing light at any time to ensure that the device has not crashed)	/
	GNSS	Green light always on	Green light flashing 1Hz	Red light flashing 1Hz	All lights extinguished
		Fixed solution-RTK	Positioned, but not a fixed solution	Received motherboard data, but no positioning	No data received from the motherboard
	LTE	Green light always on	Green light flashing	Red light flashing	All lights extinguished
		Network is normal	Poor network signal	Network deployment failed	No LTE module detected

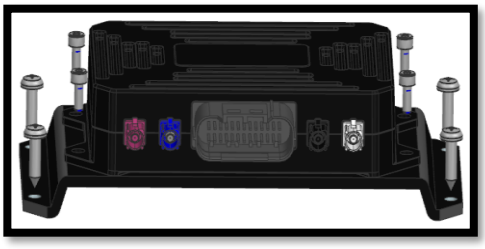
3.3.3 Packing List

Name	Quantity	Picture
ICC531 Controller	1	
3M VHB tape	4 (Two is extra On anther part)	
Self tapping dovetail screw	8 (Four is extra On anther part)	
ICC531 fixed base plate	1	
M4 combination bolt	4 (Six is extra On Spline)	

3.3.4 Installation

ICC531 should be installed in the car or on a flat surface on the roof

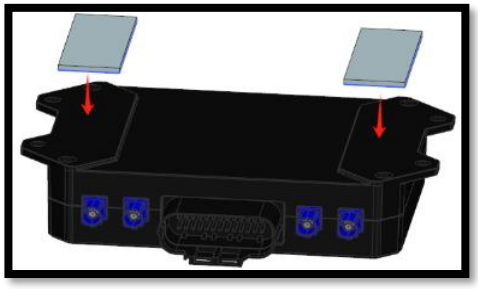
To install the ICC531, Do the following:



Suggested Installation Method

1 Find a flat installation location.
2 Clean and dry the surface where ICC531 is to be installed.
3 Place the fixing plate parallel to the vehicle's orientation and use dovetail self tapping screws to fix the four fixing plate holes,
4 Install the ICC531 assembly to the mounting bracket and tighten the 4 M4*10 bolts.

OR



1. Find a flat installation location
2. Remove the paper backing from the 3M VHB tape.
3. Paste the 3M VHB tape to the bottom of the ICC531
4. Clean and dry the surface where ICC531 is to be installed.
5. The ICC531 must be installed on a flat surface, and the installation orientation should be perpendicular or balanced to the forward direction of the vehicle body.

Please place ICC531 flat on the vehicle surface, and the placement method must be balanced according to the contour of the vehicle

3.4 Radio Antenna

3.4.1 Radio Packing List

Name	Quantity	Picture
Radio Antenna	1	
Antenna mounting base	1	

3.4.2 Installation

To install the radio antenna, do the following:

1. 1. Clean and dry the roof surface to be installed.
2. 2. Peel off the backing paper on the 3M VHB tape
3. 3. Place the 3M adhesive on the base and press down firmly to obtain appropriate adhesion.
4. 4. You can also directly place the magnetic base on the metal surface of the car,
5. 5. Finally tighten the radio antenna
6. You can determine the location based on the cable routing

3.4 4G Antenna

3.4.3 4G Packing List

Name	Quantity	Picture
4G Antenna	1	

3.4.4 Installation

To install the 4G antenna, do the following:

1. Clean and dry the roof surface to be installed.

2. Peel off the paper backing from the 3M VHB tape on the back of the antenna base.

3. Place the base and press down firmly to obtain appropriate adhesion.

You can determine the location based on the cable routing.

3.5 NGP300 GNSS Antenna

3.5.1 Packing List

Name	Quantity	Picture
Mounting plate	1	
NGP300 GNSS Antenna	1	
ST4.8 screw	4	
Antenna mounting base	1	

3.5.2 Installation

The NGP300 GNSS antenna should be installed on the central axis and front of the vehicle roof.

It is suggested that the distance between the GNSS1 antenna and the GNSS2 antenna is greater than 1 m. If the roof space is not enough, please keep the distance as long as possible.

WARNING: Please do not place the NGP300 GNSS antenna within 0.8 m of a transmitting radio antenna (such as for a 2-way or business band radio), and please tighten all screws to prevent the equipment from shaking and falling.

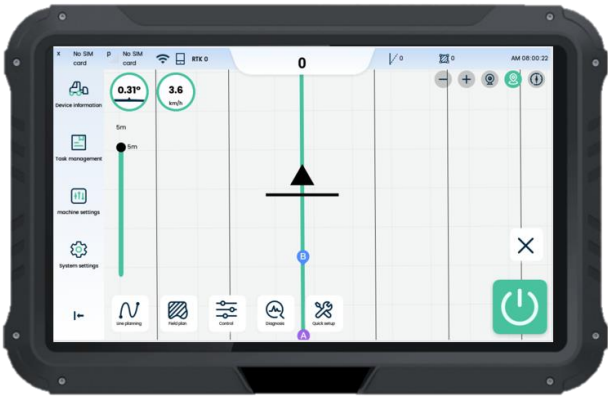
To install the NGP300 GNSS antenna, do the following:

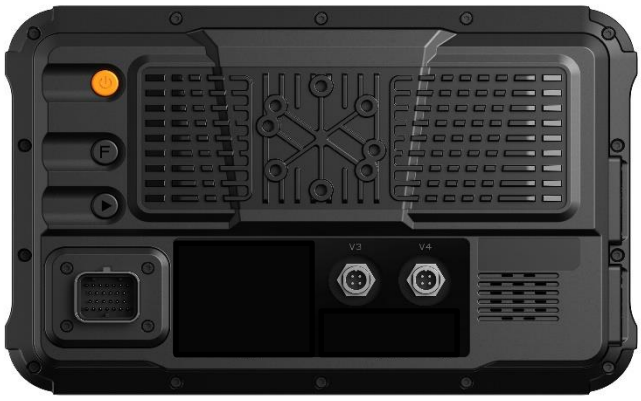
1. Clean and dry the roof surface where you will attach the antenna mounting plate.
2. Remove the paper backing from the 3M VHB tape on the back of the mounting plate.
3. Position the mounting plate and press down hard for proper adhesion.
   You can determine the location according to the cable wiring.
4. Tighten the mounting plate with 4 ST4.8 screws:
5. Attach the antenna to the antenna mounting base.
6. Directly place the antenna mounting base on the mounting plate

3.6 DP10A Display Terminal

3.6.1 About DP10A

The interface definition is as follows:



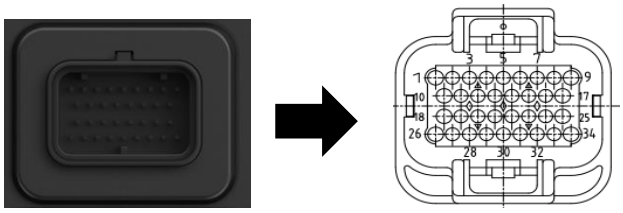


The monitor only has one plug, and the specific pin definitions are as Some have no practical application!!!

SIM CARD

USB HOST

26 PIN -TE



1脚	IN_12V 设备输入12V电源
2脚	电源GND
3脚	12V_DET 对（1脚）设备输入12V电源检测开机使用
4脚	CAN1 H
5脚	CAN1 L
6脚	NC
7脚	NC
8脚	GND
9脚	R485 A
10脚	R485 B
11脚	CAN2 H
12脚	CAN2 L
13脚	NC
14脚	RS232_OUT_A
15脚	NC
16脚	AIN_CAM2 摄像头2
17脚	RS232_IN_B
18脚	NC
19脚	NC
20脚	RS232_IN_A
21脚	DET2 （预留）
22脚	AIN_CAM1 摄像头1
23脚	CVBS_12V 摄像头12V供电输出可控制
24脚	RS232_OUT_B
25脚	NC
26脚	NC

3.6.2 Packing List

Name	Quantity	Picture
DP10A display	1	
RAM bracket kit	1 Assy	
M5 combination bolt	4	

RAM bracket kit includes the following:

- Round base (attach to the display)
- Double socket arm mount
- Bar mount base with U-bolts / nuts (attach to the cab)

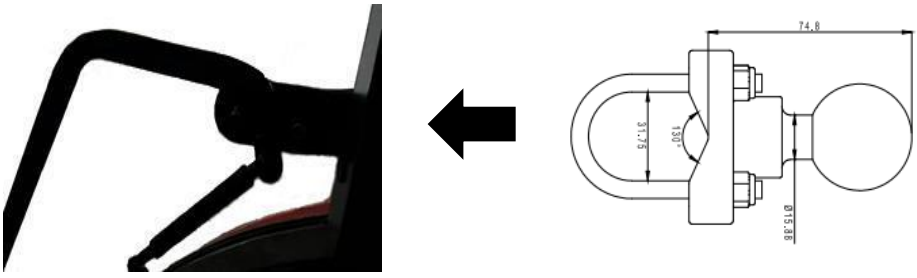
3.6.3 Installation

The intelligent display should be installed in a place that is easy for you to view and operate. Typically, this is the armrest on the right door.

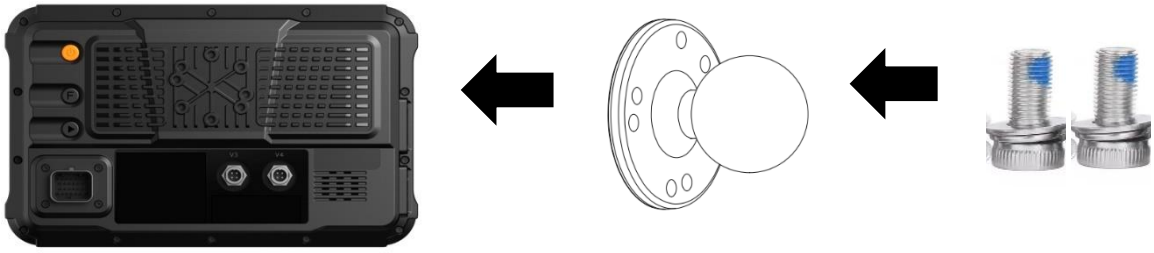
WARNING: Please do not install the display in a location where it interferes with seeing other information, controls or the filed, and do not look at the screen for too long while operating the vehicle to avoid a crash.

To install the DP10A display terminal, do the following:

1. Attach the bar mount base with U-bolts / nuts to the your preferred location on the cab:



2. Attach the round base to the back of the display with 4 M5 bolts:

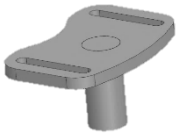
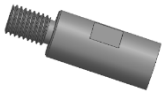
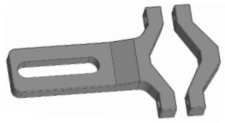


3. Attach the switch bracket to the back of the display with 2 M5 combination bolts.
4. Place one end of the double socket arm mount over the ball of the bar mount base, and tighten the knob of the double socket arm mount enough to make sure the double socket arm mount stays attached.
5. Position the display to make the round base fit in the open end of the double socket arm mount, and securely tighten the knob of the double socket arm mount.
6. Adjust the display to your preferred viewing and operating angle.

3.7 ASM07-100A Electric Steering Wheel

3.7.1 Packing List

Installation with Y-clamp and C-clamp

Name	Quantity	Picture
ASM07-100A Electric steering wheel with a steering wheel and decorative cover	1	
Top bracket	1	
Adjustable bracket - L35	1	
Adjustable bracket - L60	1	
Y-clamp and C-clamp	1	
M5X14 bolt (to tighten the top bracket with the steering motor)	2	
M6 bolt (to tighten the C-clamp and Y-clamp)	2	

Installation Example

Step1

Step2

Step3

Name	Quantity	Picture
M10*25 bolt	1	
M10*1.0 shim	1	

Installation With L-shaped Bracket

Name	Quantity	Picture
ASM07-100A Electric steering wheel with a steering wheel and decorative cover	1	
L-shaped bracket	2	
M5 bolt (to tighten the L-shaped bracket)	4	

3.7.2 Installation

Before installing the electric steering wheel, to remove the original steering wheel, do the following:

1. Center the original steering wheel.
2. Make sure there is no wheel deviation with the original steering wheel.
3. Remove the decorative cover of the original steering wheel.
4. Unscrew the steering nut without completely loosening it.

CAUTION: Please keep the locking bolt properly for future use.

To pull out the steering wheel, do one of the following:

- Downward hit the steering shaft with a hammer, and hold and pull out the steering wheel.
- Use a three-jaw gear puller.

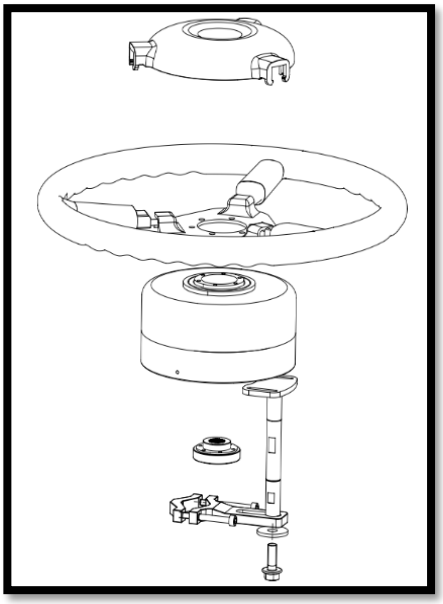
CAUTION: Please properly store the original steering wheel after removal.

To install the electric steering wheel, do one of the following:

- Install the electric steering wheel with Y-clamp and C-clamp.
- Install the electric steering wheel with L-shaped bracket.

3.7.2.1 Install the Electric Steering Wheel with Y-clamp and C-clamp

To install the electric steering wheel with Y-clamp and C-clamp, do the following:



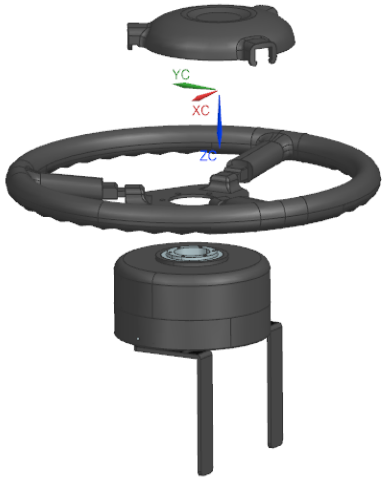
1. Put the spline on the steering shaft and rotate it leftward and rightward until there is no shaking and clearance.
2. Remove the spline from the steering shaft and attach it into the steering motor with 6 M4*10 bolts in the diagonal way to.
3. Put the electric steering wheel motor into the steering shaft, and make sure the installation position of C-clamp and Y-clamp, length of the adjustable bracket and the direction of the steering motor for wiring.
4. Remove the electric steering wheel motor, determine the specific position of the top bracket according to the installation space, attach the top bracket to the steering motor with two M5X14 bolts and make sure the top bracket can still move.
5. Attach the adjustable brackets (L30 and L60) to the top bracket with a M10 bolt.
6. Install the C-clamp on the steering shaft, attach the Y-clamp to the C-clamp on the steering shaft with the face with alphabets upwards with two M6 bolts and make sure the C-clamp and Y-clamp can still move.

CAUTION: Please avoid cables and the rubber sleeve around the steering shaft.

7. Put the M10 lock washer on the adjustable bracket, and put the electric steering wheel on the steering shaft, making sure the adjustable bracket aims at the installation hole of the Y-clamp, and slightly tighten the adjustable bracket with a M10*25 bolt.
8. Install the lock nut from the original vehicle onto the steering motor, adjust the position of the Y-shaped clamp and C-shaped clamp, tighten the M6 bolt and M10 bolt, and finally tighten the nut to lock the motor
9. Tightly put the decorative cover on the steering wheel.

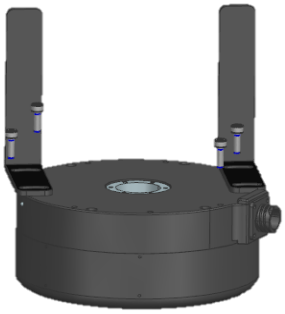
3.7.2.2 *Install the Electric Steering Wheel with L-shaped Bracket*

To install the electric steering wheel with L-shaped bracket, do the following:



1. Put the spline on the steering shaft and rotate it leftward and rightward until there is no shaking and clearance.
2. Remove the spline from the steering shaft and attach it into the steering motor with 6 M4*10 bolts in the diagonal way to firstly install the first two screws.
3. Put the electric steering wheel into the steering shaft, and make sure the direction of the steering motor for wiring.
4. Remove the electric steering wheel, attach the L-shaped bracket to the steering motor with four M5*14 bolts and make sure the L-shaped bracket can still move.
5. Put the electric steering wheel on the steering column, and tighten the four M5 *14 Hexagon flange bolts.
6. Tightly put the decorative cover on the steering wheel.

Locking Screw **Stuck the Plastic**

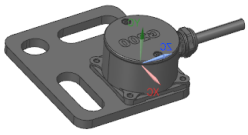


3.8 NG200 Angle Sensor

When you need a high-speed autonomous vehicle,

When the steering clearance between the vehicle and the steering wheel is large, it is recommended to use an angle sensor .

3.8.1 Packing List

Name	Quantity	Picture
NG200 Angle Sensor	1	

3.8.2 Installation

CAUTION: When installing or adjusting the NG200 angle sensor, please turn off the engine to prevent serious injury or death from pinching caused by wheel steering.

To install the NG200 angle sensor, do the following:

1. Unscrew at least two pivot bolts of the front axle of the right / left front wheel, put the gyroscopic angle sensor on the front axle, and tighten it with the two pivot bolts:
   It is suggested to install the gyroscopic angle sensor on the right front wheel.

   CAUTION: During this process, the bracket should keep more than 2 cm space with the vehicle body.

2. Connect the wiring, adjust the position of the wiring harness, and check if the wiring harness is affected when the wheel is turned.
3. Arrange and fix the wiring.
4. To check the installation, do the following:

   WARNING: When checking the installation, the wheels will move. Please keep the unrelated personnel away from the vehicle to prevent serious injury or death from wheel pinching.

   a. Check that all connections are correct, make sure all screws are tightened and clean up any excess material in and around the vehicle.
   b. Start the vehicle, slowly turn the steering wheel to the right to the full extent, and observe whether the bracket of the angle sensor contacts with the vehicle body:
      - If it does, find a new place to install the angle senor.
      - If not, the installation of the angle sensor is successful.

3.10 Rear Camera(Optional)

You can freely choose whether to equip a rear camera. With it, you do not need to frequently look back to check status of the farm tools and the current operation effect, so as to reduce your labor intensity.

3.10.1 Packing List

Name	Quantity	Picture
Rear camera	1	
ST4.8x19mm	4	

3.10.2 Installation

To install the rear camera, do the following:

1. Find a place on the rear of the vehicle, and make sure the camera view is good.
2. Tighten the rear camera with four ST4.8 screws.

3.11 Portable Handheld Micro Control Pane (Optional)

You can freely choose whether to equip a handheld operation button panel. With it, you don't need to frequently look back at the screen. In addition, you can quickly start your AB line work and achieve real-time navigation accuracy by manipulating buttons, thereby reducing your labor intensity.

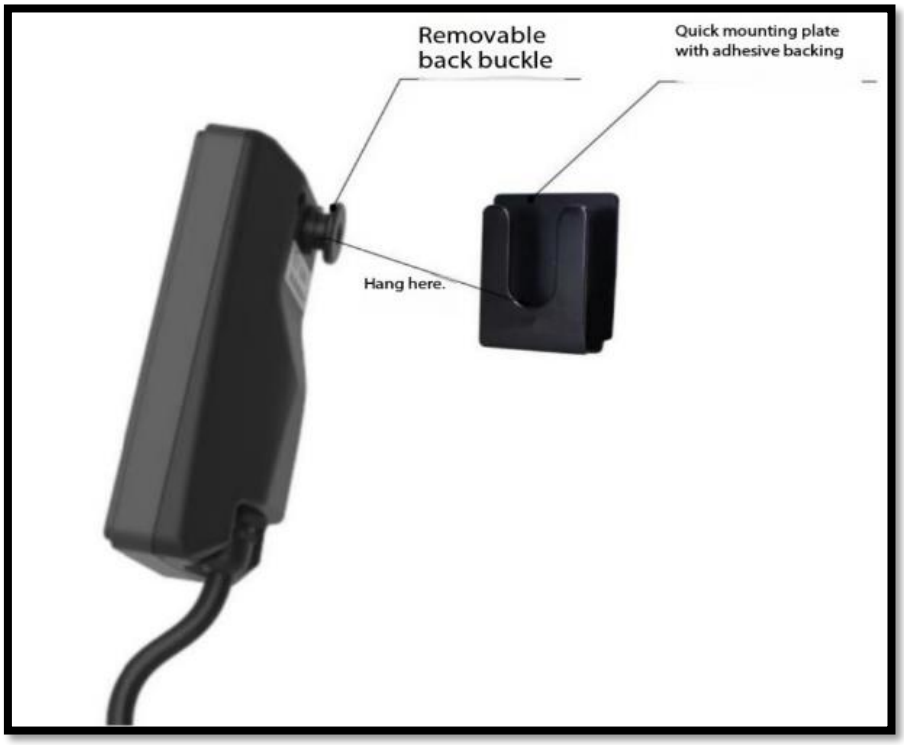
3.11.1 Packing List

Name	Quantity	Picture
Bracket	1	
Portable Handheld Micro Control Panel	1	

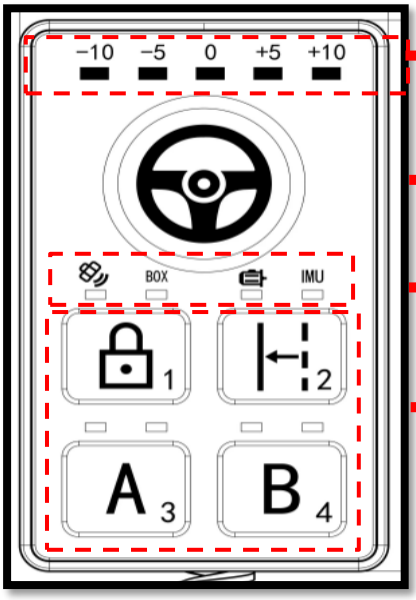
3.11.2 Installation

To install the cantrol panel please follow these steps:

1. Find a place in front of the vehicle or in an easily accessible location, ensuring that it is flat and half the size of a palm, and clean the dust in that area.
2. Peel off the 3M adhesive tape on the back of the bracket and stick it in that position, applying pressure for 3 seconds.
3. Hang the micro control panel on the bracket.



3.11.3 Instructions for Using Button Functions



Homework accuracy indicator light

Circular button for autonomous driving

Status LED

4 buttons:1- Lock button
2-Align button
3-Dot A
4-Dot B

1. Homework Accuracy Indicator Light

①Homework line not formed: no lights on

②Homework Accuracy: According to the Homework accuracy, the green light is constantly on

③Error Warning: If the Homework accuracy exceeds 50cm, the red light in the corresponding error direction will remain on.

2. Circular button for autonomous driving

①Device has been logged in: the white backlight will remain on.

②Activate autonomous driving: With a single click of the button, the green light remains on.

③Pause autonomous driving: Press the button again, and the white backlight will remain on.

3.Status Indicator Light

①Signal indicator light: Fixed release status green light flashing (1Hz)

The red light for other solution states is always on

②PBOX indicator light: the green light is always on when the device communication is normal, and the red light is always on when the device communication is abnormal (satellite indicator light: the green light is always on when the satellite data is normal, and the red light is always on when the satellite data is abnormal)

③Motor indicator light: The green light is always on when the motor communication is normal, and the red light is always on when the communication and status are abnormal

④Initialization indicator light: The green light remains on after initialization calibration is completed, and the red light remains on before initialization calibration starts or is not completed.

4.Four Buttons

①Button lock (key 1): As a switch for unlocking the keypad, buttons 2, 3, and 4 cannot be used without unlocking. Unlocking: Click the button lock, and the green light on the left button 1 will remain on; Lock: Click the button again to lock, and the left light will turn off.

②AB alignment operation key (key 2): When clicked, the green light on the left 3 will light up for successful sending, and the red light will light up for failed sending. After releasing the key light, it will turn off,

③Dot A operation key (key 3): After clicking, the green light on the left 2 is constantly on, and the sending is successful; Sending failed, red light on, light off after releasing the button: click the button again to restart the task

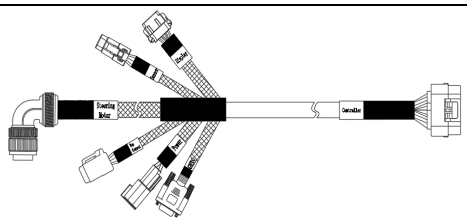
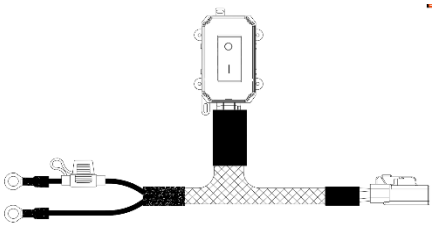
④Click the B operation key (key 4): After clicking, the green light on the left 4 will remain on and send successfully; Send failed, red light on, light off after releasing the button; A. After all B lights are turned on, there will be a 10 second delay and the button lock will automatically open.

3.12 Wiring

The system is applicable to 12 V power supply.

