


Pre-marking robot operation manual

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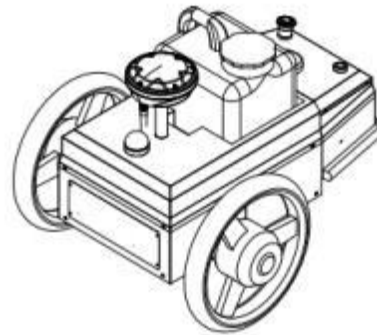
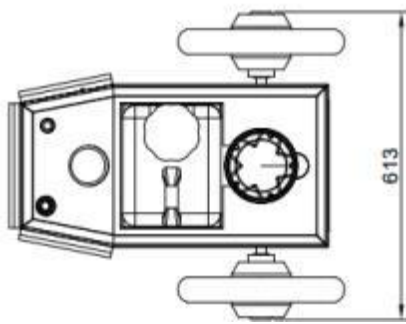
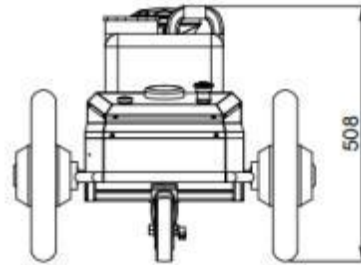
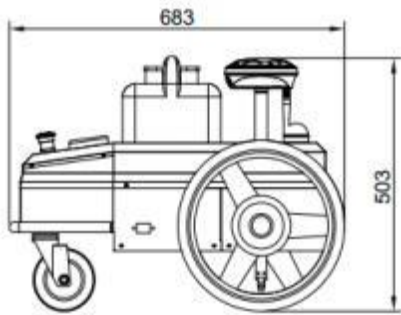
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Product physical drawing



Product dimensions



(Unit: mm)

Robot remote control operation

1、 Remote control button introduction



Power button: Control the power and screen on/off

SA gear: Three switches in upper, middle and lower gears

Top gear: Automatic mode

Middle gear: Manual mode, speed is 0.8m/s

Bottom gear: Manual mode, speed is 1.2m/s

Left joystick: In manual mode, the steering direction is controlled left and right

Right Joystick: In manual mode, the forward and backward controls forward/backward

Status indicator:

- Steady red: The remote control is not communicating with the robot
- Steady green: The remote control successfully communicates with the robot
- Blinking green: The faster the blinking speed, the worse the signal strength



Note: Other keys are not for use, and the operation is invalid

2、 Remote controller parameters

Type	Parameters
Display device	7-inch HD high-brightness LCD touch screen
System Configuration	Android 9.0, 4G RAM, 64GB of storage
Size (antenna tucked away)	308*148*72mm
Weight	1440g
Battery capacity and type	10200mAh 7.4V 2S lithium electronic battery
Fast charge protocol	PD 30W
Charging time	3.5H (30W fast charge)
Endurance of the operation	10 hours
Waterproof	IP4X
Working Temperature	-10°C ~ 50°C

3、 Remote controller turn ON/OFF and charge

1、 Power on: In the shutdown state, press the power button for about 1 second, the indicator light is on, and then press the power button for about 2 seconds, When the screen lights up, you can turn on and enter the working state.

2、 Shutdown: In the startup state, long press the power button for about 2 seconds, the system interface will pop up, touch the shutdown icon to close Remote control power.

3、Charging steps

① The remote control only supports charging in the off state using the original standard PD fast charging head

② Use the Type-C fast charge cable to connect the MK32 ground station to the PD fast charge head

③ If the charging indicator light is steady red, it means that it is charging

③ If the charging indicator light turns green and is steady on, it means that charging is complete

4、Remote control standard omnidirectional antenna installation and placement

1、The antenna SMA connector must be tightened;

2、The antenna should be placed perpendicular to the ground end operation panel, keep the flat surface of the antenna always facing the aircraft, and the antenna can not be stacked or crossed;

3、The installation interval between the two standard omnidirectional antennas at the ground end is recommended to be more than 10cm, and the minimum is not less than 5cm, otherwise the signal transmission will be affected.

5、 Remote control manually controls the robot

1. In the shutdown state, press the power button for about 1 second, the indicator light will turn on, and then press the power button for about 2 seconds, and then the screen will turn on and enter the working state;

2, the robot starts, wait for about 1 minute, the indicator light from red to green steady on, remote control SA gear to the middle or lower gear can be remote control manual control robot action, left remote sensing control robot steering, right rocker control robot forward/backward;

3. After the robot is successfully connected to the APP end, the robot is manually remote controlled to the starting point of the operation, and the SA gear is shifted to the upper gear to enter the automatic control mode;

6、 Matters needing attention of remote control

1、 Can not charge MK32 ground station with 5V adapter, please use the original PD fast charger;

2、 The remote control can not be charged when it is turned on, please make sure that the remote control is turned off before charging;

3、 If you find that the battery is smoking, overheating or bulging, please stop using it immediately;

4、 If the remote control is overheated (above 60 °C), please stop using it immediately and power off.

