CHCNAV AlphaAir 9

User Manual

Aerial Surveying | Jul. 2024

Make your work more efficient

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1 Reading Tips

1.1 Symbol Description

Forbid

Warning

Important note

Operate & Using tips

1.2 Recommendations

CHCNAV provides below documents for users:

- AA9 Lidar system user manual
- AA9 Configuration list

It is recommended for users to read above documents before first time using.

If users have any questions regarding the content of this manual, please contact us at +86 21 542 60 273 for professional consultation and assistance.

1.3 Service & Support

CHCNAV website: www.chcnav.com

Email: sales@chcnav.com | support@chcnav.com

Tel: +86 21 542 60 273 | Fax: +86 21 649 50 963

CHCNAV reserves the right to modify product status and user manuals without prior notice. For the latest product information, please visit CHCNAV's official website (www.chcnav.com).

1.4 Disclaimer

- The customer should use and maintain the equipment in accordance with the requirements of the manual. If the service life of equipment is affected due to improper use or maintenance, even broken, CHCNAV will not bear the relevant responsibility. All repairs and maintenance services resulting from this will be charged at standard prices.
- During the transportation, if the equipment is damaged due to improper logistics operation, CHCNAV will not bear the relevant responsibility.
- During equipment using time, if customer disassembles and assembles the equipment without CHCNAV's suggestions & permission, and resulting in damage, CHCNAV will not bear

the relevant responsibility.

- Customer should use default batteries and accessories. The use of non-original accessories is not eligible for warranty; if occur accident, the manufacturer will not bear the corresponding responsibility.
- The M300 drone and Skyport interface mentioned in the appendix are products of DJI Innovations Co., Ltd., based in Shenzhen, China.

2 Using Requirements

2.1 Using Environment

- It is not recommend to use in rainy, snowy, or foggy weather for safety. Also the point cloud data will have more noise.
- It is not recommend to frequently use in dusty environment, which will affect the service life of equipment.
- It is forbidden to expose the device and accessories under extreme temperature. The environment temperature must not be lower or higher than the specification temperature.
- When the equipment is transferred from a cold environment to a warm environment, water may condense on certain components inside the scanner. To avoid this, it is recommend to place the scanner in a sealed plastic bag before transferring. When the condensate is evaporated, then turn on the plastic bag.

2.2 Tips Before Using

- Check whether the laser glass is normal, if there is dust exist, please use the cleaning kit to clean it.
- Check whether the ports are clean, and whether the pins are normal.
- Check whether the connecting cables are reliable and stable, and whether the GPS cable is stable and normal.
- Check whether the remote controller has sufficient power.

2.3 Tips During Using

- When using, make sure that all cables and ports are connected correctly.
- After powered on, check whether the connection between remote controller and equipment is normal, and whether the status of tracking satellite and board is normal.
- Place equipment at an open sky area with good GPS signal during powered on.
- If the buzzer sounds abnormally during the capture process, please check immediately whether the equipment status is normal.
- Before start work, check the remaining capacity of the data memory card. If the remaining capacity is less than 10% or does not meet the current collection capacity requirements, the old data file need to be deleted in advance.
- Before start work, please check whether the controller's laser parameter settings are correct. If not correct, please reset it again according to the project requirements.

2.4 Tips After Using

- After using, unplug the cable first, then place the equipment into equipment case and accessories into accessory case.
- During transportation, take care the equipment and try to avoid bump.

3 Product Description

AlphaAir 9 is a new generation of mid-range airborne LiDAR system totally launched by CHCNAV. Based on the design concept of “strong penetration, high precision”, AlphaAir 9 integrates high-performance LiDAR, high-precision inertial navigation and full-frame camera which are equipped with UAV, CoPre and CoProcess software to provide "high precision, high efficiency, low cost” 3D data acquisition and processing of the whole process solutions for customers in terrain surveying, engineering survey, power line inspection and other industries.

3.1 Check List

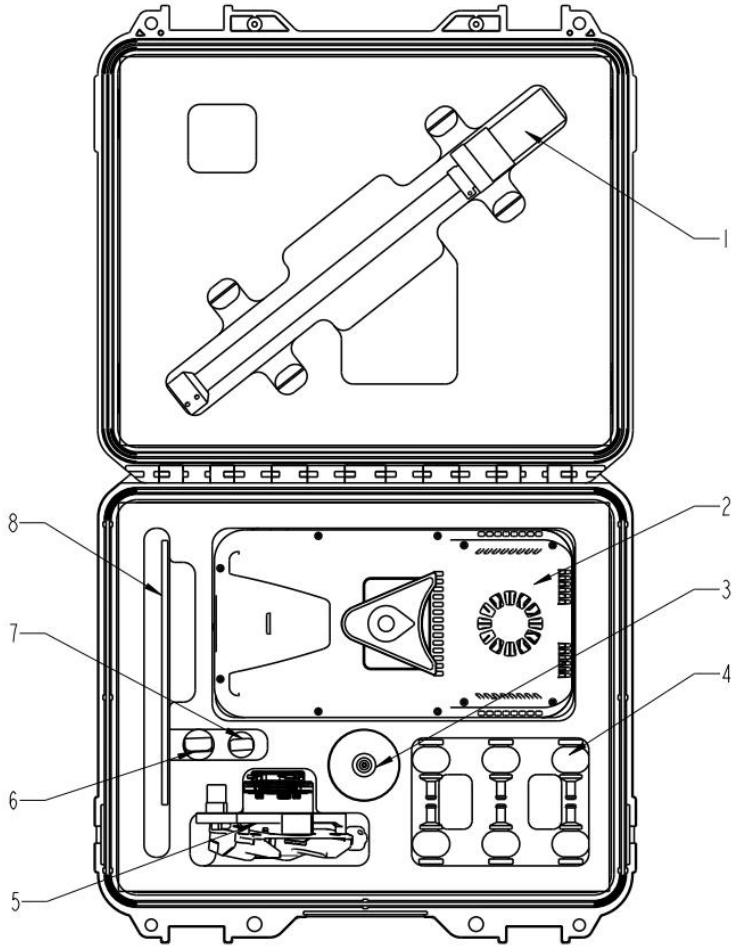
Note: Please refer to the actual delivery list.

AA9 LiDAR system configuration list is shown below:

N	Description	Model	Pcs
1	AA9 unit	AA9	1
2	AA9 transport container		1
3	USB3.0 to TYPE-C adapter cable		1
4	USB disk (32G)		1
5	Lens cleaning wipes		10
6	Lens cleaning air blow		1
7	Mount platform for M300/M350		1

3.2 Delivery of Equipment and Materials

Note: Please refer to the actual delivery list.



1. GNSS antenna;
2. AlphaAir 9 LiDAR system;
3. Cleaning ball;
4. Shock absorbing balls (for M300 & M350);

5.Mount adapter;

6/7.USB disk;

8.User manual.

- AlphaAir 9 LiDAR system:

- AlphaAir 9 transport container:

- Mount adapter & GNSS antenna:

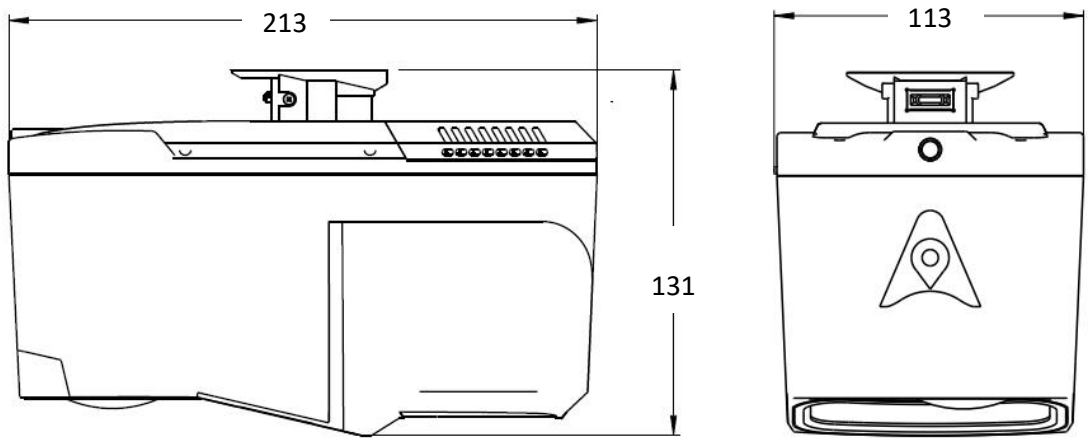
- USB disk:

- Lens cleaning air blow & Lens cleaning wipes:

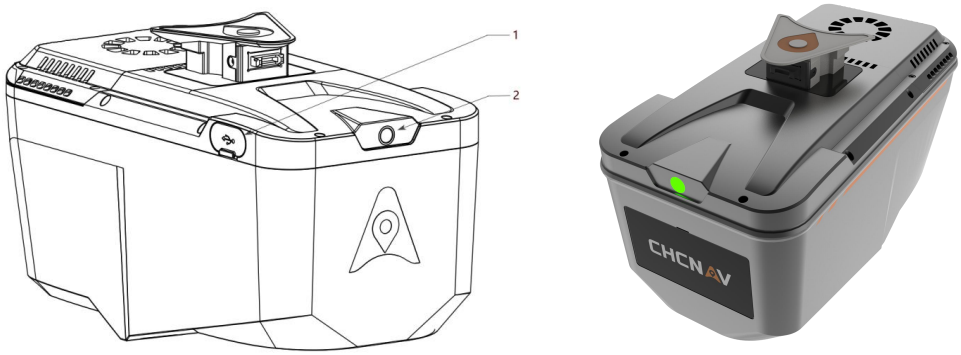
3.3 Physical Characteristics

3.3.1 Weight and Size

- Weight: 1.45kg.
- Length, width, and height (213×113×131mm) are shown below:



3.3.2 Interface Definition



1. Type-C port for data copy (without turn on).
2. LED indicator for device status.

LED indicator & buzzer	**Device status**
LED Indicator off	Power off
Quickly blink (5 times per second)	Under initialization
Solid green	Initialize successfully
Slowly blink (2 times per second)	Create project successfully; GNSS & IMU data collecting…

Normal blink (1 time per 2 second)	Data capturing...
Abnormal blink with sound	Abnormal

3.4 Power Supply and Physical Characteristics

Input voltage	24V (13~27V)
Power consumption	40W
Working temperature	-20 °C to +50 °C
Storage temperature	-20 °C to +60 °C

3.5 AA9 Technical Data

3.5.1 Laser Product Classification

Class 1 Laser Product according to IEC 60825-1:2014

3.5.2 Max. Measuring Range

Laser Pulse Repetition Rate PRR	100kHz	300kHz	500kHz
Max. range, @ρ >10%	283m	194m	152m
Max. range, @ρ >20%	300m	275m	215m
Max. range, @ρ >80%	600m	360m	280m

NOTE：

- Rounded values.
- Flat terrain assumed.
- Typical values for average conditions. Maximum range is specified for flat targets with size in excess of the laser beam diameter, perpendicular angle of incidence.

3.5.3 Max.Operating Flight Altitude AGL

Flat terrain assumed, scan angle 75° FOV

Laser Pulse Repetition Rate PRR	100kHz	300kHz	500kHz
@ρ >10%	224m	154m	121m
@ρ >20%	241m	218m	171m
@ρ >80%	474m	284m	222m

NOTE：

- Rounded values.
- Flat terrain assumed.
- Different target reflectance have different max. operating flight altitude AGL.

(1) When the mission area consists of post-rain scenes or mainly targets asphalt materials, which have low reflectance, it is recommended to set the flight altitude with a reflectance ρ >10%.

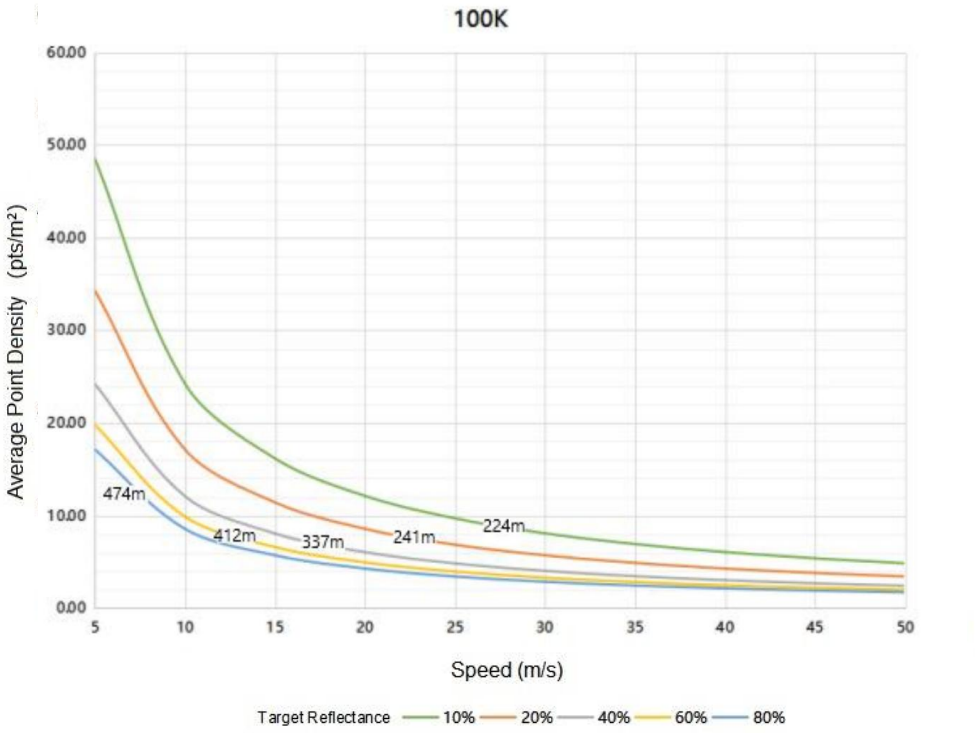
(2) When the mission area mainly composed of materials like deserts, limestone, etc., it is recommended to set the flight altitude with a reflectance ρ >40%.

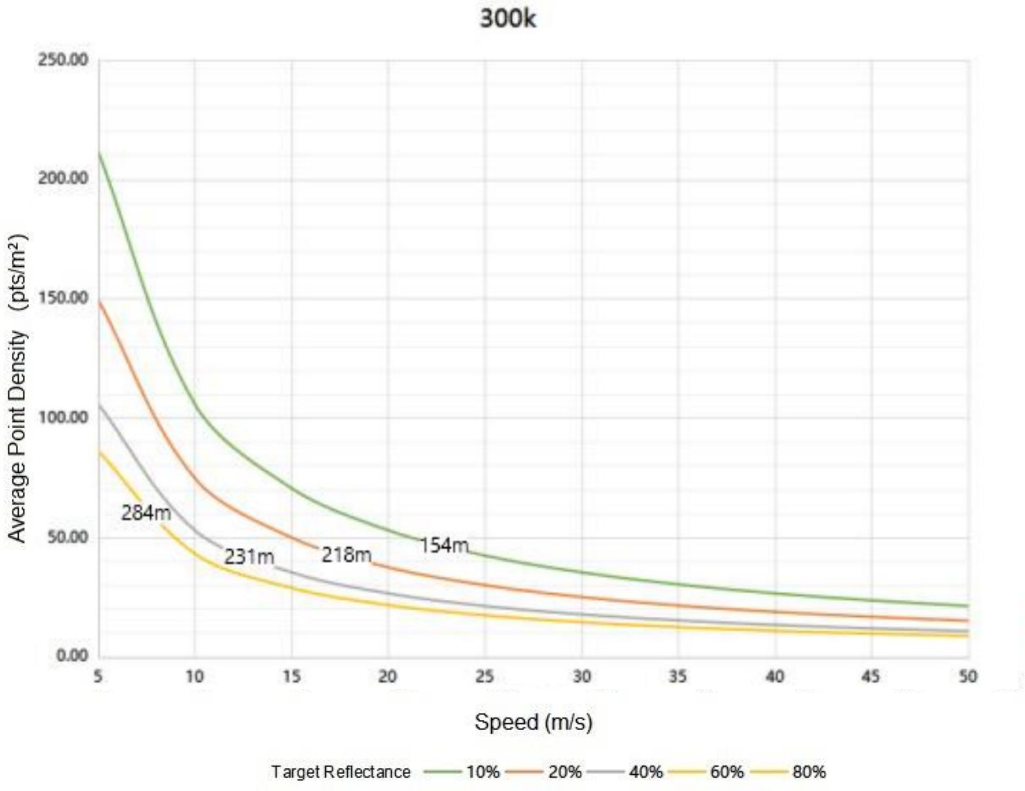
(3) For other general mission area, it is recommended to set the flight altitude with a reflectance ρ >20%.

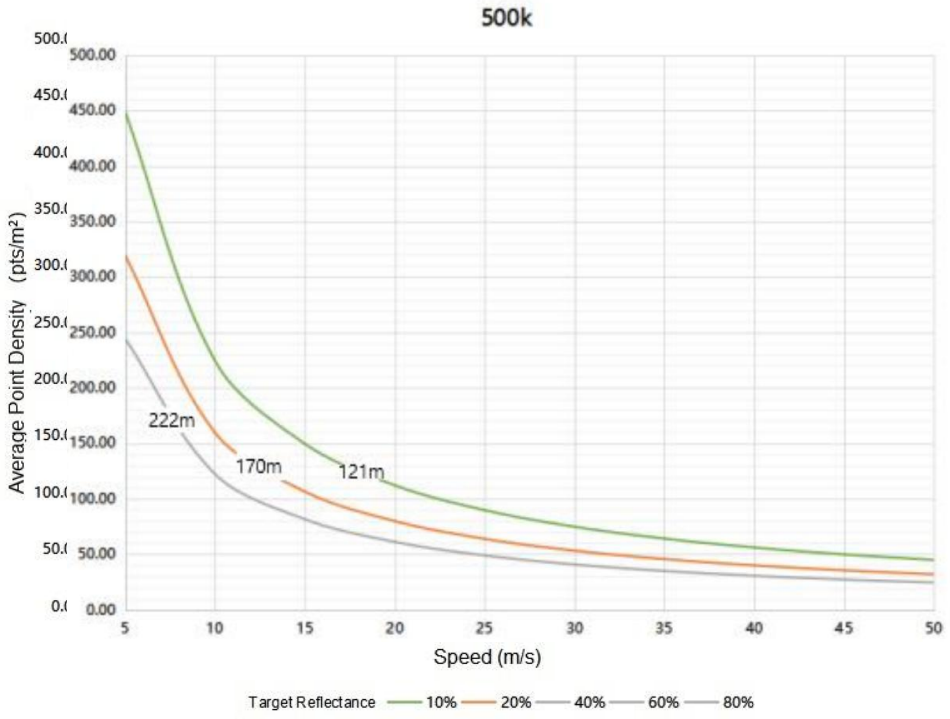
3.5.4 Max.Operating Flight Altitude AGL & Point Density

The graph below shows the maximum operating flight altitude AGL at different Laser Pulse Repetition Rate PRR under different target reflectance.

