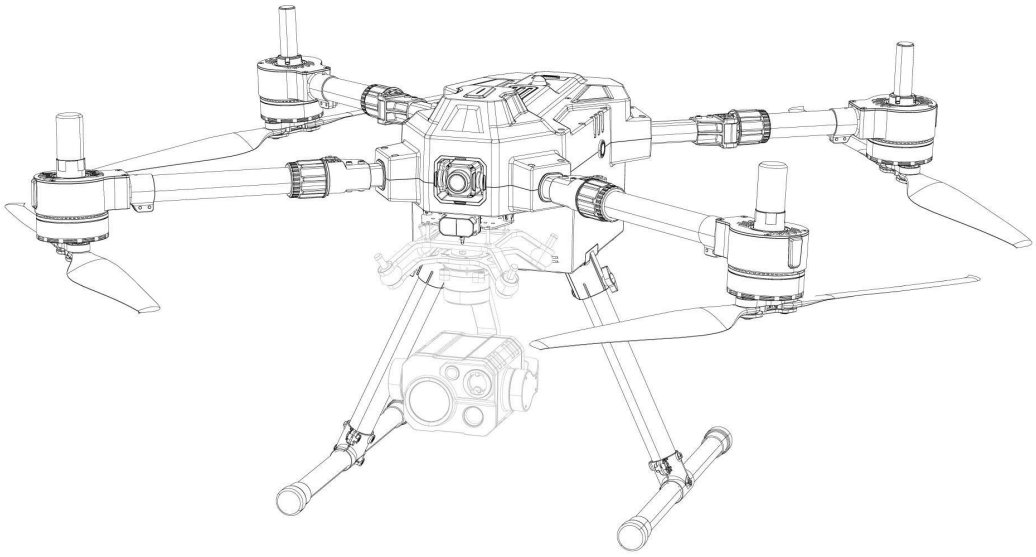
Drone platform
UniDrone E900
User Manual



Reebot Robotics (Shenzhen) Co., Ltd.

https://reebot.com/en/

thank you for purchasing Reebot products.

UniDrone E900 is the paragraph for security, search and rescue and inspection application Scenario Multi-function Industry Application Drone Platform.

Considering flight safety and in order to bring you a good product experience, please consult the user manual carefully before installing the machine. This manual can help you solve most of the use of questions, you can also visit the official website of Reebot (*https://reebot.com/en/*) and product-related pages, call Reebot official after-sales service center (400-097-0971) or send an email to the info@reebot.com directly to the Reebot engineer consulting product knowledge and feedback product problems.

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REEBOT

Manual Version Update Record

Version	Release Date	Update Content
1.0	Nov 2024	Initial Version
1.1	Feb 2025	Compass Calibration, Basic Flight, Technical Specifications
1.2	Mar 2025	Added Common Unlock Prohibition Messages, Their Causes, and Corresponding Solutions
1.3	2025.4	Addition of noise test data, indicator light color definitions, and remote identification.

CONTENTS

Reading Tips

Logo, icon

When reading the user manual, please pay special attention to the relevant contents marked as follows.

 **Hazard Operations that are likely to cause personal injury**

 **Warning Operation warning that may cause personal injury**

 **Be careful not to cause unnecessary property damage due to illegal operations.**

 **Prohibitions**  **must implement**  **precautions**

Security

UniDrone E900 is designed and manufactured for professional application scenarios. Necessary debugging has been completed before leaving the factory. Please do not disassemble or change its structure. UniDrone E900 has a precise structure and operators need to have certain basic skills. Please follow relevant laws and regulations to standardize safe operation. Reebot will not bear any responsibility for any unnecessary product damage caused by non-standard, unreasonable and irresponsible operation of this product, resulting in economic loss or even personal injury to users or others. Minors use this product must have a professional presence supervision and guidance. Reebot's products are designed for commercial scenarios and the use of Reebot's products for military purposes is prohibited. It is forbidden to disassemble or modify this product without the permission of Reebot Technology.

In order to jointly maintain flight safety and allow you to better play the characteristics of this product, please pay special attention to the following matters:

 It is prohibited to use Reebot products to control aircraft, vehicles or models in crowded places

(squares, parks, etc.), places with many obstacles (streets, parking lots, etc.), places with strong magnetic fields or signal interference sources (high-voltage lines, railway lines, radar stations, etc.) or other areas that may cause unnecessary economic losses or even personal injuries.

 When operating, never cover the ground end antenna or block signal transmission in other forms.

 The top of the standard omnidirectional antenna on the ground side is the weakest part of the signal transmission. When working, avoid pointing it at your aircraft, vehicle, or model.

 It is forbidden to use Rukawa products to control aircraft, vehicles or models when tired, drunk or unwell.

 Without a special work permit, it is forbidden to use Reebot products to control aircraft, vehicles or models in rainy, night or strong wind conditions.

 When the engine and motor on your aircraft, vehicle or model are still running, you must not cut off the power supply on the ground in advance.

 In order to ensure flight safety, please check whether the blades, motor steering, and the connection of various components are stable before takeoff, and ensure the effective connection with the link.

 For flight safety, please keep the aircraft in view when operating the aircraft for takeoff. And to ensure that the flight landing UAV around no pedestrians, animals, obstacles, etc.

 When you a job, be sure to return to the main page from the system parameter setting page.

 Before starting work, be sure to check the power of the remote controller and the power supply voltage of the drone.

 When the ends the operation, the UAV is powered off first, and then the remote controller is powered off.

 Before setting the ground end parameters, be sure to power off the engine and motor to prevent accidental start.

 Before starting work, be sure to set up the runaway protection function on the drone.

 Before starting work, turn on the remote controller and keep the throttle at the lowest position or throttle dead zone position before powering the drone.

When the is installed, please avoid the air unit and the GPS module installation position too close to avoid interference. It is recommended that the distance between the air unit and the GPS module is greater than 20CM.

Equipment idle, carrying, recycling

When you have Reebot products idle, or to carry Reebot products out of work, or the product has reached the service life, please pay special attention to the following matters:

Danger

Reebot products should be kept away from areas easily touched by children when they are idle.

Please avoid Reebot products placed in hot (60 degrees Celsius), cold (minus 20 degrees Celsius) environment.

Attention

Please avoid placing Reebot products in a humid or dusty environment.

When carrying and transporting Reebot products, please avoid operations that may damage components such as vibration or impact.

Chapter 1 Product Overview

1.1 Introduction to Products

UniDrone E900 (hereinafter referred to as "E900") is the multifunctional drone platform with modular functions, horizontal folding of the arm, quick release of the tripod, dual compatibility of intelligent battery and soft pack battery, and adaptation to multi-module equipment.

E900 has dual IMU redundant flight control, forward lidar obstacle avoidance, 4K HD FPV flight camera, E900 gimbal camera with multiple protocols (MAVLINK SBUS UART network serial port), can use up to two gimbal cameras, is equipped with multiple interfaces, and meets the expansion functions of different protocols. E900 is equipped with night flight lights, is convenient for night identification of aircraft, and innovates compatible design of intelligent battery and soft pack battery, users have more battery programs, intelligent battery no-load time up to 56 minutes.

UniDrone E900 handheld ground station (hereinafter referred to as "handheld ground station"), the handheld ground station has a 7-inch 1080P high-definition high-brightness touch display screen. Based on the in-depth development of the Android system, it integrates high-performance points and innovative designs such as 2.4G/5G dual frequency, 35KM remote controller distance, transmission code rate as high as 65MbpS, AES encryption, 1600 nits, quick release, quick release, quick release, quick release, quick release, quick release and quick release of battery, quick release of 8 hours, with WIFI and Bluetooth function.

1.2 Features Highlights

E900 uses high reliability dual IMU Redundancy design and multi-frequency link system, the fuselage is made of engineering plastics and carbon fiber materials to ensure flight safety to the greatest extent; 4k HD FPV flight camera and forward laser obstacle avoidance radar let the user the

flight is safer, the fuselage can reach IPX4 waterproof, and it can still perform tasks efficiently in rainy days; built-in RTK module can realize centimeter-level positioning and orientation, built-in remote Identification Module, can provide real-time detection, prompt the surrounding aircraft situation, and send out information about its own aircraft, to ensure the safety of the aircraft.

Intelligent function: AI algorithm is built-in, which can track and follow the target object and realize intelligent follow-up (Use the corresponding SIYI gimbal equipment.).

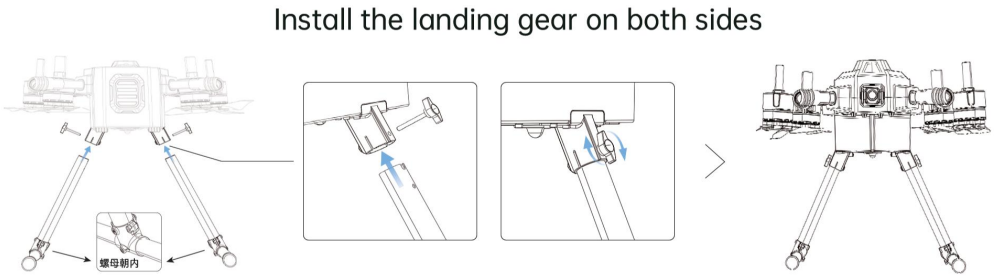
Multi-load capacity: It supports the combined use of front double gimbal and lower single gimbal, which can meet different application scenarios. It is equipped with multi-channel serial port, CAN port, XT30 and XT60 power interface to meet different expansion functions.

1. 3 system assembly

1. 3 .1 Mounting tripod

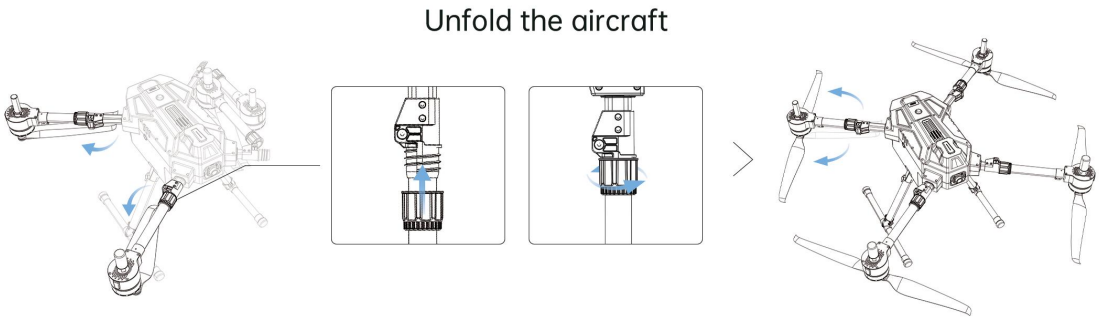
1. Align the tripod with the tripod mount and install it into the fuselage. Note: The position of the tripod nut is inward

2. Place the fuselage on a horizontal surface, insert the T-shaped hand screw and tighten it clockwise.

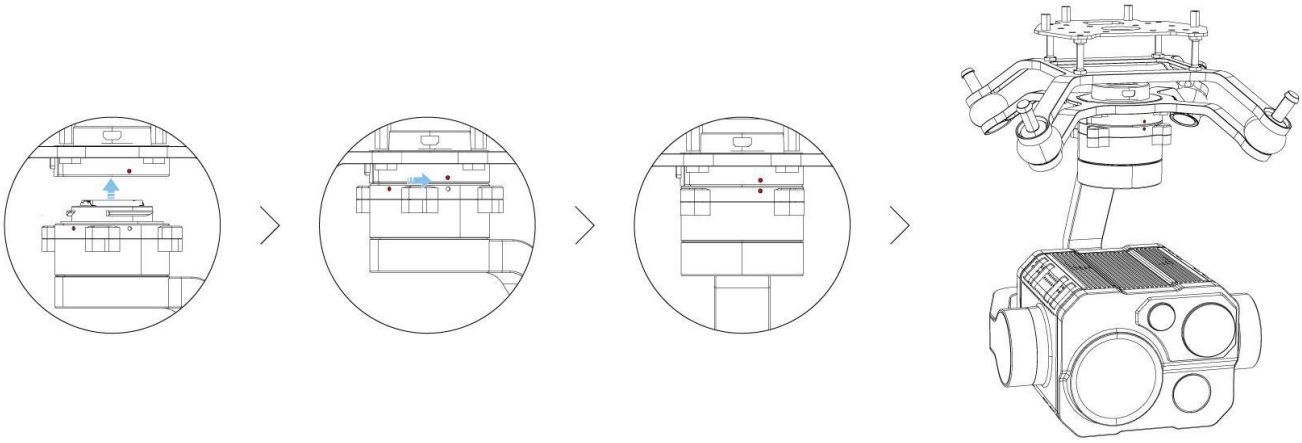


1. 3 .2 Expand the arm and propeller

Unfold the four rotorcraft arms and tighten the arm fastening set. Then spread the paddle straight out.

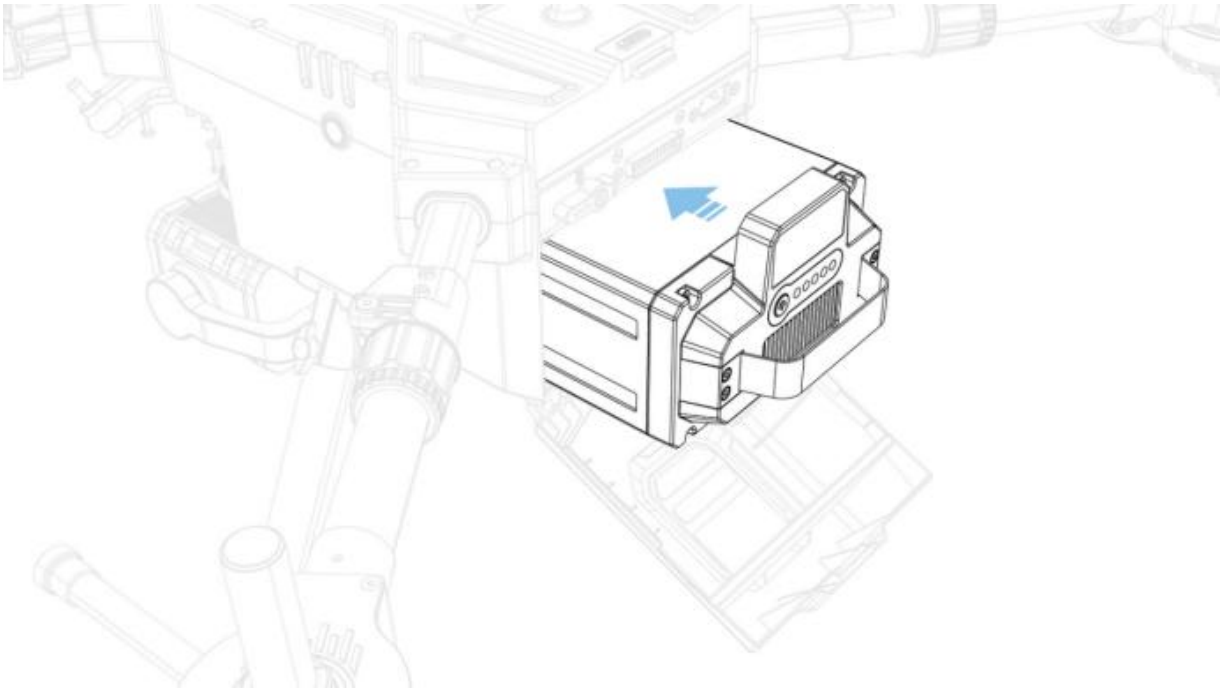


1. 3 .3 Install gimbal camera



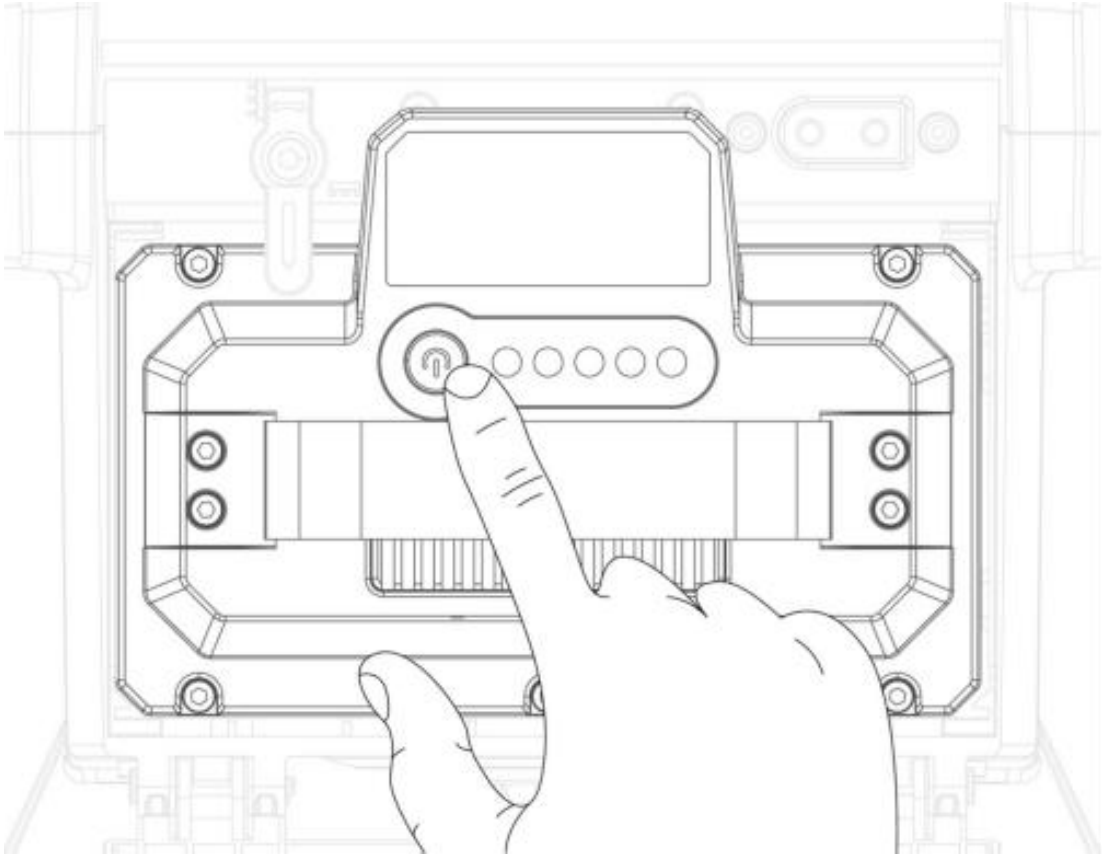
1. 3 .4 Install Smart Flight Battery

Insert the smart flight battery as shown



Check the power: short press the battery power button once

Turn on the power: short press the smart power button once, long press within 3 seconds to turn on/off the power



Chapter 2 Flight Safety

2.1 Flight Environment Requirements

Do not fly in bad weather, such as strong winds (wind speed greater than 12 m/s). When flying in the rain, always follow the requirements described in the IPX4 class of protection instructions.

2. Ensure that the aircraft takes off on an open, unobstructed and flat ground, and needs to be far away from surrounding buildings, trees, people, water surface, etc. Please keep flying within the sight distance. If over-the-horizon flight is required, please ensure that the aircraft is in good condition and the user has the corresponding qualification. Before flying, please confirm whether it meets the requirements of local regulations for over-the-horizon flight.

3. Do not take off from the surface of moving objects (such as moving cars, boats).

4. Please avoid sand and dust road when landing, otherwise it will affect the service life of the motor.

2.2 Wireless Communication Requirements

1. Make sure that the aircraft antenna is intact and not damaged or detached.

2. Ensure that the aircraft is operated in open areas or on high ground. Tall reinforced buildings, mountains, rocks, and woods may block the GNSS and map-transmitted signals of the aircraft.

3. As other wireless devices will interfere with the remote controller, it is recommended to use the remote controller to control the aircraft flight around the high-power radio, away from the base station and other strong interference equipment.

4. Please be careful when flying near the source of electromagnetic interference, and continuously observe whether the image transmission screen of UniGCS App is stuck and whether the signal strength of the image transmission is weak. Sources of electromagnetic interference

include, but are not limited to: high-voltage power lines, high-voltage transmission stations, mobile phone base stations, and television broadcast towers.

Chapter 3 Automatic Return

The aircraft has an automatic return function, which is mainly divided into return, low-power return and out-of-control return according to the return trigger mode. If the return point is successfully recorded before takeoff and the GNSS signal is good, the aircraft will automatically return to the return point and land when the user actively starts the return, the aircraft's low battery triggers the intelligent low battery return, and the loss of communication signal between the remote controllerler and the aircraft triggers the uncontrolled return. In the process of automatic return, the user can not adjust the direction of the nose, and can not control the aircraft to fly to the left and right.

3.1 Manual Return

Manual return can be initiated by pressing the RTL button on the remote controller. During the return process, the heading is uncontrollable. If the RTL button on the remote controller is pressed briefly or if another mode is switched during the return, the user can regain control of the aircraft.

Return process

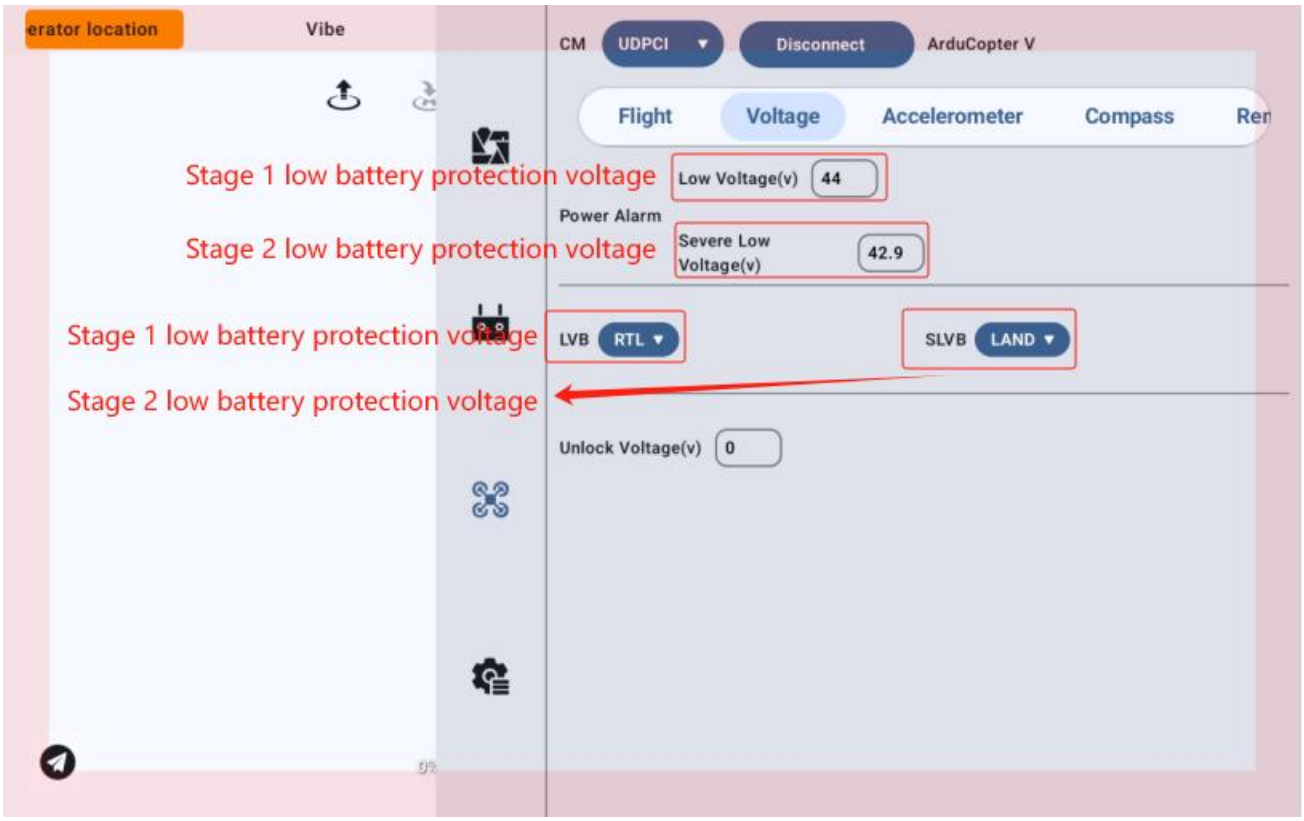
1. The aircraft records the return point.

2. Trigger the return condition (triggered by the user using the remote controller or by the aircraft low battery).

3. The aircraft confirms the return point and automatically adjusts the nose direction.

4. The aircraft automatically flies above the return point, enters the landing protection process, and the aircraft lands or hovers directly. For details, see Landing Protection Function ".

3.2 low battery return



To prevent unnecessary risks caused by insufficient battery power, the aircraft will identify whether low battery protection behavior should be triggered based on the set protection voltage. If the user does not make a selection within 10 seconds, the aircraft will automatically enter return-to-home (RTH) mode after 10 seconds. During the return process, the user can briefly press the return-to-home button on the remote controller or switch to another flight mode to cancel the return.

Low battery return-to-home will only occur once during a single flight. If the user cancels the low battery return reminder and continues flying, it may result in the aircraft having insufficient battery power to return, leading to a forced landing and potential loss or crash of the aircraft.

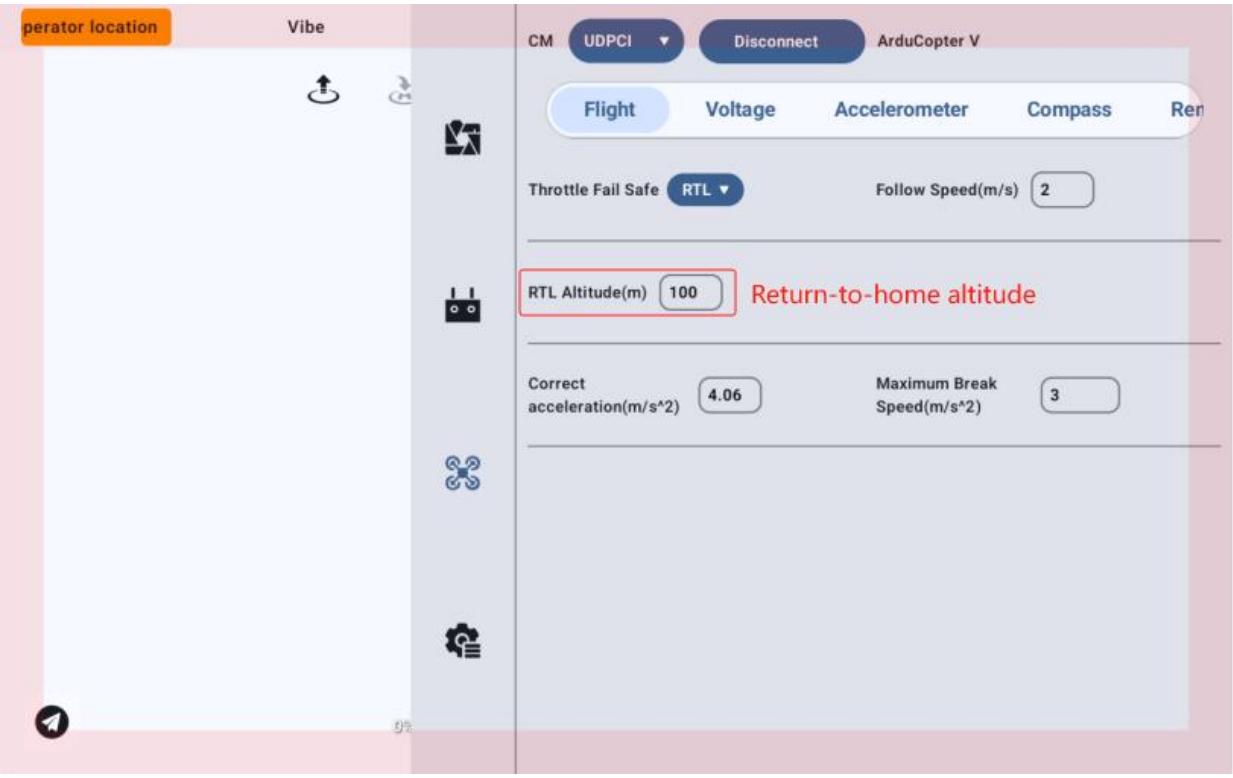
If the aircraft continues flying with low battery, when the set second-stage protection voltage is

triggered, the aircraft will initiate the set landing behavior. During the landing process, the user can control the aircraft’s lateral movements to choose a suitable landing spot, or switch flight modes to cancel the aircraft's continuous descent.