No moment APP operation

1、 Log in

- 1、 Remote control long press the power button to turn on, after the screen is turned on, select open [no moment] APP.;
- 2、 After the startup animation is played (select "Skip" to skip the startup animation), enter the login interface;





3、 Enter the account and password provided by our company, select login, and enter the work group selection interface after successful login;



4、 Select the current robot and enter the robot operation interface



2、Project New

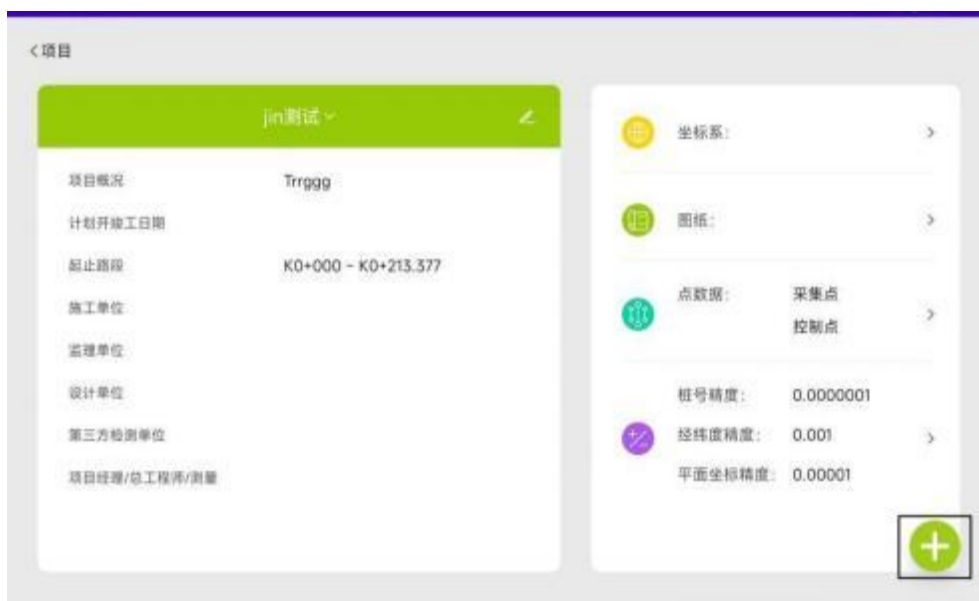
1、 In the APP as the owner interface, select the "Settings" icon, the interface will enter the "Settings" menu bar



2、 In the menu bar of [Settings], select [Project Management] to enter the project interface



3、 In the project interface, select the [+] button at the lower right corner to enter the project add interface



4、 In the new project interface, fill in the relevant job information, click the "Get Location" button in the column of construction address, you can get the current construction address (you can also manually select)



5、 Select the coordinate system setting, ellipsoid name select **WGS84**;



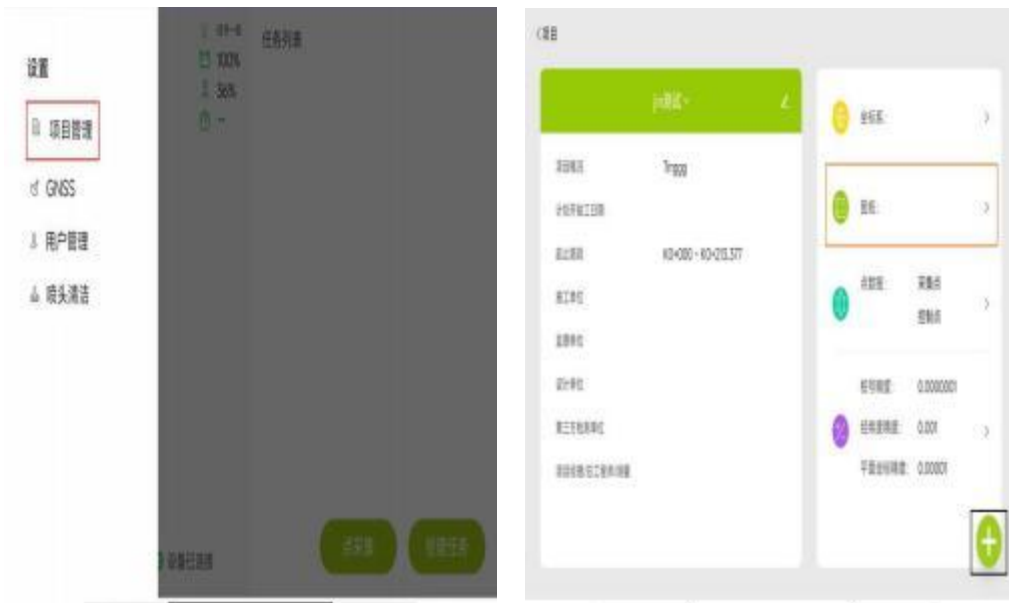
6、 Select **Gaussian projection** model;



- 7、 Select input central meridian (according to the current construction road design drawing)
- 8、 Select Submit and the project is newly built.