The graph below also shows the relationship between the average point density within a single strip and the flight speed .



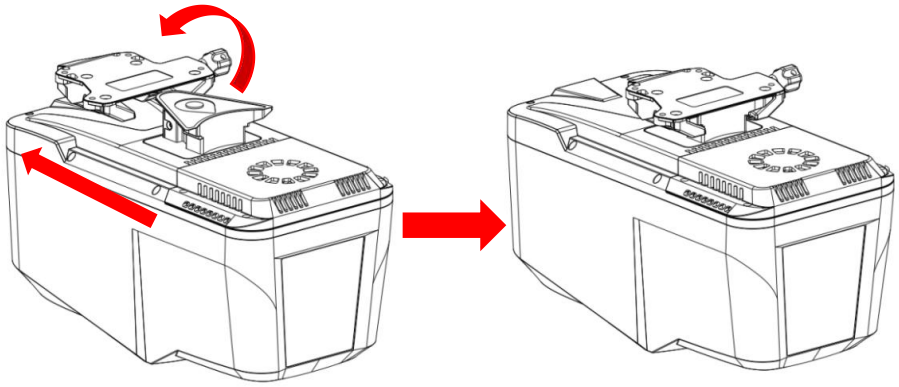

300k
250.00
200.00
150.00
100.00
50.00
0.00
Average Point Density (pts/m²)
284m
231m
218m
154m
5
10
15
20
25
30
35
40
45
50
Speed (m/s)
Target Reflectance
10%
20%
40%
60%
80%



4 Installation And Disassembly Guide

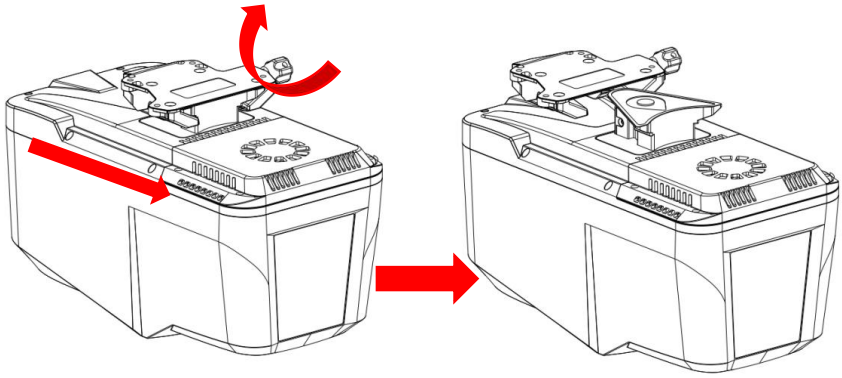
4.1 Installation Steps

- Push the “Alpha port” slider of scanner into the quick-release clamp which on the bottom of the airborne mounting platform in the direction of the arrow until hear a “click” sound.
- Tighten the side screw bolts to make it stable and finally finished the installation.



4.2 Disassembly Steps

- When removing the AA9 from the platform, hold the bottom of device with left hand , loosen the side screw bolts counterclockwise with right hand until the threaded part of the side screw bolts disengages.
- Pull the side screw bolts back to the maximum position with the right hand and keep it. Pull the “Alpha port” slider of scanner out the quick-release clamp which on the bottom of the airborne mounting platform in the direction of the arrow.



5 Product Using

5.1 Advance Preparation

- Check the equipment to ensure that the contents and other accessories are not missing.
- Check whether there are any stains on the laser beam exit window and camera lens. If there are stains, use the cleaning tools provided with the package to gently wipe and clean them.
- Make sure the batteries of base station , aircraft , and remote control are fully charged.
- Check the device authorization and storage space.
- Confirm whether there are tall buildings or interference sources nearby the take-off point.

5.2 Equipment Installation

Take out the equipment from the container before using. Install it on the corresponding platform and connect all cables.

- First, install the equipment on the platform and lock it with screws. For detailed information, refer to Chapter 4.
- Connect both power supply cable and GPS feeder cable of equipment.

5.3 LiDAR Power On

Set up the base station at an open sky area, frequency set as 1Hz. Turn on the equipment after the base station start recording static data. During capture, one person operates the remote controller and control the flight.

- After the device installation is completed, turn on the drone's power. The AA9 will power on automatically.
- Wait for about ten seconds, and the device's indicator light will start flashing, which means the system has powered on successfully and start initialize.
- Use DJI controller to connect to the device. For detailed information, refer to Chapter 6.
- After powering on the AA9, wait around 1 minute until the device indicator light becomes steady on, indicating that the device initialization is complete.

☞ **Note: The correct procedure is to install the AA9 first and then power on the aircraft. The AA9 does not have an on/off switch; the AA9 will automatically power on when the aircraft is powered on. So, please make sure to install the AA9 before powering on the aircraft.**

5.4 LiDAR Power Off

- Before power off equipment, please make sure the project is already stopped.
- Turn off power supply system to power off the equipment .

☞ **AA9 has no “ON/OFF” button, which will be powered off automatically after the power supply turned off.**

6 Product Workflow

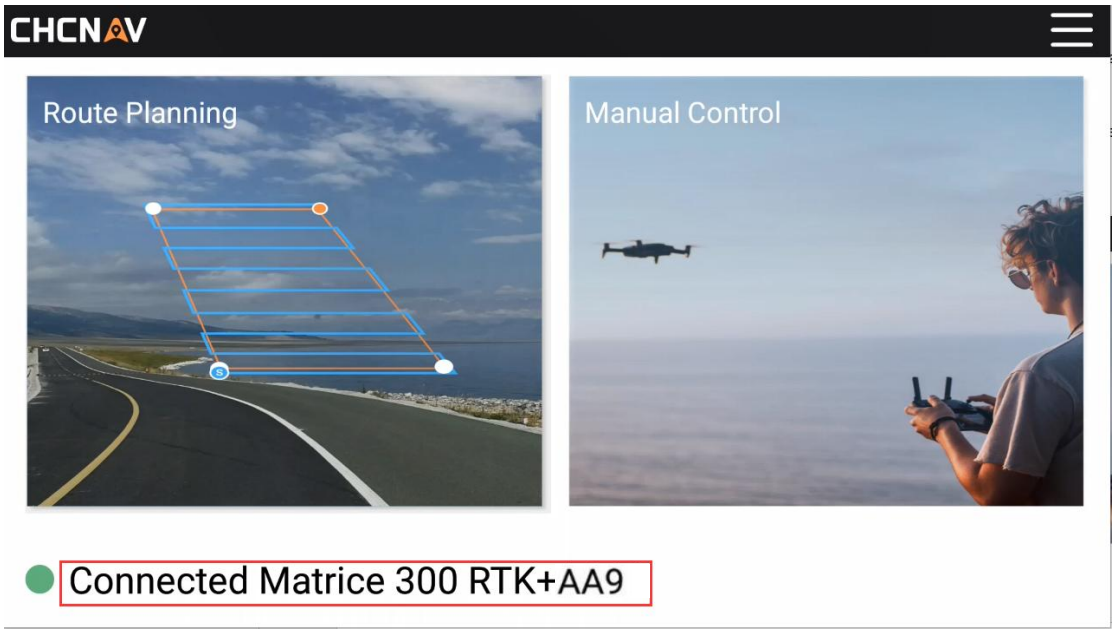
AA9 use SmartGo software to configure settings and control. The SmartGo can be accessed from remote controller, mobile phone and tablet running Android. If AA9 is installed on Matrice 300 RTK or 350 RTK, the SmartGo should be installed on the controller. The following will use Matrice 300 RTK or 350 RTK equipped with AA9 as an example to introduce the workflow.

6.1 AA9 Connection

After AA9 installation is completed, turn on the drone's power. The AA9 will power on automatically, wait for about ten seconds, and the device's indicator light will start flashing, which means the system has powered on successfully and start initialization.

After drone is turned on, SmartGo will connect to drone and payload automatically. After connect successfully, the main interface will show drone and payload type.

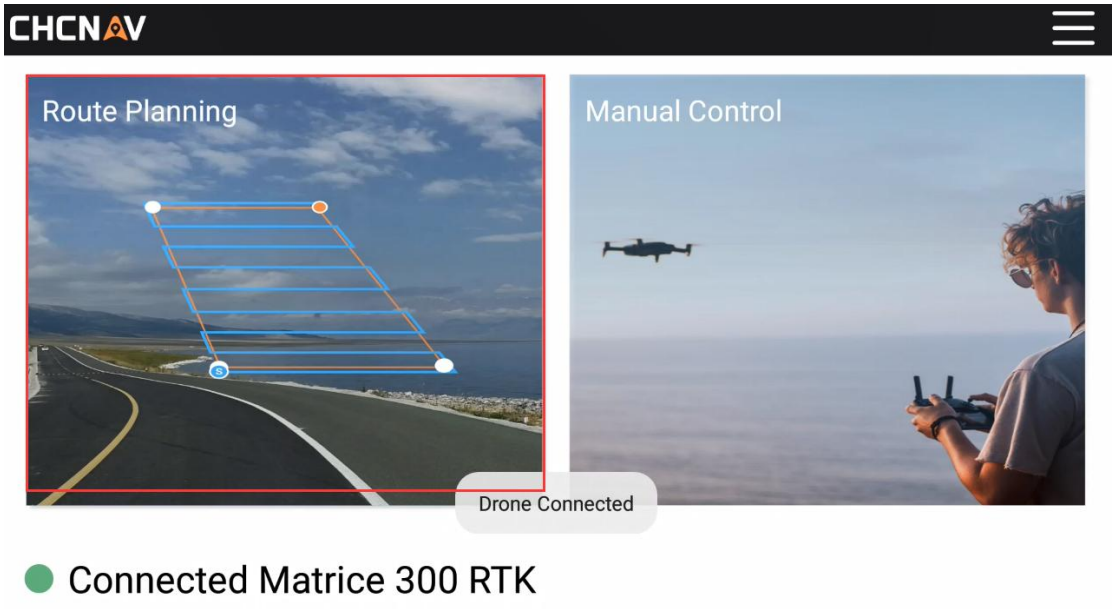
☞ **Note: Payload connection should slower than drone connection around 1 minute.**



☞ **Note: The correct procedure is to install the AA9 first and then power on the aircraft. The AA9 does not have an on/off switch; the AA9 will automatically power on when the aircraft is powered on. So, please make sure to install the AA9 before powering on the aircraft.**

6.2 Route Planning

Open “Route Planning” and create a new project with regional route or strip route.



6.2.1 Interface Introduction

①3D/2D display

2D / 3D : Switch 2D & 3D map view. For 3D view, user can only rotate map view but can not

zoom in or zoom out.

② Map source change

：SmartGo supports TDT map, Google map, OSM and ArcGis map. User can also import customized map URL.

③ Positioning

：When UAV is connected, click this button will locate to UAV position; When UAV is unconnected, click this button will locate to controller position.

④ No-fly zone display

：Orange means no-fly zone has been displayed; Grey means not display no-fly zone.

⑤ Measuring tape

: User can measure distance on map, which supports 3D distance and 2D distance.

⑥ Compass

: Compass will show north direction when user rotate map. Click this icon, map will restore to north direction and lock map. Click again to unlock rotate.

⑦ Exit

Click CHCNAV logo on left top to exit software page.

⑧ UAV & Payload status

Show real-time status of UAV and payload.

⑨ Connection status

：Show real-time connection status between UAV and payload: Green is connected status and gray is unconnected status. Click this icon to display UAV safety configuration page.

⑩ Controller signal status

：Quality of communication between drone and remote controller.

⑪ Satellite number

: UAV satellite number, which represents GNSS signal strength.

⑫ RTK status

: UAV RTK status: red is single, yellow is float and green is fix. It's recommend to start mission with green fix status.

⑬ Obstacle avoiding

: Icon to turn on/off obstacle avoiding function: green is on and UAV will hovering then return, and gray is off.

⑭ Controller voltage

: Remote controller voltage and red means voltage is less than 25%. Click this icon to open controller configuration page.

⑮ UAV voltage

: UAV voltage of two batteries. It will show red color if battery voltage is lower than warning threshold or battery is not normal. Click this icon to open battery configuration page.

⑯ UAV parameters configuration button

: Click this icon to open configuration page: security settings, remote controller settings, battery settings, camera parameter settings and LiDAR settings.

⑰ RTH

: Click this icon, UAV will return to home point and landing.

⑱ Pause/Continue

: Click this icon to pause or continue UAV flight. After pause, user can manually control UAV flight.

⑲ Flight info

This column shows UAV horizontal speed, vertical speed, longitude/latitude, relative flight height, straight distance to landing point.

⑳ Flight attitude ball

It shows horizontal relative position between controller, home point and UAV. Horizontal line shows real-time UAV attitude change and N is north direction of Android device.

㉑ FPV window

It shows real-time camera view, and click this icon to switch between map and FPV view.

㉒ Real-time point cloud window

It shows LiDAR real-time point cloud data, and click this icon to switch between map, FPV and real-time point cloud window.

㉓ Flight progress bar

It shows UAV flight progress bar, and current flight time and estimated rest time.

㉔ Message log

It shows drone log information, which includes error (red), warning (yellow) and normal (white) messages.

㉕ S waypoint

: Start waypoint of mission route.

㉖ UAV icon

: It shows UAV real-time location on map, and arrow direction shows UAV real-time flight direction.

㉗ Home waypoint

: It shows home waypoint of UAV. When mission finish, UAV will landing on this point.

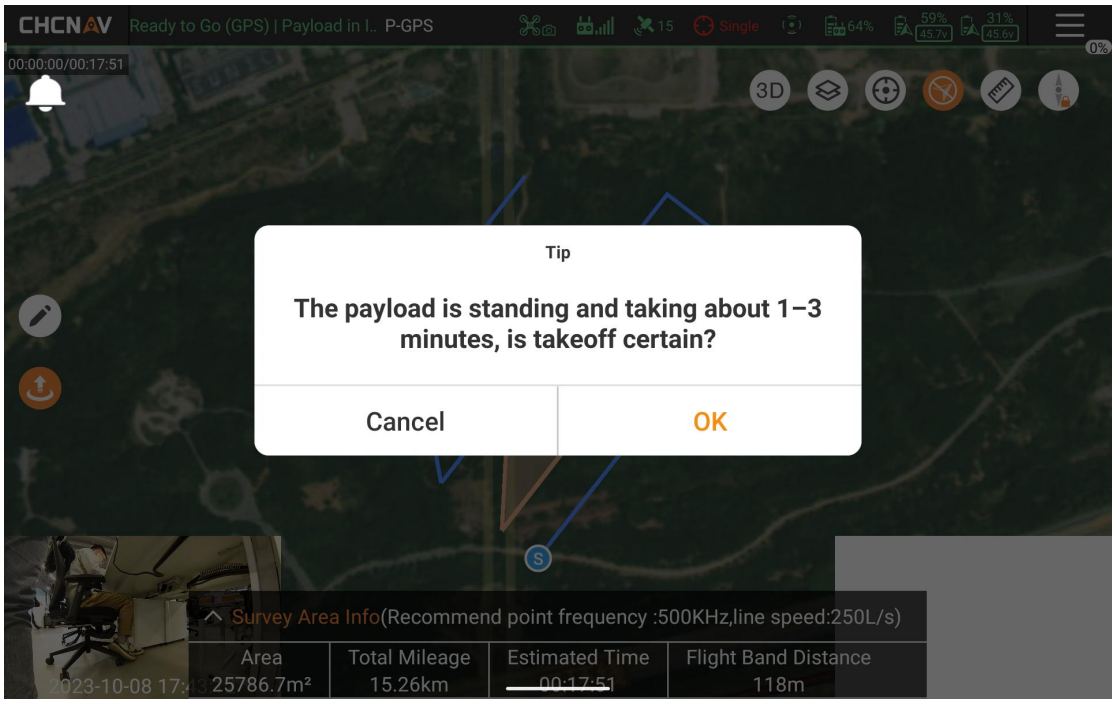
㉘ **Continue mission**

：User can click this icon to continue last time unfinished mission. UAV will start from a previous waypoint of unfinished location to continue work.

：Remote controller location.

6.2.2 Pre-flight Check

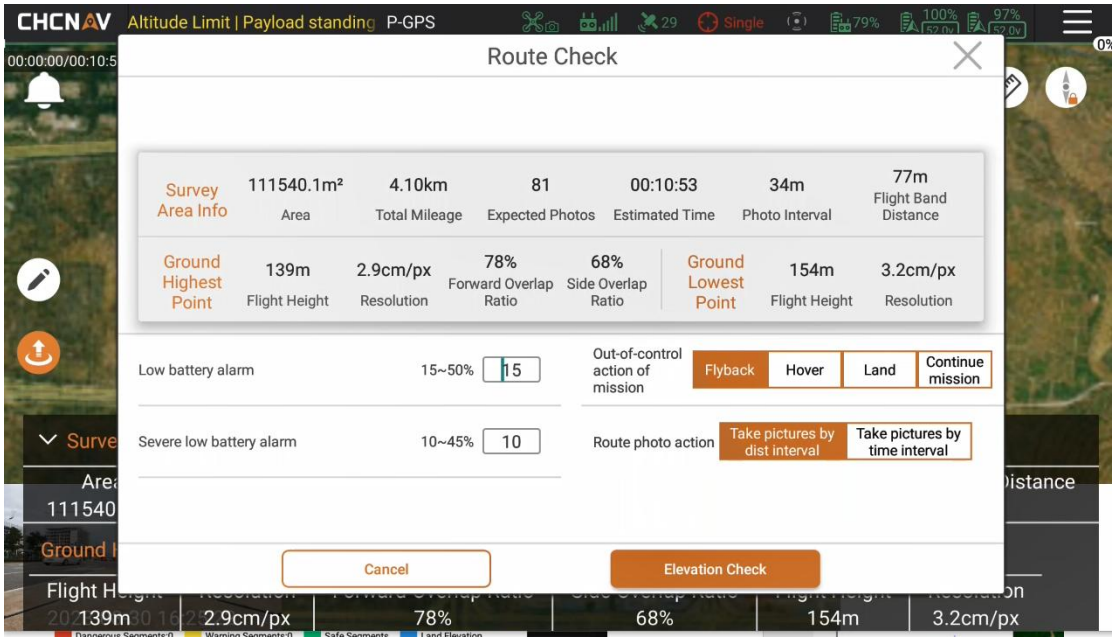
After mission route design finished, user need run a set of pre-flight check: mission parameters, UAV parameters, mission height, UAV sensor status and surrounded environment check. If the drone is equipped with lidar, user need wait LiDAR finish 1-3 minutes static alignment first then can start pre-flight check, otherwise SmartGo will show a warning message.



☞ **Note: If the interval for taking pictures of the camera is less than 1s, the system displays a message indicating that saving the route fails.**

① **Route check**

First step is mission route check, which will show survey area information and drone information. User can also modify some parameters here.