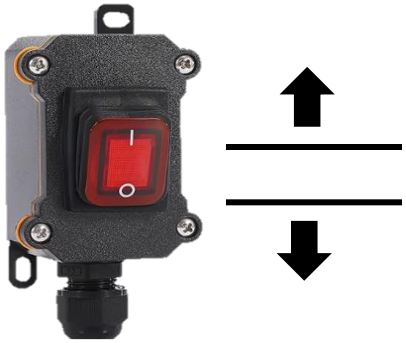
3.12.1 Packing List

The packing list is as follows:

Name	Quantity	Picture
ICC531-MATOR-CABLE	1	
DISPLAY CABLE	1	
PWR-MAIN-CABLE	1	
G200-SENSOR	1	

Switch Picture

It can be adhered to a suitable location on the car using 3M film



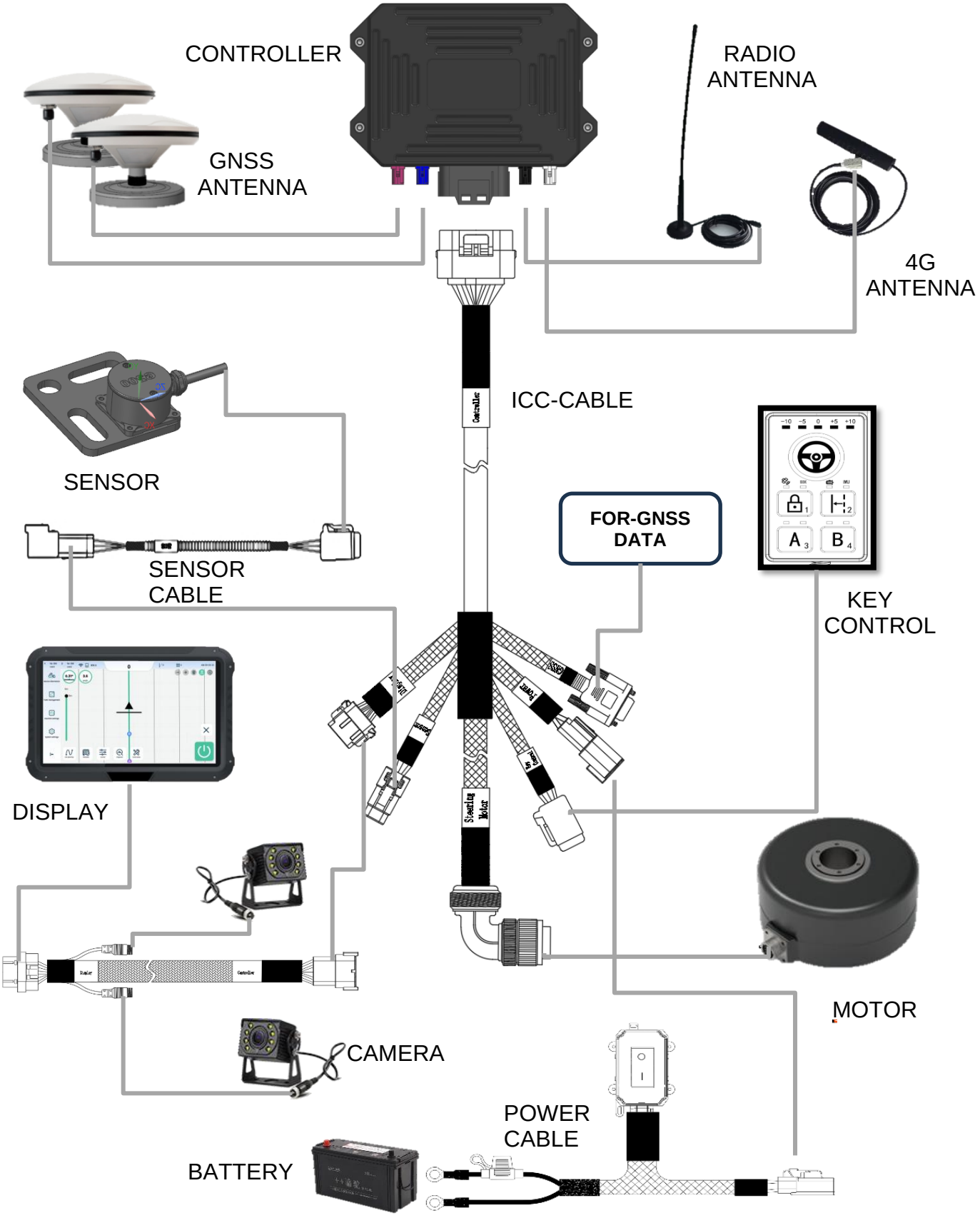
Press up “I” means turn on power and red light on

Press down “O” means turn off power

3.12.2 Wiring Diagram

Before wiring, please make sure power is off.

The whole wiring diagram is as follows:



WARNING: Not doing wiring according to the wiring diagram is prohibited.

During wiring, please note the following:

- The cable should be arranged along the frame, body, bracket and other entities to avoid overhanging wiring.
- The cable should avoid the engine or high temperature area, movement area, water immersion area, and oil contamination area.
- CAN interface/relay should be fixed to the cable or bracket nearby to avoid shaking with the whole vehicle.

4 Check

After installation of all hardware and connection of all cables, you needs to check if the system can work normally.

Hardware connection check

1. Checking if all parts are installed in accordance with the installation instructions.
2. Check if the wiring is correct.
3. Check if the power cables antenna and display terminal are tightly connected to the battery.
4. Before powering on, keep the vehicle still about 1 minute.
5. Start the engine, turn the steering wheel left and right, and check if the newly installed parts interfere with other parts.

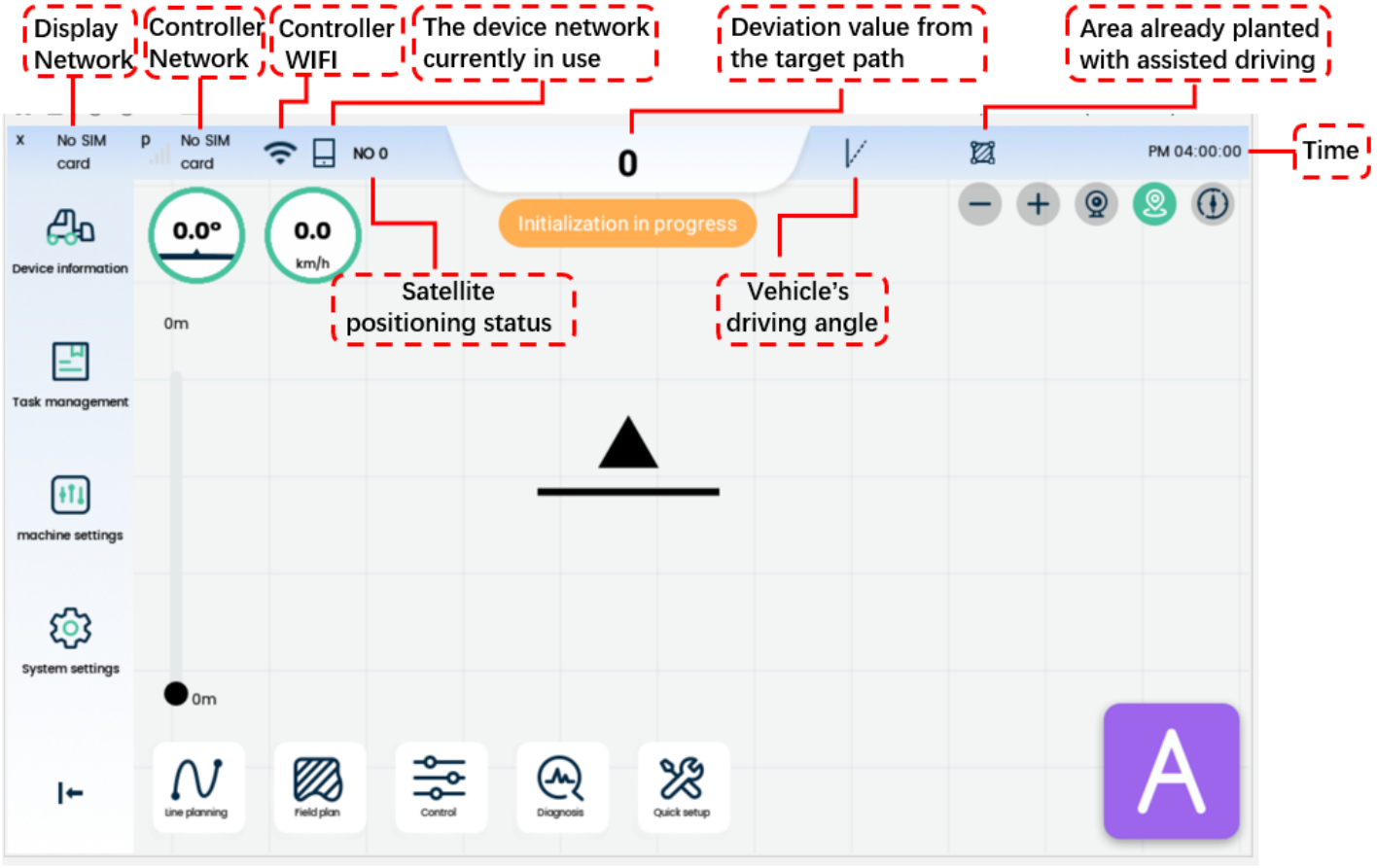
Software check

1. Turn on the power , start the software, enter the software interface, and check if the system is normally powered on.
2. Check if the software version is the latest one. If not, please upgrade it in time.
3. Carry out left and right steering test on the display terminal, and check if the connection is correct.
4. Check satellite signals and solution status.
5. Measure the vehicle and antenna data, and enter them into the software in time.

5 Software

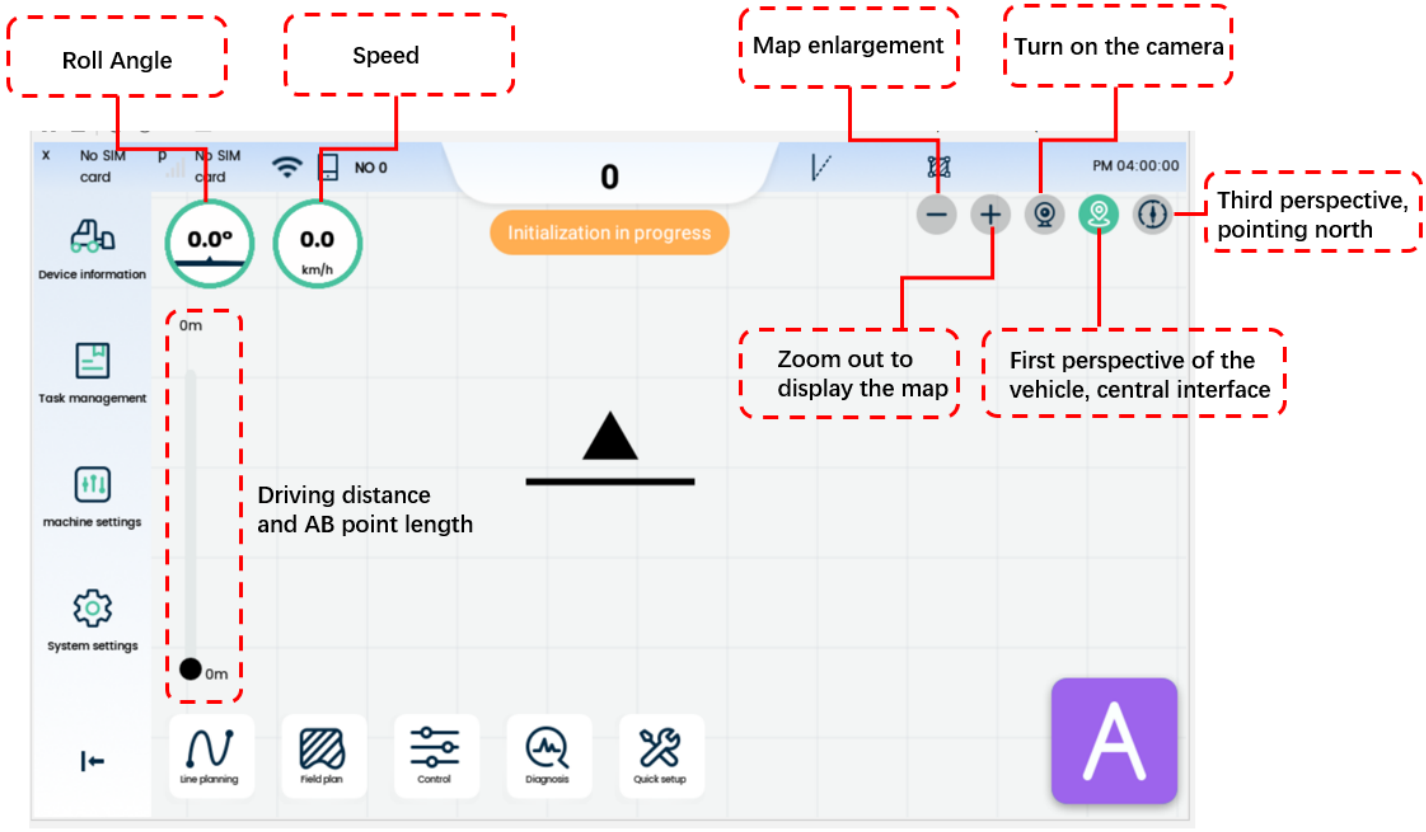
5.1 Overview

The main software interface is as follows:



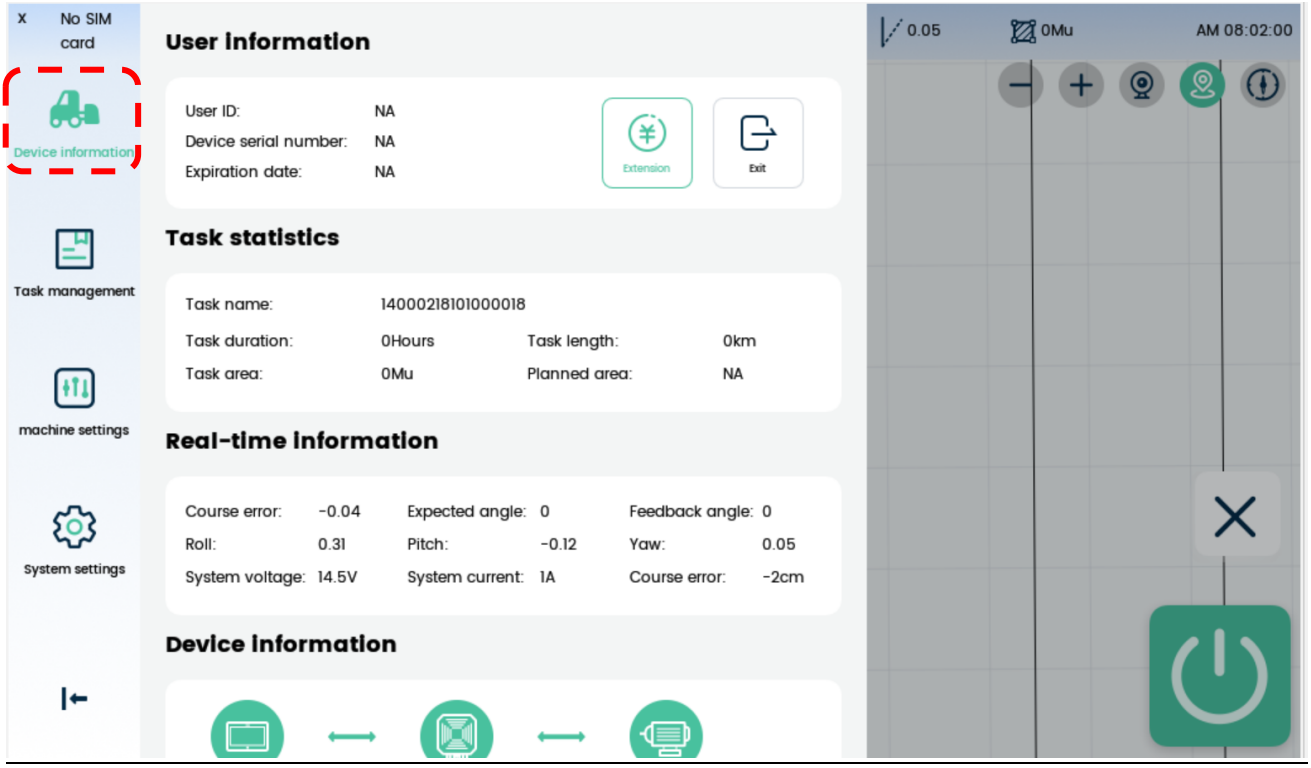
Satellite Positioning Status

- NO : no satellite signal.
- AUT single solution.
- FLT :float solution.
- DIF : SBAS status (the wide-area differential augmentation system (satellite-based augmentation system)).
- RTK : fixed solution. The number after **RTK** refers to delay. Please start your work after the solution status is fixed solution.
- PPP : Star based enhanced state, while reaching a fixed solution.
- PPP-S : Star based system, the system is in a converging state.



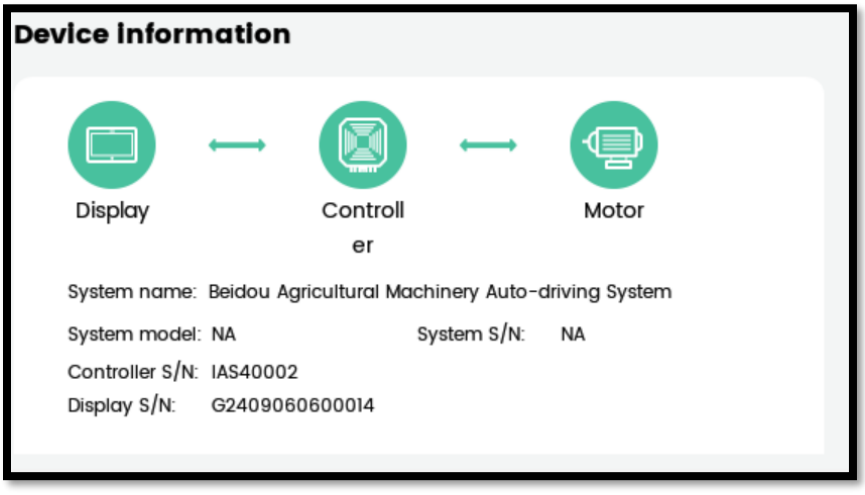
Driving distance and AB point length：

- 0m ： The number represents the straight-line distance between point A and point B after the navigation line is set.
- 0m :The distance that has already been traveled.
- :Driving progress bar,and the green represents the part that has already been driven
- :The pattern represents the vehicle.
- A :The pattern represents point A.(use in creating a new homework navigation line after clicking once successfully, it will become point B)

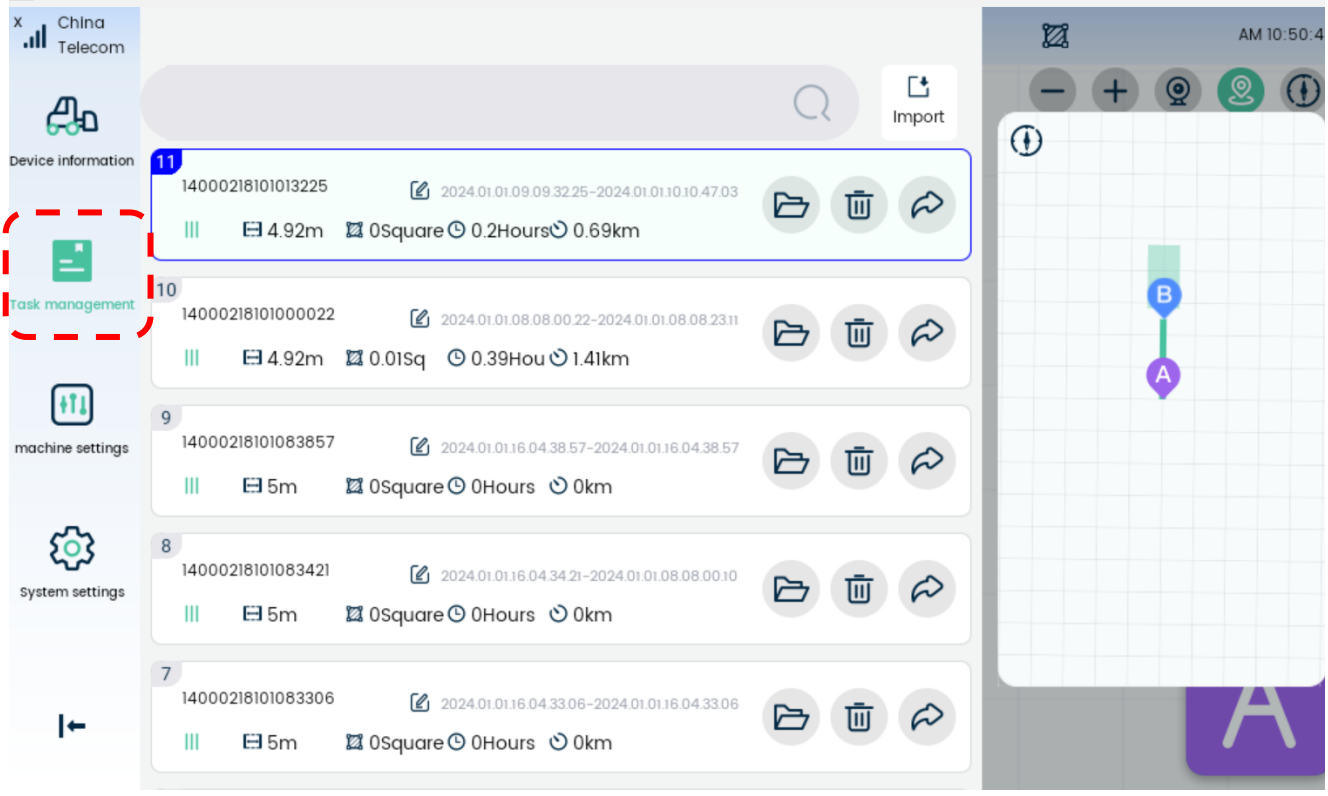


5.2 Device Information：

- User Information-------- You can see your ID information through it; Device code and expiration time of the device
- Task statistics--------You can see the information of your current assignment through it.
- Real-time Information--------You can see real-time change information of the controller, including the gyroscope, through it; Sensors; Current, voltage, etc
- Device Information

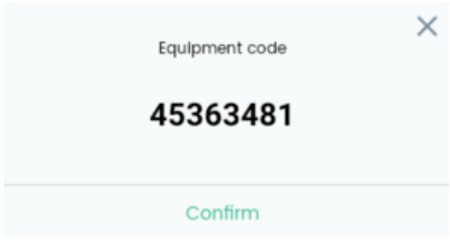


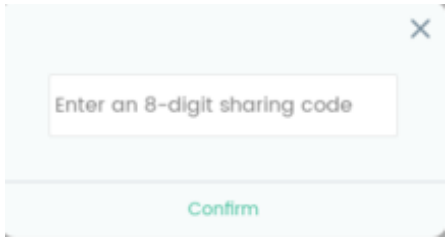
--------You can see the connection status of the controller, motor, and display through it, as well as the ID code information of the device. When the device malfunctions, it will turn red, indicating that there is a problem with the circuit or the device



5.3 Task Management:

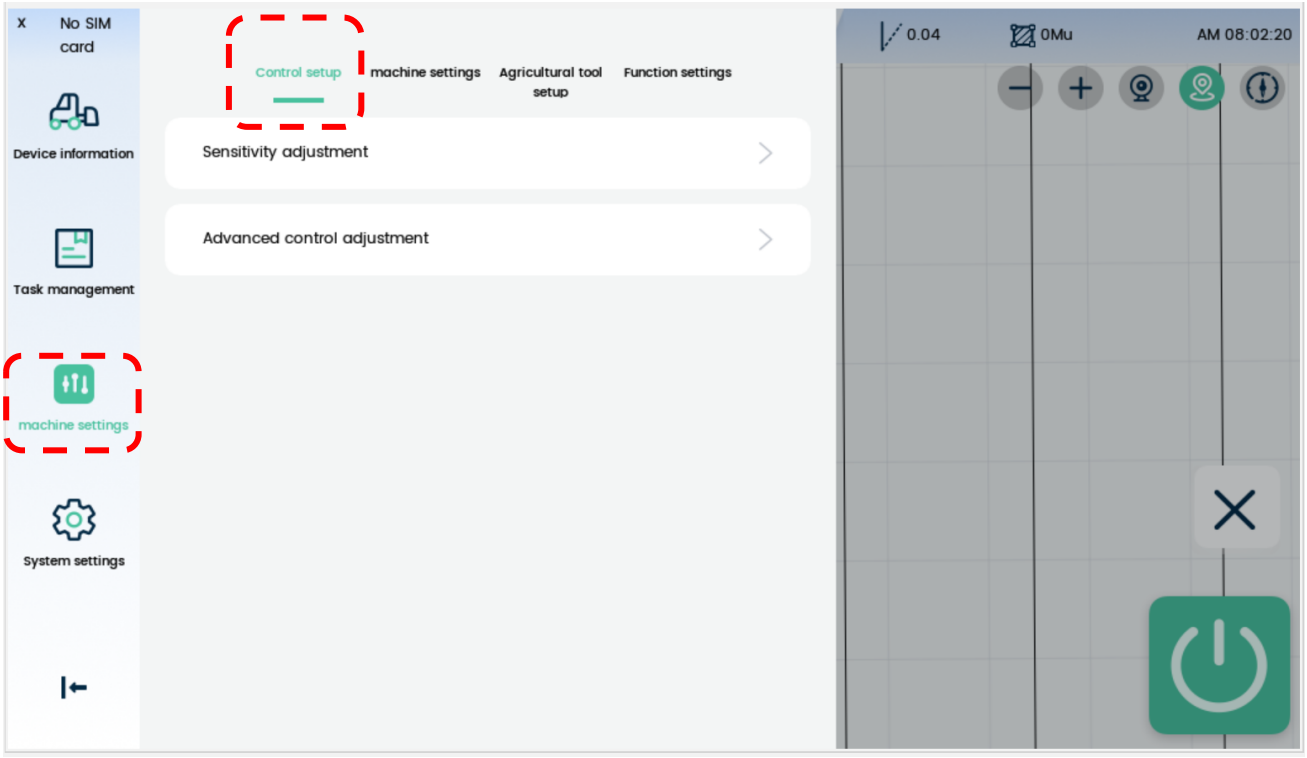
-  : Click on the icon to open the homework file.
-  : Click on the icon to delete the corresponding homework file.
-  : Click on this icon to share the corresponding homework file with other devices. Clicking on it will generate a numeric code, and the corresponding device will enter the device code to obtain the homework file