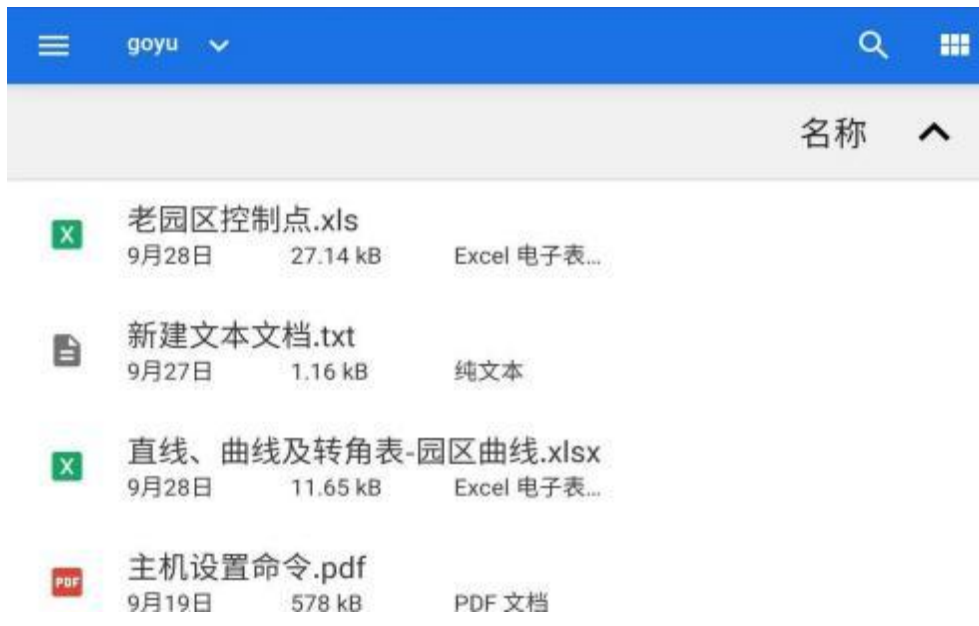
3、 Map import

- 1、 The road design drawing road line, curve and corner table excel file import to the ground receiving station
- 2、 Setup bar Select 【 Project Management 】 , then select 【 Drawing 】



3、 In the edit project interface, select [Add], and the interface will jump to the internal file interface





4、 Select the current construction road straight line, curve and corner table, after the successful import, the interface will display.



5、 Return to the main interface, select the table, the map interface on the left will show the imported road section.



4、CAD drawing import

1、The road design drawings CAD drawings dxf file import to the ground receiving station

2、Set bar select 【 Project Management 】 , then select 【 Drawing 】



3、 In the edit project interface, select [Add], and the interface will jump to the internal file interface

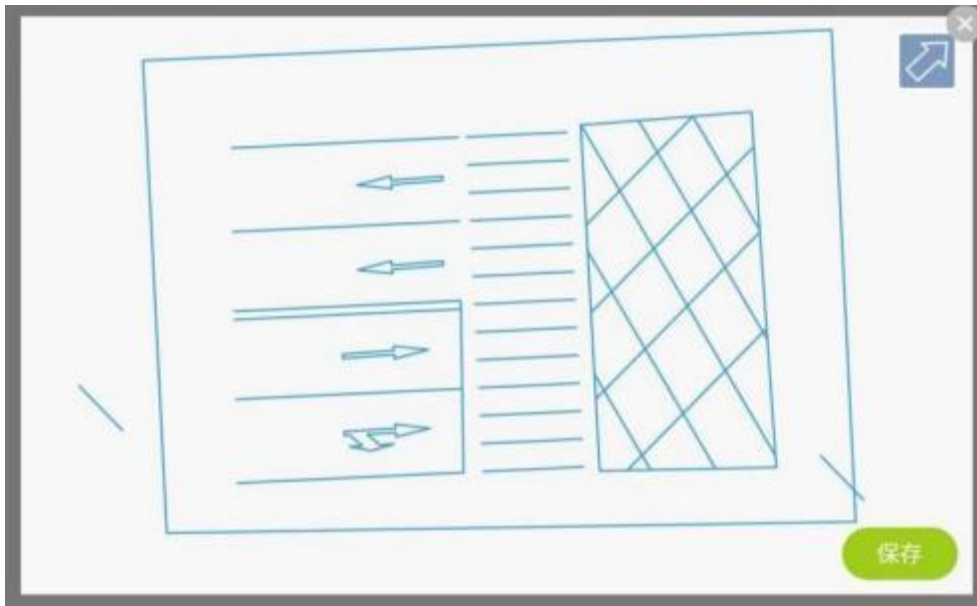


4、 Select the current construction road straight line, curve and corner table, after the successful import, the interface will display.



5、After the Dxf file is imported successfully, click the lower right corner of the required drawing file [full screen], after the full screen display, manually enlarge the drawing, so that the line segment is displayed in the center of the screen, select [Save], select "x" to exit the current interface, CAD drawing import is completed.