Note:

1. When the type of camera mounted on the drone is none or the camera is disabled, the route photographing action is automatically selected as no photographing and cannot be modified.

2. If the actual mounted load does not match the load type set in the route plan, a red message will be displayed on the route check interface and the elevation check cannot be performed.

② Elevation check

Elevation check page shows mission route height of drone and elevation height of terrain, which includes take off and landing stages: Red color shows dangerous part, which means height difference between route and elevation is lower than danger threshold; Yellow color shows warning part, which means height difference between route and elevation is lower than warning threshold. User can modify thresholds here and then refresh page to re-calculate.

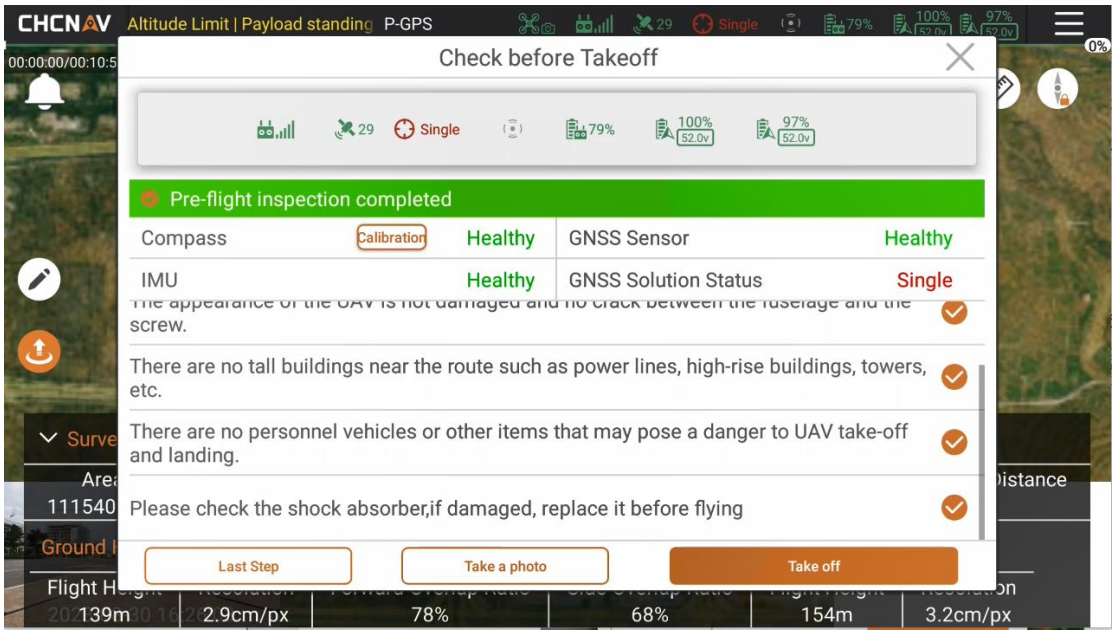
If mission contains dangerous part, then user can not upload mission to drone, and map will shows risky part area.

Note:

1. If mission route is too long, the elevation check page may not display whole mission route figure, so user need left slide page to show hidden part.
2. The elevation check page will shows whole route check result from take-off to landing, also includes 8-shape figure route.
3. When the interface indicates that the elevation cannot be obtained, please connect to the network to obtain the online elevation data or import the DEM elevation data file in the route editing interface.

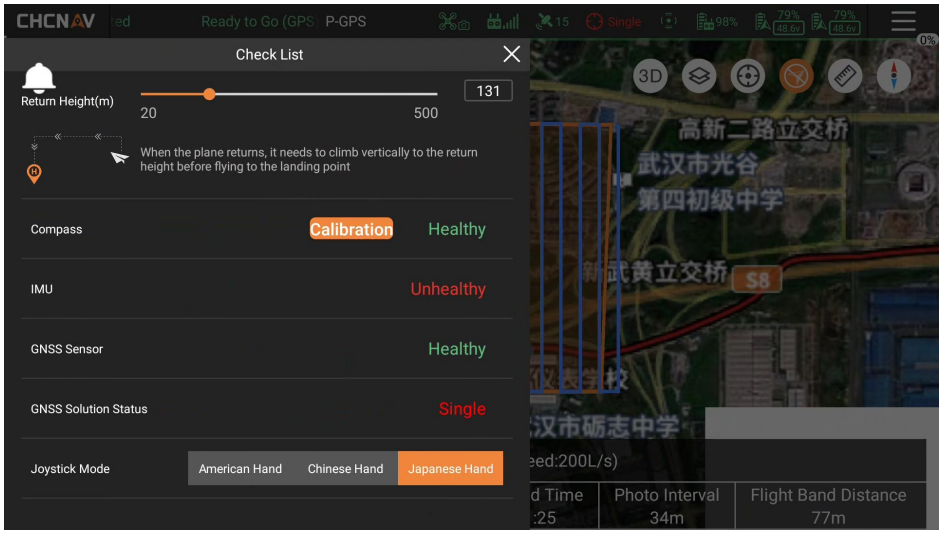
③ Sensor check

Sensor check is the last step of pre-flight check, need to make sure all sensors are normal then can take-off drone.



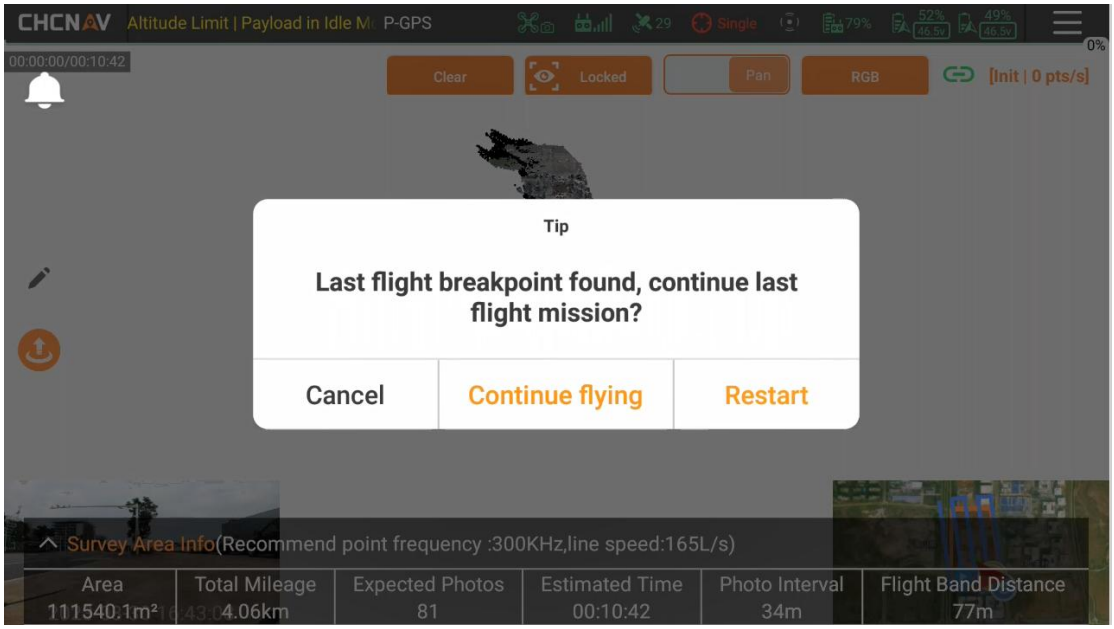
6.2.3 Drone check list

User can check real-time drone status via check list page. This page contains return height, compass, IMU, GNSS sensor, GNSS solution status and joystick mode.



6.2.4 Continue flight

SmartGo supports continue flight mode which is used to continue last mission when drone not finish whole mission but return to home already. It will generate a new “continue” waypoint on map, and user can click “continue flight” so that drone will flight to the previous waypoint of continue position to start work.

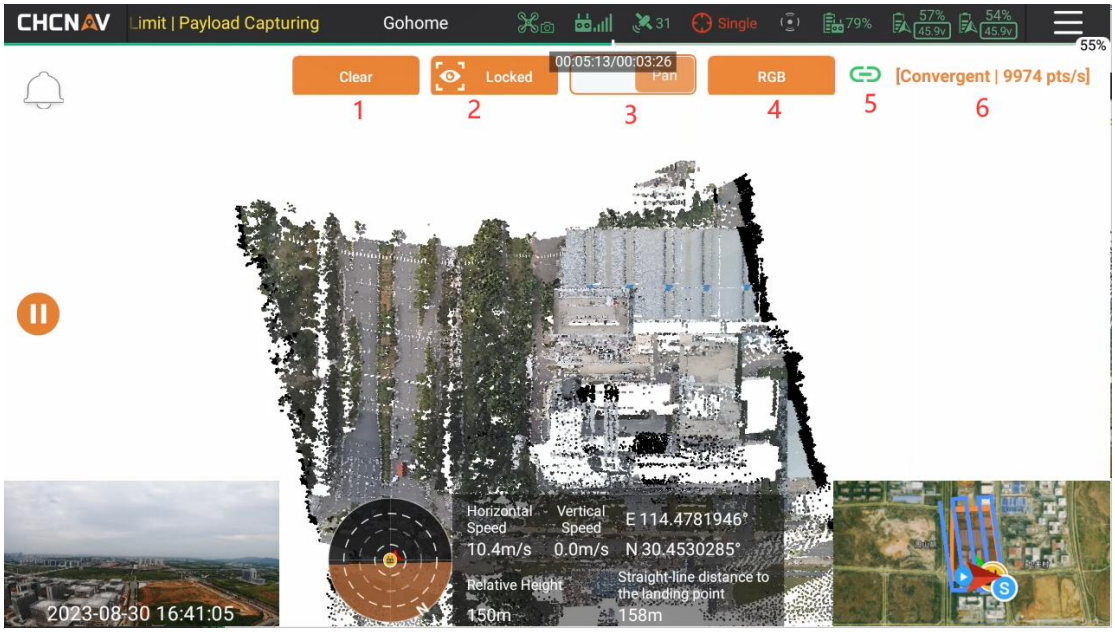


Note:

1. User can not modify continue flight mission parameters, otherwise this mission will not allow to continue flight, but this not includes drone speed and 8-shape route, these two parameters can be changed and mission still allow to continue fly.
2. After change parameters, software can still retain continue waypoint without saving.
3. After continue flight mode start, software will clean continue waypoint and can not be restored.
4. Copy mission will also copy continue waypoint property.
5. If drone has return to home point because of communication lose, then the continue waypoint can only be created on the last waypoint before lose.
6. If drone return to home point from the middle of two routes, then the continue waypoint will be created on the start of next route.
7. During flight, if drone is far off mission route, then the continue waypoint will refresh on the start of this route.

6.2.5 Real-time Point Cloud

SmartGo supports real-time point cloud display for DJI M300 drone with CHCNAV AlphaAir 9 LiDAR system. User can click right bottom icon to switch real-time point cloud display page.



① Empty

Clear：Click this icon to empty all current displayed point cloud data on software interface, and shows new captured point cloud result (last flight real-time point cloud will be emptied automatically). This empty will not delete LiDAR stored raw data.

② Lock view/Unlock view

Locked：Click this icon to switch view between lock and unlock status. User can only slide or rotate point cloud under unlock view mode.

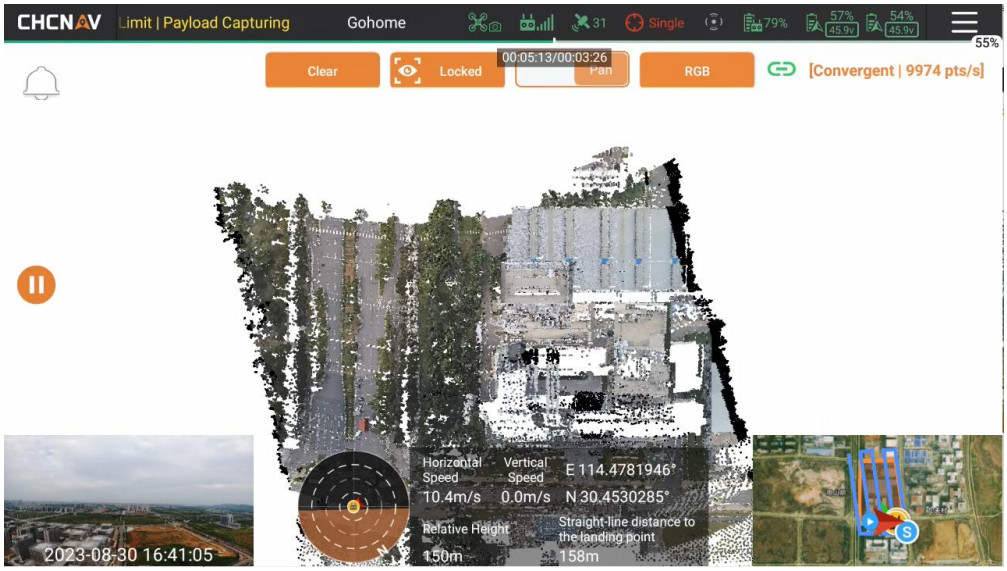
③ Drag/Pan

Pan：Click this icon to switch operation mode between drag and slide: under drag mode, point cloud can do 360 degree rotate based on central point. Under slide more, point cloud can be slide move in different directions.

Note: This icon is only available under unlock view.

④Render mode (RGB/ALT)

RGB：Click this icon to switch render mode between RGB and ALT for real-time point cloud.

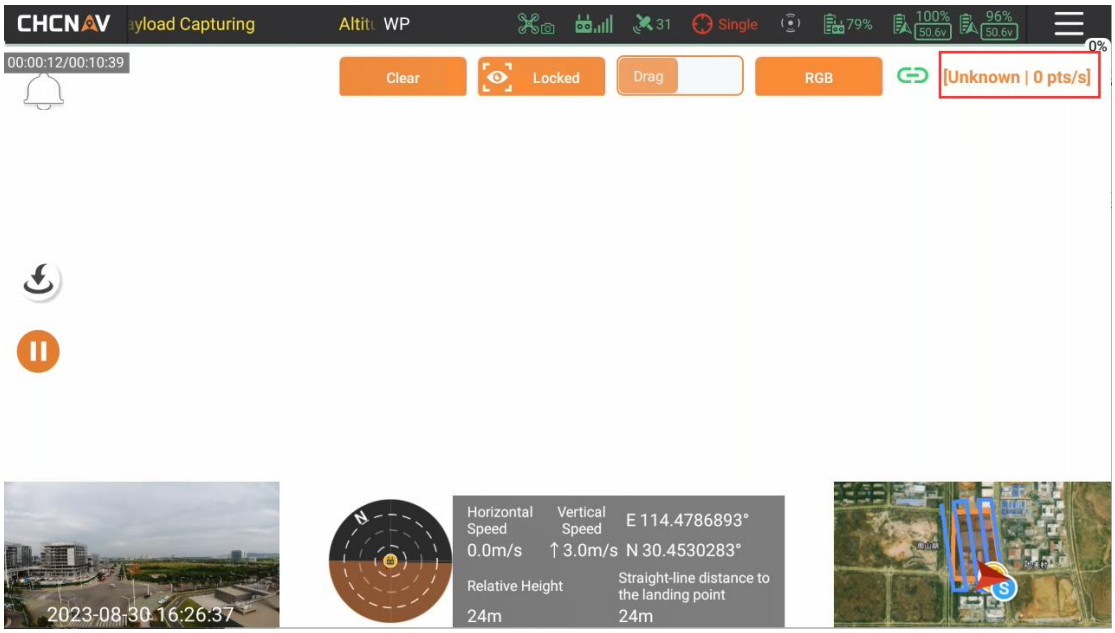


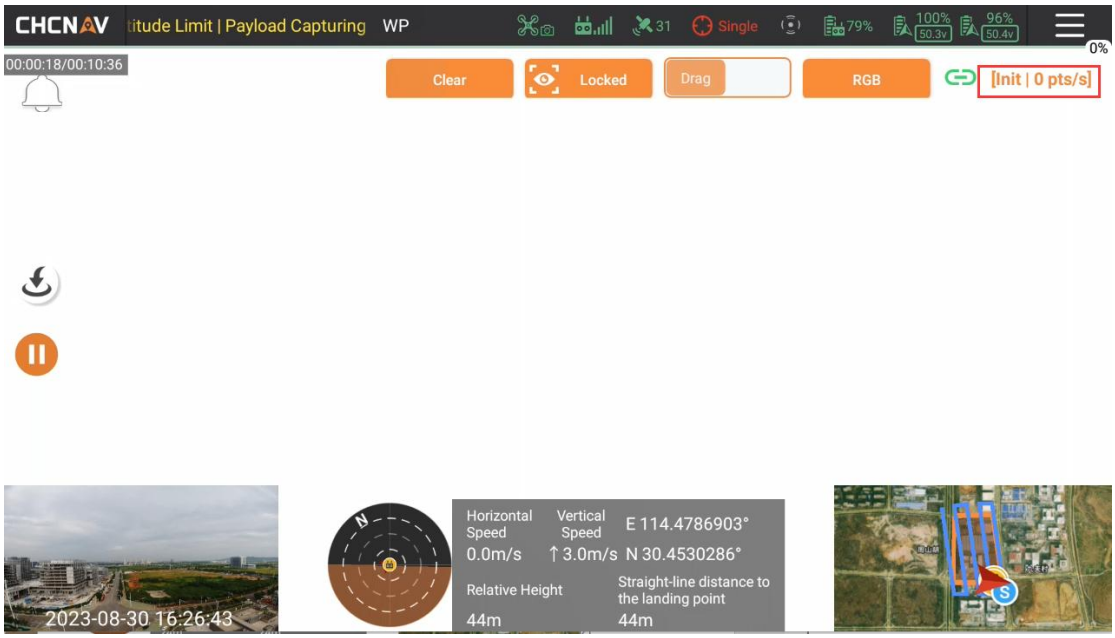
⑤ Connection status

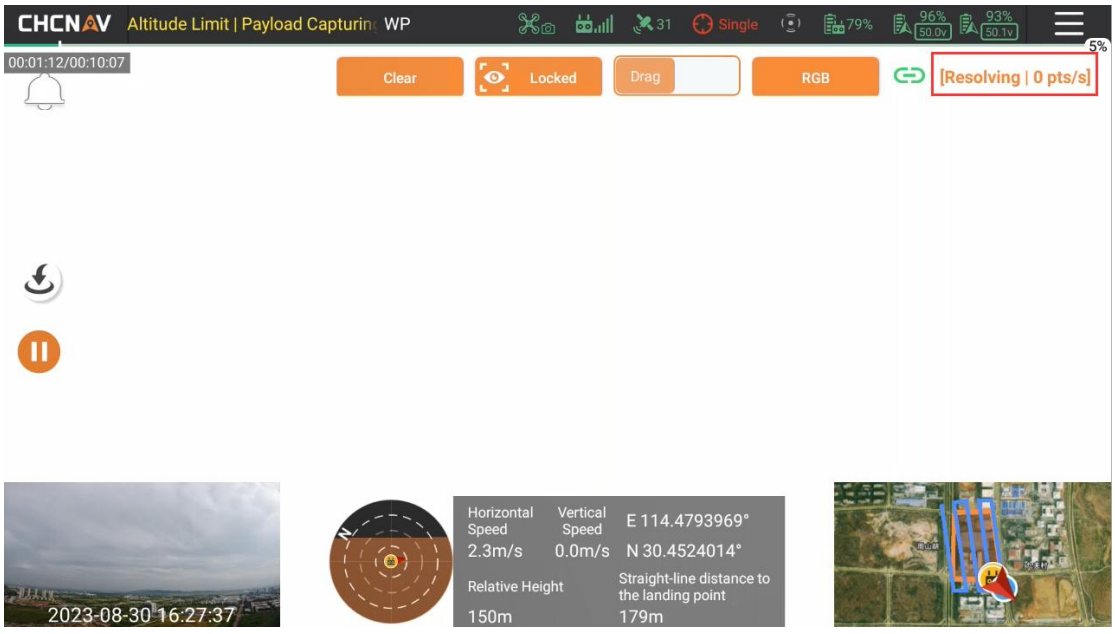
This icon shows connection status for real-time point cloud data: green means connected and gray means disconnected (real-time point cloud status shows N/A).

