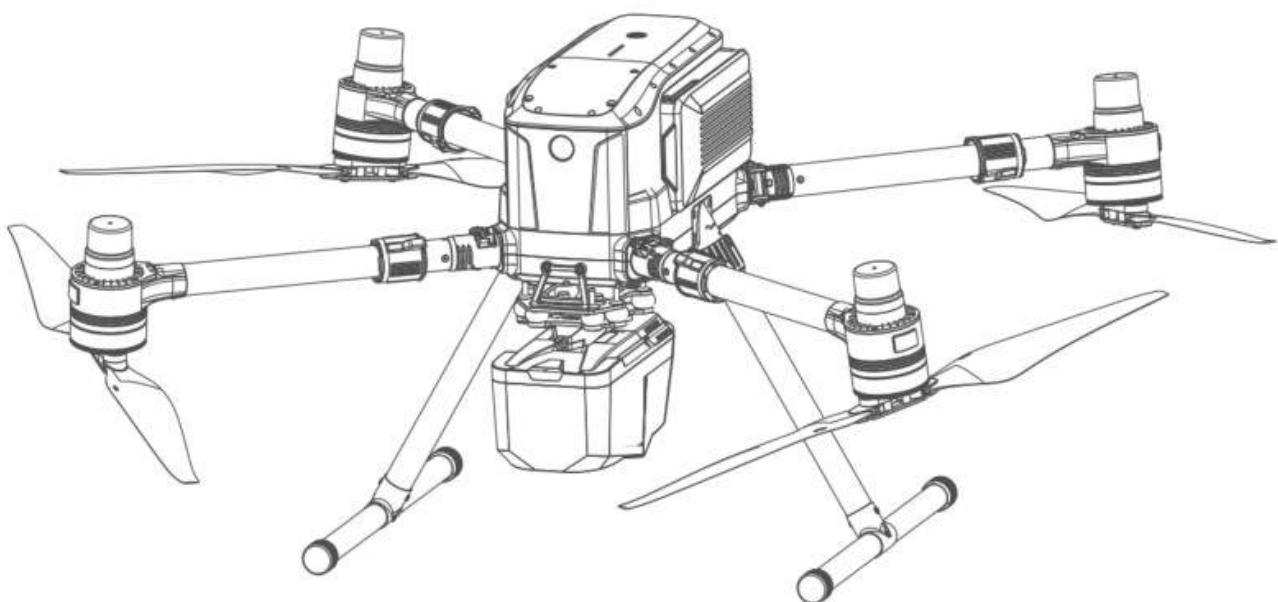


# **CHCNAV X500**

## **User Manual**



UAV Platform | Dec. 2024



Version	Revised by	Data	Description	Revision History
1.0	Zora	2024.12.25		
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## Table of Content

<b>Table of Content.....</b>	<b>3</b>
<b>1 Reading Tips.....</b>	<b>7</b>
1.1 Symbol Description.....	7
1.2 Recommendations.....	7
1.3 Service & Support.....	7
1.4 Disclaimer .....	7
<b>2 Product Overview.....</b>	<b>8</b>
2.1 Introduction.....	8
2.2 Key features .....	8
2.3 Prepare the aircraft.....	9
2.4 Install payload.....	10
2.5 Install battery / Check battery level.....	11
2.6 Power on.....	11
<b>3 Flight Safety .....</b>	<b>12</b>
3.1 Tips before using.....	12
3.2 Flight environment requirements.....	12
3.3 Wireless communication requirements .....	13
3.4 Millimeter-wave obstacle avoidance sensing system.....	13
3.4.1 Obstacle detection range.....	14
3.4.2 Obstacle avoidance function .....	14
3.4.3 Obstacle avoidance scenarios.....	14
3.4.4 Return-to-Home Obstacle Avoidance.....	15
3.4.5 Precautions for using .....	16
3.4.6 Obstacle Information Display .....	17
3.5 Automatic return .....	17
3.5.1 One-click return.....	17
3.5.2 Low battery return.....	17
3.5.3 Low battery warning.....	18
3.5.4 Severe low battery landing .....	18
3.5.5 Lost contact and returned .....	18
3.6 Precision Landing.....	18
3.7 Automatic return process.....	19
3.8 Optical flow positioning.....	20
3.9 Flight data .....	20
3.10 Compass calibration .....	20
3.11 Triple rotor spin protection .....	21
3.12 Manual start/stop of the motor .....	22
3.13 Emergency propeller stop.....	23
3.14 Basic flight.....	23
3.15 ADS-B .....	23

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3.16 Pre-flight checklist .....	24
<b>4 Aircraft .....</b>	<b>24</b>
4.1 Understanding the aircraft .....	25
4.2 Propeller .....	26
4.3 Replacing the propeller blades .....	27
4.4 Aircraft indicator lights .....	27
4.5 Aircraft auxiliary light.....	28
4.6 Flight Mode.....	29
4.7 Various expansion devices.....	31
4.8 IP55 protection level description.....	31
<b>5 Remote Controller.....</b>	<b>32</b>
5.1 Remote Controller Overview .....	32
5.2 Remote controller function buttons.....	32
5.3 Remote controller use .....	33
5.3.1 Expand .....	33
5.3.2 Antenna location .....	34
5.3.3 Power on and off .....	34
5.3.4 Joystick Mode .....	35
5.3.5 Charge.....	36
5.4 Remote control communication range.....	36
<b>6 BS10 Intelligent Battery Station .....</b>	<b>37</b>
6.1 Introduction.....	37
6.2 Precautions for use .....	38
6.3 Use .....	39
6.3.1 Charge.....	39
6.3.2 Group charging strategy .....	40
6.4 Indicator Lights .....	41
6.5 Specifications .....	41
<b>7 B10 Intelligent Battery.....</b>	<b>42</b>
7.1 Introduction.....	42
7.2 Features .....	42
7.3 Install the battery .....	43
7.4 Pairing .....	43
7.5 Power on/off.....	43
7.6 Hot swap battery .....	44
7.7 Heat battery.....	44
7.8 Precautions for low temperature use .....	44
7.9 Check battery level .....	45
7.10 Battery self-discharge .....	46
<b>8 SmartGo Ground Control Software .....</b>	<b>47</b>
8.1 SmartGo App Overview .....	47
8.2 Main Interface .....	47

8.3 Function Menu .....	48
8.3.1 Offline maps .....	49
8.3.2 Settings interface.....	50
8.3.3 Payload log export .....	53
8.3.4 Video Tutorial .....	55
8.4 Manual control .....	56
8.4.1 Checklist.....	56
8.4.2 Parameter settings.....	57
8.4.3 Security Settings .....	58
8.4.4 Obstacle avoidance system settings .....	59
8.4.5 Remote Control Settings.....	60
8.4.6 Battery Information .....	61
8.4.7 RTK Settings .....	61
8.4.8 More settings.....	62
8.5 Route Planning.....	63
8.5.1 Regional route .....	64
8.5.2 Strip route.....	66
8.5.3 KML import planning .....	68
8.5.4 Route parameter settings .....	69
8.5.5 Advanced Parameters.....	71
8.6 Payload safety diagnostics .....	73
8.6.1 Maintenance Service .....	73
8.6.2 Authorization Status .....	74
8.6.3 Firmware Information.....	74
8.6.4 Search aircraft.....	75
8.6.5 Log Management.....	76
<b>9 Maintenance.....</b>	<b>76</b>
9.1 Daily inspection .....	76
9.1.1 Unpowered checklist .....	76
9.1.2 Power-on checklist.....	78
9.1.3 Test flight checklist.....	80
9.2 Regular maintenance.....	81
9.2.1 Maintenance recommendations .....	81
9.2.2 Regular maintenance items .....	82
9.2.3 Battery .....	88
9.3 Flight accident handling.....	90
9.3.1 Lost aircraft accident .....	90
9.3.2 Collision, crash .....	90
<b>10 Transportation.....</b>	<b>91</b>
10.1 Aircraft.....	91
10.2 Battery .....	91
10.3 Others .....	92



## 1 Reading Tips

### 1.1 Symbol Description



**Forbid**



**Warning**



**Important note**



**Operate & Using tips**

### 1.2 Recommendations

Thank you for using this product. This is a specialized electronic item, and improper operation may result in damage to the product, personal injury, or even death. Any legal consequences arising from such incidents will be your sole responsibility. Minors are not permitted to use this product. To ensure optimal user experience and personal safety, please read the following documents carefully before using this product:

- X500 Checklist
- X500 Quick start guide
- X500 User manual

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](http://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](http://www.chcnav.com)).

### 1.4 Disclaimer

- Use of this product is prohibited for minors.
- Use of this product is prohibited in crowded public places.
- Use of this product is prohibited in areas restricted by laws and relevant regulatory authorities.
- Please keep this product out of reach of children.
- Please do not use this product under the influence of alcohol, fatigue, medication, or other mental states.
- Please fly in an outdoor environment with good weather and open space.
- The schematic diagram is for reference only; actual product appearance may vary.



## 2 Product Overview

This chapter mainly introduces the product features and how to install the aircraft.

### 2.1 Introduction

Designed by CHCNAV, the X500 Rotor UAV is a professional drone platform with exceptional payload capacity and endurance. Featuring advanced flight control systems and high-precision positioning technology, the X500 provides superior maneuverability, outstanding flight performance, and industry-leading stability. Its built-in Visual SLAM and obstacle detection radar ensure advanced intelligent flight operations for optimal efficiency and safety. The X500 supports multiple payloads from CHCNAV own sensors and third-party extensions, making it the most versatile drone for applications such as surveying, urban surveillance, emergency scouting, disaster relief, and demanding inspection missions.

### 2.2 Key features

#### HIGH PERFORMANCE

The X500 supports a 5 kg payload capacity and offers a flight endurance of 58 minutes, or up to 50 minutes when equipped with the CHCNAV AA10 LiDAR. Its IP55 rating and 12 m/s wind resistance enable reliable performance in challenging environments.

#### STABLE & SAFE FLIGHT

The X500 supports a 5 kg payload capacity and offers a flight endurance of 58 minutes, or up to 50 minutes when equipped with the CHCNAV AA10 LiDAR. Its IP55 rating and 12 m/s wind resistance enable reliable performance in challenging environments.

#### HIGH EFFICIENT ENERGY SYSTEM

Paired with the BS10 charging station, which holds up to six batteries, it allows fast charging from 20% to 90% in just 40 minutes ensuring uninterrupted operation throughout the day.

#### VARIED PAYLOAD OPTIONS

The X500 supports up to three concurrent payloads and is compatible with CHCNAV LiDARS and cameras. Its open SDK interface facilitates integration with third-party devices, enabling customization for specific mission requirements. Built on the universal Mavlink protocol, it ensures adaptability to multiple applications.

#### LONG-RANGE OPERATION

The X500 uses CHCNAV's video transmission system, enabling a range of up to 20 km.

Advanced algorithms optimize wireless HD video transmission by minimizing latency and enhancing reliability. Its 1080p HD FPV feed and 10.1" large-screen remote control provide intuitive operating experience.

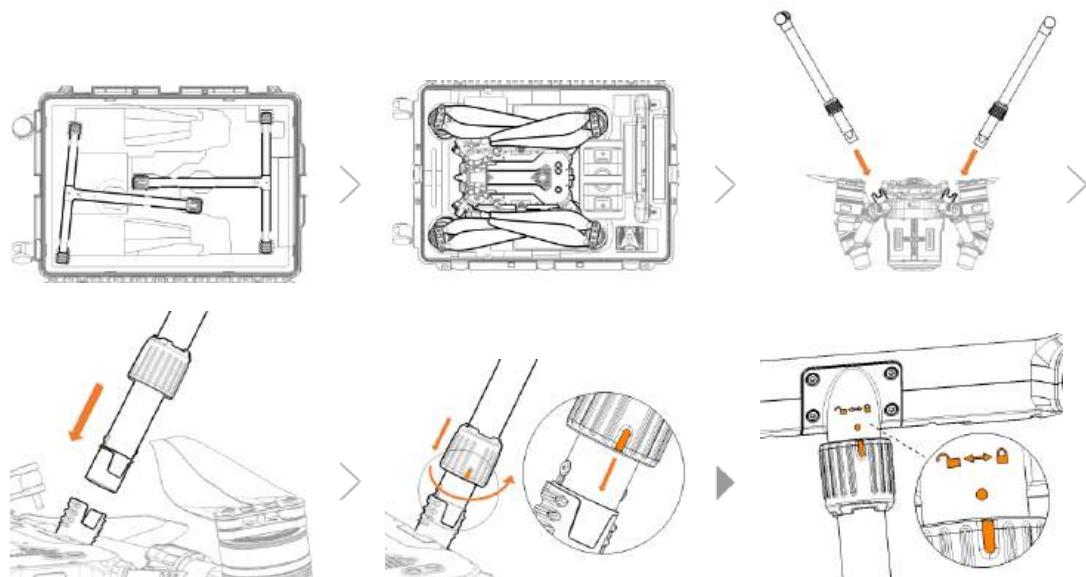
### INTELLIGENT AND SIMPLIFIED FLIGHT SOFTWARE

CHCNAV's SmartGo ground control software supports diverse flight path options, including rectangular, strip, polygonal, and facade routes. It provides real-time updates on the drone's status, heading, and surrounding obstacles, ensuring enhanced safety for beyond-visual-line-of-sight (BVLOS) operations.

## 2.3 Prepare the aircraft

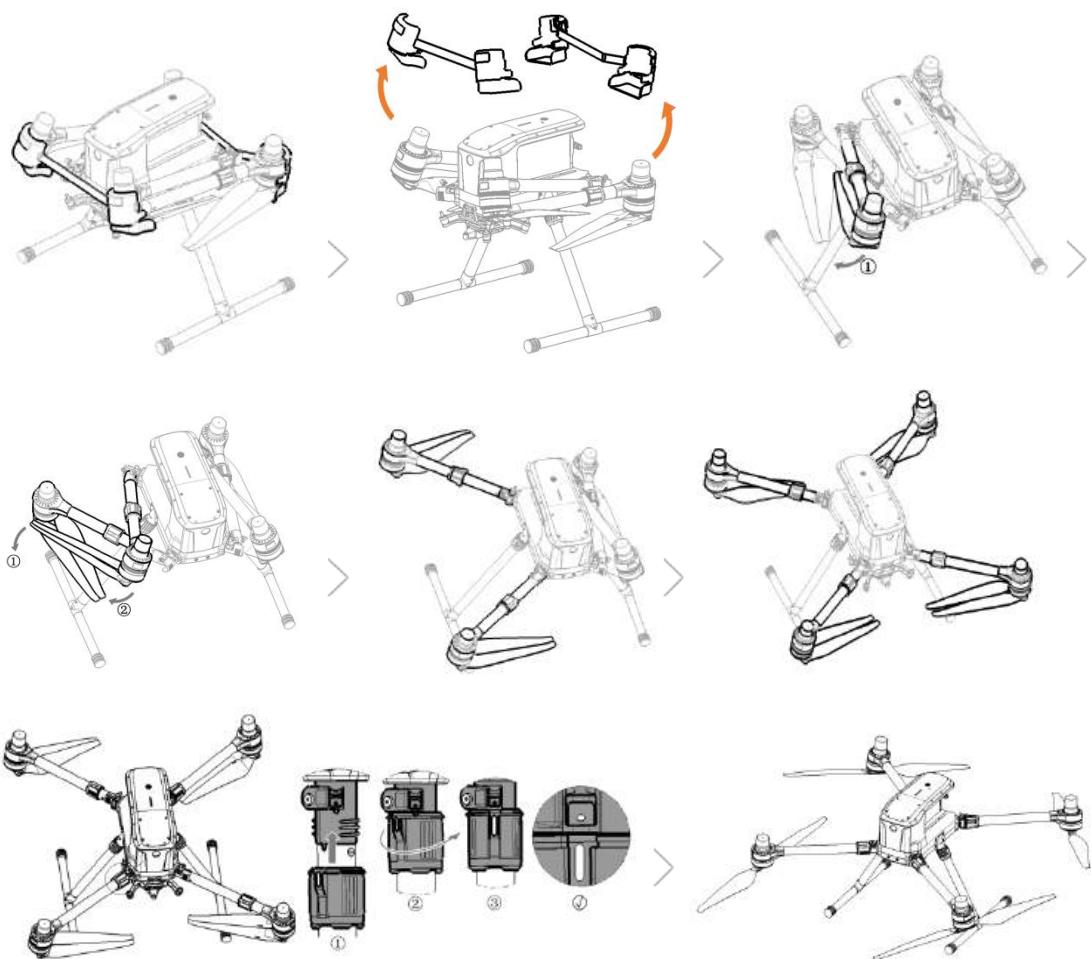
### Install the landing gear

Take out the landing gear and insert it into both sides of the bottom of the fuselage. Slide the locking sleeve down and rotate it until the alignment mark matches the dot, ensuring the locking latch is correctly aligned and secured.



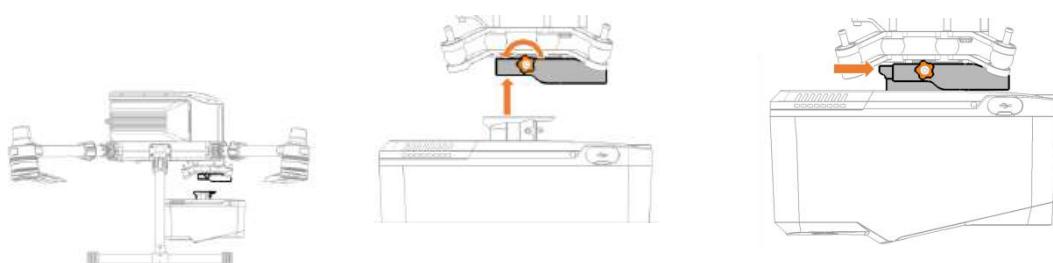
### Unfold the aircraft

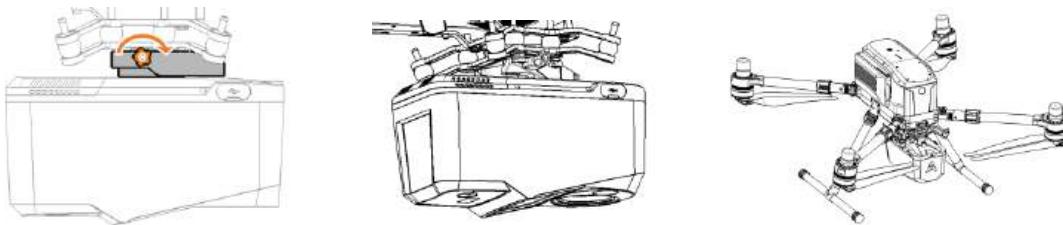
Take out the aircraft, remove the velcro strap from the arm, unfold the aircraft's arms one by one, rotate the arm sleeve to lock the arms in place, and unfold the rotor blades.



## 2.4 Install payload

- Push the "A" slider of scanner into the quick-release clamp which on the bottom of the airborne load plate until hear a fix sound.
- Lock the side screw bolt to make it stable to finish installation.





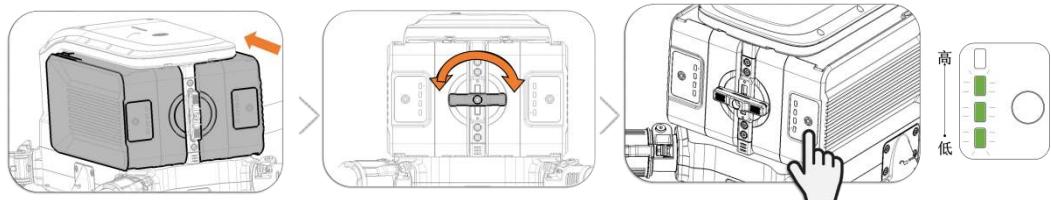
 Please confirm that the payload is securely locked in place after installation.

### Disassemble payload

- Hold the bottom of scanner with left hand first, then open the handle bolt on the side of the quick release in counterclockwise direction with right hand, until the handle bolt is loose.
- Pull the handle bolt out first, then remove payload to complete uninstall it.

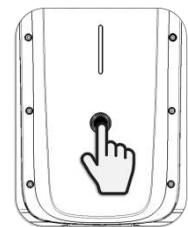
## 2.5 Install battery / Check battery level

- Install two batteries.
- Check battery level: Short press the battery level button once.



## 2.6 Power on

Turn on/off: First, short press the power button on the aircraft. Then, long press the same power button within 3 seconds to turn on/off the battery. The indicator light will remain on after powering on.



 If only one battery remains functional after takeoff, please land as soon as possible and replace the battery.

 Use the standard battery provided; do not use any other batteries.

## 3 Flight Safety

This chapter introduces the safety precautions for the aircraft, the return-to-home (RTH) logic, and the obstacle avoidance features.

### 3.1 Tips before using

Before conducting actual field flights, you must undergo flight training or guidance from a professional, as this is the foundation for ensuring flight safety.

During flight, the appropriate environment should be selected based on flight requirements and restrictions, with particular attention paid to ensuring the aircraft's altitude does not exceed 120 meters; otherwise, there may be legal risks. Therefore, it is essential to familiarize yourself with the relevant local laws and regulations in advance to ensure the flight is legal.

Additionally, before flying, make sure to carefully read the "Quick Start Guide" or "User Manual," and keep the safety precautions in mind, so that you can effectively respond to any unexpected situations during the flight and ensure its smooth execution.

### 3.2 Flight environment requirements

- Exercise caution when flying in adverse weather conditions. Flying is prohibited during thunderstorms, typhoons, or strong winds (wind speed exceeding 12 m/s). When flying in the rain, the IP55 protection level requirements must be followed.
- The aircraft should take off from an open, unobstructed, and flat surface, and stay away from buildings, trees, crowds, water, etc. For beyond-visual-line-of-sight flights, ensure that the aircraft is in good condition, the operator is qualified, and all activities comply with legal regulations.
- In poor lighting conditions, use the SmartGo App's flight interface to observe the surrounding environment, maintain control over the aircraft, and ensure flight safety.
- Please turn on the night flight auxiliary light during nighttime flights to ensure flight safety.
- Do not take off on the surface of fast-moving objects .
- Please avoid dusty roads during takeoff and landing, otherwise it will damage the motor.
- It is recommended to replace the high-altitude propellers when flying in high altitude areas.
- The aircraft cannot fly in N gear within the Arctic and Antarctic circles. Please use it with

caution.

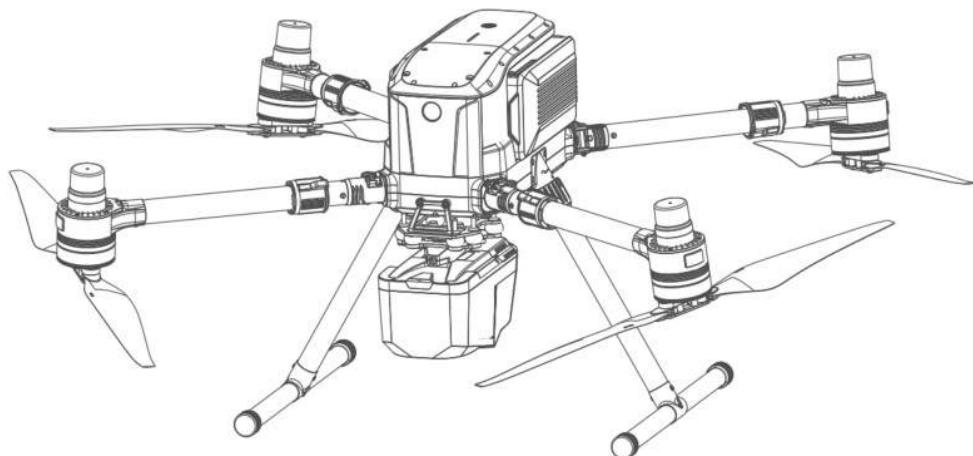
### 3.3 Wireless communication requirements

- Before flying, check that the aircraft's antenna is intact and free of any damage or detachment.
- Ensure the aircraft is operated in open areas or on high ground, away from tall buildings, mountains, forests, or any objects that may block the signal.
- When using the remote controller, it is recommended to turn off nearby Wi-Fi and Bluetooth devices to reduce interference.
- Exercise heightened caution when flying near sources of electromagnetic interference, such as high-voltage power lines, high-voltage substations, mobile phone base stations, or television broadcast towers. During the flight, continuously monitor the SmartGo App for any screen lag or a weakening of the signal strength. If significant interference occurs in these areas, the aircraft may malfunction. In such cases, follow the SmartGo App's instructions to quickly initiate a return-to-home and landing procedure to ensure flight safety.

### 3.4 Millimeter-wave obstacle avoidance sensing system

The millimeter-wave obstacle avoidance sensing system is located in front of the aircraft. It senses obstacles through ranging, which can effectively avoid flight accidents and improve flight safety.

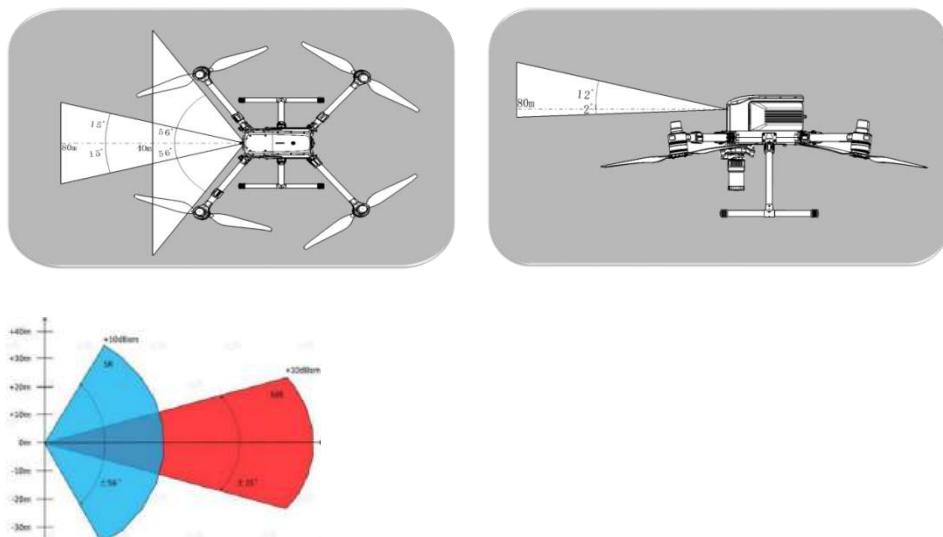
- ☞ Make sure the sensors are functioning properly before takeoff.
- ⚠ Do not block the obstacle avoidance system sensors, otherwise the aircraft will not be able to avoid obstacles and may cause flight accidents.



### 3.4.1 Obstacle detection range

Obstacle detection range is shown in the figure below.

If the obstacle avoidance sensing system is blocked by an object, the aircraft will be unable to effectively detect and avoid obstacles.



 The gray area represents the visual blind spot, which the UAV cannot detect. Please pay attention to flight safety.

### 3.4.2 Obstacle avoidance function

The obstacle avoidance function has a switch option. You need to turn on the obstacle avoidance function in the SmartGo App. The aircraft will automatically brake when encountering an obstacle on the flight path.

### 3.4.3 Obstacle avoidance scenarios

- The millimeter-wave obstacle avoidance sensor can provide obstacle information, and the obstacle avoidance distance can be set in the SmartGo App. To achieve better obstacle avoidance performance, it is recommended to maintain a flight altitude above 50 meters.
- During manual flight, as the user can freely control the UAV, please always pay attention to the flight speed and direction, and use the obstacle avoidance function reasonably to prevent obstacles from entering the sensor blind spot and causing collisions.
- When the UAV is close to an obstacle, it will automatically perform an emergency stop and hover. If the UAV is not controlled, it will trigger a return-to-home (RTH) after 60 seconds.
- When obstacle avoidance is triggered during a flight route mission: If the remote controller

has a signal, you can check the display screen to control the UAV to return or use one-key RTH. If the remote controller has no signal, the UAV will hover for 60 seconds, automatically climb to the return altitude, and enter RTH mode. If the UAV encounters an obstacle during the RTH process, it will stop, move backward approximately 10 meters, ascend 50 meters, and continue to return. If it encounters another obstacle, it will repeat the previous actions until it passes safely. It can ascend a maximum of 6 times, after which it will execute a forced RTH. Please monitor the UAV signal transmission status.

- When the UAV triggers low-battery RTH and encounters an obstacle during the return process, it will stop, move backward approximately 10 meters, ascend 50 meters, and continue to return. If it encounters another obstacle, it will repeat the previous actions until it passes safely. It can ascend a maximum of 6 times, after which it will execute a forced RTH. Please monitor the UAV signal transmission status.

### 3.4.4 Return-to-Home Obstacle Avoidance

The aircraft has the function of obstacle avoidance during return, which can automatically avoid obstacles in front and return safely during the return process.

The return-to-home obstacle avoidance function is enabled by default.