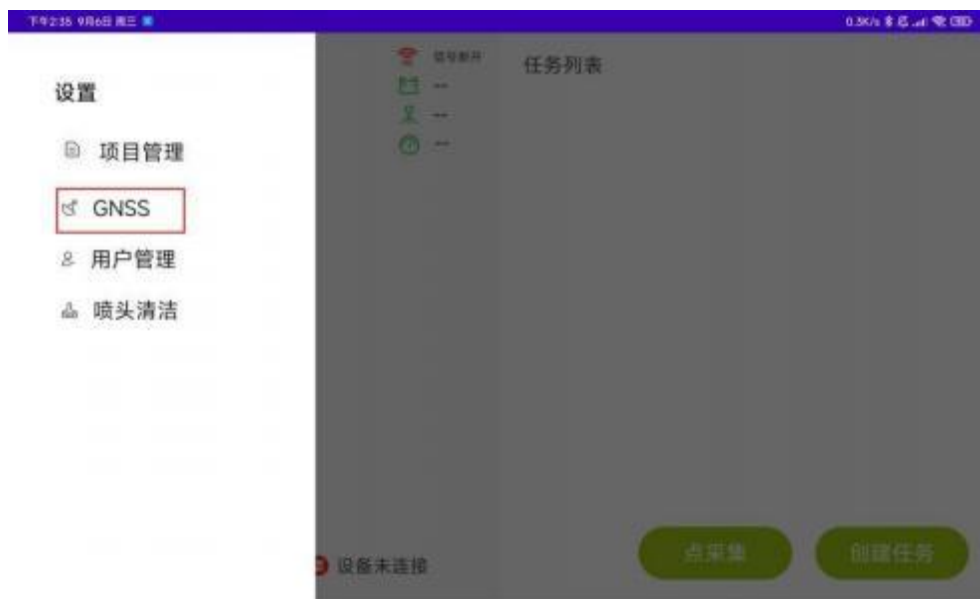




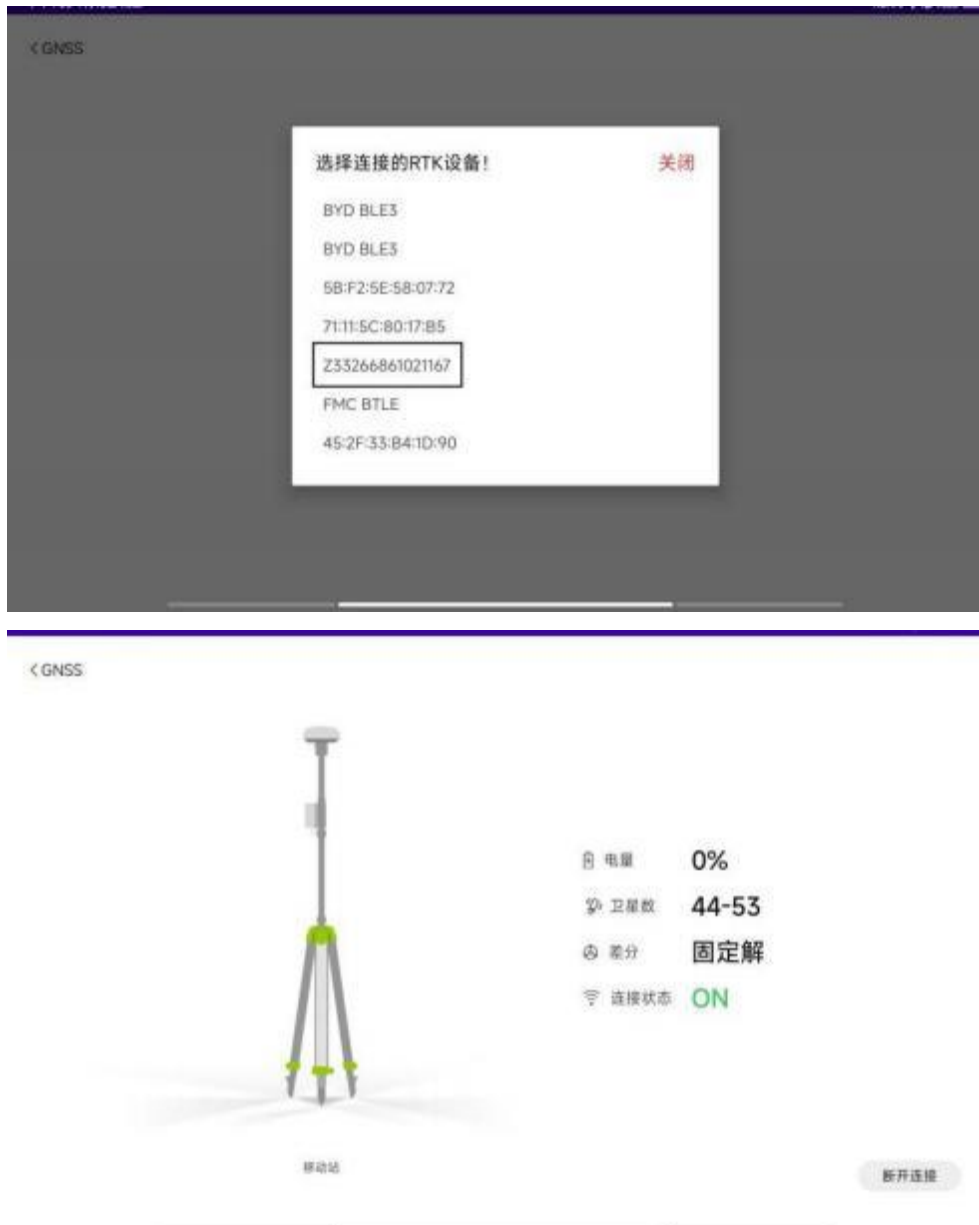
5、 Collection of work points

1、 Rotate and remove the geodesic GNSS receiver on the middle fixed rod of the robot, long press the power button to turn on, and enter the next step after the device broadcasts the fixed solution;

2、 APP as the owner interface, select Settings, select [GNSS], enter the receiver Bluetooth connection interface;



3、 Search for the Bluetooth name of geodesic GNSS receiver (Zxxxxxx), select connection, after successful connection, the interface will jump to the receiver status interface;



4、 Click [job] to enter the job interface;

5、 Select "point collection" button to enter the point-to-point collection interface

6、 Place the geodesic GNSS receiver at the starting position of the operation (as horizontal as possible), click the button "Smooth acquisition" on the APP, and the

smooth acquisition dialog box will pop up on the interface. After smooth acquisition for ten times, click "Confirm"



7、 Check whether the collected points are saved in the collection point sequence table, and then repeat this action to collect the coordinate points of the end point of the operation;

Note: 1, when collecting points, non-high-speed sections, in the straight section

can be separated from a larger distance to pick points, the recommended interval of 10-20m; In the curve section when the density needs to increase, it is recommended that the interval of 2-10m;

High-speed sections, in the straight section can be spaced a little distance between the mining points, the recommended interval is 30-50m; In the curve section when the density needs to increase, it is recommended that the interval of 10-20m

2. The horizontal distance between all the collected points and the edge of the central isolation belt of the road must be basically the same. If the three points before and after are not in the same line and the direction is inconsistent, the saving will prompt an error and the saving is unsuccessful.