You can observe the homework time, number of acres, width of farming tools, etc. through the small window

5.4 Machine Setting



5.4.1 Control Setup: Clicking on this position will bring up the following window

Sensitivity adjustment

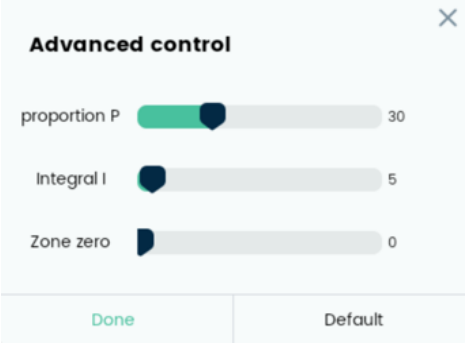
Stability→Represents the velocity coefficient, the

Entry→Adjustment of entering the target line

Reverse→Regarding the adjustment of reversing

Generally, within 5km/h all the 3，5~10km/h all the 6，10km/h and more, suggestion 8~10

Advanced control adjustment: Clicking on this position will bring up the following window



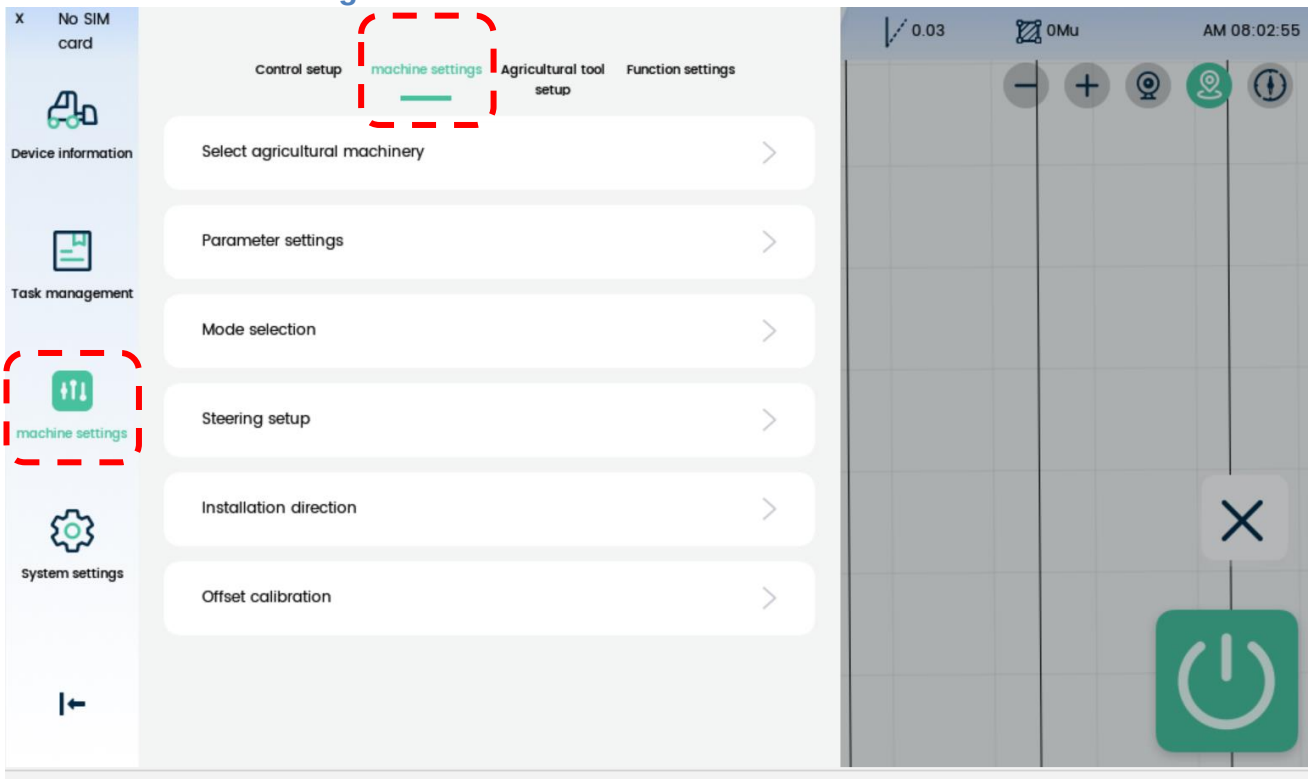
P→Hight numerical value,faster the motor rotation

I→I is an integral used to eliminate errors. If it is too high, it will increase the error.

Zero→Steering wheel gap, 1 represents 1 angle

Generally, PID is not adjusted. It is recommended to first adjust the sensitivity adjustment

5.4.2.1 Machine Settings：

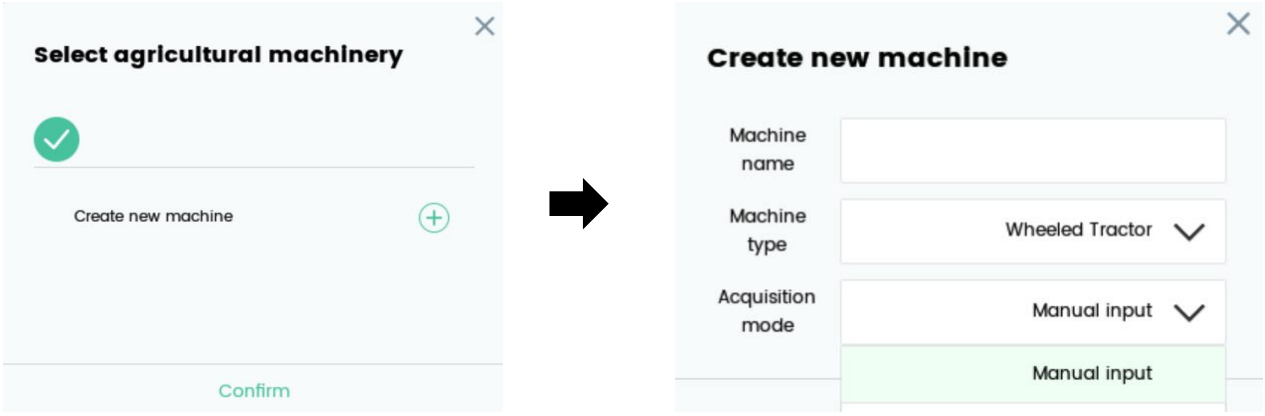


Machine Settings：

Select agricultural machinery :

You can create a mechanical record on the device or select a machine

Like this:

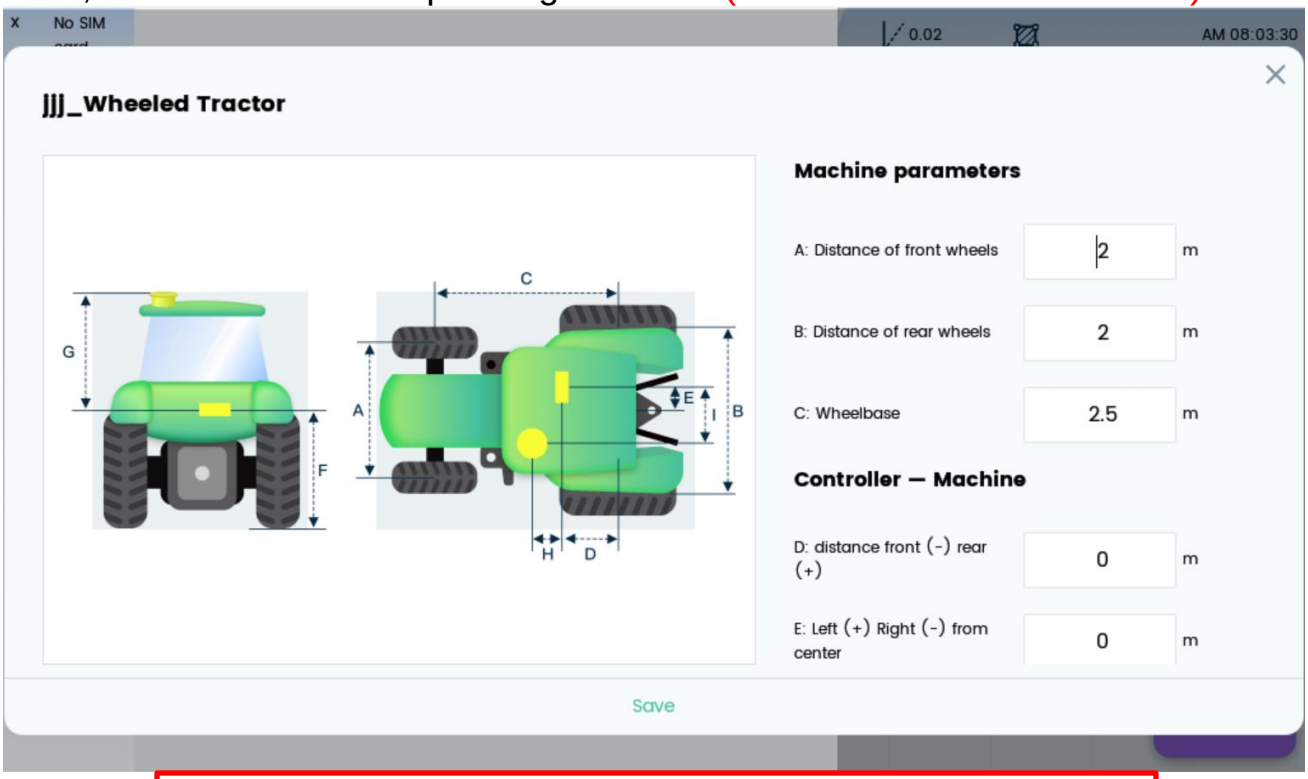


Edit your device name or select a suitable device for you (not mandatory to fill in correctly)

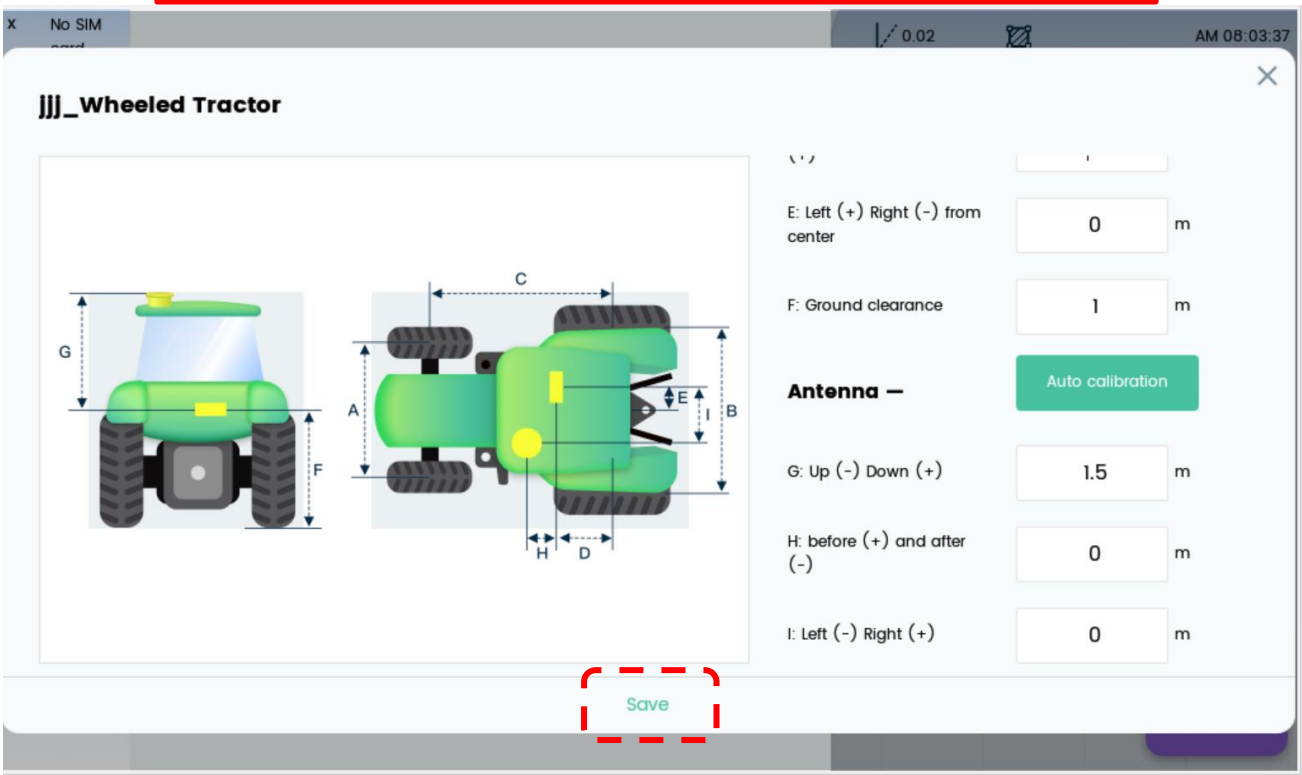
5.4.2.2 Parameter Settings :

(Equipment Parameter Input)

You need to accurately fill in the parameters as shown in the figure, observe A \ B \ C \ D \ E \ F \ G \ in the figure, measure the actual data with a ruler, and fill in the corresponding data box (Note that the unit is "meter")

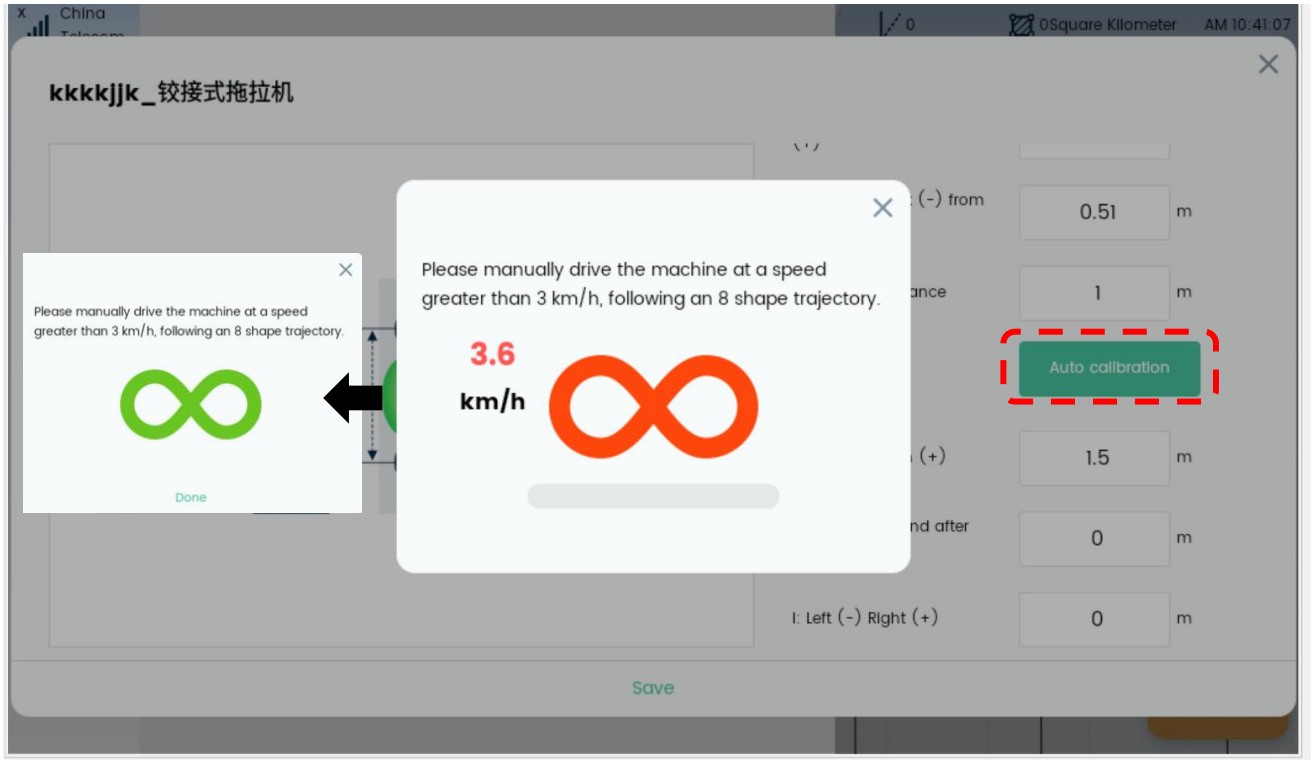


Please try to control the measurement error within the range of 5CM



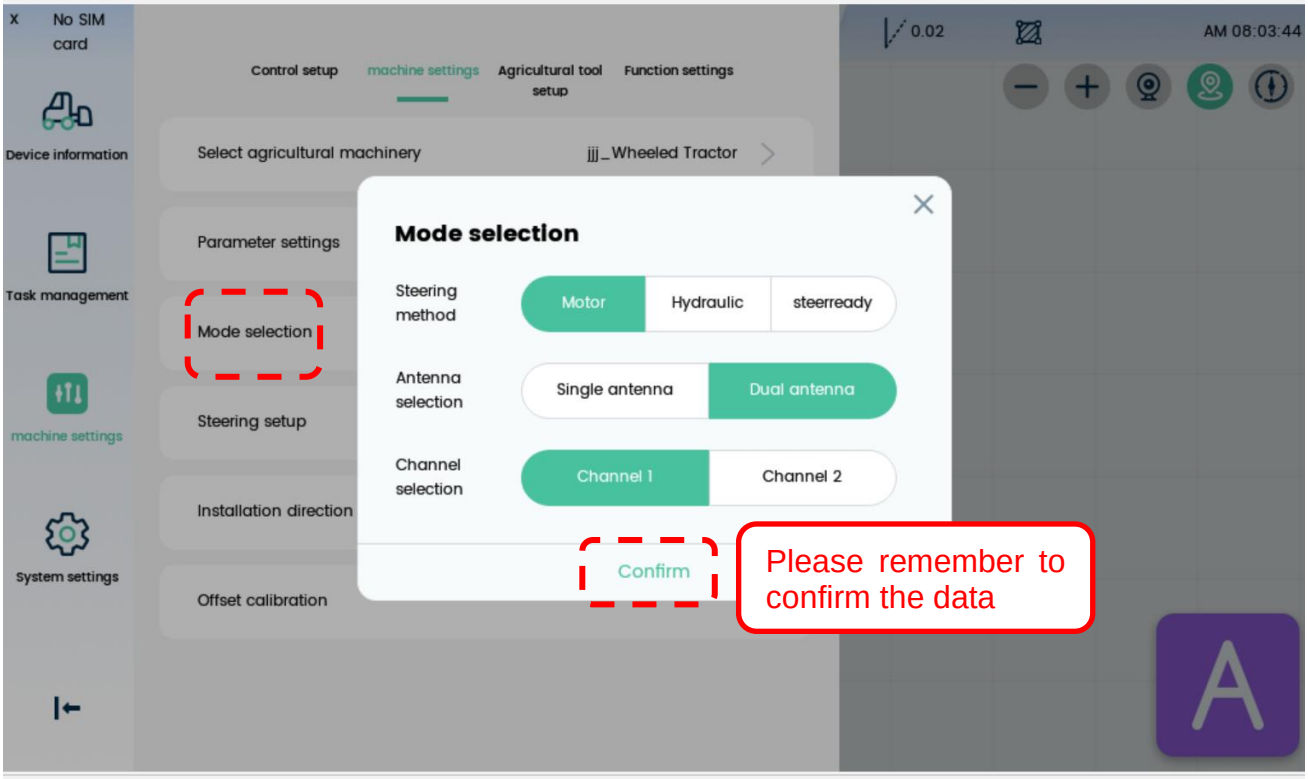
Please remember to save the data

In Addition：



Click to enter automatic calibration, then start the tractor and drive it at a speed of 3KM/h or above in the shape of "8". The progress bar below will move until the interface appears, and click "Finish". The software will automatically change the values of H and I to complete automatic calibration。

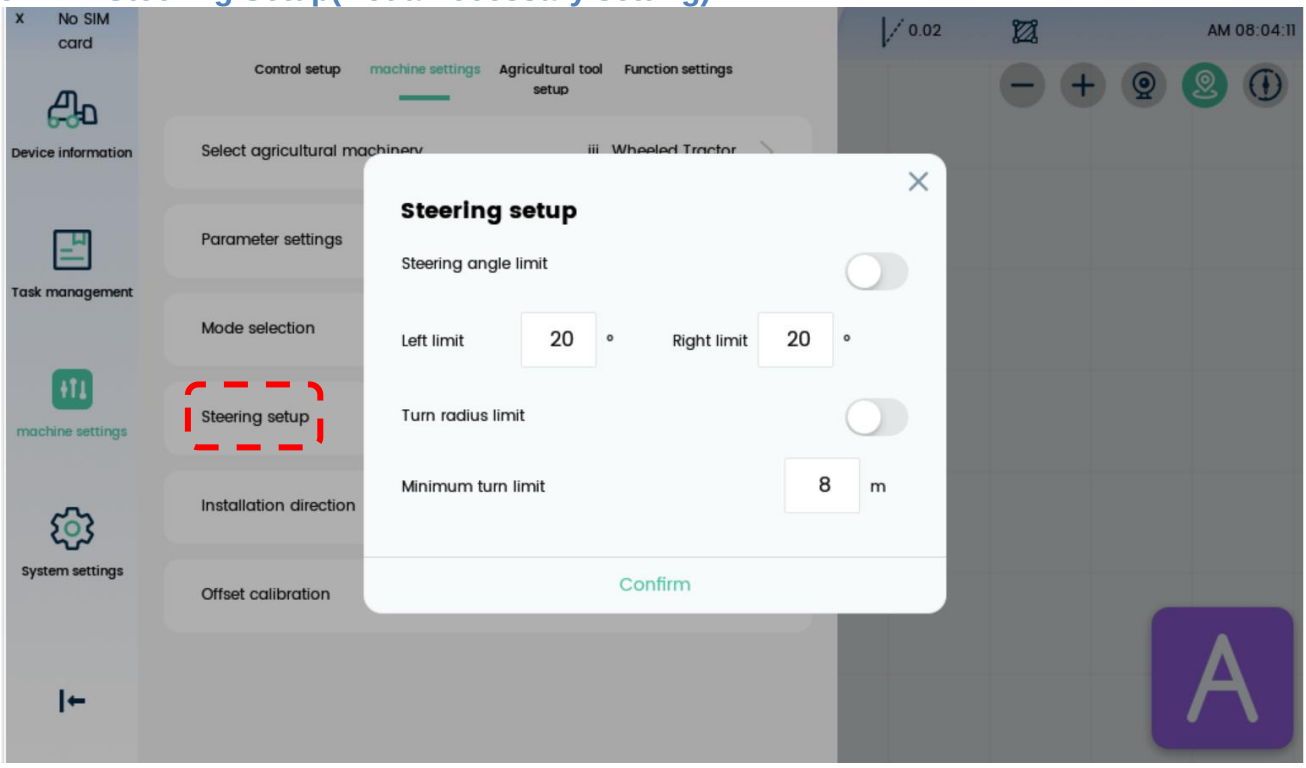
5.4.2.2.3 Mode Selection:



:Channel 1 means : No angle sensor
: Channel 2 means : angle sensor

Please make sure to choose according to the actual usage situation

5.4.2.4 Steering Setup(Not a necessary setting)

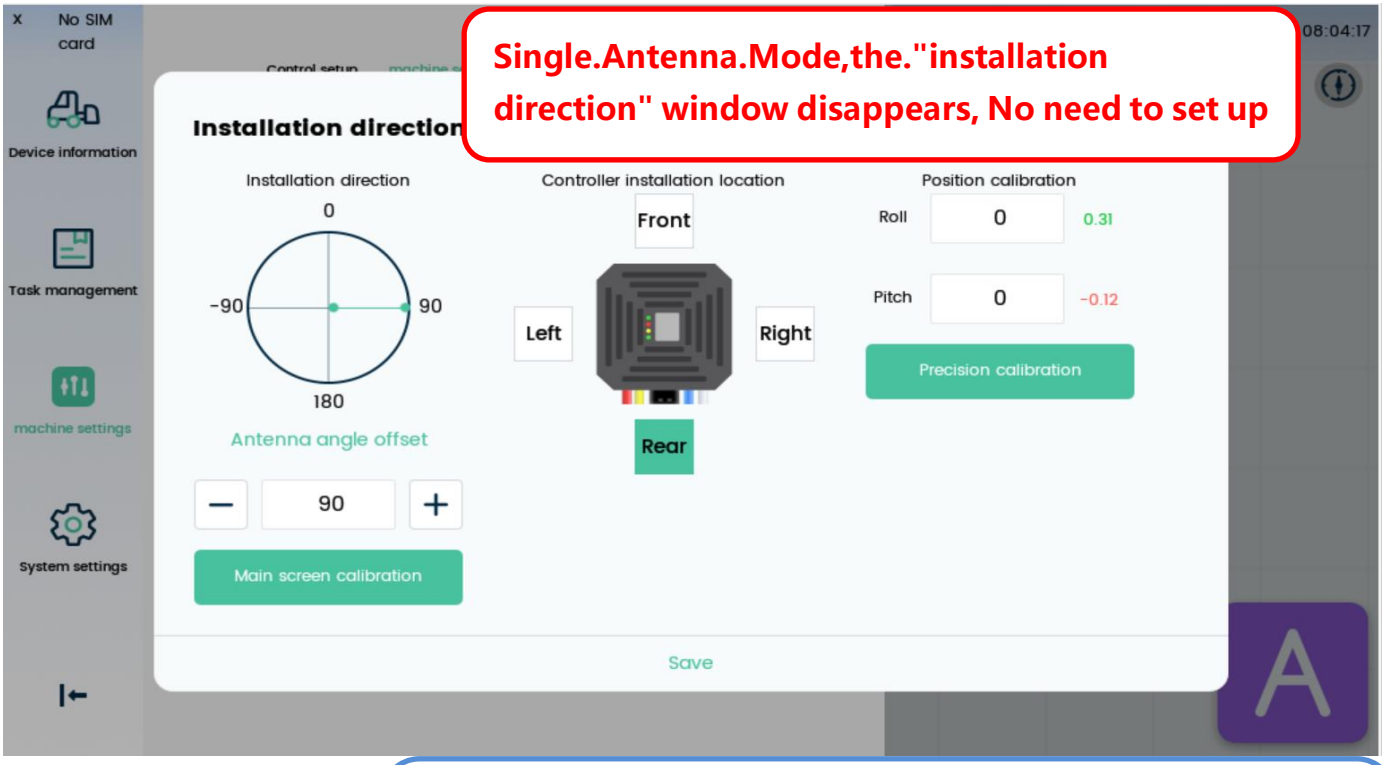


You can limit the steering limit of the vehicle's autonomous driving according to your needs.