Obstacle detection during the return-to-home (RTH) process:

- The UAV will automatically move backward and ascend 50 meters before continuing the RTH process.
- The auto-climb feature can be triggered up to 6 times, after which the UAV will proceed to return directly at its current altitude.
- If an obstacle is detected within 20 meters of the landing point during RTH, the UAV will exit RTH mode and hover in place.
- During RTH in moderate to heavy rain conditions: The UAV will detect obstacles and trigger avoidance twice. On the first obstacle detection, it will ascend 50 meters. If moderate to heavy rain is detected, the UAV will trigger a second obstacle avoidance, ascending an additional 100 meters before continuing RTH. After this, no further obstacle avoidance actions will be triggered during RTH. Please closely monitor the remote controller interface to ensure the safety.

-  For strongly reflective objects, such as buildings or mountain surfaces, set the flight route speed to below 15 m/s.
-  For objects with slightly weaker reflective surfaces, such as glass buildings, trees, or high-voltage towers, set the flight route speed to below 12 m/s.
-  For large areas of greenery, such as forests in arid regions, set the flight route speed to below 10 m/s.
-  For sparse strip-shaped obstacles, such as rooftop rebar, signal towers, wind turbines, or high-

voltage power lines, set the flight route speed to below 8 m/s.

### 3.4.5 Precautions for using

- The detection range of the millimeter-wave obstacle avoidance system varies depending on the size and material of the obstacle. For example: For strongly reflective objects (e.g., buildings, trees, utility poles), the effective detection range is approximately 60 meters. For weakly reflective objects (e.g., dead branches), the effective detection range is about 20 meters. Beyond the effective detection range, obstacle detection may be impaired or ineffective. Please use with caution.
- Always maintain control of the UAV and do not rely solely on the obstacle avoidance module or the information provided by the SmartGo App. Ensure clear visibility and use your eyes to assess flight conditions and avoid obstacles promptly.
- In manual operation mode, as users have full control of the UAV, it is essential to monitor flight speed and direction carefully. Avoid allowing obstacles to enter the blind spot of the obstacle detection system to prevent collisions. Use the obstacle avoidance feature appropriately based on the surrounding environment.
- The obstacle avoidance feature is applicable only in mission mode and return-to-home (RTH) mode.
- For objects such as stay cables, significantly tilted utility poles (more than 10° ), or wires angled relative to the UAV's flight direction, obstacle detection performance may be affected as most electromagnetic waves are reflected in other directions. Fly cautiously and constantly monitor the UAV's relative altitude.
- Use millimeter-wave obstacle avoidance in compliance with local radio regulations and legal requirements.
- The millimeter-wave obstacle avoidance module is delicate; avoid squeezing or bumping it. Ensure the module's casing remains clean, unbroken, undented, and undeformed.
- Do not block the millimeter-wave obstacle avoidance sensors during use, as obstruction may cause functional abnormalities and affect normal flight.
- If additional equipment is mounted on the UAV, ensure it does not block the millimeter-wave obstacle avoidance system. Obstruction can degrade obstacle detection performance. Operate with caution.

### 3.4.6 Obstacle Information Display

After the obstacle avoidance function is turned on in the app, the flight interface will display the distance of the detected obstacle.

When an obstacle is detected and obstacle avoidance is triggered, the aircraft will slow down and continue to detect. If an obstacle is still detected, it will avoid the obstacle and brake to hover.

The obstacle avoidance braking distance can be set in the SmartGo App.



## 3.5 Automatic return

The aircraft has an automatic return function, which is mainly divided into one-key return, low-battery return, intelligent low-battery return, and lost connection return according to the return trigger method. If the return point is successfully recorded before takeoff and the GNSS signal is good, when the user actively turns on the intelligent return, the aircraft's low battery triggers the intelligent low-battery return, the remote controller and the aircraft lose communication signals, and the image transmission signal triggers the lost connection return, the aircraft will automatically return to and land.



During the automatic return, if the forward obstacle avoidance sensing system is turned on and environmental conditions permit, when the aircraft encounters an obstacle in front of the nose, the aircraft will trigger obstacle avoidance hovering and automatically climb to avoid the obstacle. When the aircraft completes avoiding the obstacle in front, the aircraft will maintain the current altitude and fly horizontally above the return point, and then automatically land.



During the automatic return to home process, the user cannot adjust the direction of the aircraft.



During the automatic return to home process, operating the joystick to slow down will exit the return to home mode, enter the position mode and hover.

### 3.5.1 One-click return

During the flight, long press the "H" button on the remote control for 3 seconds or click the "Return Home" button on the App interface and select Confirm Return Home to achieve automatic return home. During the return home process, the user can cancel the return home by controlling the "Pause" button on the remote control to regain control.

### 3.5.2 Low battery return

There are two mechanisms for low battery return, low battery return and severe low battery

landing. When the aircraft battery is too low, there is not enough power to return, and the user should land the aircraft as soon as possible.

If the current battery is too low, the SmartGo App will prompt the user whether to perform a return home. If the user does not make a choice within 10 seconds, the aircraft will automatically enter the return home after 10 seconds. During the return home process, you can short-press the "Pause" button on the remote control to exit the return home. Low-battery return home only occurs once during the same flight. If the user cancels the low-battery return home reminder and continues to fly, it may cause the aircraft to run out of power when returning, causing an emergency landing, resulting in damage or loss of the aircraft.

### **3.5.3 Low battery warning**

When the aircraft is in a low battery state, the aircraft status indicator light flashes slowly in red. When the aircraft is in a critically low battery state, the aircraft status indicator light flashes quickly in red.

The low battery warning threshold can be set in the SmartGo App interface. The factory default low battery warning value is 20%, and the severe low battery drop warning value is 10%.



During the automatic descent of the aircraft, you can also push the throttle lever to make the aircraft hover or rise, and control the aircraft to move to a more suitable place before landing.

### **3.5.4 Severe low battery landing**

If the battery is seriously low, the aircraft will be forced to descend and cannot be canceled. During the descent, the aircraft can be controlled by the remote controller (if the remote controller signal is normal).

### **3.5.5 Lost contact and returned**

During the flight, if the remote controller is disconnected from the aircraft, the aircraft will trigger a loss of connection return (need to set the loss of connection as return in the App). If the signal connection between the remote controller and the aircraft is restored during the return process, the aircraft will still perform the return. During the return process, the user can short press the "Pause" button on the remote controller to cancel the return.

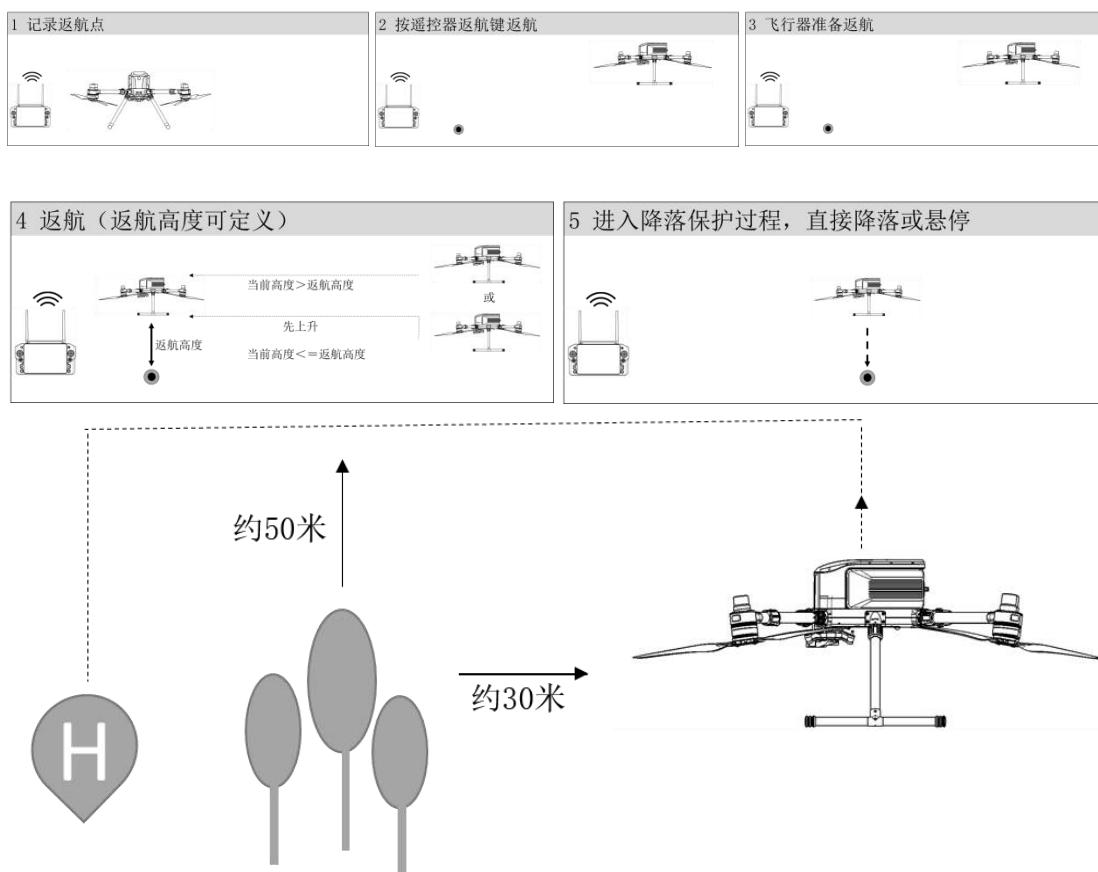
## **3.6 Precision Landing**

The accuracy of the visual precision landing system is easily affected by the light intensity and the integrity of the landing QR code. It should be used with caution in the following scenarios.

- The QR code is dirty or blocked (such as by rocks or trees) when it is landed, or the QR code is not fully unfolded or has obvious wrinkles.
- When the surface of the QR code is extremely dark (light less than 15 lux) or extremely bright (light greater than 10,000 lux).
- Lens ExistsDirt or obstructions (such as raindrops, tape, etc.).

### 3.7 Automatic return process

- The aircraft records the home point.
- Triggering automatic return conditions (triggered by the user using a remote control button or the aircraft is low on battery or lost).
- The aircraft confirms the return point and automatically adjusts the direction of the nose.
- When the aircraft is above the return altitude, it will return at the current altitude. When the aircraft is below the return altitude, it will rise to the return altitude and return.
- During the return process, the obstacle avoidance mode is turned on throughout the process to avoid obstacles autonomously.
- The aircraft automatically flies above the return point and enters landing mode.



### 3.8 Optical flow positioning

The measurement accuracy of the visual optical flow positioning system is easily affected by the light intensity and the surface texture of the object. It should be used with caution in the following scenarios.

- Pure color ground (such as pure black, pure white, pure red, pure green) and weak texture scenes.
- There are scenes with strong reflections, mirror reflections, water surfaces, etc.
- Scenes with drastic and rapid changes in lighting and scenes with direct strong light sources.
- On extremely dark (light less than 15 lux) or extremely bright (light greater than 10,000 lux) surfaces.
- The lens is dirty or blocked (such as raindrops, tape, etc.).

### 3.9 Flight data

Both the aircraft and the SmartGo App have flight data recording capabilities.

During use, simple flight-related logs will be stored in the SmartGo App, and the logs can be viewed, uploaded and exported through the remote control interface.

Detailed logs will be stored in the aircraft flight control. If you have any questions, you can copy them from the aircraft and export them to your computer for viewing.

### 3.10 Compass calibration

Please calibrate the compass according to the instructions of the SmartGo App or the aircraft status indicator.

- Do not calibrate in areas with strong magnetic fields or near large pieces of metal, such as magnetic mines, parking lots, construction areas with underground rebar, etc.
- Do not carry ferromagnetic objects such as mobile phones, electronic watches, metal accessories, etc. during calibration.

#### Calibration steps:

Please choose an open area and follow the steps below.

- Enter the SmartGo App flight interface, select Security Settings, and click Compass Calibration. The aircraft status indicator light turns yellow to indicate that the compass calibration process has started.
- Rotate the aircraft horizontally by 360°.
- Rotate the aircraft in pitch by 360°.
- Rotate the aircraft in roll by 360°, completing the calibration.



**DJI's picture needs to be  
changed**



**DJI's picture needs to be  
changed**



**DJI's picture needs to be  
changed**

- ☞ If the calibration fails, it means there is interference. Please change the calibration site.
- ☞ If the aircraft needs to calibrate the compass, after running the SmartGo App, the interface will prompt that the compass calibration is required. The prompt will disappear after successful calibration.
- ☞ If the calibration is successful and the aircraft is prompted to calibrate again when it is placed back on the ground, please move the aircraft to another location.

### **3.11 Triple rotor spin protection**

During flight operations, if one of the aircraft's motors fails and stops, the aircraft will

automatically enter the tri-rotor spin protection mode. In this mode, the flight control system will work to maintain the stability of the aircraft's attitude and speed while automatically reducing altitude. This gives the user time to move the aircraft to a suitable landing area, minimizing damage to the aircraft, payload, and any potential harm to ground personnel or property.

Once the tri-rotor spin protection mode is activated, the aircraft will rapidly spin and automatically descend. The user can control the joystick to quickly move the aircraft to an appropriate landing zone. As the aircraft approaches the ground, the emergency motor stop function can be activated to ensure a safe landing, minimizing the damage caused by the spin.

- ☞ The tri-rotor emergency landing function is available when the takeoff weight is  $\leq 10\text{kg}$ , the flight altitude is  $\geq 10\text{m}$ , and the aircraft is in an open environment.
- ☞ In the event of such a failure, immediately operate the aircraft to move away from people and valuable property. To minimize damage to the aircraft, it is recommended to perform the emergency landing on soft ground, such as grass.
- ☞ If the propeller blades are damaged or missing but the motors are still functioning normally, the aircraft will not enter tri-rotor emergency landing mode.
- ☞ Tri-rotor emergency landing is an emergency protection feature for power failure and should never be triggered intentionally; it must be used strictly in emergency situations.
- ☞ Make sure to update the aircraft's firmware regularly to support a wider range of operating scenarios and ensure flight safety and the normal operation of all functions.
- ☞ After the emergency landing, please contact CHCNAV technical support for a power system inspection as soon as possible.

### 3.12 Manual start/stop of the motor

#### Starter Motor

Perform any of the following stick movements to start the motor. Release the joystick immediately after the motor starts.



#### Stop the motor

After the aircraft lands, pull the throttle stick to the lowest position and hold it until the motors stop.



### 3.13 Emergency propeller stop

- When a serious malfunction occurs in the aircraft in the air, you can use the key combination "pull down the throttle lever + L1/R1 (3 consecutive presses)" to implement the emergency propeller stop function and let the aircraft fall on the spot to reduce losses.
- During normal flight, do not use the emergency propeller stop function to avoid losses.
- Before takeoff, the user should face the tail of the aircraft and maintain an appropriate safety distance from the aircraft placement point.
- Do not perform an unlock takeoff on a slope with a large inclination angle.

### 3.14 Basic flight

- First, place the aircraft steadily on a flat, open surface, with the user standing facing the aircraft's tail.
- Turn on the remote controller power, then turn on the aircraft power.
- Launch the SmartGo App and enter the flight interface.
- Wait for the aircraft's status indicator light to flash green, signaling it is ready.
- If the battery is too cold, it will automatically activate the heating function to ensure the battery reaches the required temperature for takeoff.
- Once everything is ready, perform the throttle stick action to start the motors. Push the throttle stick up to lift the aircraft smoothly.
- When descending, slowly pull the throttle stick down to gently lower the aircraft to the flat ground.
- After landing, pull the throttle stick to the lowest position and hold it until the motors stop.
- After the motors stop, turn off the aircraft and remote controller power in sequence.

### 3.15 ADS-B

An aircraft equipped with ADS-B can receive flight information broadcasted by ADS-B transmitters that support the 1090ES or UAT standards within a 50-kilometer range. Based on the received flight information, ADS-B can analyze and obtain data on the position, altitude, heading, speed, etc., of manned aircraft, assess the risk of proximity, and make accurate predictions to reduce risk.

This module only provides proximity alerts for specific manned aircraft under certain conditions and cannot actively control or take over the aircraft to avoid approaching manned aircraft. Therefore, you should always ensure the aircraft remains within visual line of sight

and adhere to flight safety procedures.

The following limitations apply to this module:

- This module can only receive broadcast information from manned aircraft equipped with ADS-B Out devices that comply with the 1090ES (RTCA DO-260) or UAT (RTCA DO-282) standards. It cannot receive information from manned aircraft that are either not equipped with ADS-B Out or are equipped but not functioning properly, and will issue a warning in such cases.
- This module operates on wireless frequencies, and if there are obstructions between the aircraft and a manned aircraft, it may have difficulty receiving the broadcast information from the manned aircraft, triggering a warning.
- Due to changes in the surrounding environment and interference, there may be delays in issuing warning information, so you should always operate cautiously and remain vigilant about your surroundings.
- If the aircraft is unable to obtain its own position, the warning information issued by this module may contain errors.
- If the module malfunctions, it will not be able to receive the broadcast information from manned aircraft and therefore cannot issue any warning information.
- When the ADS-B system detects a risk, you should immediately take measures to land or use other means to avoid the risk.

### 3.16 Pre-flight checklist

- Carefully check that all parts of the aircraft are intact. If any cracks or damage are found, please stop flying.
- Check whether the batteries, remote control and mobile terminal devices have sufficient power.
- Make sure the arms and tripod are fully deployed and the propellers are securely installed.
- Make sure the remote controller is connected to the aircraft properly.
- Check whether all firmware versions are up to date and whether the App and remote controller are connected properly.
- Make sure the App interface displays “Ready to take off completed” .
- Check whether the motors are working properly after turning on the aircraft.

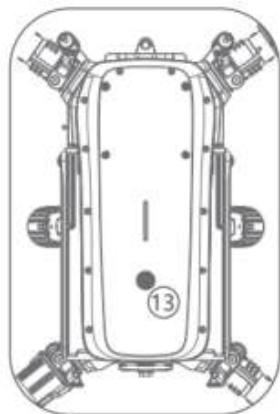
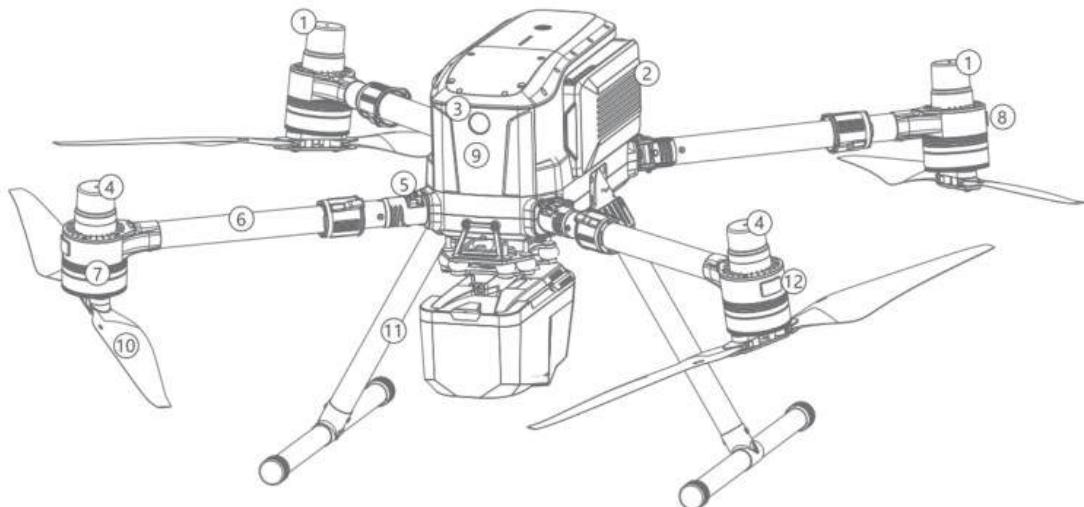
## 4 Aircraft

This chapter introduces the flight control system, vision system, various flight modes, return-to-home function, and other features of the aircraft.

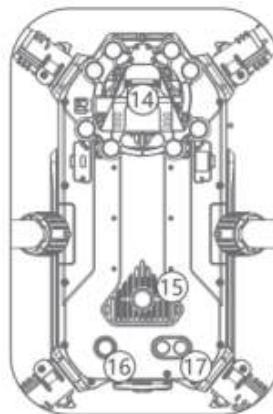
The X500 aircraft primarily consists of the flight control system, communication system, vision system, obstacle avoidance system, power system, and battery system.

This chapter will provide a detailed introduction to the functions of each component of the aircraft.

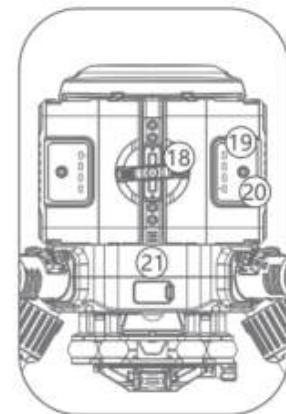
## 4.1 Understanding the aircraft



Top view



Bottom view



Rear view

①-Video transmission antenna	⑧-Aircraft status indicator light	⑯-Night flight auxiliary light
②-B10 intelligent battery	⑨-Millimeter wave radar	⑰-vSLAM
③-High-definition FPV camera	⑩-Propellers	⑱-TOF
④-GNSS antenna	⑪-Landing Gear	⑲-Battery locking knob
⑤-Arm sleeve lock	⑫-Aircraft nose indicator light	⑳-Battery level indicator light
⑥-Arm	⑬-Power Button	㉑-Battery level button

⑦-Motor

⑯-Payload Rack

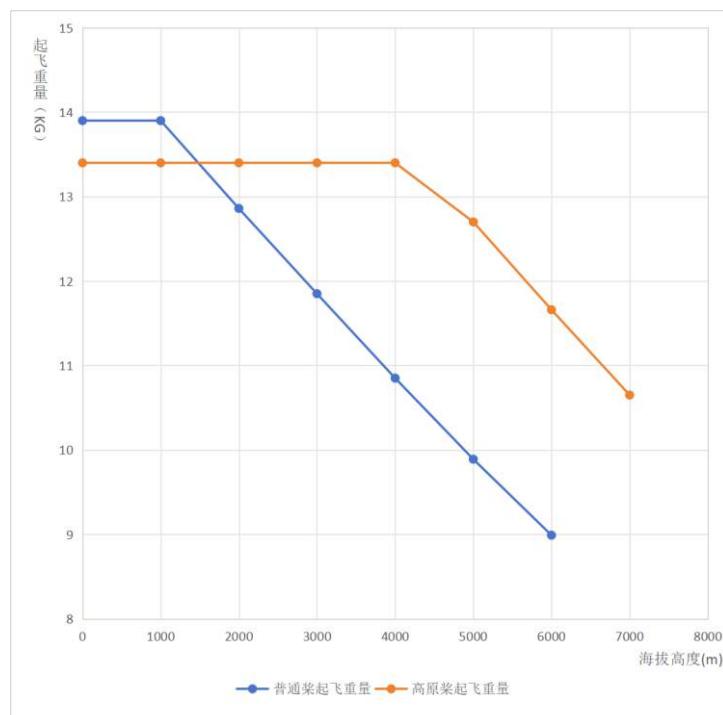
㉑-Data copy port

## 4.2 Propeller

The X500 is equipped with the plain propeller as standard. However, when flying in high-altitude areas, users must select and equip the high-altitude propeller.

The flight ceiling refers to the maximum altitude at which the aircraft can theoretically fly. It is important to note that the wind speed in the flight environment should be kept within 12 m/s. When the aircraft is operating near its flight ceiling, its braking and acceleration capabilities may be weakened compared to when flying at lower altitudes.

For the X500 aircraft, we have created a ceiling chart for different payload configurations, ranging from an empty weight to various loaded conditions, with the 2475 plain propeller and the 2412 high-altitude propeller. Therefore, users should carefully assess whether it is necessary to switch propellers based on the actual takeoff weight and desired maximum flight altitude to ensure a safe and successful mission.



- Always use the propellers provided by CHCNAV and avoid mixing propellers of different models to ensure the normal operation of the aircraft.
- Propellers are consumable items; if necessary, purchase additional spare propellers to

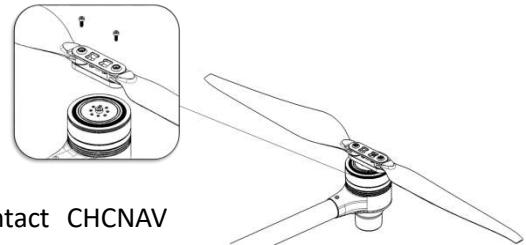
ensure you have replacements when needed.

- Before each flight, check that the propellers are correctly installed and securely fastened.
- Before each flight, be sure to check the condition of each propeller. If any are found to be aged, damaged, or deformed, they should be replaced before flying.
- Do not approach the rotating propellers and motors, as this could lead to serious injury.

Always maintain a safe distance to avoid personal harm.

### 4.3 Replacing the propeller blades

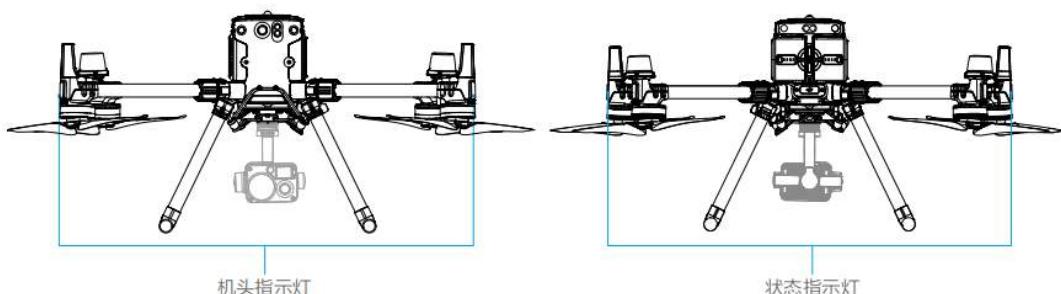
Please use an H2.5 hexagon socket wrench to assist in replacing the propeller blades. It is recommended to replace the propeller blades only in emergency situations during field operations. After the emergency flight, please contact CHCNAV technical support or regional agents as soon as possible for maintenance.



Since the blades are thin, please handle them with care to avoid accidental scratches.

### 4.4 Aircraft indicator lights

There are 4 indicator lights on the front and rear arms of the aircraft on the fuselage, and their positions are shown in the figure.



## DJI's picture needs to be changed

- Head indicator light: used to indicate the direction of the aircraft's head. When the aircraft is turned on and the motor is not started, the red light is always on. After the motor is started, the red and green lights flash alternately.
- Status indicator: When the aircraft is turned on and the motor is not started, it indicates the current status of the flight control system. When the motor is started, the green light flashes.

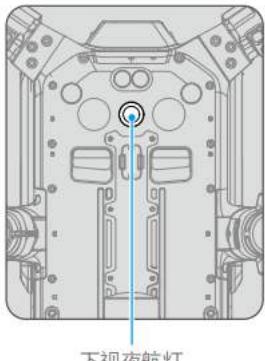
The front and rear arm indicators of the aircraft can represent different flight states. Please

refer to the following table for specific meanings:

Status light (4 arms)		
Head indicator light: two lights under the arms in the direction of the aircraft head Status indicator light: two lights under the arms at the tail of the aircraft		
	Indicator Lights	illustrate
Head indicator light	Red light is steady on	When the motor does not start after the aircraft is turned on
	Red and green flashing alternately	After the motor starts
Status Indicator Light	Red, green and yellow flashing alternately	Aircraft self-checking
	Green light flashing slowly	N gear, normal flight status, GNSS or RTK positioning in use
	Green light flashes quickly	S gear, normal flight status, GNSS or RTK positioning in use
	Green light double flash	Visual landing
	Yellow light flashing slowly	Height hold mode
	Yellow light flashing quickly	Remote control signal interrupted
	Red light flashing slowly	Drone battery is low
	Red light flashing quickly	Severe low battery warning, the aircraft is about to land
	Red light flashes at intervals	The aircraft is not placed level
	Red light is steady on	Unable to take off
	Red and yellow lights flashing alternately	Compass Error

## 4.5 Aircraft auxiliary light

The auxiliary light makes it easier to identify the aircraft during low-light flight and assists in landing identification.



## DJI's picture needs to be changed

- When the fill light is working, do not look directly at it to avoid damage to your eyesight caused by strong light.
- When the fill light is working, please do not touch it to avoid overheating and burns.

## 4.6 Flight Mode

The aircraft has the following two flight modes, which can be switched manually via the remote controller, as follows:

### A mode (fixed altitude)

The millimeter wave obstacle avoidance perception system, GNSS positioning and downward vision positioning system do not work.

If the aircraft is out of navigation control and the joystick is not operated, it will drift horizontally and needs to be controlled in real time through the joystick.