Options (Parameters ardupilot Return)

RTL_ALT: The minimum altitude of the aircraft before returning to home.

Set to zero to return at the current altitude.



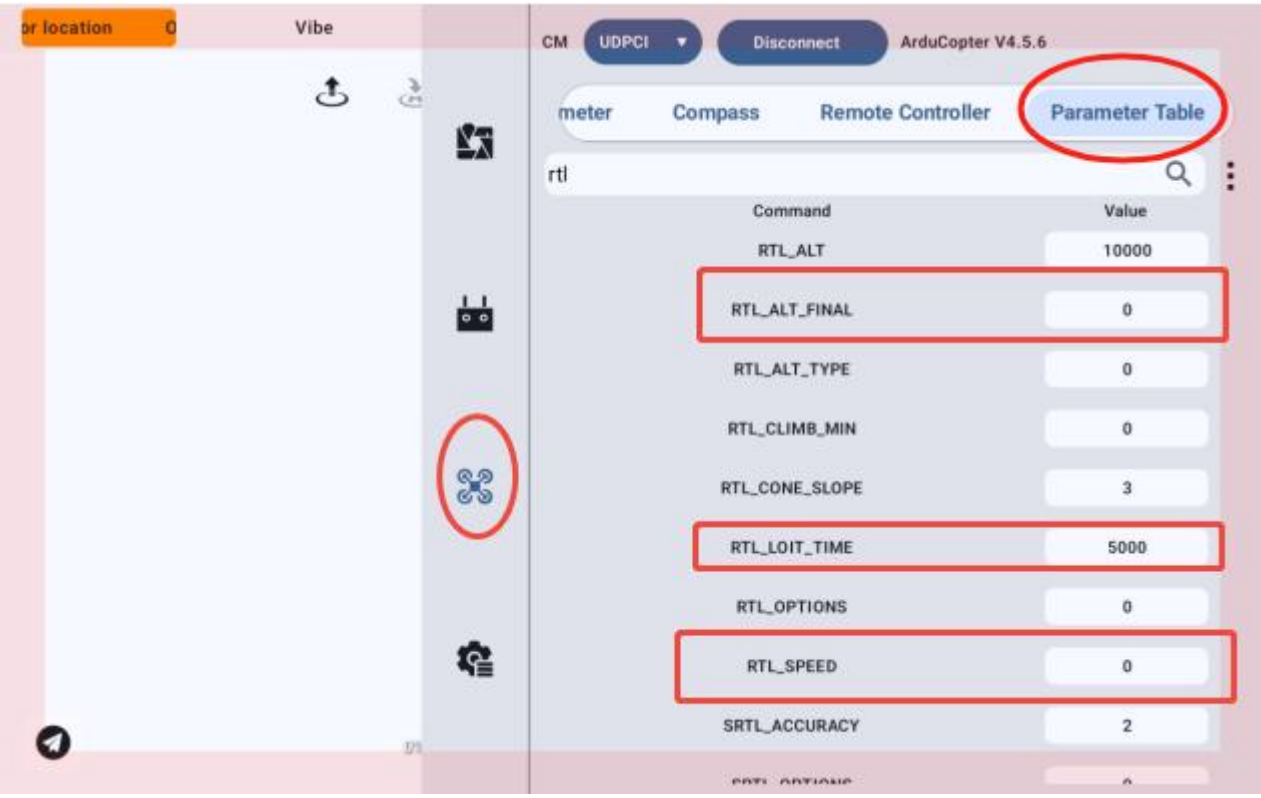
The default return altitude is 100 meters.

RTL_ALT_FINAL: In the final stage of the return flight or after completing a mission, the aircraft will reach the altitude.

Set to zero and the aircraft will land automatically.

RTL_LOIT_TIME: The time in milliseconds to hover above the "home" point before the final descent.

The hover time can be adjusted from 0 to 60,000 milliseconds.



WP_YAW_BEHAVIOR: Sets how the autopilot controls the "Yaw" during missions and homecoming ".

0 = Never change Yaw.

1 = The nose is facing the next waypoint or, for return, the nose is facing the "home" point.

2 = The nose is facing away from the next waypoint, or for return, the nose is facing away from the "home" point.

LAND_SPEED: The rate of descent during the final landing phase, in centimeters per second.

The landing speed is adjustable from 20 to 200 centimeters per second.

Attention:

Other navigation settings also affect the RTL mode:

WPNAV_ACCEL

WPNAV_SPEED_DN

WPNAV_SPEED_UP

To use return, GPS positioning is required to establish a "home" point or take-off position before unlocking and taking off.

Landing and unlocking the aircraft again will reset the "home" point, which is a great feature when flying in the field.

If you get a fix for the first time while in flight, the "home" point is set to the position at the time of fix.

If the RTL_ALT is set to a number other than 0, it will reach and maintain this height on return.

Return uses WPNAV_SPEED to determine how fast to return.

Once the aircraft reaches the 'home' point, it will first enter hover mode and then land.

To stop the automatic landing, simply use the control switch to change the mode and clear the landing timing, and you can resume normal flight.

Attention

If you do not know the above parameters, please do not modify the corresponding parameters to avoid risks. If you do not understand and want to modify the corresponding parameters, please contact technical support or relevant professionals.

3.3 Fail-safe Return to Home

After triggering the radio fail-safe protection, the drone will perform the previously set operation; such as no operation, immediate landing, RTL or SmartRTL (Return/Smart Return). It can also be configured as an automatic route to bypass the fault protection and continue the route, or continue the landing if it is already in the landing phase.

- If the multicopter is already locked, no failsafe is performed.
- If the multicopter has unlocked but landed, it will lock immediately.

- If the multi-rotor is unlocked in stabilize or Acro mode, and the throttle output value is minimum, the drone will be locked.

Note: The UniDrone E900 remains in its fail-safe mode if the fail-safe clears (I. e. the remote controller transmitter and receiver re-establish communication). It does not automatically return to the flight mode that was active before the failsafe was triggered. This means that, for example, if the drone is in Loiter when a fail-safe occurs and the flight mode automatically changes to RTL, the drone will remain RTL even if the transmitter and receiver reestablish communication. If the pilot wants to regain control in Loiter, he needs to switch modes through the remote controller transmitter and then return to Loiter.

Chapter 4 Compass Calibration

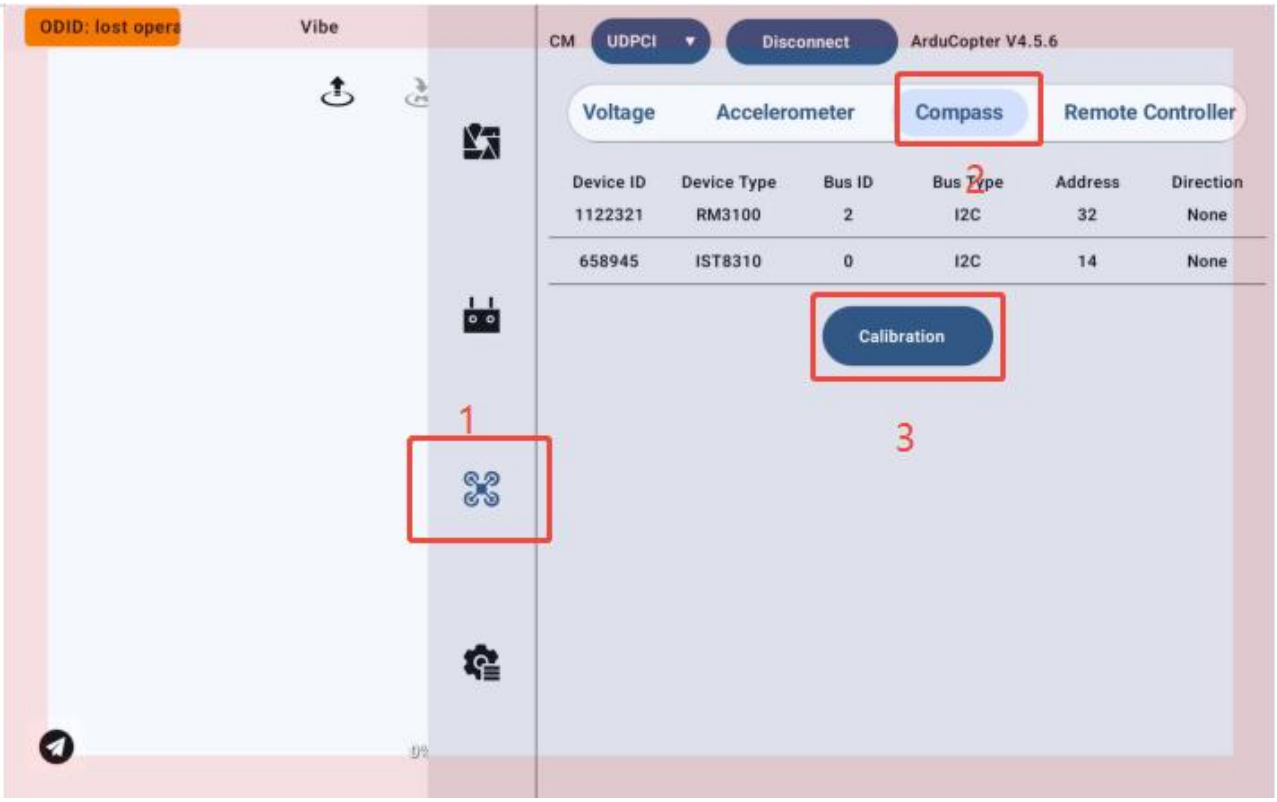
Note:

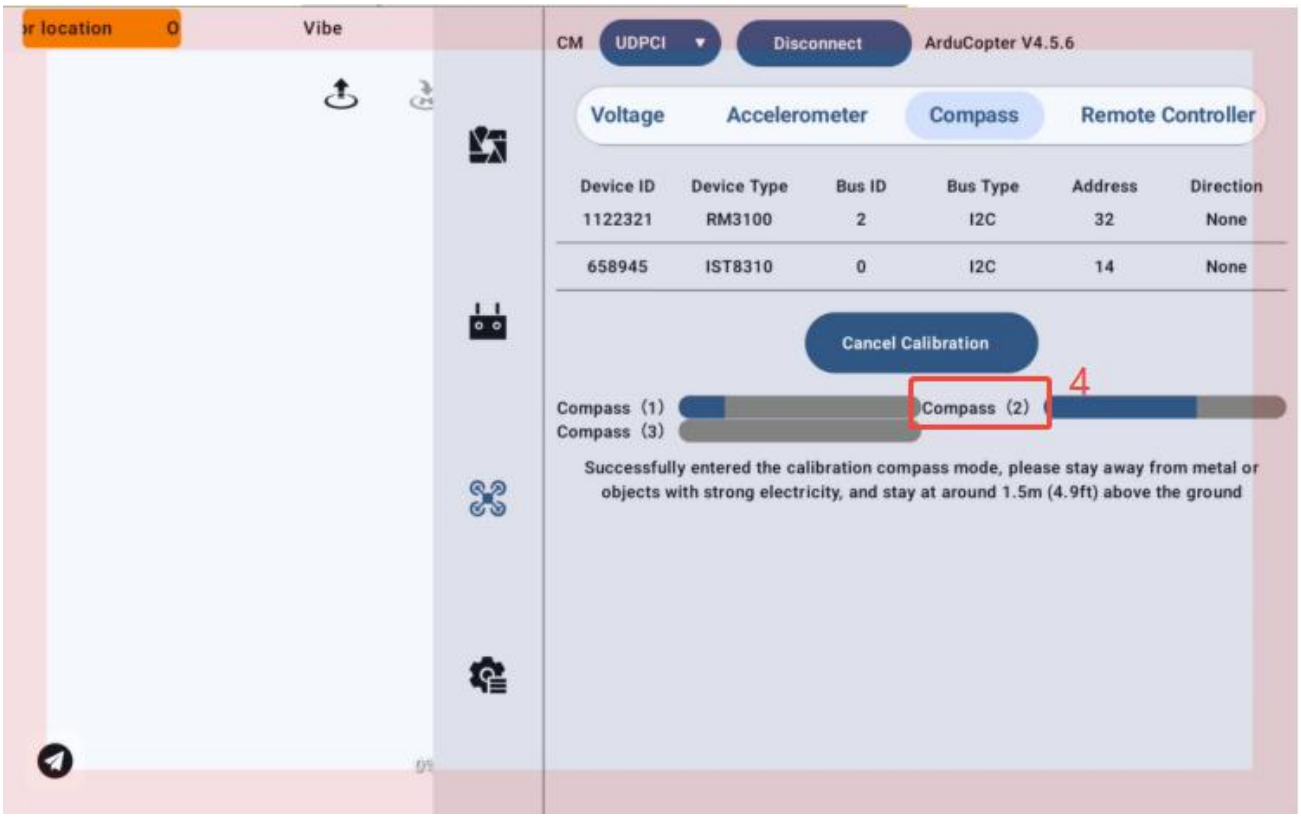
Do not calibrate in areas with strong magnetic fields or near large metal objects, such as magnetic ore, parking lots, or buildings with underground steel reinforcements.

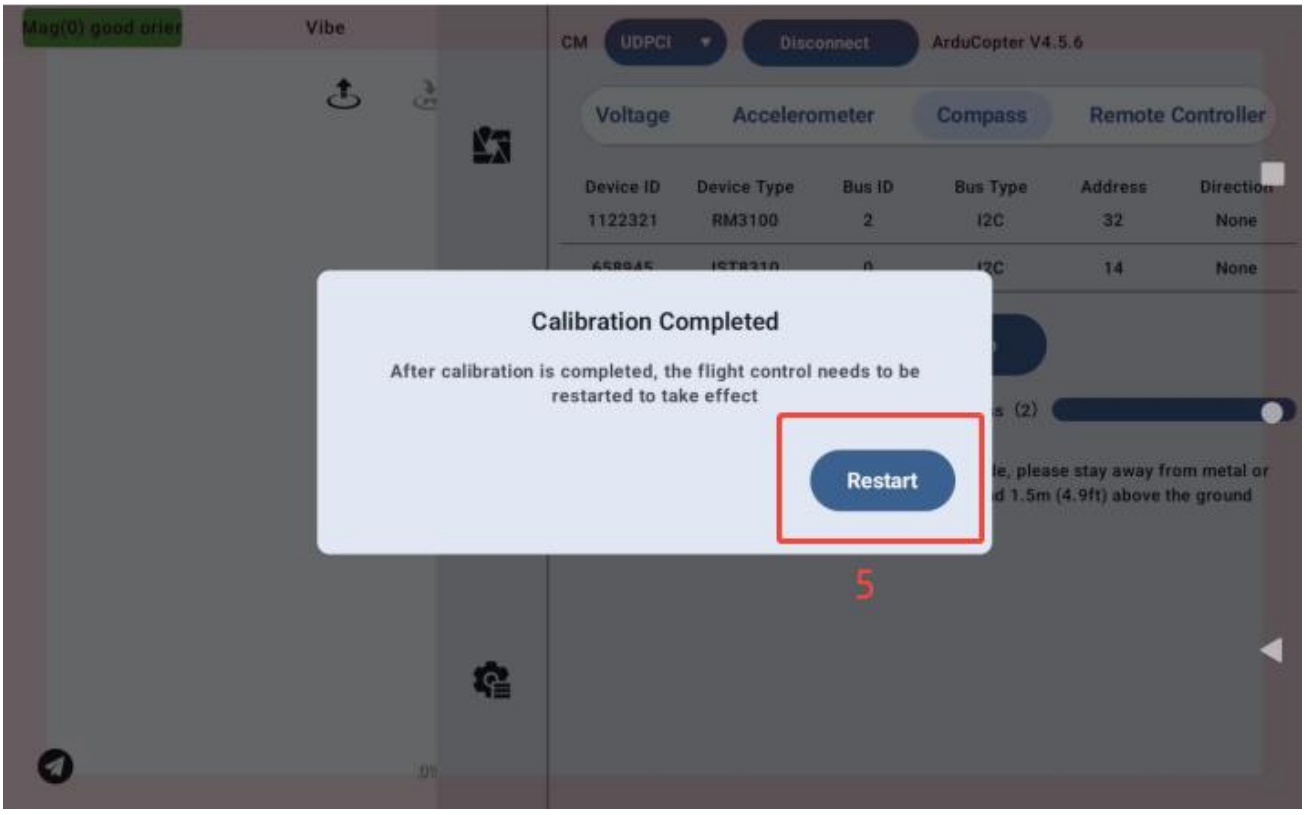
Do not carry ferromagnetic materials, such as mobile phones, during calibration.

4.1 Using UniGCS Ground Station for Compass Calibration

1. Open the compass calibration interface in sequence.
2. Perform motor calibration.
3. Lift the drone and rotate it in different directions so that each side (front, back, left, right, top, and bottom) points downward toward the Earth for a few seconds, until the progress bar in Compass 2 is fully loaded.
4. Restart the aircraft.







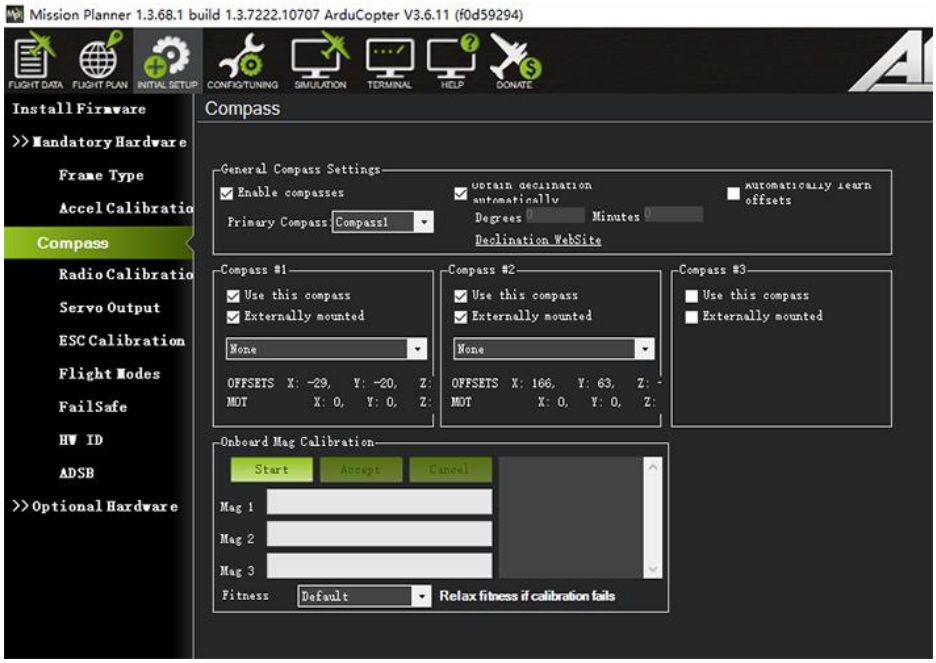
Note:

• Do not calibrate in areas with strong magnetic fields or near large metal objects, such as magnetic mines, parking lots, or construction areas with underground reinforcement, etc.

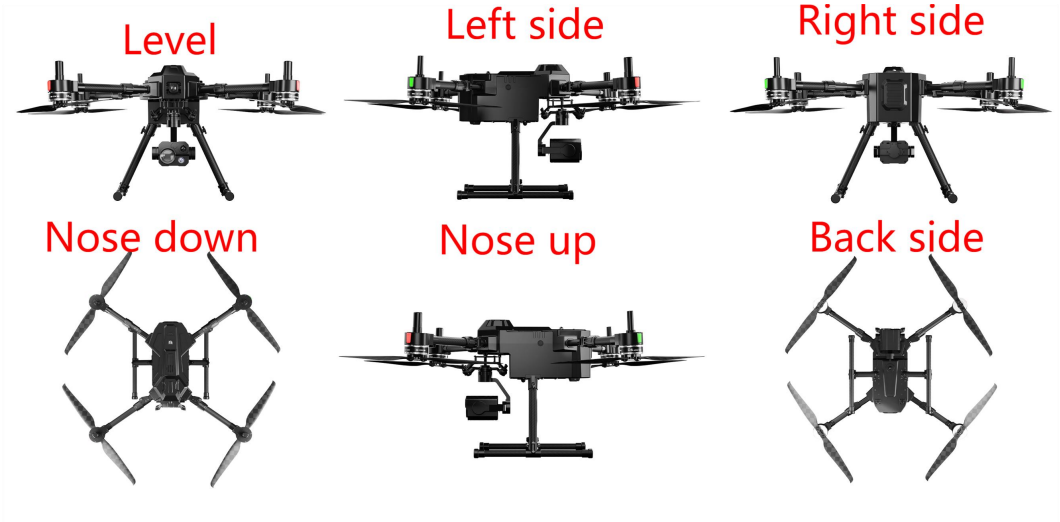
• Do not carry ferromagnetic objects, such as mobile phones, during calibration.

4.2 Using Mission Planner Ground Station for Compass Calibration

- Click the Start button

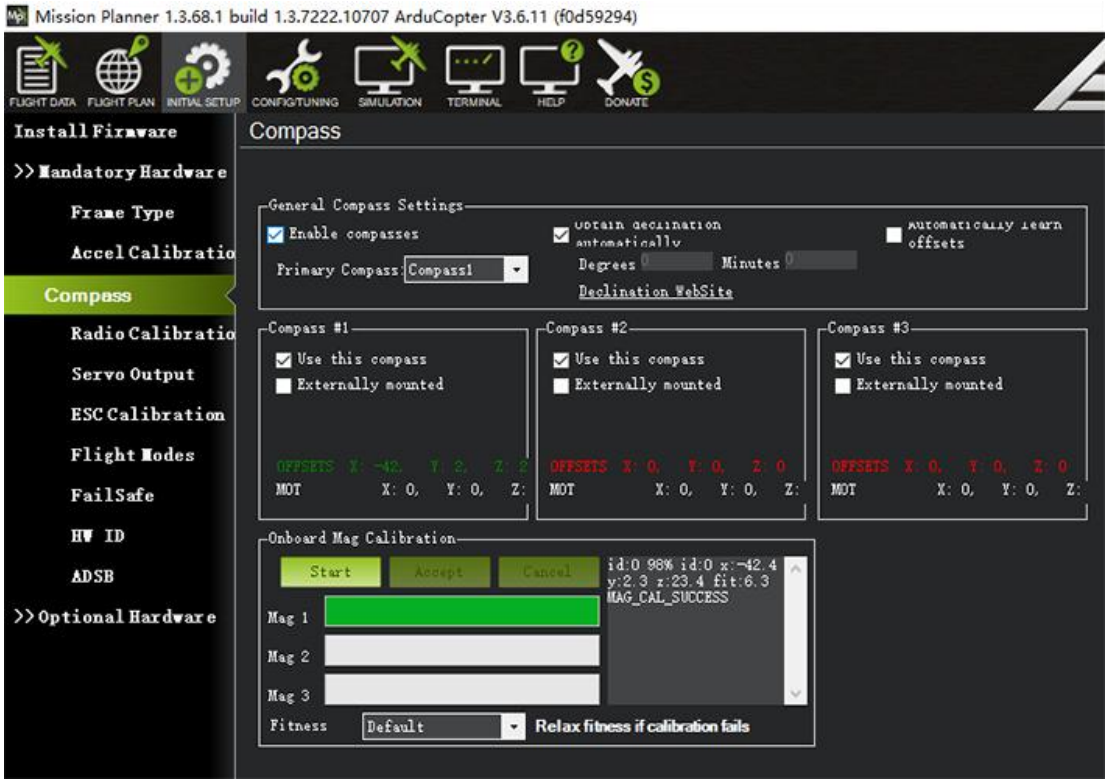


- Lift the drone and rotate it in different directions so that each side (front, back, left, right, top and bottom) points down to the earth for a few seconds



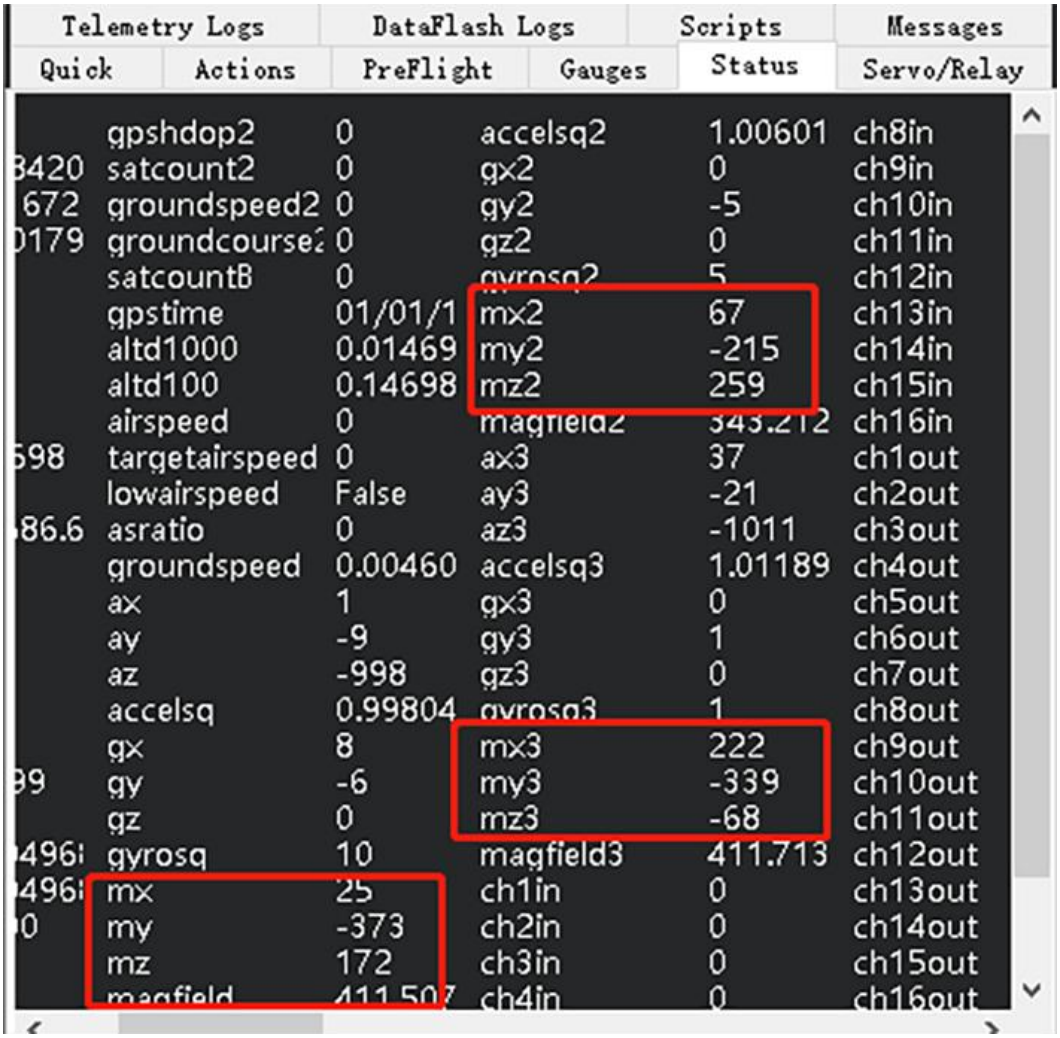
- When the drone rotates, the green indicator bar should extend farther and farther to the right until the calibration is completed

- After successful completion, three prompts will sound, and the "Please restart the autopilot" window will appear. Switch to other interfaces and switch back to this interface to check the offset value obtained by calibration. If the offset value is green, it means good (the absolute value of each offset is <400); Yellow is acceptable (the absolute value of each offset is <600); Red is but not zero (there may be magnetic field interference)



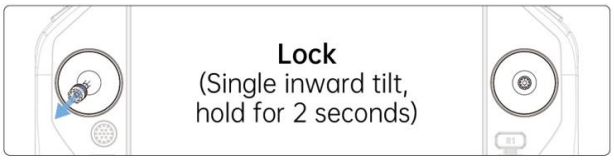
- After the calibration is complete, you need to restart the autopilot.

Note: If the calibration fails: you will hear a fault tone, the green bar may be reset to the left, and the calibration routine may restart (depending on the ground station). If the compass cannot be calibrated after multiple attempts, Press the "Cancel" button and change the "Eligibility Level (fitness)" drop-down list to a more relaxed setting, and then try again. If the compass calibration still fails, you can find the compass that may have magnetic interference through the "Flight Data" status bar interface. The failure of compass calibration is generally caused by the interference of magnetic fields around a single compass or multiple compasses. You can analyze the data of the compass (mag) marked in the above figure. Under normal circumstances, before the compass calibration is completed, the data of X, Y and Z do not exceed 700 (regardless of positive or negative), and the fluctuation does not exceed 20; if the above conditions are not met, there may be continuous/non-continuous magnetic field interference; you can adjust the installation position of the compass or remove the interference source.