6、 Geodesic GNSS receiver initialization operation

1、 The geodesic GNSS receiver (hereinafter referred to as "RTK receiving station") is used to collect the operation point and install it to the fixed hole of the robot body;

2、 Shut down and then turn on the receiver;

3、 After the receiver's voice broadcast is fixed and the robot announces "fixed solution" and "GNSS data reception is normal", shift the SA gear of the remote control to the lower gear, manually control the robot to drive forward (do not move the left remote sensing direction during the process), and then cut the SA gear to the middle gear after driving for 1s to control the robot to continue to drive forward. Until the robot voice broadcast "inertial navigation initialization is complete";

4、 The manual remote control robot returns to the starting position of the operation, the small wheel faces the starting position, and then cut the upper SA gear of the remote control to the upper gear, waiting for the APP to issue the task instruction.

7、 Four-parameter solution and calibration

Before drawing the line according to the design drawing and CAD drawing, it is necessary to complete the calculation and calibration of four parameters/seven parameters.

Preparation work:

- 1、 Find two or three control point locations based on the list of control points on the road design drawings. Note: When using two control points to solve, the two control points need to be distributed on both sides of the road; When solving with three control points, the three control points need to be distributed on both sides of the road, and the distance between them is as equal sceles triangle as possible. ;
- 2、 The list of control points has been imported to the ground receiving station;
- 3、 The robot is powered on, initialization is complete, app Bluetooth has been connected tothe RTK receiving station of the robot side;

Operation steps:

- 1、 app In the project management interface, select [set coordinate system], fill in

the ellipsoid, central meridian and related information according to the road design drawing

2、 In the 【 Set coordinate system 】 interface, select 【 Parameter calculation 】 , click to select 【 Four parameters 】



3、 Select and click [Source point (control point)] input box or [target point (collection point)] input box to enter the [point-to-coordinate information interface



4、 Click [Source point (control point)] or [target point (collection point)] to enter

the arrival point data interface; Select the control point, click [Import form], enter the ground receiving station file management interface, select the control point file import file





5、 Select the control point, and the interface will return to the point-to-point coordinate information interface.

6、 Click [target point (collection point)] again to enter the point-to-point data interface; Select the collection point and click [Add] to pop up the interface of adding the collection point





7、 Remove the connecting collection rod from the robot end of the RTK mobile station, adjust the height of the rod to 1.8m (can be any value), and place it horizontally on the control point; Enter the roll call (it can correspond to the roll call of the upper control point) in the interface of the new collection point in the APP, enter the rod height, and click smooth collection

8、 After the collection is completed, click "Confirm", and the interface will enter the point-to-point coordinate information interface, enter "name" (it can correspond to the "name" of the upper control point), and click "Confirm".



9、 Repeat steps 5-8, add two other groups or two groups of point-to-point coordinate information, in the "parameter calculation" interface, click "calculation parameters", the conversion parameter (four parameters/its parameters) information confirmation box will appear, if the scaling K (PPM) value is close to 1 up or down indefinitely, then the parameter is available, click "Apply parameters"



10、 After the interface displays the "parameter application success" prompt, switch

and click the reference conversion (seven parameters), plane correction (four parameters), elevation fitting and other interfaces, check the information display, confirm that the display is correct, return to the group selection interface, and then select the current robot to enter the main interface, at this time, the robot will announce "parameter reception completed";



11、Select [Calibration] in the setting interface, enter the calibration interface,

select the control point name on the upper right side of the calibration interface, and place the RTK receiving station connected to the acquisition rod horizontally on the control point, and select smooth acquisition;



12、 After the smooth acquisition is completed, select confirm, check and confirm that the north, east and height difference equivalent of the lower right side are within the range of $\pm 2\text{cm}$, and then select and confirm; At this time, the robot end will announce "calibration is complete".



Note: The number of control points required for four parameters is 2-3; The number of control points required for its parameters is 3-4

8、Create line segments

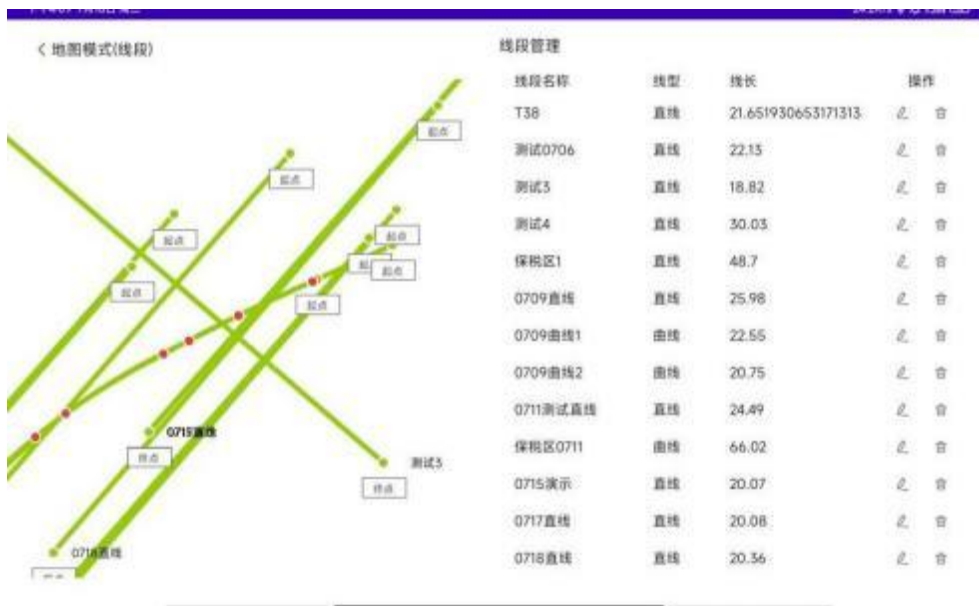
1、After the collection of collection points is completed, in the point collection interface, select 【 Create line segment 】



2、On the Create Line segment screen, enter a line segment name (custom) and click Save.