Input parameter settings to control the limit value of the vehicle's left and right sway, as well as the turning radius of the vehicle.

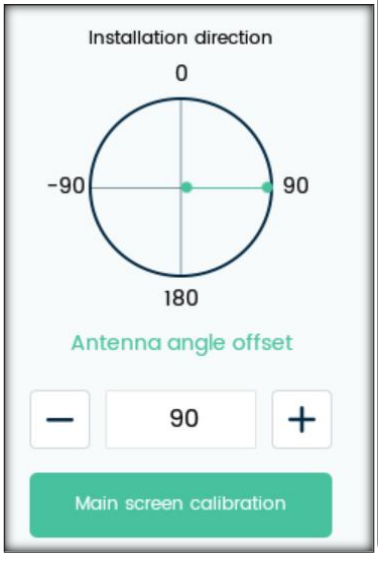
Please remember to save and confirm the parameter

5.4.2.5 Installation Direction



Single.Antenna.Mode,the."installation direction" window disappears, No need to set up

Antenna Angle Offset



When choosing dual antenna installation, the antenna angle needs to be set. (The angle and orientation between two antennas).

GNSS1 main antenna
GNSS2 is the secondary antenna

Referring to the diagram, the main antenna is located at the center point. On which side of the main antenna is the secondary antenna located, corresponding to the input value.

As shown in the diagram, if the secondary antenna is on the right, fill in 90 value.

and so on

Main Screen Calibration

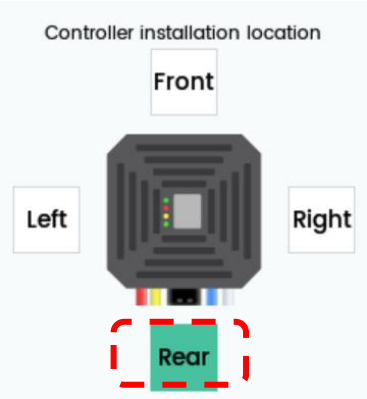
When your navigation deviation value cannot run to 0 and appears a fixed value, You need to click main screen calibration to enter the main interface for calibration.

When the fixed deviation is greater than 0, you need to press the minus sign icon.

When the fixed deviation is less than 0, you need to press the plus icon

Alternatively, you can adjust it by entering a numerical value, with a range of adding or subtracting 0.5 degrees each time

Controller Installation location

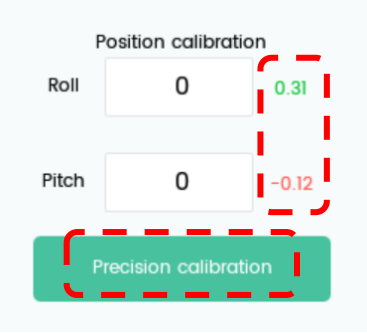


Headstock

According to the Headstock if the outlet of the controller is facing backwards,

Click "Rear" as shown in the example in the figure

Position Calibration



After the controller is installed, the flatness of the controller installation can be displayed as shown in the figure.

ROLL represents the left and right roll data→0.31

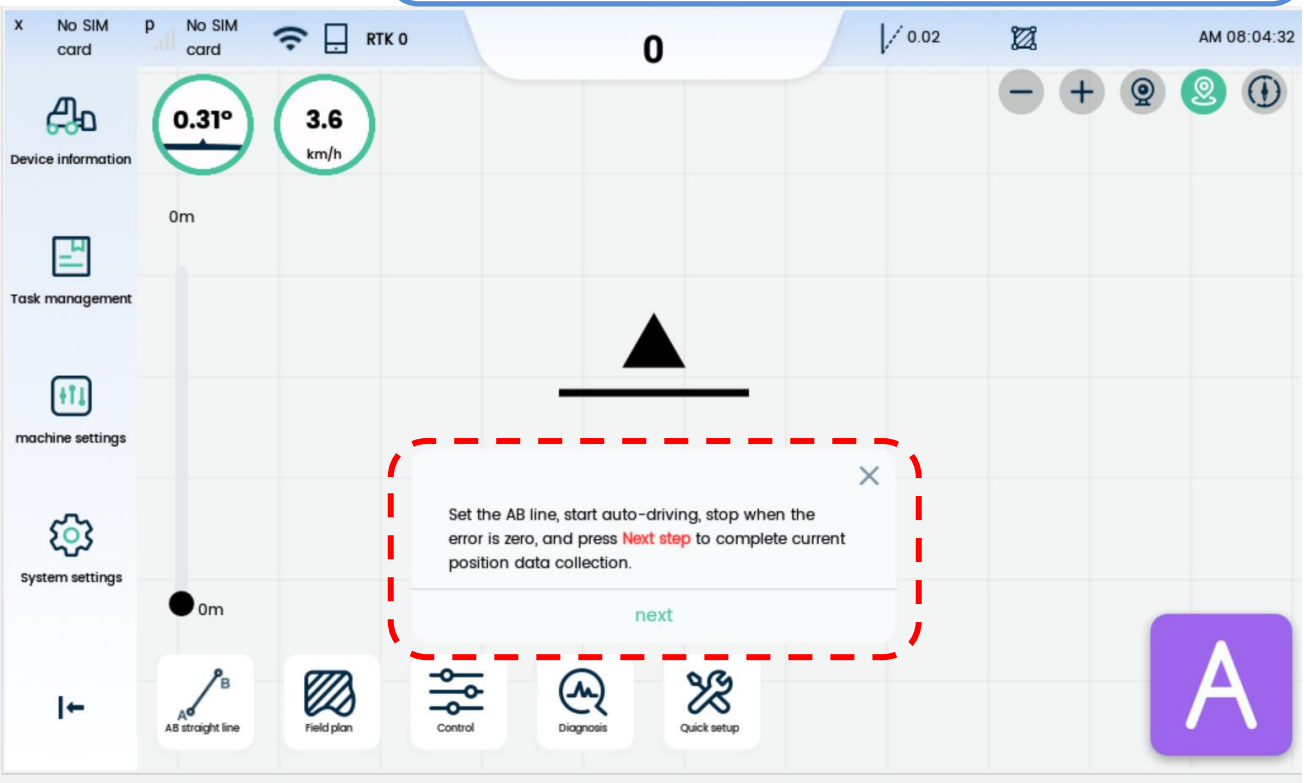
PITCH represents the front and rear pitch data→-0.12

The vehicle must be parked on a flat surface，

If the displayed value exceeds 1 degree, it is recommended to click the icon below to calibrate.

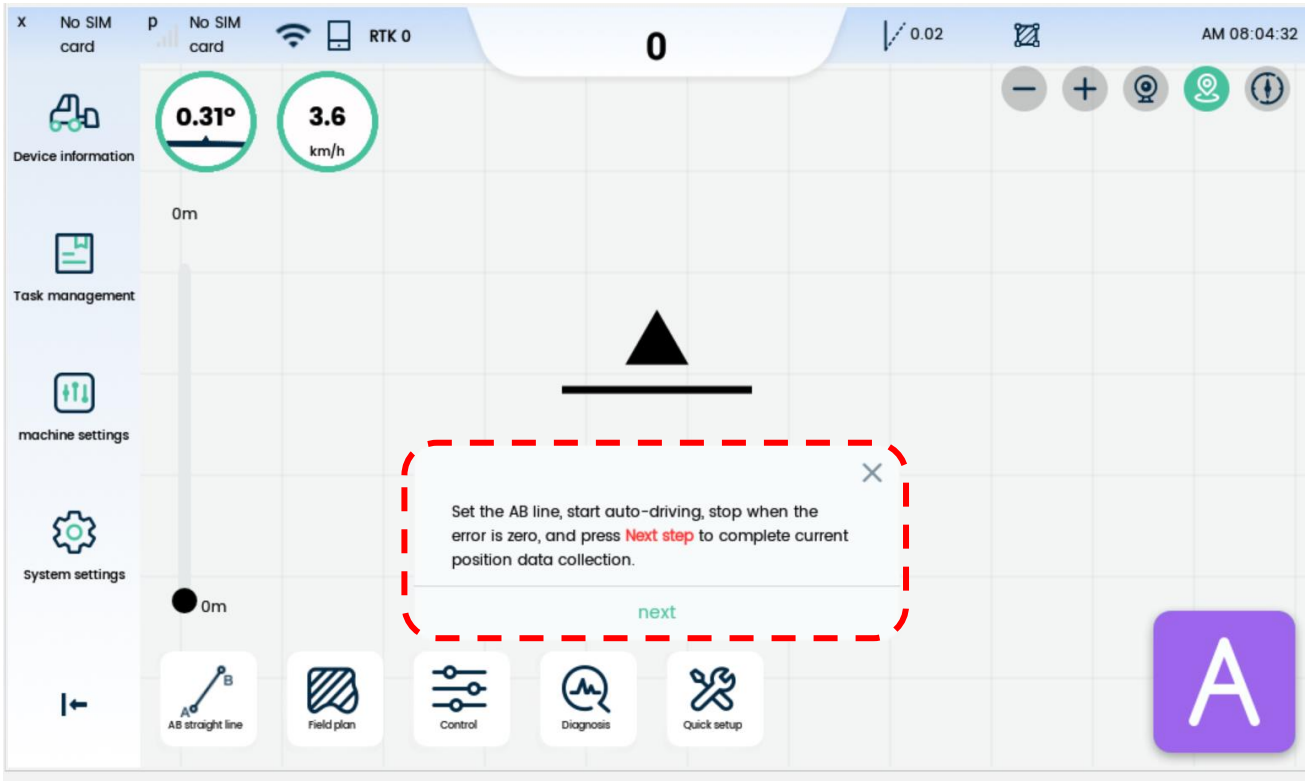
If it exceeds 5 degrees, the position of the controller needs to be reinstalled

Precision Calibration



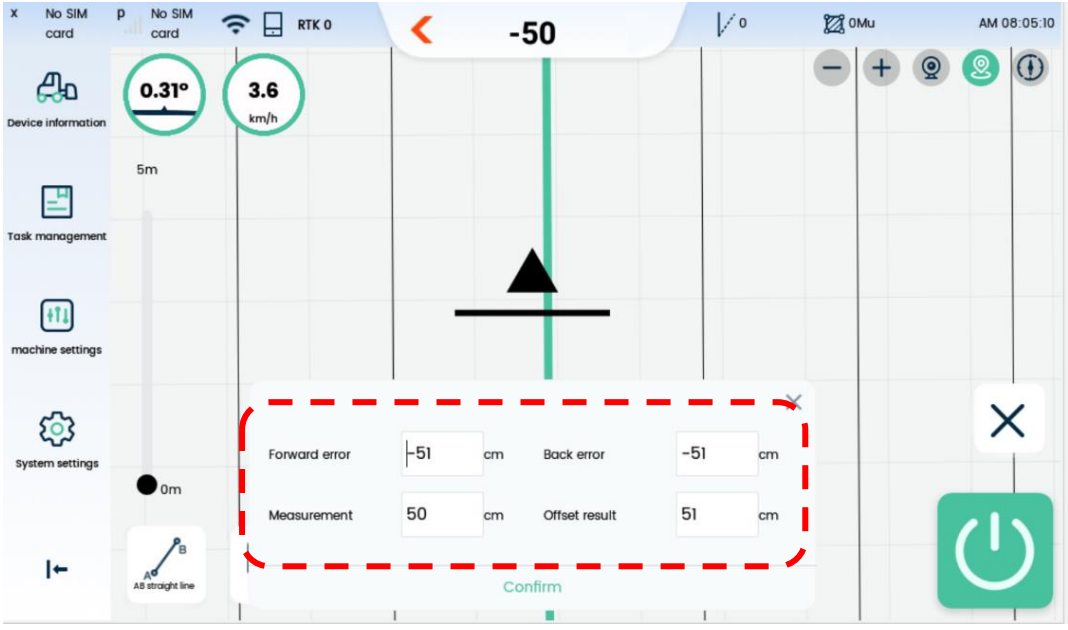
Please follow the window language prompts step by step to operate
Suggest driving on a flat road surface to calibrate

5.4.2.6 Offset Calibration



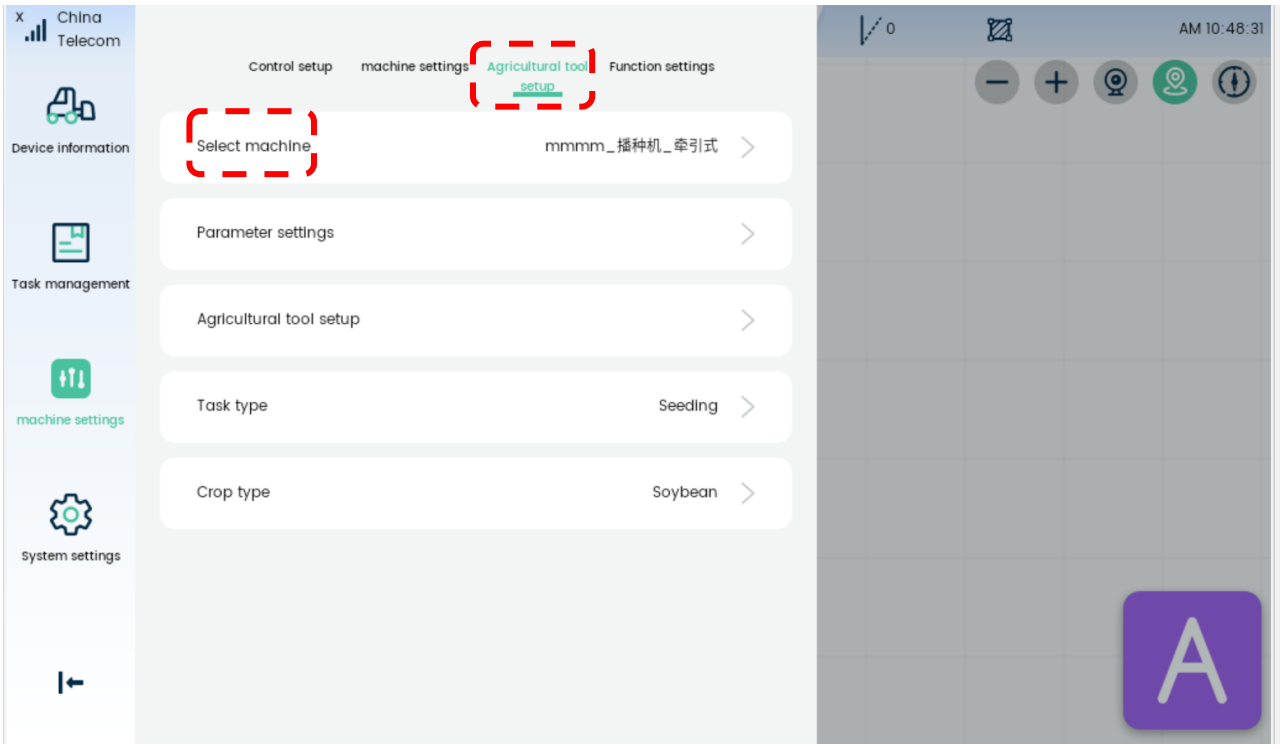
Offset calibration : After clicking the offset calibration icon, enter the display interface shown in the above figure, and then follow the window prompts to enter the data step by step, and finally confirm and save

Please note that after completing the steps, the calculated results will correct the E parameter in the agricultural machinery parameter settings

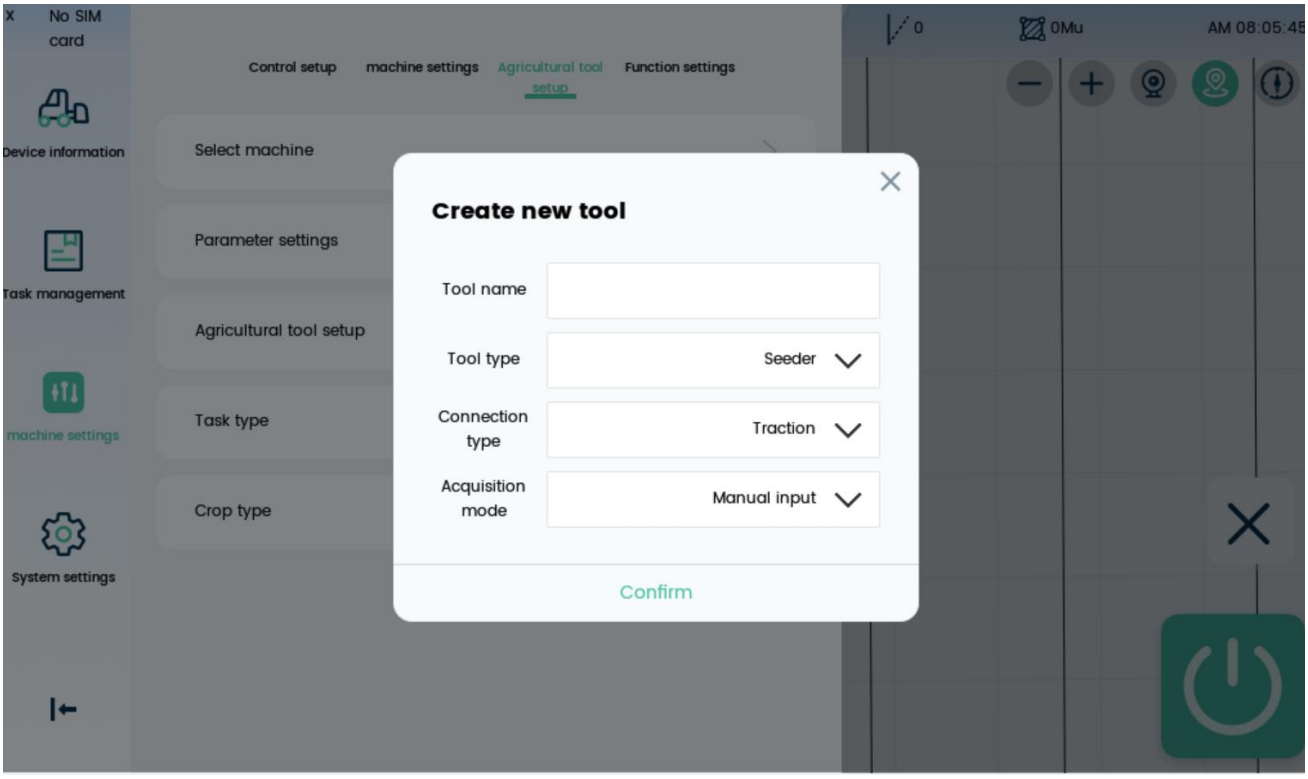


5.5 Agriculture Machine Setup

5.5.1 Select Machine

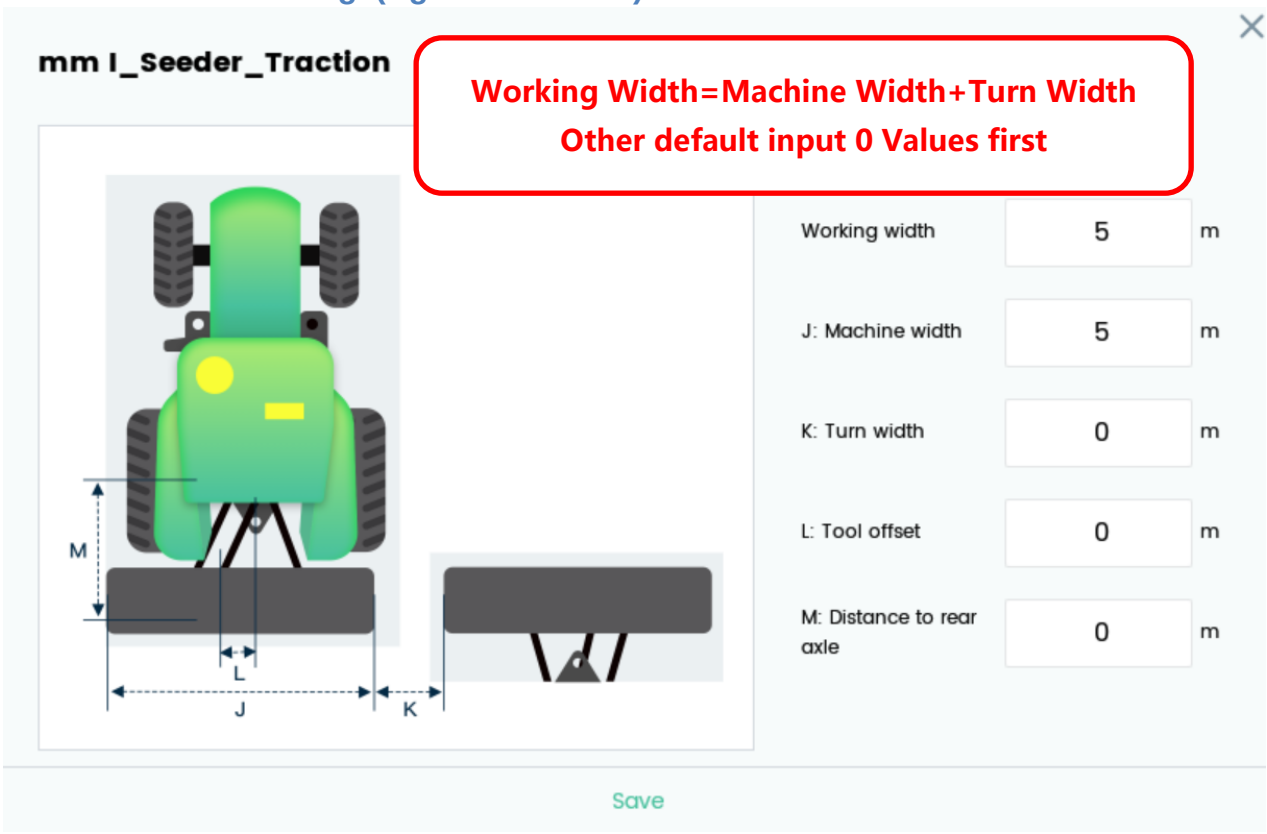


You can choose a tool to record on your current job, or you can click the plus sign to add a new tool for recording. Similarly, you can also click the delete icon to remove the tool



In the interface for creating a new agricultural machinery, enter the name of the tool, select the type of tool, choose the attachment form and acquisition method (where manual input means creating a new tool with fixed parameters, and host acquisition means creating a new tool with parameters already set by the current controller.