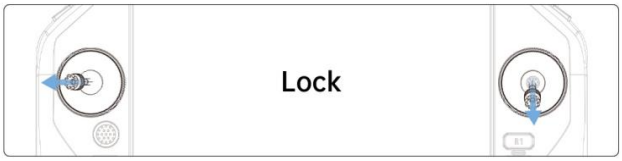


Chapter 5 Manual Start/stop of Motor

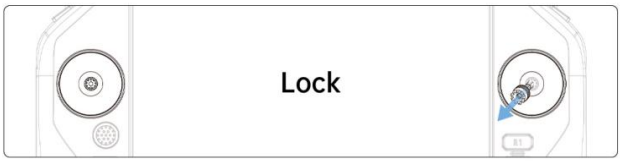
5.1 Mode 2 (American Style) (current default)



5.2 Mode 1 (Japanese Style)



5.3 Mode 4 (Chinese Style)



Chapter 6 Basic Flight

6.1 Basic Flight Overview

1. Place the aircraft on flat, open ground with the tail of the drone facing the operator.
2. Turn on the remote controller and then the aircraft power in sequence.

3.Run the UniGCS app and enter the flight interface.

4.Wait for the aircraft to pass the self-check.

5.Perform the corresponding joystick actions to start the motors. Slowly push the throttle stick upwards to allow the aircraft to take off smoothly.

6.When descent is needed, slowly pull the throttle stick down to allow the aircraft to descend gently to a flat surface.

7. After landing, pull the throttle stick to the lowest position and wait for the drone to enter idle mode. Lock it in place until the motors stop.

8.After the aircraft has stopped, turn off the aircraft and remote controller power in sequence.

6.2 Practical Function Overview

6.2.1 One-Key Takeoff Function

6.2.2 One-Key Landing Function

Chapter 7 Pre-Flight Inspection List

7.1 preflight inspection list can be used as a preflight inspection reference for daily operations

1 The remote controllerler and the aircraft battery are fully charged, and the aircraft battery is installed in place and locked.

2. Ensure that the propeller of the aircraft is installed and fastened without damage and deformation, the motor and propeller are clean and free of foreign matters, the propeller and the arm are completely unfolded, and the arm sleeve and landing gear are locked.

3. All device firmware is the latest version of the official website.

4. Ensure that the lenses of the vision system, FPV flight camera, gimbal camera, infrared sensor, and fill light are free of foreign matter, dirt or fingerprints, and are not blocked by the load on the fuselage or external accessories.

5. Make sure the remote controller antenna is deployed.

6. Turn on the remote controllerler and the aircraft, ensure that the flight gear switching switch is in loiter mode, and check whether the remote controllerler status indicator light and the flight control authority button are always green to ensure that the frequency of the aircraft and the remote controllerler is in normal state and has the control right of the aircraft.

8. Place the aircraft outdoors in a flat and open area to ensure that there are no obstacles, buildings, trees, etc. around, and the pilot is 5 meters away from the aircraft and faces the tail.

9. If multiple aircraft operate at the same time, please divide the airspace to avoid air collision.

7.2 safe operation

- Do not approach the rotating propeller and motor, please confirm that the drone motor is

locked before approaching.

- Before takeoff, make sure that the power battery and remote controller are fully charged.

During flight, make sure that the power is sufficient for returning.

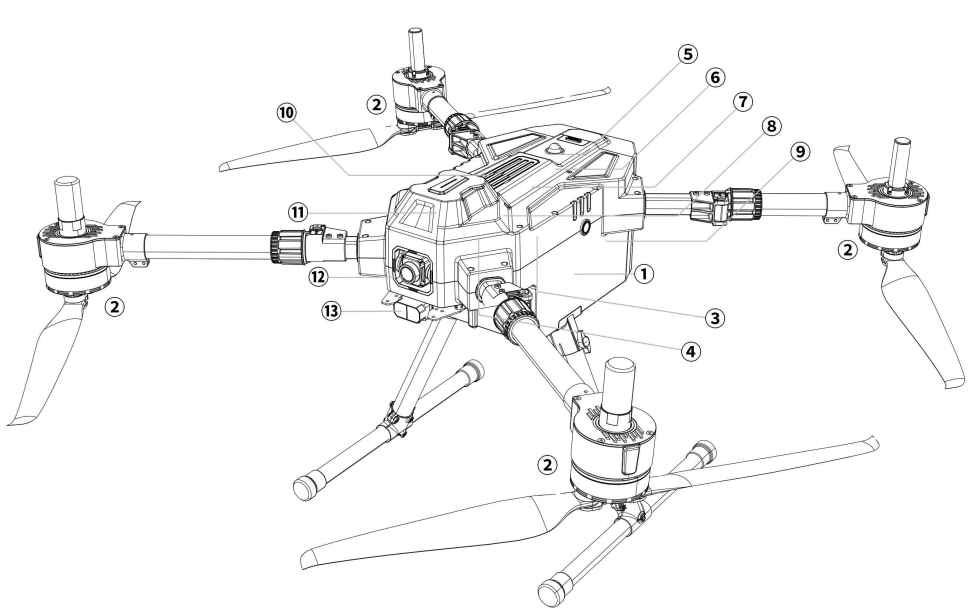
- Fly away from the crowd and take safety precautions.
- Non-professional technicians shall not disassemble or change the aircraft design, firmware

program and parameter configuration without authorization; otherwise, serious losses will be caused.

Chapter 8 Aircraft

UniDrone E900 aircraft is mainly composed of flight control system, communication system, AI system, image processing system, power system and battery system. This chapter describes the function of each component on the aircraft in detail.

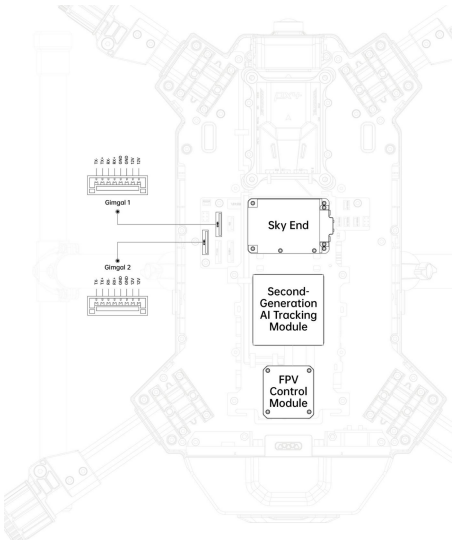
8.1 understanding of aircraft

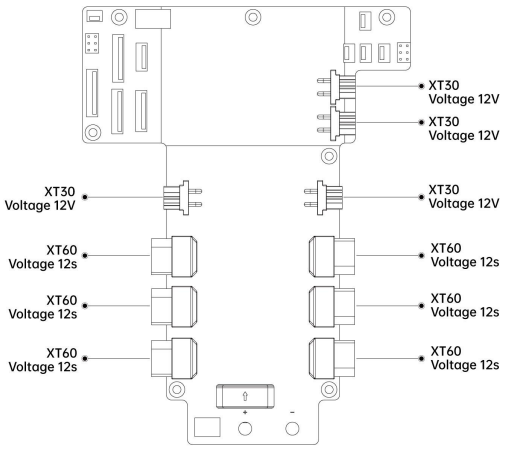


① Frame
② Power System
③ Central Board
④ RTK Positioning and Orientation Module
⑤ Strobe Light
⑥ FPV Control Module
⑦ Second-Generation AI Tracking Module
⑧ Sky End
⑨ Smart Battery
⑩ Cooling Module
⑪ Flight Control System
⑫ FPV Camera
⑬ Obstacle Avoidance System

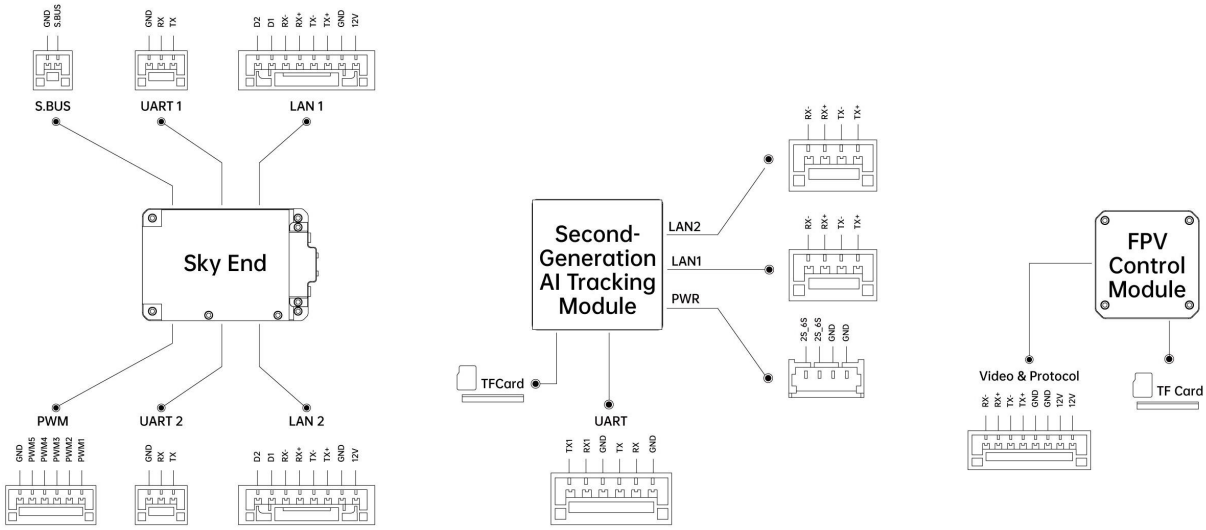
8.1.1 Interface Definition

- **UniDrone E900 Central Edition**





- **UniDrone E900Control Module**



8.2FPV Flight Camera

The UniDrone E900 is equipped with a 4K ultra-wide-angle FPV camera, and the pod/PTZ viewing angle and flight viewing angle are freely switched, making flight safer.

Illustration information:

① FPV wide angle: 122 degrees in the vertical direction, 113 degrees in the horizontal direction

② FPV lens pitch angle: 68 degrees

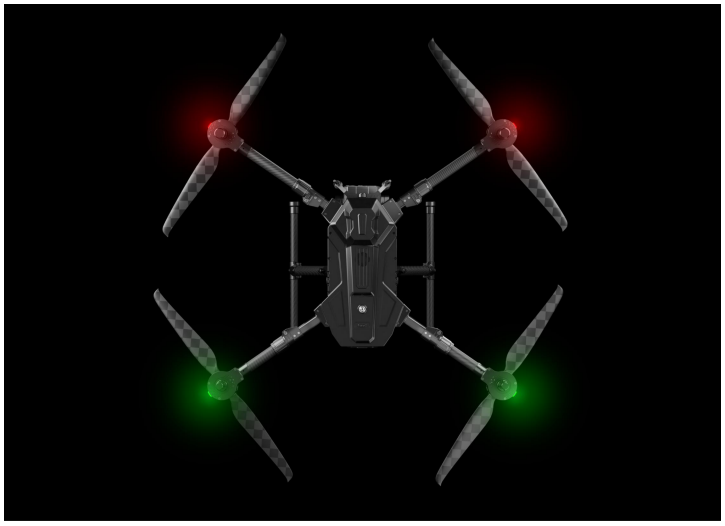
③ FPV lens mode: pitch follow mode + FPV mode

8.3 propeller

Equipped with carbon fiber paddle blade, lightweight material, high strength and more durable, high rigidity without deformation, corrosion resistance, stable performance, high precision, stable operation

Note Since the blades are thin and sharp, please operate carefully to prevent accidental scratches.

8.4 aircraft propulsion system indicator light



The red light indicates the nose direction of the E900,
while the green light indicates the tail direction of the E900.

The power indicator light colors are defined as shown in the figure below.

Status	Exception information	Buzzer	Indicator light	Suggested countermeasures
Self-test status	Overvoltage, undervoltage	Don't tweet	Yellow light flashing Overvoltage: Short 1 Undervoltage: two short	Check the supply voltage and reduce it reasonably
	O.P. Abnormal	Don't tweet	Yellow light	Contact Technical

			flashing two long and three short	Support
	MOS short circuit	Don't tweet	Yellow light flashing two long and two short	Contact Technical Support
	Motor phase loss	Don't tweet	Yellow light flashing two long and one short	Check whether the motor rotation is stuck
	Throttle missing	Short 1 sound	Yellow light flashing Long 1	Check whether the accelerator harness is damaged and whether the connected equipment outputs corresponding signals.
	Throttle not zero	Rapid short chirping	Yellow light flashing one long and one short	Inspect the throttle travel of flight control and remote controller.
In operation	Throttle missing	Short 1 sound	Yellow light flashing Long 1	The wire harness is loose, the wire harness is damaged, or the signal inserted into the device is not output.
	Throttle stall	Don't tweet	Yellow light flashing Long 1 and short 4	Check the motor for foreign objects
	MOS overtemperature	Don't tweet	Yellow light flashing 1 long and two short	Whether it is within the recommend load range
	Capacitor overtemperature	Don't tweet	Yellow light flashing 1 long three short	Whether it is within the recommend load range
	Full throttle (100%)	Don't tweet	The yellow light will stay on until it is not in full oil state and then return to normal light color.	It is not in the recommend tension range and returns to normal light color until it is not in full oil state.
Electric	No Firmware	Don't tweet	The white light	Upgrade the

Tuning Firmware Upgrade			is always on	firmware after connecting the parameter adjustment software
	Firmware upgrade failed	Don't tweet	The white light is always on	Make sure that the power system works normally and the wiring harness is connected normally, and then try to brush the firmware again.
	Firmware upgrade in process	Don't tweet	Flashing white light	During firmware upgrade, it will return to normal after successful upgrade.

Note: Red, green and blue are normal light colors, which can be defined by the user, or the indicator light can be turned off and flashing. Even if the indicator light flashes off, the yellow light will still flash when the fault is abnormal.

8.5 Gimbal Camera

Unidrone E900 can support SIYI full range of gimbal load combinations, as shown in the following table.

photoelectric pod	ZT30	ZT6	ZR30	ZR10
PTZ camera	A8	A2MINI		

Note: When using the upper and double gimbal loads, it needs to be used with the corresponding gimbal components. Please refer to the appendix for installation details. Please refer to the user manual of the corresponding product for the specific use of the PTZ camera.

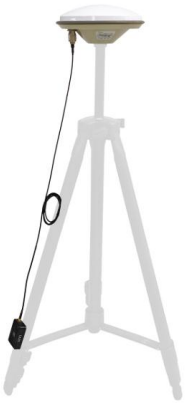
8.6 Obstacle Avoidance System

Unidrone E900 is equipped with forward-looking laser obstacle avoidance, with an effective detection distance of 10m, an effective braking speed of 8 m/s and a laser field of view angle of 3.6 degrees.

8. 7 aircraft RTK

The aircraft has a built-in RTK module and RM3100 industrial magnetic compass, which can realize single-module dual-antenna direction finding, support Beidou, GPS, GLONASS, Galileo and QZSS all-system full-band high-precision positioning, and greatly improve positioning accuracy and reliability. In the complex electromagnetic environment, it still has excellent anti-jamming performance, which provides high-precision control response for the UAV system and realizes accurate operation.

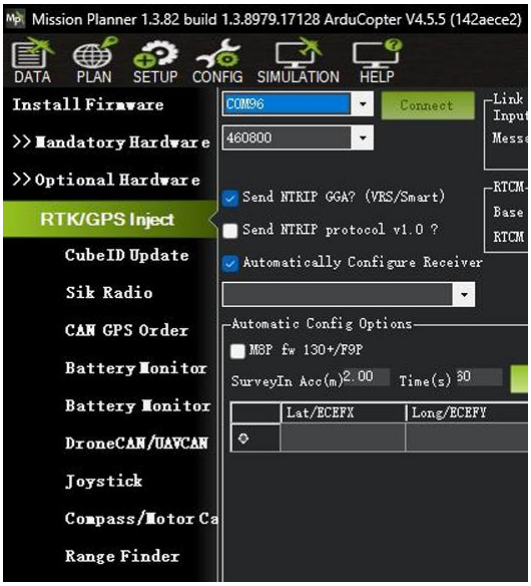
Base station side description

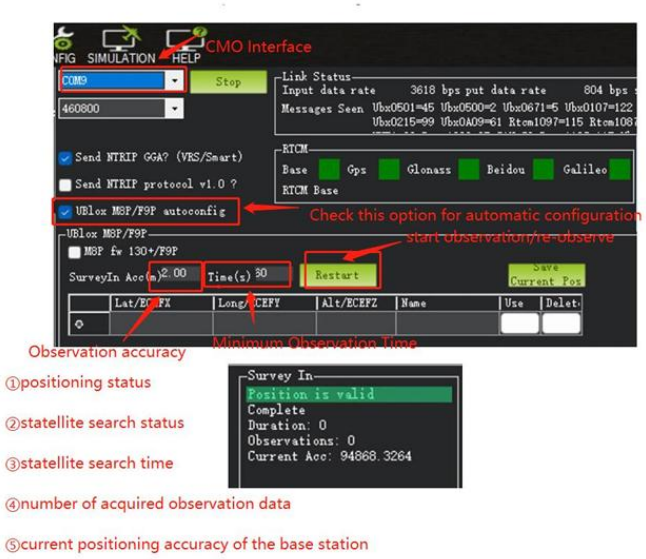


Note: The tripod should be provided by the user. Please ensure that there are no obstacles or interference sources around the RTK antenna to avoid affecting convergence time and positioning accuracy.

ground station parameter settings:

Run mission planner ground station software and enter Initial Setup → Optional Hardware → RTK"



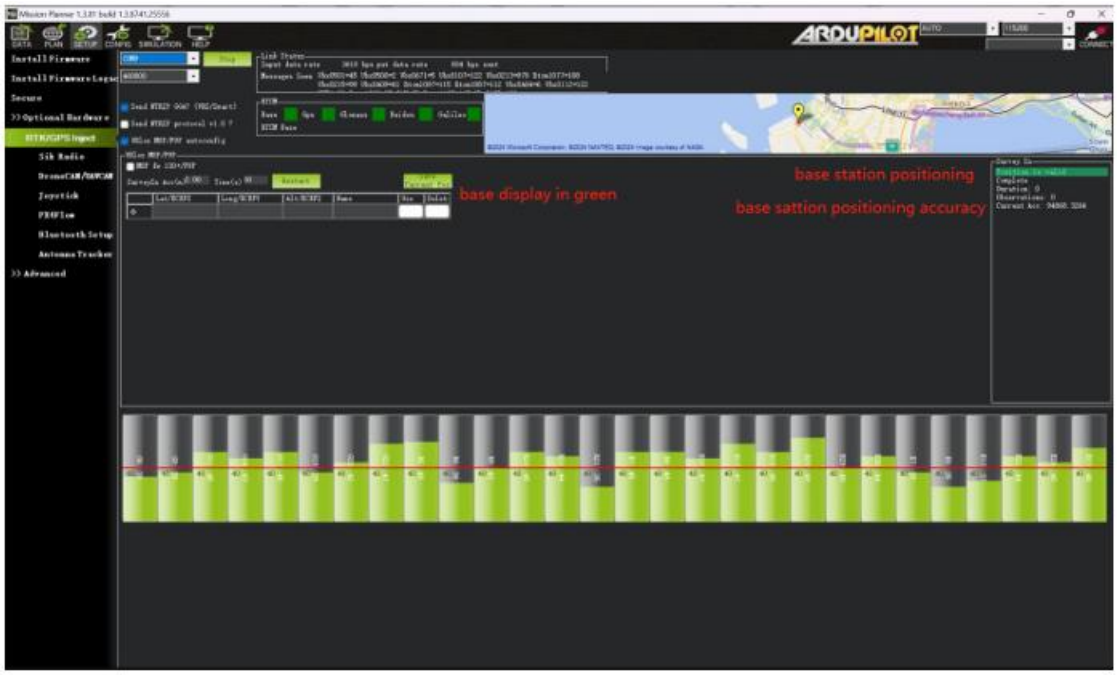


It is recommended to check the automatic configuration F9P, set the observation accuracy to 2.5, and set the minimum observation time to 60s.

After the setting is completed, click Restart to start observation

Note:

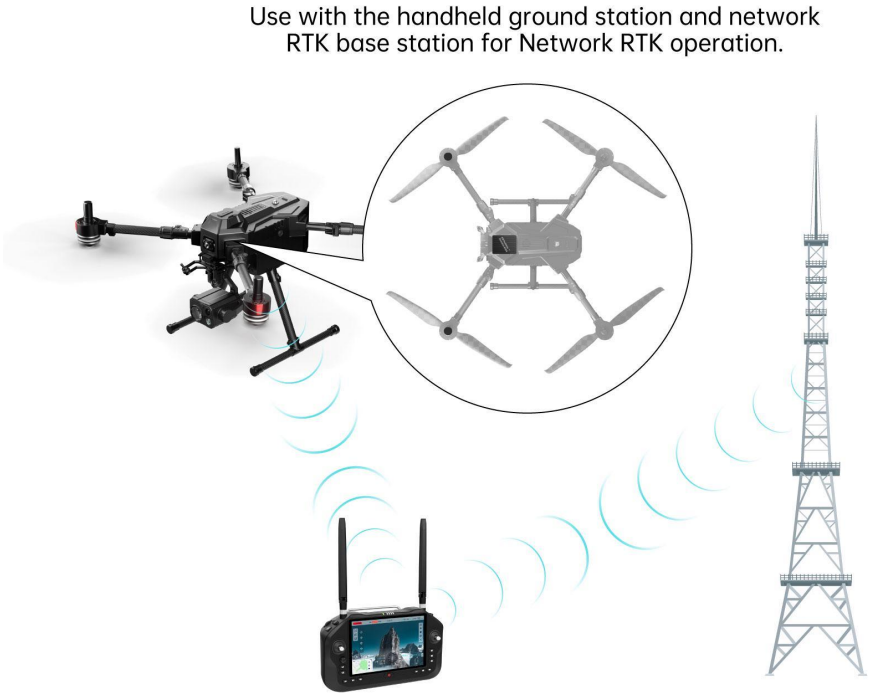
After the successful positioning of the base station, it is strictly prohibited to move the base station! When the base station works normally and the convergence ends, the ground station interface is shown below.



The GPS status is displayed as rtk fixed, I .e. the RTK positioning status is entered.

Use network RTK with handheld ground station

Handheld ground station with RTK mobile terminal and network RTK base station can realize network RTK function



Use the handheld ground station to run the Mission Planner ground station software and connect the handheld ground station to the mobile Internet. Go to Initial Settings> RTK > NTRIP ".

The protocol address format is as follows (take Chihiro RTK as an example): http://USER:PASSWORD@rtk.ntrip.qxwz.com:8002/RTCM32_GGB

Among them, USER is the FindCM service account name applied by the user, PASSWORD is the corresponding password, rtk.ntrip.qxwz.com is the FindCM service address of qianhe location server, 8002 port broadcasts WGS84 coordinate system data, and RTCM32_GGB is the data source for externally broadcasting RTCM3.2 format data.

Note:

For more detailed information, please consult the official website document of Chihiro network RTK:

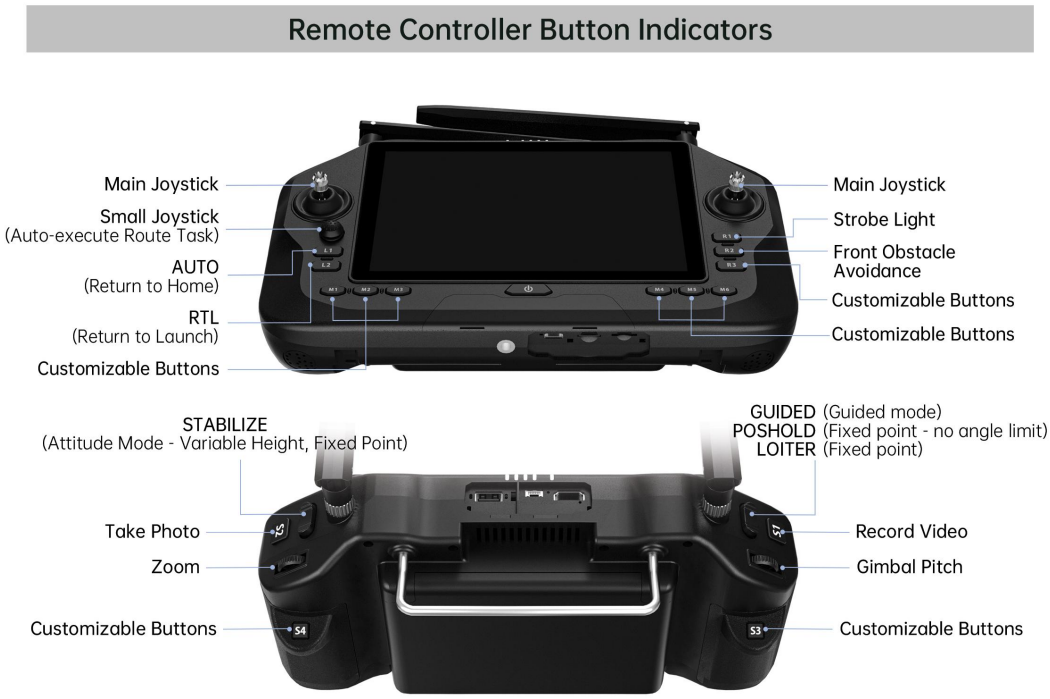
Chihiro findcm_ Frequently Asked Questions-Chihiro Location Help Center (qxwz.com)

After correctly obtaining the base station data, you can view the protocol number, data rate, base station coordinates, satellite number, and signal-to-noise ratio on the RTK/GPS inject page.

8.8 Remote Identification Module

Item	Value or Description
Broadcast Protocol	Wi-Fi Beacon
Trigger Conditions for Starting and Stopping Broadcast Messages (Broadcast Operating Interval)	Drone power-on / power-off
Broadcast Frequency Band or Channel	2400MHZ-2476MHZ
Broadcast Frequency	1hz
Message Data Update Rate	1hz
Abnormal Status Notification Method	Text
Emergency States and Trigger Conditions for Unmanned Aircraft	Low battery protection, disconnection protection
Abnormal Status and Trigger Conditions for Remote Identification of Unmanned Aircraft	Disconnection of the remote identification module

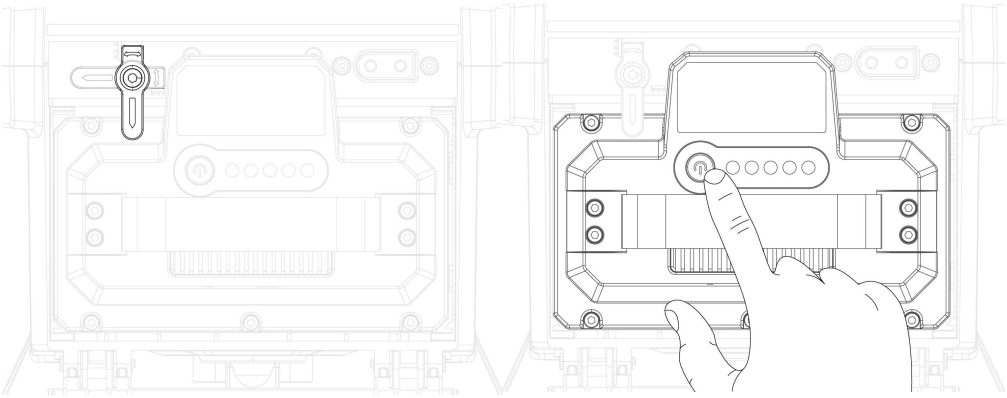
Chapter 9 remote controllerler



9.1 Takeoff

1) Turn on the drone remote controller and place the remote controller antenna correctly.

2) Install the battery and confirm that the smart battery limit is open (smart battery short press and long press to turn on).



3) Toggle the UAV mode lever to switch the mode to Loitor mode after confirming that the flight mode is correct; Pull down the throttle lever to the lowest level, pull the direction lever to the far right, and wait for the UAV to unlock.

4) When the throttle lever is kept above the neutral position, the aircraft will take off at a vertical rising height. When the throttle lever is kept in the neutral position, the drone will maintain the height. At the same time, when the pitch and roll joystick is kept in the neutral position, the drone will hover in the air to maintain position.