- T (stable) gear: maximum acceleration attitude angle 15°, maximum ascending speed 4m/s, maximum descending speed 4m/s.
- N (normal) gear: maximum acceleration attitude angle 23°, maximum ascending speed 6m/s, maximum descending speed 5m/s.
- S (Sport) gear: maximum acceleration attitude angle 23°, maximum ascending speed 8m/s, maximum descending speed 6m/s.

### P mode (position) - 3 typesGear position (can be switched manually via SmartGo App)

When the GNSS signal is good, accurate positioning can be achieved using GNSS;

When the GNSS signal is poor, the intelligent vision system is used for positioning when the lighting conditions meet the requirements of the intelligent vision system;

If both the GNSS signal and vision-assisted positioning fail, the system will automatically switch to A mode and be manually controlled by professionals.

- T (stable) gear: maximum level flight speed 10m/s, maximum ascent speed 4m/s, maximum descent speed 4m/s.
- N (Normal) gear: maximum level flight speed 15m/s, maximum ascent speed 6m/s, maximum descent speed 5m/s.
- S (Sport) gear: maximum level flight speed 23m/s, maximum ascent speed 8m/s, maximum descent speed 6m/s.

#### **Special instructions:**

##### **A Mode (fixed altitude) Description**

- Mode A is a professional mode. Please do not switch it at will unless there are special circumstances.
- When the GNSS satellite signal is poor or the compass is interfered with, and the visual positioning working conditions are not met, the aircraft will enter the altitude hold mode passively.
- You can manually switch to A mode through the flight mode switch of the remote controller. In this mode, the aircraft is easily disturbed by the outside world, drifting in the horizontal direction, and some intelligent flight modes will not be available. Therefore, in this mode, the aircraft itself cannot achieve fixed-point hovering and autonomous braking, and the user needs to manually control the remote controller to achieve hovering of the aircraft.
- The control difficulty of the aircraft in this mode is greatly increased. Users must be familiar with the behavior of the aircraft in this mode and be able to control the aircraft skillfully. When using the aircraft, do not fly the aircraft for a long distance to avoid losing judgment of the aircraft's attitude due to the long distance, thereby causing risks.
- Once the aircraft enters the altitude hold mode, it should land in a safe location as soon as possible to avoid accidents. At the same time, it should be avoided as much as possible in narrow, semi-obstructed and other spaces with poor GNSS satellite signals to avoid entering the altitude hold mode passively, which may lead to aircraft accidents.

##### **P Mode (Position) - S(sports)Gear illustrate**

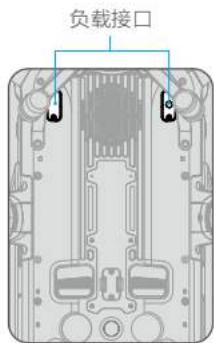
- Users must be aware that when flying in S mode (Sport), the visual obstacle avoidance function will not take effect and the aircraft will not be able to brake actively. Users must pay attention to the surrounding environment and control the aircraft to avoid obstacles on the flight path.
- Users must be aware that when flying in S mode (Sport), the aircraft's flight speed will be significantly increased compared to T (Stable) and N (Normal) gears, resulting in a

significantly increased braking distance. When flying in a windless environment, users should reserve at least 50 meters of braking distance to ensure flight safety.

- Be sure to familiarize yourself with the characteristics of the aircraft and various flight modes before switching gears in P mode.

## 4.7 Various expansion devices

The aircraft bottom interface supports SDK expansion, so that developers can develop more extended functions. Please contact CHCNAV technical support to obtain SDK development information.



**DJI's picture needs to be changed**

## 4.8 IP55 protection level description

- Do not fly when the rainfall is greater than 100mm/24h.
- Do not fold the arms in the rain.
- Before flying, make sure the battery interface, battery compartment interface, battery surface, and battery compartment surface are dry and free of moisture before inserting the battery into the aircraft.
- Make sure the battery interface and battery surface are dry and free of water before charging the battery.
- Please wipe the surface of the device clean and make sure there is no water droplets before putting it into the package.
- Damage caused by liquid intrusion is not covered by the warranty.

**The following situations do not have IP55 protection level:**

- The connector cover is not properly installed.
- The waterproof rubber plug falls off.
- Other possible damages may occur to the device, such as cracks in the outer shell, failure of waterproof glue, etc.

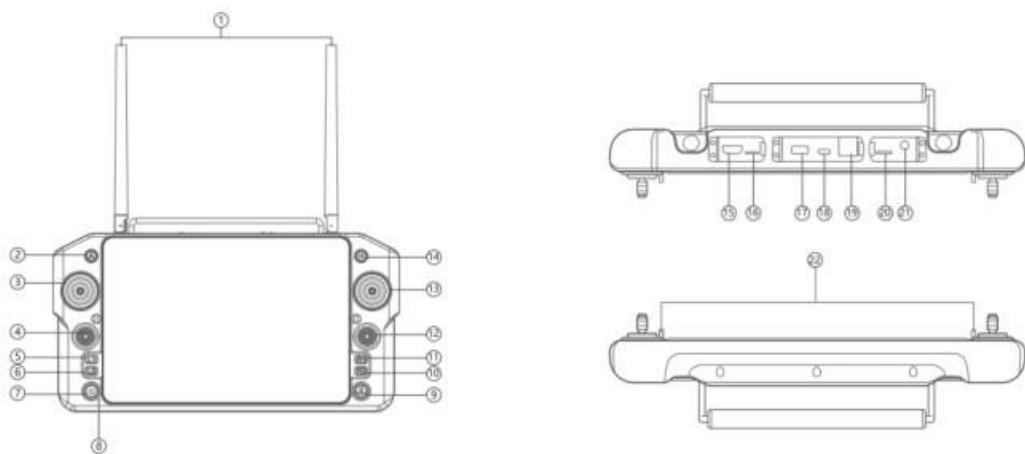
## 5 Remote Controller

This chapter introduces the functions of the remote controller, including how to use it and how to control the aircraft.

### 5.1 Remote Controller Overview

The remote control adopts advanced SDR technology and a superior protocol stack to deliver clearer vedios, lower latency, longer range up to 20 km, and enhanced anti-interference. It features a 13.25-inch sunlight-visible touch screen with a resolution of  $1920 \times 1200$ , supporting 1080P high-definition vedio transmission. The dual-frequency antenna signals work together to provide an exceptionally strong signal and ultra-long range. Powered by a high-energy density lithium-ion battery, it can operate for approximately 6 hours on a full charge.

### 5.2 Remote controller function buttons



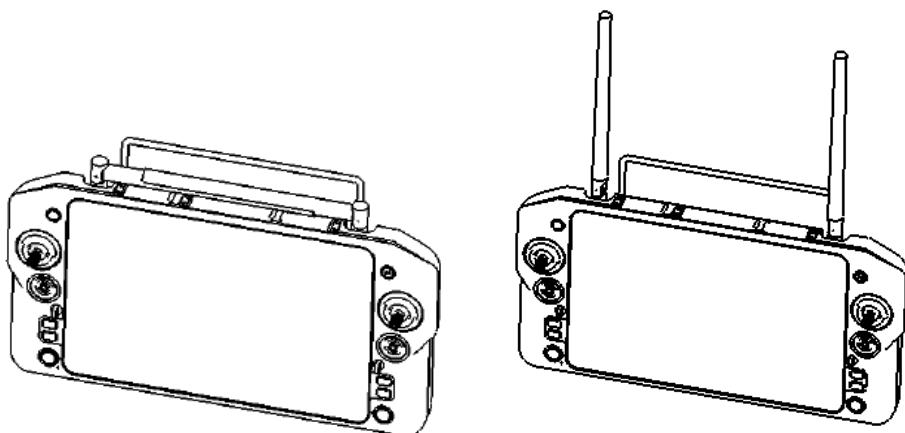
①-Video transmission antenna Transmit signals between the remote controller and the aircraft	⑨-RTH (Return to Home) Button Press and hold for 3 seconds and the aircraft will return	⑯-USB Port The OTG port supports third-party devices
②-Mode Switch Button	⑩-R2 Button	⑯-TYPE-C Charging Port

P mode (position) and A mode (fixed altitude)	Can customize mapping function	Remote controller charging port
③-Left Stick Control the aircraft	⑪-R1 Button Can customize mapping function	⑯-RJ45 Ethernet Port Connect to RJ45 LAN port
④-Left Small Stick Can customize mapping function	⑫-Right Stick Can customize mapping function	⑰-TF Card Slot Expand TF card slot
⑤-L1 Button Can customize mapping function	⑬-Right Small Stick Can customize mapping function	⑯-PPM Port Output PPM signal
⑥-L2 Button Can customize mapping function	⑭-Pause Button Short press the aircraft to hover in place	⑰-Lanyard connector Can be installed with strap and lanyard
⑦-Power Button Long press for 3 seconds to turn on or off	⑮-HDMI Port Output HDMI image	
⑧-Microphone Audio can be received while recording	⑯-SIM Card Slot After installation, you can use the traffic network	

## 5.3 Remote controller use

### 5.3.1 Expand

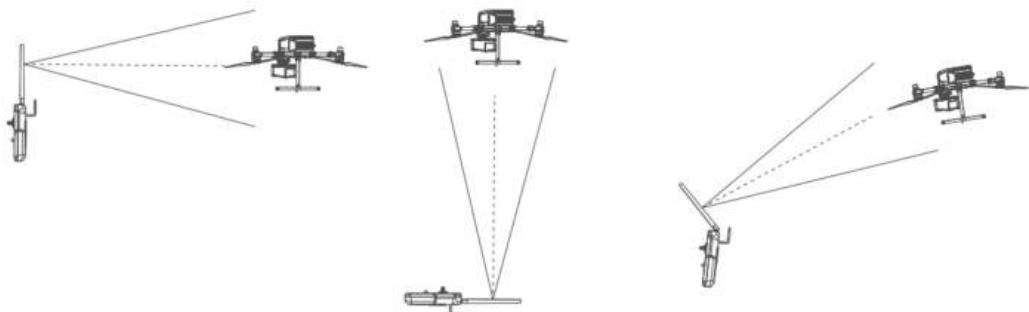
Unfold the remote control antenna and adjust its position. The signal strength varies with different antenna positions.



### 5.3.2 Antenna location

Adjust the direction of the remote controller's external antenna according to the relative position of the remote controller and the aircraft.

Aim the antenna plane towards the direction of the aircraft to achieve the best signal quality between the remote controller and the aircraft.

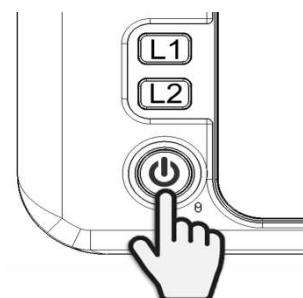


- When the antenna is adjusted to the limit, do not bend it with force to avoid damaging the antenna. If the remote control antenna is damaged, it will affect the performance and safety of use. Please contact CHCNAV after-sales technical support in time.
- Do not use other communication devices on the same frequency band simultaneously, as it may interfere with the remote control signal.
- During actual operation, the SmartGo App will notify you when the image transmission signal is weak. Please adjust the antenna position according to the prompt to ensure the aircraft remains within the optimal communication range.
- The communication distance of the remote control antenna is about 20km (without interference or obstruction). If the flight distance is longer than this, the signal may be disconnected. Please pay attention to flight safety.

### 5.3.3 Power on and off

Turn on the remote control: When the remote control is off, press and hold the power button for 3 seconds to turn on the remote control.

Turn off the remote control: When the remote control is turned on, press and hold the power button for 3 seconds, then click Shutdown to turn off the remote control.

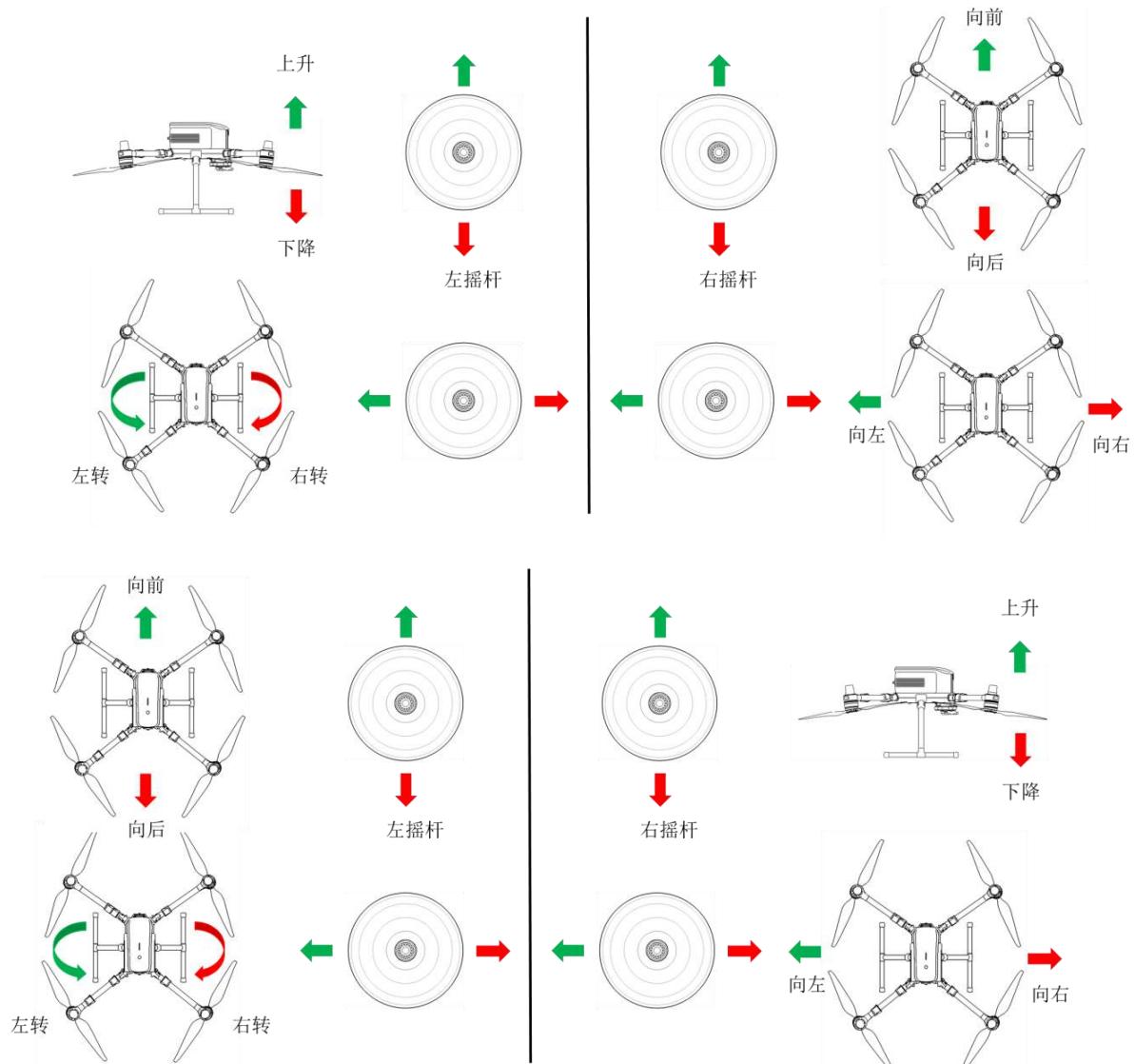


### 5.3.4 Joystick Mode

Before using the remote controller to control the aircraft, please confirm the current joystick mode. The joystick modes are divided into American hand and Japanese hand.

After the aircraft is powered on, the remote controller and aircraft data link communication are automatically connected.

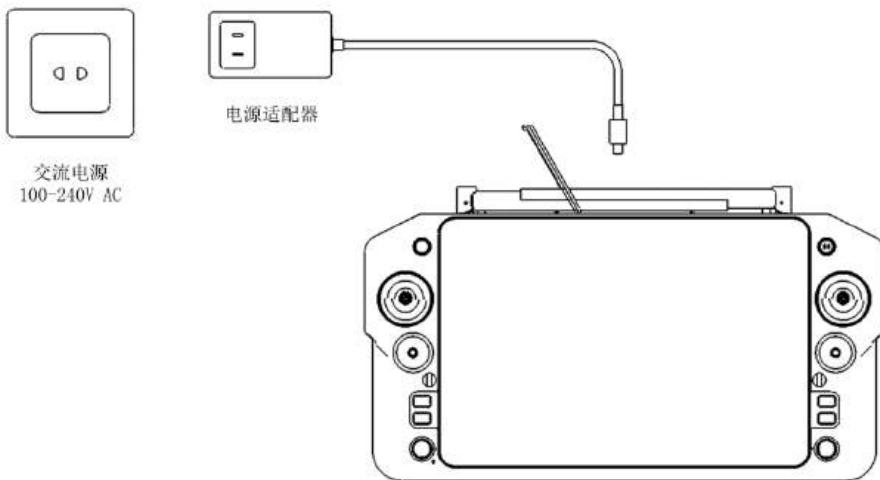
Enter the SmartGo ground station and switch the remote controller's joystick mode in the joystick settings interface.



- The factory default setting of the remote control is US hands.
- Before taking off, please confirm the current joystick mode.

### 5.3.5 Charge

Using the standard USB charger, it takes about 3 hours to fully charge.

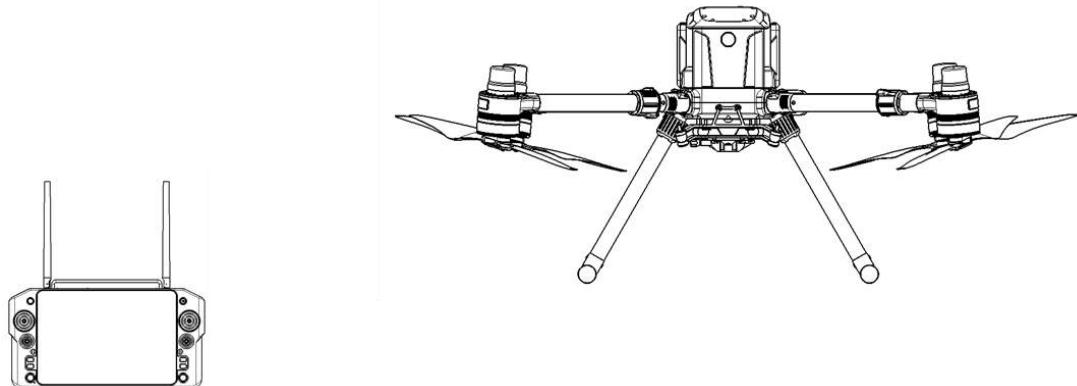


- Please use the standard charger to charge the remote control. If you do not use the standard charger, it is recommended to use a USB charger that complies with FCC/CE standards and has a specification of 9V/4A.
- To keep the remote control battery in optimal condition, make sure to fully charge it every 3 months.

### 5.4 Remote control communication range

When remotely controlling the aircraft, the direction and distance between the remote controller and the aircraft should be adjusted in a timely manner to ensure that the aircraft is always within the optimal communication range.

To obtain the best communication range, the corresponding positions of the remote controller and the aircraft are shown in the figure; and the antenna is facing the aircraft, so that the signal quality between the remote controller and the aircraft can reach the best state.



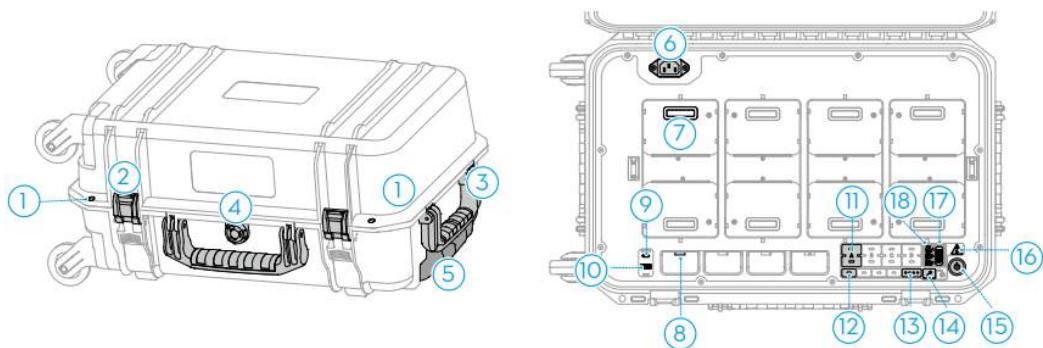
- Do not use other communication devices in the same frequency band to avoid interference with the remote control signal.
- In actual operation, the SmartGo App will prompt you when the image transmission signal is poor. Please adjust the antenna position according to the prompt to ensure that the aircraft is in the best communication range.

## 6 BS10 Intelligent Battery Station

This chapter introduces how to use the intelligent battery station.

### 6.1 Introduction

The intelligent battery station features fast charging and high efficiency, with six independent output channels. Users can select between three working modes—Standard Mode, Standby Mode, and Storage Mode—via the mode switch to meet different needs. The charging case can simultaneously hold up to six batteries and is equipped with a retractable handle for easy portability. Additionally, it supports outdoor discharging, providing power for devices such as smartphones, tablets, and remote controllers.



1. 挂锁孔	7. TB65 电池接口	13. WB37 电量指示灯
2. 锁扣	8. WB37 电池接口	14. USB-C 维护接口
3. 提手	9. USB-C 充电接口	15. 电源按键
4. 压力均衡阀	10. USB-A 充电接口	16. 电池箱指示灯
5. 可伸缩拉杆	11. TB65 电池指示灯	17. 充电模式切换开关
6. 交流电源接口	12. WB37 电池指示灯	18. 充电模式指示灯

## DJI's picture needs to be changed

①-Lock hole	⑥-AC power input	⑪-Charging mode switch
②-Lock catch	⑦-B10 Battery port	⑫-External discharge button
③-Handle	⑧-USB-C charging port	⑬-USB-C upgrade port
④-Pressure balance valve	⑨-USB-A charging port	⑭-Power on/off button and indicator light
⑤-Telescoping handle	⑩-Charging mode indicator light	⑮-B10 battery indicator light

### 6.2 Precautions for use

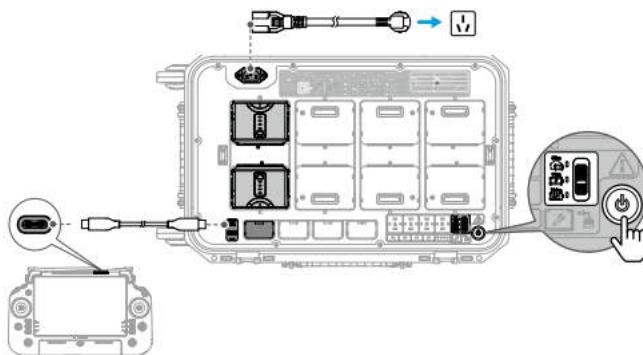
- Keep the box dry and avoid immersing it in water, oil or other liquids.
- Do not close the battery box for charging or discharging, and keep ventilation and heat dissipation.
- The charging box is only suitable for charging the B10 Intelligent Battery, remote controller, and mobile devices. Do not use the charging box to charge other types of batteries.
- Please place the charging box stably during use and pay attention to insulation and fire prevention.
- Do not touch the metal terminals with your hands or other objects. If there is foreign matter attached to the metal terminals, wipe them clean with a dry cloth.
- Be careful not to pinch your hands when opening and closing the charging box and

telescopic handle.

- Please place the battery in the specified direction.
- If the charging box is transported by air for a long time or the ambient air pressure changes, the air pressure inside the charging box may change. At this time, the pressure equalization valve will automatically adjust to balance the air pressure inside and outside the box without manual adjustment.
- Please use a dust remover to remove sand and dust from the charging box.

## 6.3 Use

### 6.3.1 Charge



## DJI's picture needs to be changed

- Connect the power supply, press the power switch, and the green LED light on the power switch is always on. The charging box communicates with each battery in turn to obtain the power of each battery, saves it, and then starts charging according to the following logic.
- Each time the battery is charged, it can charge a group of batteries (2 pieces) at the same time. The charging strategy is to charge the group of batteries with the highest power first.
- During the charging process, the corresponding battery charging indicator light flashes green slowly, and the other waiting battery charging indicators light up yellow. After charging is completed, the corresponding battery charging indicator light turns green.
- During the charging process, it is detected that there is no battery in the corresponding slot, no voltage output is performed, and the charging indicator light of the empty slot is off.
- Communicate with the battery before charging, and do not charge when the battery power is greater than 95%.

- There are three modes when charging: storage mode, standby mode and standard mode.

**Standard Mode** charges each group of batteries to 100% in sequence, fully meeting daily operational needs.

**Storage Mode** charges each group of batteries to 50% in sequence when the batteries are not in use, maintaining that 50% charge afterwards to effectively maintain battery life and performance.

**Standby Mode** quickly charges each group of batteries to 90% in sequence during emergencies or when continuous high-frequency operations are needed, providing charging support for urgent tasks at any time.

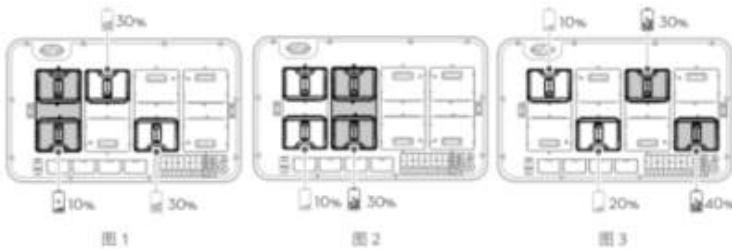
### 6.3.2 Group charging strategy

Using batteries in pairs helps to extend their service life. After the batteries are inserted into the battery box, the A/B/C upper and lower batteries automatically form a pair and the charging sequence is as follows:

When there are matched and non-matched batteries, the matched batteries are charged first. (Figure 1)

When there are multiple groups of batteries, the group with the highest power will be charged first. (Figure 2)

When the inserted batteries are not paired, the two batteries with the highest power will be charged first. (Figure 3)



**DJI's picture needs to be changed**

## 6.4 Indicator Lights

LED Indicator	describe
<b>Power button indicator light</b>	
Green light steady on	Power on
Green light flashing	Intelligent battery is being upgraded
Red light flashing	Intelligent battery failure
<b>Charging case status indicator</b>	
Green light flashing	Charging
Green light steady on	Charging complete
Yellow light flashing	Battery heating/Battery cooling
Yellow light steady on	Waiting for charging
Red light flashing	Communication abnormal
Red light steady on	Battery failure

## 6.5 Specifications

Model	BS10
Size	586 x 372 x 302 mm(L x W x H) 23.1" x 14.6" x 11.9"
Net weight	Approx. 9.9kg
Compatible stored items	Six B10 intelligent flight batteries
Input voltage	100-120VAC, 50-60Hz 220-240VAC, 50-60Hz
Maximum input power	AC220V~240V,1200W AC100V~120V,750W
Max. input power	1200W
Output power	1000W
Operating temperature	-20° to 40° C (-4° to 104° F)

## 7 B10 Intelligent Battery

This chapter introduces the intelligent battery, including its use, storage and maintenance, etc.

### 7.1 Introduction

The intelligent battery uses high-performance cells and an advanced battery management system to provide efficient performance for the aircraft. The intelligent battery must be charged using a dedicated charger provided by CHCNAV. Before using it for the first time, be sure to fully charge the intelligent battery.

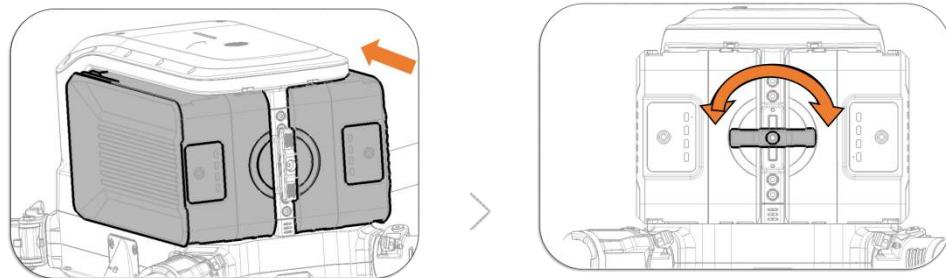
### 7.2 Features

- Power display: The battery has its own power indicator light, which can display the current battery power.
- Short circuit protection: When a short circuit is detected in the battery, the output will be automatically cut off to protect the battery.
- Balance protection function: automatically balance the internal cell voltage of the battery to protect the battery. The battery has static balance and charge balance functions.
- Overcharge protection: Overcharging will seriously damage the battery, and charging will stop when the battery is fully charged.
- Charging temperature protection: Charging when the battery temperature is below 8° C or above 46° C will damage the battery. The battery will not start charging at this temperature.
- Charging overcurrent protection: High current charging will seriously damage the battery. When the charging current is too large, the battery will stop charging.
- Over-discharge protection: Over-discharge can seriously damage the battery. When the battery is not in flight, the battery cell will be cut off when it is discharged to 3.1V; when the battery is in flight, the over-discharge protection will not be activated to ensure flight safety. When the battery is in flight discharge, in order to maximize the flight time and allow the operator to have more time to land, the battery will turn off the over-discharge protection to allow the battery to continue to output. Once this happens, it is likely that the cell voltage will be lower than 2.5V due to over-discharge. Recharging an over-discharged battery has a fire safety hazard. Therefore, when the voltage of a single cell is lower than 2.5V, the battery will be locked and recharging is prohibited. The battery cannot be used any more. Therefore, please note that users should not intentionally over-discharge the battery, otherwise they will bear the risk of battery damage. When the battery is over-discharged and locked, short press the battery button and the four-grid power indicator light will flash red quickly.
- Sleep protection: When the battery is not in flight mode, it will enter sleep mode to

preserve power.