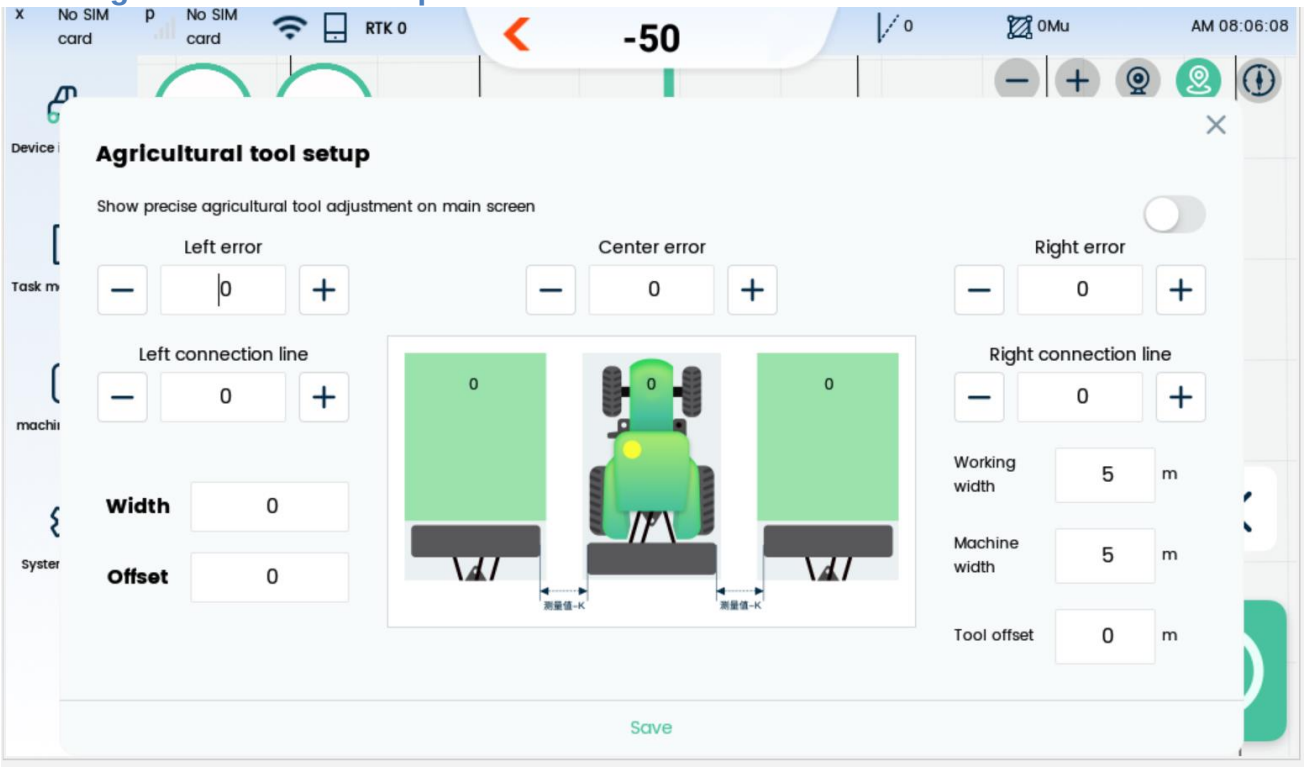
5.5.2 Parameter Settings(Agricultural tool)



Please use a measuring tool to measure and input into the box

(Record →J/K)(L/M input 0 valves first)

5.5.3 Agricultural tool set up



Agricultural tool offset adjustment interface

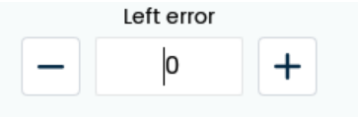
Method:----------

Adjust the agricultural tools to the central position of the vehicle, fix them in place, and then enter the graphical interface. This function is used to modify the width of the tools, the width of the operation, and the offset of the tools to correct the problem of inaccurate line spacing during operation (line spacing calculator function).

Drive a tractor to simulate a task, driving a short distance for a total of 3 round trips, generating two line spacing as shown in the figure.

For example:

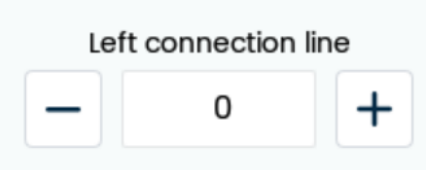
Record the error value displayed on the first screen as the left error value,



Record the error value displayed on the second screen as the middle side error value,

Record the error of the third lie as the right error value,

Then the handover between the first and second trips is left connection line, and the handover between the second and third trips is right connection line.



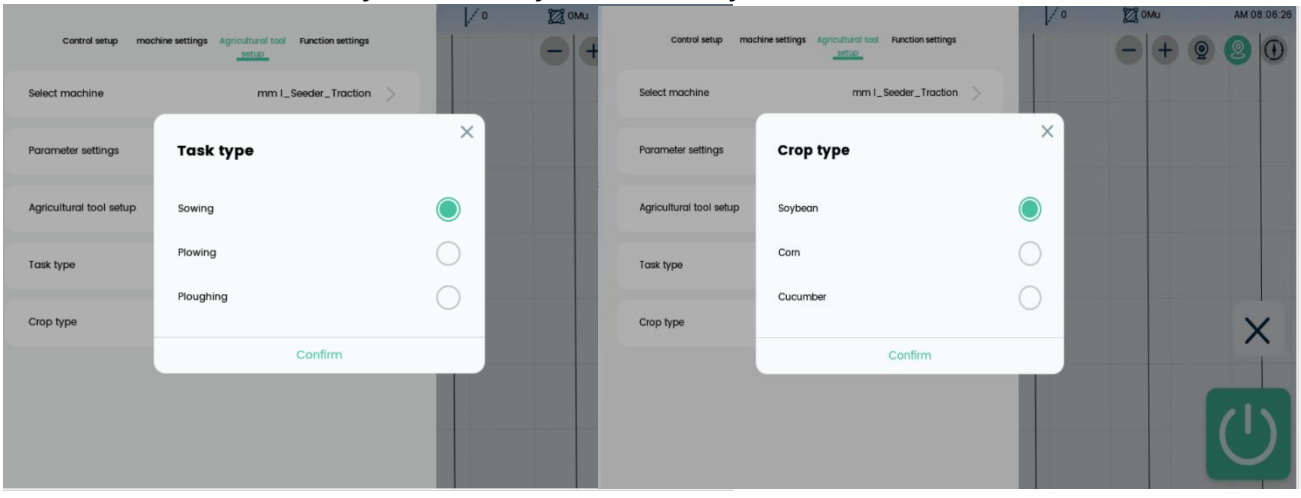
After entering all the values, the software will automatically calculate the width correction and offset correction.

Click “Save”.

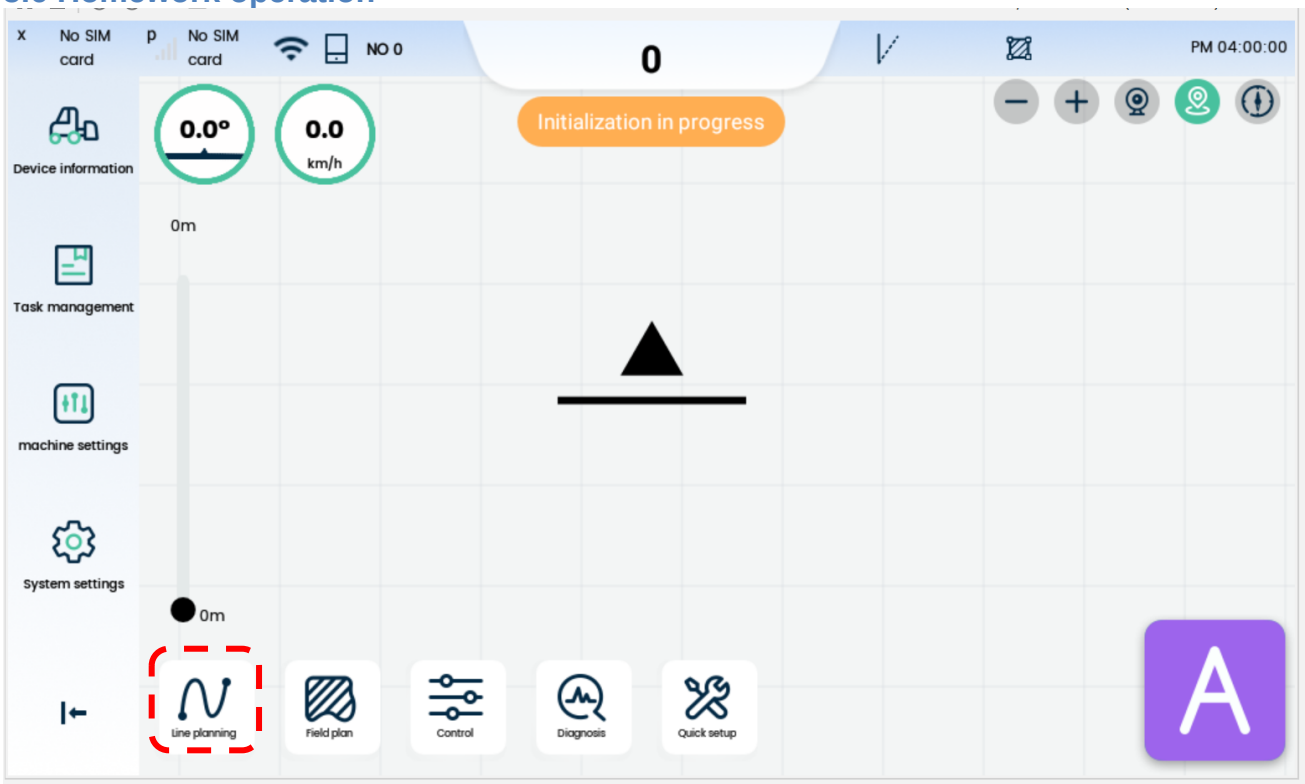
5.5.4 Task Type and Cope Type

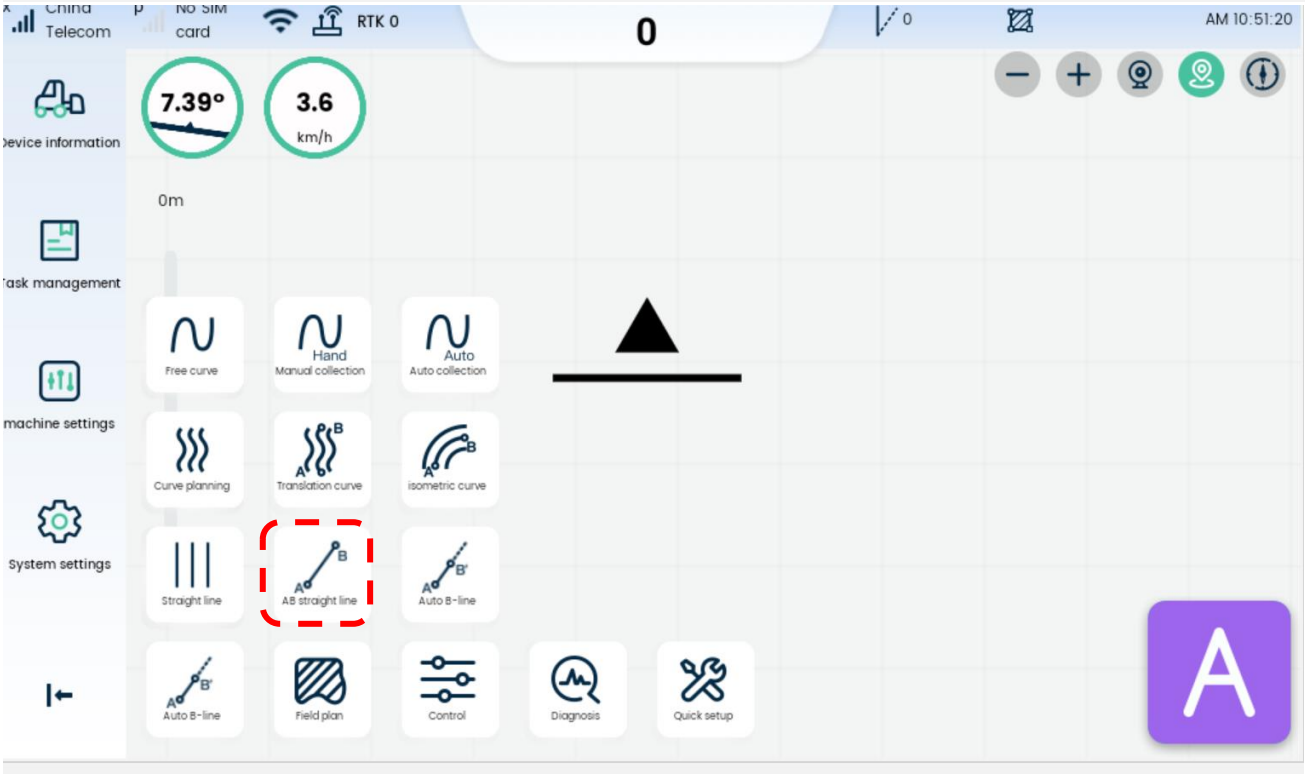
Types and types of assignments.

After selection, it will be synchronously recorded in your homework record



5.6 Homework operation





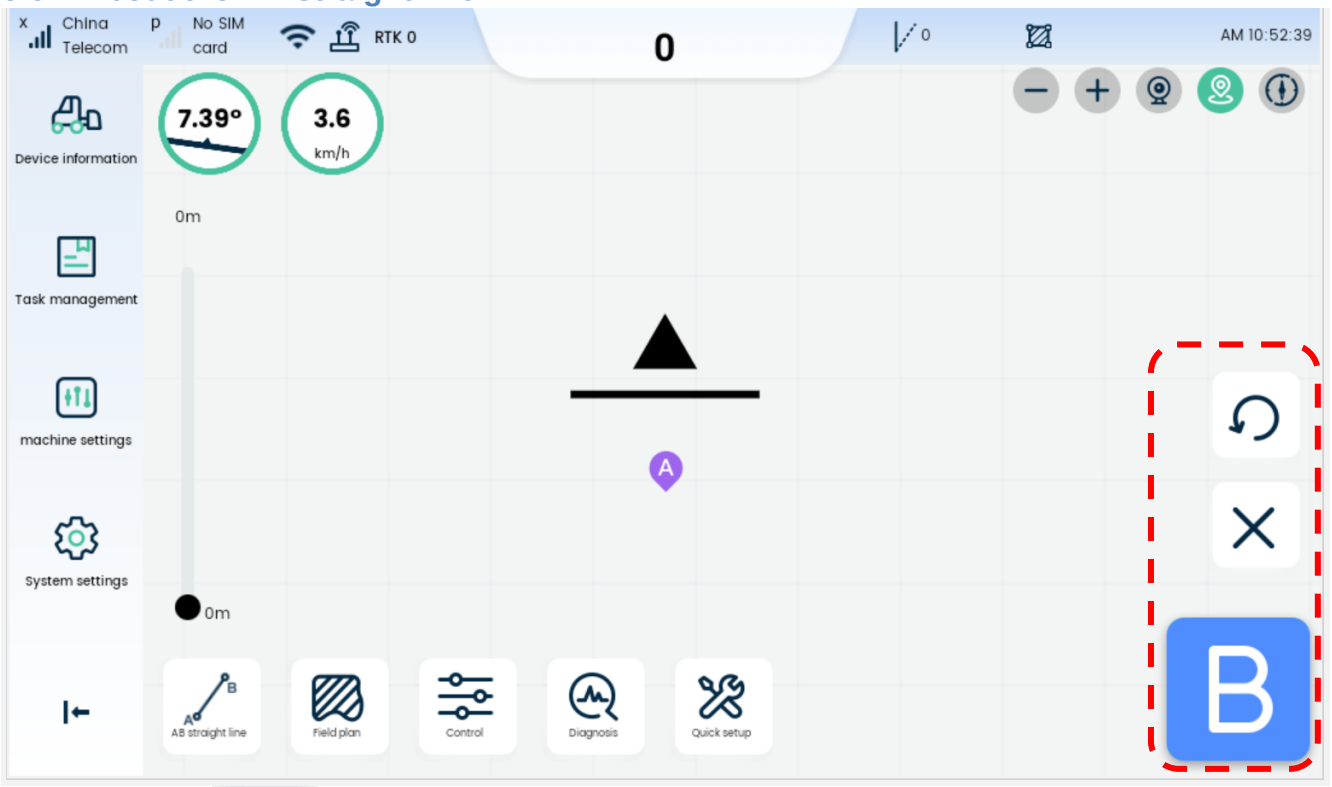
Click on the icon to expand different types of work modes

(Currently only supports AB straight line, automatic B-line)

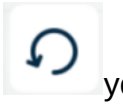
In this mode, the working track is a line, and you can set it by setting two points. You can shift the guidance line if it is not the desired one instead of creating a new one.

To use AB line mode, do the following:

5.6.1 About the AB straight line



1、 Click  to set point A,  you can return and type point A again,  or exit the new job,

2、 Click  to set B,  you can return to point B again

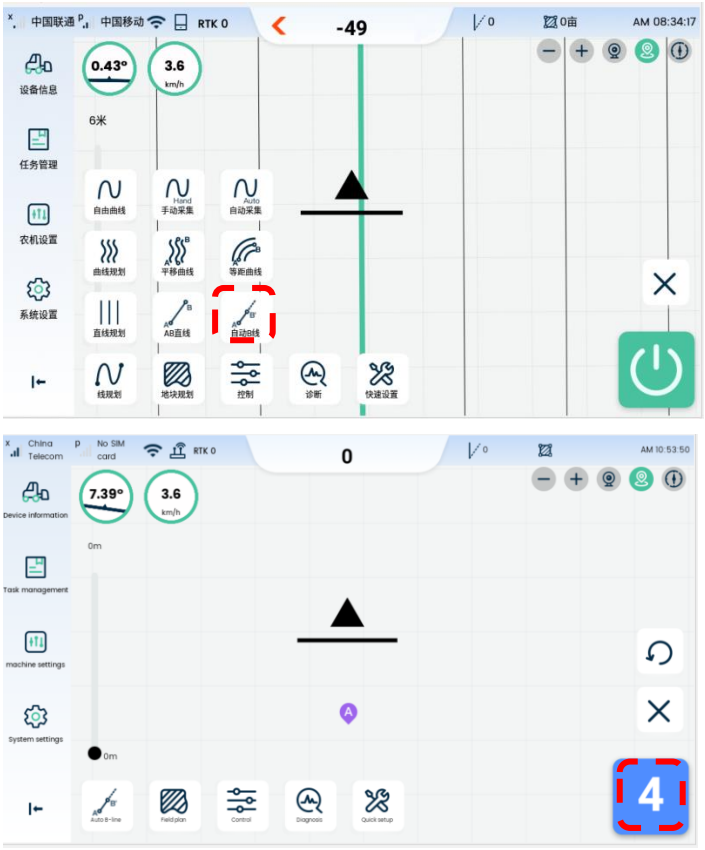
3、 Click  to confirm to complete the new assignment operation

4、 Press  to engage automatic driving, and stop the vehicle when it reaches the plot tail.

Turn the vehicle around, engage automatic driving to enter any of AB guidance lines, and start your work.

To calibrate line spacing, press Agricultural tool settings, See Configure the Implement for details.

5.6.2 Automatic B-line function



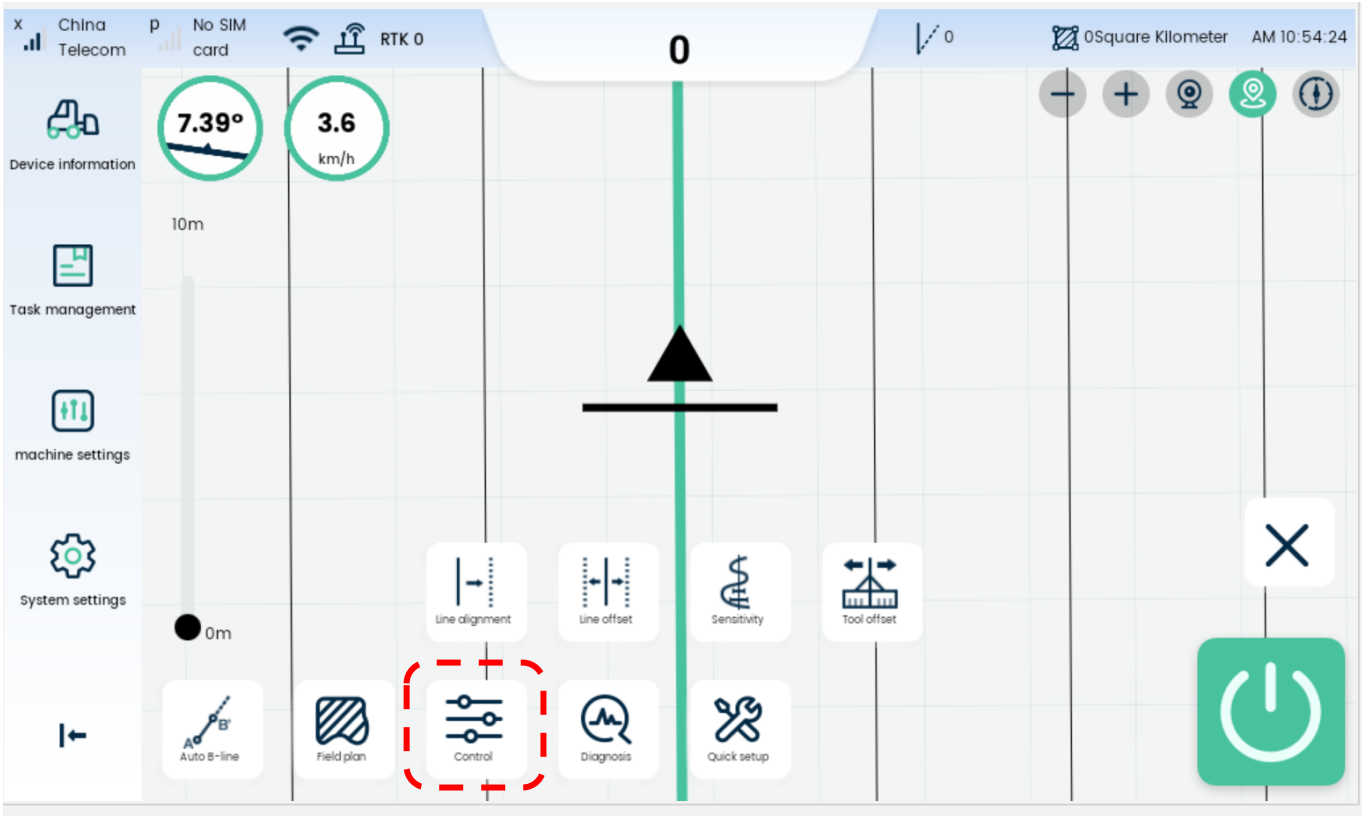
Click on the automatic B-line icon

Set point A,or  you can return and type point A again,  or exit the new job,

 Indicate the straight-line distance between the current point and point A, where 4 represents 4 meters. If it exceeds 50 meters, point B will be automatically marked.

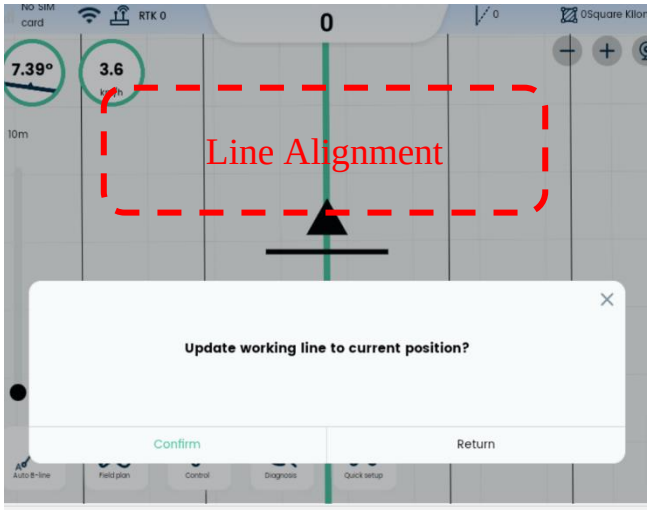
 Click to complete the new assignment

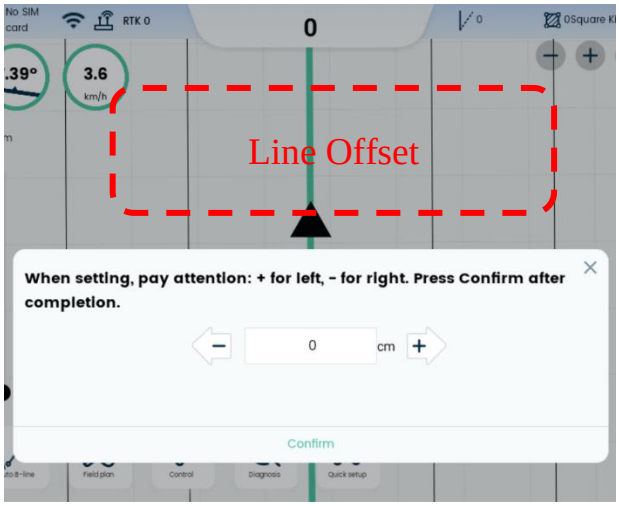
5.6.3 Control function

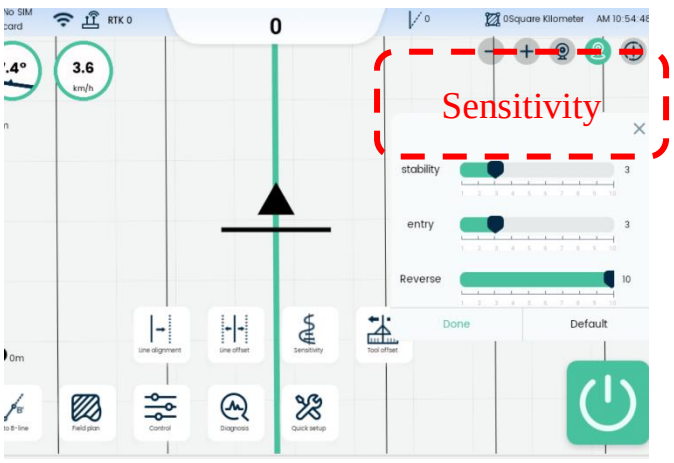


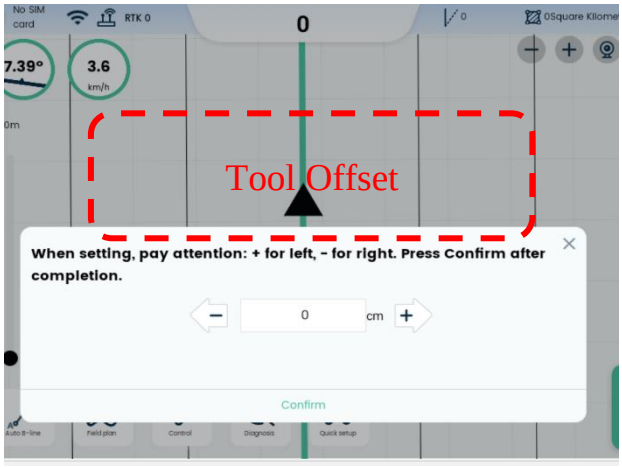
Control(Quickly and conveniently adjust the window)