5) If you need the airplane to perform a course task (the course task must be written before the flight), you can switch the flight mode to AUTO mode, and the airplane will automatically climb and perform the course task without manual intervention.

6) Fully automatic route operation:

After the route is uploaded, click the takeoff command to increase the airplane to the default altitude (10m).

Note: After the UAV is automatically unlocked and climbs to the specified altitude, the UAV will automatically execute the route task by clicking the AUTO button.

In fully automatic flight mode, no manual intervention is required for return and landing.

9.2 Introduction to Common Flight Modes

- Loiter (hover mode): Hover mode maintains the aircraft's current altitude, position, and heading.
- ALT HOLD: In the Alt Hold mode, the aircraft maintains the same altitude and can operate pitch, roll and yaw. The Alt Hold mode is the basis for many modes, such as Loiter and Sport.
- Stabilize (Attitude Mode): The multi-rotor attitude mode, altitude and attitude are all controlled by the remote controller stick, and the attitude of the UAV needs to be controlled in real time (but the aircraft can maintain attitude balance when the stick is not shifted)

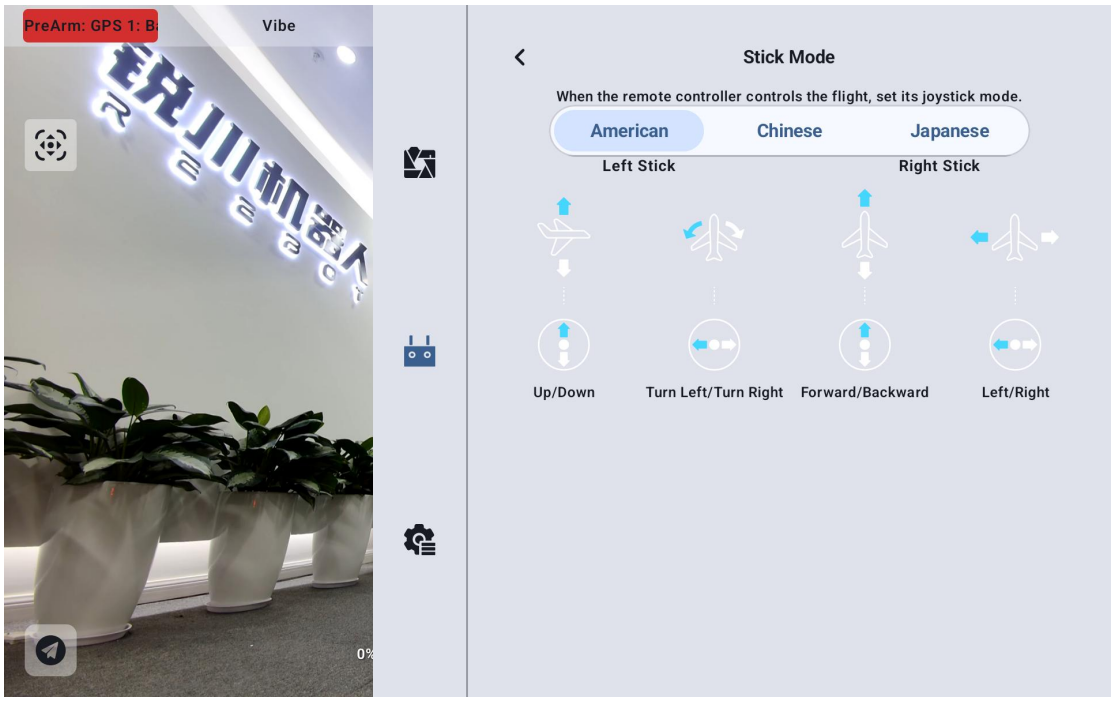
 Note:This mode does not have position hold or altitude hold functionality. It requires a certain level of skill from the pilot and is recommended for use only when the drone’s GPS is not functional.

- PosHold (hover angle control mode):PosHold mode is similar to Loiter mode, maintaining the current altitude, position and heading. The difference is that the joystickof the PosHold mode directly controls the angle of deflection of the aircraft.
- Guided (guided mode): This mode uses the data transmission good ground station to guide the aircraft position in real time. Boot mode is not a basic mode and is formed by switching between several other modes. When the aircraft reaches the

target point, it will hover over the target point.

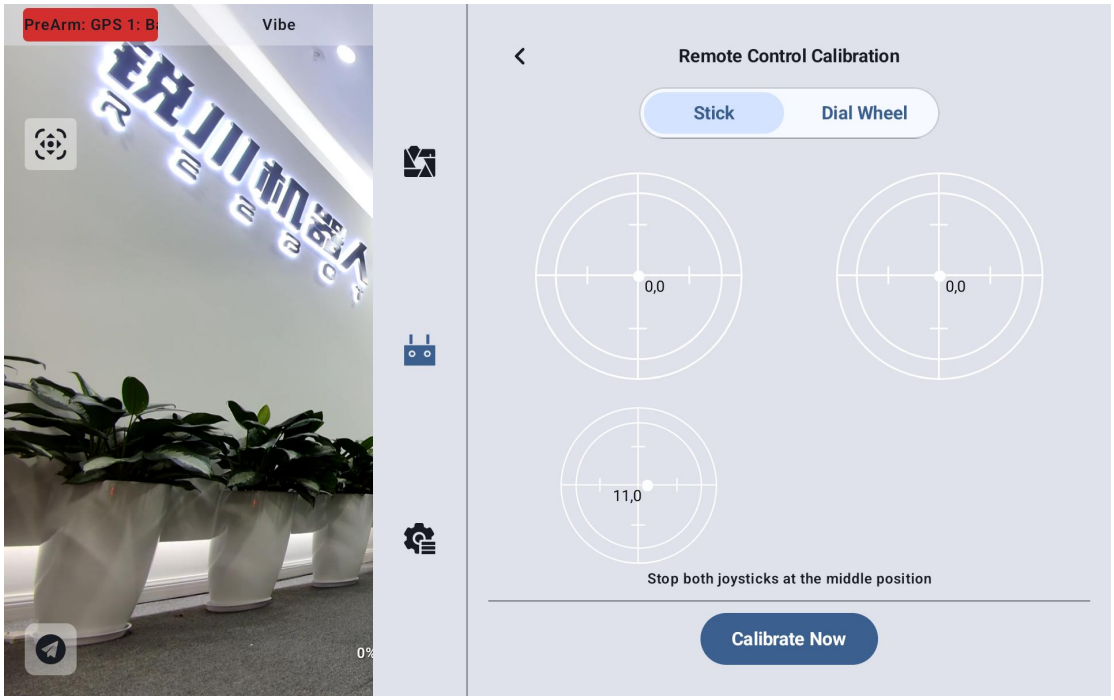
9.3 joystick mode

UniRC 7 supports users to switch between "Mode 1 (Japanese Style)", "Mode 2 (American Style)" and "Mode 4 (Chinese Style)"



9.4 remote controllerler Calibration

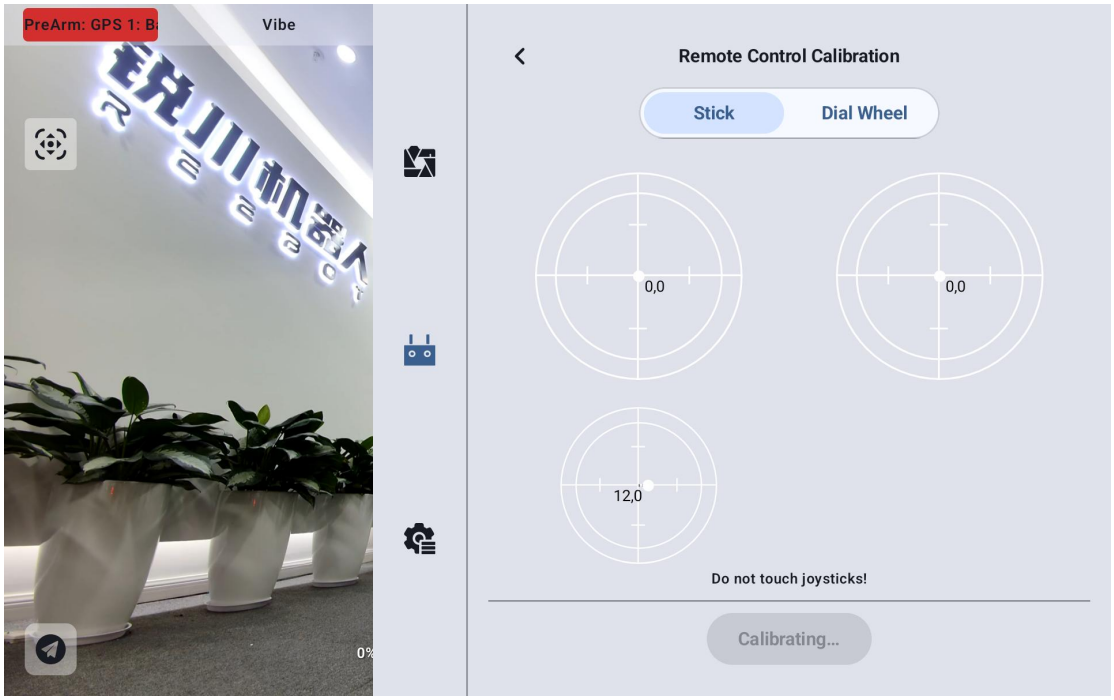
The remote controller calibration function helps the user calibrate the neutral position and maximum limit of the hand-held ground station joystick and paddle wheel. Regularly calibrating the joystickhelps maintain the accuracy of the output of the joystickchannel.



9.4.1 joystickcalibration steps

1. Before carrying out the joystickcalibration, please make sure that the left and right rockers of the hand-held ground station are naturally stationary and are not displaced due to external forces.

2. In the " joystickCalibration" menu, click "Start Calibration" and enter the following interface:



3. According to the prompt, if the joystickhas been naturally stationary but the output value of the joystickchannel is not 0, it means that the neutral point of the joystickhas been offset. Do not touch the joystick at this time and wait for the neutral point alignment to complete.

4. When the following prompt appears, it means that the neutral point calibration has been completed, and then the maximum limit is calibrated.

According to the interface prompts, push each joystickto the maximum limit in each direction.

On: 0,100

Next: 0,-100

Left:-100,0

Right: 100,0

Then click Finish Calibration ".

5. The "Stick Calibration" menu shows that the calibration was successful.

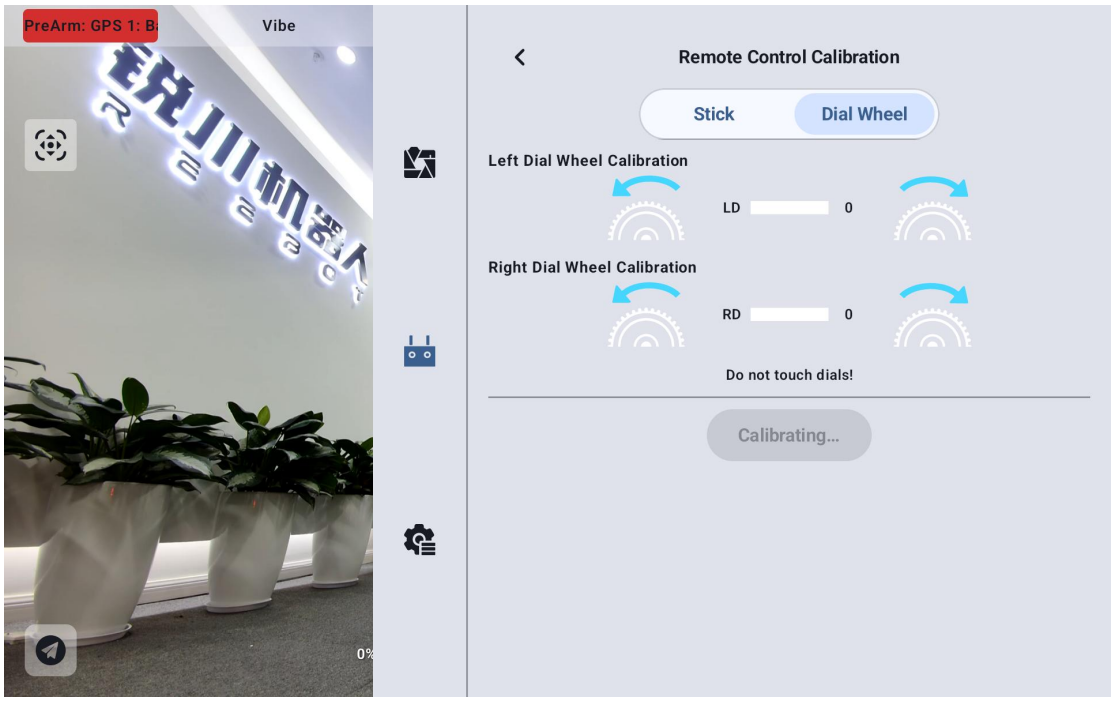
Note

When the joystick does not return to the midpoint when it is naturally stationary (the channel output value is not 0) or the maximum or minimum value (-100,100) cannot be output when it is pushed to the limit pole position, the joystick calibration should be carried out immediately.

9.4.2 Calibration steps of the shift wheel

1. Before calibrating the dial wheel, please ensure that the left and right dial wheels of the hand-held ground station are naturally stationary and are not displaced due to external forces.

2. In the "Dial Wheel Calibration" menu, click "Start Calibration" and enter the following interface:

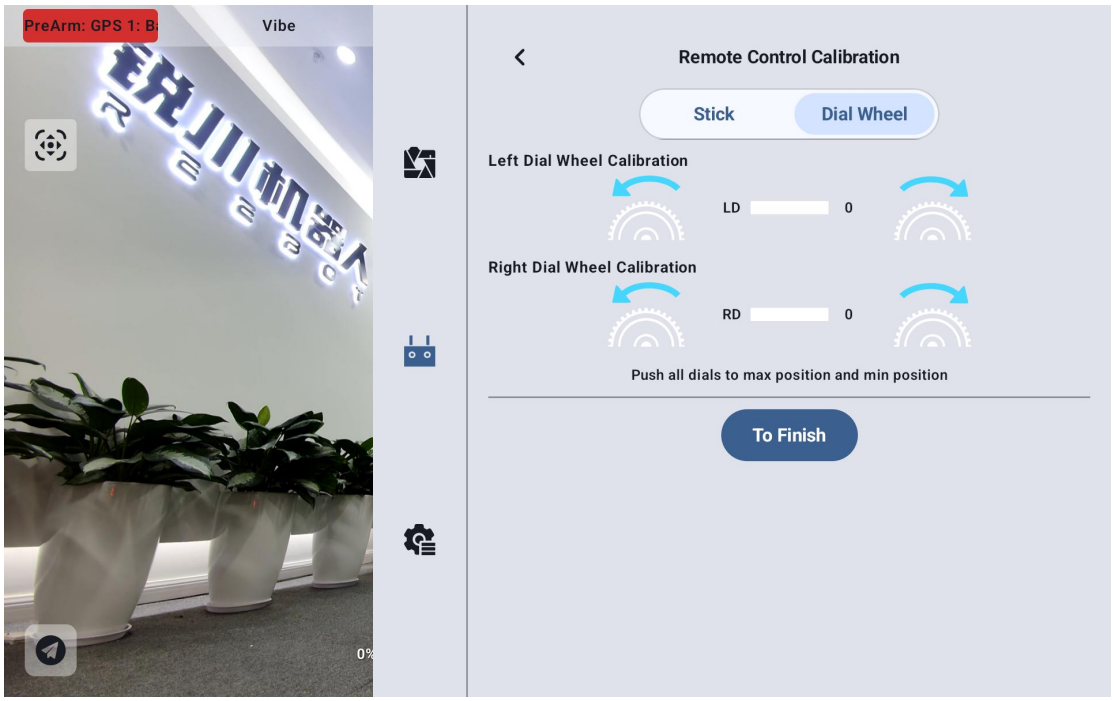


3. According to the prompt, if the dial wheel has been naturally stationary but the output value of the dial wheel channel is not 0, it means that the neutral point of

the dial wheel has been offset. Do not touch the dial wheel at this time, and wait for the neutral point calibration to be completed.

4. When the following prompt appears, it means that the neutral point calibration has been completed, and then the maximum limit is calibrated.

According to the interface prompts, push each wheel to the maximum limit in each direction.



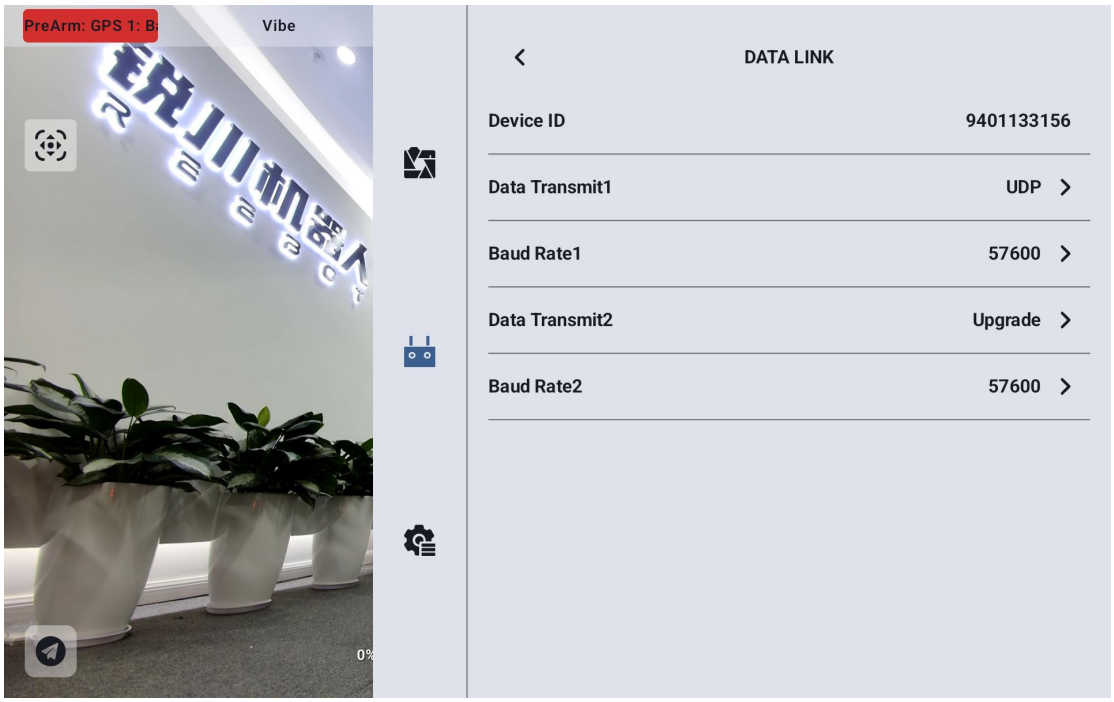
Left:-100

Right: 100

5. "Dial Wheel Calibration" menu returns to the initial interface, and the calibration is completed.

9.4.3 Digital transmission settings

The data transmission setting menu supports the user to identify the device number of the handheld ground station, set the data transmission connection mode and set the specific baud rate of the serial port.



9.4.3.1 About Digital Transmission Settings

Equipment: Display the serial number of the Bluetooth module integrated in the handheld ground station, which will be identified as the corresponding Bluetooth name when the Bluetooth is matched, and the serial number is unique for each ground terminal.

Digital transmission 1: the data transmission connection mode of the equipment connected to the TELEM 1 port at the air unit.

Serial port baud rate 1: should be set with access to the sky terminal TELEM 1 port of the device corresponding to the serial port baud rate.

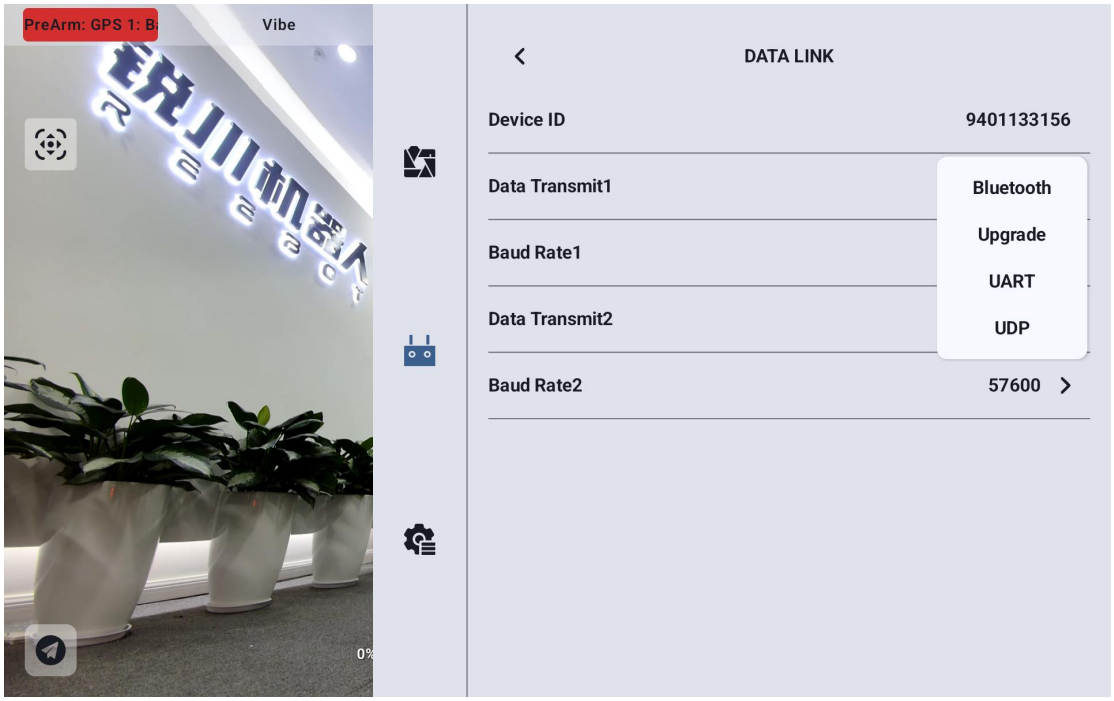
Digital transmission 2: the data transmission connection mode of the equipment

connected to the TELEM 1 port at the air unit.

Serial port baud rate 2: should be set with access to the sky terminal TELEM 1 port of the device corresponding to the serial port baud rate.

9.4.3.2 Connection

The optional data transmission connection modes of UniRC 7 handheld ground station are: Bluetooth, Upgrade, UART serial port and UDP.



UART serial port: through the ground end built-in UART serial port for data transmission communication.

Bluetooth: data transmission communication is carried out through the built-in Bluetooth wireless connection at the ground end (most ground station software is supported, and data transmission communication with external devices such as Windows ground station software is also supported.)

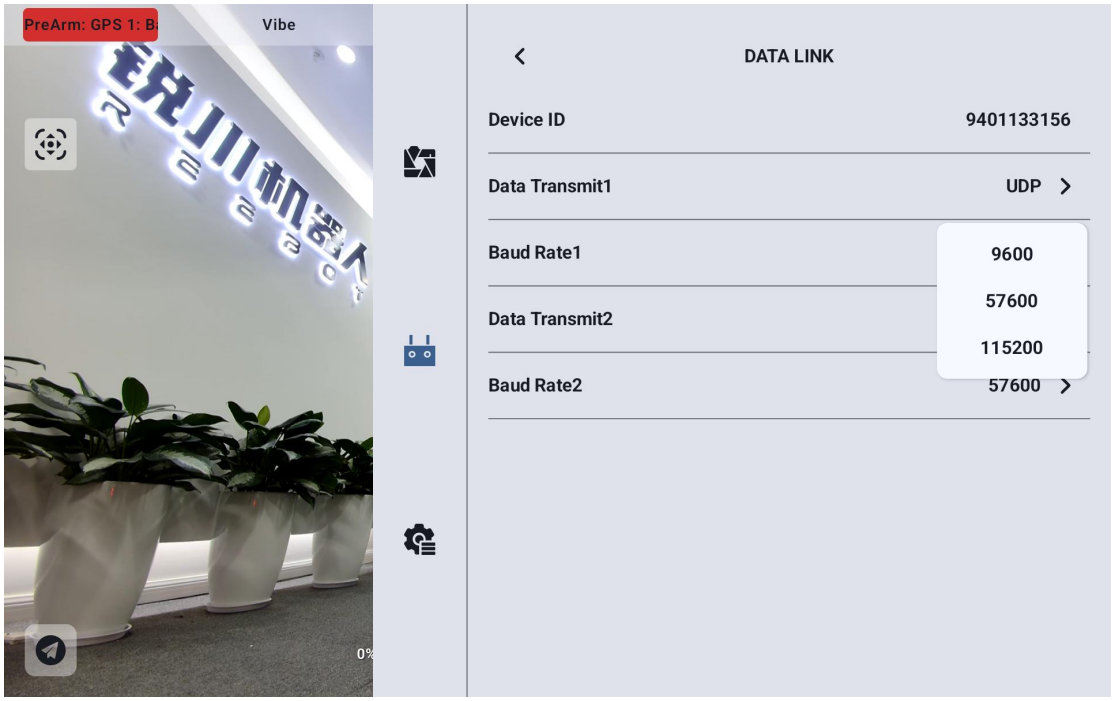
Upgrade: Establish data transmission communication with external equipment such as Windows ground station software through the Type-C interface at the bottom

of the handheld ground station.

UDP: through the UDP network protocol connection for data transmission communication.

9.4.3.2 Serial Port Baud Rate

Please manually select the matching serial port baud rate setting.



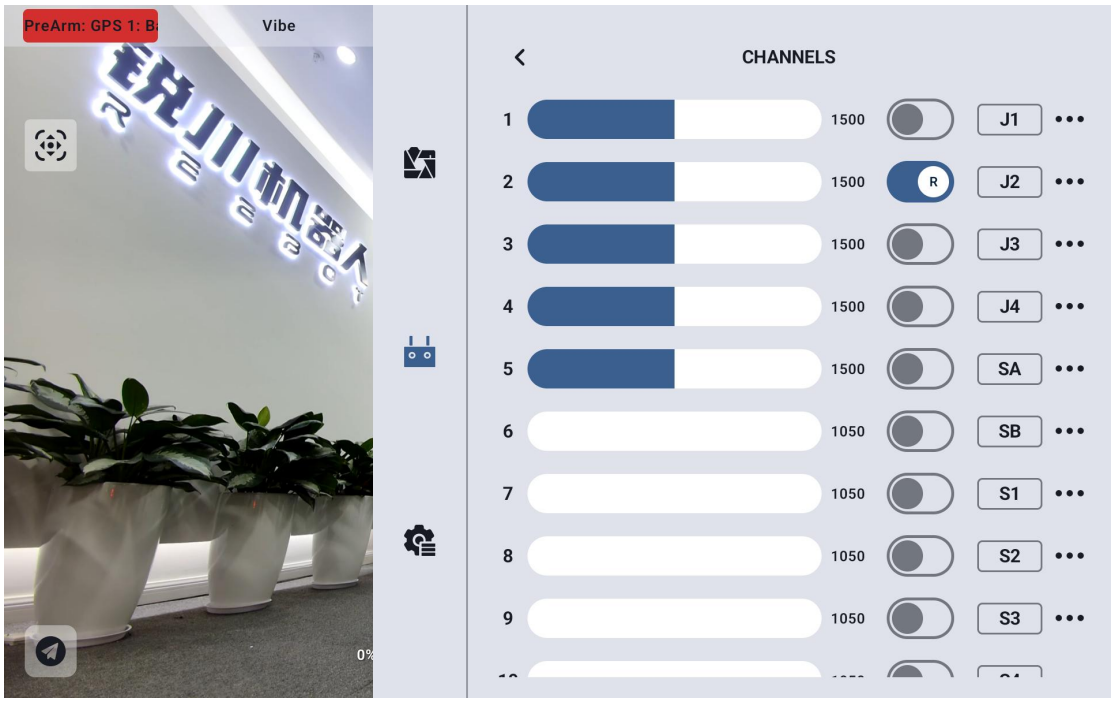
Note

Before changing the baud rate of the serial port, please make sure that the ground terminal and the sky terminal have successfully used the frequency, otherwise the setting will not take effect.