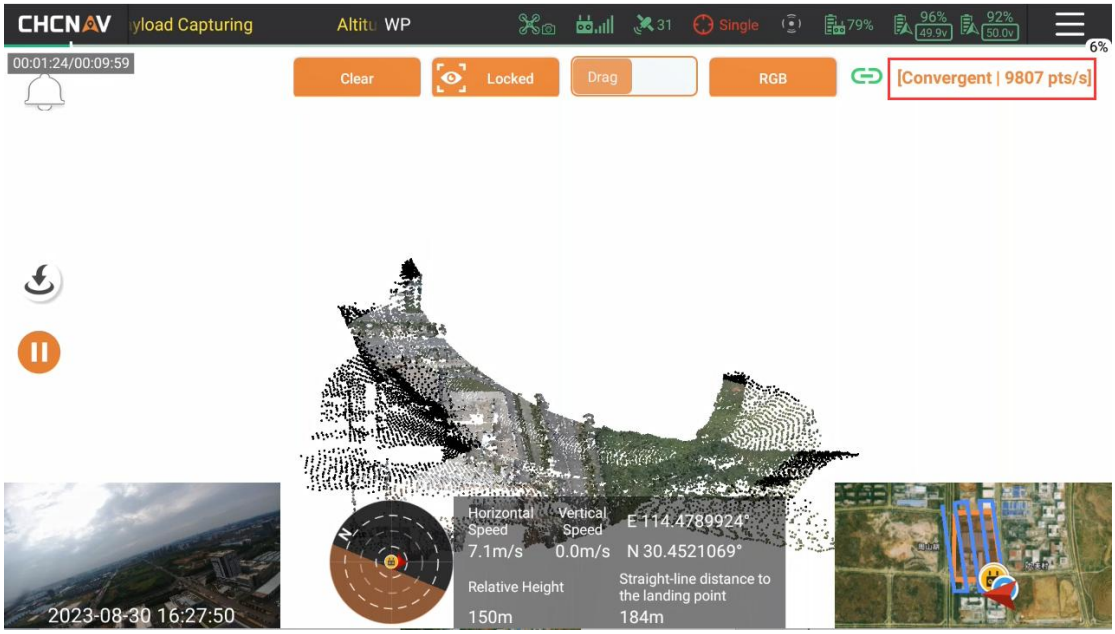
⑥ Real-time point cloud status

This icon shows real-time point cloud status: initialization, processing, converging, convergent. The real-time point cloud is only available when the status are converging and convergent.




CHCNAV
itude Limit | Payload Capturing WP
31
Single
79%
100%
50.3v
96%
50.4v
0%
00:00:18/00:10:36
Clear
Locked
Drag
RGB
[Init | 0 pts/s]
2023-08-30 16:26:43
Horizontal Speed
Vertical Speed
E 114.4786903°
0.0m/s
↑ 3.0m/s
N 30.4530286°
Relative Height
Straight-line distance to the landing point
44m
44m


CHCNAV
Altitude Limit | Payload Capturin WP
31
Single
79%
96%
50.0v
93%
50.1v
5%
00:01:12/00:10:07
Clear
Locked
Drag
RGB
[Resolving | 0 pts/s]
2023-08-30 16:27:37
Horizontal Speed
Vertical Speed
E 114.4793969°
2.3m/s
0.0m/s
N 30.4524014°
Relative Height
Straight-line distance to the landing point
150m
179m



Note:

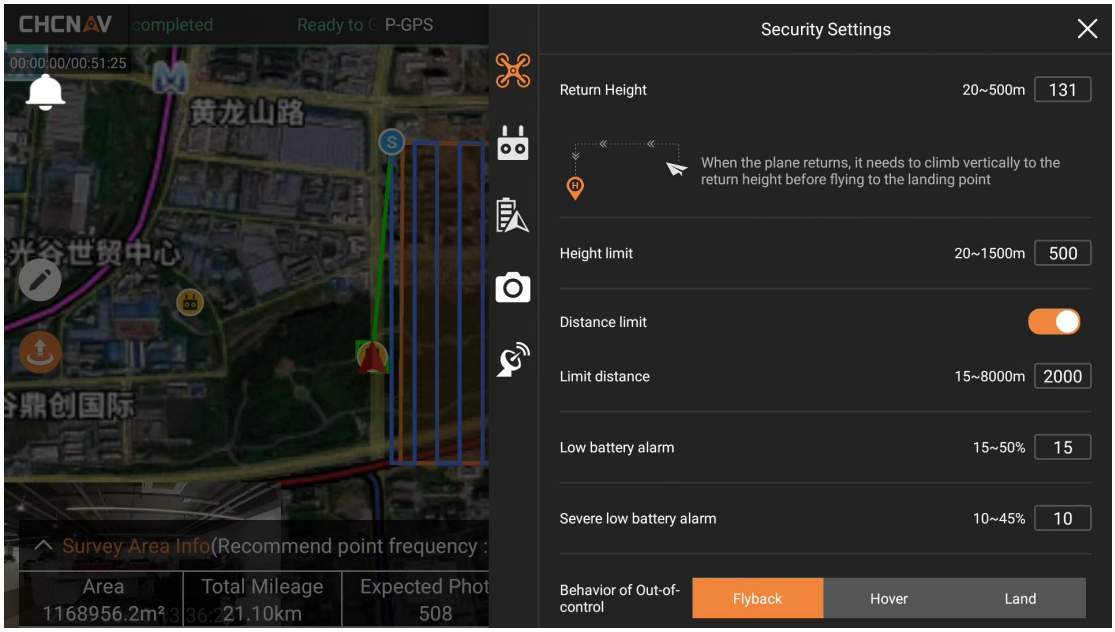
1. AA9 LiDAR only support DJI PSDK currently.
2. Drone need to wait LiDAR finish initialization then allow to work.
3. LiDAR need wait around 5 seconds from data capture to stop, and do not click take-off button during this time.
4. SmartGo will show white area during real-time point cloud display, which is normal and the white area will be filled gradually by point cloud.

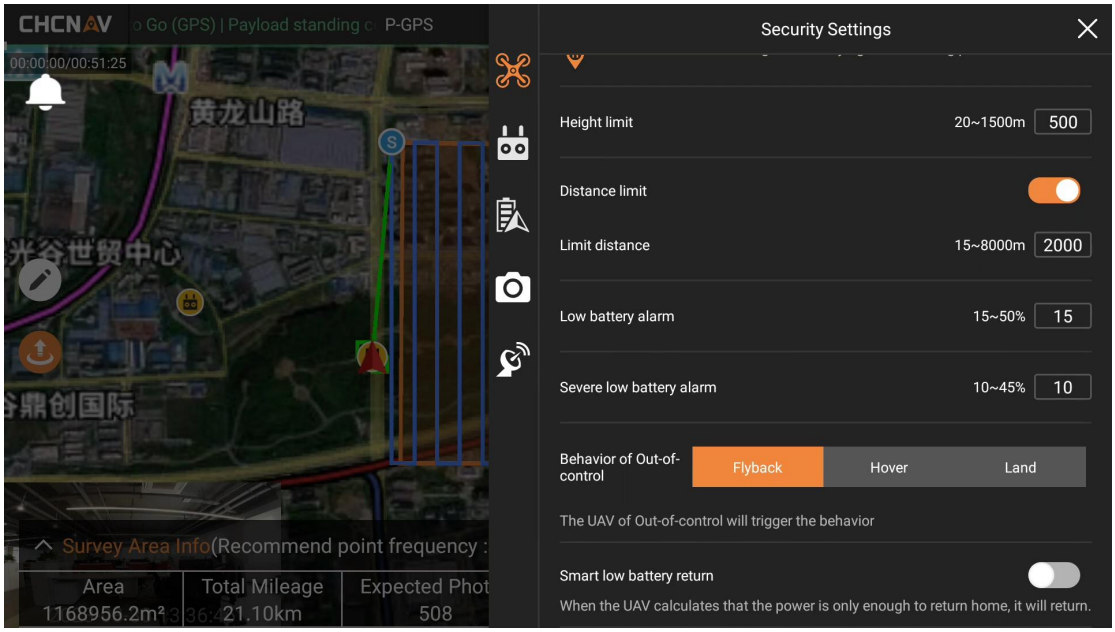
6.3 Drone Parameter Settings

User can configure some drone parameters via SmartGo software: security settings, remote control settings, battery settings .

6.3.1 Security Settings

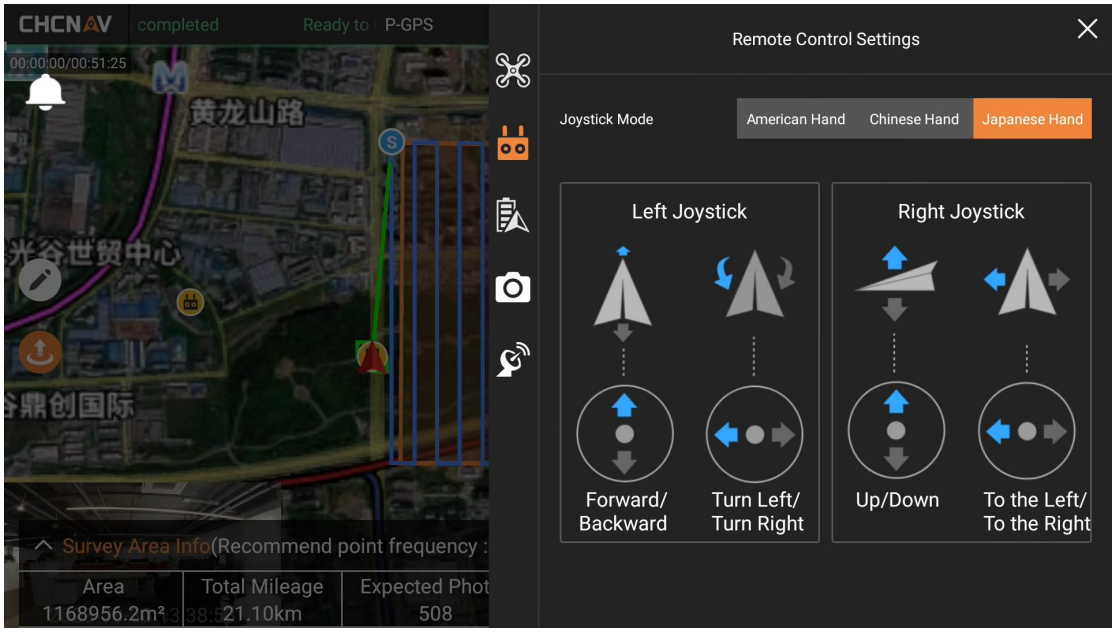
Drone security settings include return height, height limit, distance limit, low battery alarm, severe low battery alarm, behavior of out-of-control and smart low battery return.

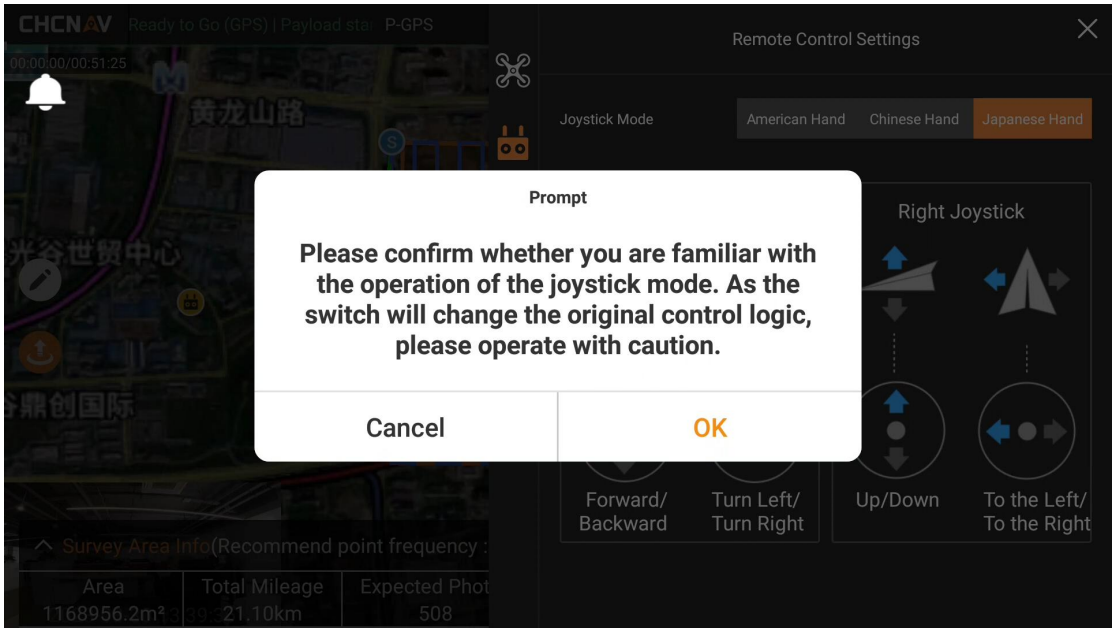




6.3.2 Remote Control Settings

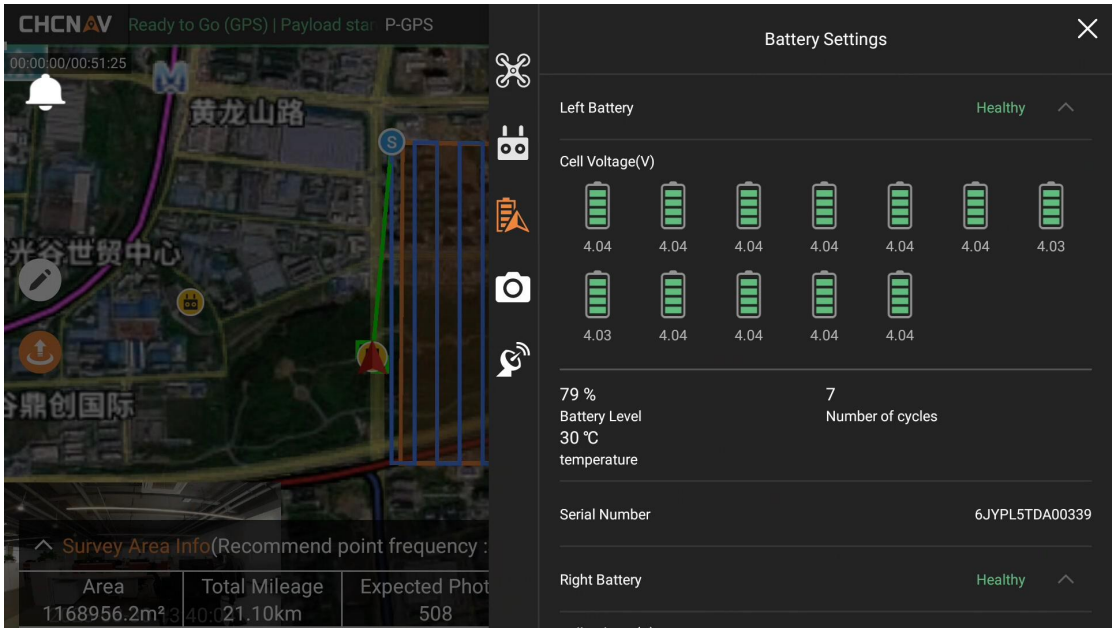
User can switch joystick mode based on using habit.

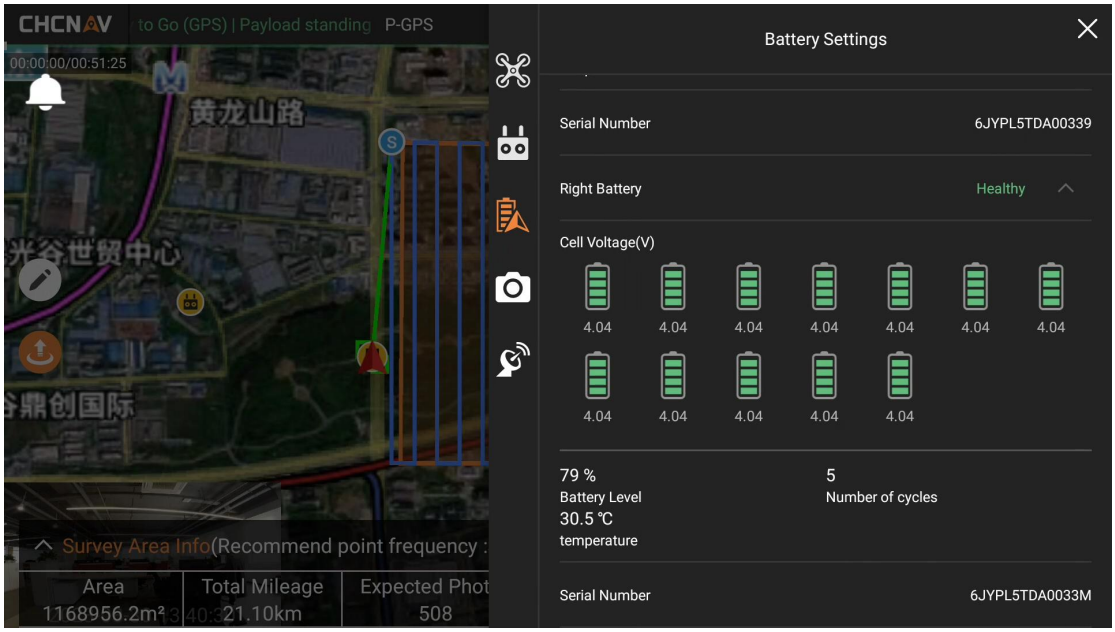




6.3.3 Battery Settings

Battery settings page display both two batteries status, include each cell voltage, number of cycles, temperature and serial number, when the aircraft is DJI Matrice 300 RTK or 350 RTK.