- Waterproof and dustproof function: After being correctly installed on the aircraft, it meets the IP55 protection level.

### 7.3 Install the battery



### 7.4 Pairing

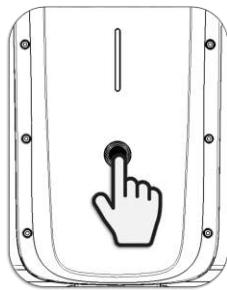
Before use, please mark the two batteries. Make sure to charge/discharge the two batteries at the same time to obtain the best power supply performance, otherwise it may affect the battery life and flight performance. If the number of cycles of the two batteries is greater than 40 times or the power difference is 13%, the App will pop up a prompt after installing them in the aircraft and turning on the aircraft. At this time, it is recommended to replace them with batteries with similar performance before use.

### 7.5 Power on/off

The battery must be installed in the aircraft to turn the power on and off.

Turn on the power: When the power is off, first short press the aircraft power button once, then long press the power button within 3 seconds to turn on the power. When the power is on, the aircraft's power button is always green, and the battery indicator shows the current battery power.

Turn off the power: When the power is on, first short press the aircraft power button once, then long press the power button within 3 seconds to turn off the power. After the power is turned off, the power and battery indicators go out.



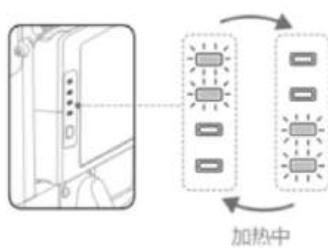
## 7.6 Hot swap battery

When the battery needs to be replaced during flight and landing, you can leave the aircraft powered on and replace it with a fully charged battery first and wait for 3 seconds to confirm that the battery level display is normal before replacing it with another battery.

## 7.7 Heat battery

After the battery is installed in the aircraft and the power is turned on, if the temperature of the Intelligent Flight Battery is below 11° C, the battery will automatically start heating to keep the battery temperature above 15° C at a rate of 5° C per minute.

When the battery is in heating state, the battery power indicator light flashes as shown in the figure.



**We are in the middle two squares, flashing red lights**

## 7.8 Precautions for low temperature use

- After booting up, When the temperature is below 11 degrees, the heating will be automatically turned on to keep the battery temperature within the appropriate range.
- When charging, stop charging if the temperature is below 8° C and turn on heating at the same time. Stop heating when the temperature reaches 15° C and then continue charging.
- If the charger is unplugged during heating, the heating will be turned off after a delay of 3

seconds.

- In extremely cold conditions, even if heating measures are taken in time, the battery temperature may not reach a usable temperature. Please increase insulation measures.
- If the temperature is higher than 46° C, stop charging.
- Heating is not turned on when the device is turned off or in sleep mode.
- To maximize battery performance, it is recommended that the battery temperature be kept above 15° C before flight.
- In low temperature environments, the battery preheating time may be longer. It is recommended that users keep the battery warm in advance to shorten the preheating time.

## 7.9 Check battery level

When the power is off, short press the battery power check button once to check the current battery power.



The power indicator light can be used to display the battery power during the battery discharge process. The indicator light is defined as follows.

- Indicates that the LED light is always on during the indication process
- Indicates that the LED light flashes during the indication process
- Indicates that the LED light is off

电量	LED1	LED2	LED3	LED4
0%~15%	●	○	○	○
16%~28%	●	○	○	○
29%~41%	●	●	○	○
42%~54%	●	●	○	○
55%~67%	●	●	●	○
68%~80%	●	●	●	○
81%~94%	●	●	●	●
95%~100%	●	●	●	●

**The following is from DJI, you can refer to the style**

电量指示灯可用于显示电池放电过程中的电池电量，指示灯定义如下。

— 表示 LED 灯在指示过程中常亮

■ 表示 LED 灯在指示过程中有规律地亮

○ 表示 LED 灯熄灭

电量指示灯				
LED1	LED2	LED3	LED4	当前电量
—	—	—	—	88%~100%
—	—	—	■	75%~88%
—	—	—	○	63%~75%
—	—	■	○	50%~63%
—	—	○	○	38%~50%
—	■	○	○	25%~38%
—	○	○	○	13%~25%
■	○	○	○	0%~13%

## 7.10 Battery self-discharge

When the battery power is greater than 65%, it will start self-discharging if it is turned off for more than 72 hours, and the self-discharging will end when the battery power drops to 50%. During the self-discharging period, the four green lights on the battery will flash and the battery will become warm. Press and hold the power switch for 5 seconds to stop the self-discharging.

## 8 SmartGo Ground Control Software

This chapter introduces the interface and functions of the SmartGo App.

### 8.1 SmartGo App Overview

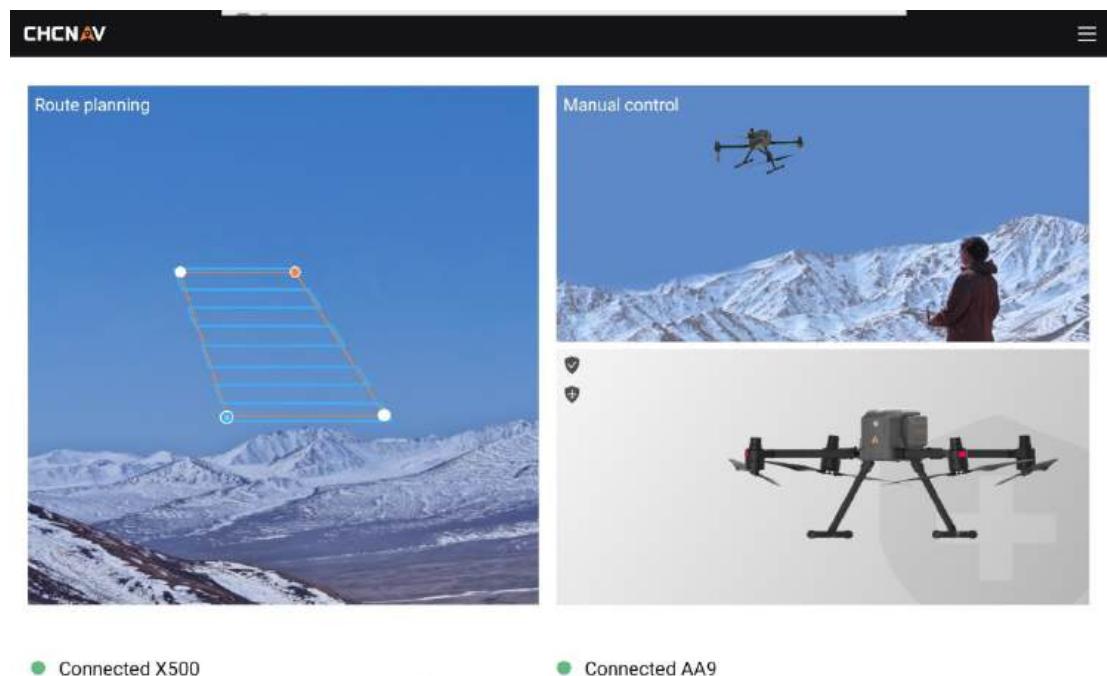
SmartGo is a comprehensive application control software designed specifically for UAV intelligent surveying and mapping industry applications.

It is mainly used for parameter settings of UAVs and payloads. It can realize full 3D display of routes and terrains, and present complex work environments to users more intuitively.

The SmartGo main interface includes three main modules: route planning, manual control, and payload safety diagnosis.



### 8.2 Main Interface



#### ①.Quit button(CHCNAV):

Click "CHCNAV" icon to quit the current interface.

#### ②.Function menu

Includes offline maps, no-fly zone clearance query, settings, payload log export, and video tutorial functions.

#### ③.Route planning

Click to enter the mission project management interface, which includes the functions of

opening, creating, sorting, filtering, searching, copying, deleting, and importing and exporting KML route projects.

④. Manual control

Click to enter the manual flight interface, which displays FPV and current aircraft information.

⑤. Device diagnostics

Click to enter the carrier safety diagnosis, which provides inquiries: flight information, maintenance services, industry worry-free, firmware information, aircraft search, and log management functions.

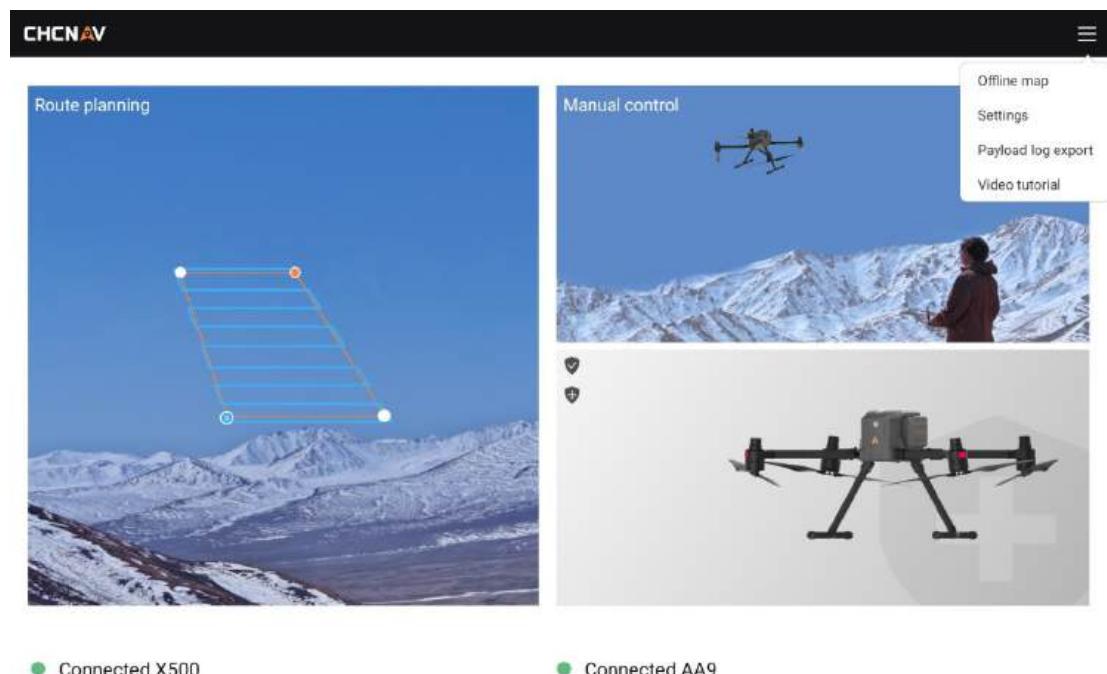
⑥. Drone connection display

Displays the current drone connection status.

⑦. Load connection display

Displays the current load connection status.

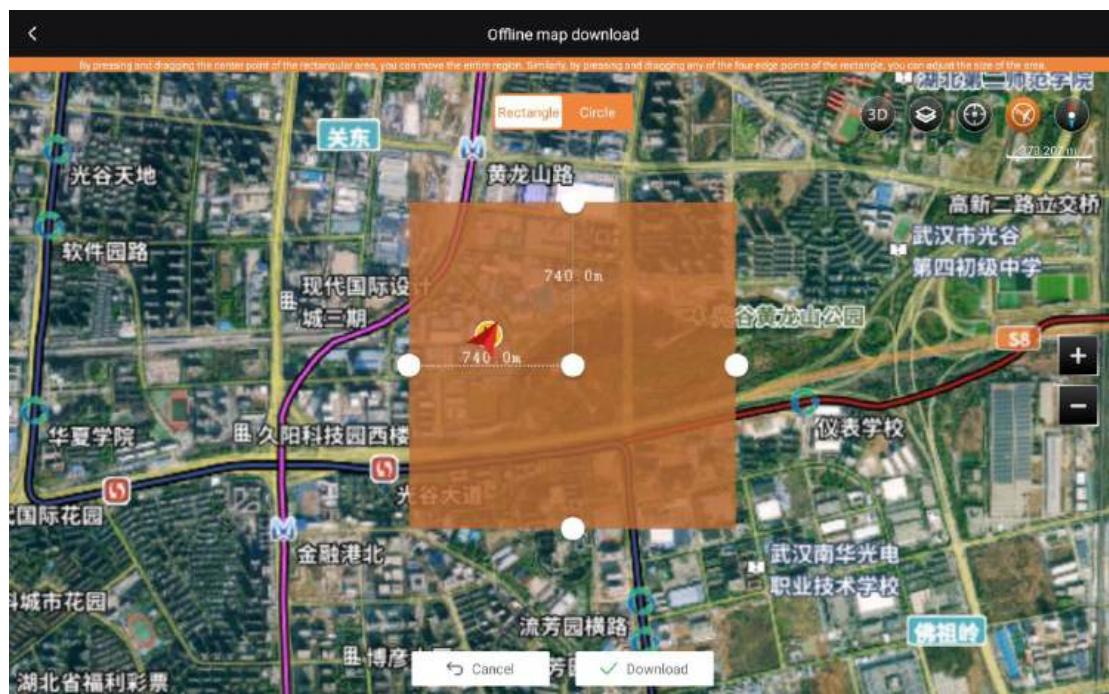
### 8.3 Function Menu

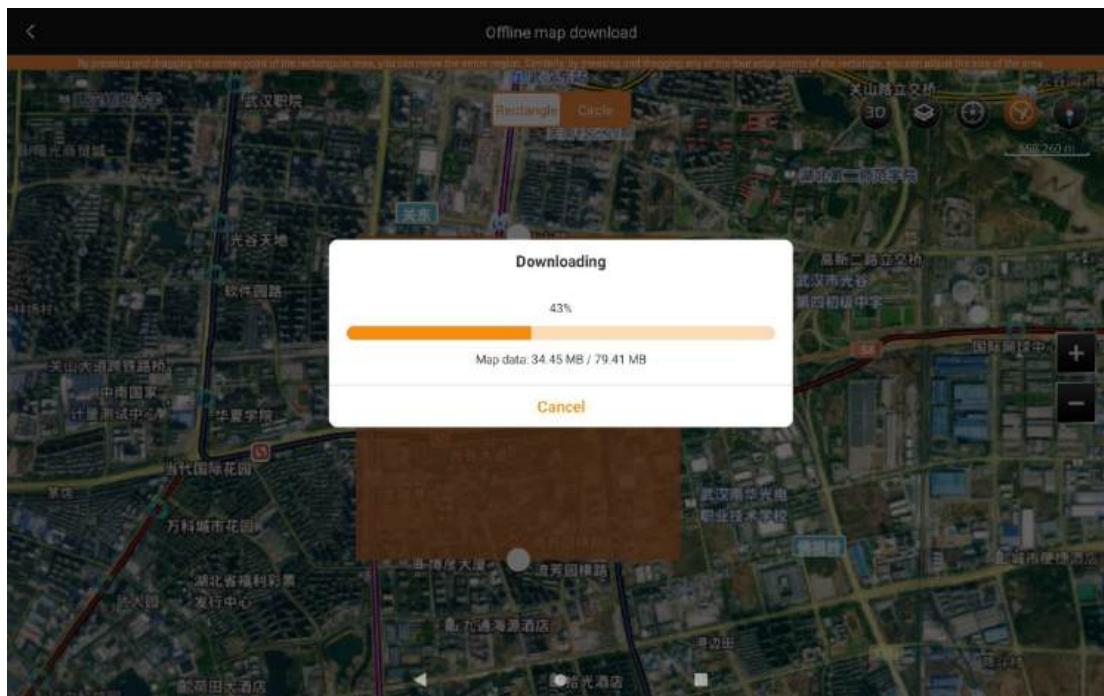
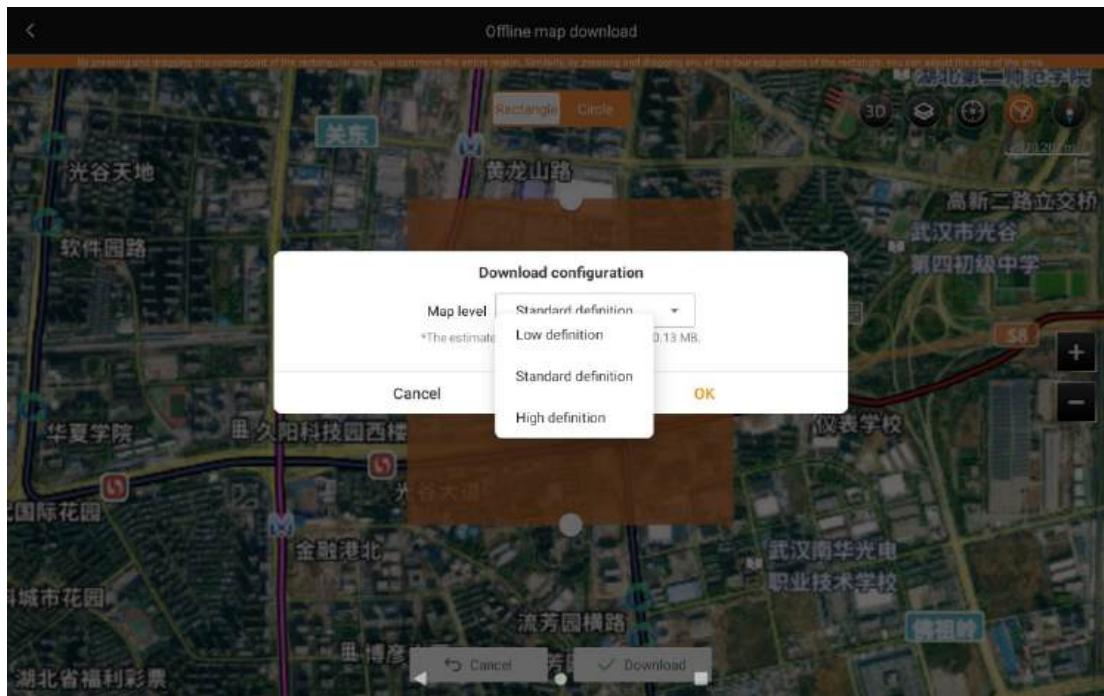


- Offline map
- Settings
- Payload log export
- Video tutorial

### 8.3.1 Offline maps

- After entering the offline map, click on the map to generate a rectangular/circular download area. Users can adjust the area and location by dragging the points.
- Cancel the download during the download process and continue downloading next time.
- If a network anomaly occurs during the download process, the download will continue after the network is restored.
- Download will only download the current map. You can select map source.



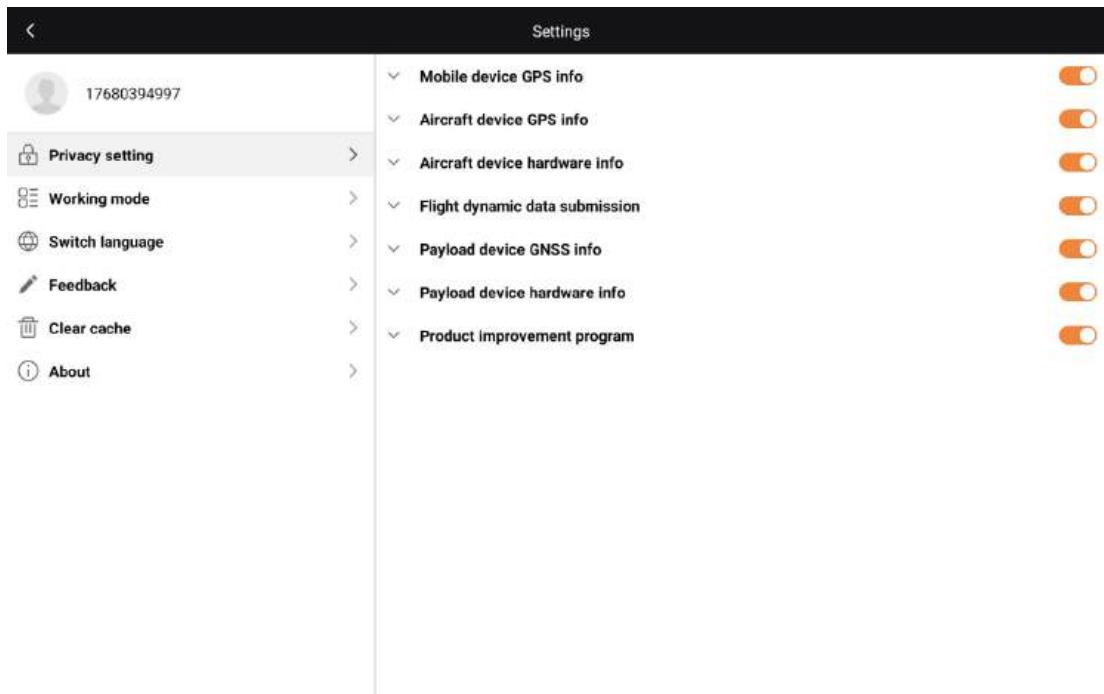


### 8.3.2 Settings interface

#### ■ Privacy Setting

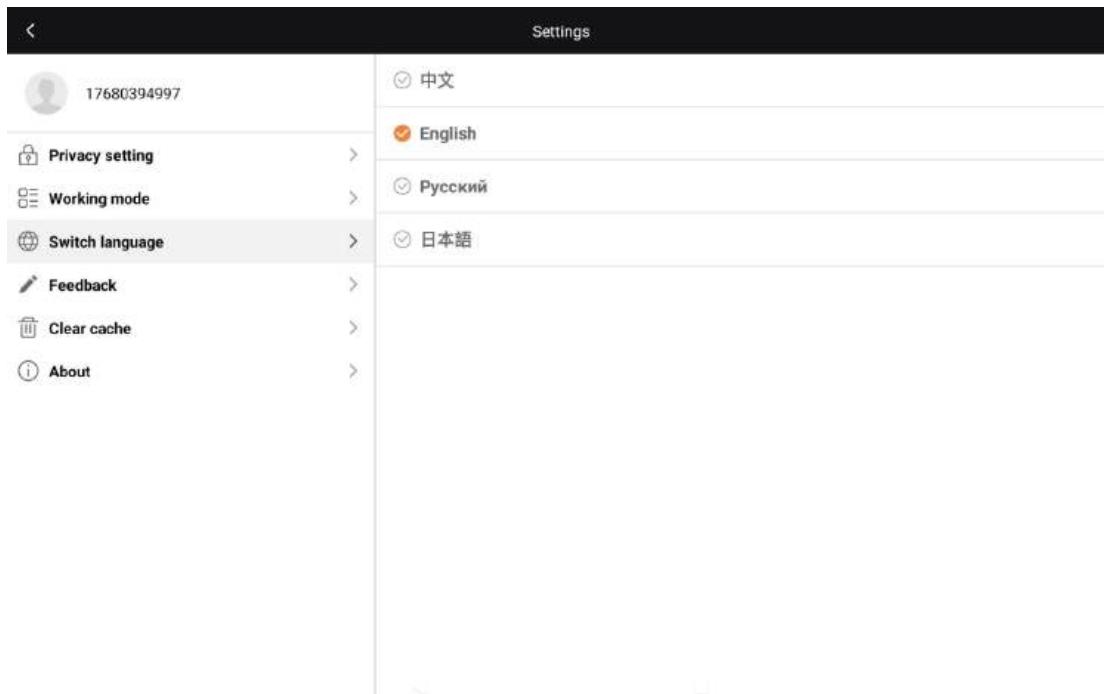
Privacy setting shows all configurations about software, which not allow to turn off.

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



### ■ Switch language

Optional four types language: Chinese, English, Russian and Japanese. After selecting Confirm, the software will automatically restart to complete the language switch.

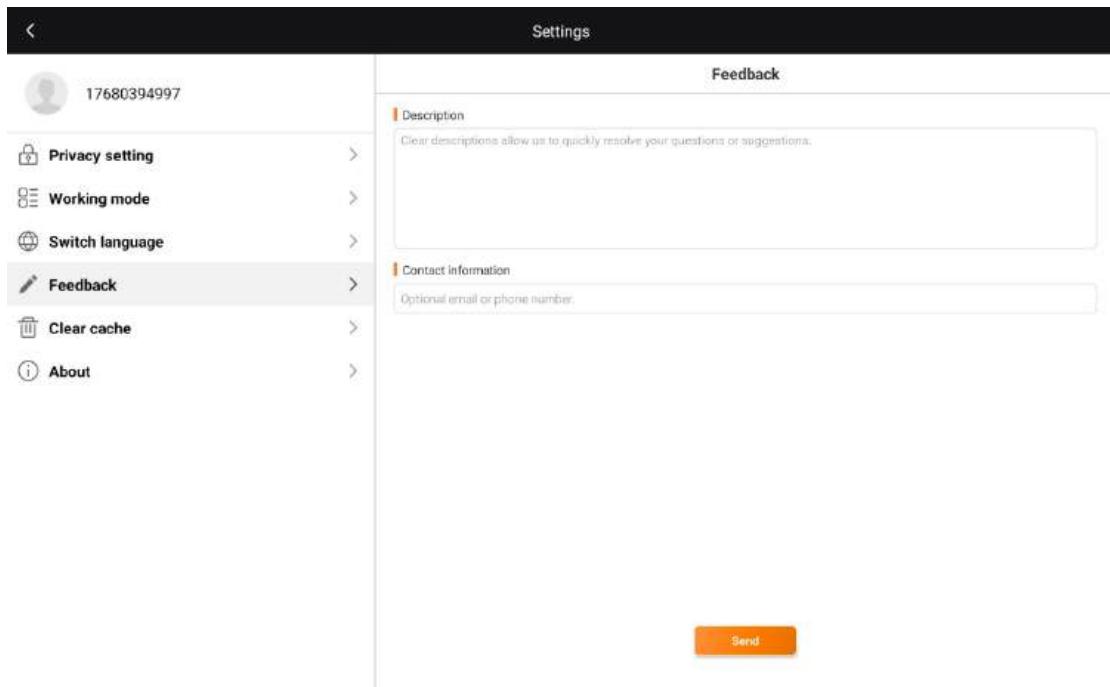


When installing for the first time (or uninstalling and reinstalling), the software language follows the system language.

If the system language is not Chinese, English, Russian or Japanese, the software defaults to English. Changing the system language will not affect the software language.

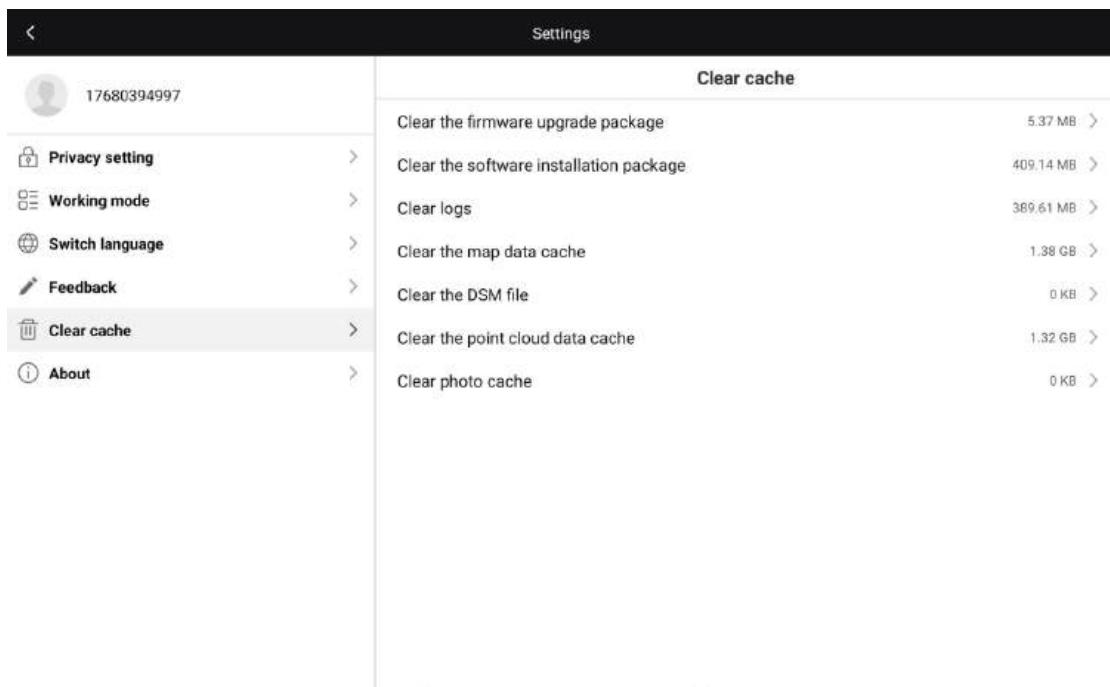
## ■ Feedback

When you find a problem while using the software, you can describe the problem and leave your contact information via feedback.