9.4.4 Channel setting

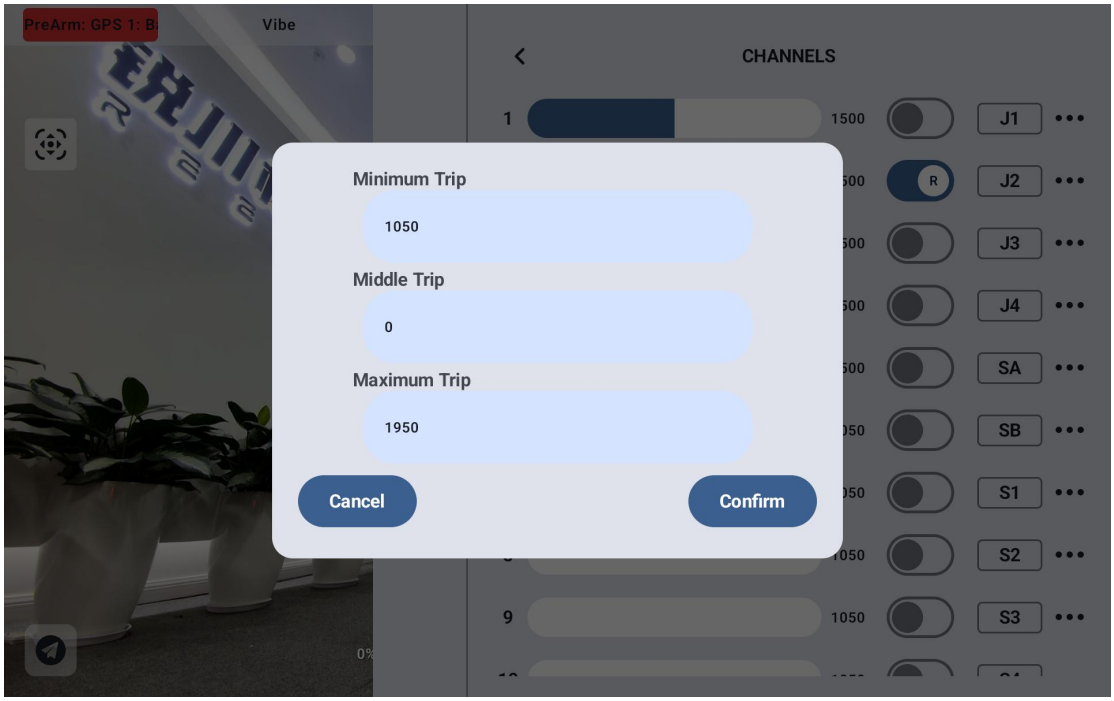
Through the channel setting function, users can set the stroke amount, neutral

point, reverse direction of steering gear and channel mapping of each channel of the hand-held ground station.



9.4.4.1 Steering gear stroke

The UniRC 7 handheld ground station has a default range of 1050 to 1950 strokes.



Select the target channel and enter the required stroke value to successfully change it.

The median default channel stroke is 1500.

Select the target channel and enter the value of the desired neutral point change to successfully change it.

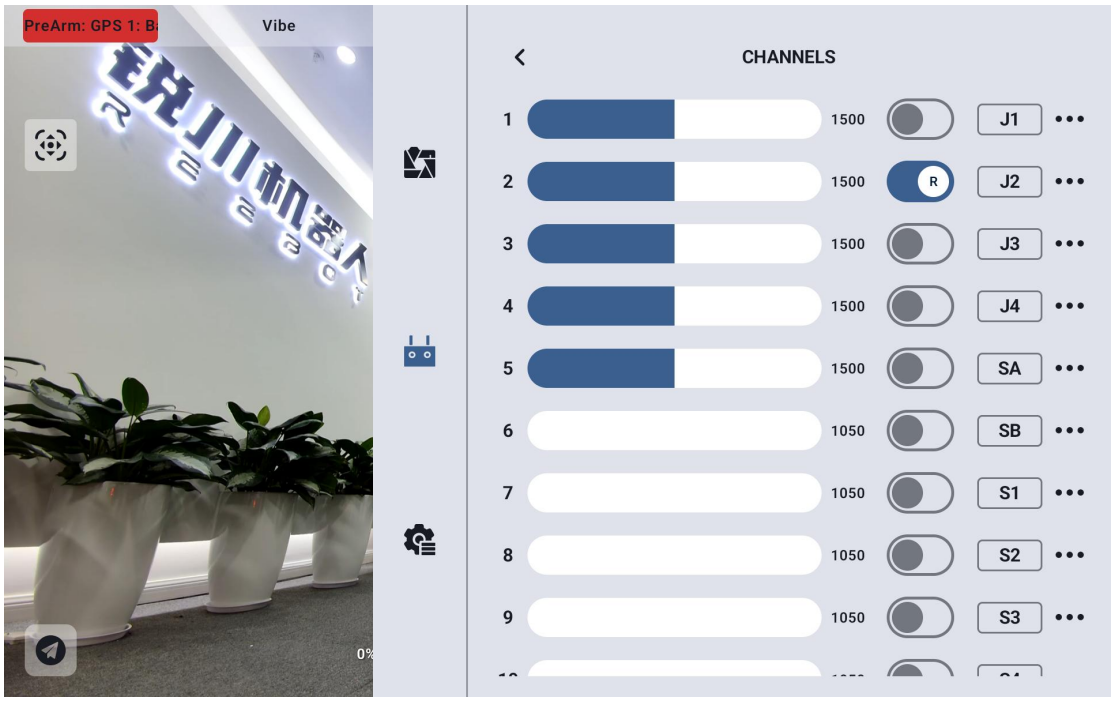
Note

The range of the median stroke amount is ± 500. If you want to set the neutral point to 1700, set the median stroke amount to +200. If you want to set the neutral point to 1300, set the median stroke amount to -200

9.4.4.2 Steering gear reverse

The servo reverse function is used to change the output direction of the channel

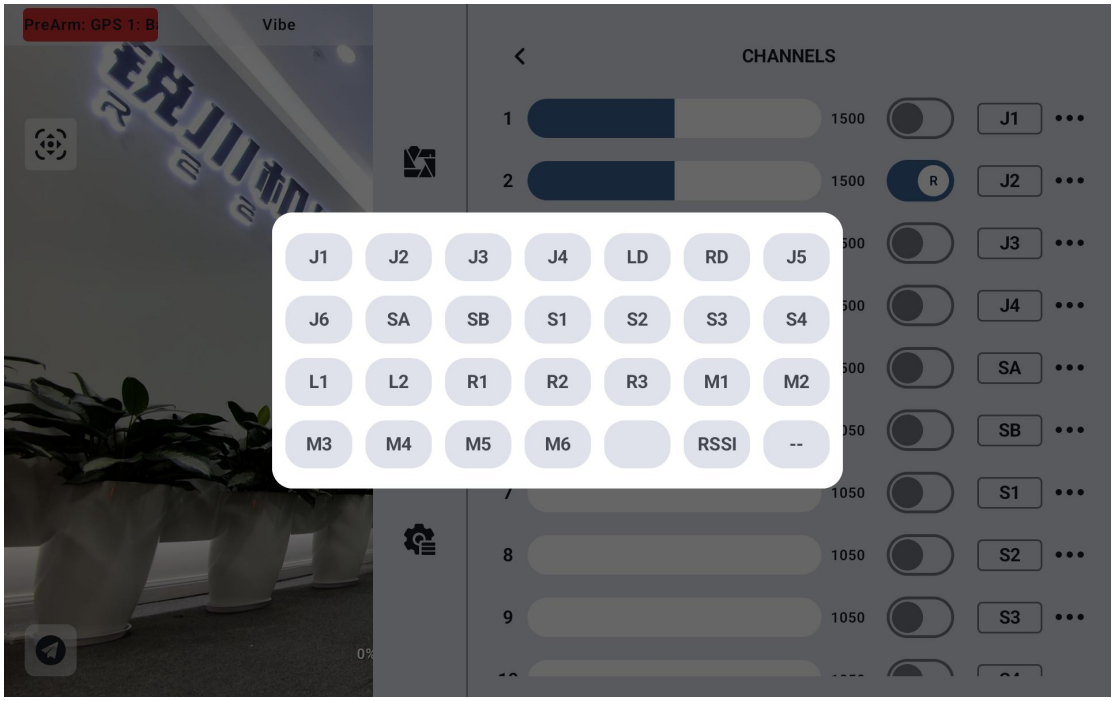
stroke.



Select the target channel and click the corresponding steering gear forward and reverse switch to successfully set the steering gear forward and reverse.

9.4.4.3 Channel Mapping

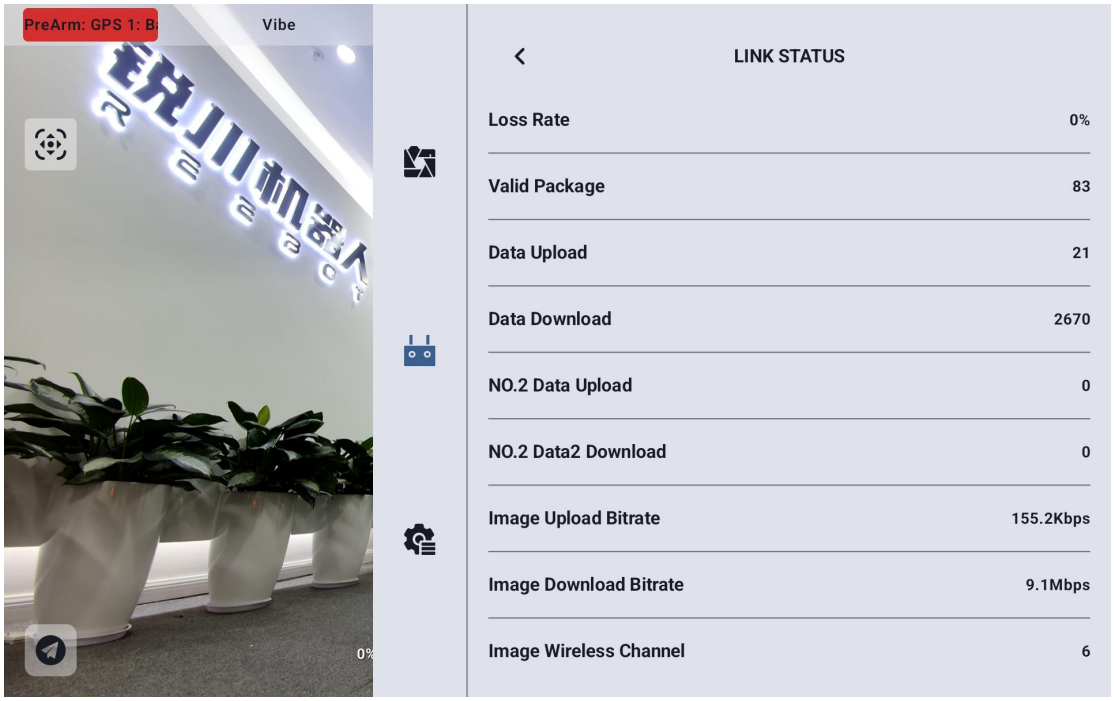
The UniRC 7 handheld ground station supports a total of 26 physical channels and 16 communication channels and allows users to freely define the mapping relationship between physical buttons, switches, joysticks and communication channels through the channel mapping function.

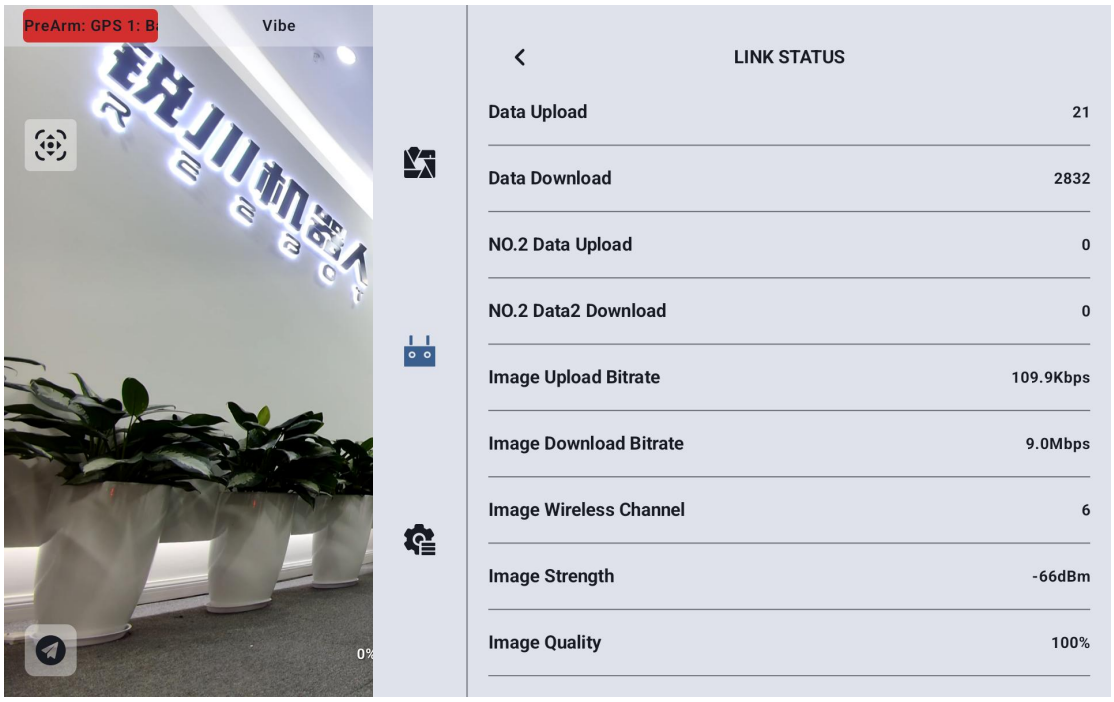


Select the target channel, click the channel mapping button, the pop-up switch list, select the required switch, you can successfully connect.

9.4.5 Link Information

Through real-time display link status information to visually display the quality of wireless communication.





About Link Information

Packet loss rate: the number of packets per second that fail to return to the ground

Valid packets: Number of packets successfully delivered back to the ground per second

Data transmission uplink: the amount of data uploaded to the sky terminal per second (bytes)

Data transmission downlink: the amount of data downloaded from the air unit per second (bytes)

Figure uplink code rate: Figure uplink per second data size

Figure transmission downlink code rate: Figure transmission uplink per second received data size

Figure transmission wireless channel: the working frequency point under the current working frequency of the link

Signal strength: the strength of radio waves communicated between the ground station and the air unit

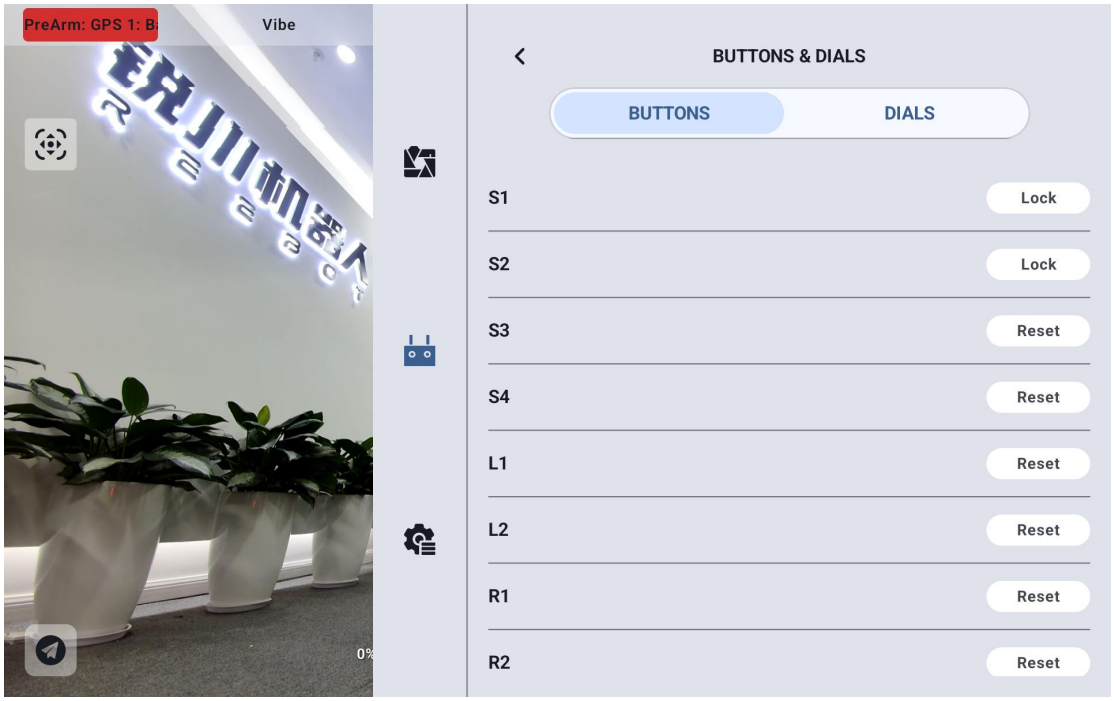
Signal quality: transmission signal reliability and stability between ground station and air unit

9.4.6 Button dial wheel setting

The UniRC 7 handheld ground station supports the working mode of setting keys and dial wheels.

9.4.6.1 Key Settings

This function allows you to set the way the keys work.



About the way keys work

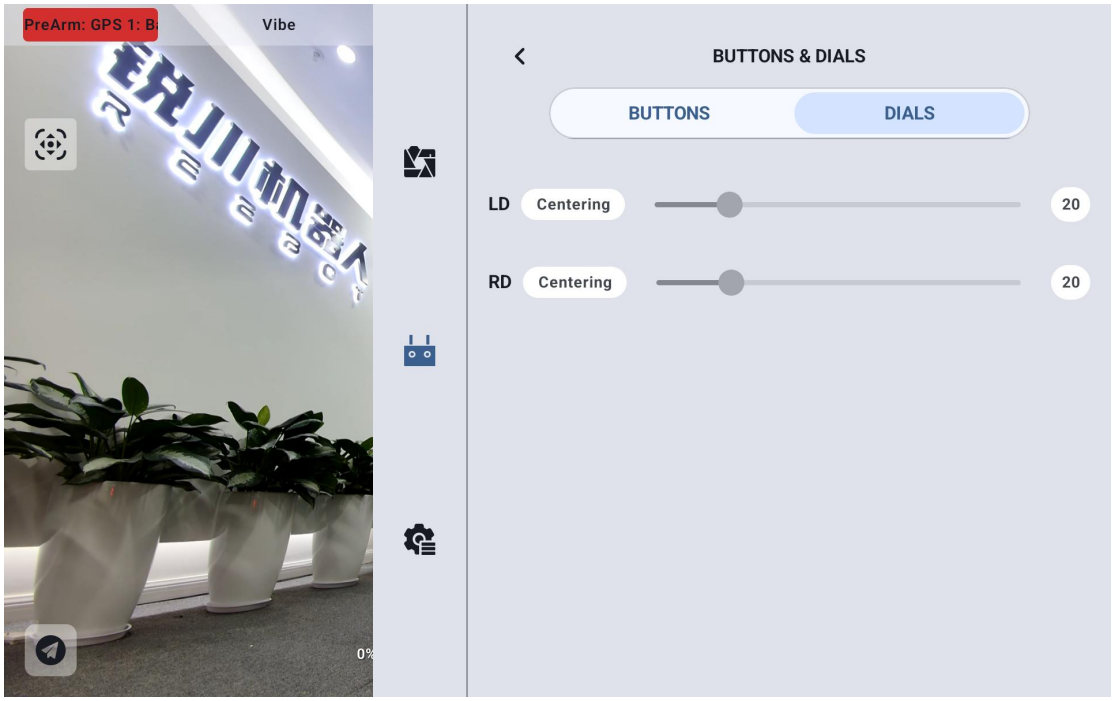
Self-locking: After pressing the self-locking key, the key will rebound but the key channel will continue to output, the output value is 1950, and the channel output is 1050 when pressed again.

Three-gear switch: In this mode, the key will have 3 gears, similar to the three-gear switch. When the key is pressed for a short time, the channel output value will be switched between 1950 and 1050. When the key is pressed for a long time, the channel output value will be 1500.

Non-self-locking: When the self-locking button is pressed, the channel has an output, and when the channel is loose, the output is zero.

9.4.6.2 Dial wheel setting

Through this function, the working mode of the left and right dial wheels of LD and RD can be set.



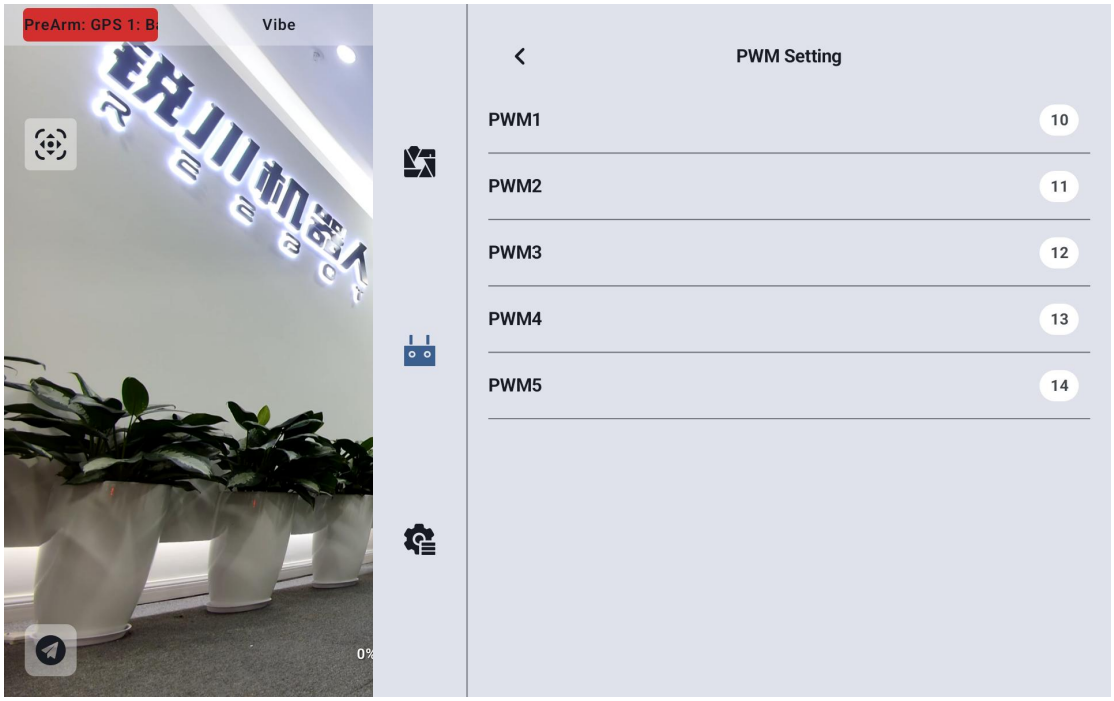
About the working mode of the dial wheel

Automatic return to center: in the "automatic return to center" mode, the dial wheel is loosened when pushed, and the output value of the dial wheel will return to the initial value (channel midpoint).

Non-automatic return to the middle: in the "non-automatic return to the middle" mode, the push wave wheel is released, and the output value of the dial will maintain the current channel output value and will not return.

9.4.7 Receiver Settings

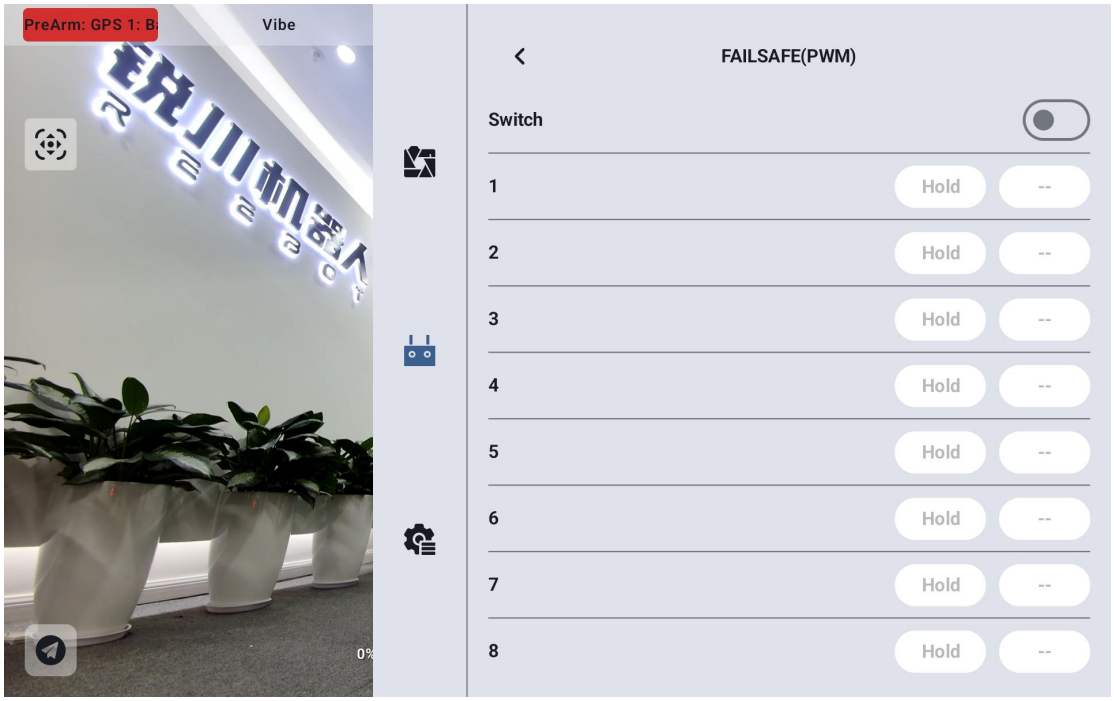
Match the corresponding link communication channel for the 5 channel of the sky-side PWM interface.



9.4.8 Loss of control protection

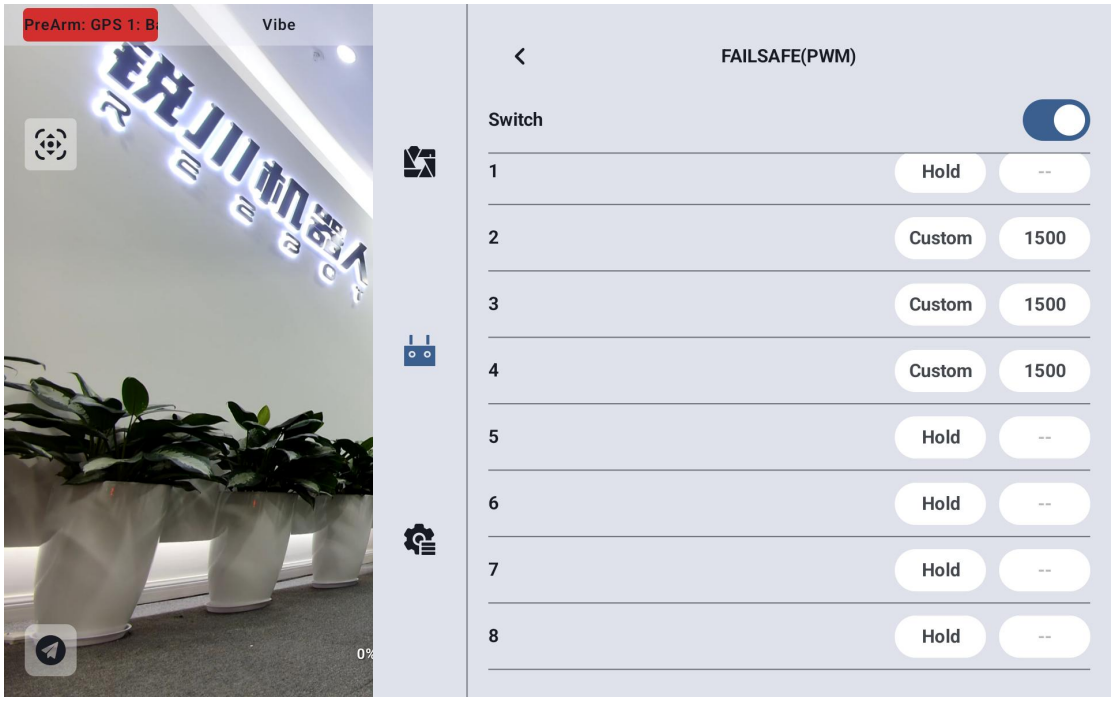
After the first frequency match between the ground end and the air unit, be sure to set up the runaway protection function.

Out-of-control protection means that when the connection between the ground end and the air unit is lost, the air unit PWM continues to output the preset channel value to avoid the machine falling to the greatest extent.



Follow these steps to set up runaway protection for your handheld ground station:

1. Make sure the ground end is already on the frequency with the air unit.
2. Enter the runaway protection menu and display the following interface:



3. The out-of-control protection function is turned off by default, and the number on the left represents the communication channel. When the out-of-control protection output channel value is not set, the channel output value displays "Hold" by default ".