3、 After saving successfully, select [Line Segment Management] to view the successfully created line segment.



9、 Create a task -- pick points and draw lines

- 1、 On the job screen of the APP, select [Create Task].
- 2、 In the Create task interface, select Task [type];
- 3、 From the "Select Line segment" drop-down box, select the section you want to

work;

4、 Select the path direction, is the starting point of the currently selected section as the starting point of the job or as the end of the job;

5、 Select the offset direction, the left and right reverse is also the starting point of the selected section as the origin to select the offset direction, the left and right reverse is also the starting point of the selected section as the origin.

6、 Select the offset distance, is the starting point of the selected section as the origin, the horizontal left or right offset distance, the unit is cm;

7、 Whether it is non-edge line: according to whether the working section is edge line to choose the robot turn way;

8、 Select the type of line segment: the robot draws the line as a solid line by default, and the length and interval of the line segment determine the length of the second nozzle to make marks;

9、 Finally select OK.

< 创建任务

任务类型 采点画线 采点画图标 CAD画线

选择线段 线段 -

路径方向 ④ 起点 -> 终点 终点 -> 起点

偏移 ⑤ 左偏 右偏

是否是边线 ⑦ 非边线 边线

线段类型 ⑧ 实线长度(cm)

取消 ⑨ 确定

10、 Create the task - guide drawing lines

- 1、 After the excel file of the road design drawing straightening table is imported to the ground receiving station, select [Create task] on the operation interface of APP;
- 2、 Select K (or other AK, JK, etc.) in the drop-down box of line segment in the create task interface, and then select the need to work pile number;
- 3、 Other operations are the same as [8, create tasks to pick points and draw lines].

< 创建任务

任务类型 采点画线 采点画图标 CAD画线

选择线段 K - K 0+000 - K 0+177.758

路径方向 起点 -> 终点 终点 -> 起点

偏移 左偏 右偏 偏移距离(单位:cm)

是否是边线 非边线 边线

线段参数 线段长度(cm) 线段长度 线段间隔(cm) 线段间隔

取消 确定

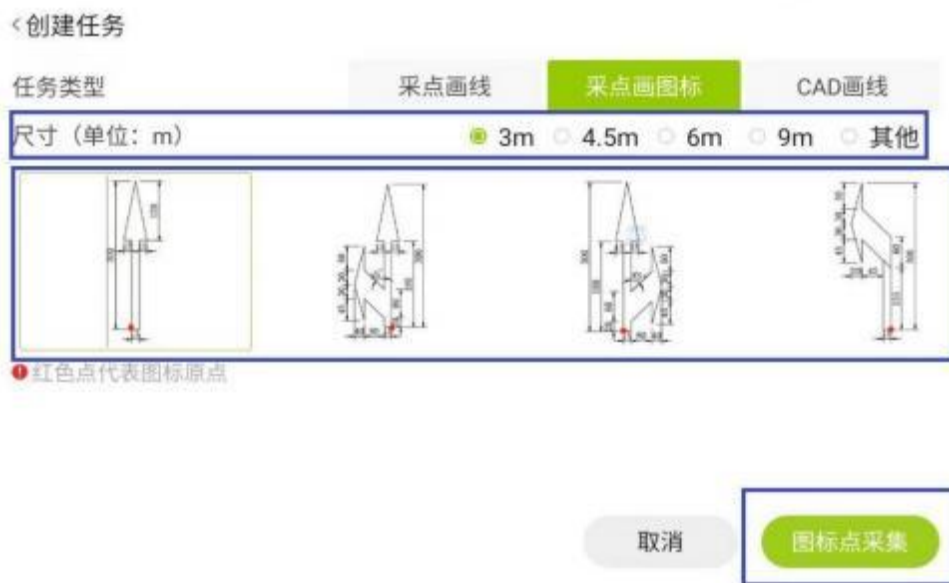
Note: 4 parameter / 7 parameter calculation and calibration must be completed before importing the drawing creation task and issuing the task

11、 Create task -- Pick dots and draw ICONS

- 1、 On the main screen of the APP, select 【 Create task 】 ,jump to the interface of creating task, select 【 Draw icon 】



2、According to the requirements of the job, select the arrow size and style, select 【 Figure punctuation collection 】



3、Connect the APP Bluetooth to the RTK receiving station of the robot end, take down the RTK receiving station of the robot end and place it at the starting point of the job or push the robot to the starting point of the job (the robot nozzle to its starting point), select acquisition or smooth acquisition in the origin bar of the app interface;

< 机器人标定

RTK实时数据
 蓝牙: 固定解
 卫星: 39-52
 纬度: 30.408580492
 经度: 114.44190715816667

起点	X	3365496.664	Y	542467.047	采集	平滑采集
终点	X	0.0	Y	0.0	采集	平滑采集

速度(m/s) 0.3 0.5 0.8

开始标定

4、After the origin collection is completed, take any point on the straight line perpendicular to the arrow direction and the starting point, the interval is greater than 2m, and collect the direction point;

< 图标点采集

RTK实时数据
 蓝牙: 固定解
 卫星: 43-57
 纬度: 30.408542777833333
 经度: 114.44184926483334

原点	X	3365482.621	Y	542454.176	采集	平滑采集
方向点	X	3365485.639	Y	542456.892	采集	平滑采集

横向距离(cm) 左偏 右偏

取消 确定

5、After selecting the lateral offset distance, select OK, the interface jump value main interface task list



6、Click Draw icon task, select Execute, the robot starts to draw icon job



Note: If the robot end RTK receiving station is removed from the mining point, after the mining, the RTK receiving station must be shutdown and turned on again, fixed to the robot body, do inertial navigation initialization operation, before the icon painting task can be issued.