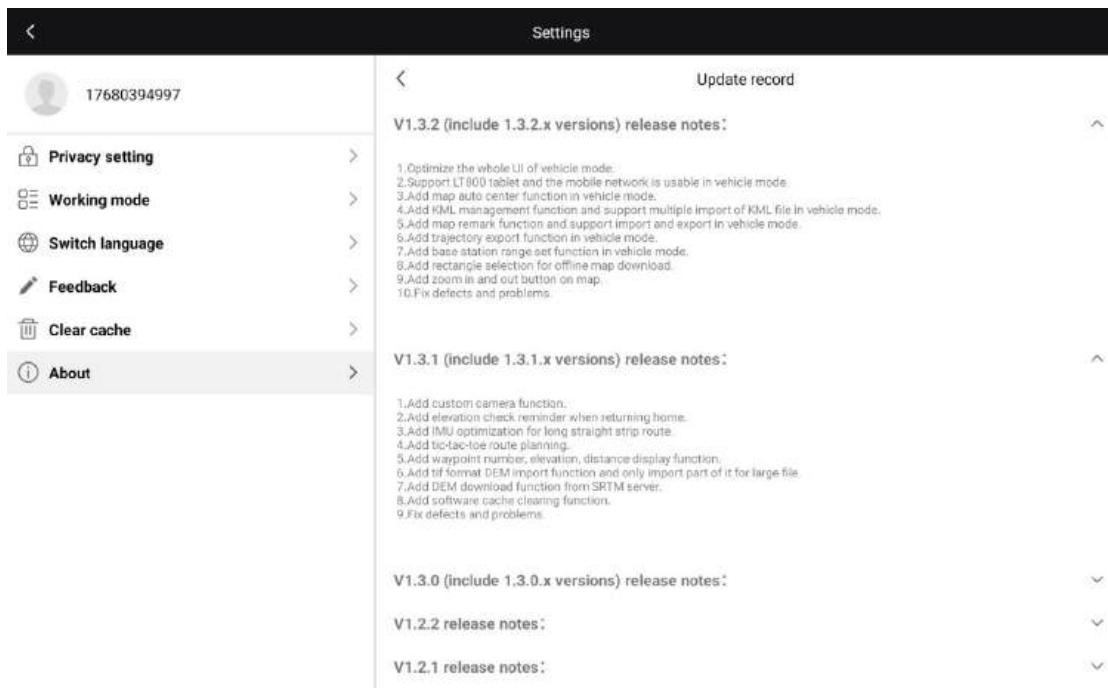
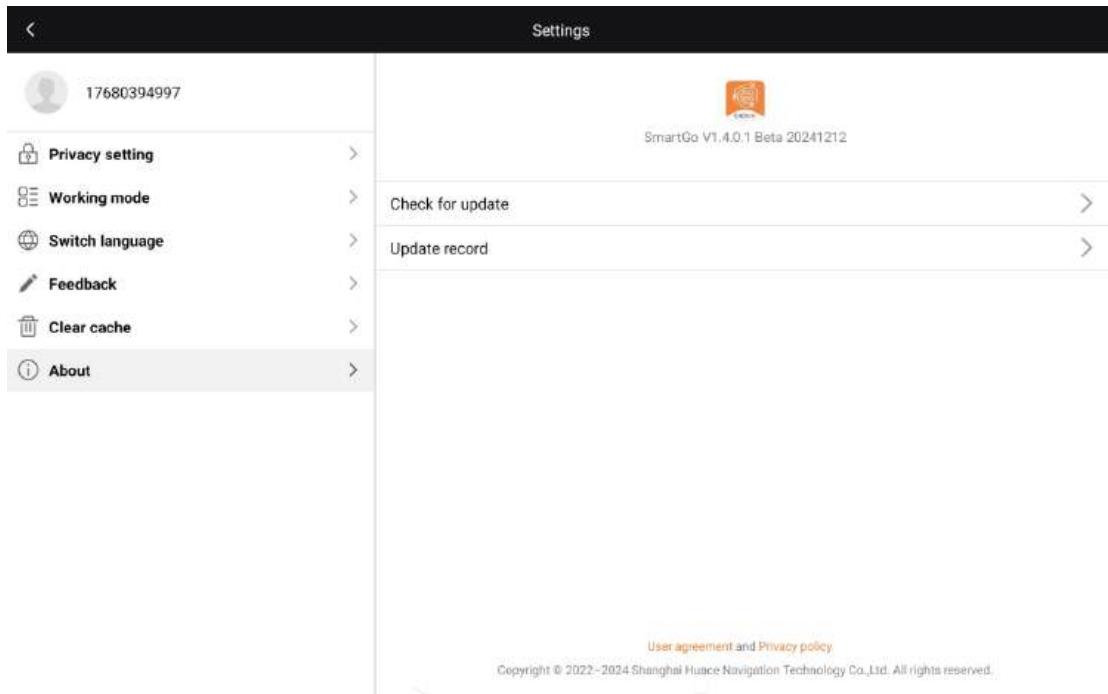
## ■ Clear cache

When the tablet memory space is insufficient, you can clear the cache to free up space.



## ■About

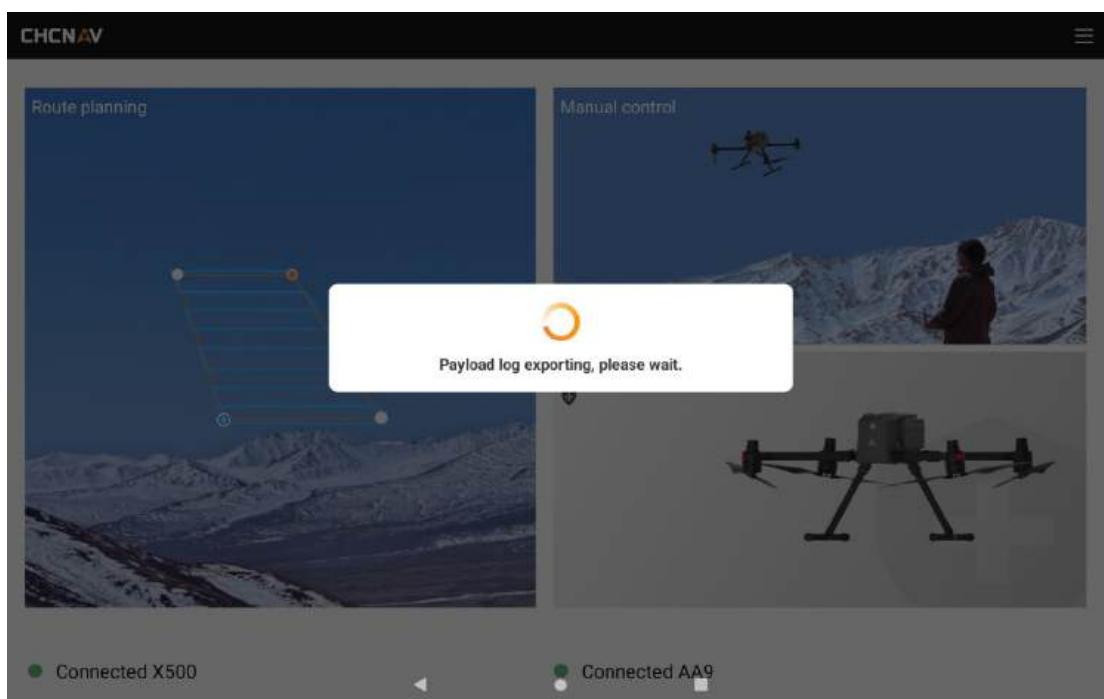
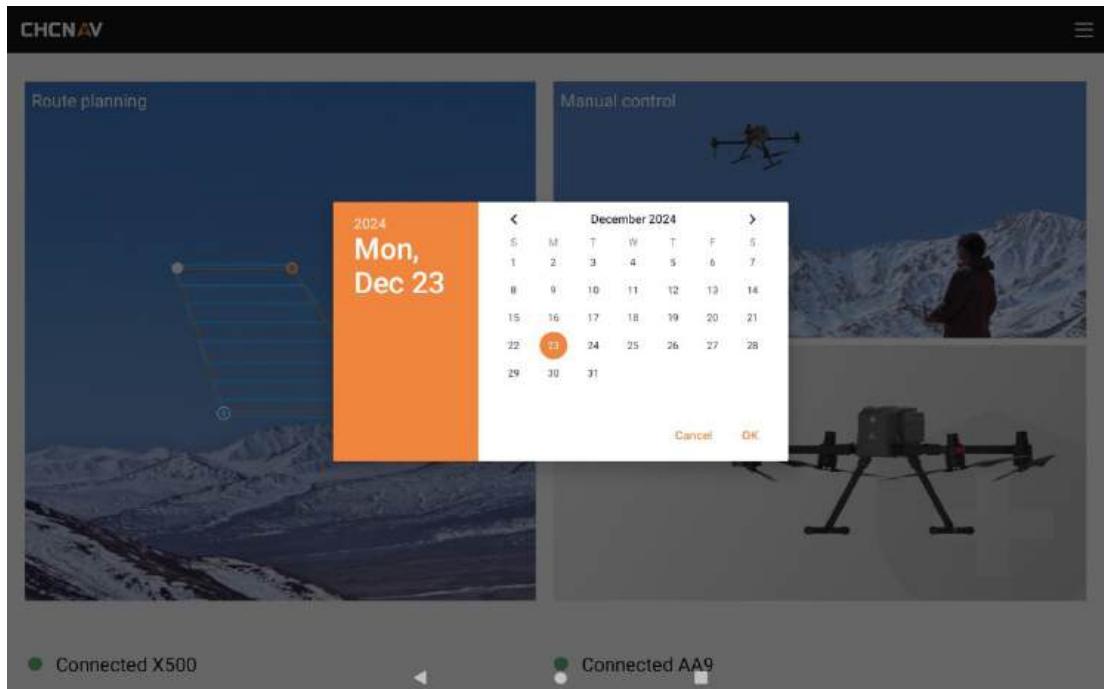
About interface shows current software version, update check, update record, user agreement and privacy policy. User can check latest version via "Check for update".

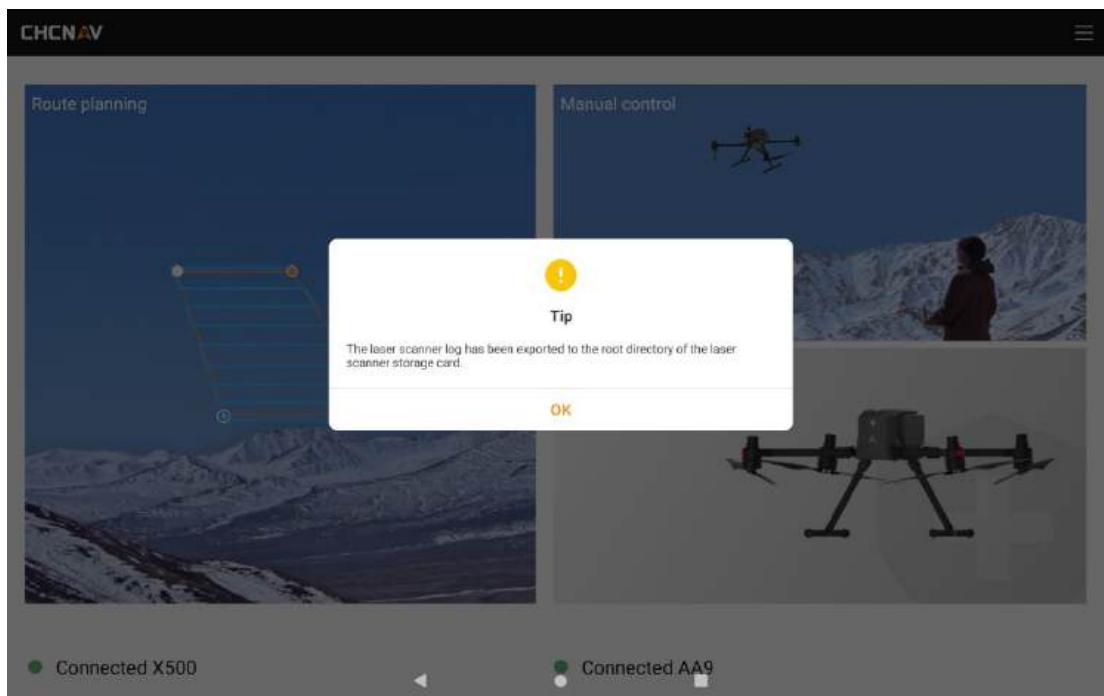


### 8.3.3 Payload log export

When the aircraft is connected to the payload, click "Payload Log Export" and a prompt will

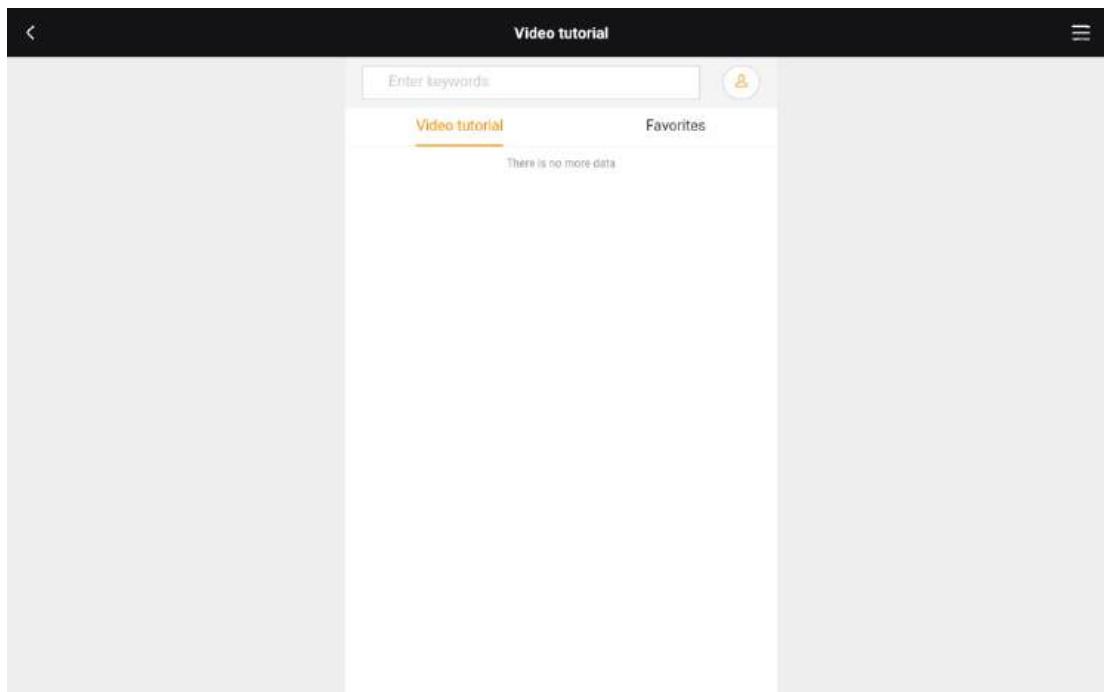
pop up to select the specific date payload log to export. After confirmation, the log will be packaged. After completion, a prompt will pop up saying "The laser scanner log has been exported to the root directory of the laser scanner storage card". At this time, turn off the power, remove the payload storage card and read it. The packaged zip format log can be viewed in the root directory of the storage card.



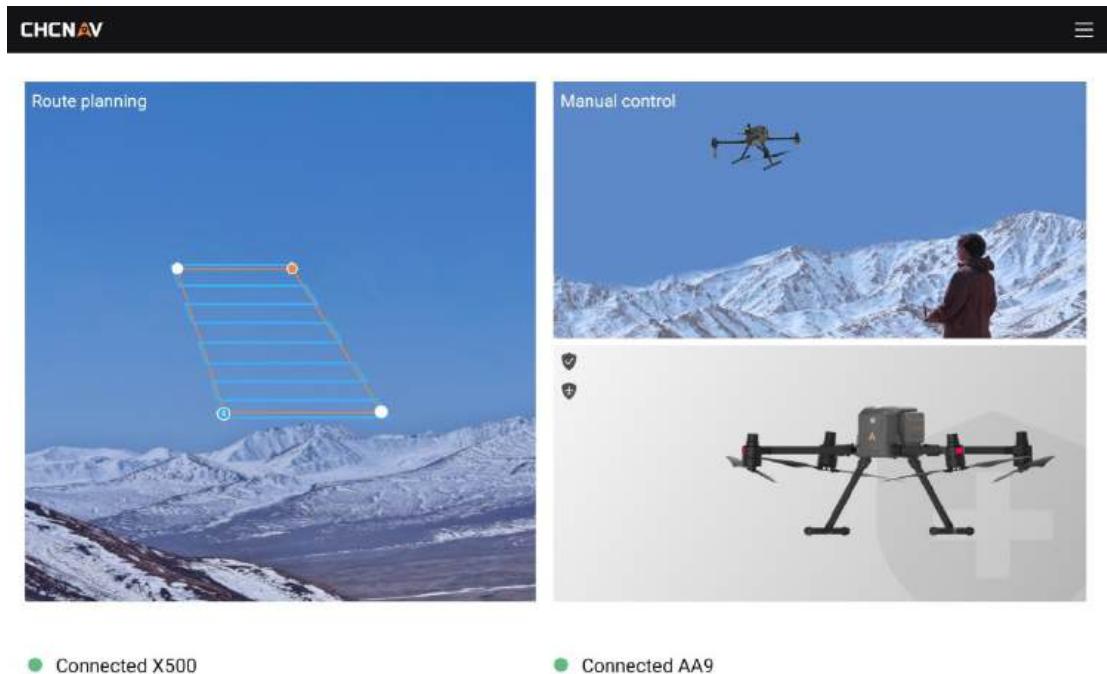


### 8.3.4 Video Tutorial

You can search for video tutorials on related aircraft



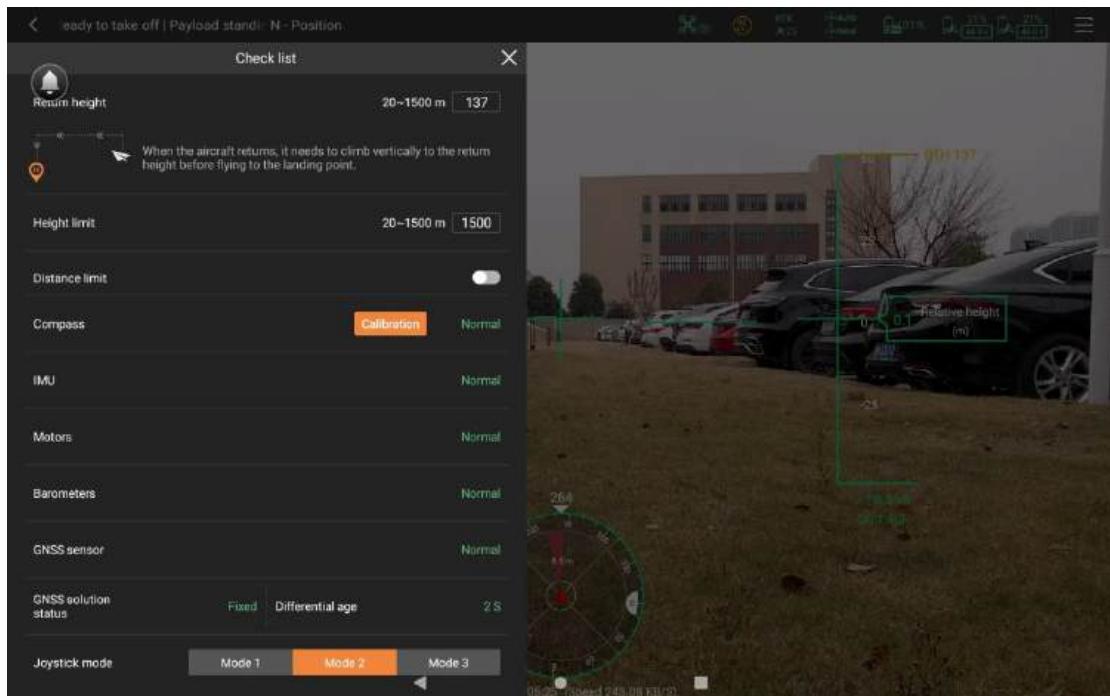
## 8.4 Manual control



### 8.4.1 Checklist

In manual control mode, click the status bar of the aircraft to pop up a checklist, which supports real-time viewing of the drone's sensor status.

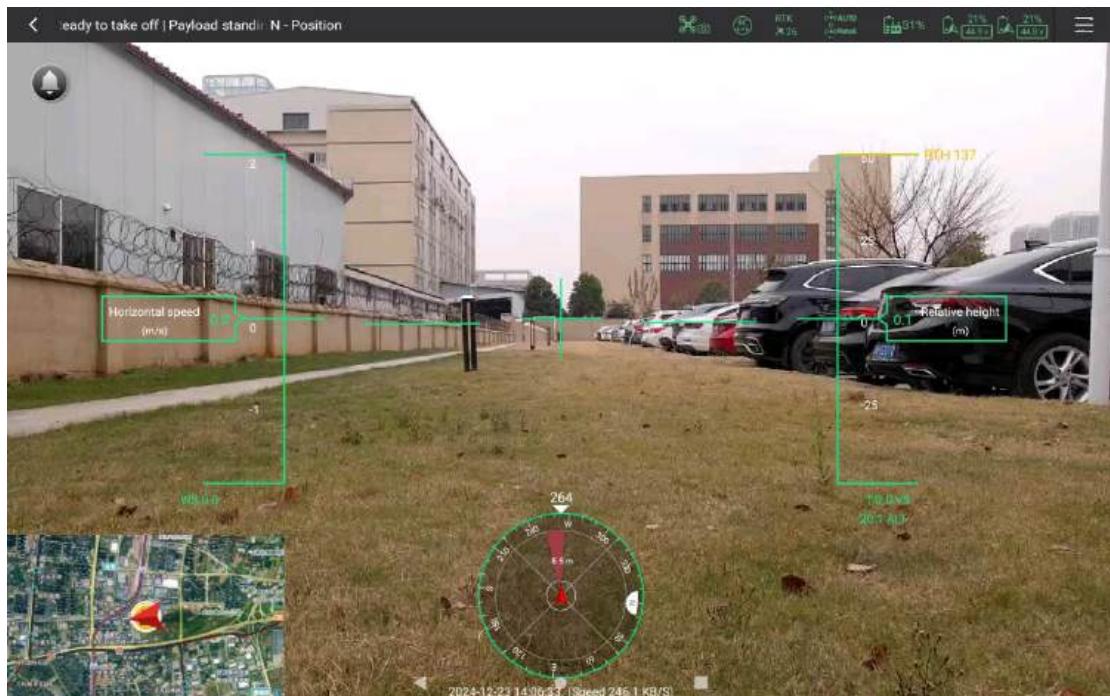
The main check items include: return height, height limit, distance limit, compass, IMU, motors, barometers, GNSS sensor, GNSS solution status and joystick mode.



- Return height: 20-1500m, can be modified in real time.
- Height limit: 20-1500m, can be modified in real time.
- Distance limit: You can set an electronic fence to limit the distance of the aircraft.
- Compass: normal, abnormal (compass needs to be calibrated).
- IMU status: normal, abnormal.
- Motors: normal, abnormal.
- Barometers: normal, abnormal.
- GNSS sensor: normal, abnormal.
- GNSS solution status: fixed, single point.
- Joystick mode: Japanese-style, American-style (joystick mode can be changed).

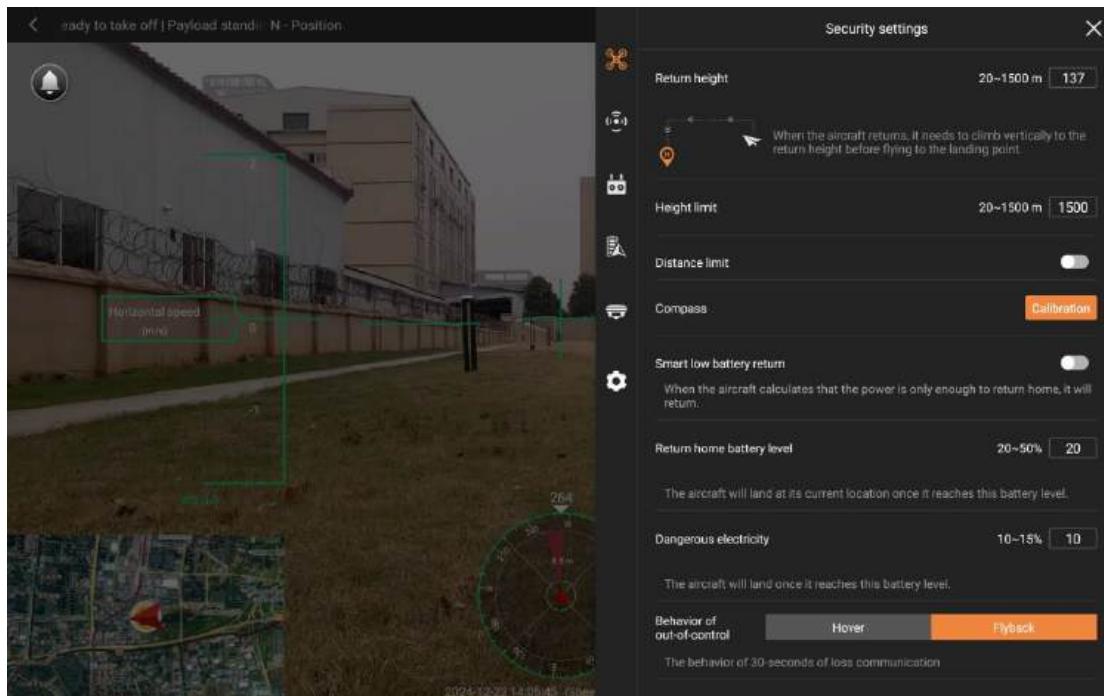
## 8.4.2 Parameter settings

Modify according to actual application needs, including security settings, obstacle avoidance system settings, remote control settings, intelligent battery information check, RTK settings, and more settings.



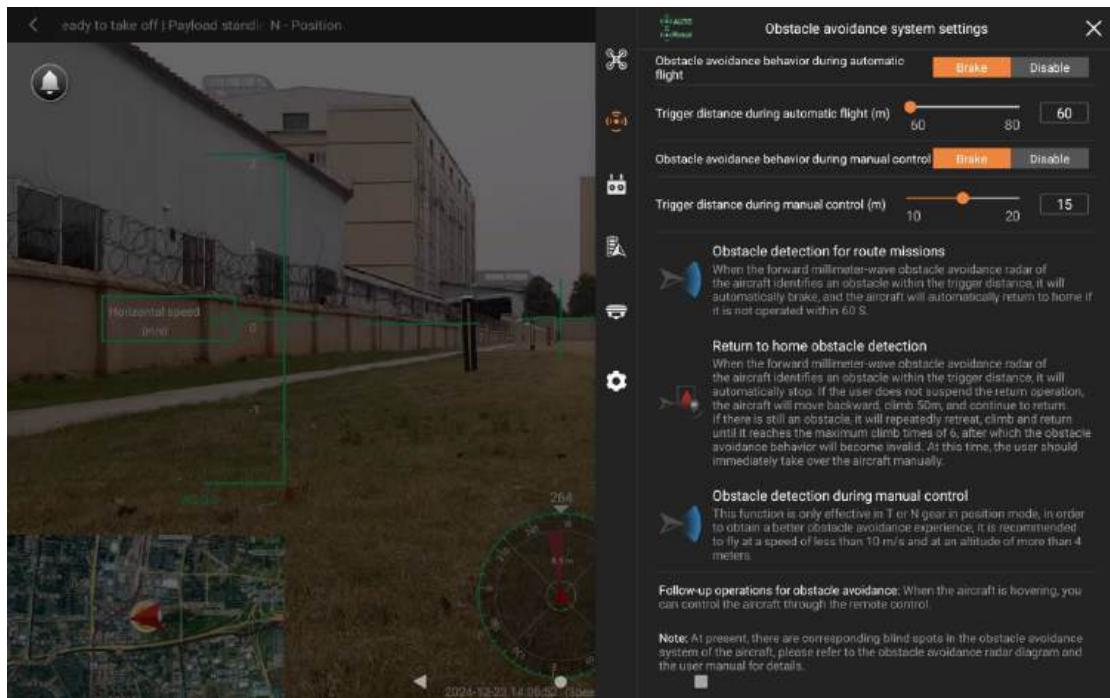
### 8.4.3 Security Settings

- Return height: the altitude when returning (20-1500m). When the mission route altitude is lower than the return altitude, the drone will first rise vertically to the set altitude before returning. If the route altitude is higher than the return altitude, the drone will return at the current altitude of the route.
- Height limit: Limit the flight altitude of the aircraft (20-1500m). The aircraft cannot exceed the restricted altitude.
- Distance limit : You can set the maximum flight distance.
- Compass: When the system prompts compass abnormal, calibration is required.
- Smart low battery return: The system will automatically calculate the remaining battery power and execute the return.
- Behavior of out-of-control: You can set hover/return. When the drone loses connection with the ground station, the set action will be executed.