4. If you need a channel to output a specific value, please turn on the runaway protection switch first, then click the "hold" button after the corresponding channel to enter the "custom" state, and then enter the required stroke amount.

5. After the setting is completed, when the link loses connection, the channel will output the set amount of travel.

Note

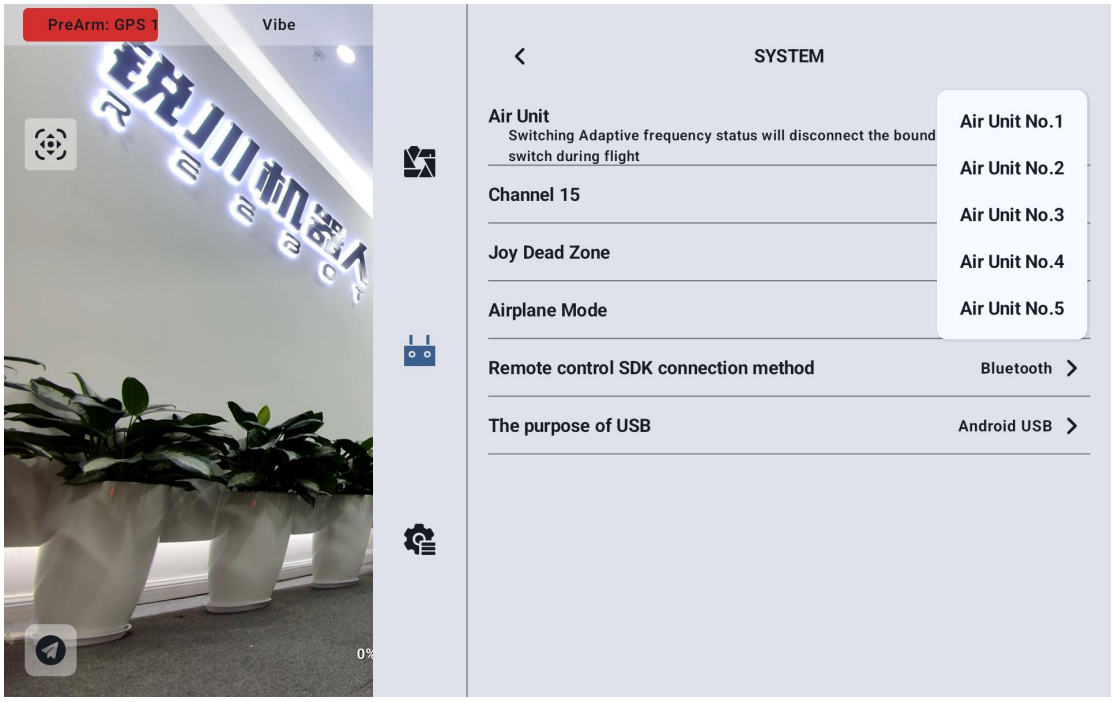
If the flight control used with your hand-held ground station communicates through S.Bus protocol, you do not need to set up loss-of-control protection on the ground terminal (unless the flight control has special requirements to maintain a value through a certain channel when out of control to trigger the loss-of-control protection to enter the return flight), you only need to set corresponding protection measures in the flight control ground station software, there are out-of-control Peugeot bits in the S.Bus communication protocol to tell the flight control which situations belong to out-of-control situations.

9.4.9 System Settings

9.4.9.1 Multi-air unit

The multi-sky terminal function supports saving multiple sets of sky terminal

frequency information and corresponding channel setting data on the same ground terminal. In this way, after each air unit and ground end are matched for the first time, users no longer need to rematch the frequency to switch.

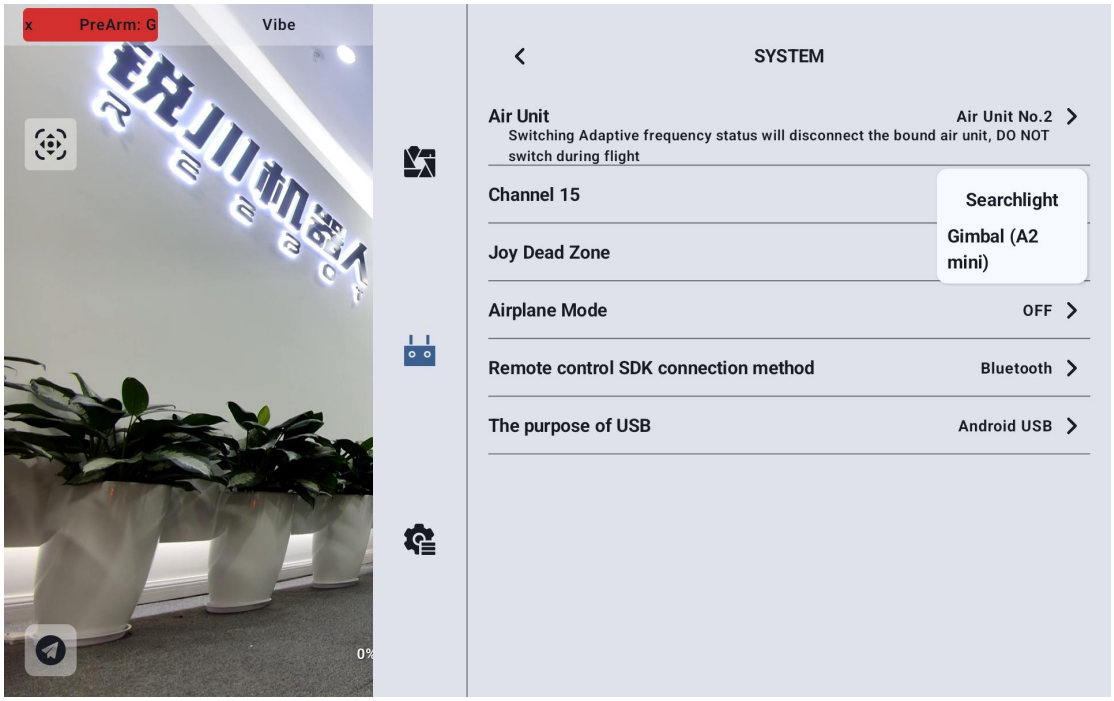


Danger

It is forbidden to switch the sky terminal in flight. Switching the sky terminal in flight will cause the link to lose control!

9.4.9.2 Channel 15

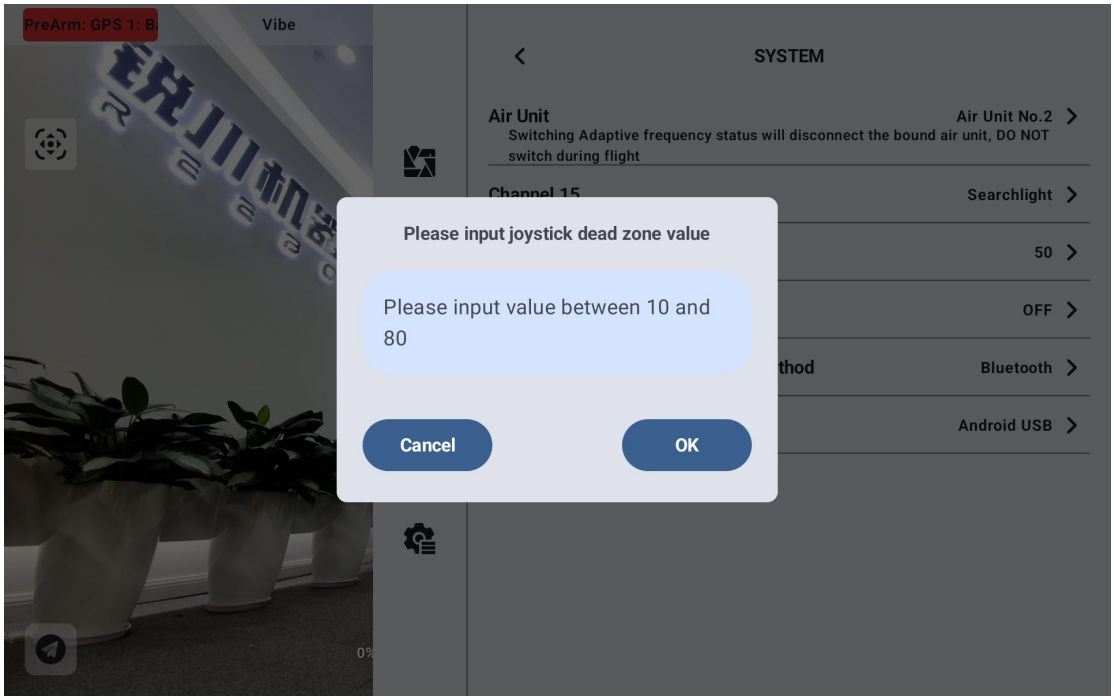
Switch the control right of the 15th communication channel to the searchlight switch of the three-proof camera or the pitch rotation of the A2 mini gimbal



Note: Channel 15 corresponds to the equipment connected to LAN 1 interface at the air unit, channel 16 corresponds to the equipment connected to LAN 2 interface at the air unit, and channel 16 defaults to searchlight

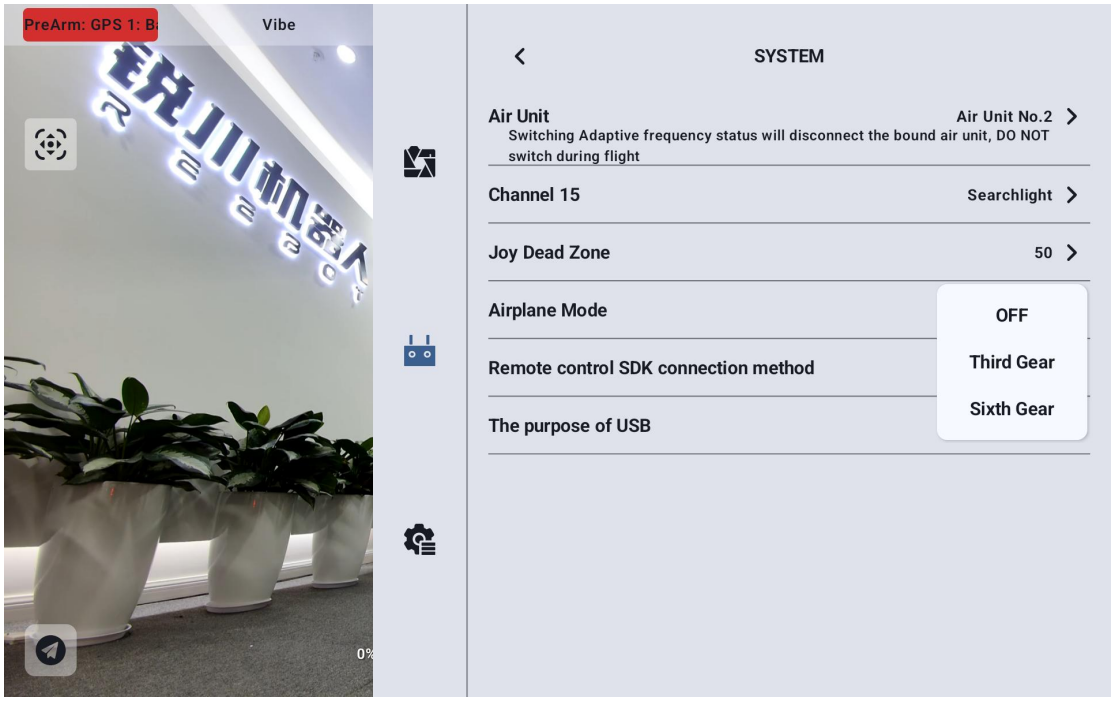
9.4.9.3 joystick Dead band

Adjust the joystick dead band to accommodate a variety of handling feel.



9.4.9.4 Flight path

Flight channel can be set to 3rd gear mode, 6th gear mode and off



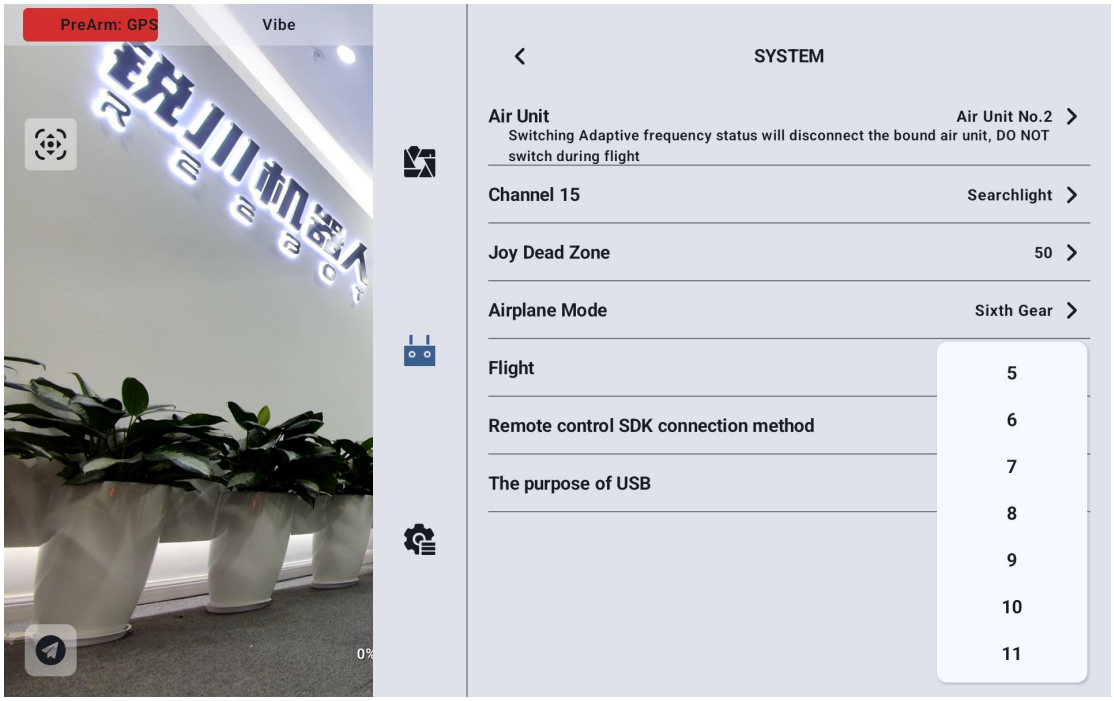
Off: Turn off the Flight Mode feature

3-gear mode: the key M1-M3 is mapped to 1 channel, the channel output is 1050 when M1 is pressed, the channel output is 1500 when M2 is pressed, and the channel output is 1950 when M3 is pressed.

6-gear mode: the key M1-M6 is mapped to 1 channel. When M1 is pressed, the channel output is 1000, when M2 is pressed, the channel output is 1250, when M3 is pressed, the channel output is 1425, when M4 is pressed, the channel output is 1575, when M5 is pressed, the channel output is 1700, and when M6 is pressed, the channel output is 2000,

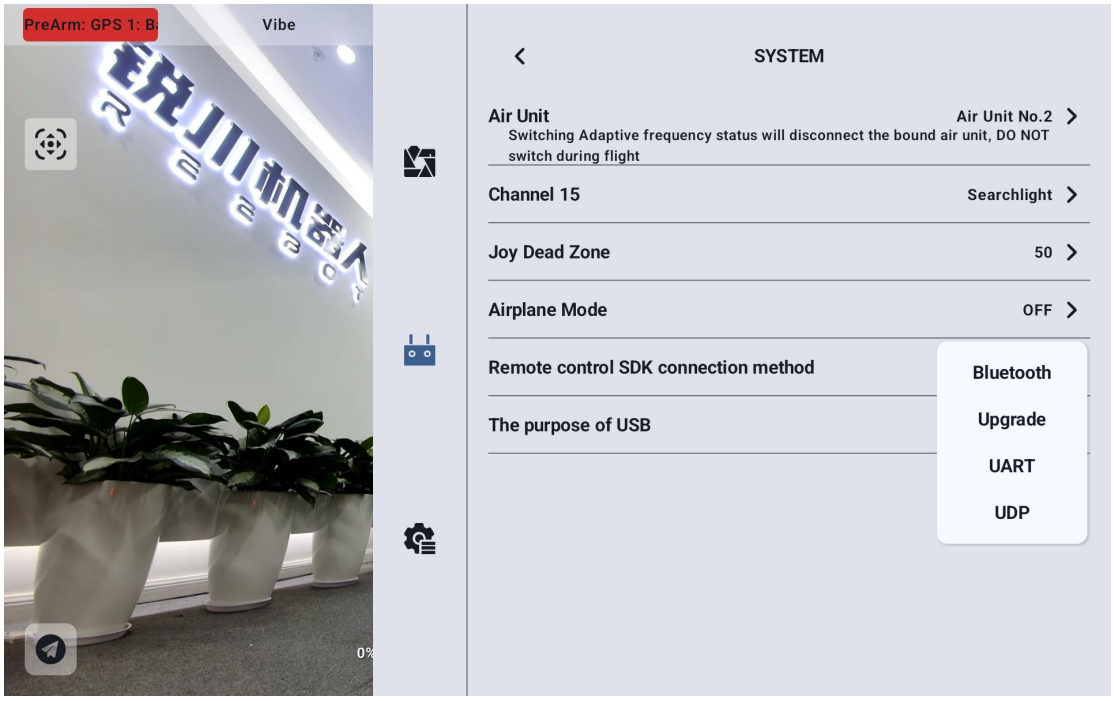
9.4.9.5 Flight path

Flight Mode Mapping Communication Channel



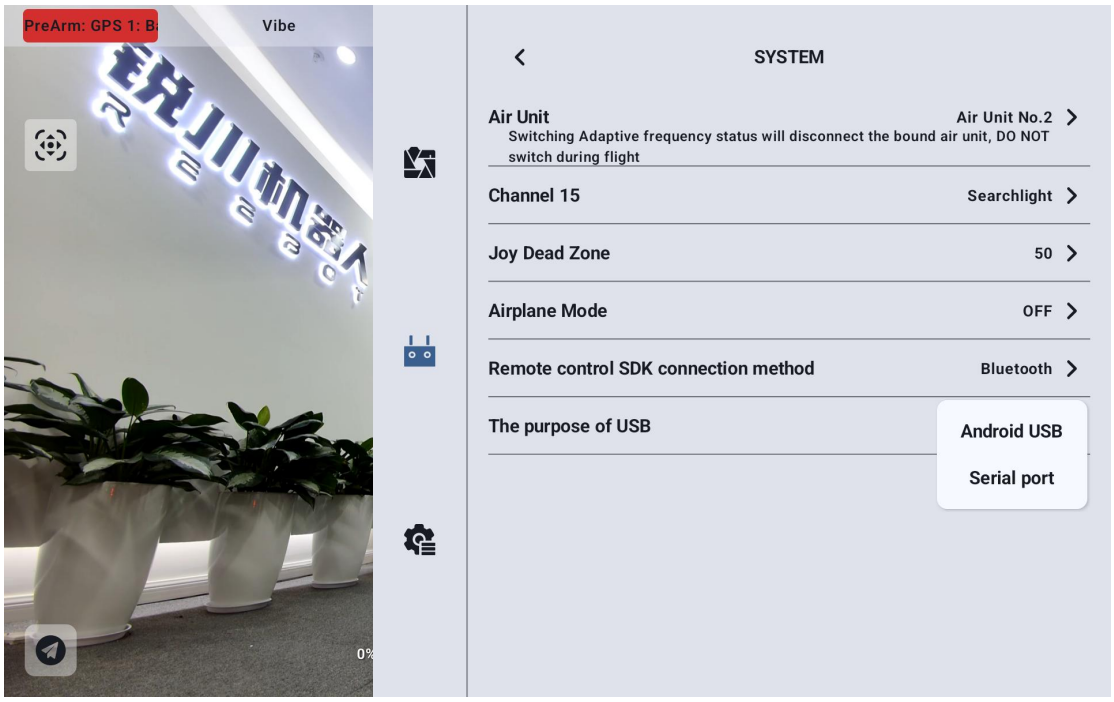
9.4.9.6 remote controller SDK Connection Mode

Users connect links to their own networks and ground stations through the SDK



9.4.9.7 Use of remote controller USB

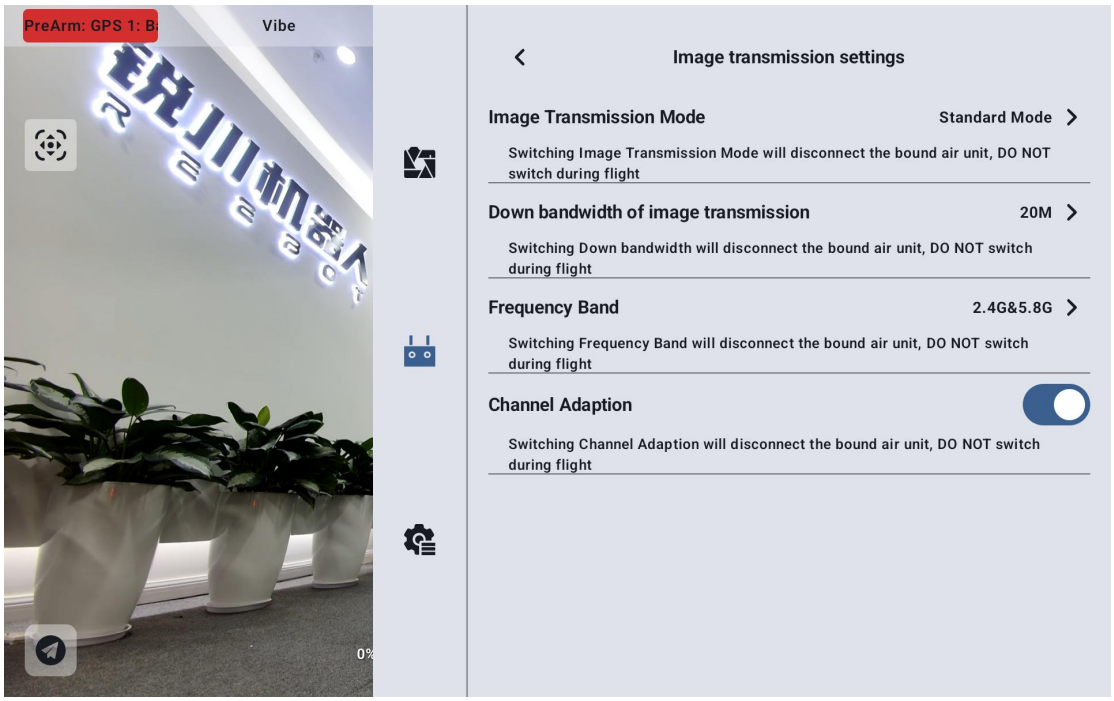
The user can manually switch the working mode of the internal USB of the remote controller



9.4.10 Multi-machine interconnection

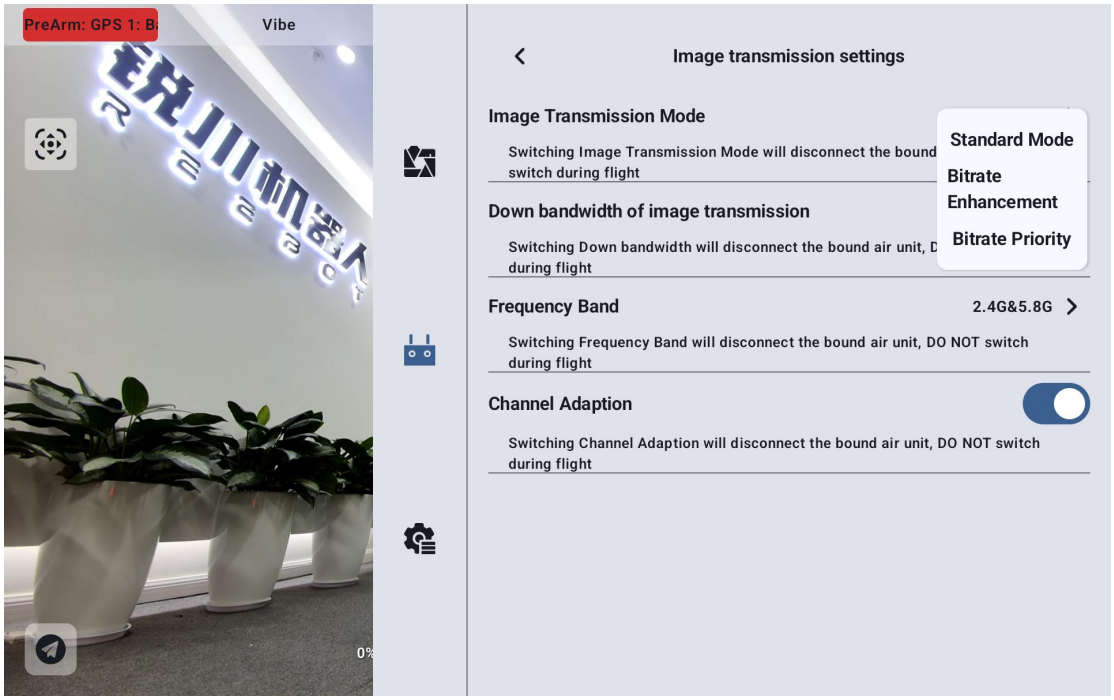
Function development, please look forward.

9.4.11 Image transmission settings



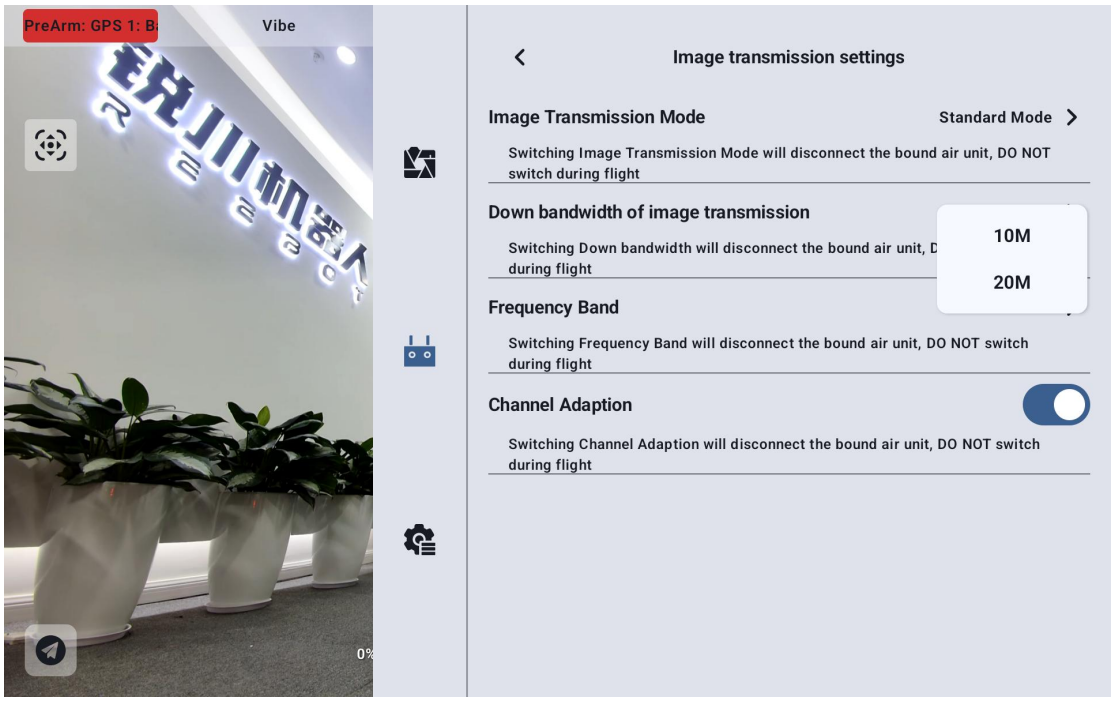
9.4.11.1 Image transmission mode

Change the code rate mode of image transmission



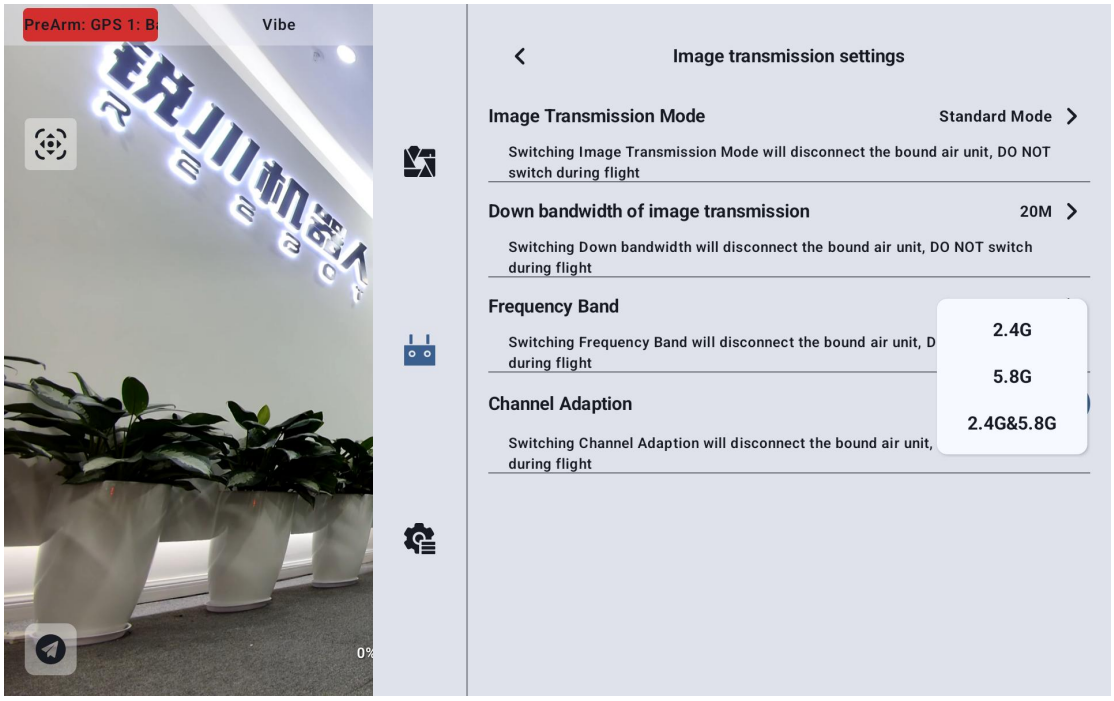
9.4.11.2 Downstream bandwidth of figure transmission

The maximum bandwidth of the downlink that can be switched.