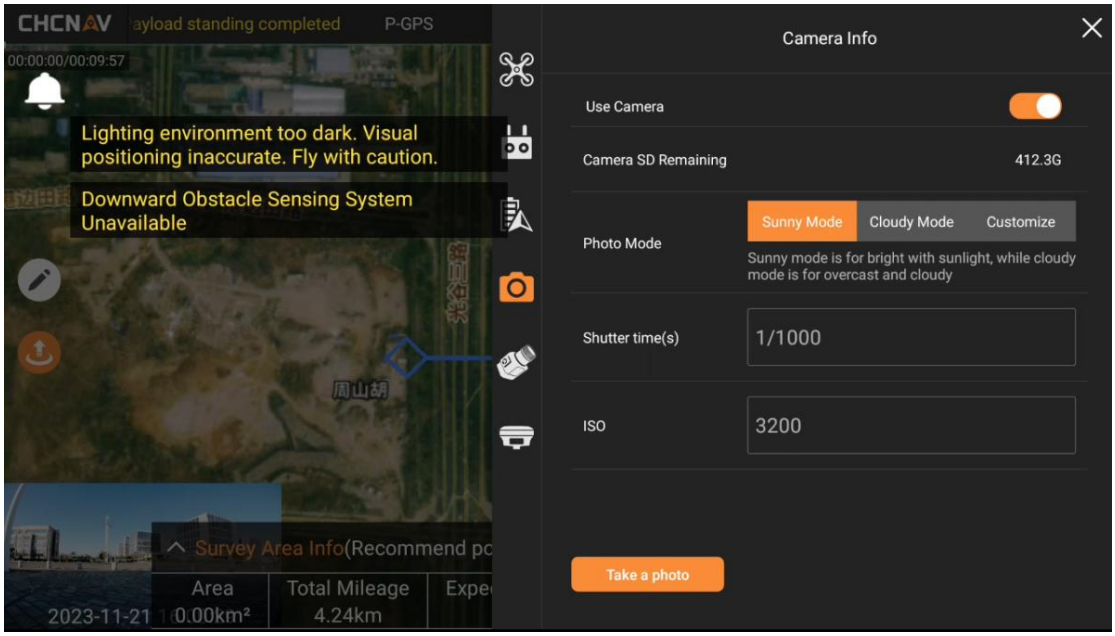
6.4 Payload Parameter Settings

6.4.1 Camera Settings

The camera parameter settings allow you to set the photography mode for the payload camera, including "Sunny Mode," "Cloudy Mode," and "Custom Mode". In custom mode, you can edit the shutter speed and ISO .

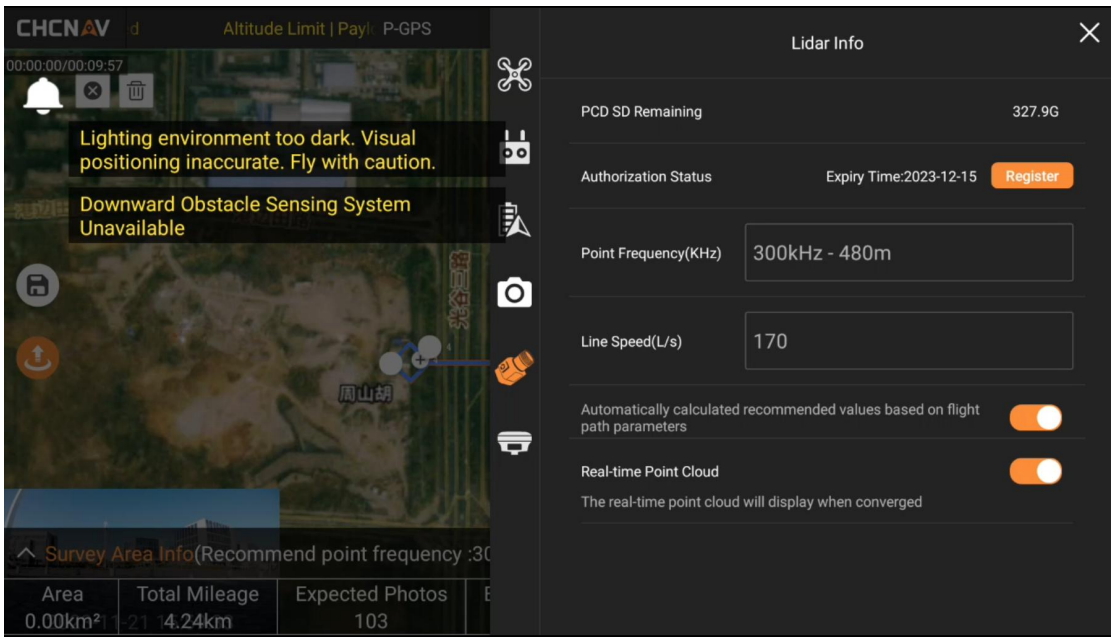
The camera SD remaining can be displayed. When remaining memory is less than 20G, a

yellow warning message will appear on the route check page. Click “Take a photo” to take a test shot of the camera, and the software will prompt the photo success or failure.



6.4.2 Lidar Settings

Lidar settings page includes: remaining memory, authorization status and registration, point frequency, line speed , automatically calculated recommended values and real-time point cloud function switch.



PCD SD Remaining: Displays the remaining memory of the Lidar memory card. When the

remaining memory is less than 50G, a yellow warning will appear on the route check interface.

Authorization Status: Displays the expiration date of the Lidar authorization, and when the authorization expires in 15 days, a pop-up prompt is displayed. After you click "Confirm", the prompt is not displayed that day.

Registration: After connecting the Lidar, click the "Register" button, and the interface will be switched to the online registration interface. The software will automatically obtain the registration expiration time and SN of the Lidar. Click the "Online Registration" button to obtain the registration code, and then click "Register" to complete the registration. The payloads currently supported for online registration are AA9, AA10, AA15, AU20 and AU1300.

Point Frequency and Line Speed: The Lidar settings allows you to manually configure the laser PRR and line speed. You can also check the option for "Automatically calculated recommended values calculated based on flight path parameters." The settings will be used during mission upload.

Real-time Point Cloud: This parameter is disabled by default. The real-time point cloud window is displayed on the route planning interface only after this parameter is enabled.

Note:

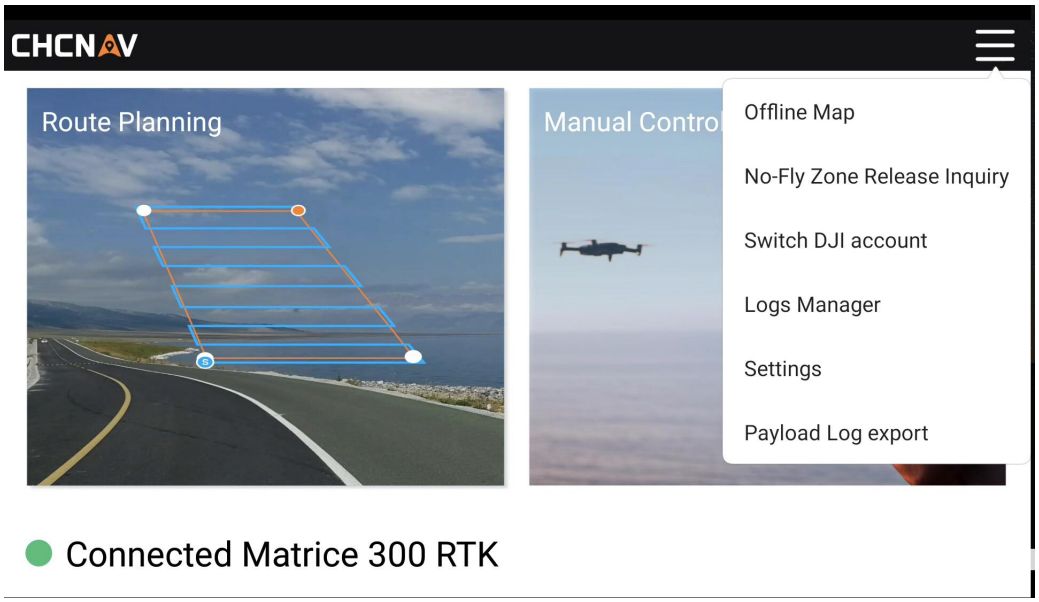
1.For AA9, the input laser line speed must be a multiple of 5 and the range is between 50-250.

2.All Settings on the Lidar settings interface (except the real-time point cloud) do not take effect immediately, and Settings will be uploaded before the route is uploaded.

3.After the authorization expires, the device cannot be used. Please register and authorize the device in time.

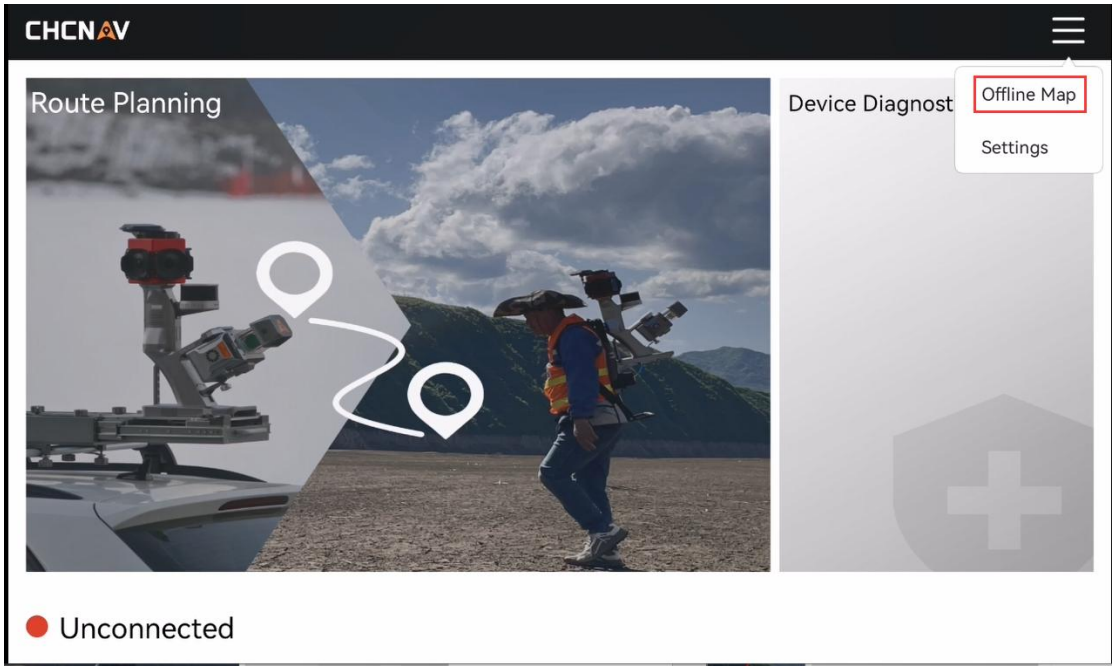
6.5 Other functions

On the main interface, click right top icon to show other functions: offline map download, no-fly zone release inquiry, switching DJI account, log management, and settings.

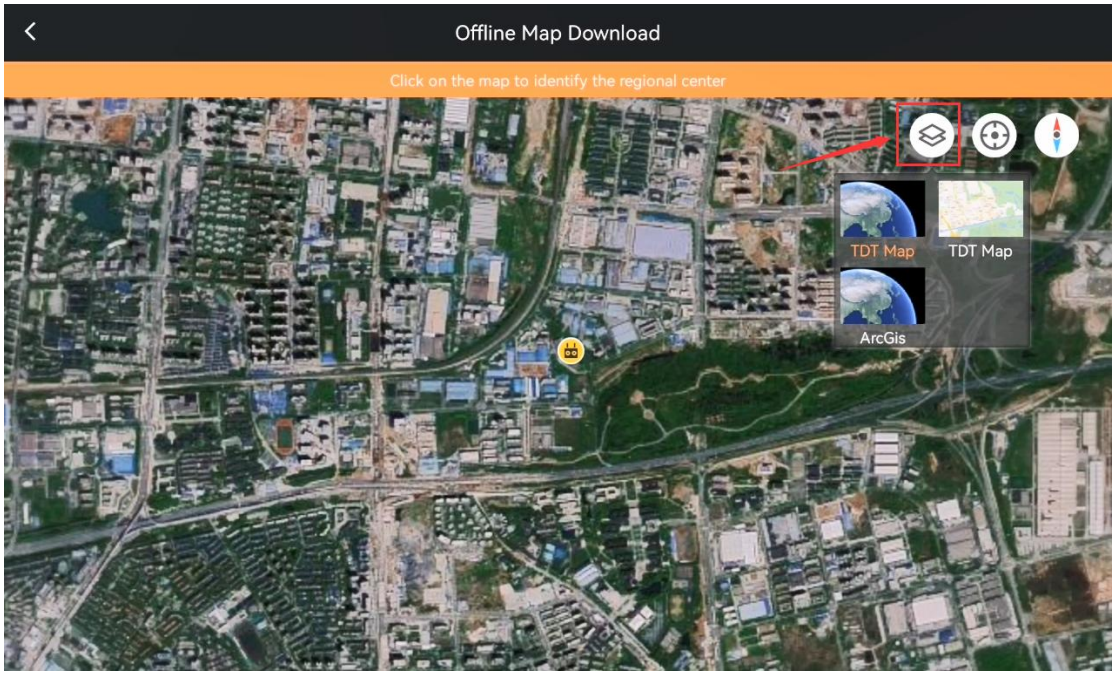


6.5.1 Offline Map

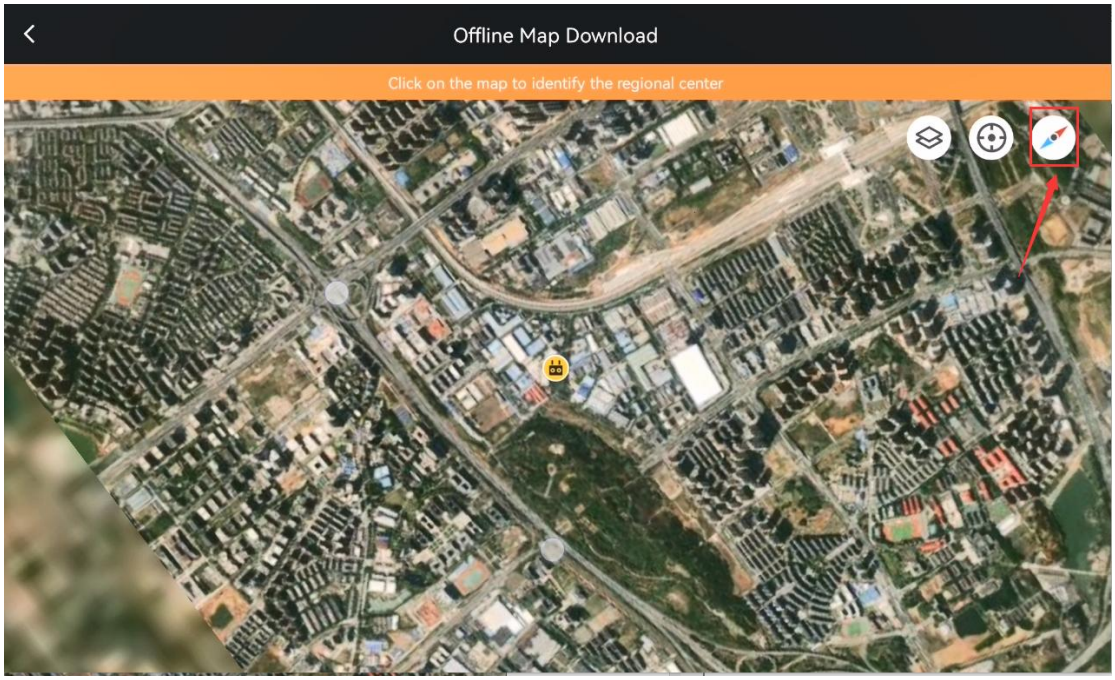
When the network is available (connect to mobile's Wi-Fi), click “Offline Map” in the upper right corner to enter the offline map download interface.



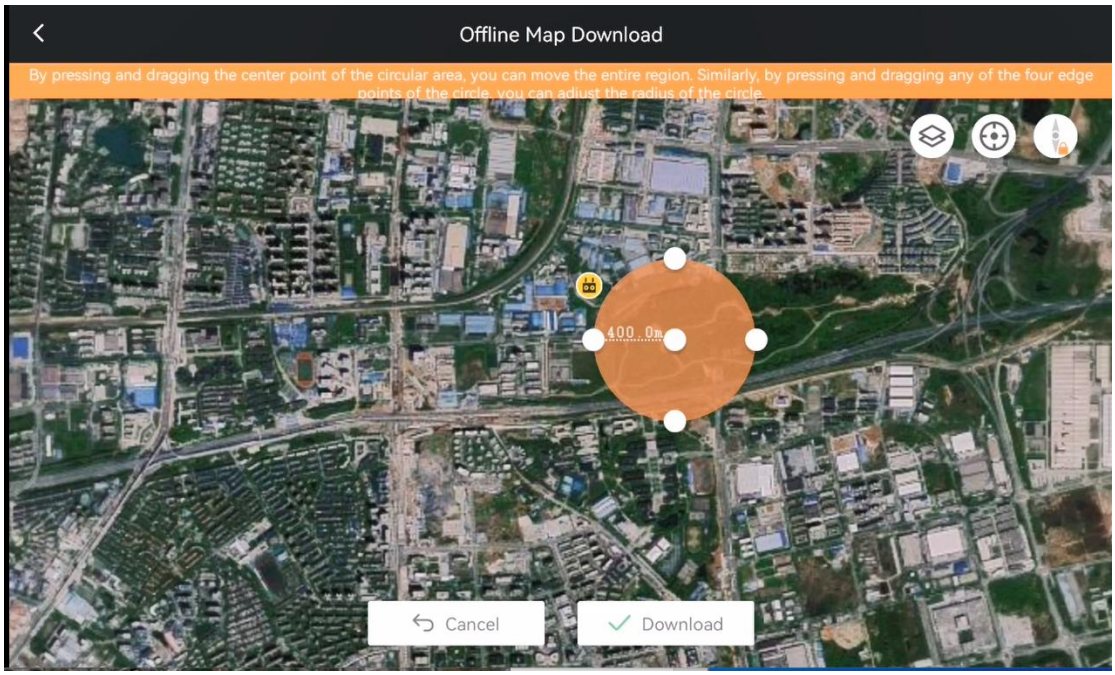
▪Select map source:



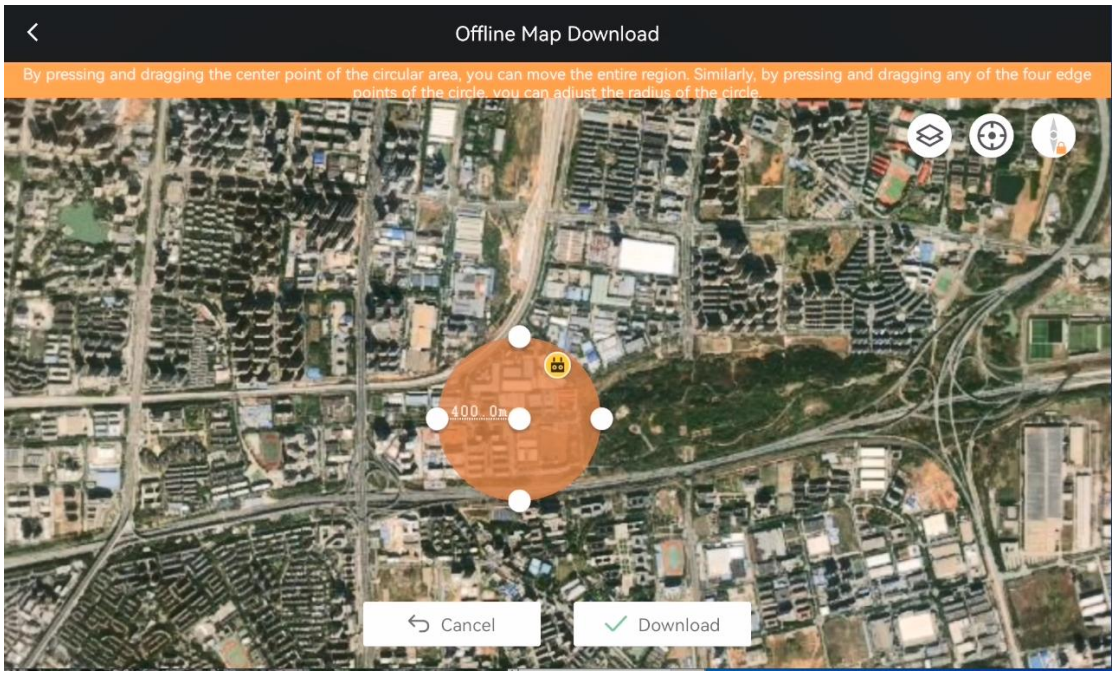
▪Rotate map source:



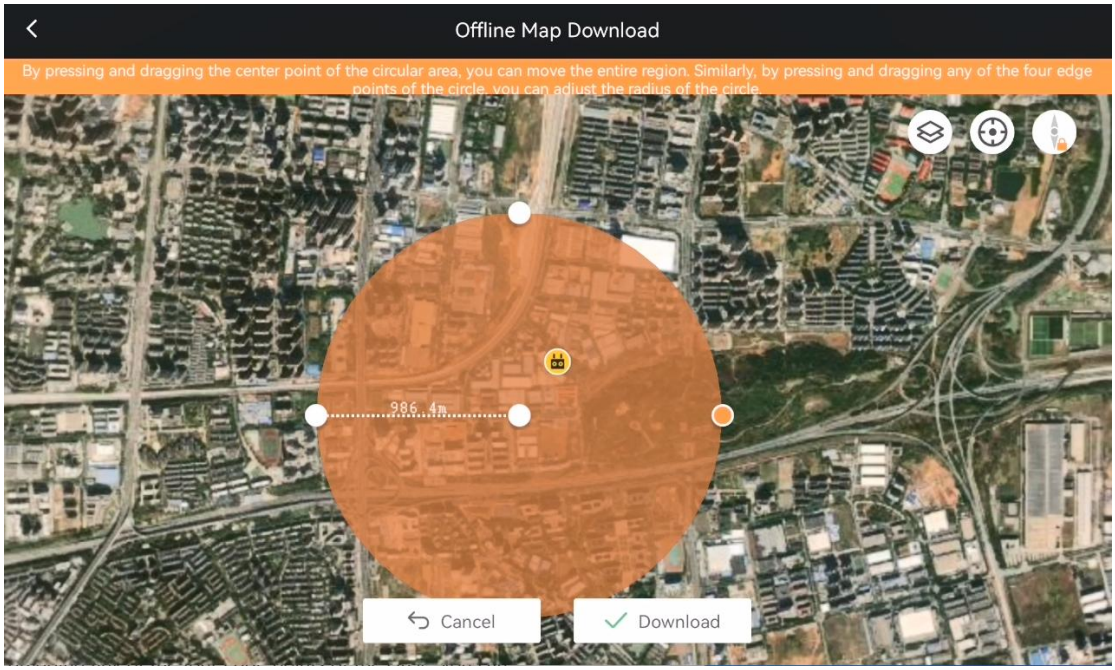
▪Click on the map to set the mission area center.



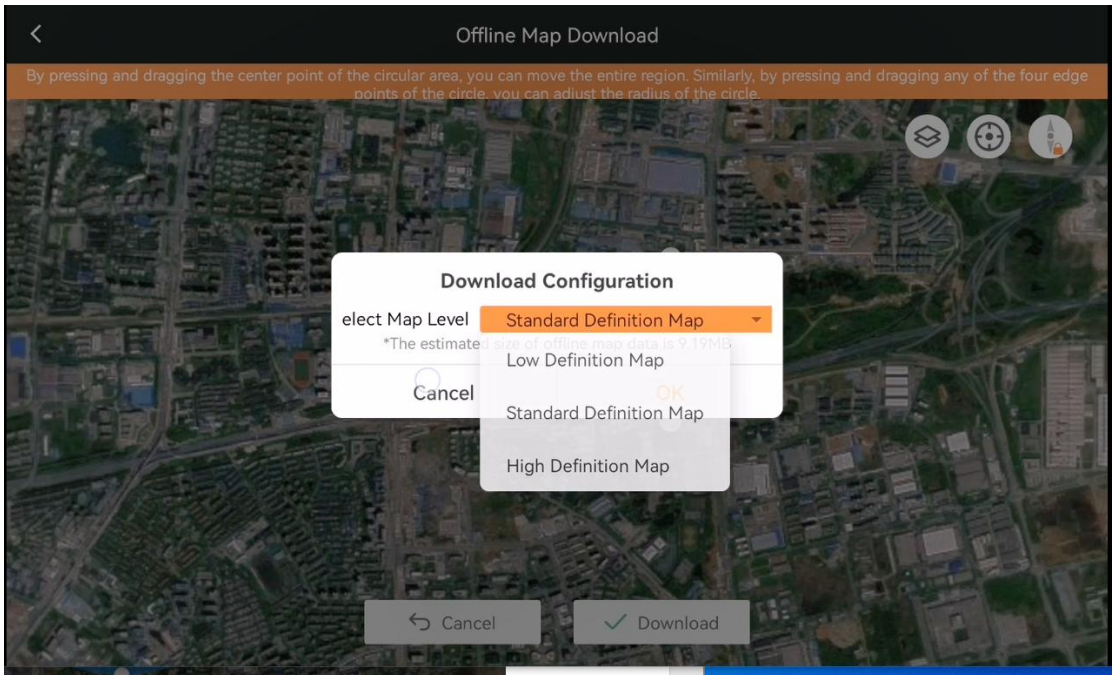
By pressing and dragging the center point of the circular area, you can move the entire region.



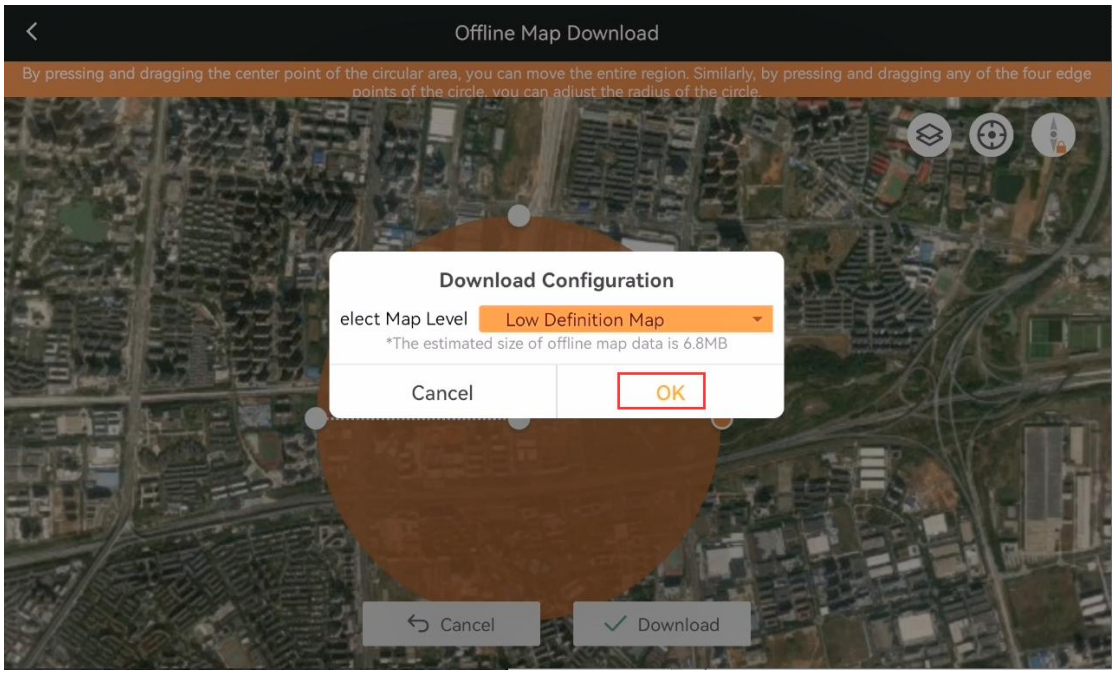
▪Similarly, by pressing and dragging any of the four edge points of the circle, you can adjust the radius of the circle.



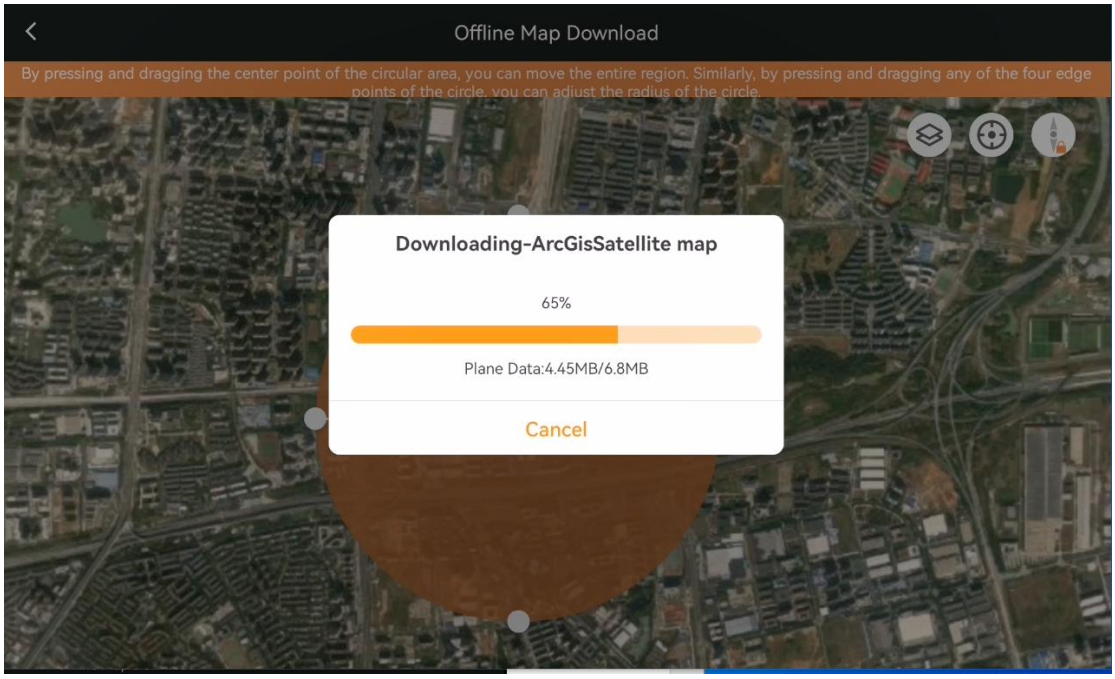
▪Set the mission area, and click “Download”, which will pop up a window that let you select map level.



▪Click “Ok” to start downloading map.



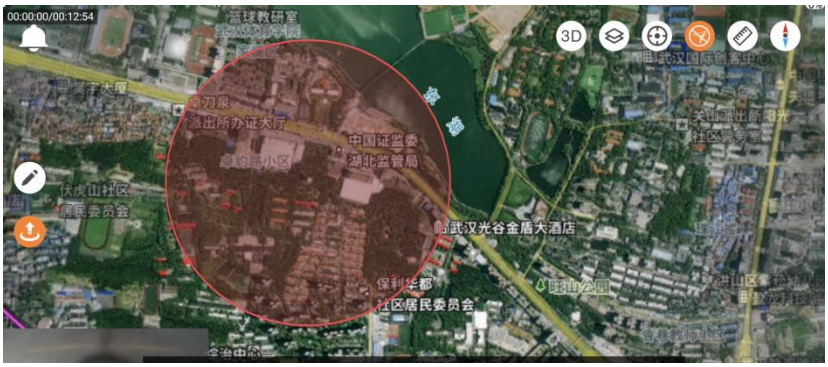
▪After the download is complete, a message is displayed indicating that the download succeeded.



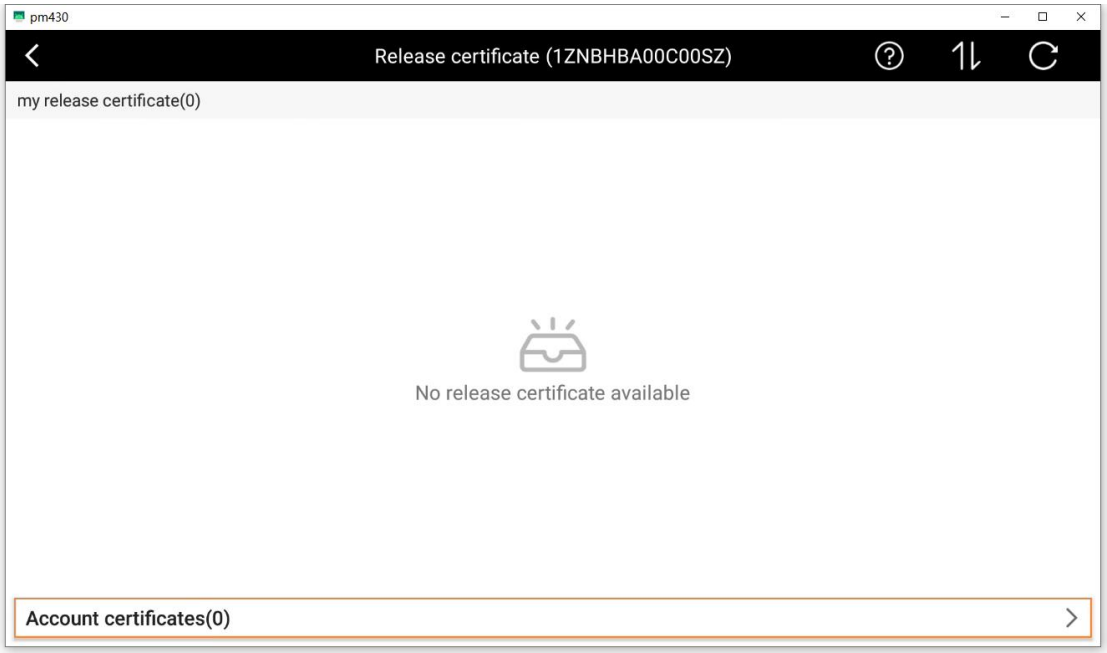
Note: SmartGo will only download current map source based on map selection.

6.5.2 No-Fly Zone Release Inquiry

SmartGo will automatically shows drone nearby no-fly zone after drone connected.



If user need fly drone in no-fly zone, then user need get approval from relative government agency. After get approval, please contact DJI support to unlock no-fly zone. When unlock finish, user can find unlock certificate on software interface, which includes name, shape, distance, expire data and switch icon. Click icon to unlock no-fly zone for flight.



① Unlock course

: User can check DJI no-fly zone unlock course via this icon.

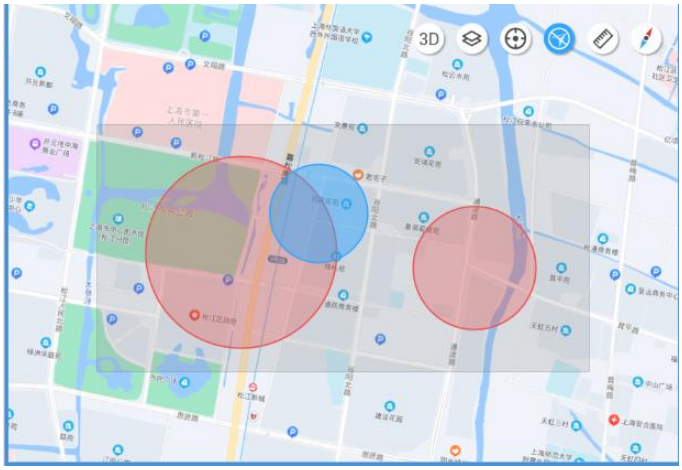
② Sort

: User can select sort type via this icon: distance, start time, end time etc.

③ **Refresh certificate**

: User can click this icon to refresh certification list.

④ After unlock finish, the no-fly zone will show red color and unlock zone will show blue color.