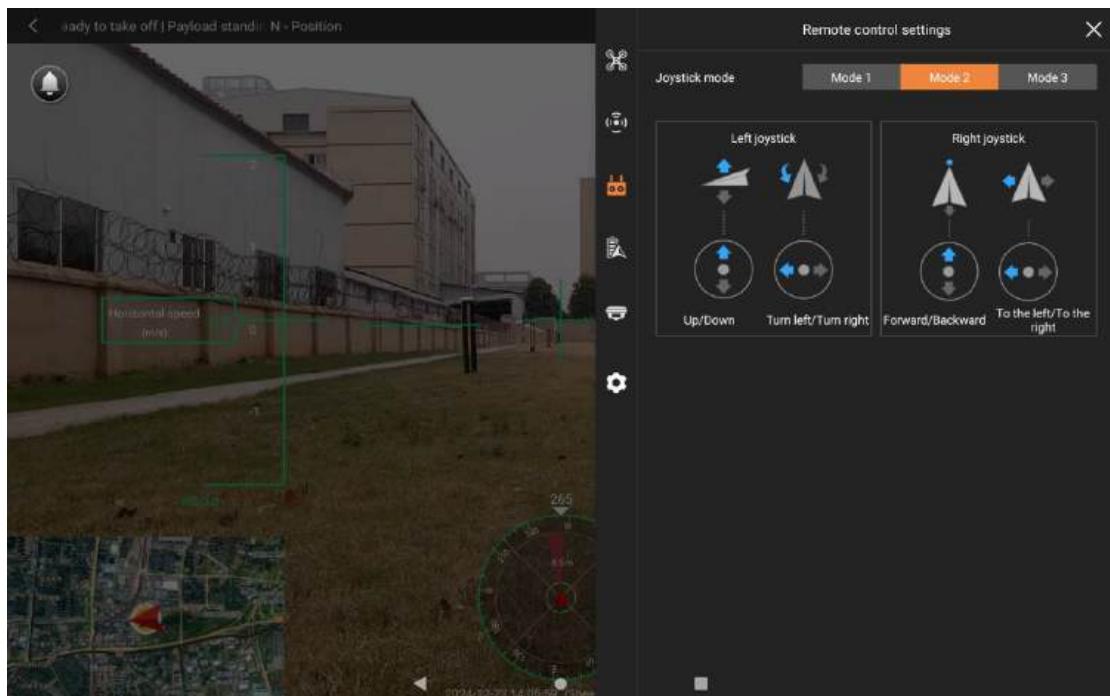
#### 8.4.4 Obstacle avoidance system settings

- The obstacle avoidance system is divided into “Obstacle avoidance behavior during automatic flight” and “Obstacle avoidance behavior during manual control”. The obstacle avoidance behavior can be set to brake or disable.
- Trigger distance during automatic flight (m) can be set within the range of 60 to 80 m. It is recommended to set the distance  $\geq 70$  meters.
- Trigger distance during manual control (m) can be set within the range of 1 to 80 m. It is recommended to set the distance  $\geq 70$  meters.



#### 8.4.5 Remote Control Settings

The joystick mode supports switching between Japanese-style, American-style and Chinese-style.

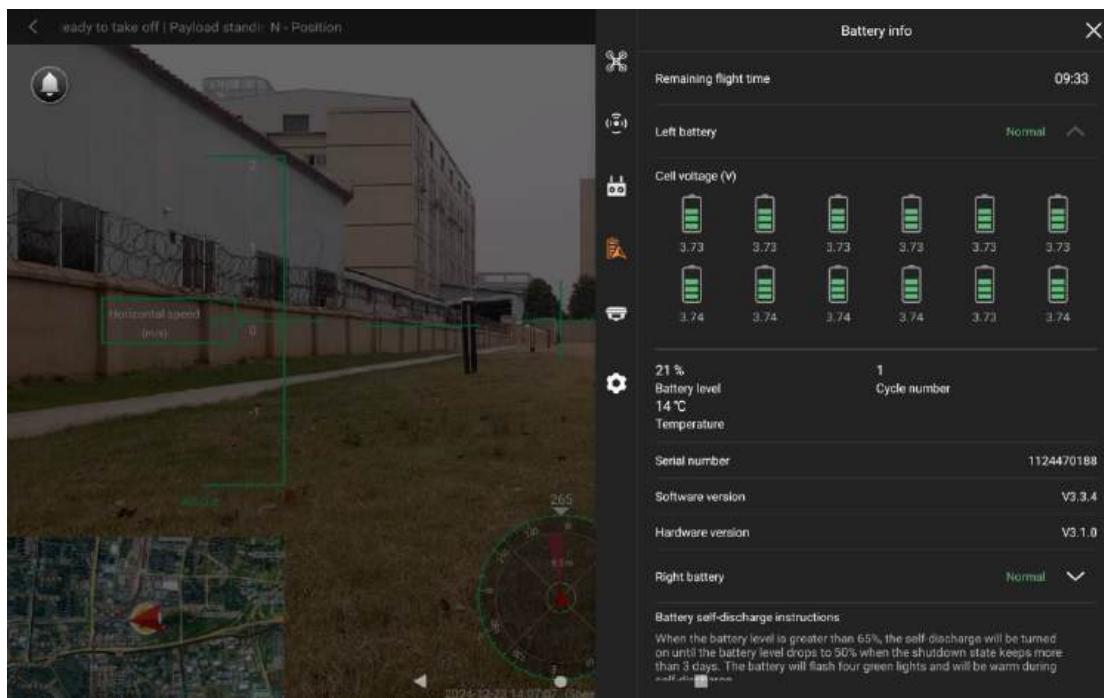


## 8.4.6 Battery Information

You can check the remaining flight time, left and right battery status, and battery self-discharge instructions.

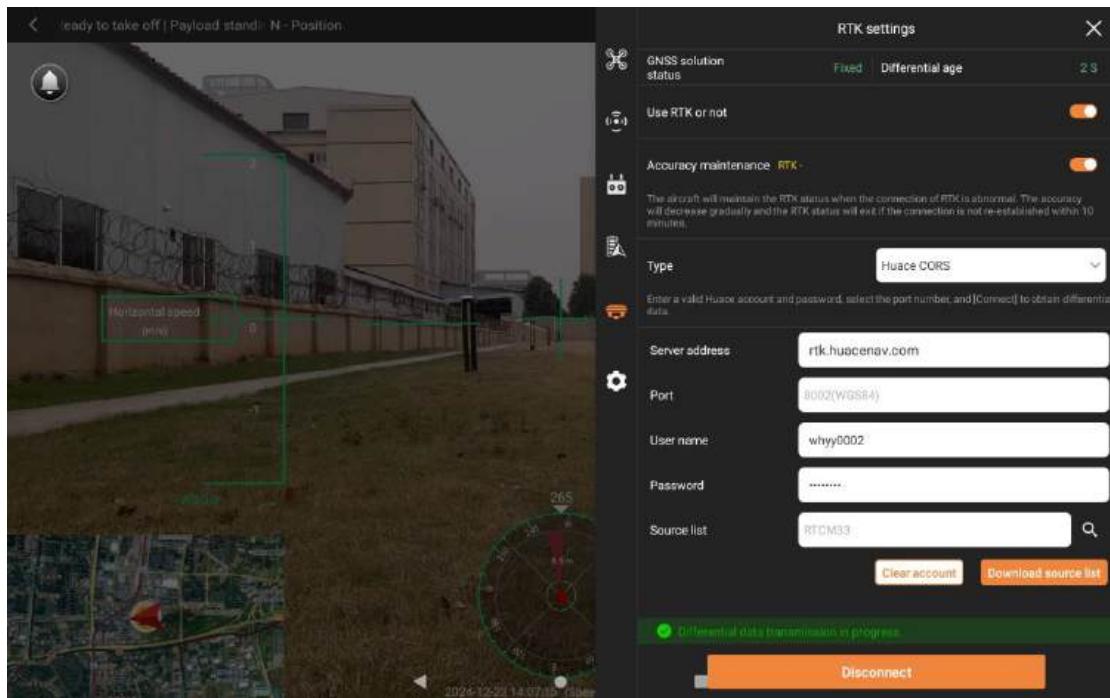
You can check the single cell voltage, battery level, battery temperature and number of cycles.

The battery software version and hardware version are consistent.



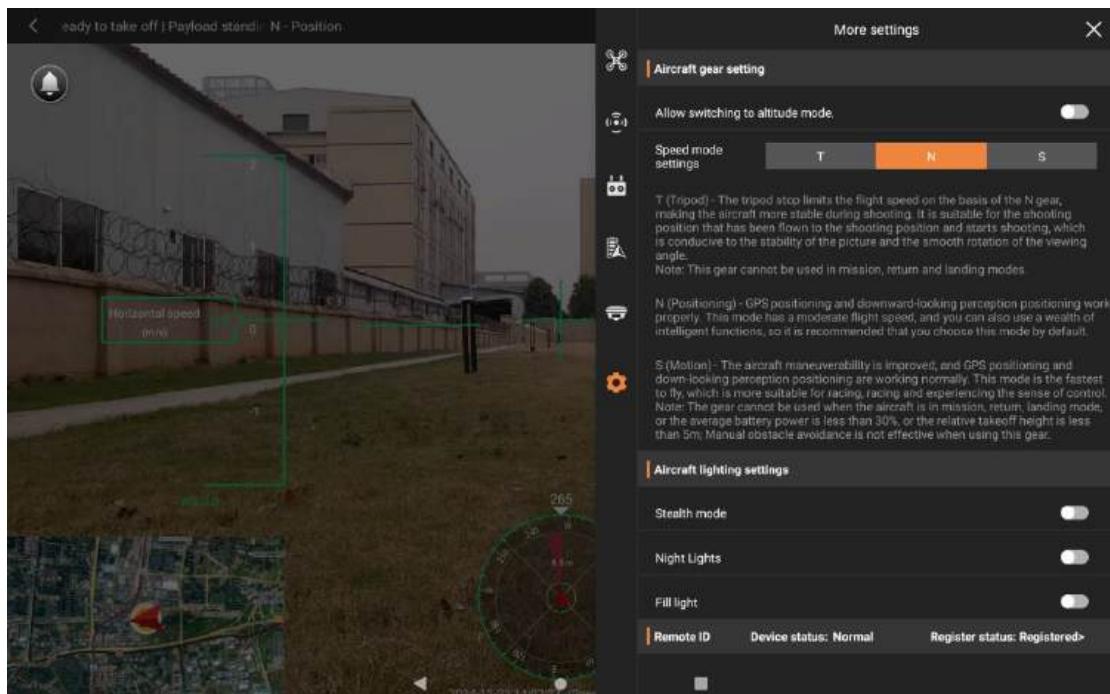
## 8.4.7 RTK Settings

You can check the GNSS solution status and accuracy maintenance settings.



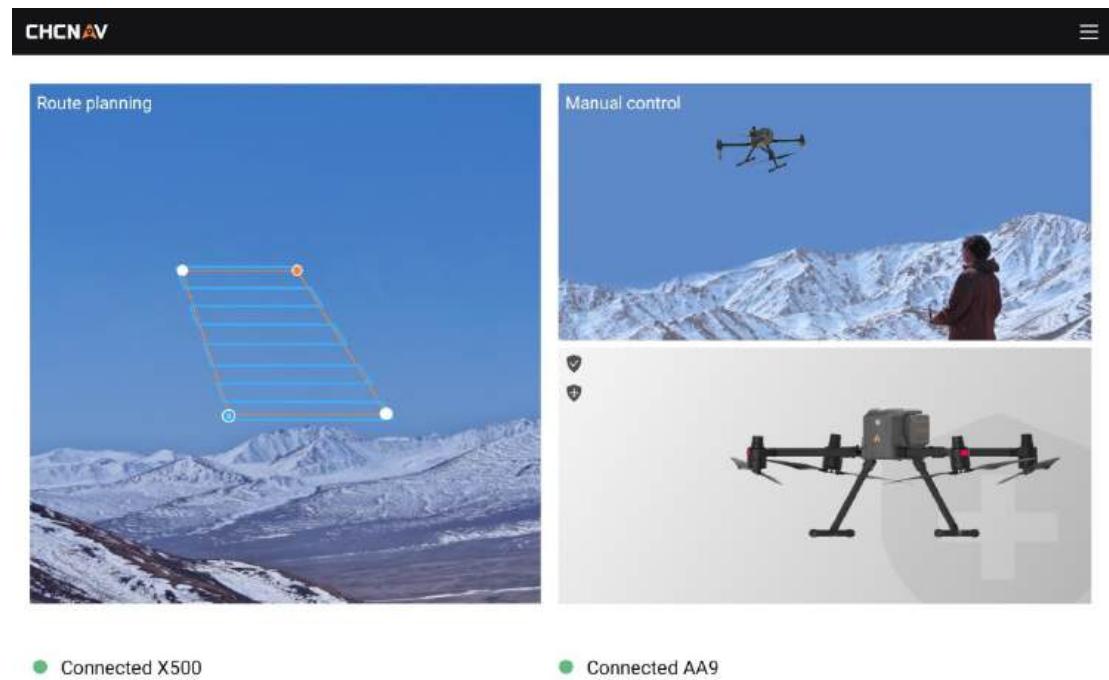
#### 8.4.8 More settings

- Allow switching to altitude fixation mode: After turning it on, click the "A" button on the remote control to switch to altitude fixation mode;
- Speed mode settings: Set the flight gear. X500 provides T, N and S gear switching;
- Aircraft lighting Settings: You can control the aircraft to enter stealth mode (all lights off), turn on or off the navigation lights and auxiliary lights.

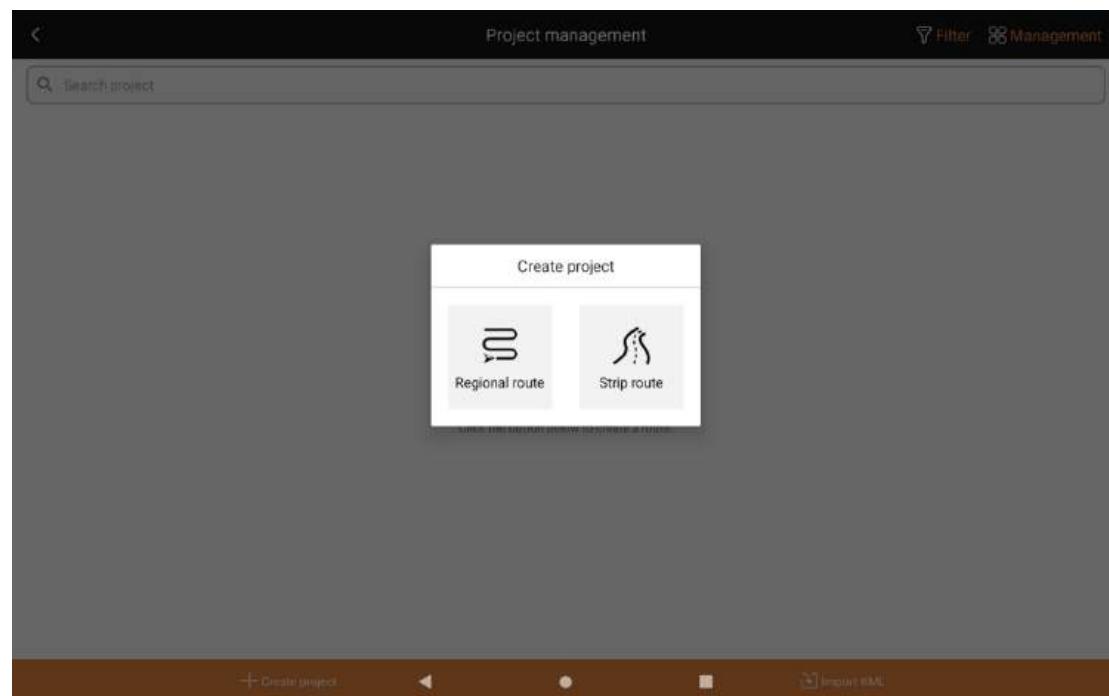


## 8.5 Route Planning

Click on anywhere on the “Route Planning” interface.,enter “Project Management” interface.



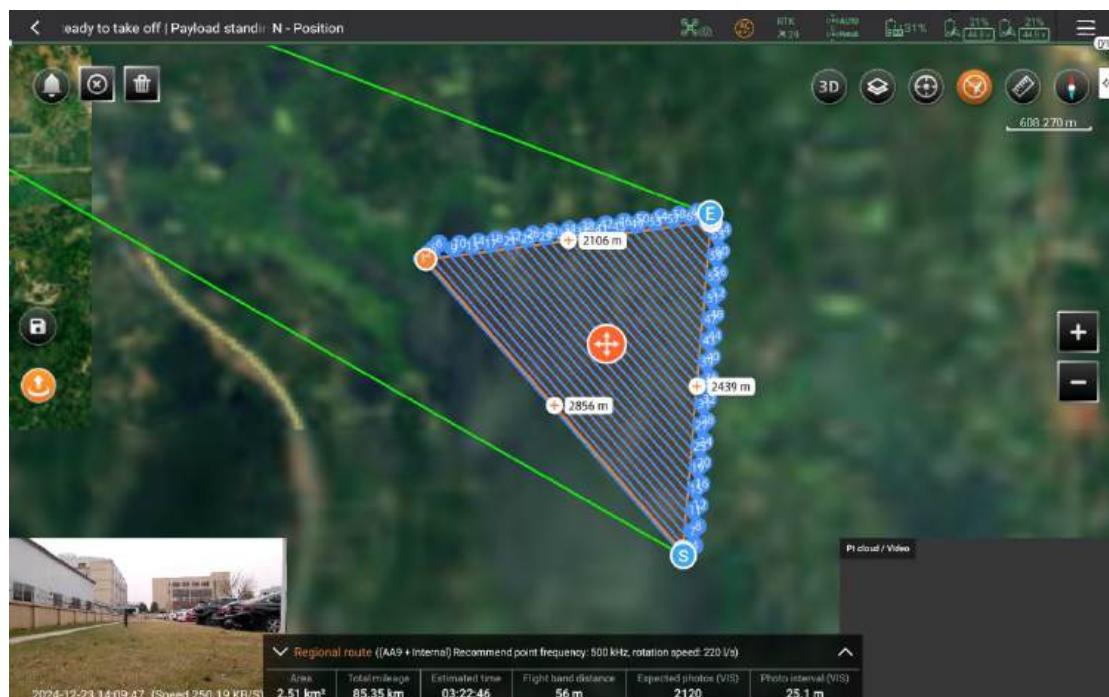
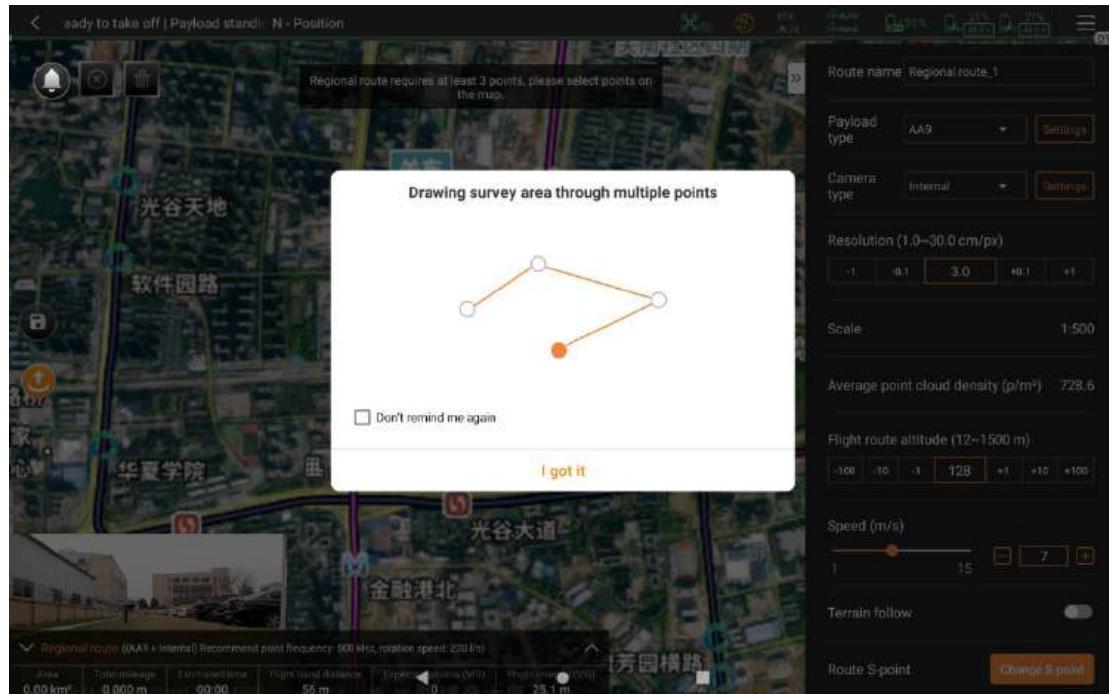
Click “Create Project”, SmartGo support two types of project: regional route and strip route. The software also supports importing both KML and KMZ format files containing multiple vector lines and polygon to automatically create routes.



## 8.5.1 Regional route

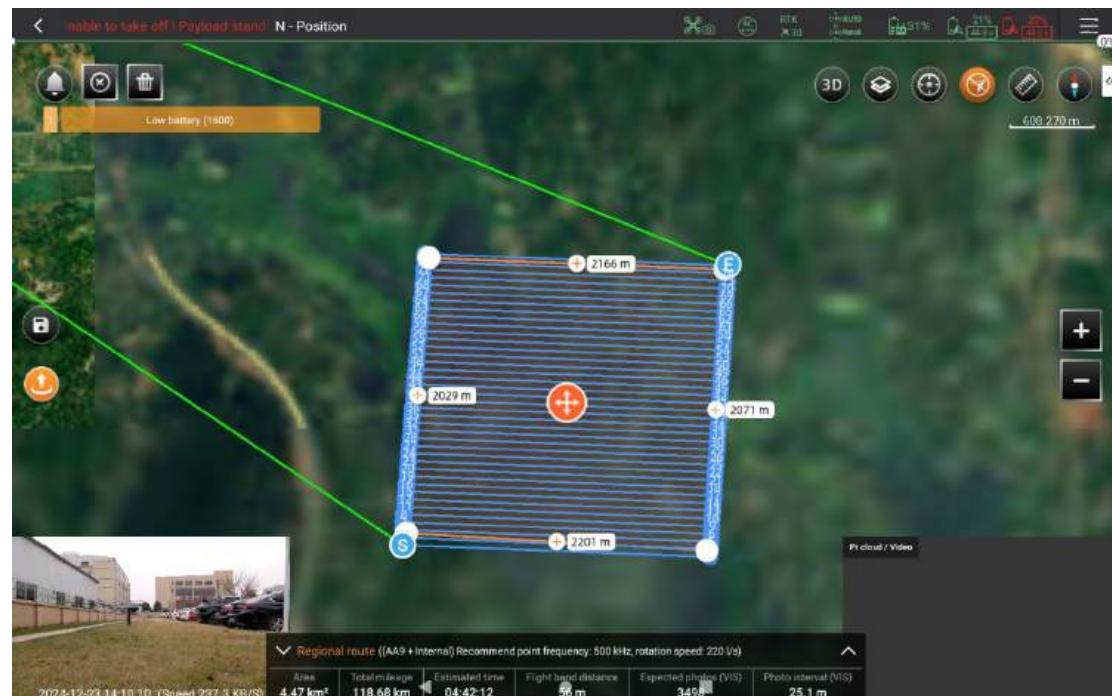
Click three times on map to create 3 points then generate a polygon area. User can also click

⊕ to add more polygon points and design mission. SmartGo will automatically design flight route which has the shortest flight time based on polygon area.

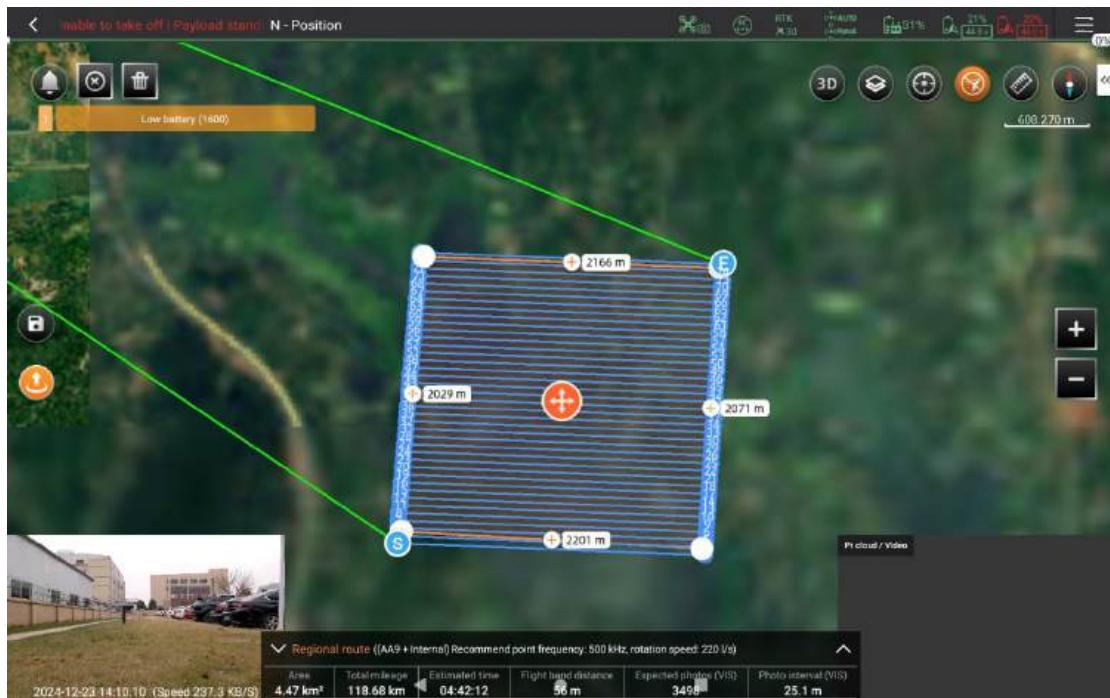


The current operations on the boundary points of the survey area include deleting a boundary point and deleting all points:

- Click  button to delete the last added boundary point;
- Select any boundary point in the measurement area. The selected point will be orange. , then click  delete;
- Direct click  All boundary points will be deleted.

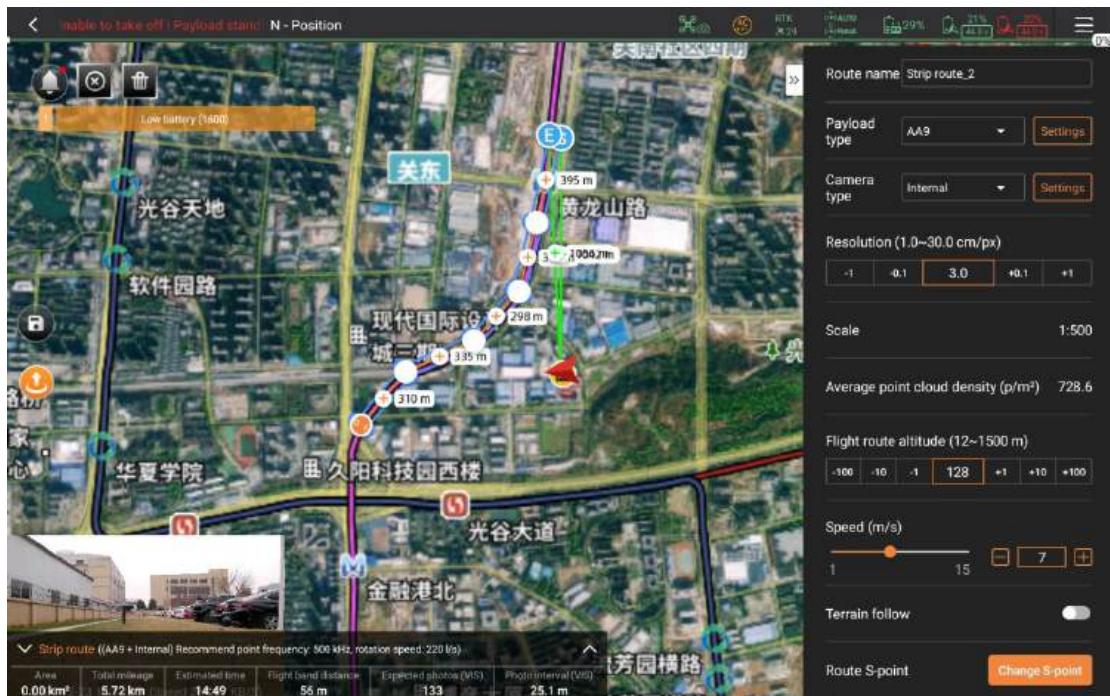


**Tic-tac-toe route:** Regional routes support the tic-tac-toe route function, which can generate a corresponding tic-tac-toe route at 90 degrees vertically based on the original route. This allows users to quickly generate multi-directional routes when performing oblique photography to improve the efficiency and accuracy of data collection.