Line Alignment	Move the navigation target line to the current position of the vehicle	
Line Offset	Move the target line by inputting parameters	
Sensitivity	Sensitivity adjustment Convenient small window →Stability →Entry →Reverse	
Tool Offset	Used for hanging agricultural tools off center and adjusting row spacing	

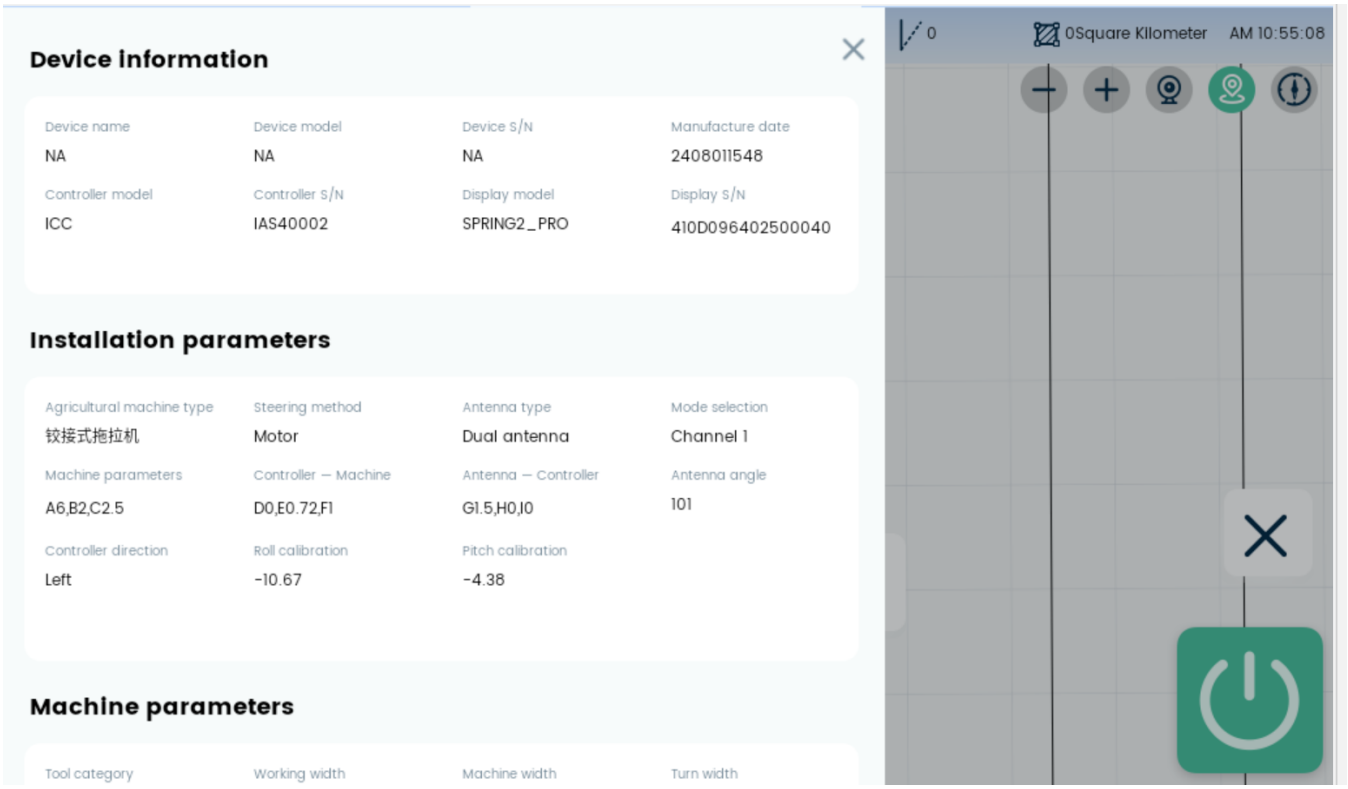








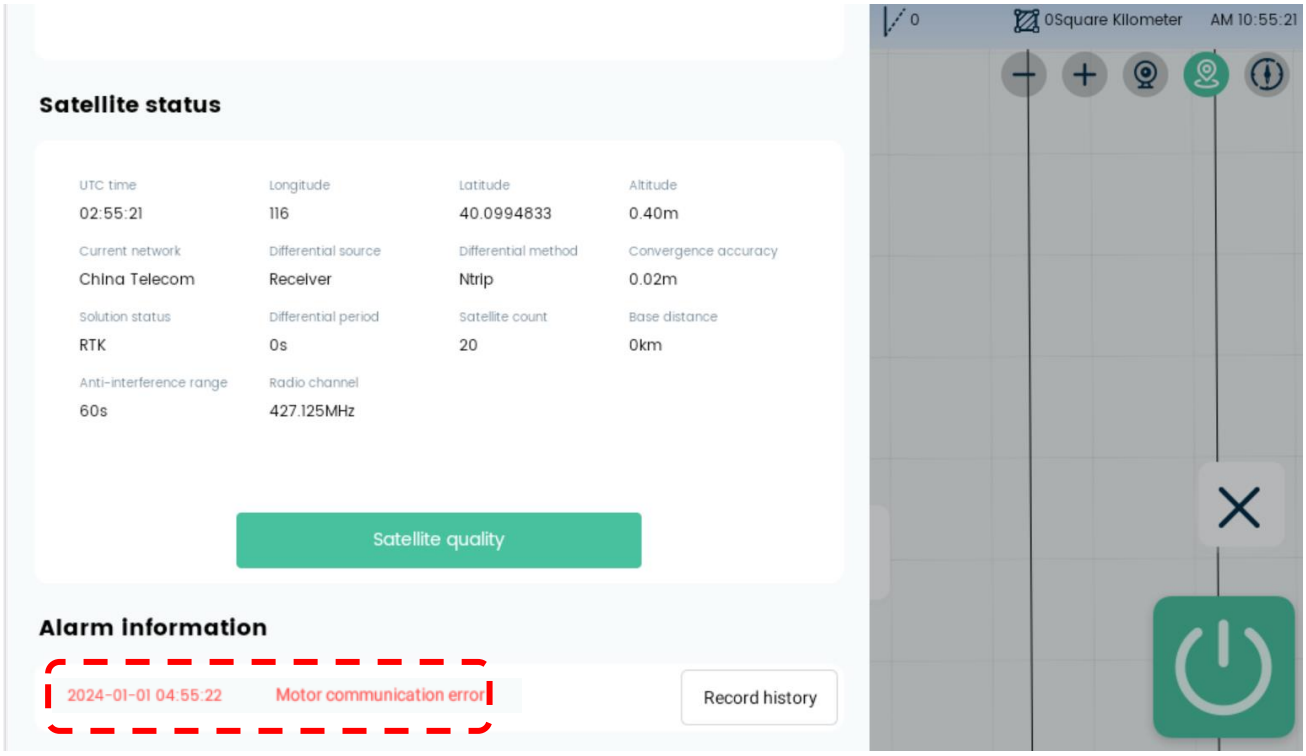
5.6.4 Diagnosis



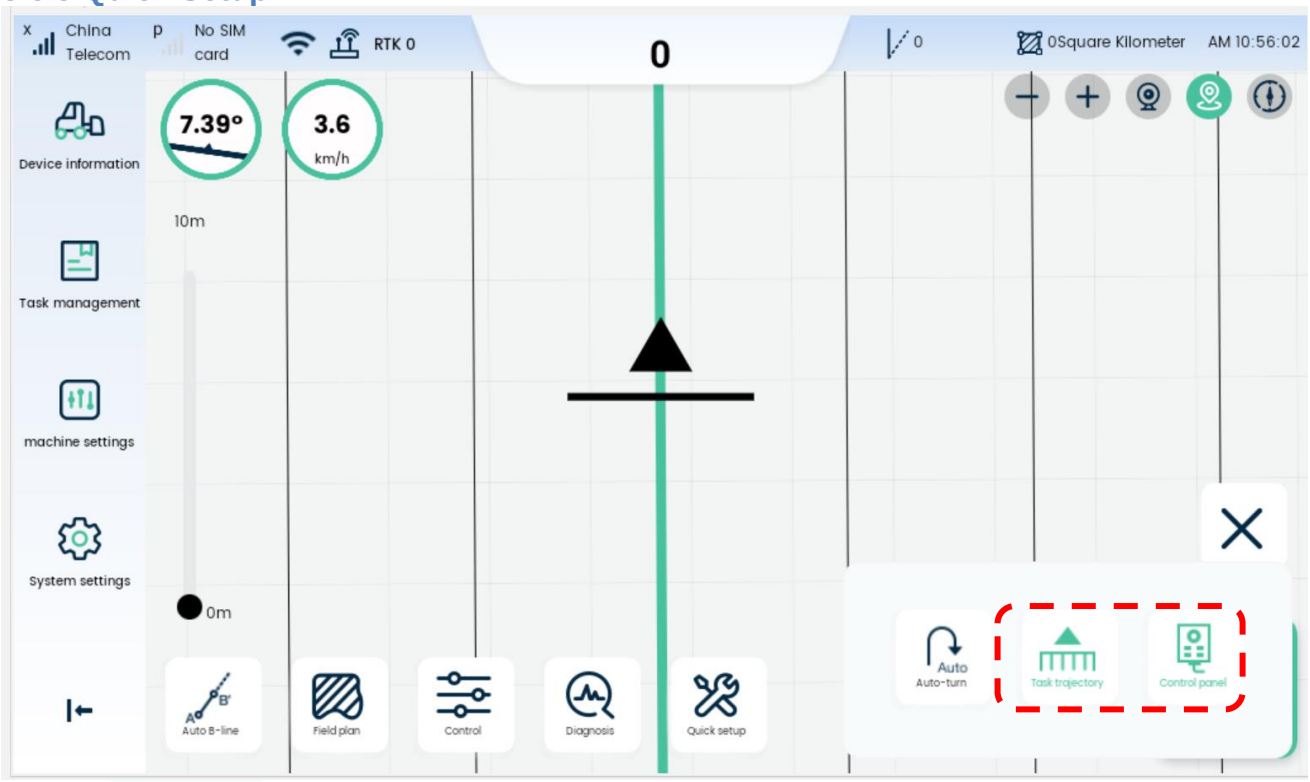
Click on Diagnosis to easily see all the information

Including: equipment information, installation parameters,

tool parameters, satellite status, historical alarm information.



5.6.5 Quick Setup

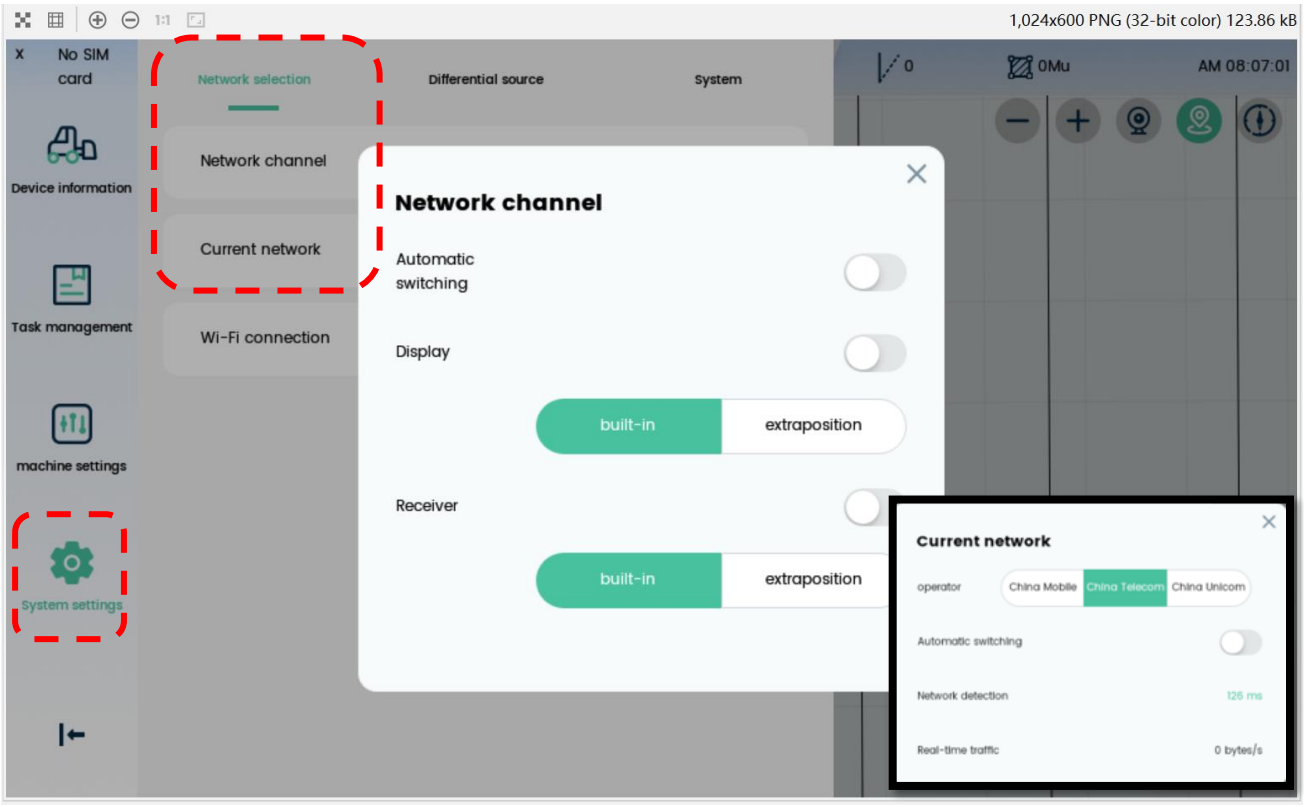


Click to light up, green represents the activation of the track recording function (displaying the job track on the map, otherwise, the track will not be displayed)

When your navigation is connected to the handheld control panel, clicking on it will light it up. Green represents that the control panel has been turned on.

Auto turn function has not been developed yet

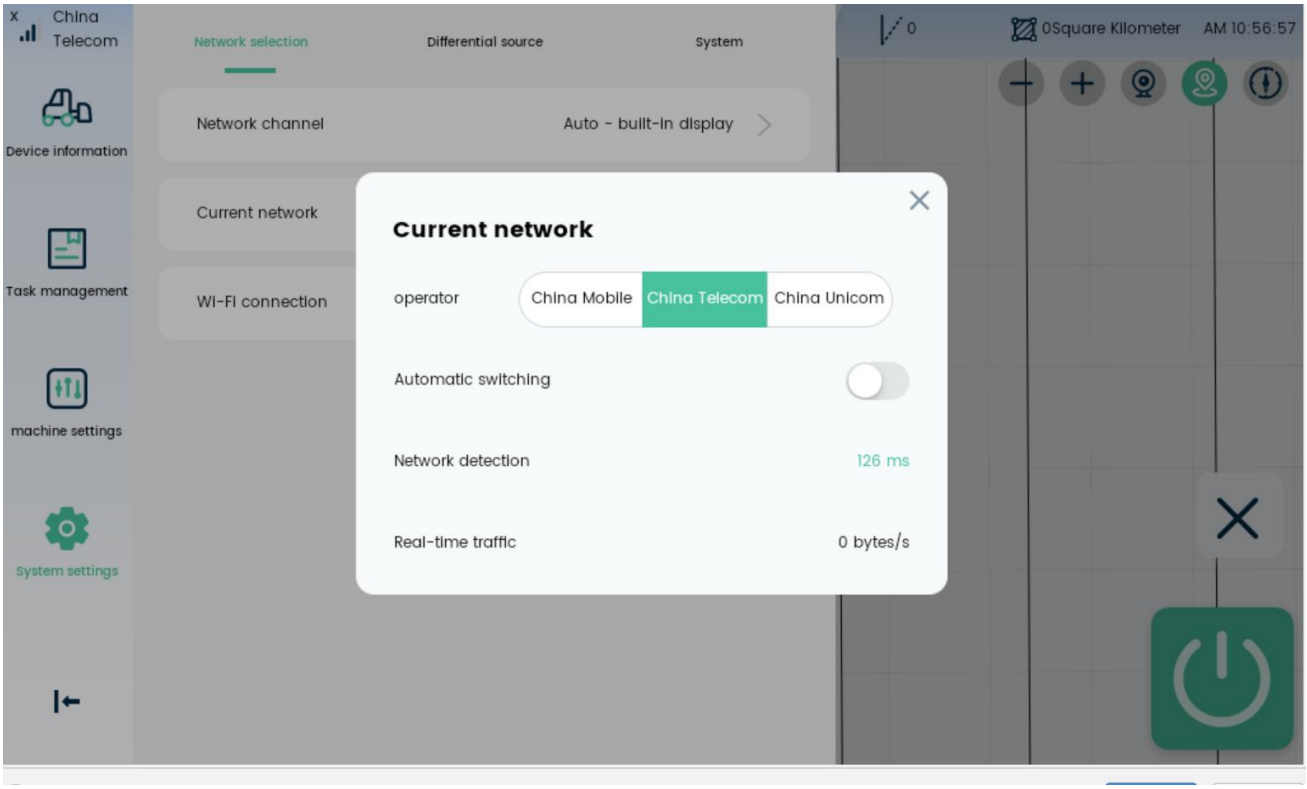
5.7 Network Selection



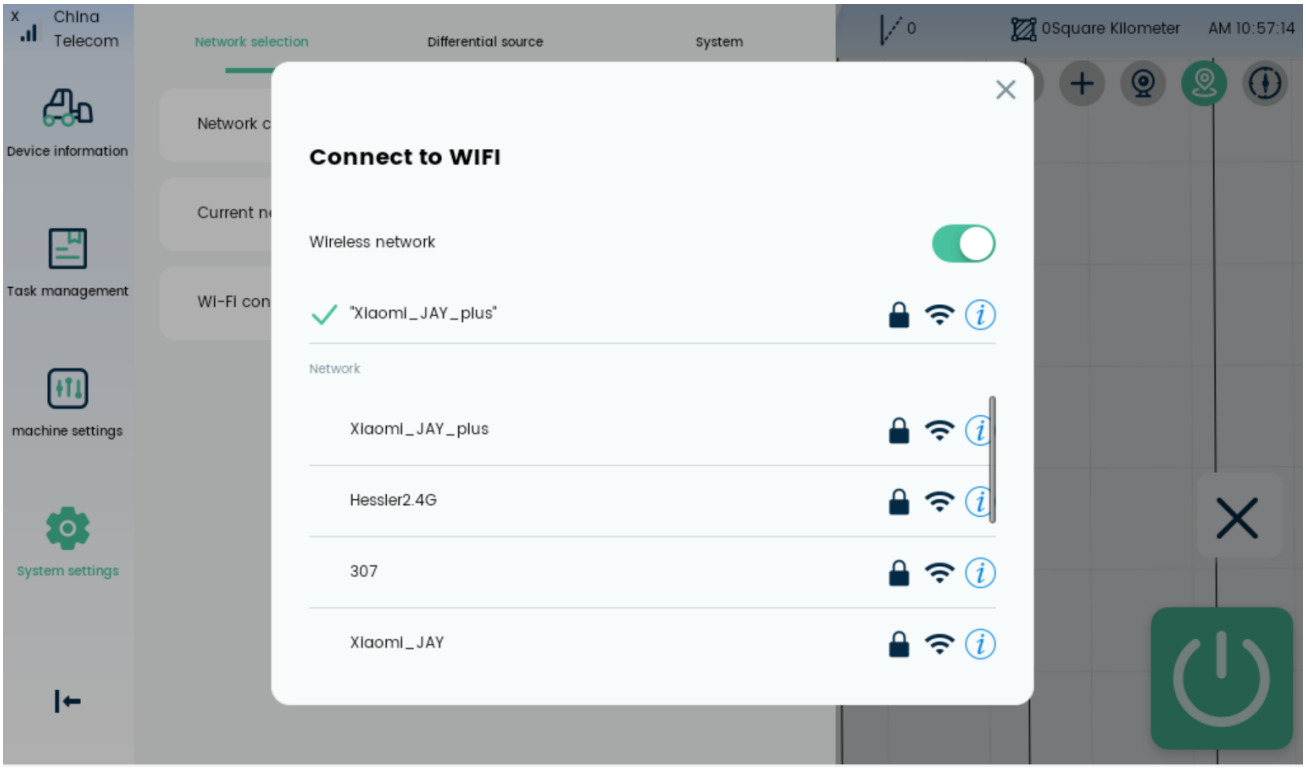
5.7.1 Netork Channel and 5.7.2 Current Network

Click to enter the interface and switch the tablet network.

After clicking on the corresponding carrier, patiently wait for 1 minute to switch to the corresponding carrier. (The automatic switching function is still under development)

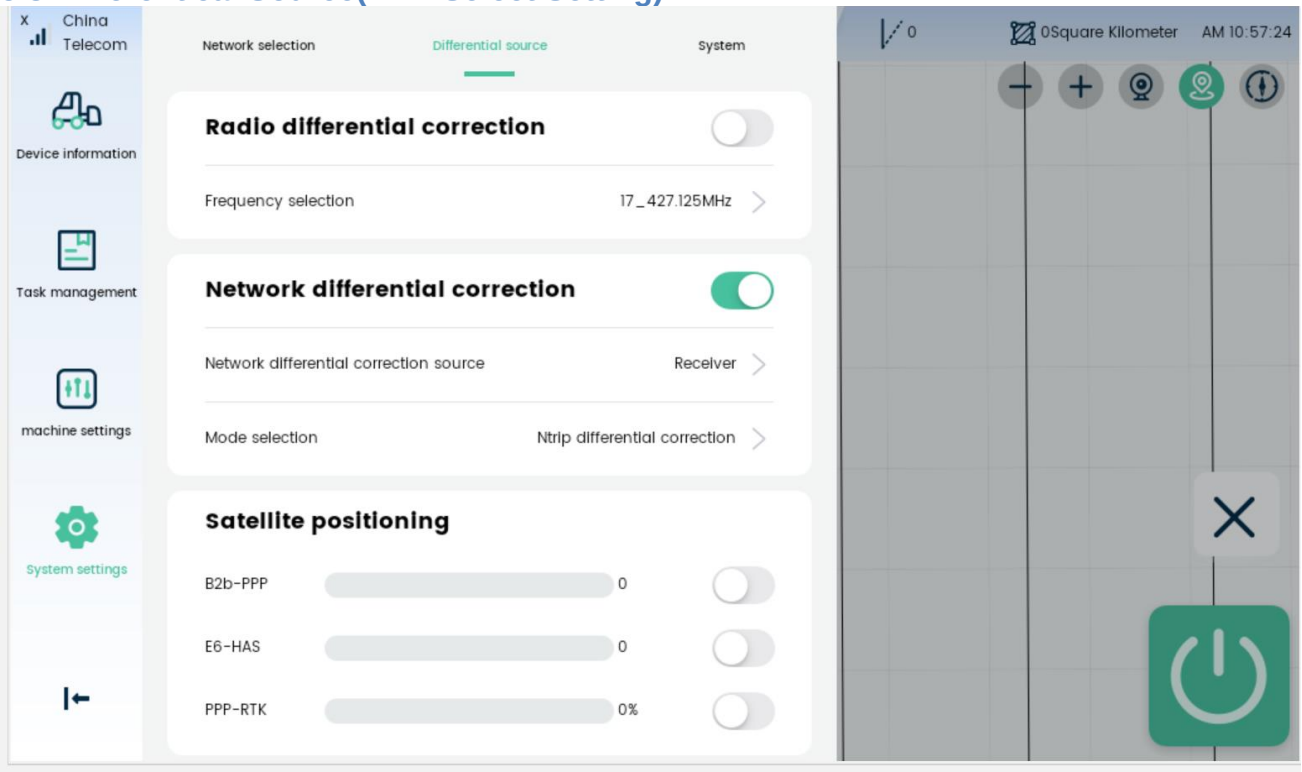


5.7.3 Connect To WIFI



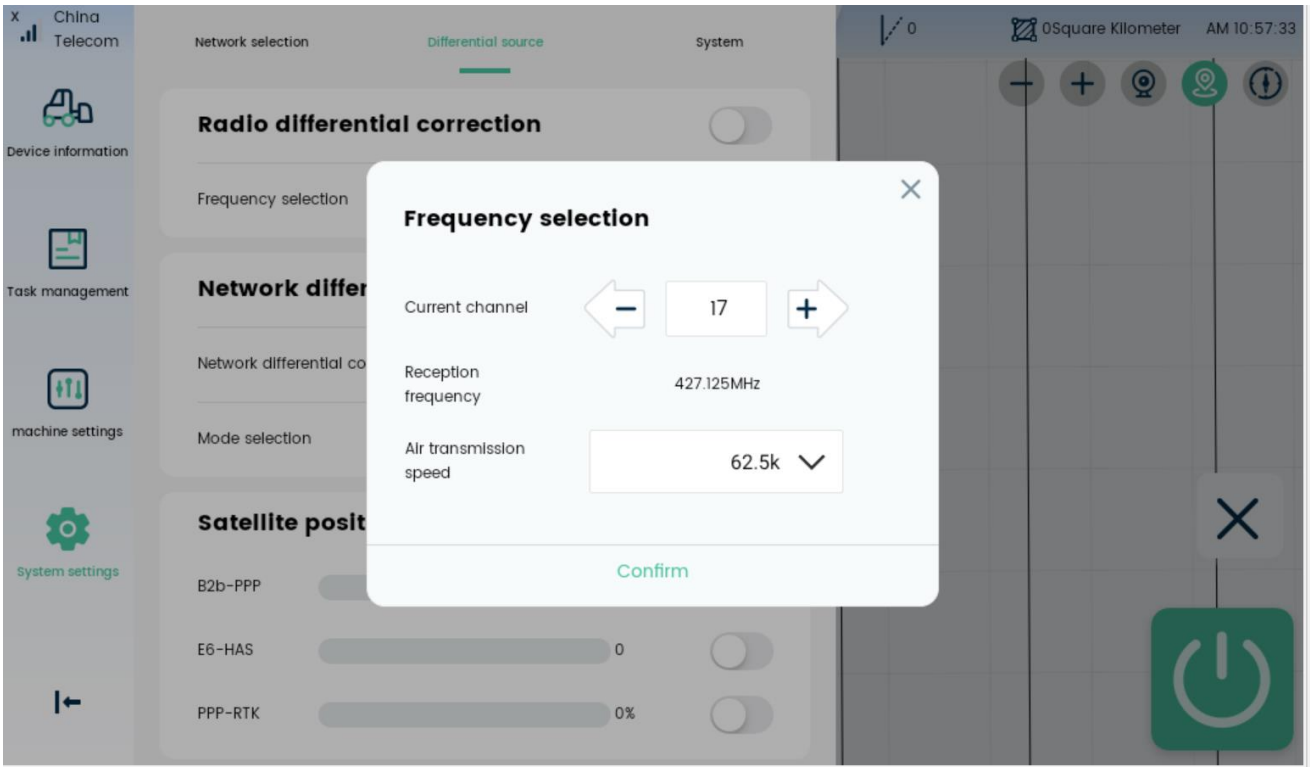
Click on WIF connection to enter the WIFI interface, select the corresponding WIFI and enter the password to connect to WIFI.