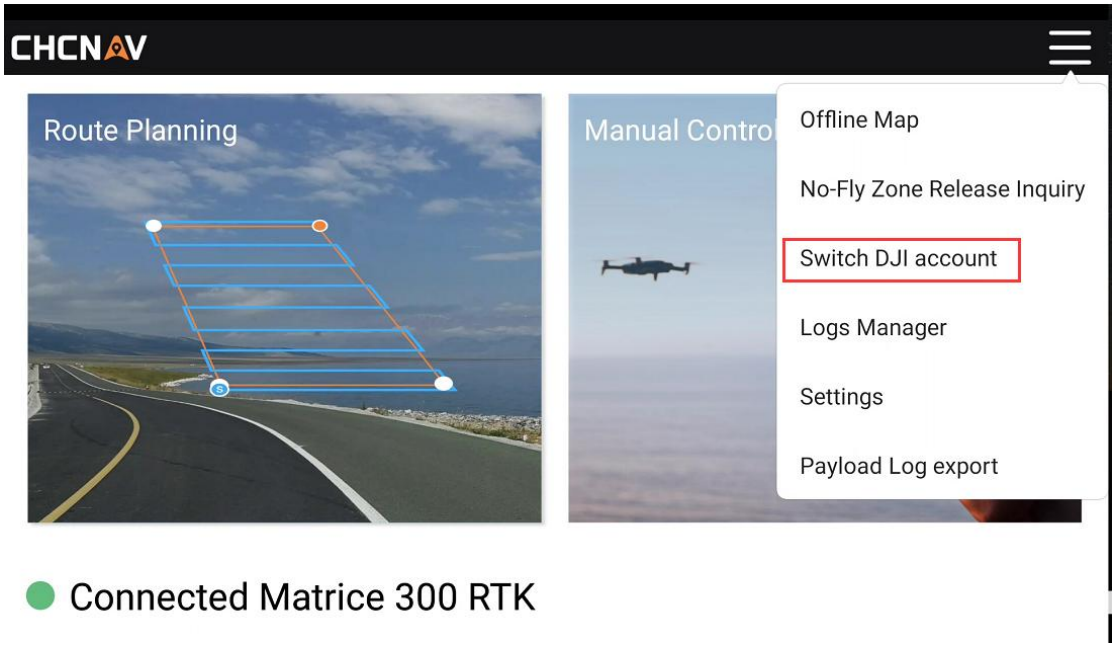


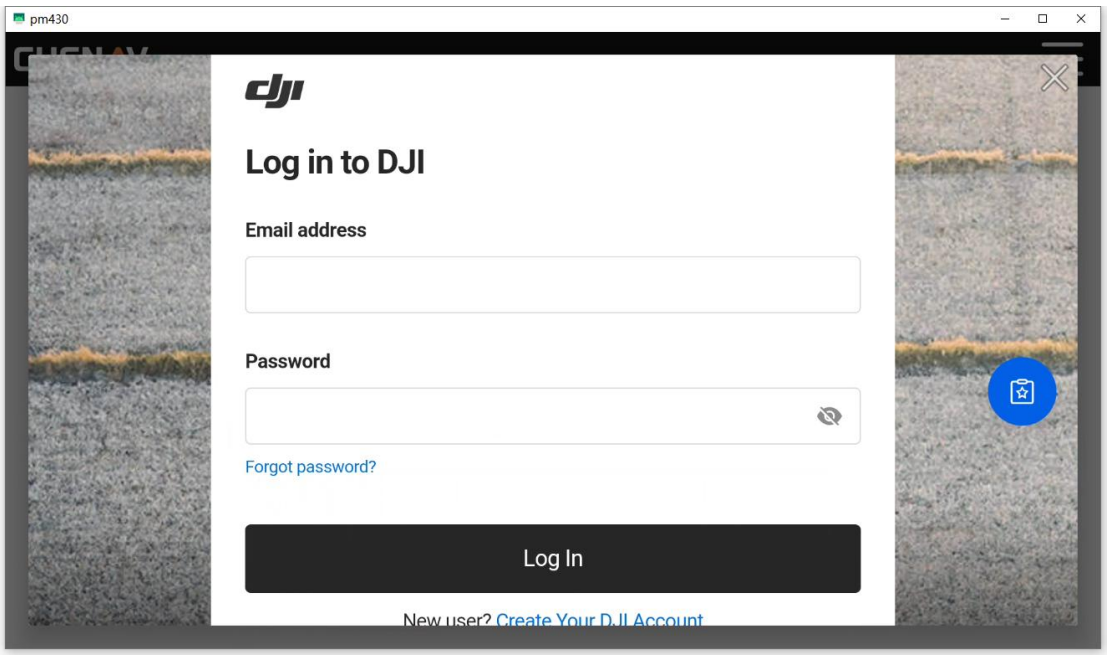
Note:

1. Pilot need comply with local rules and regulations about drone flight.
2. SmartGo no-fly zone area is coming from DJI drone, if user has questions can contact CHCNAV & DJI support team either.

6.5.3 Switch DJI Account

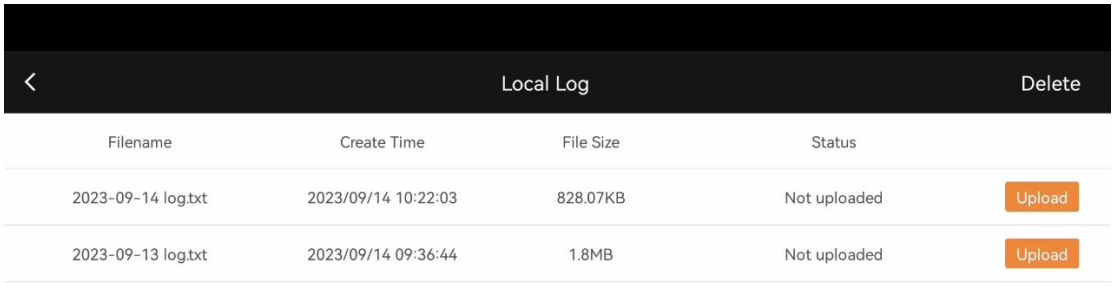
User must log in a DJI account before using, and user can also switch account via here.





6.5.4 Logs Manager

Logs manager will show current drone log info and software log. If drone or payload has issue, user can contact CHCNAV support team and upload log file for analyze. Delete button is used to delete historical log files before 7 days.



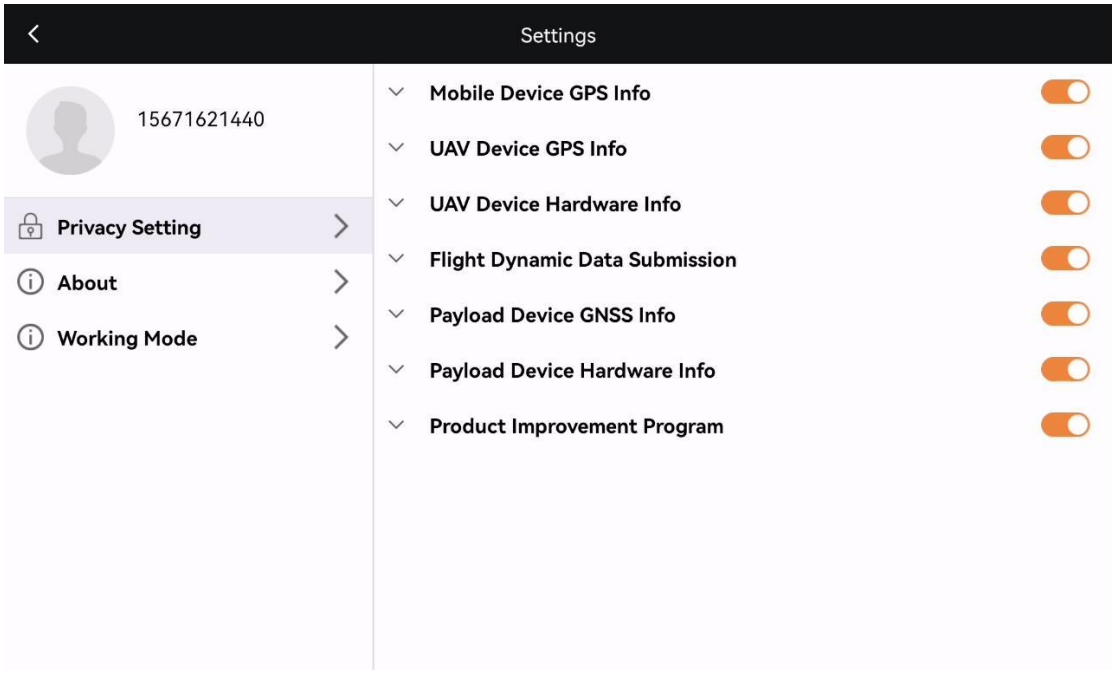
6.5.5 Settings

Settings interface will show software privacy setting, about, language switch and working mode switch.

▪Privacy setting

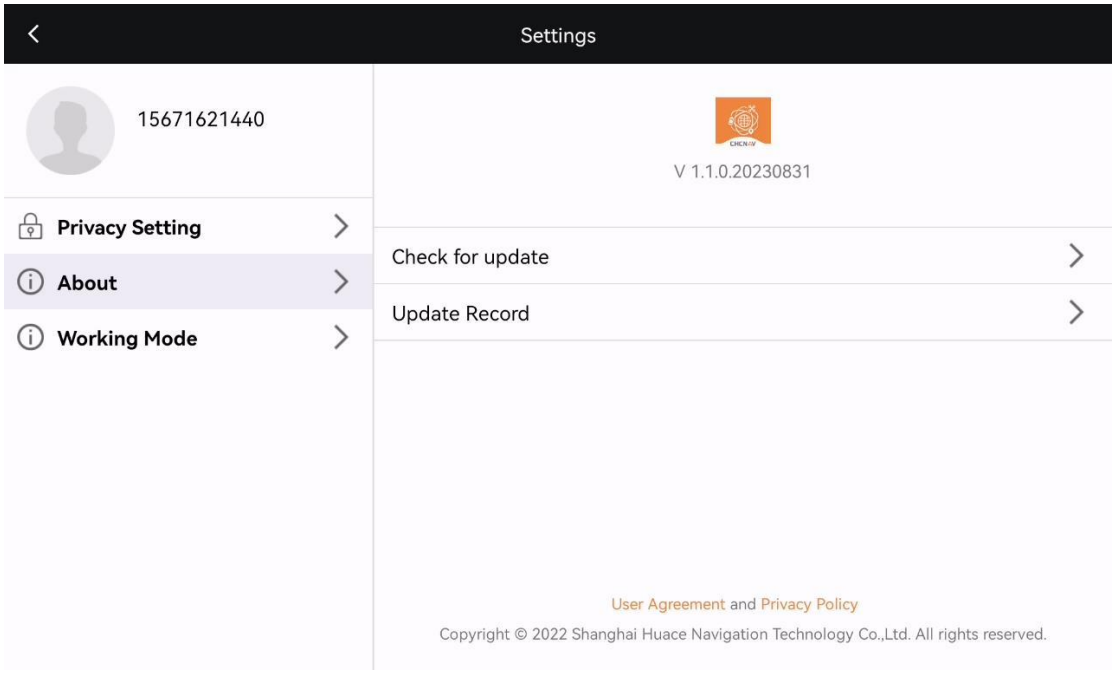
Privacy setting shows all configurations about software, which not allow to turn off.

A licensee can agree to the terms and enjoy the prescribed permissions or forgo using the software.



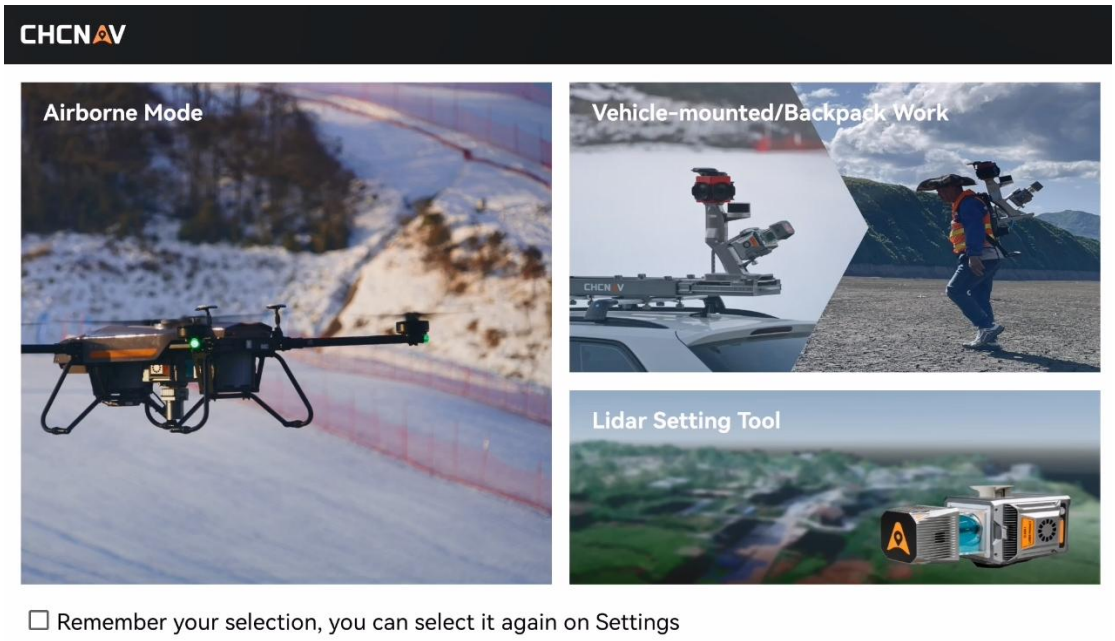
▪About

About interface shows current software version, update check, update record, user agreement and privacy policy. User can check latest version via “Check for update”.



▪Working mode

User can click “Working Mode” to switch mode between airborne, vehicle or Lidar setting tool.



▪Language

User can click “Language” to switch language between Chinese, English and Russian.

Note:

1. When installing the software, the software language follows the system language. If the system language is not Chinese, English, or Russian, the software language is English.

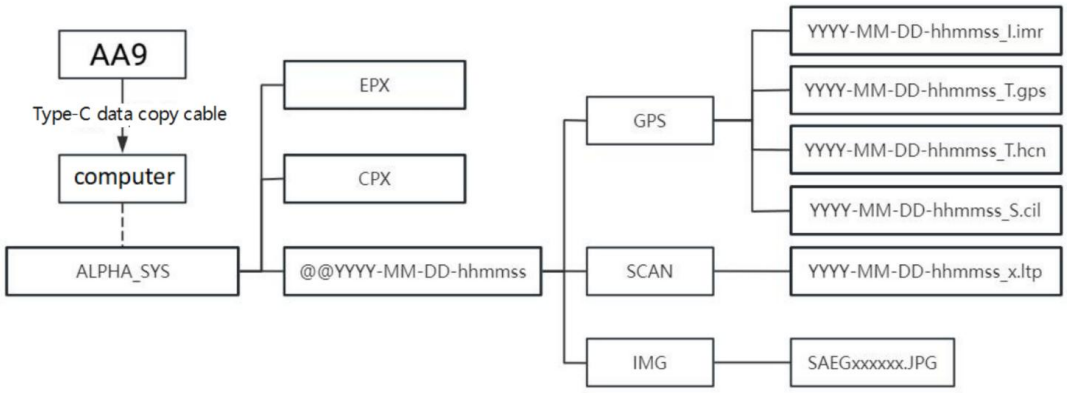
2. System language changes do not affect the software language.

7 Data Copy Steps

Connect the AA9 to the computer with the type-C cable, the computer will pop up a disk named ALPHA_SYS that contains laser data, GNSS & IMU data, and picture data.

☞ **Note**: Connect the AA9 to the computer with the type-C cable when the device is powered off. Otherwise, the SD card (data storage card) cannot be recognized.

7.1 Disk Structure



- There are three types of folders in ALPHA_SYS: "EPX", "CPX" and "Project folder named @@YYYY-MM-DD-hhmmss".
- The project folder stores the collected data:

  xxxxxx.ltp: Laser data.

  xxxxxx_I.imr: IMU data.

  xxxxxx_S.cil: Synchronizes data.

  xxxxxx_T.gps/ xxxxxx_T.hcn: GNSS data.

  xxxxxx.JPG: picture data.

Note:

1. *.EPX & *.CPX: Default calibration files which can not be modified or deleted.

2. After the data copy is completed, please eject the disc drive before unplugging the data copy cable to avoid disc drive damaged..

7.2 Data Copy

1. Use the TYPE-C cable to connect the AA9 to the laptop, then the disk interface will pop up the ALPHA_SYS disk.

2. Directly copy the project folder that needs to be processed to the laptop locally.

NOTE :

① Don't move the laptop or AA9 during the copying process to avoid data copying interruption or abnormality.

② Don't use the cut function for data copying to avoid having no data backup in the device.

③ CoPre does not support Chinese path, and it is recommended to copy the project to English path.

8 Matters Need Attention

8.1 Important Notes

LiDAR measure system is a complex and precise survey system. In daily carrying, using and storing, please operate equipment correctly and maintenance properly. There are some important notes listed below:

- Do not disassemble equipment privately. If equipment has issue, please contact CHCNAV support team.
- Please use the default battery and accessories. Use non-dedicated battery may cause charger exploding or burning. The use of non-original accessories is not eligible for warranty.
- When using charger for charging, please keep away from fire, flammable or explosive materials to avoid serious consequences such as fire.
- Avoid any strong impact or vibration.
- If need to continue using the instrument for a long period of time or under special conditions such as high humidity environment, please consult the relevant precautions of CHCNAV Support team in advance. Generally, the damaged occurred under a special environment is not covered by the product warranty.

8.2 Product Transportation

- CHCNAV AA9 product equipped special container. During transportation, make sure the container is fixed at a stable location.
- During transportation, please tell relative person that this is precise system container, and it needs to be handled gently. Also, attach fragile label on container.
- If the equipment is sent by express service, the container needs an outer box with foam inside also for safety.
- When transporting or moving batteries, take proper measures to prevent materials from falling or damage.

8.3 Using Tips

- The equipment should be handled gently during use to avoid soiling and scratching its surface, and it is strictly forbidden for surveyors or others sit on the container.
- After the external test or operation, the surface of equipment should be cleaned regularly by provided clean suits (3-5 days) and check whether the structural screws and plugs are loose, and whether the peripheral cables are loose.
- After long time storage in store, it needs to be taken out regularly (about one month) for power-on test to check whether the function is normal.
- The limitation of environment temperature is between -20 °C to +50 °C.
- If the equipment is disassembled or loosen, it should be re-calibrated.
- When it is difficult to rotate any rotating parts of the equipment, please do not forcibly

rotate. After the equipment is damaged, please do not continue using, otherwise the damage of the equipment will increase. Do not disassemble equipment in field.

- If faced rain or snow in field during work, please move the equipment into the container quickly.

8.4 Storage Tips

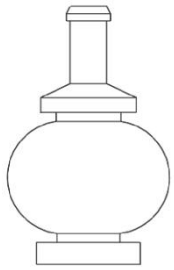
- The room where the equipment is stored should be clean, dry, bright and well ventilated.
- It should be placed flat or upright, and it should not be leaned casually to prevent distortion.

9 Frequently Asked Questions

- Equipment can not power on or power off normally: Check whether the power supply and connect port are normal. If still can not power on or power off, please contact CHCNAV Support team for repair.
- Equipment can not be timed or need long time: Check whether the GPS feeder cable connection is stable.
- If the images appear dark, check the camera's shutter settings to ensure they are appropriate.