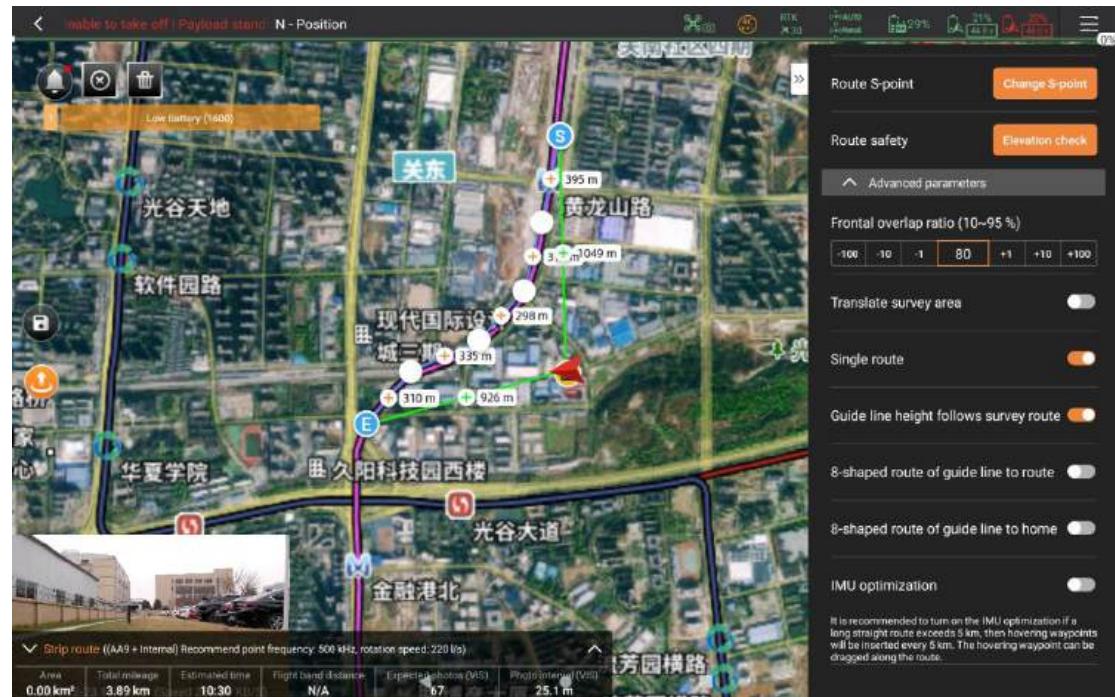


### 8.5.2 Strip route

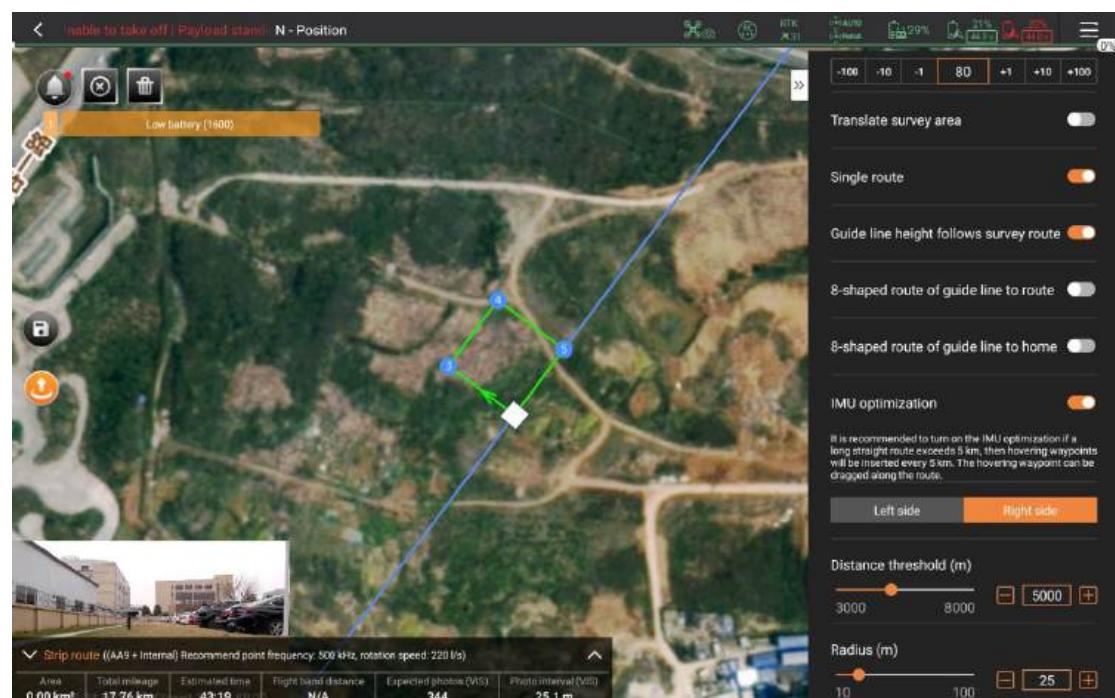
Customers create strip routes by clicking on the center point of the strip area generated on the map. At least two center points are required to generate a route. There is a prompt above the editing interface that says "A strip route requires at least 2 points, please select a point on the map." A strip survey area with 2 routes is generated by default. The operation of the center point is the same as the survey area boundary point of the regional route.



Single route: After turning on the single route switch, the strip route will generate a single route based on the center line of the strip measurement area.

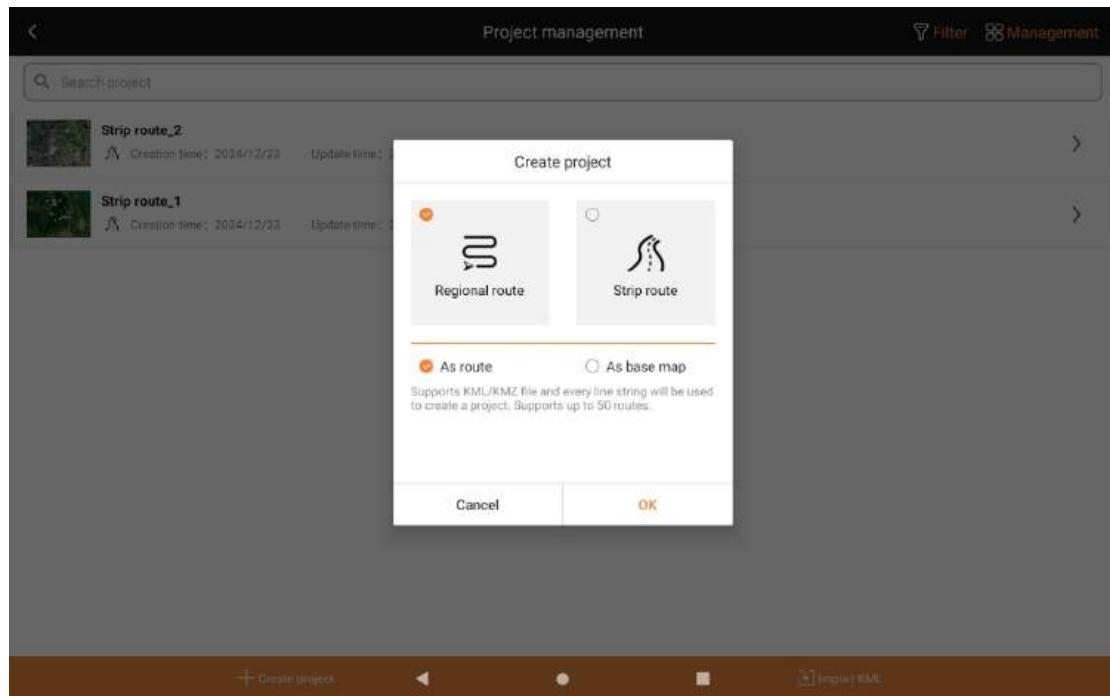


IMU Optimization: If the length of the long straight route exceeds 3000m (which can be set by oneself), it is recommended to turn on IMU Optimization. A hovering waypoint will be inserted at 3000m to optimize the accuracy of the IMU. The hovering waypoint can be dragged along the route.



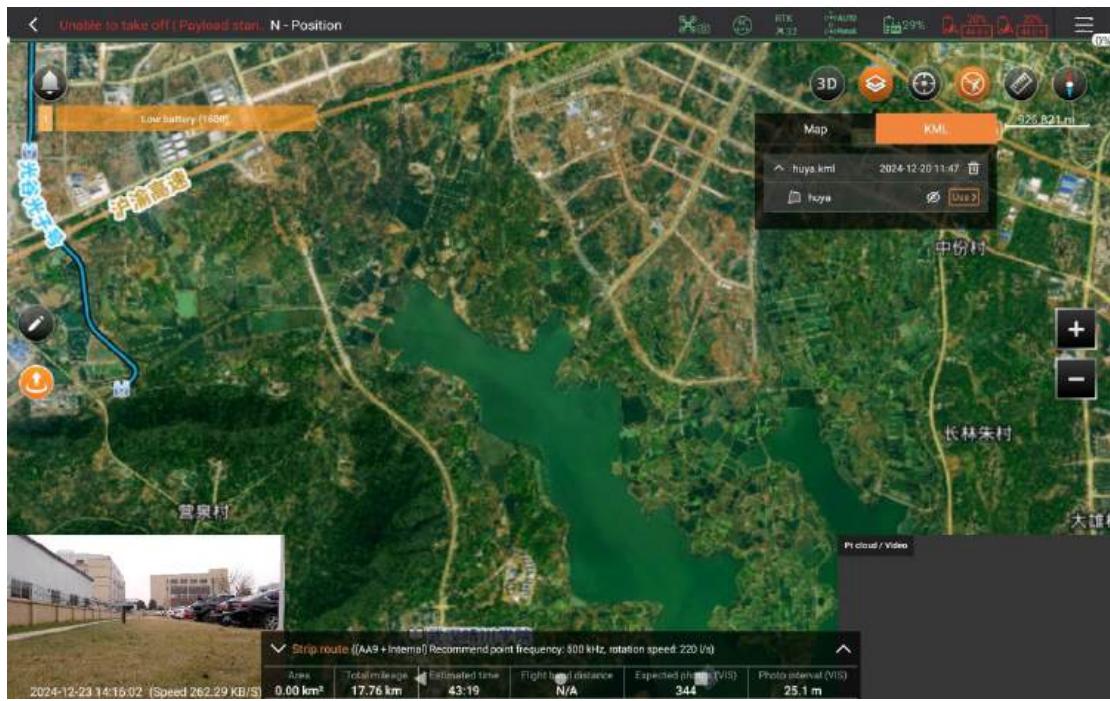
### 8.5.3 KML import planning

The software supports KML/KMZ format files, which can be imported to generate routes and used as base maps.



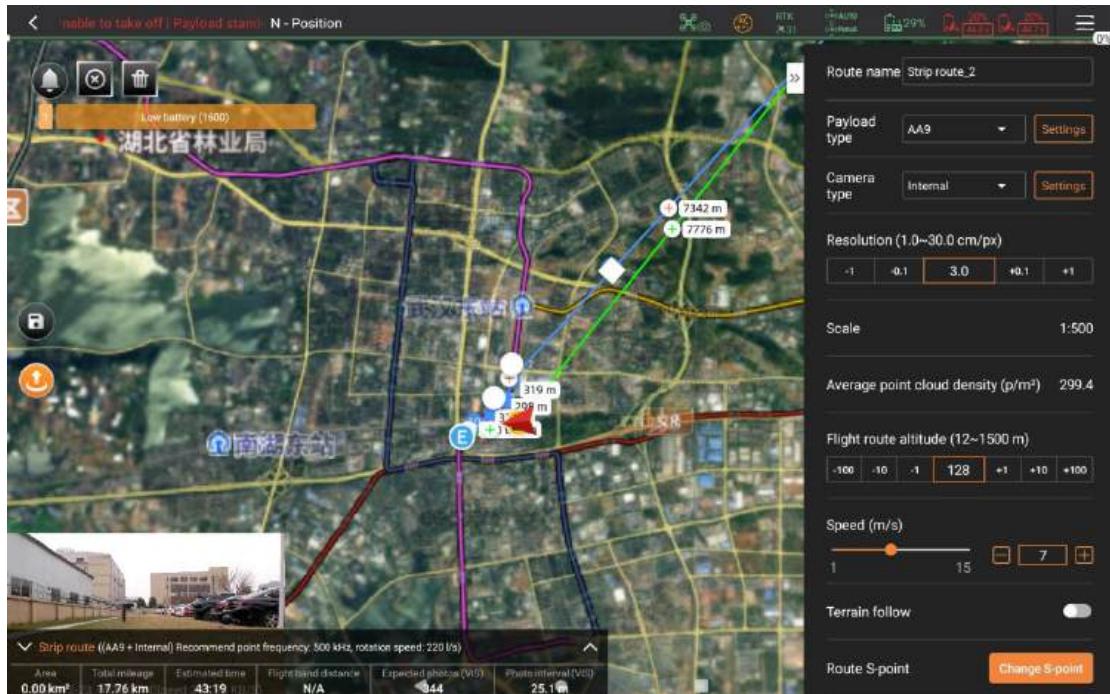
When you choose to generate a route, each line/area in the KML file will generate a route; when you choose to use it as a base map, After importing, it is only displayed as a layer. You can click View and manage, no need to import different route projects repeatedly.

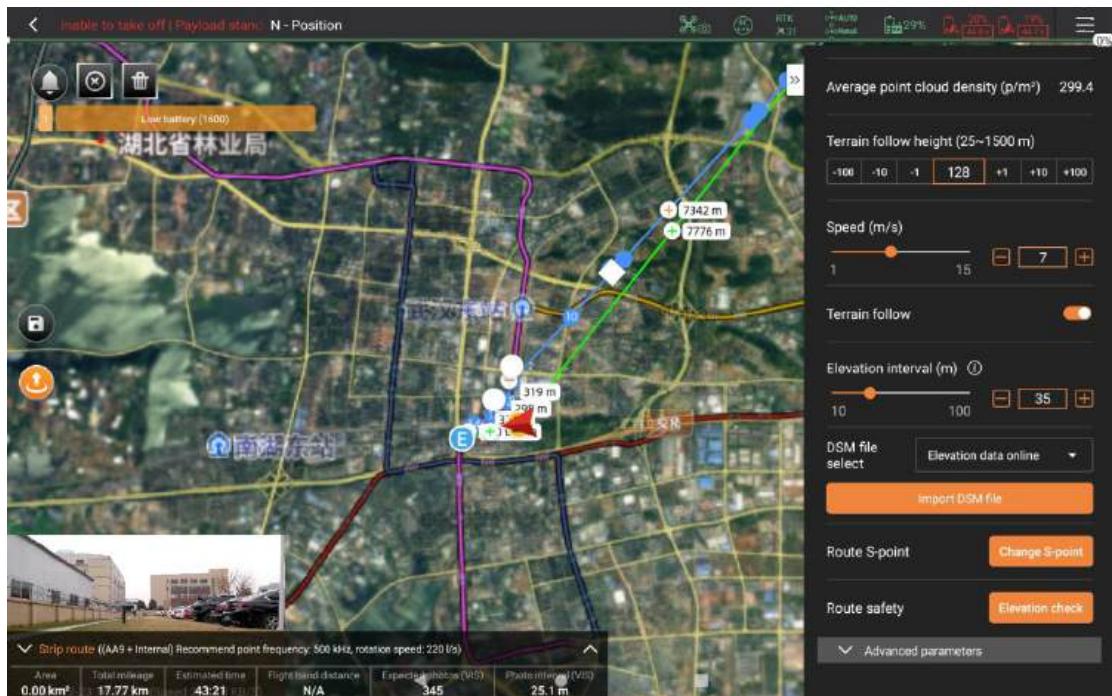
After the KML is imported, it is not displayed by default. After opening the KML management, clicking the corresponding KML will automatically jump and display. The base map lines are displayed in yellow.



#### 8.5.4 Route parameter settings

After adding the route, click the icon in the upper right corner to open the route parameter editing page. The route parameters are divided into common parameters and advanced parameters.





- Route name: You can set the name of the route project;
- Load type: Click the drop-down list to open it, and select the type of load to be mounted. Click the [Set] button next to it to jump to the load setting interface;
- Camera type: If the selected load type is laser scanner, the system will automatically list the compatible camera types according to the laser scanner type. You can select it through the drop-down list. If the selected load type is camera, there is no such item. Click the [Set] button next to it to jump to the load setting interface;
- Resolution: Resolution and scale are related to the camera. If the camera type is set to None, these two items will not be available. The input of resolution and height affects each other. If the resolution is input, the height will also change accordingly, and vice versa.
- Scale: The scale of the results obtained by the camera under this route;
- Average point cloud density: the average point cloud density obtained by the laser scanner on this route;
- Relative take-off point altitude/terrain-like flight altitude: Set the relative altitude of the drone when flying the route (H point/terrain);
- Flight speed: The cruising speed of the aircraft can be adjusted during flight.
- Terrain simulation: When the terrain simulation switch is turned on, the route will draw a survey route that fits the terrain according to the terrain data;
- Starting point of the route in the survey area: adjust the starting point of the route in a clockwise direction;
- Route safety: Open the elevation check window to check the elevation curve of the route and the elevation curve of the terrain corresponding to the route.

Terrain simulation is a method of providing route planning based on the elevation difference and undulation of the terrain.

Terrain precision (m): The smaller the value, the more waypoints there are and the closer the route is to the terrain.

Online elevation data: internationally available data with an accuracy of 30 meters.

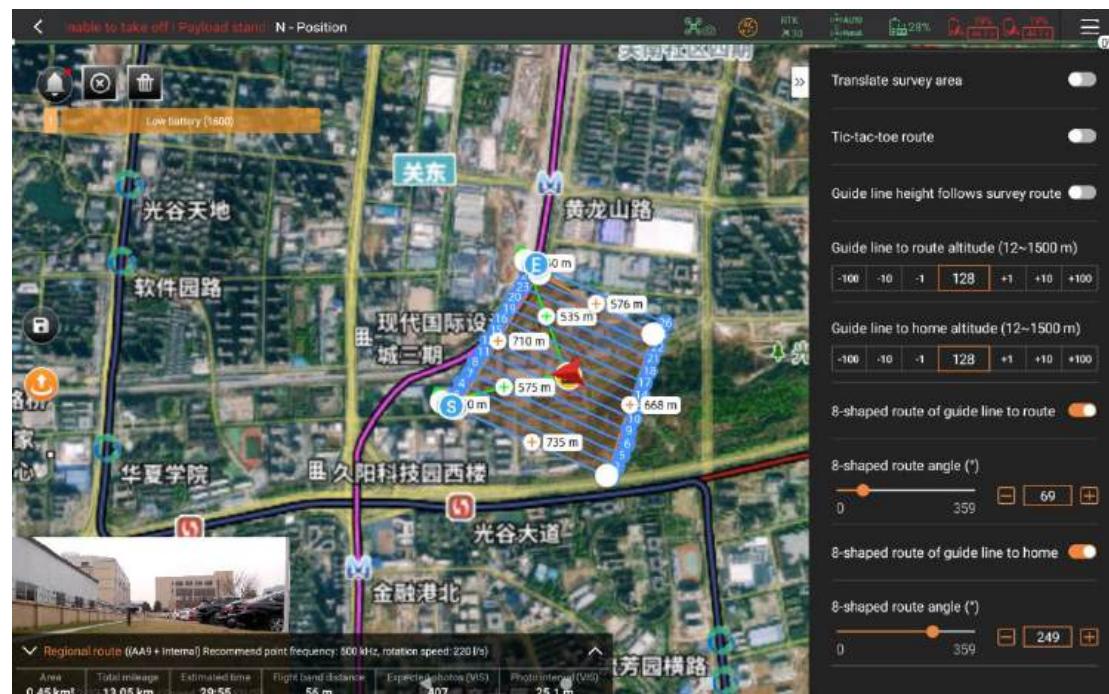
Download elevation data: The downloaded elevation data is EARTHDATA public data, and the geographic coordinate system is WGS84.

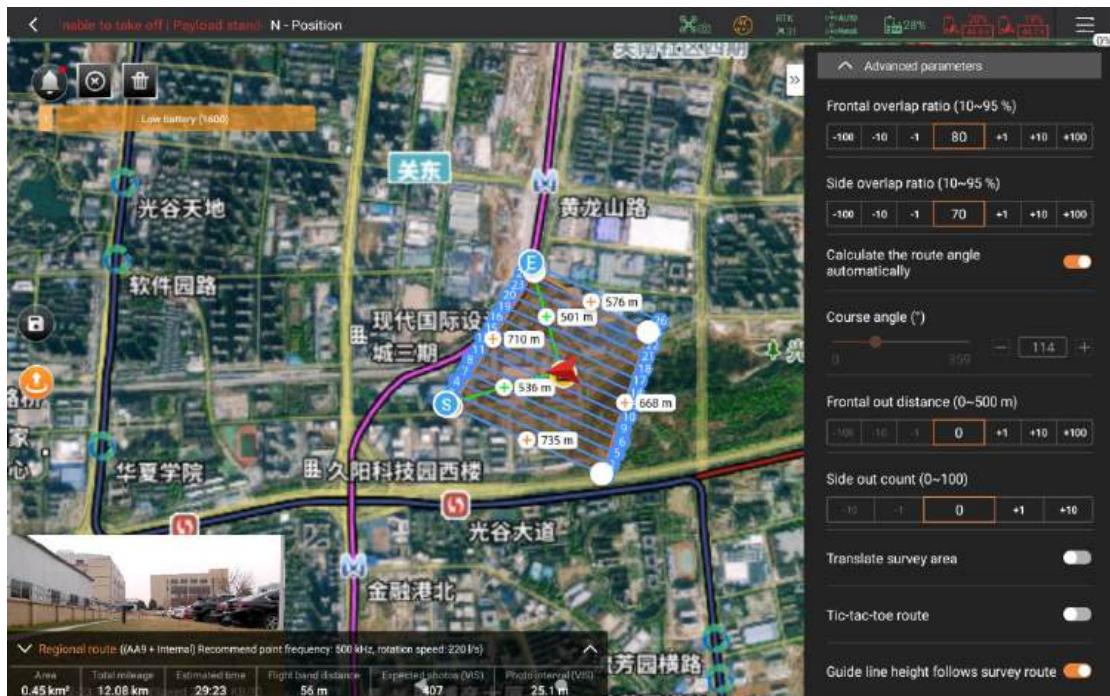
Import local files: Support Mbtiles elevation data of WGS84 UTM projection, the file size shall not exceed 3GB. Support Tif elevation data of WGS84 coordinate system, only import elevation data within about 200km around the route center, please pay attention to the route center.

Please pay attention to the accuracy, authenticity and validity of the data, observe the flight environment and pay attention to flight safety during the flight.

Our company does not guarantee the accuracy, authenticity and validity of the data. Please observe the flight environment and pay attention to flight safety during the flight.

### 8.5.5 Advanced Parameters



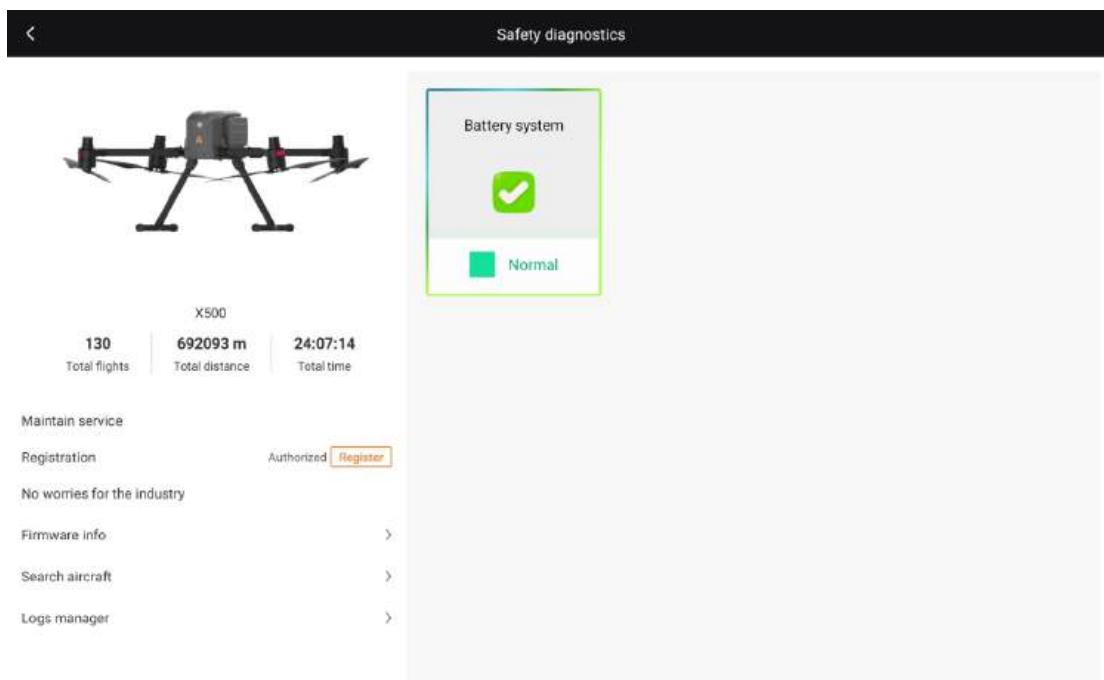


- Heading overlap: This parameter refers to the image overlap between the front and back adjacent photos taken in the flight strip, which mainly affects the number of photos and the interval between photos: the smaller the overlap, the fewer photos are taken and the longer the interval between photos. If the camera type is selected as None, there is no such item;
- Lateral overlap: This parameter refers to the overlap between photos of adjacent routes, which mainly affects the flight mileage, number of photos taken and route interval;
- Automatically calculate the route angle: Automatically calculate the route angle. The route angle cannot be adjusted when it is turned on.
- Route angle: This parameter uses the north direction as the reference datum and can adjust the angle of the route in the survey area clockwise;
- Course extension distance: This parameter can adjust the length of the flight strip extended outside the survey area along the flight strip;
- Number of lateral expansion strips: This parameter can expand the strips to both sides of the survey area parallel to the route angle;
- Measurement area translation: Turn on measurement area translation, and  appears in the middle of the test area, move , the post-test area moves accordingly;
- Tic-tac-toe route: Tic-tac-toe routes can be automatically generated based on the strip route;
- The height of the guide line follows the route of the survey area: If this option is turned on, the height of the guide line will be consistent with the route of the survey area;
- Height of the entry guide line relative to the take-off point: When the height of the guide line following the survey area route is closed, this parameter can adjust the height of the entry guide line relative to the H point;

- Height of return guide line relative to take-off point: When the height of the guide line following the survey area route is closed, this parameter can adjust the height of the return guide line relative to point H;
- Figure 8 route entry: Figure 8 route switch, insert a figure 8 route before entering the route;
- Figure 8 route angle: With due north as the reference, the figure 8 route angle can be adjusted clockwise;
- Return 8-shaped route: 8-shaped route switch, insert 8-shaped route after the outbound route;
- Figure 8 route angle: With due north as the reference, the figure 8 route angle can be adjusted clockwise;

## 8.6 Payload safety diagnostics

Mainly includes: counting the number of flights, mileage, time, checking the battery system, maintenance services, authorization status, worry free insurance, firmware information, finding aircraft, and log management.