12、 Create the task --CAD line drawing

1、 After the CAD drawing dxf file is imported to the ground receiving station, select [Create task] on the job interface of the APP.

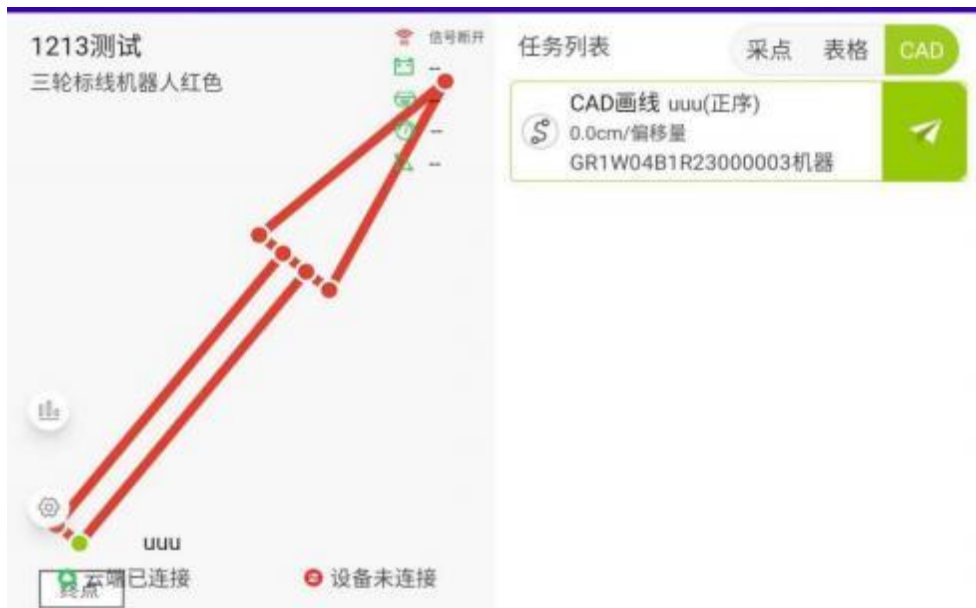


- 2、 Select [CAD line drawing], the name of the task can be entered arbitrarily
- 3、 Task type: Line segment or arrow can be selected
- 4、 Path direction: Whether the starting point of the currently selected section is the starting point or the end point of the job;
- 5、 Whether it is the edge line: according to whether the working section is the edge line to choose the robot turn way



6、 Select the line segment or arrow in the left view area, fill in the relevant information on the right side, and select OK





Note: 4-parameter / 7-parameter solution and calibration must be completed before CAD creation task and delivery task

13、Task delivery -- take points and draw lines

- 1、 After a task is successfully created, the task list displays the created task. When the task is not selected, the background is gray
- 2、 Left swipe the task to select task edit or delete; After the task is selected, the background is green
- 3、 Click on the task and select Execute



4、 After the task is delivered, the interface will indicate that the task is delivered successfully, and the robot will announce the task name simultaneously

5、 After the task is completed, the robot will announce the completion of the task by voice, the APP interface will indicate that the task is completed, and the completed tasks will not be displayed in the task list.

Note:

1. During operation, if the inertial navigation positioning signal fluctuates (GNSS solution state will be displayed on the APP side) or other anomalies occur, resulting in deviation of the robot's driving action or other anomalies, the robot can be stopped by performing any of the following steps:

- ① Manually cut the upper SA gear of the remote control to the middle or lower gear
- ② APP task list interface click the running task and select pause task
- ③ In the APP Task list interface, swipe the running task to the left and select Delete task

④ Press the emergency stop button on the robot car body

⑤ Press the power switch button of the robot body

2、After GNSS signal recovery or other abnormal recovery, the following steps to restore the action is as follows:

① Manually cut the upper SA gear of the remote control to the upper gear

② On the task list interface of APP, click the task in pause and choose to continue the task

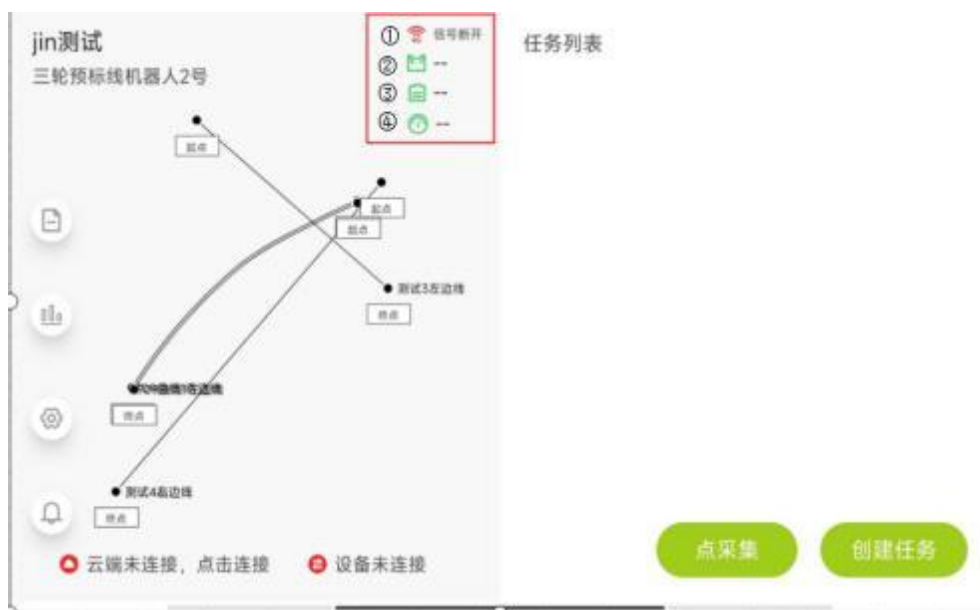
③ The same task needs to be created again, and the robot will continue to execute the task instead of starting from scratch