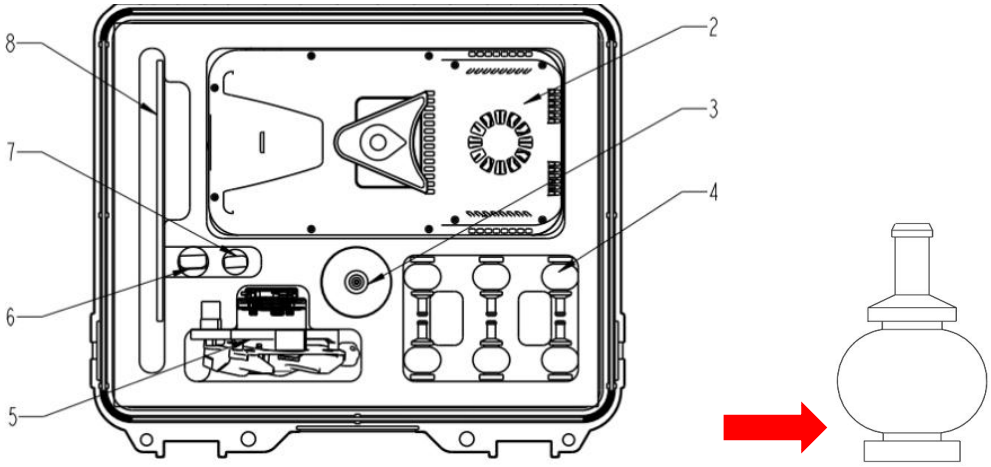
10 Appendix

10.1 Replace Shock Absorbing Balls

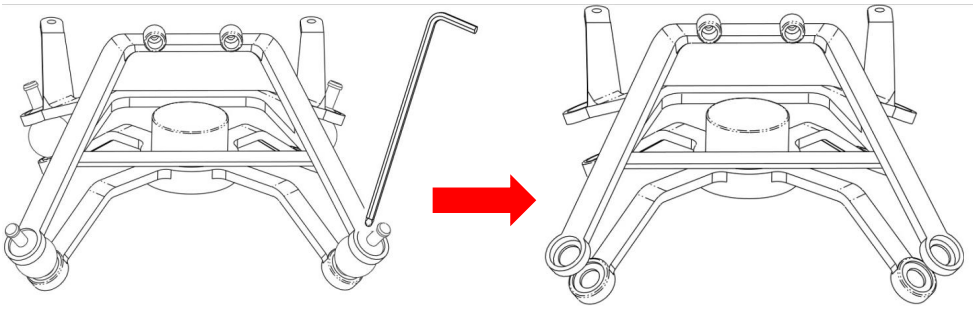
Pictures	Name	Pcs
	Shock-absorbing ball module	6
	M4 Allen wrench	1

Note: Since the maximum load weight of the original shock-absorbing ball of the M300 or M350 is less than 1Kg, so it is necessary to replace the original shock-absorbing ball to the new equipped balls.

- Take out the shock-absorbing balls from the transport container (slot 4).

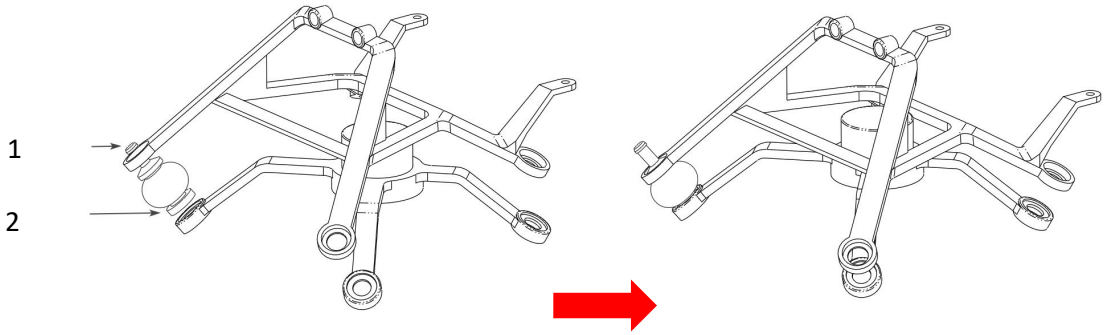


As shown in the following figure, remove 4 original shock-absorbing balls from M300/M350 using M4 Allen wrench (it is recommended to replace all the original shock-absorbing balls one by one). Push the shock-absorbing ball from the groove edge towards the center. Repeat this process a few times until it comes off. Avoid pulling or yanking with force, as it may cause damage to the shock-absorbing ball.

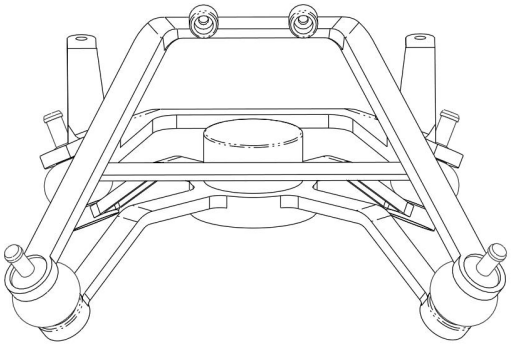


When removing the shock-absorbing ball, use the round end "1" to remove it. Do not use the right-angle end "2" to remove it, as it may damage the shock-absorbing balls.

Replace all the original shock-absorbing balls one by one. When installing the new shock-absorbing ball, insert the bottom rubber ring down first, then insert the top rubber column from the top bracket and pull the rubber column up.



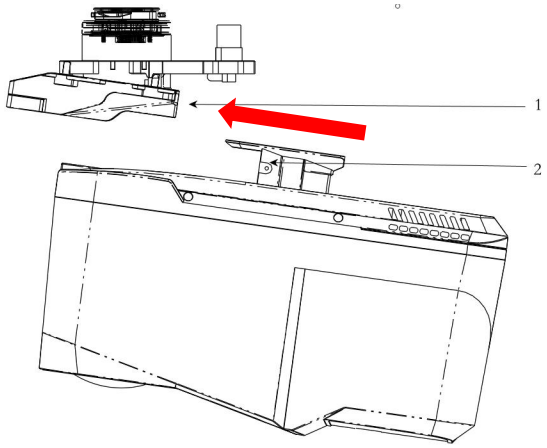
1- Top rubber column; 2- Bottom rubber ring



It is recommended to install a new shock-absorbing ball every time when user remove an original one to prevent the load plate from falling off or becoming misaligned.

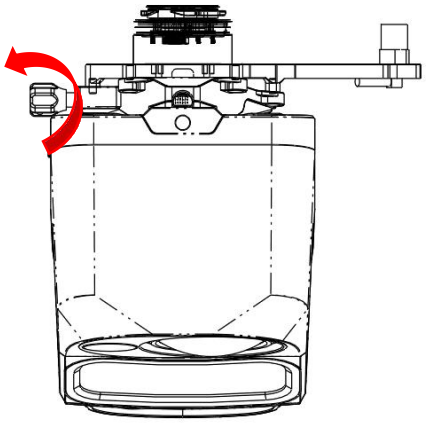
10.2 M300 Installation Steps

- Push the “Alpha port” slider of scanner into the quick-release clamp which on the bottom of the airborne mounting platform in the direction of the arrow until hear a “click” sound.

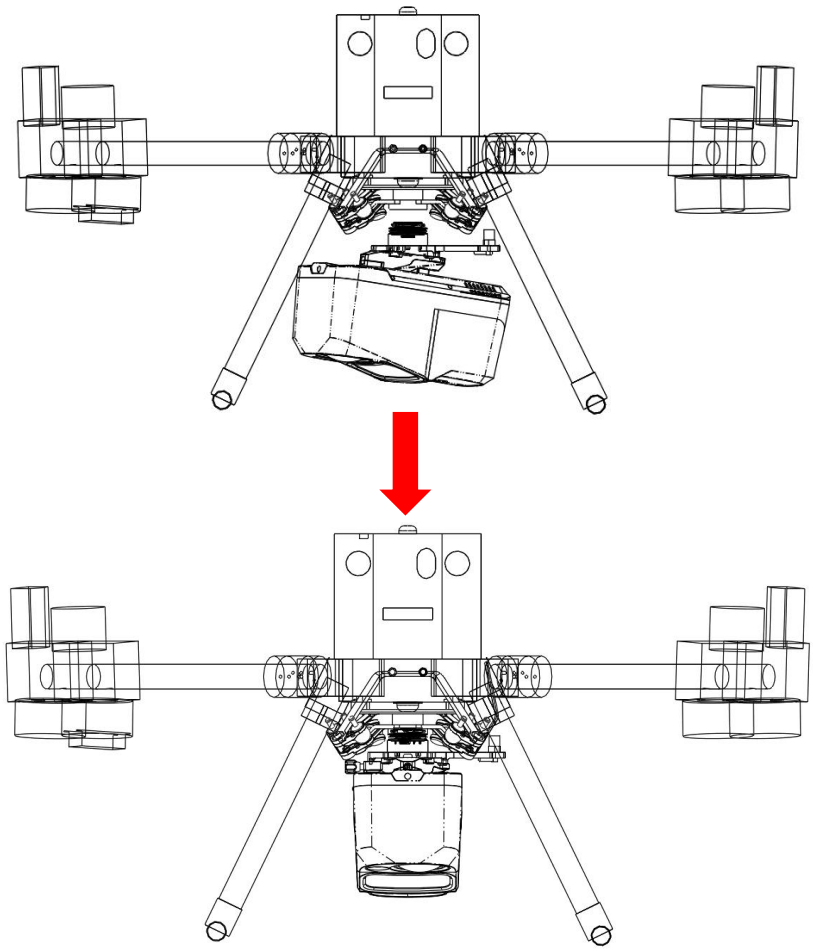


1- quick-release clamp; 2- Alphaport

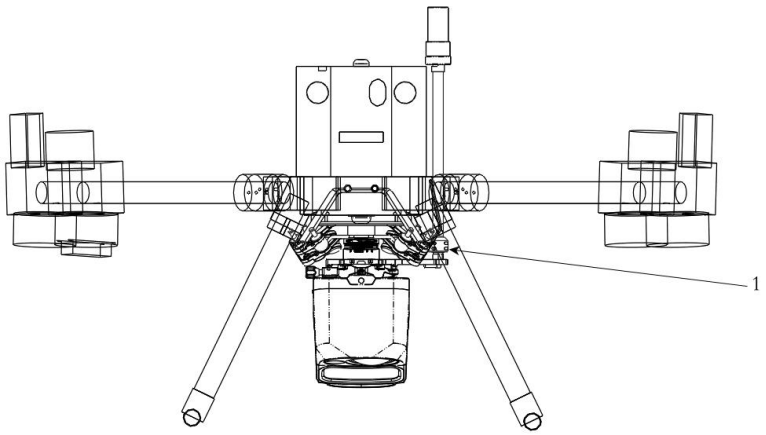
- Tighten the side screw bolts to make it stable and finally finished the installation.



- Align the white dot on the device Skyport interface with the red dot on the M300 interface and embed it in the installation location. Rotate the device SkyPort interface to the locked position (red dots align red dots) to be fixed.



- Insert the rod antenna into the antenna mount and tighten it.



10.3 Install AA9 On Other Platform

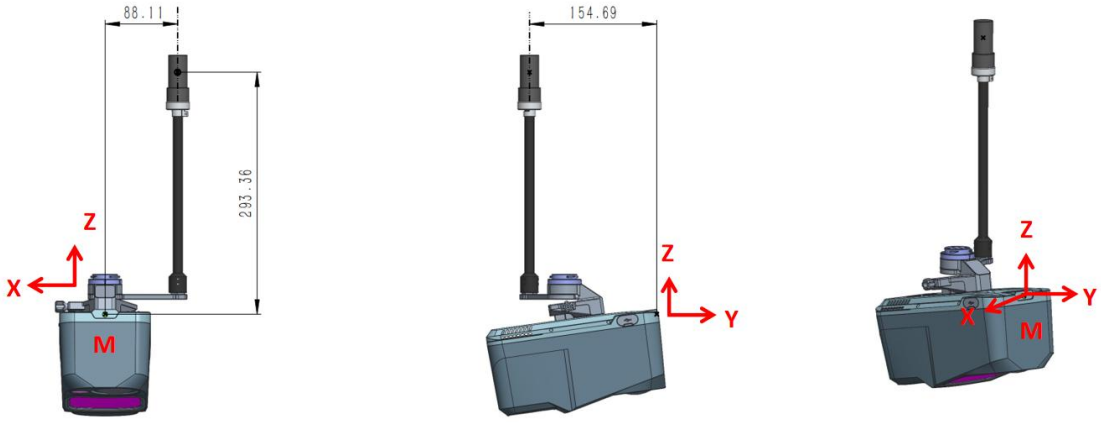
If install AA9 on a third-party aircraft, it is necessary to measure the Lever Arm Offset value from Sensor Measurement Origin to Antenna Phase Center.

10.3.1 How to measure Lever Arm Offset

Use total station to measure the Lever Arm Offset value from Sensor Measurement Origin to Antenna Phase Center, the coordinate system takes the Sensor Measurement Origin as the original point. Show as follow (Please refer to the actual antenna phase center):

- "M" is Sensor Measurement Origin on AA9 (LED indicator light).
- X is right, Y is forward, Z is up direction. If the direction is opposite, then value is negative.

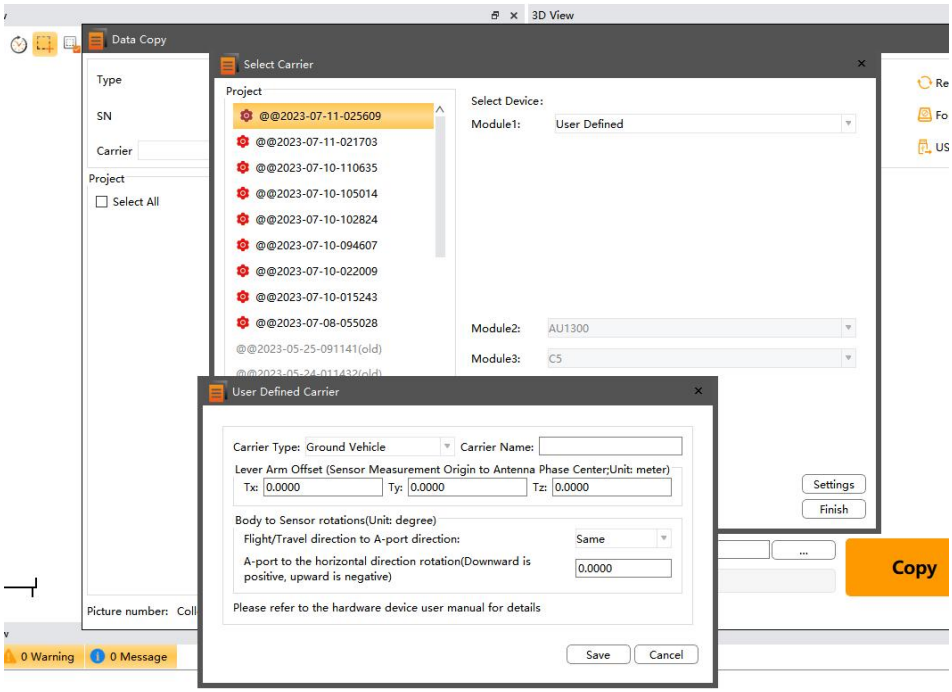
For example: If use default antenna, then TX = -0.08811m, TY = -0.15469m, TZ = 0.29336m.



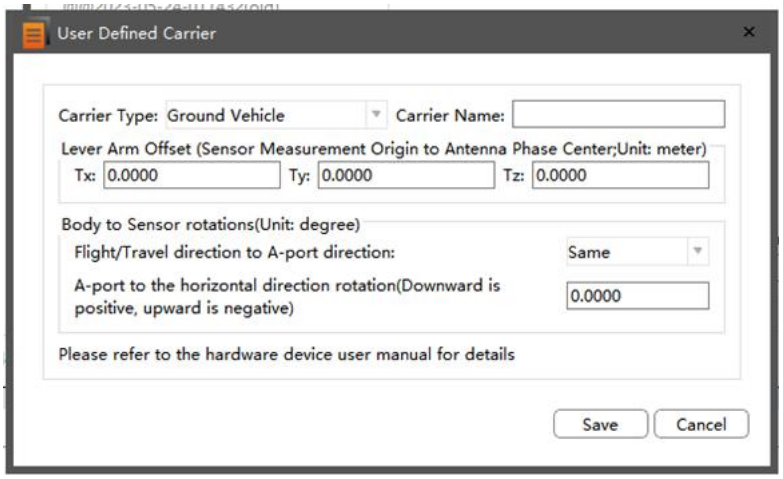
10.3.2 How to generate a new EP in CoPre

- Click "Tools->Data Copy" ;

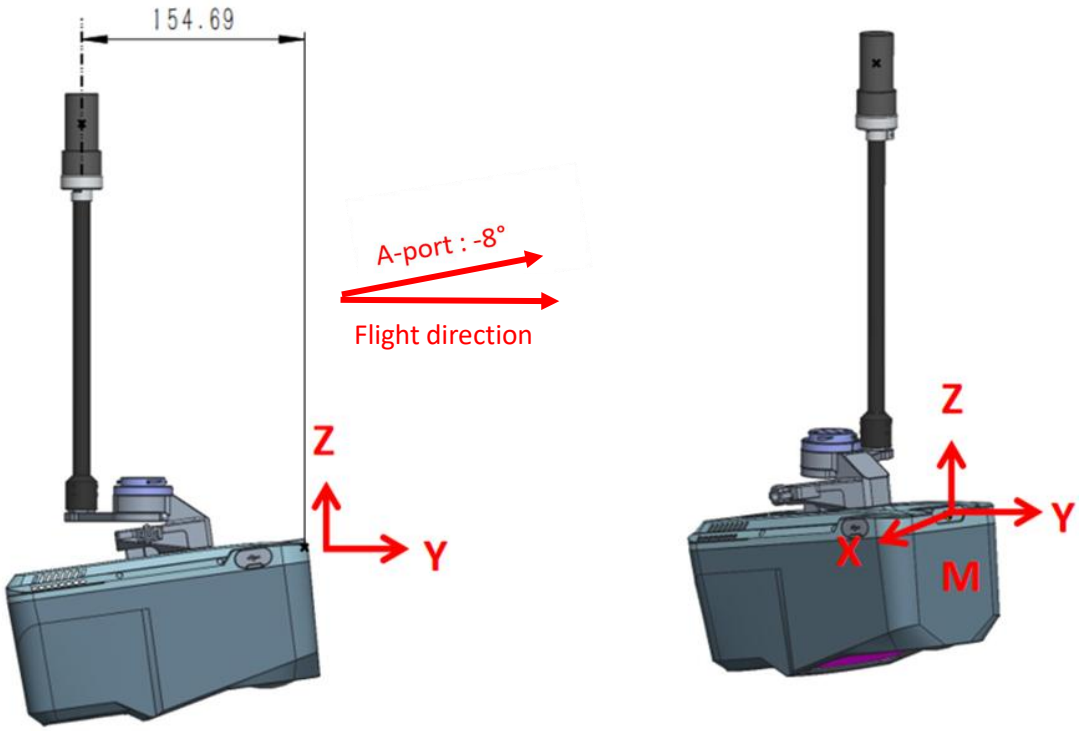
- Select User Defined when copying data:



- Set parameters as shown below.



- Carrier Type: Select the original EP of the device.
- Carrier Name: Rename the new EP.
- Lever Arm Offset (Sensor Measurement Origin to Antenna Phase Center;Unit: meter): Fill in the measured values in section 10.3.1.
- Installation Direction (Unit: degree): Flight direction to A-port direction (Same/Opposite): If the flight direction is the same direction as the Y-axis, select same.
- A-port to the horizontal direction rotation (Downward is positive, upward is negative). If the device has angle, as follow, value is -8



- Click Save when the settings are complete, and then simply apply the configuration to the project

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