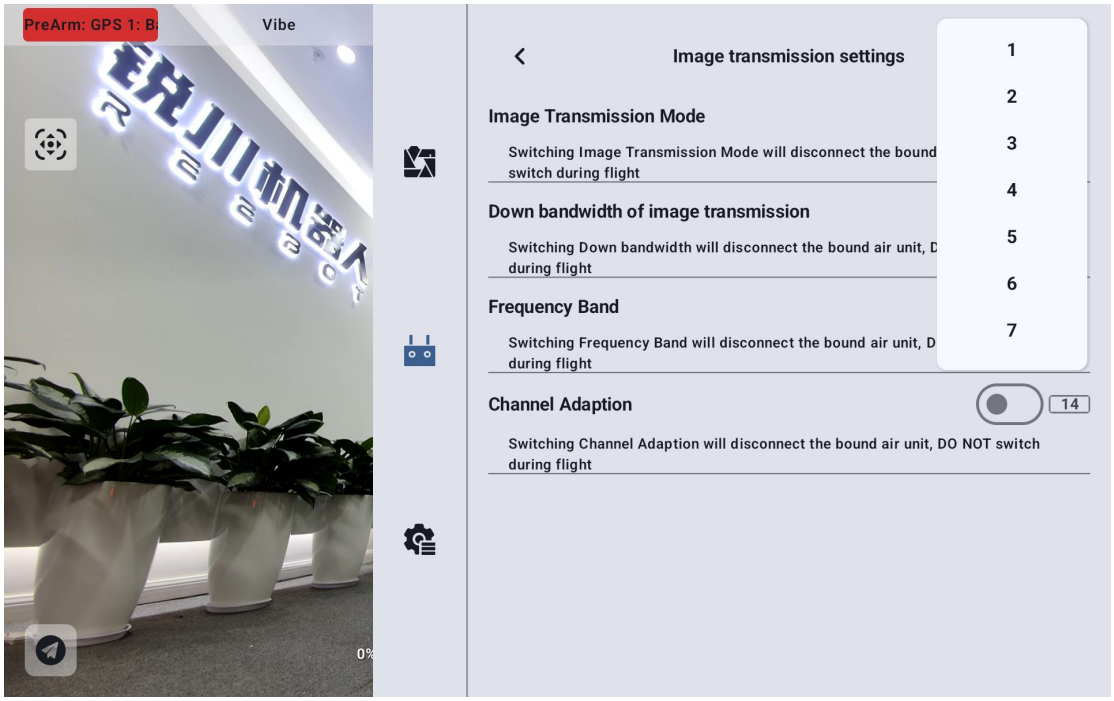
9.4.11.3 Operating frequency band

Manually switch the frequency band of the remote controller

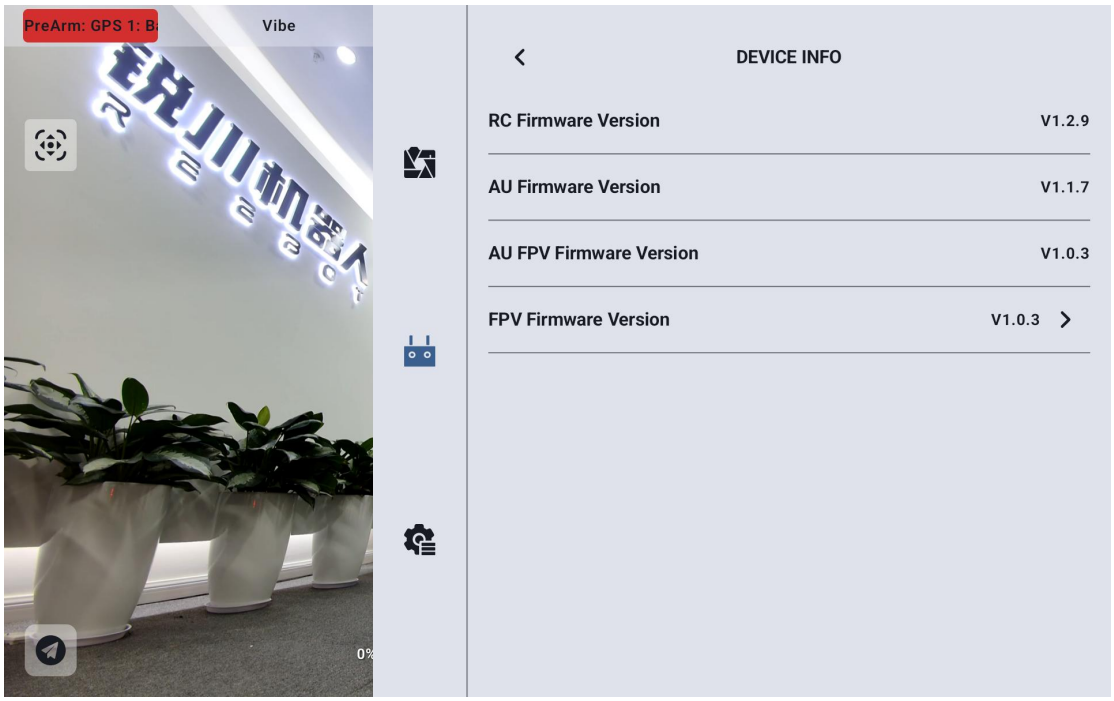


9.4.11.4 Adaptive Wireless Channel

In the complex electromagnetic interference or wireless signal noisy environment, turn on the function, the link to establish a link will automatically search for the lowest interference of the wireless channel to achieve the most conducive to wireless communication conditions. After turning off the adaptive wireless channel, you can manually select the wireless channel between 1-32.



9.4.11.5 Equipment Information



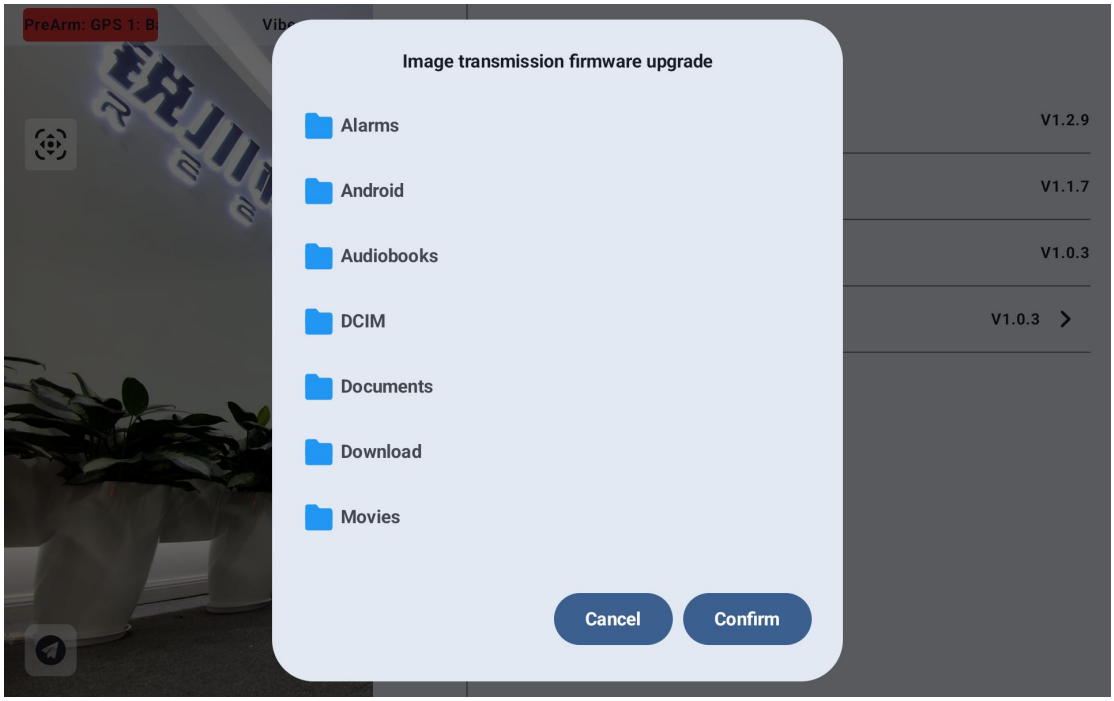
remote controller firmware version: the current firmware version information of the remote controller board

Sky Firmware Version: The current firmware version of Sky

Skyside Image Transmission Firmware Version: the current firmware version of the Skyside Image Transmission Module

Image transmission firmware version: the current firmware version information of the remote controller image transmission module

Click the graphic firmware version to manually select the local graphic firmware version to upgrade the graphic firmware version of the sky terminal and remote controllerler.



Note: The firmware of the graphic transmission module at the air unit and the ground end needs to be the same version before communication can be carried out.

9.4.11.6 Binding

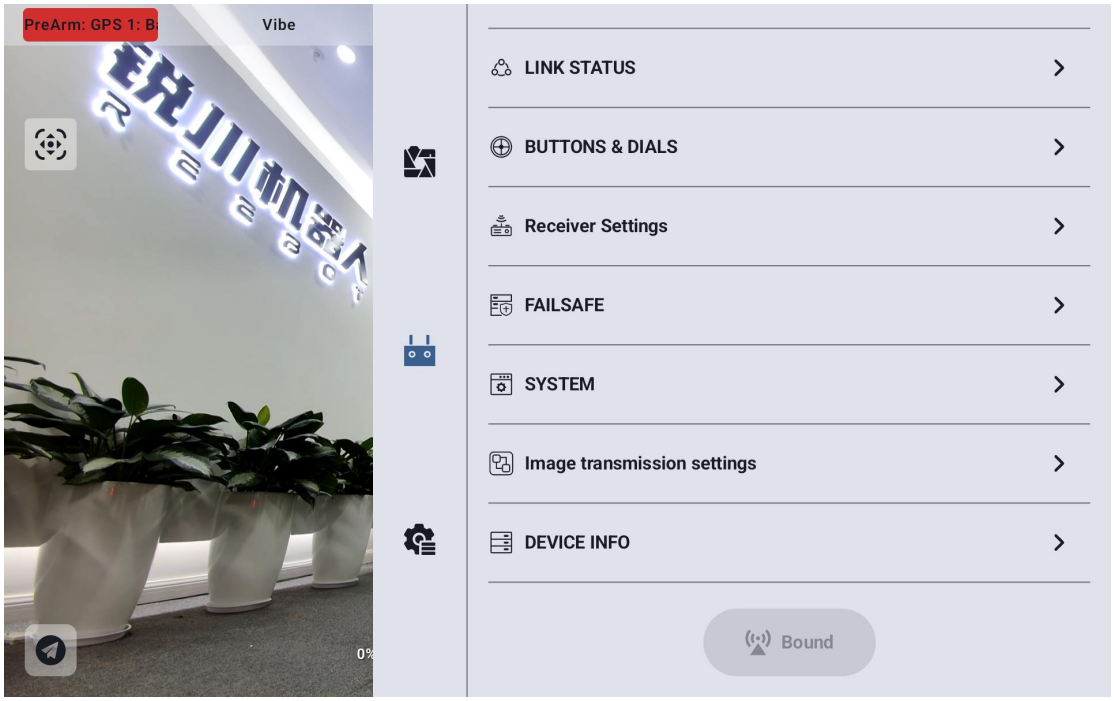
Please follow the steps below for the ground end and the air unit:

1. Open the remote controller setting menu in "UniGCS", and click "remote controller Frequency";

2. The status indicator light at the ground terminal enters the red light flash state, the "Frequency" menu shows "In Frequency", and the handheld ground station starts buzzing;

3. Then press the sky-end-to-frequency button for 2 seconds, and the sky-end status indicator will also enter the red flash state;

4. At this time, please wait for about 5 to 10 seconds, wait for the ground end and air unit status indicator lights to turn green and keep on, then the frequency is successful.



Chapter 10 E17A Smart Flight Battery

The smart flight battery uses high-voltage 4.35V lithium cobalt oxide cells and is equipped with an advanced Battery Management System (BMS) to provide ample power for the aircraft. Before the first use, be sure to fully charge the smart flight battery.

1.Smart Battery Storage Voltage: 45V ~ 46.8V (Single cell: 3.75V ~ 3.9V)

2.Empty Voltage (Nominal Voltage): 47.4V (Single cell voltage: 3.95V)

3.General Minimum Discharge Voltage: 40.8V (Single cell: 3.4V)

4.Discharge:

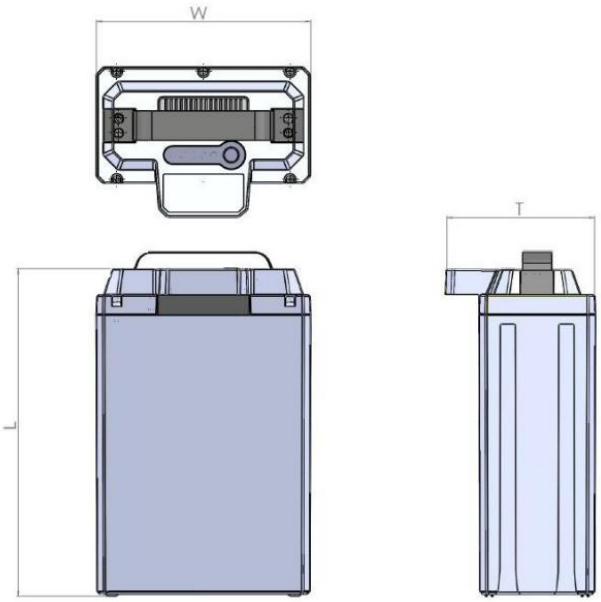
- Standard discharge current: 3.8A (0.2C)
- Maximum continuous discharge current: 57A
- Instantaneous peak discharge current: 95A

5.Charging:

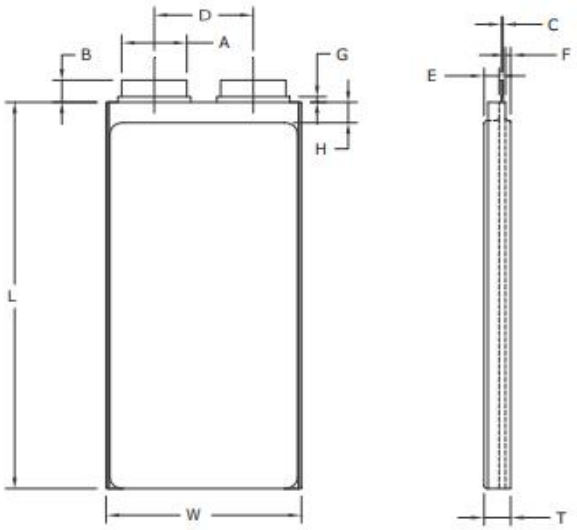
- Standard charging current: 9.5A (0.5C) — Charging time: 3 hours
- Fast charging current: 19.0A (1C) — Charging time: 1.5 hours

10.1 product specifications

10.1.1 Battery Schematic



项目 Items	标准 Standard
厚度 Thickness(T)	102.4±1mm
宽度 Width(W)	146.8±1mm
长度 Length(L)	223.1±1mm



10.1.2 Battery parameters

	Project	Type	Standard
Parameters	T	Thickness	≤ 10.3mm
	W	Width	≤ 71.0mm
	L	Length	≤ 175.0mm
	A	ear width	20.0±0.2mm

	B	Exposed ear long	20.0±1.5mm
	C	ear thickness	0.3±0.02mm
	D	ear center distance	40.0±1.5mm
	E	Groove depth 1	6.0±0.15mm
	F	Groove depth 2	3.0±0.15mm
	G	Exposed long ear glue	0.2~3mm

10.1.3 Battery performance

No.	Item 项目		Type 类型	Standard 标准	Note 备注
1	capacity 容量		Nominal Capacity (Typical) 标称容量（典型）	17000mAh	0.2C,cell 4.35-3.0V @23±5℃；
			Minimum Capacity 最小容量	16500mAh	
2	Voltage 电压		Nominal Voltage 标称电压	47.4V	12S1P(十二串一并)
			Shipment Voltage 出货电压	45V~46.8V	
3	Impedance 内阻		AC Impedance 交流内阻	≤25mΩ	1KHz AC Method
4	Charge 充电		Charge Mode 充电模式	CC-CV	Constant Current and Constant Voltage
			Charge Voltage Limit 充电电压限制	52.2V	Upper limit voltage
			Standard Charge Current 标准充电电流	9.5A	Charge Time：3.0h(Ref.)
			Fast Charge Current 快速充电电流	19.0A	Charge Time：1.5h (Ref.)
5	Discharge 放电		Discharge Mode 放电模式	DC	Constant Current Discharge
			Discharge Cut-Off Voltage 放电截止电压	cell 3.0V@0.2C cell 3.4V@≥0.5C	Lower limit voltage
			Standard Discharge Current 标准放电电流	3.8A	Discharge Time：270 min(Ref.)
			Max Continuous Discharge Current 最大持续放电电流	57A	Discharge Time: 18min(Ref.)
			Peak Discharge Current 瞬间峰值放电电流	95A	Discharge Time ≤3S
6	工作温度 work Temperature	Charge 充电	Standard Charge Temperature 标准充电温度	5~15℃	≤0.2C
				45~50℃	≤0.5C
			Fast Charge Temperature 快速充电温度	15~45℃	≤1C
		Discharge 放电	Standard Discharge Temperature 标准放电温度	-20℃~0℃	≤0.2C
				0~10℃	≤0.5C
				45-60℃	≤0.5C
			Max Continuous Discharge Temperature 最大持续放电温度	10~45℃	≤57A (T1/T2 温度不超过 80℃)
7	Storage 存储		≤7days，≤7天	>46.8V	Temperature：23±5℃； Humidity：≤75%RH；
			for long time 长期	45~46.8V	
8	weight 重量		---	≤3950g	

Notice: Please do not assemble the battery privately，Parallel charging for two packs of batteries maybe lead to short circuit or ignition。If no otherwise specified, an interval rest time is 30min between charging and discharging。

注意：请勿私自组装电池，将两组电池并联在一起进行充电，此有可能造成短路或燃烧。如果没有特别说明，电池充放电间隔时间为 30 分钟。

10.2 System working mode of 10.2

- **Power-down mode:**

Enter**:** When the system is in the static mode or sleep mode, it is detected that the minimum voltage of the system is less than the shutdown voltage of 2.7V, and the total voltage is less than 42V, the system enters the power-down mode and shuts down, reducing the power consumption of the system to the greatest extent.

Exit: wake-up mode after entering power-down mode: 1. wake-up after charging; 2. wake-up by pressing the button.

- **Sleep mode:**

Entry :1. When the system is in the static mode, there is no communication, and the static time reaches 1800s, the system enters the sleep mode and shuts down to reduce power consumption. 2. End of equalization; 3. End of self-discharge. In this mode, wake up once every 30 minutes, detect data, and record once every hour.

Exit :1. Wake up from communication and enter static mode, start up. If the charger is connected and meets the charging conditions, it will automatically switch to charging mode. If there is discharge current, switch to discharge mode; 2. Press the key (short press + long press) to start up and stay in static mode. If there is discharge current, switch to discharge mode and charge current. 3. When the system reaches the shutdown condition, switch to power-down mode, power down the system. 4, to achieve equilibrium or self-discharge conditions, switch to equilibrium mode or storage mode

- **Rest mode:**

Enter: 1. After the system is reset and powered on, the system is turned on, and there is no charge/discharge current in the static mode; 2. After the key wakes up (short press and long press), there is no charge/discharge current;

Exit :1. Switch to charge/discharge mode when there is charge/discharge current; 2. Switch to sleep mode when there is no communication and the static time exceeds 1800s;

- **Charging mode:**

Entry: the charger is connected and meets the charging conditions;

Exit: normal charging ends, or abnormal charging exits.

- **Discharge mode:**

Enter: connected to load and current> 0.3A;

Exit: No discharge electric current.

- **Equilibrium mode**

Enter: In the sleep mode, the equilibrium time threshold and the equilibrium opening voltage threshold are met, and the voltage difference between any two sections reaches the equilibrium opening threshold.

Exit: 1. Reach the equilibrium closing voltage threshold or the voltage difference between any two batteries reaches the equilibrium closing threshold; 2. Communication or key startup (short

Press + long press)

- **Storage Mode**

Enter: in the sleep mode, meet the self-discharge time threshold, self-discharge open voltage threshold.

Exit: 1. The minimum voltage reaches the self-discharge shutdown voltage threshold; 2. Communication or key startup (short press + long press).

10.3 battery storage

10.3.1 Storage requirements

项目 Item	要求 Requirement	备注 Remark
湿度 Humidity	≤75%RH	/
电池电压 Cell Voltage	3.7~3.9V	/
环境温度 Ambient temperature	-20~25℃	1 年
	-20~35℃	3 个月
	-20~45℃	1 个月

Note: Keep the voltage at 3.75-3.9V and the charging capacity at 40%-50%; Prohibit long time (>7 days) under high voltage (voltage> 3.9)

Storage

During storage, with the passage of time, the voltage and recoverable capacity will decrease, and the internal resistance will increase.

10.3.2 Storage Reminder

Please activate the battery every 3 months as follows

Charge at 0.2C to 52.2V (cell 4.35V), then let it rest for 5 minutes. After that, discharge at 0.2C to 36V (cell 3.0V) and let it rest for 5 minutes. Finally, charge at 0.2C to 46.8V (cell 3.9V).

10.4 Other matters

10.4.1 Prevent short circuit in battery

Use sufficient insulating material to protect the line

10.4.2 It is forbidden to disassemble the battery cell

Removal of the battery cell may result in an internal short circuit, which may cause aeration, fire and other problems

10.4.3 In theory, there is no flowing electrolyte for polymer lithium batteries, but in case of electrolyte leakage and contact with skin, eyes or other parts of the body, rinse the electrolyte with clean water immediately and seek medical treatment.

10.4.4 Under any circumstances, do not burn the battery or put the battery into the fire, otherwise it will cause the battery to burn, which is very dangerous and should be absolutely prohibited

10.4.5 Do not immerse the cell in liquid, such as fresh water, sea water, beverages (juice, coffee), etc.

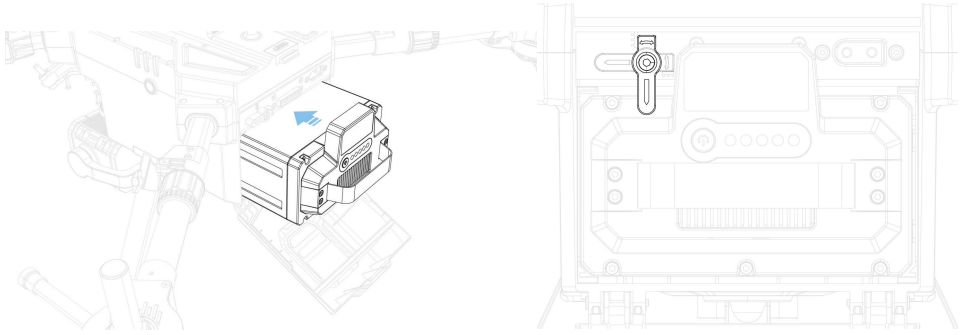
10.4.6 The replacement of the battery core shall be completed by the battery core supplier or equipment supplier, and the user shall not replace it by himself.

10.4.7 Do not use damaged cells

1. The battery core may be damaged due to impact and other reasons during transportation. If any abnormal characteristics of the battery core are found, such as damage to the plastic sealing edge of the battery core, damage to the shell, smell of electrolyte gas, electrolyte leakage, etc., the battery core shall not be used.

2. Batteries with electrolyte leakage or electrolyte odor should be kept away from fire sources to avoid fire.

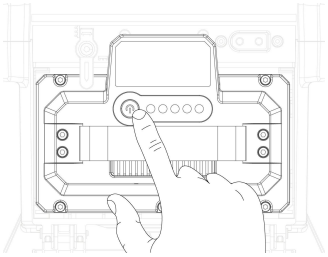
10.5 to install the battery



Battery On/Off

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

Turn the battery on/off: First short press the aircraft power button once, then long press the power button within 3 seconds. When the battery is turned on, the power button of the aircraft is always on as a green light, and the power indicator of the battery shows the current battery power.



View Power

When the power is not on, short press the battery power check button once to check the current power.

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

RGB Definitions					
Status	R	G	B	Colors	Colors
Normal State		1		Green	
Protection	1	1		Yellow	
Protection and Warning	1	1	1	White	
Permanent Failure	1			Red	
Storage Mode (50% SOC)		1		Blue	

10.6 standard charge and discharge

10.6.1 Charging

Note

- **Charging current:** The charging current shall not exceed the maximum charging current specified in this standard. Charging with a current higher than the

recommend value may cause problems in the charge and discharge performance, mechanical properties, and safety of the battery, and may cause heat generation or leakage.

- **Charging voltage**: **The** charging voltage shall not exceed the rated voltage of 53.4V(Cell 4.45V) specified in this standard. Cell 4.5V is the maximum charging voltage limit. The charger shall be designed to meet this condition: when the cell voltage is higher than the rated voltage value, it may cause problems with the charging and discharging performance, mechanical performance and safety performance of the battery, which may lead to heat generation or leakage.

- **Charging temperature**

Charging temperature	5~15 ℃	≤(0.2C)
	15~45 ℃	≤(1C)

Note

Charging temperature: The battery must be charged at the specified current within the above ambient temperature range.

- **Prohibit reverse charging:** connect the positive and negative poles of the battery correctly, and reverse charging is strictly prohibited. If the positive and negative poles of the battery are reversed, the battery cannot be charged. At the same time, reverse charging will reduce the charge and discharge performance and safety of the battery, and will cause heat and leakage.

10.6.2 Discharge

Note

- **Discharge current** shall **not** exceed the maximum discharge current specified in this standard. Large current discharge will cause the battery capacity to decrease sharply and cause overheating.

- **Discharge temperature:** Discharge at too low or too high temperature or not within the specified current range may cause battery failure or other conditions.