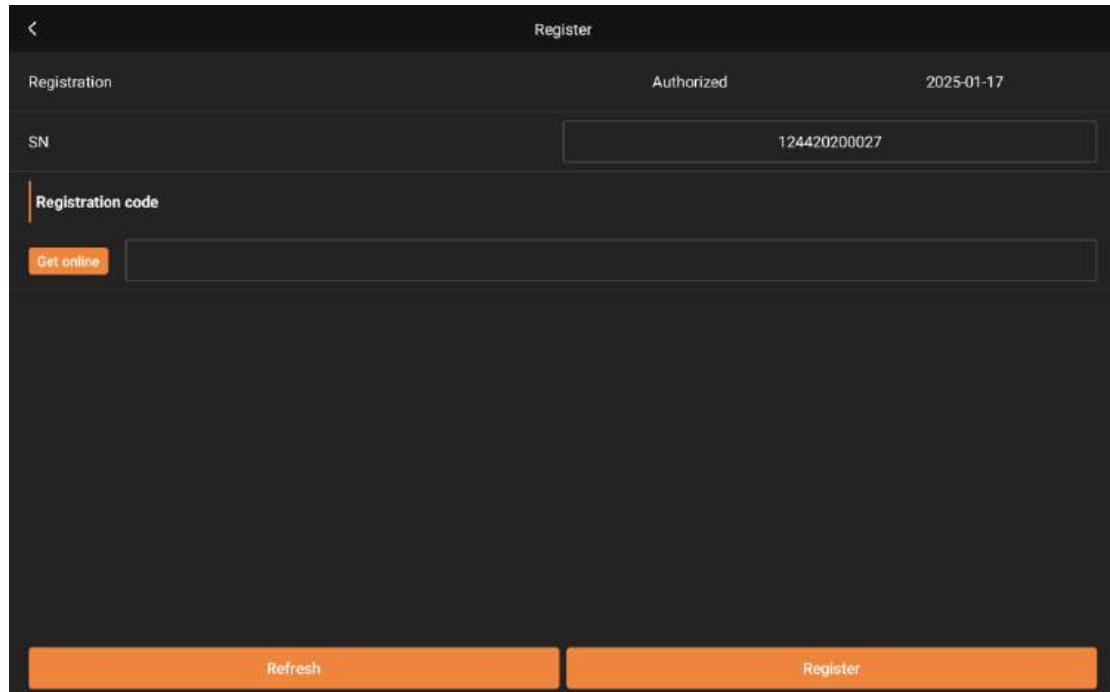


### 8.6.1 Maintenance Service

Users can view historical flight data and combine it with maintenance service information to decide whether to perform maintenance on the aircraft.

## 8.6.2 Authorization Status

Drone authorization status, click "Register" to enter the registration page to complete the drone registration authorization.



## 8.6.3 Firmware Information

Drone authorization status, click "Register" to enter the registration page to complete the drone registration authorization.



Latest version:  
Firmware version:  
Size:  
Changelog:

Current version: S10614504050205002 v2.10.6  
Hardware version: v2.1.0  
Aircraft SN: 124420200027

Note: before starting the upgrade, please make sure that the power of the remote control is above 20% and the power of the aircraft is above 30%. During the upgrade, please keep the remote control connected to the aircraft.

Reinhardt

#### 8.6.4 Search aircraft

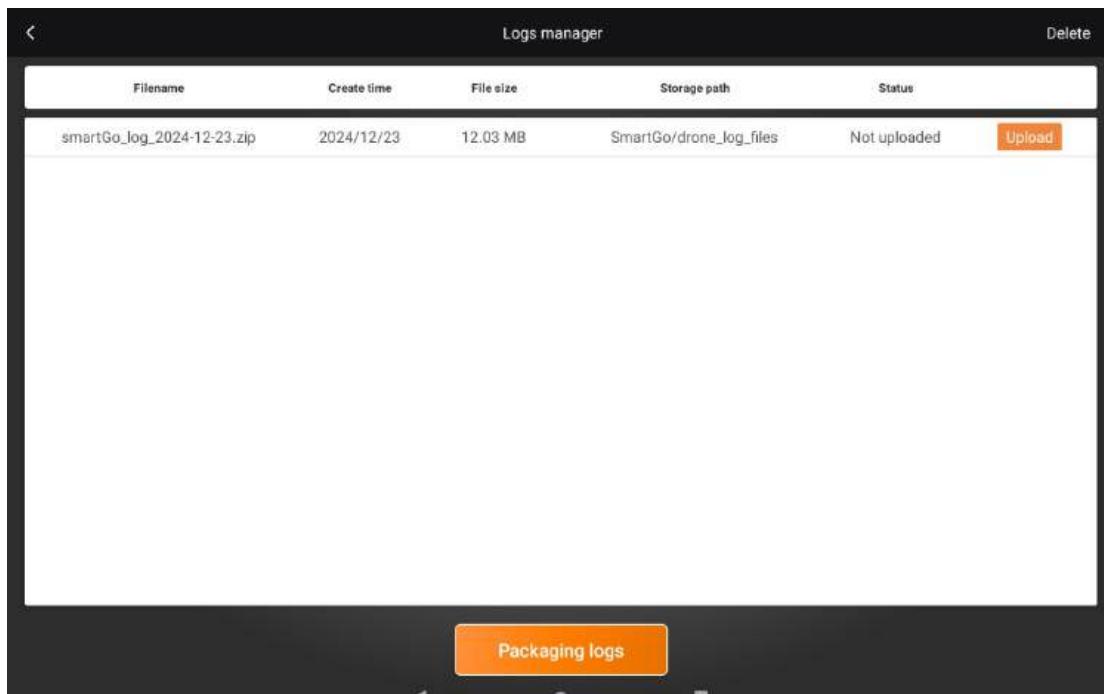
If the aircraft loses contact, click **Find Aircraft**, the ground station will record the last latitude and longitude coordinates of the drone when it loses contact, and refer to the recorded location to find the lost aircraft.



**Please ensure personal safety when searching for the aircraft. If necessary, please contact the after-sales staff of CHCNAV for assistance.**

## 8.6.5 Log Management

The software displays the current drone information log and software log. When the drone is abnormal, the after-sales staff will contact the customer to upload the relevant logs for analysis. The [Delete] button supports deleting logs older than 7 days.



## 9 Maintenance

This chapter introduces daily inspections, maintenance, and handling of flight accidents.

### 9.1 Daily inspection

It is recommended to perform the following routine checks before each flight.

#### 9.1.1 Unpowered checklist

type	Key Points
structure	<ol style="list-style-type: none"><li>1. Visually and tactiley check whether the propeller, arms, sleeve joints, and landing gear are intact. If there are cracks or damage, they need to be replaced in time.</li><li>2. Check whether the screws of each connecting part are tightened,</li></ol>

	<p>especially the screws of the arm connector and the battery locking knob.</p> <p>3. Check whether the waterproof rubber plug is fastened properly. If it is not fastened properly and water enters the machine, it will cause a short circuit.</p>
Motor	<p>1. Check whether the propeller blades are deformed, damaged, aged or softened. If so, replace them immediately. If there are foreign objects on the propeller surface, clean them immediately.</p> <p>2. Manually test-run the power motor to check whether it is firmly installed, whether there is any loose position, and whether it rotates smoothly without abnormal noise.</p> <p>3. The propellers are installed correctly. The CW propellers are installed on motors 1 and 3. CW The propellers are installed on motors 2 and 4. (Starting from the front right of the fuselage is motor 1, and in counterclockwise order are motors 2, 3, and 4)</p>
Battery	<p>1. Check the battery interface of the aircraft for any foreign matter or deformation.</p> <p>2. Check whether the battery locking knob is secure to ensure that it will not come loose during flight.</p> <p>3. Check whether the battery casing is obviously damaged. Batteries with obvious damage are not allowed to be used in flight.</p>
antenna	<p>1. Check whether all antennas of the aircraft and remote controller are tightened, loose or damaged, and whether they will affect the rotation of the propellers.</p>
Obstacle Avoidance	<p>1. Check whether there is any obstruction within the viewing angle of each perception system, and pay special attention when mounting non-original loads or accessories.</p>
Downward-looking ToF	<p>2. Check the glass surface of each perception system sensor:</p> <p>a. Remove films, stickers and other obstructions from the surface.</p> <p>b. If there are water drops, fingerprints, dirt, etc., wipe them clean with a dust-free cloth.</p> <p>c. If the surface glass is dropped, broken, scratched, worn, etc., please return</p>

	it to the factory for repair.
Remote Control	<ol style="list-style-type: none"> <li>1. Check whether the joystick of the remote controller is in the middle position, whether sand or other foreign objects have entered the joystick, whether the joystick is stuck, and whether the joystick can reach the maximum value.</li> <li>2. Check whether the remote control screen is clean and free of water stains, foreign objects, etc.</li> </ol>
Mounting plate	<ol style="list-style-type: none"> <li>1. Check whether the shock-absorbing ball is broken or damaged.</li> <li>2. Check whether the shock-absorbing plate has cracks or breaks.</li> <li>3. Is the latch of the "A" mounting part normal?</li> </ol>
Spare items	<ol style="list-style-type: none"> <li>1. Several USB-C cables.</li> <li>2. Spare landing gear.</li> <li>3. Spare blades CW, CCW.</li> <li>4. A set of multimeter, a set of screwdriver tools, various types of screws, cable ties, tape, and dust-free cloth.</li> </ol>

### 9.1.2 Power-on checklist

type	Key Points
Remote Control	<ol style="list-style-type: none"> <li>1. Confirm the joystick mode (American hand/Japanese hand) and check it in the App joystick settings interface.</li> <li>2. Check whether the remote control has sufficient power and the batteries are properly installed.</li> </ol>
Battery	<ol style="list-style-type: none"> <li>1. All batteries (aircraft batteries, remote controller) should be fully charged.</li> <li>2. If the battery has been stored for more than one month, it is recommended that you perform a complete charge and discharge operation</li> </ol>

	<p>again before going out.</p> <ol style="list-style-type: none"> <li>3. Is the aircraft battery installed firmly?</li> <li>4. Use the App's battery page to check the aircraft's battery level and the voltage of each battery cell to see if they are normal.</li> </ol>
Flight parameters	<ol style="list-style-type: none"> <li>1. Whether the loss of contact behavior meets the operational expectations.</li> <li>2. Check whether the return altitude, height limit, distance limit, obstacle avoidance switch, etc. are set correctly.</li> </ol>
Module self-test	<ol style="list-style-type: none"> <li>1. Check the self-check information in the upper left corner of the App to see if there is any module failure prompt.</li> </ol>
Satellite positioning	<ol style="list-style-type: none"> <li>1. If the self-check is passed, the system will enter "take-off preparation completed".</li> <li>2. Turn on the RTK switch, select the correct base station and channel, and confirm that the GNSS solution status is fixed.</li> </ol>
sensor	<ol style="list-style-type: none"> <li>1. Check whether the IMU is normal in the App.</li> <li>2. Check the compass in the app to see if it is working properly.</li> <li>3. Check whether the sensor is normal and whether there is any abnormal error.</li> <li>1. Ensure that the FPV image transmission on the App interface is normal.</li> </ol>
Mounting Devices	<ol style="list-style-type: none"> <li>1. Check for any abnormal noise in the load equipment.</li> <li>2. Check whether the load equipment is powered normally.</li> <li>3. Check whether the load device reports any errors.</li> </ol>
Check for updates	<ol style="list-style-type: none"> <li>1. After the remote controller is connected to the network, open the app and make sure the firmware of the app, aircraft, remote controller, and battery match each other. Otherwise, it may not be able to take off or there may be other flight safety risks.</li> <li>2. All aircraft intelligent batteries need to be inserted into the aircraft one by one for inspection to ensure that the firmware is all the latest.</li> </ol>

Motor start	<ol style="list-style-type: none"> <li>1. After ensuring safety, start the motors in the inner/outer eight pole position and let them idle on the ground, and confirm that all four motors are rotating at a uniform speed.</li> <li>2. The motor rotates normally, there is no abnormal noise, and the App does not report any abnormal errors.</li> <li>3. Observe the rotation direction of the motors and ensure that motors 1 and 3 rotate clockwise and motors 2 and 4 rotate counterclockwise.</li> </ol>
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### 9.1.3 Test flight checklist

type	Key Points
Test Flight Checklist	<ol style="list-style-type: none"> <li>1. Make sure there are no potential safety hazards or personnel within 5m of the aircraft.</li> <li>2. Confirm that the FPV image is normal.</li> <li>3. Confirm that "Takeoff preparation is complete" and when there is sufficient ambient light, start the remote controller to record the screen.</li> <li>4. In the N gear position mode, use the inward/outward eight lever position to idle the aircraft on the ground, observe whether the whole machine shakes, and then pull down the throttle to stop the motor.</li> <li>5. In N gear mode, take off and hover at an altitude of about 5m. Keep hovering for 1 minute and observe the hovering performance of the aircraft (horizontal deviation does not exceed 1m, and height deviation does not exceed 0.5m), whether there is abnormal vibration of the fuselage, battery power and voltage status, motor and propeller sounds, etc.</li> <li>6. Try to control the aircraft with small amounts of stick movement through the four control channels. The aircraft should respond normally.</li> <li>7. Adjust the sticks on the four control channels from small to large amplitudes, and observe the forward attitude response speed and the jitter during braking.</li> <li>8. Set altitude and distance limits to test whether the aircraft can break</li> </ol>

	<p>through these limits.</p> <p>9. When in N gear mode, turn on the obstacle avoidance switch to test whether the aircraft can achieve obstacle avoidance.</p> <p>10. When in N gear mode, if the aircraft is far away from the return point and below the set return altitude, press the return button on the remote control to trigger the return. The aircraft should land at the return point by ascending to the return altitude, returning, and descending. The error between the landing position and the return point should be within 1 meter.</p> <p>11. Stop remote control screen recording after landing.</p>
Landing Check	<p>1. Check whether the propellers, motors, and fuselage look normal, with no signs of collision, looseness, breakage, or other abnormalities.</p> <p>2. Check whether the motor temperature is abnormal, such as uneven heating.</p>

## 9.2 Regular maintenance

It is recommended that users refer to the following items and perform regular inspections and maintenance to maintain the aircraft in optimal condition and reduce safety risks.

### 9.2.1 Maintenance recommendations

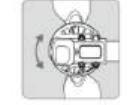
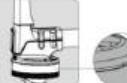
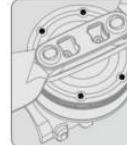
type	Maintenance items	Maintenance recommendations	cycle
Basic maintenance	<p>1. Regular maintenance items</p> <p>2. Millimeter wave obstacle avoidance detection</p> <p>3. Deep Cleaning</p>	Return to factory	Accumulated flight time of 120 hours or usage time of 6 months

General maintenance	<ol style="list-style-type: none"> <li>1. Regular maintenance items</li> <li>2. Millimeter wave obstacle avoidance detection</li> <li>3. Deep Cleaning</li> <li>4. Replacement of wearing parts</li> </ol>	Return to factory	300 cumulative flight hours or 12 months of use
Deep maintenance	<ol style="list-style-type: none"> <li>1. Regular maintenance items</li> <li>2. Millimeter wave obstacle avoidance detection</li> <li>3. Deep Cleaning</li> <li>4. Replacement of wearing parts</li> <li>5. Core component replacement</li> </ol>	Return to factory	900 cumulative flight hours or 36 months of use

## 9.2.2 Regular maintenance items

### ■ Power System

type	Inspection process and handling methods	Graphics
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Motor rotation	<ol style="list-style-type: none"> <li>1. Unfold the arms and secure them.</li> <li>2. Turn the motor rotor to check for any jamming or scratching.</li> <li>3. Visually check the clearance between the motor stator and rotor to see if there is any scratching against the base.</li> <li>4. If any jamming or scratching occurs, flight is prohibited and the aircraft needs to be returned for repair and maintenance.</li> </ol>	   
Motor and arm fixed	<ol style="list-style-type: none"> <li>1. Apply force to the motor seat along the axis of the carbon tube to rotate it and check whether the motor and the carbon tube are loose.</li> <li>2. Check whether the four fixing screws are loose.</li> <li>3. If it becomes loose, it needs to be repaired and maintained.</li> </ol>	 
Motor cover	<ol style="list-style-type: none"> <li>1. Check whether the screws on the motor cover are loose and whether the cover has cracks or damage.</li> <li>2. The screws of the upper cover are loose: Use screw glue and tighten the screws.</li> <li>3. The upper cover is damaged and cracked: repair and maintenance is required.</li> </ol>	 
Paddle	<ol style="list-style-type: none"> <li>1. Visually inspect the blades for obvious deformation, severe wear, notches, cracks, and any attachments on the surface.</li> <li>2. Use a dry, soft cloth to wipe the propeller until it is clean and free of foreign matter.</li> </ol>	

	<p>3. The blades need to be replaced promptly if they show obvious deformation, severe wear, nicks or cracks.</p> <p>4. The propeller blades should be replaced in time when the cumulative flight time reaches 300 hours or after one year of use.</p>	
Paddle Clip	<p>1. Check whether the propeller clamp fixing screws are loose.</p> <p>2. If the screws are loose, you need to use screw glue and tighten the screws.</p> <p>3. Check whether the propeller clamp structure is deformed or broken.</p> <p>4. If the propeller clamp is structurally deformed or damaged, it needs to be replaced.</p>	

It is recommended to replace the propeller blades only in emergency situations during field operations.

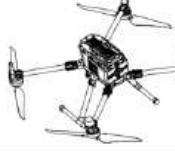
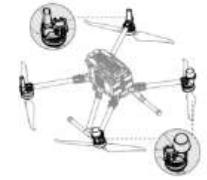
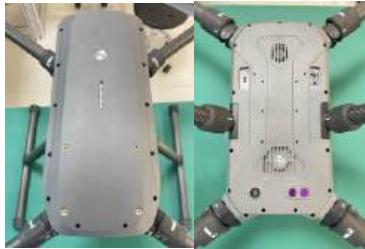
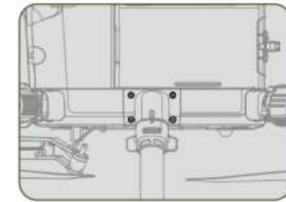
After the emergency flight, please contact CHCNAV after-sales service as soon as possible for maintenance.

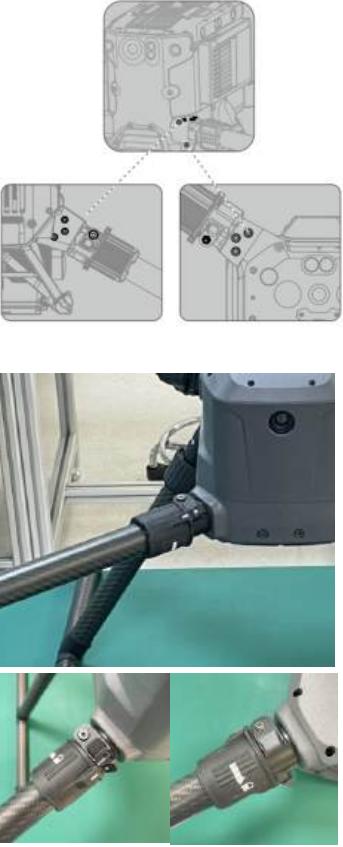
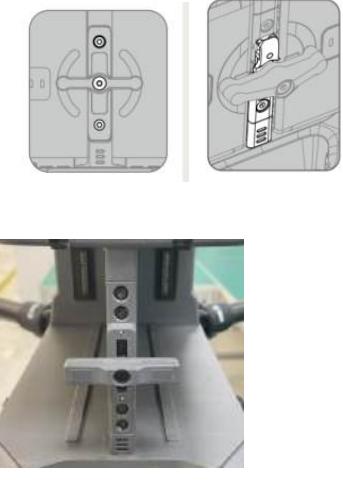
#### ■ Flight control system

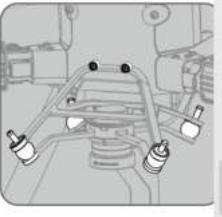
- After the power-on self-test, the App did not indicate any abnormalities in the flight control system.
- In an open outdoor environment, the GNSS solution status is fixed within 1 minute after powering on.
- In an open outdoor environment, the compass has no abnormal alarm.
- The IMU sensor has no abnormal alarm.

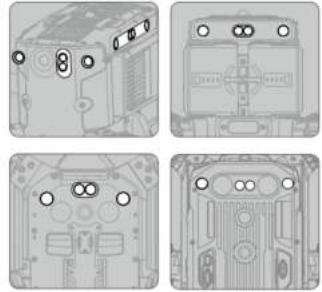
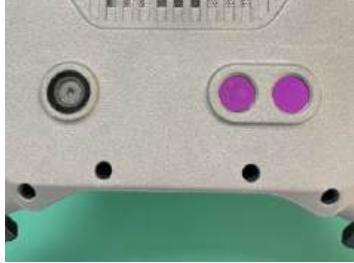
#### ■ Body structure

type	Inspection process and handling methods	Graphics
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Appearance	<ol style="list-style-type: none"> <li>1. Check whether the appearance of the machine is clean and free of damage or deformation.</li> <li>2. Use a clean soft cloth to wipe the body of the camera, paying special attention to the cleaning of the forward-looking FPV system and the downward-looking ToF system lenses.</li> </ol>	 
Machine screws	<ol style="list-style-type: none"> <li>1. Check all the screws on the fuselage to see if they are loose or falling off, especially pay attention to the connection between the motor and the carbon tube.</li> </ol>	 
landing gear	<ol style="list-style-type: none"> <li>1. Check if the screws are loose.</li> <li>2. Check whether the surface is free of damage and cracks.</li> </ol>	 

Folding arm	<ol style="list-style-type: none"> <li>1. Check whether the machine arm screws are loose or falling off.</li> <li>2. Check whether the arm connectors are free of damage and cracks.</li> <li>3. Grasp the carbon tube and gently shake the arm to check if there is any noticeable shaking.</li> </ol>	
Arm Light	<ol style="list-style-type: none"> <li>1. Check whether the surface is dirty or damaged.</li> </ol>	
Battery compartment	<ol style="list-style-type: none"> <li>1. Check that the battery locking knob and the three screws on its base are not loose or fallen off.</li> <li>2. Check if there is any dirt, water stains or corrosion in the battery interface. If there is any water stain or dust, wipe it clean.</li> <li>3. Check whether the pop-up mechanism under the knob is stuck and whether it can pop out normally without obvious shaking when the battery is locked.</li> </ol>	

Data Interface	<ol style="list-style-type: none"> <li>1. Use gauze to wipe away any foreign matter near the interface.</li> <li>2. If the interface is in use, remove the connecting wire and shine a light on the interface to check if there is any foreign object in the interface.</li> <li>3. Use tweezers to remove any foreign objects in the interface, such as pebbles or small pieces of paper.</li> <li>4. Use gauze to wipe off the gluey foreign matter on the interface.</li> <li>5. Place the aircraft in a tilted position with the interface facing downward and use gauze, a small brush or other tools to remove other powdery foreign matter in the interface. Note that the cleaning method should be from the inside of the interface to the outside.</li> </ol>	 
Waterproof rubber plug	<ol style="list-style-type: none"> <li>1. Check whether the rubber plug is damaged or loose.</li> </ol>	
Load shock absorption	<ol style="list-style-type: none"> <li>1. Check whether the shock-absorbing ball is damaged, loose, aged, softened or stretched; and whether there is any abnormality in the rotation of the gimbal interface.</li> <li>2. Check whether the screws connecting the shock-absorbing plate to the fuselage are loose.</li> </ol>	 

Sensor & Fill Light	<ol style="list-style-type: none"> <li>1. Use a soft cloth to wipe the lenses.</li> <li>2. Check all lenses for any peeling or cracking.</li> </ol>	<p>红外感知系统和视觉系统</p>  <p>补光灯</p>  <p>顶视图 底视图</p>   
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### 9.2.3 Battery

#### Battery maintenance conditions



Maintenance is required if any of the following conditions are met:

- The battery cycle reaches 50 times.
- The idle time reaches 3 months.
- The App prompts that the battery needs maintenance.

#### **Maintenance inspection items**

- Perform a standard charge and discharge cycle on the battery.
- After fully charging and leaving it for 6 hours, check whether the battery cell voltage difference is less than 80mV.
- Check the battery for bulging, leakage, or damage.
- Check whether the battery interface is dirty or damaged.
- Check if the battery firmware is up to date.

#### **Standard charging and discharging operation process**

- Charge the battery to 100% and leave it for more than 24 hours.
- Insert the battery into the aircraft and fly. When the remaining power is less than 20%, land and remove the battery.
- Leave the battery alone for more than 6 hours.
- Charge the battery to 100%.
- Repeat the above steps.

#### **Battery Replacement Standards**

- There are obvious bulges, leakage or damage on the battery surface.
- SmartGo App reminds you that the battery voltage does not match or is severely over-discharged (four red lights flash).
- When the battery is cycled for more than 450 times, the battery stability will be affected. Be sure to replace the battery with a new one. Otherwise, the user will be responsible for any damage to the device or loss to a third party caused by this.
- If the battery abnormality cannot be restored after 2 consecutive standard charge and discharge operations, it is recommended to replace it.

#### **Battery Disposal Guidelines**

- Use an insulated bucket filled with 5% salt water and soak the battery in it for more than 48 hours until it is fully discharged.
- After step 1, it is recommended to recycle and dispose of them in a unified manner to avoid polluting the environment.

## Emergency Handling Procedures

- If a battery fire occurs, use a dry powder fire extinguisher or cover with sand to extinguish the fire.
- If the battery shell is obviously damaged or in any other abnormal condition, it must be immersed in 5% salt water in time and never used again.
- If battery leakage occurs and splashes onto human skin, immediately rinse with clean water or alkaline hand soap for 15 minutes and seek medical attention promptly.

## Precautions

- It is recommended that the battery be charged and discharged in a dedicated explosion-proof cabinet.
- Keep away from flammable and explosive items during charging.
- Avoid using the battery in a humid environment to prevent the battery from short circuiting.
- It is prohibited to disassemble or puncture the battery in any way.
- Store the battery in a cool and dry place.
- If the battery temperature reaches 70° C or above during flight, please return to the airport as soon as possible.

## 9.3 Flight accident handling

When your aircraft encounters a flight accident, please follow the steps below to handle it.

### 9.3.1 Lost aircraft accident

- Please contact CHCNAV after-sales service immediately and describe the circumstances of the loss.
- Please check the flight records through the SmartGo App and find the aircraft at the location where the data was interrupted based on the actual terrain.
- Please connect the remote controller to the computer, export the flight control data and flight records, and contact CHCNAV after-sales assistance to apply for data analysis.
- CHCNAV after-sales service will provide a treatment plan based on the analysis results.

### 9.3.2 Collision, crash

- Please take photos of the aircraft status and surrounding environment in a timely manner after the accident, and record the aircraft status before the accident and the process of the accident.

- Please make sure the aircraft is powered off, separate the battery from the aircraft, and store the battery in an isolation box. Please note that if the accident is serious, do not turn on the aircraft again, otherwise the internal circuit may be burned and cause greater losses.
- Please connect the remote controller with screen to the computer, export the flight control data and flight records, and contact CHCNAV after-sales assistance to apply for data analysis.
- Please send the accident equipment back for damage assessment and repair.

## 10 Transportation

This chapter introduces transportation precautions.

### 10.1 Aircraft

The original manufacturer's transport container must be used, and the equipment should be placed according to its designated storage position. Improper placement is not allowed.

### 10.2 Battery

project	Parameter requirements	Remark
Environmental requirements	Temperature: -10°C~35°C	Long-term storage (more than 3 months): 18°C~25°C;
Site Requirements	indoor	For long-term storage, it must be placed in an explosion-proof box or explosion-proof cabinet. For temporary storage, it must be well protected to prevent rats from biting.
Storage power	Battery 50%	During long-term storage, check the battery level once a month. If the battery level is less than 10%, recharge in storage mode.
Shipping requirements	Filling, anti-collision and other measures must be taken to protect the battery from severe collision or vibration.	

It is strictly forbidden to transport fully charged batteries over long distances or for long periods of time.

It is strictly prohibited to transport batteries that are swollen, deformed, damaged, leaking, or in any abnormal condition.

It is strictly prohibited to transfer or transport unprotected batteries; they must be safeguarded using the original manufacturer's packaging.

### **10.3 Others**

The charger must be transported using the original manufacturer's packaging for protection.

All equipment must be securely packaged to prevent internal collisions and friction during transport, which could lead to damage.

 **The transport container must be kept with the front facing up, and the package should have labels such as 'This Side Up' and 'Handle with Care'.**

 **Transport and handling must be done with caution. If severe damage occurs to the container or the equipment due to improper protection, or if the aircraft is damaged from impact during handling, a thorough inspection must be carried out. If necessary, contact after-sales technical support for assistance in assessment.**



## Warning(FCC)

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference and (2) this device must accept any interference received, including interference that may cause undesired operation

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 0mm between the radiator and your body.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.



## RSS GEN Notice

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

- (1) This device may not cause interference.
- (2) This device must accept any interference, including interference that may cause undesired operation of the device.

Ce dispositif contient émetteur (S)/ récepteur (S) exempté (S) de licence qui sont conformes à l'innovation, Les RSS exemptées de permis de sciences et développement économique Canada. Le fonctionnement est soumis aux deux conditions suivantes:

- (1) ce dispositif ne peut pas causer d'interférence.
- (2) ce dispositif doit accepter toute interférence, y compris l'interférence qui peut causer indésirable Fonctionnement de l'appareil.

## CHC Navigation

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