5.8 Differentical Source(RTK Select Setting)



There are three types of satellite positioning methods available for you to choose from: radio differential, network differential, and satellite based positioning. Only one option can be selected between radio differential and network differential (if you perform radio differential, network differential will automatically turn off), and only satellite based positioning can be turned on simultaneously.

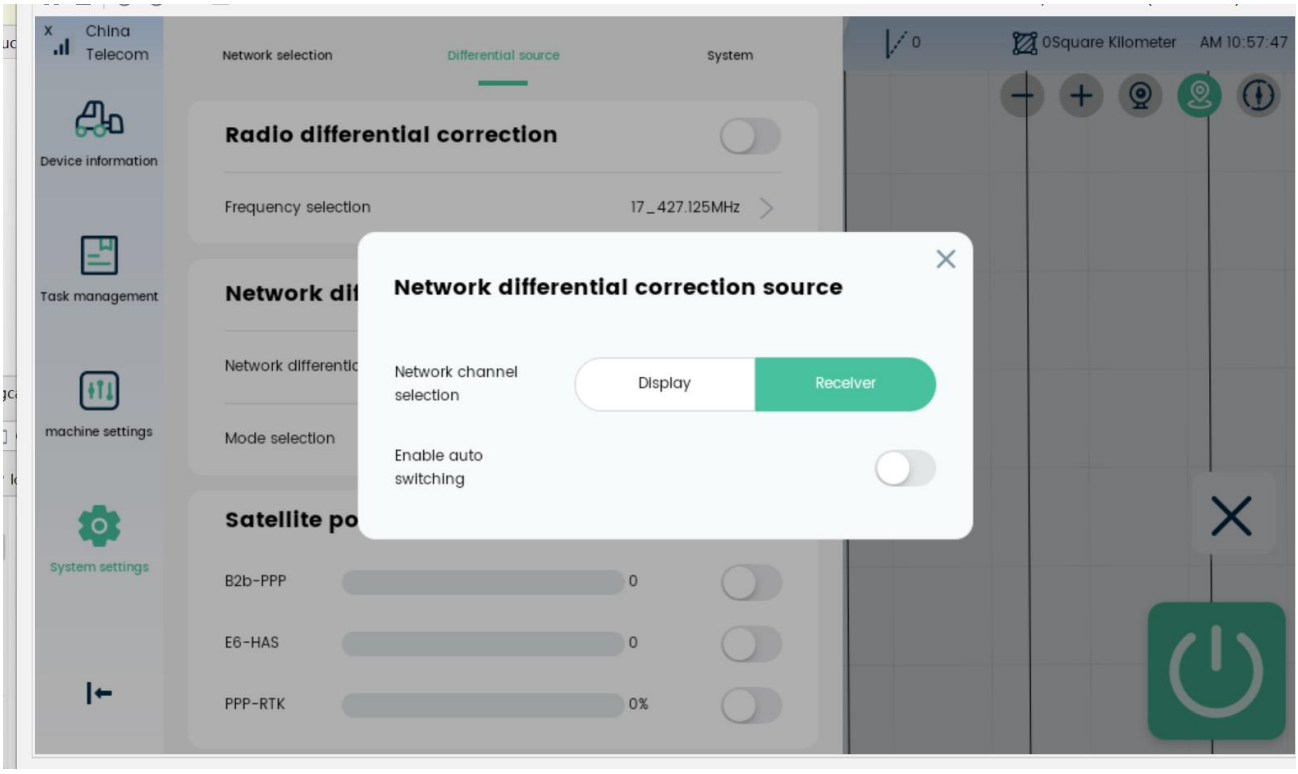
5.8.1 Radio Differential Correction



Click on channel selection to set radio parameters for matching. In the future, baud rate selection will be added, and radio protocols from different manufacturers will be connected. More brands of RTK reference stations will be opened up for you to choose from for matching.

(When you choose to purchase RTK signal base stations from this brand,
it is recommended to use the signals from the base stations for navigation operations)

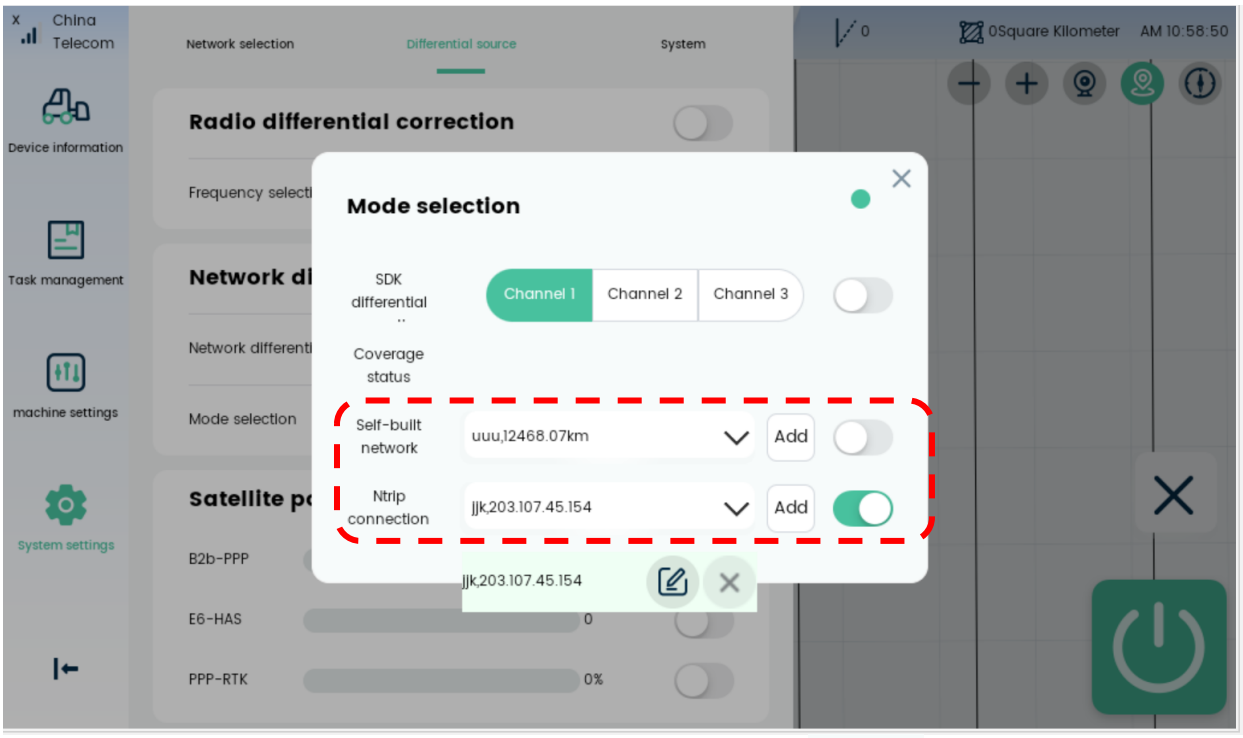
5.8.2 Network differential correction source



Click on the network RTK differential source to select the network differential source.

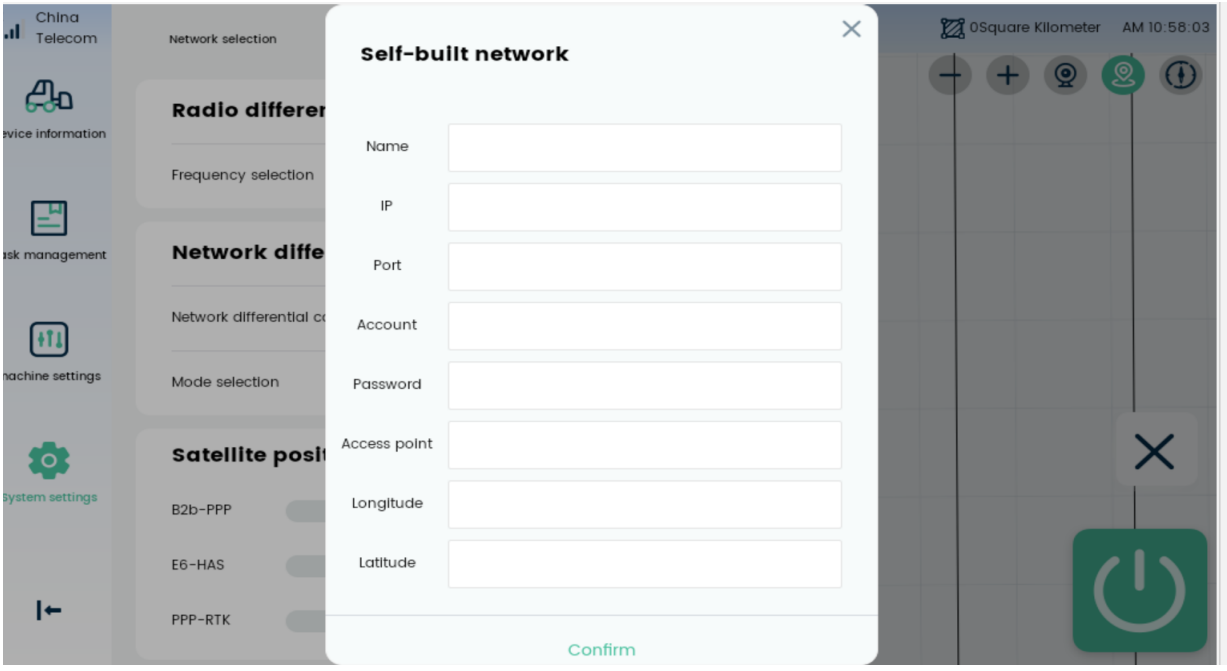
And Click on the mode selection to enter the network differential source selection. Currently, SDK differential only supports channel one

Mode selection



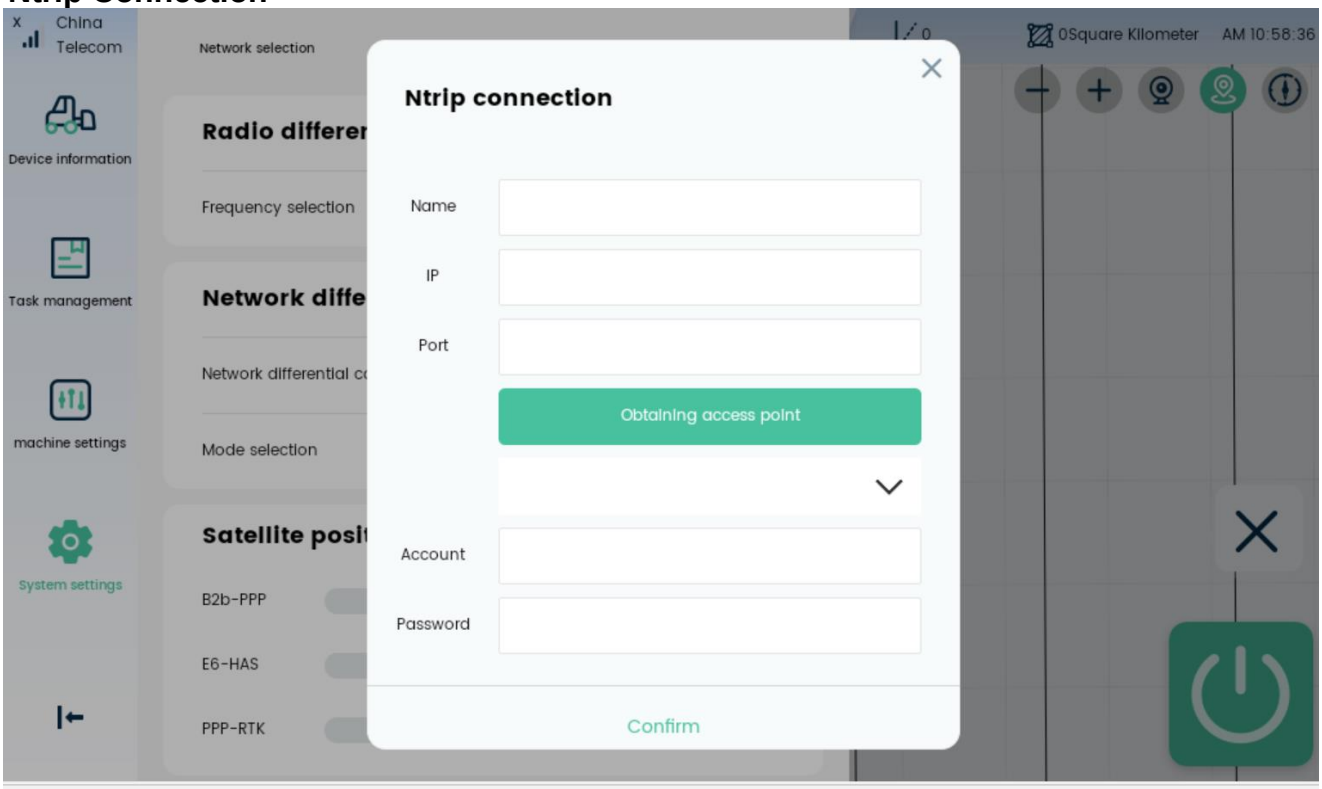
SDK differential →Channel 1 is Qianxun positioning， Click on the icon to turn it green, indicating that the channel is currently open and in use。  ， When this gray dot turns into a green constant light as shown in the picture, it indicates that RTK is successful.

 Turning on different switches represents using different positioning functions.



Click 'Add' to add a self built network, enter the corresponding parameters, and click 'Confirm'

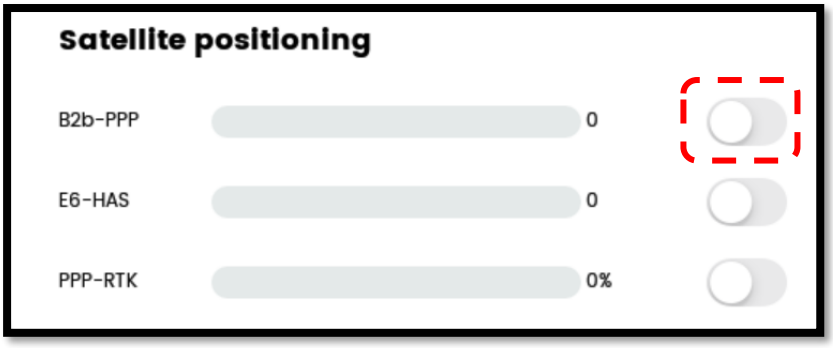
Ntrip Connection



Click 'Add' to add Ntrip connection to the network. Input the corresponding parameters (enter the IP port before clicking 'Get Connection Point' and selecting the corresponding connection point), and click 'Confirm'.

Finally, click to enter the modification interface to modify parameters, and click to delete them.

5.8.3 Satellite-Based Augmentation System



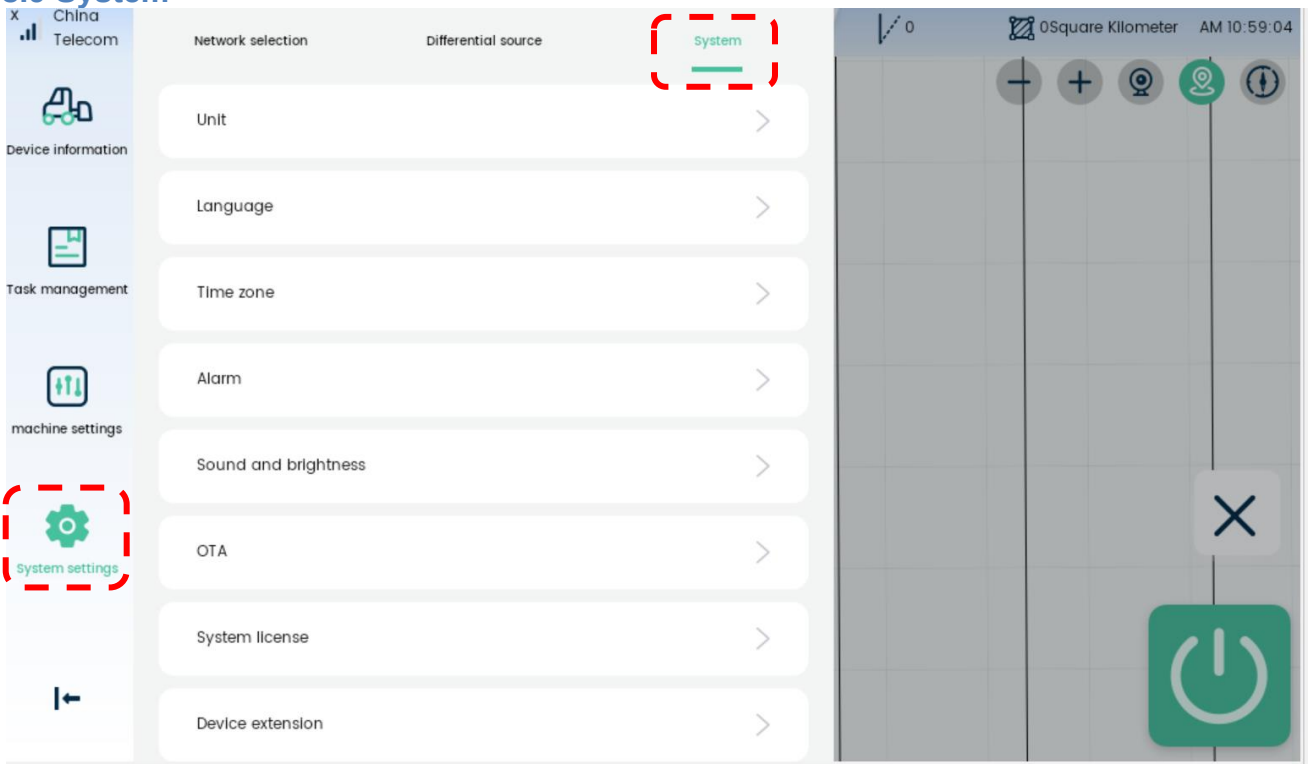
When the progress bar reaches 70%, homework is allowed.

It is recommended to reach 100%, and homework is best

After clicking the button on the right to select, wait patiently for about 10-20 minutes, and the progress bar will gradually increase. Currently, only B2B-PPP and E6-HAS are supported.

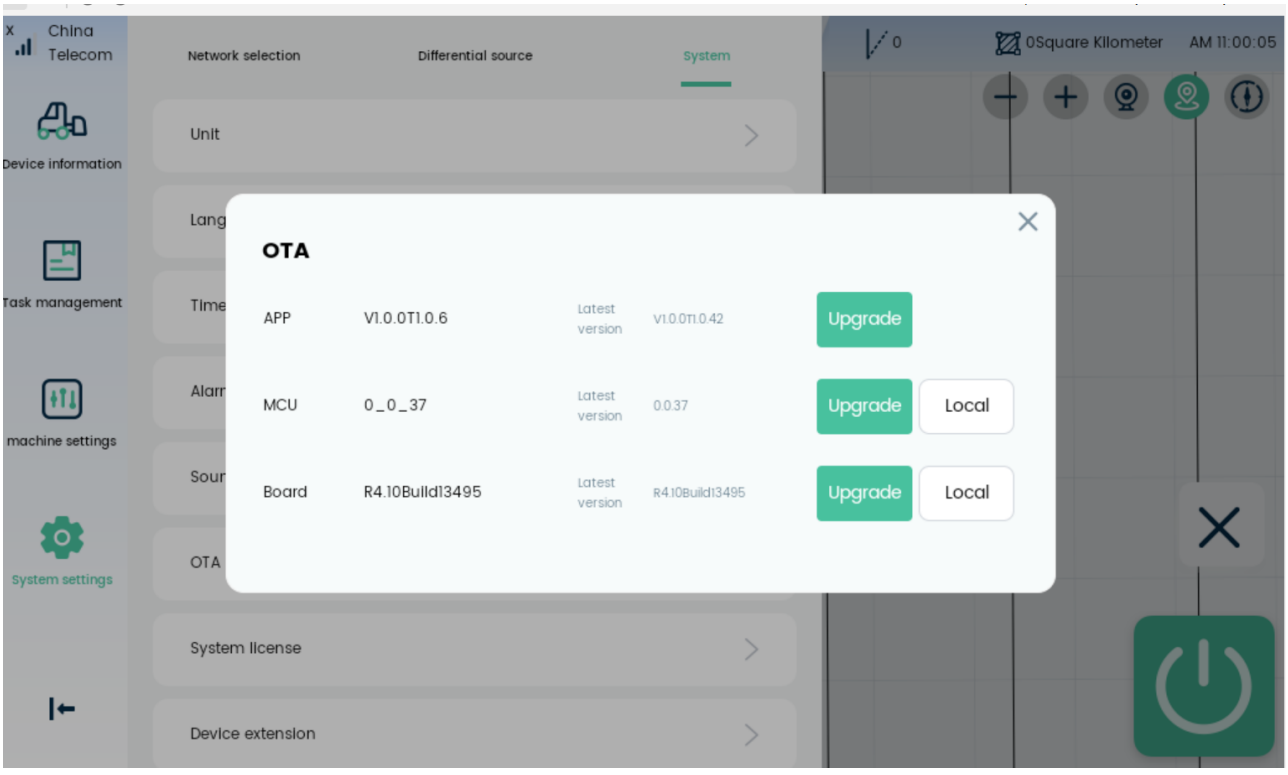
In addition, The satellite based positioning enhancement system can coexist with the differential positioning system. When RTK is lost, this system supports a 10 minute endurance signal. After 10 minutes, when the satellite based positioning enhancement system reaches 70% convergence or above, it will switch to satellite based positioning to assist in positioning operations.
(The battery life after signal loss can be modified in the advanced settings)

5.9 System



You can set the unit, language, time zone, alarm switch, sound, and screen brightness.

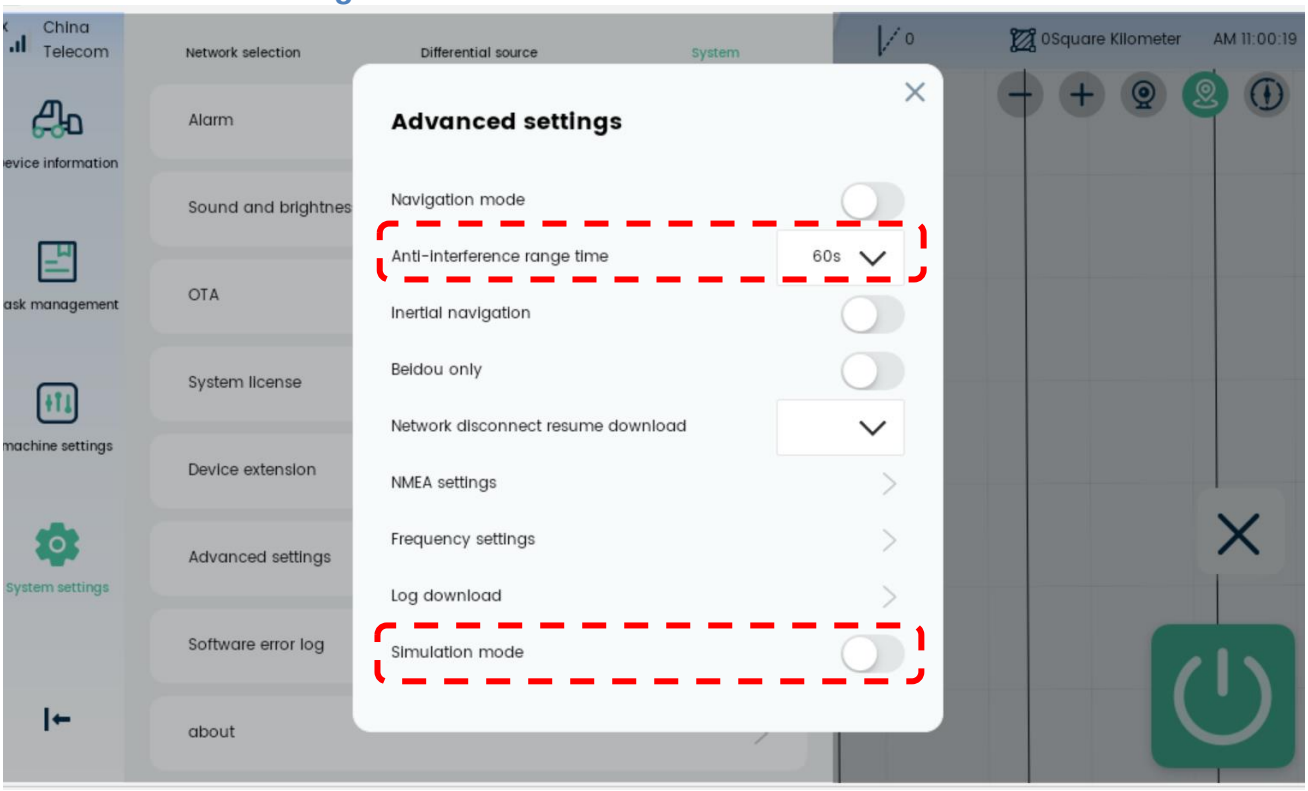
5.9.1 About the OTA



In the case of software networking, the latest version of the software will be automatically recognized, You can directly click on upgrade and wait for completion, or you can choose to use the local method and select the upgrade file to achieve version iteration

Click on upgrade, wait for completion, it is recommended to restart before starting work.