④ Turn the emergency stop button to exit the emergency stop state

⑤ Restart the machine, wait 2 minutes after the robot starts, and start the task again

3、 Robot status display

In the main interface of the APP, the following status is displayed as follows:



① Robot 4G signal status display: display "good signal", "general signal", "poor

signal", "signal disconnected" four states;

(2) Robot power display, when less than 25%, the APP end will be low power alarm

3. Geodesic GNSS receiver power display

④ Robot heading Angle display:

1) During operation, the display value fluctuates between ± 0.2 , indicating that the current heading Angle is good; The display value is between ± 0.5 , indicating that the current heading Angle is moderate; When the display value is beyond ± 0.5 , it indicates that the current course Angle is poor.

2) When the robot is stopped or when the manual operation is reversed, the course Angle display value is not for reference.

4. When the heading Angle is poor, the operation method:

1) The remote-operated robot walks in a straight line and observes the heading Angle display on the APP until the heading Angle value returns to ± 0.5 ;

2) Operate the GNSS ground receiving station on the robot vehicle body to shut down and start up again, and re-operate the GNSS ground receiving station initialization.

14、 Add the collection point

After the line segment is created, the additional collection point function can be used to achieve the drawing while mining. This function only applies to the dual RTK receiving station version

1、 After the line drawing task is delivered, in the task list of the APP main interface, select left slide the current task and select the edit icon to enter the interface of adding points



2、 In the interface of adding points, select [Add points], and then after connecting the APP Bluetooth to the mobile RTK receiving station, place the mobile RTK receiving station horizontally on the first point of the road section to be added, select [smooth acquisition] or [acquisition].

3、 After the collection is completed, select [OK], and the interface will return to the interface of adding points

4、 Repeat operation 2, after collecting at least two points, select [Save and Add]

Note:

1, the additional collection point can only be used in the issued line tasks (tasks in the execution state, the robot can be in the suspended state)

2. At least two additional points should be added
3. The addition must be at least 10m before the completion of the original task of the robot
4. It can be added multiple times, but it must be ensured that each time it is added, the robot must perform at least 10m before the completion of the original road section task
5. Collection method and precautions can be seen 【5. Collection of work points 】

15、 Nozzle cleaning

Before and after the daily operation, it is recommended to use the nozzle cleaning function to clean the nozzle to prevent the nozzle from blocking after the water paint solidified:

- 1、 On the home page setting interface of APP, select [nozzle cleaning];



- 2、 Click "Start Cleaning" in the nozzle cleaning interface, and the cleaning function will start.



Note:

- 1、 Before using this function, it is necessary to move the robot to the outside of the working road to avoid the pollution of the road after the residual water paint is sprayed;
- 2、 Remote control SA shift to automatic mode (upper gear);
- 3、 Pull out the pipe from the tank and insert it into the spare water bottle.
- 4、 The cleaning function will automatically turn off after 30 seconds. During the cleaning process, switch the SA gear to manual mode (middle gear or lower gear) to abort the task; If you need to continue cleaning, you can shift the SA gear to automatic mode (upper gear) and then click the "Start cleaning" button again;
- 5、 During the cleaning process, the current interface cannot be exited.

16、 [no moment] APP. Version upgrade

No moment APP supports OTA upgrade, the new version will be pushed to the user, the user can choose the upgrade version, the operation is as follows:

1、 On the main interface, select [Settings] icon to enter the Settings menu bar



2、 Select "User Management" to enter the user management interface



3、 If there is a new version push, the user management interface "About no Moments" column will be marked with a red dot



4、Click [About no moment], pop up the information display box, [Check new version] column will be marked with a red dot



5、Click [Check new version], the upgrade dialog box will pop up. Users can choose [upgrade] or [do not upgrade] according to their personal wishes.



6、 After selecting [Upgrade], the new version will start to download



7、 After the download is complete, select Confirm according to the guidance prompt, and the installation is successful



8、 Open the APP again, log in and use it

△ Robot precautions

- 1、 Use the product as directed in the operating guide. The company is not responsible for any loss or injury caused by improper use;
- 2、 The shell of the robot can not carry the force, place heavy objects;
- 3、 To prevent damage to the equipment and violation of warranty terms, do not disassemble the robot body;
- 4、 Do not use the product in extremely high (50° C) or extremely low (-20° C)

environment, which may cause equipment failure;

5、 Please use the original rechargeable battery specially supplied by our company;

6、 Do not use the product on wet or stagnant ground;

7、 If you do not use the product for a long time, please turn off the product; And at least every 1 month to the robot, remote control, GNSS receiving station battery charging, to avoid long-term battery failure;

8、 The concentration ratio of water paint can be used according to the concentration ratio of manual marking. It is necessary to use the cleaning function to clean the nozzle and the conduit after the completion of the operation everyday to avoid the blockage of the nozzle and the conduit;