5.9.2 Advanced Settings



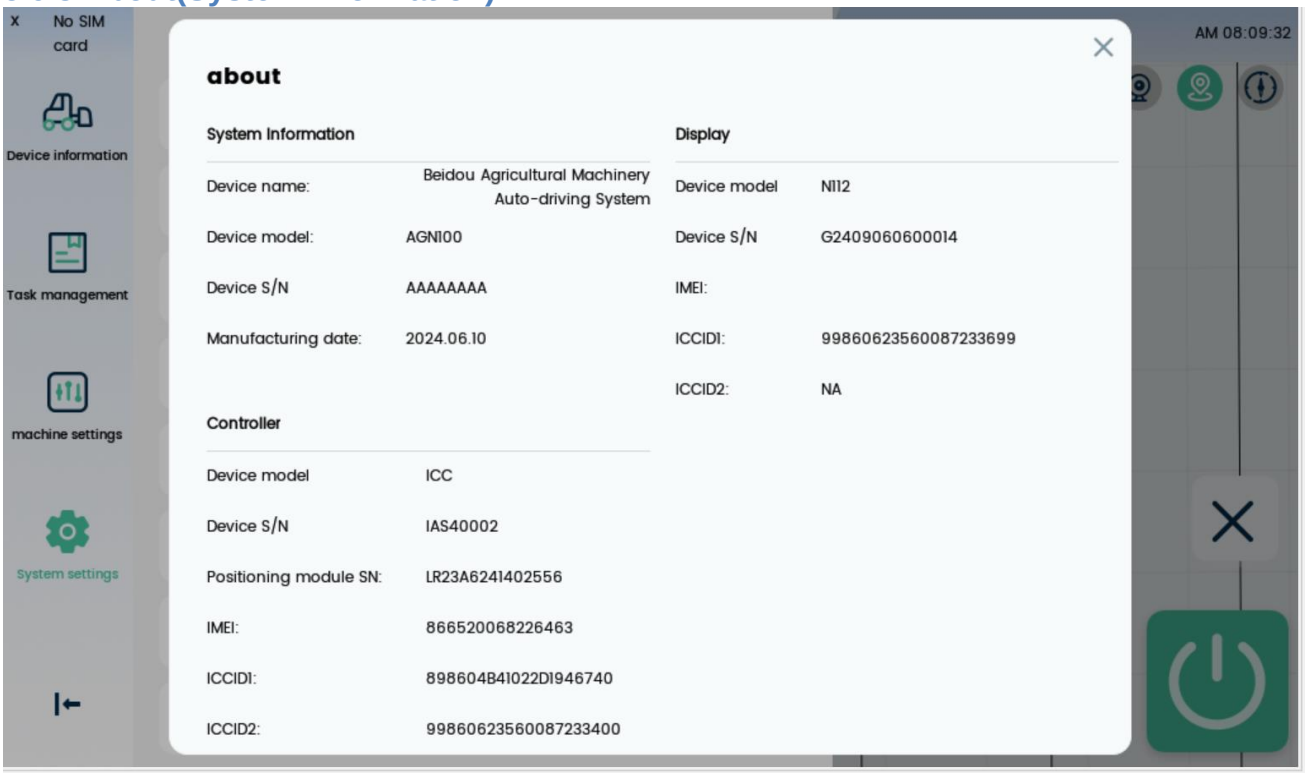
1、 Anti interference range time→

When the signal is lost, you can choose to continue working for a limited time

2、 Simulation Mode→

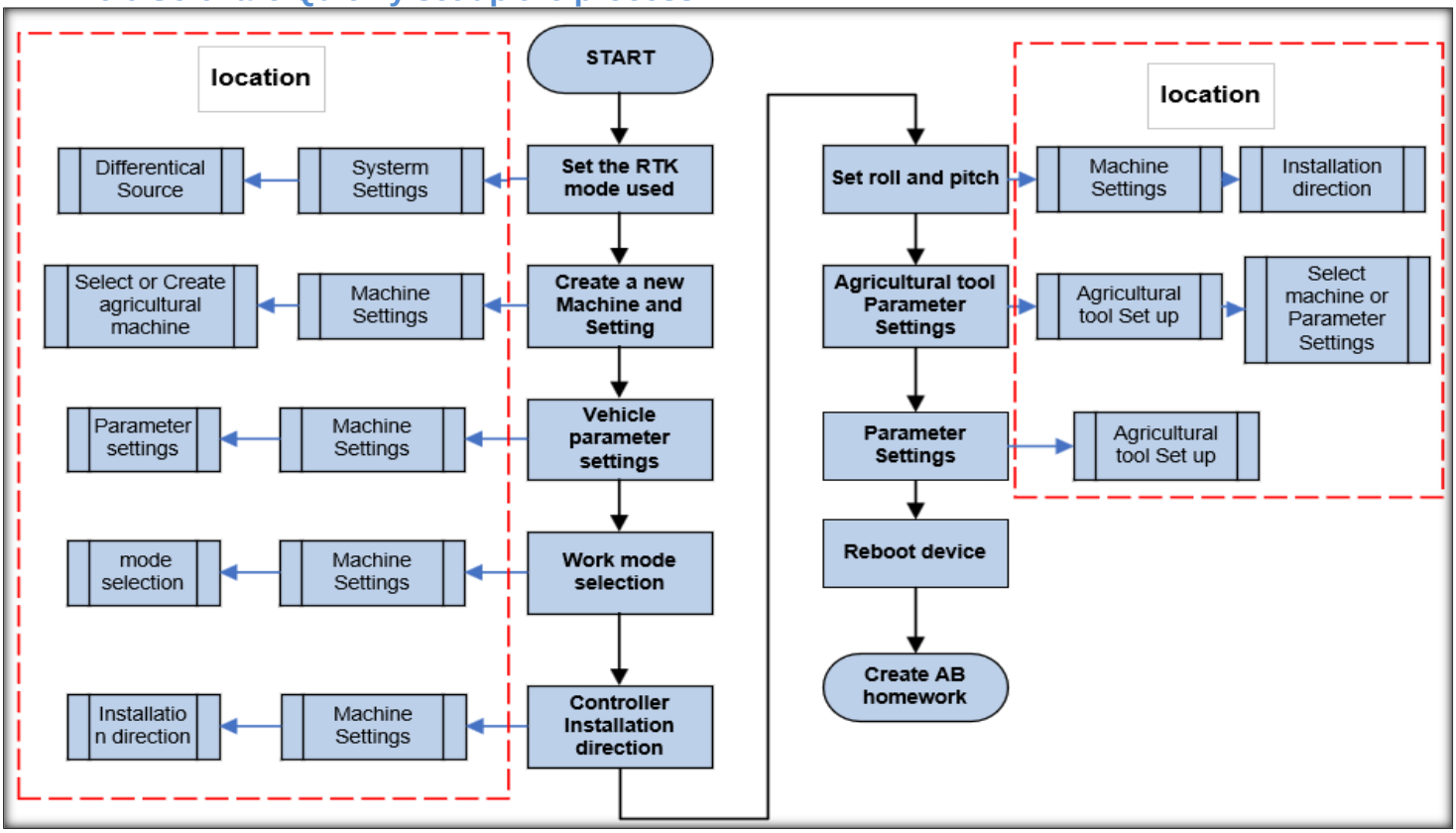
Simulation mode is used for non operational demonstrations and is generally used for exhibition counters(Other button functions are currently not supported)

5.9.3 About(System information)



You can see the information of the host device
and confirm your device information through the identification code

6.0 Software Quickly set up the process



① Differential Source Settings - Please choose according to the actual situation

② Agricultural Machinery Selection - New Agricultural Machinery - Enter Naming

③ Vehicle parameters - Measure according to the diagram and enter the value, note that the unit is meters.

④ Working mode - Select motor - Single antenna - Channel 1 (If installing dual antennas, select dual antennas. In the case of dual antenna installation, the installation angle needs to be selected on the installation orientation interface) (Channel 2 is equipped with an angle sensor)

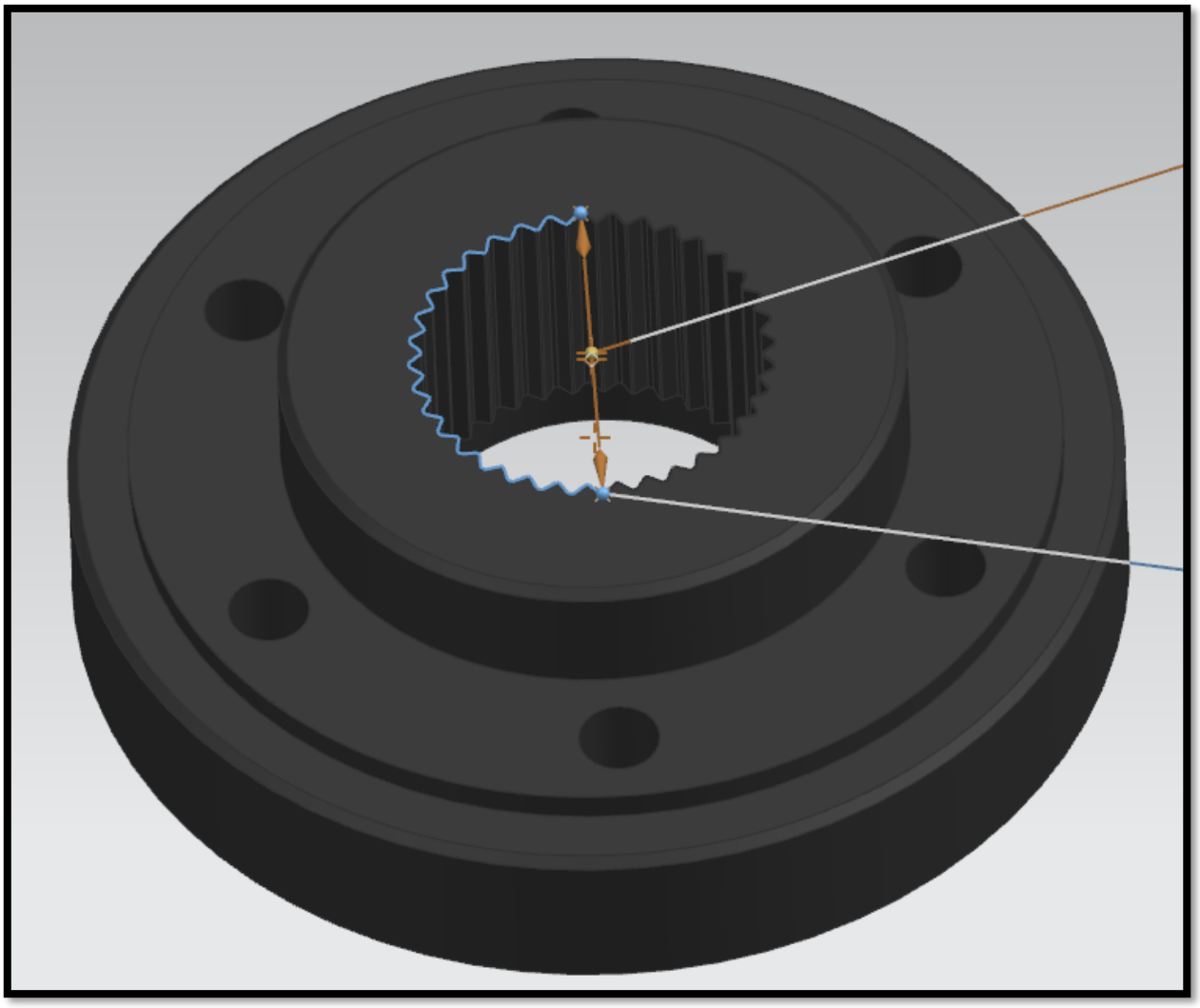
⑤ Controller installation direction - Select according to the direction of the plug relative to the front of the vehicle. If the front of the vehicle is facing forward and the interface is facing backward, select backward. This is similar (please install the controller on a flat surface, and the installation should be horizontal and vertical to the vehicle's orientation)

⑥ Attitude calibration - Input the displayed value into the corresponding window (assuming that the vehicle is parked on a flat surface as much as possible, it is recommended to input directly within a range of 1 °. If all angles are greater than 5 °, the vehicle needs to be driven to the flat surface as much as possible, or the installation position needs to be checked for sufficient flatness)

⑦ Tool selection - New tool - Enter name

⑧ Farm Tool Parameter Settings - Enter the actual working parameters of the farm tool, input the width and spacing of the farm tool, and the width will be automatically generated. Width=width+spacing, and the rest will default to 0 values.

6.1 Solution when the vehicle cannot be equipped with splines



How to handle when your vehicle cannot be fitted with splines?
As shown in the picture:
The spline sleeve is matched with a large diameter and a small diameter.

Please take out the vernier caliper, You carry with you and measure the large and small diameter dimensions of the vehicle's spline shaft.
(the root diameter of the diagonal gear and the top diameter of the diagonal gear)

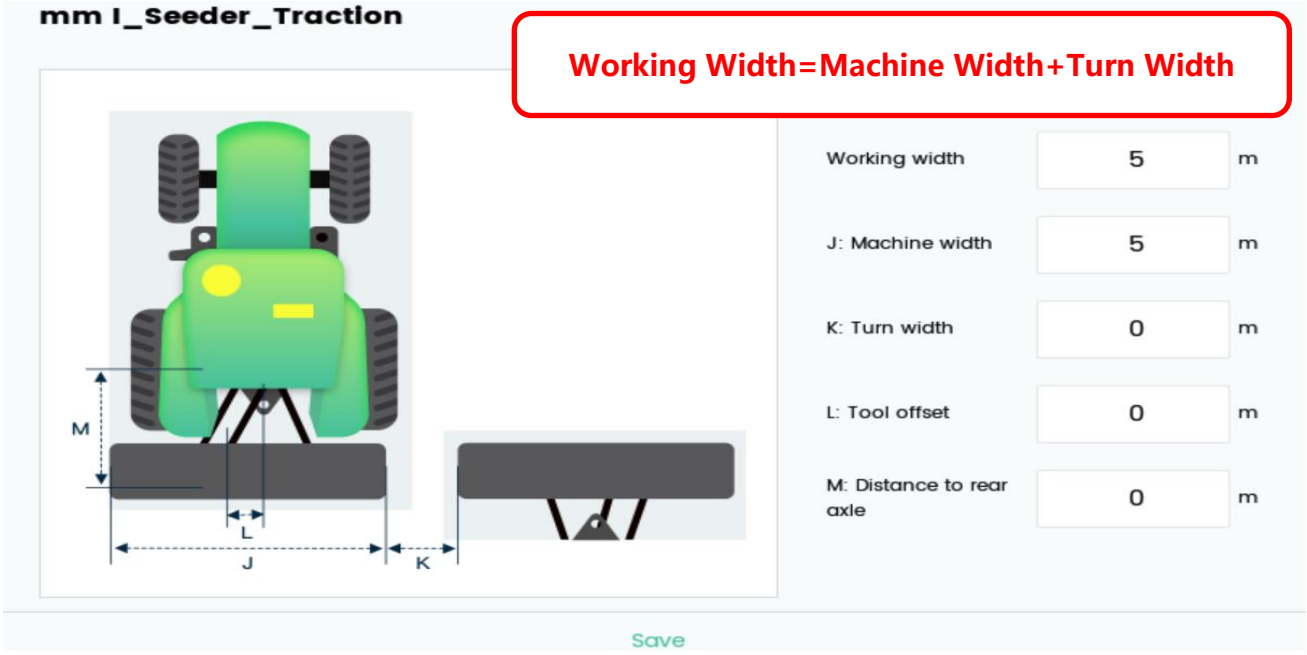
Finally, You also need to count the number of teeth on the gears.

Record the model of the vehicle, take photos of all the data, and contact local sales to seek help in matching suitable splines

In addition, If your vehicle's spline shaft is not in gear state, please make sure to measure the data. When it is tapered, you need to measure the diameter of the top and bottom of the cone. If there is a positioning key, please measure the diameter and width of the key position.

6.2 Agricultural machinery offset

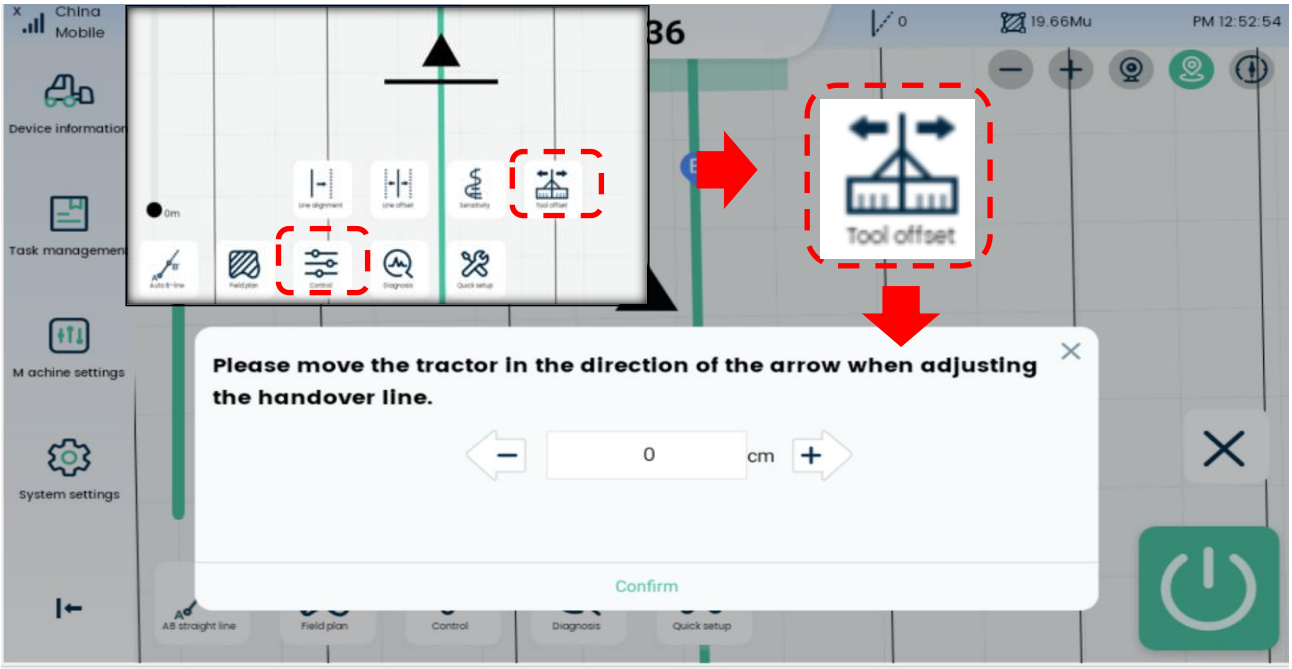
When the vehicle's agricultural tools are not in the center position and the distance between the running joints is not equal, this function needs to be used



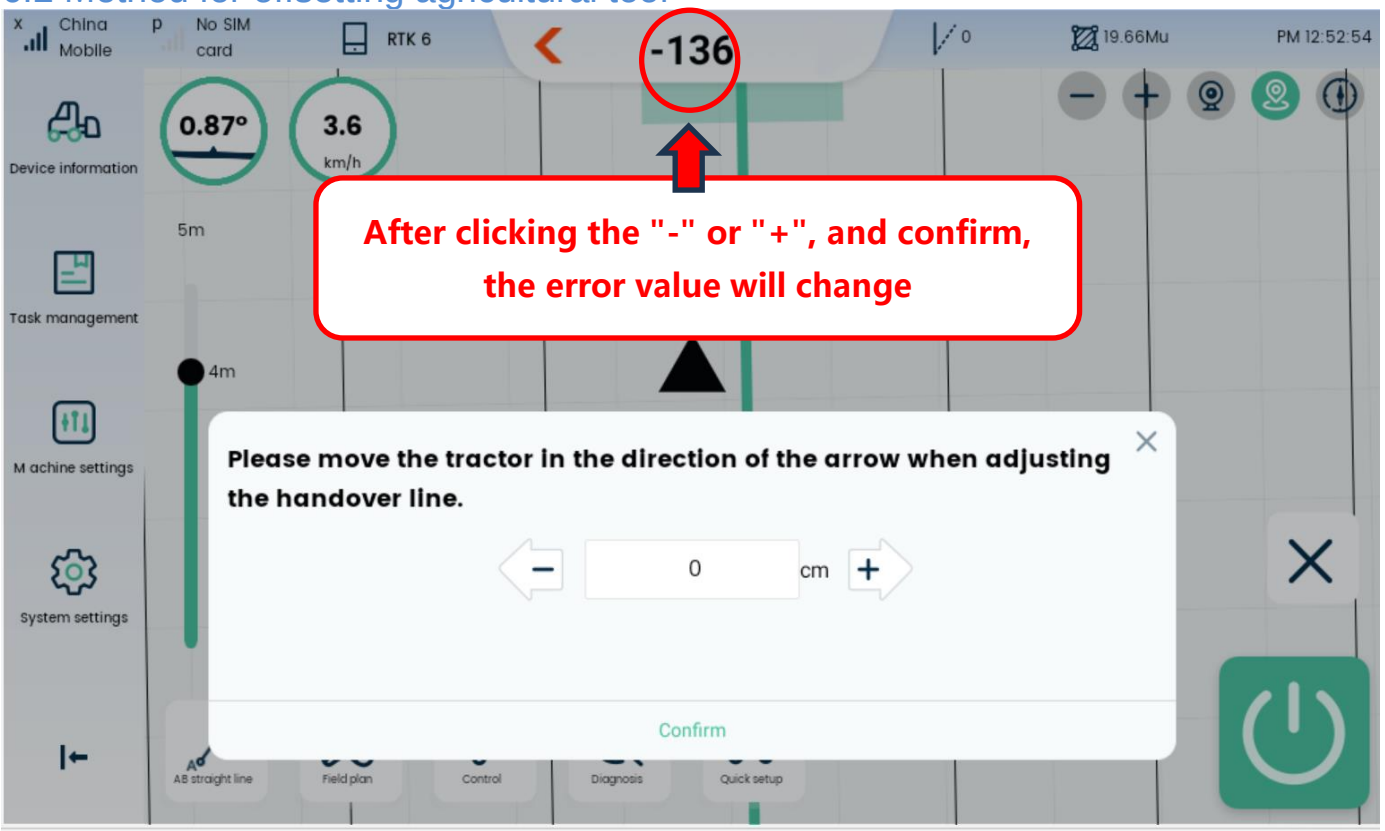
Machine width---the actual width of the agricultural tool (please measure the width trajectory of the tool after driving)

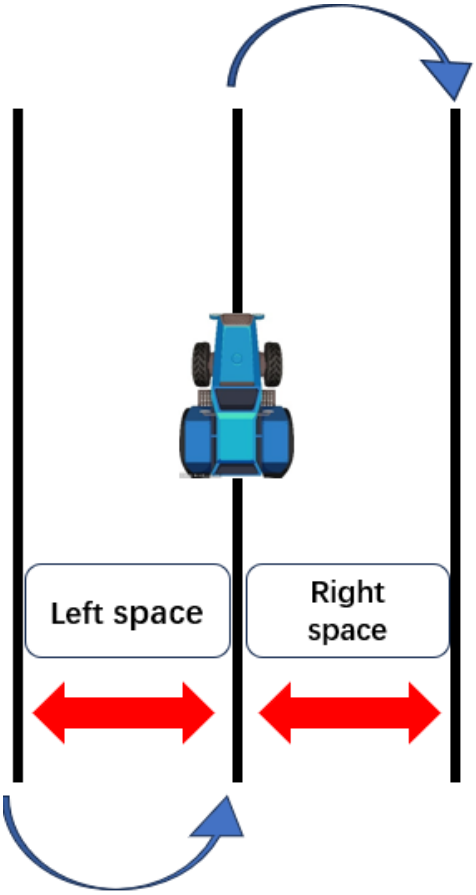
Turn width--- Connection width between two columns.

Tool offset---the numerical value input will be combined for calculation, as shown in the figure below. The values entered by "+" and "-" will be calculated together. It is recommended to input the value "0" at the beginning, and then adjust it in the quick window



6.2 Method for offsetting agricultural tool





Tractor navigation starts, driving twice back and forth can produce two column spacing
(Please determine the left and right directions based on the direction of the vehicle traveling in the middle.)

As shown in the figure, when the left space is large, such as 5 centimeters larger than the "ideal value", you can click "-" 5CM. Clicking once is 0.5CM, and you need to enter 10 clicks. If it is smaller than the ideal value, So you need to click "+".

When the vehicle starts running in the second column, it can measure the left value and input the value according to logic.

Please remember that the sum of the left and right intersection lines is equal to twice the line spacing(turn width).
If the sum is greater or less than the "line spacing" after measurement, please check the correctness of the input parameters for the Machine width and Turn width.

If you don't understand, you can click on 'Machine Settings' and select' Adjustment tool ',click the **Agricultural tool set up** to help you intelligently modify and adjust your farm tools

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