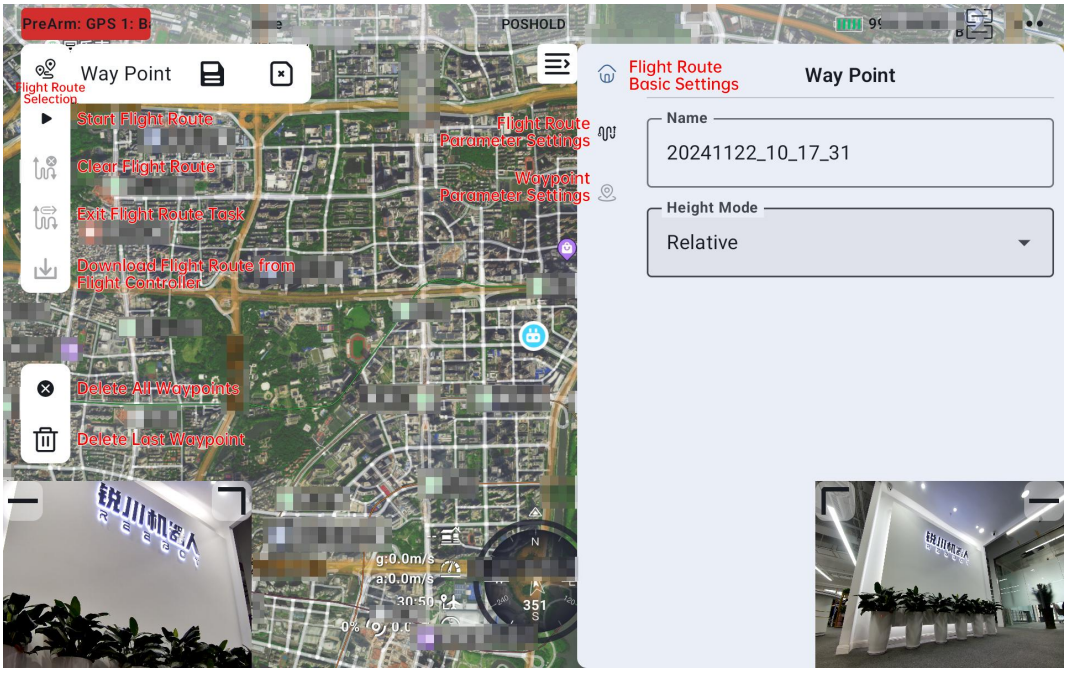
discharge temperature	-20~0 ℃	≤0.2C
	0~10 ℃	≤0.5C
	1 ℃ 0-45	≤57A(T1/T2 temperature does not exceed 80 ℃)
	4 ℃ 5-60	≤0.5C

- **Over-discharge:** It should be noted that during the long-term non-use of the battery, it may be in some kind of over-discharge state with other self-discharge characteristics. In order to prevent the occurrence of discharge, the battery should be regularly charged to maintain its voltage between 45V(cell 3.75V) and 46.8V(cell 3.9V), over-discharge will lead to the loss of battery performance and battery function. The charger shall have a device to prevent the battery from discharging below the cut-off voltage specified in this standard. In addition, the charger should also have a device to prevent repeated charging. The steps are as follows: the battery should be pre-charged with a small current (0.01C) for 15 to 30 minutes before fast charging, so that the voltage of (each) battery core reaches 3.0V Above, fast charging. The pre-charge step may be implemented with a 1 timer. If the voltage of the (individual)

battery has not risen above 3.0V within the specified time of pre-charging, the charger shall be able to stop the next fast charging and indicate that the battery is in an abnormal state.

Chapter 11 UniGCS APP

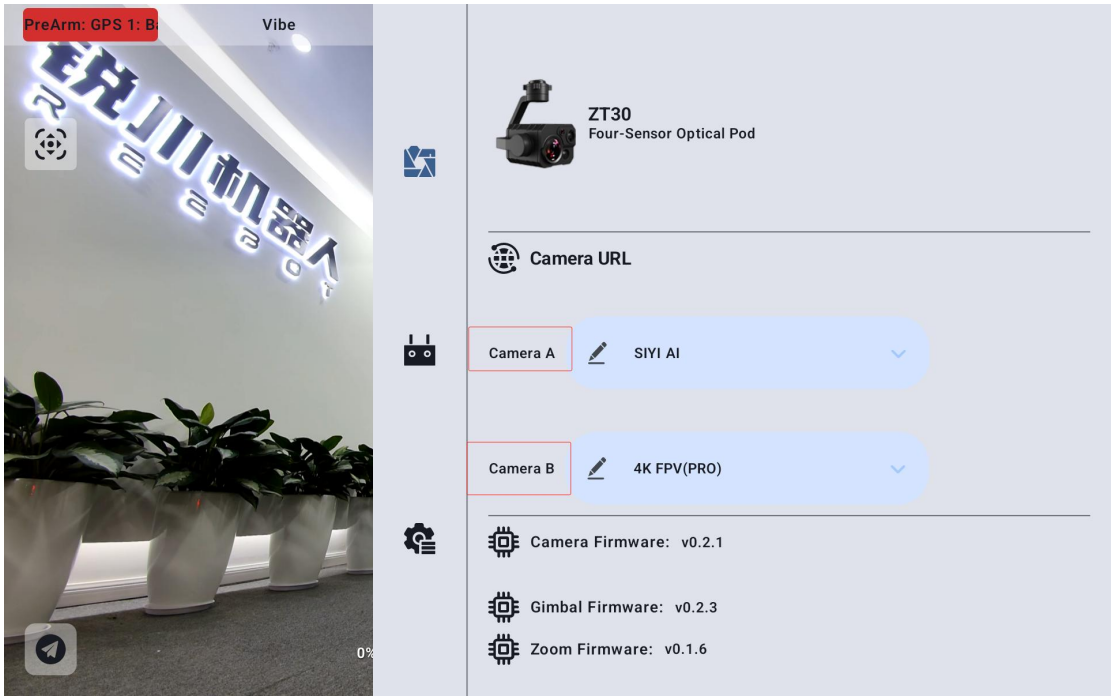
11.1 flight interface and map interface



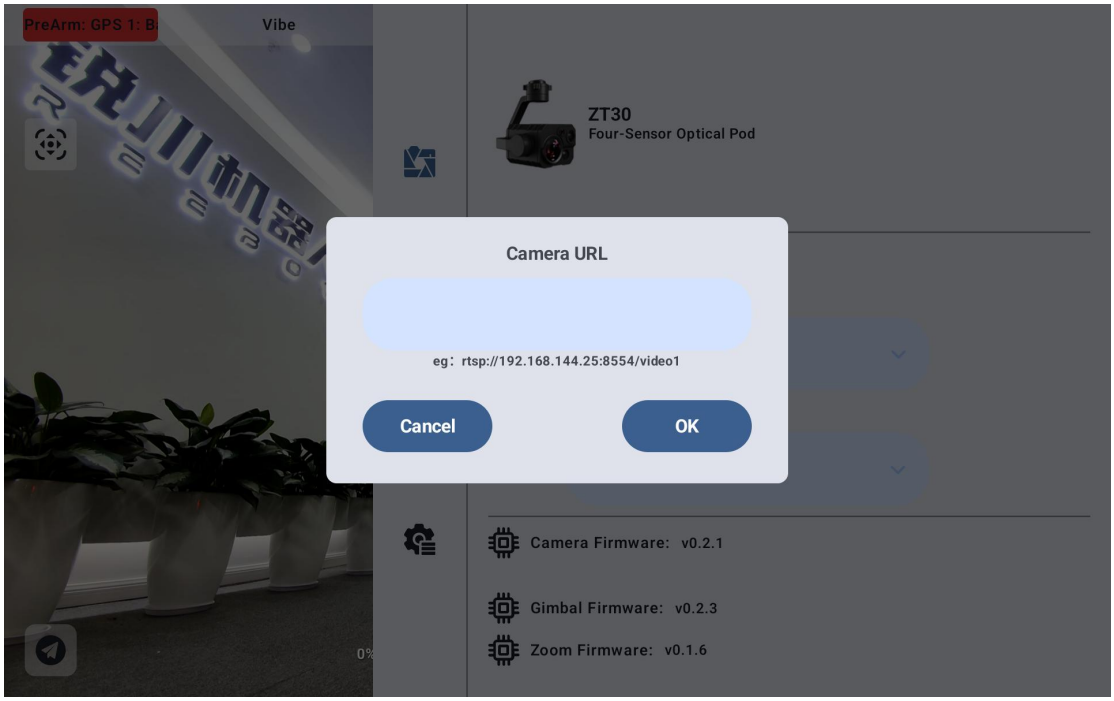
11.2 gimbal settings

11.2.1 Connecting the gimbal

After connecting the gimbal to the sky network port, select the gimbal to use in Camera A or Camera B.



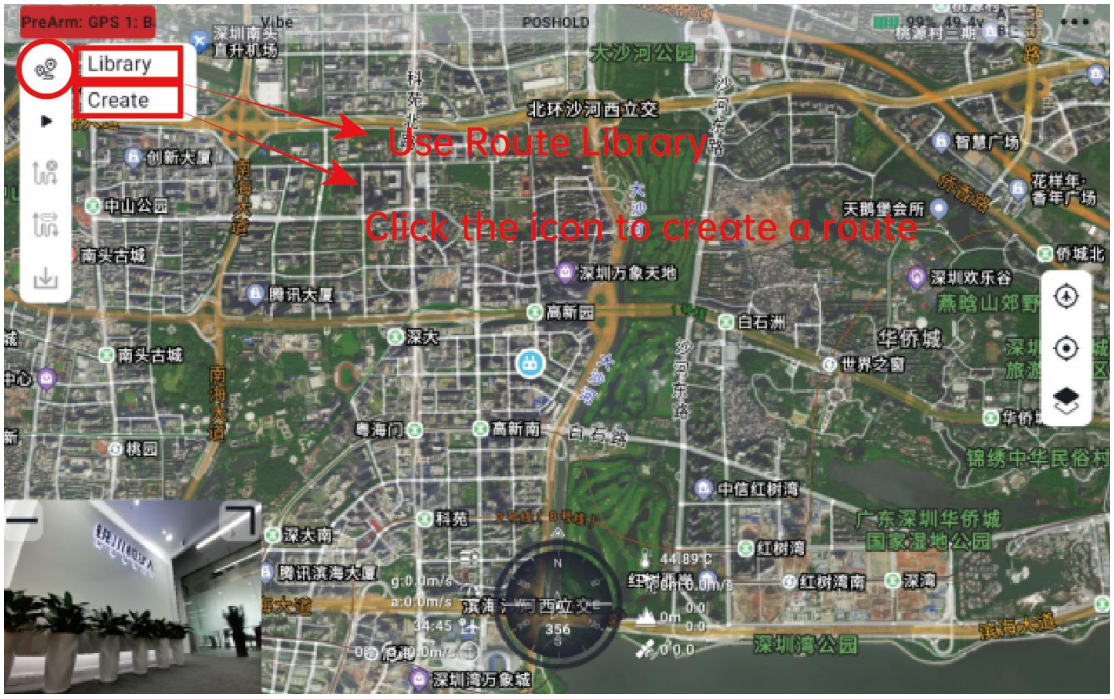
You can also choose to manually enter the rtsp address to connect



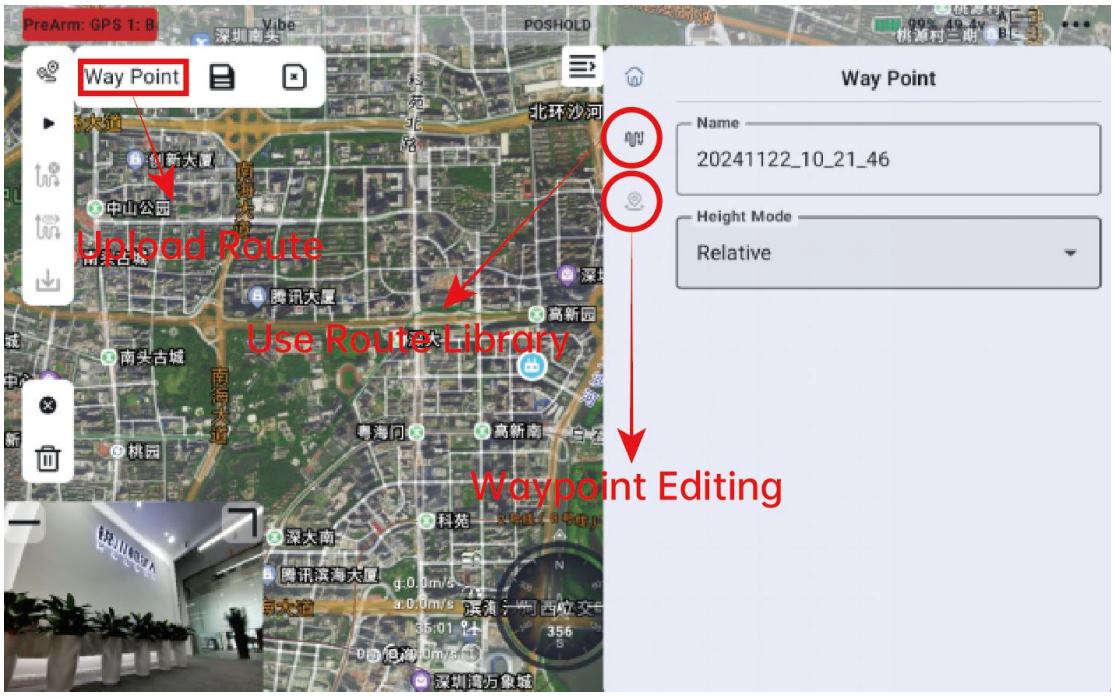
Note: When two gimbal platforms are connected at the same time, the IP address of one of the gimbal platforms needs to be changed to the end of non -25. When connecting, choose to manually enter the rtsp address to connect

11.3 route planning

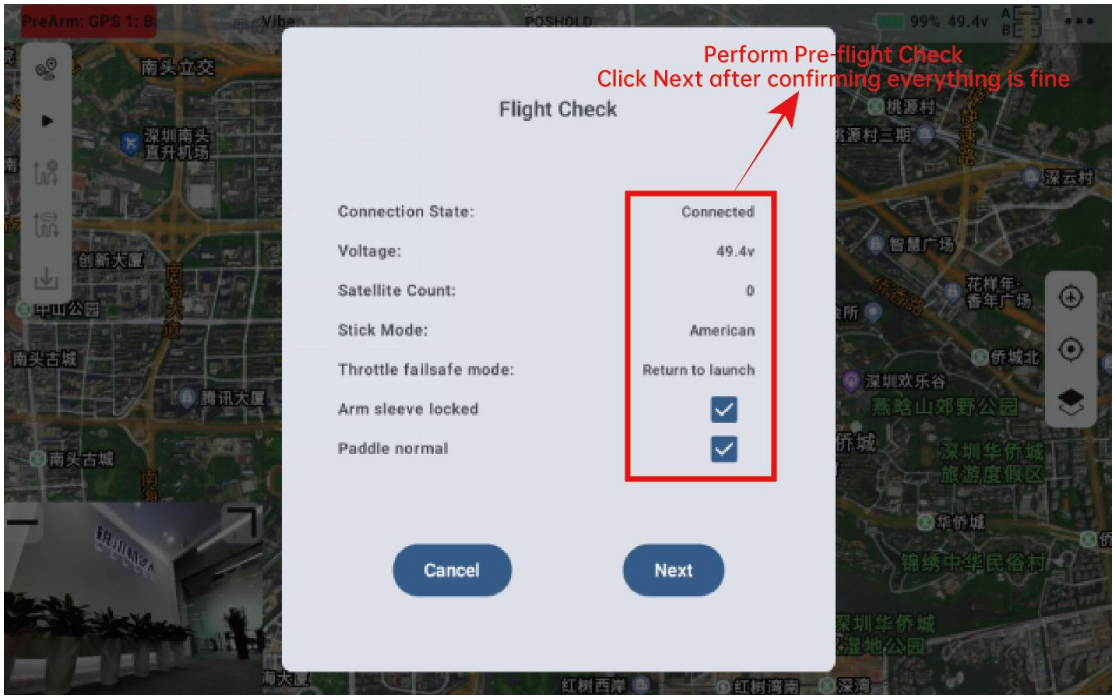
- Click the icon to enter the route planning interface,
- Choose to create a new route or use the route library route and write the route.



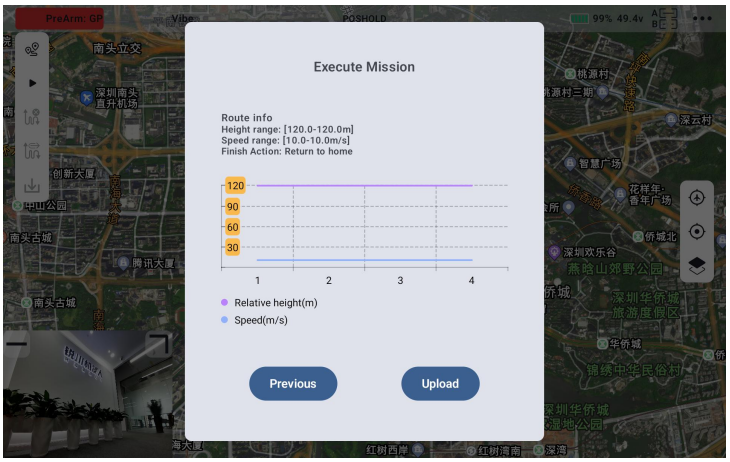
- Save route information after route drawing



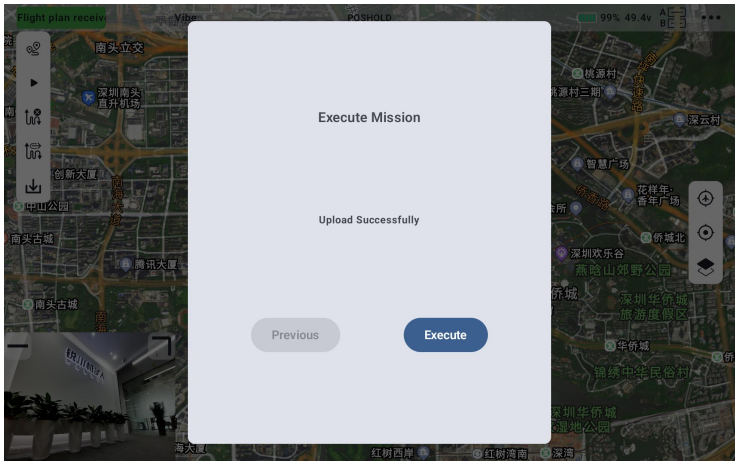
- Enter the flight inspection interface, please review the relevant contents carefully and check the inspection items.



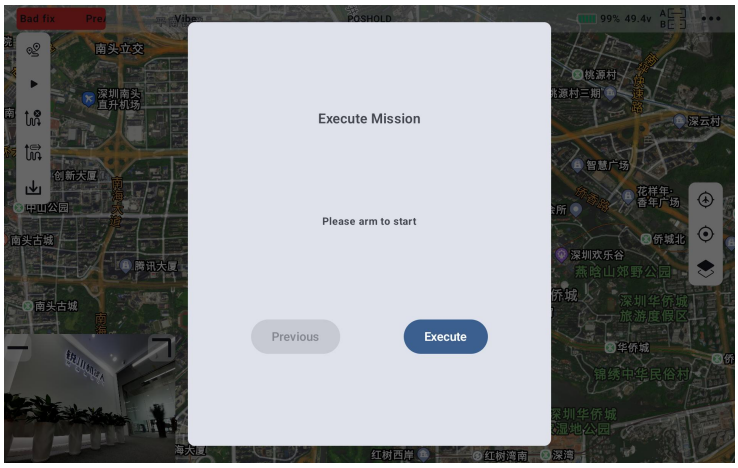
- Check the route information and upload the route



- Wait for the route upload to complete, and click Do Task



- Manually unlock the aircraft, the drone will automatically perform route tasks



- At the end of the mission waypoints, add the appropriate waypoints to guide the aircraft back to the landing point on a safe path.

Note: For the return altitude, pay attention to the environment or the height of buildings on the return route. If the altitude cannot be raised, add a waypoint to bypass obstacles.

11.4 Flight Restriction Zone

Please use the UniGCS ground station software and comply with relevant legal rules, including but not limited:

1. Comply with flight restrictions and no-fly regulations: Before flying, please check and understand the latest no-fly and no-fly information through the local official unmanned aircraft management platform, and comply with relevant regulations.

2. Comply with the regulations on real-name registration and flight information reporting: According to laws and regulations, you need to register with your real name on the Unmanned Aerial Vehicle Integrated Comprehensive Supervision Service Platform (UOM). When using it, you need to submit flight dynamic data online, and you cannot turn off the reporting function during operation.

3. Compliance with other laws and regulations: Before flying, be sure to understand and comply with local unmanned aerial vehicle flight laws and regulations in detail.

Chapter 12 After Sales and Warranty

Please visit the official Reebot Robotics website at https://www.reebot.com/index.php?id=support to learn about the latest after-sales service and warranty information.

Chapter 13 Appendix

13.1 Technical Parameters of UniDrone E900

Body material	engineering plastics
Wheelbase	900mm
Maximum flight speed	20m/s
Economic cruise speed	8-12m/s
Maximum ascent/descent speed	4m/s;2m/s
Endurance * (Measured near the static wind and sea level, there are data differences in different environments, and the actual endurance shall prevail)	No load: 55 min ZT30 mount: 50min 10kg full load: 43min
Maximum Payload	2.1kg
Empty weight *	8.4kg (with battery)
Maximum takeoff weight *	10.5kg
Maximum Wind Resistance Speed	11.5m/s
Take-off and landing mode	Vertical take-off and landing
Strobe Light Frequency	1.5HZ
Power Energy	Battery

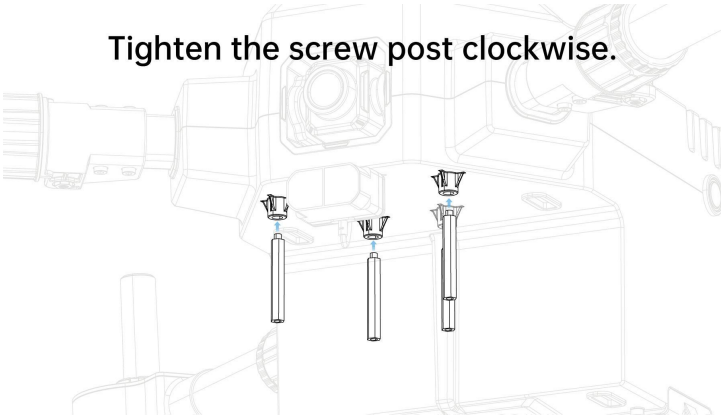
Soft Pack Battery Power Input	Amass XT90 Female Socket
Operating Voltage	12S
Battery Compartment Dimensions	L205mm*W144mm*H78mm
Positioning accuracy	Single Point Positioning: 1.5m RTK: 1CM + 1PPM
Flight Controller	Standard N7 flight controller (optional)
communication distance	Subject to link data
DIY Customization	Flight control, GNSS receiver, remote controller, task load, waterproof design, fuselage shell, etc.
ground station	QGoundcontrol/Mission planner/UniGCS
Application	Aerial surveying and mapping, patrol inspection, logistics, monitoring, public security, transportation, mooring, etc.
Motor mounting angle	3 .
Forward-looking obstacle avoidance speed	8m/s
Forward Obstacle Avoidance Distance	10m

13.2 Use the downward dual gimbal assembly

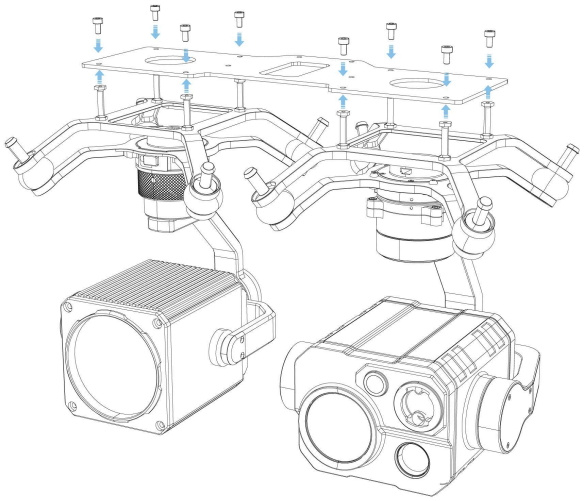
The lower dual gimbal assembly is used to install the gimbal camera to the bottom of the UniDrone E900 aircraft.

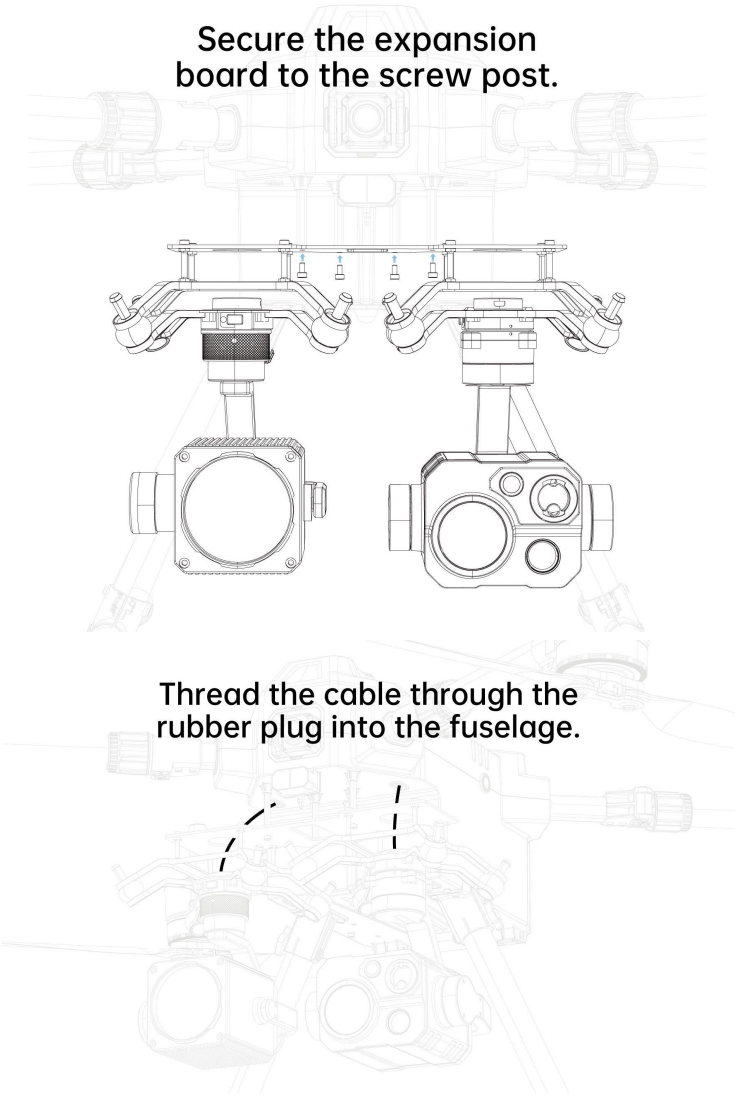
Installation steps

Tighten the screw post clockwise.

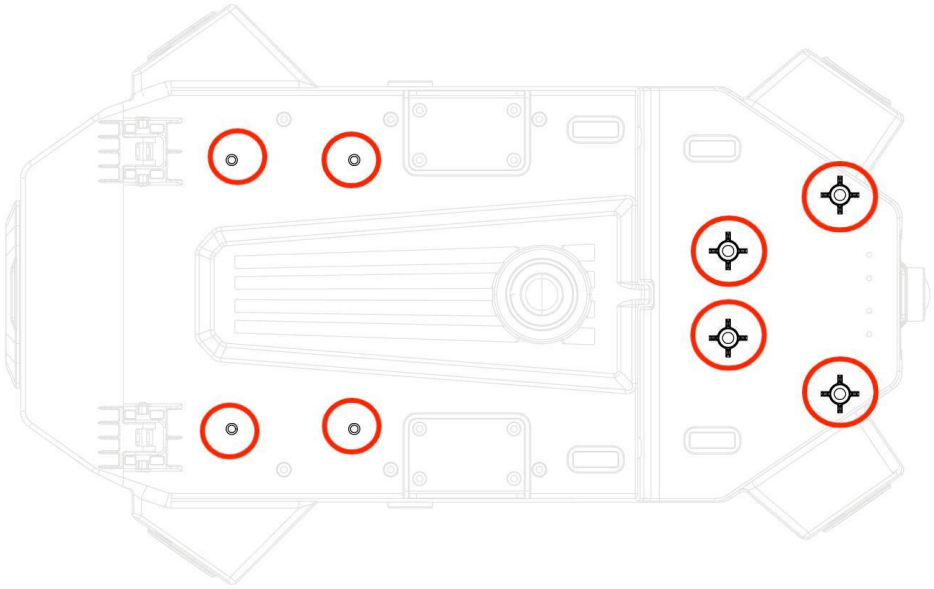


Mount the optical pod onto the expansion board.





13.3 Expansion Screw Hole Description



Note: M3 size screws are used here.

13.4UniDrone E900 Noise Test Results

Observation point	Hover	Flight (at 1 m/s)
Ground observation point (vertically below)	88.6dB(A)	91.2dB(A)
Side observation point (contour plane)	80.4dB(A)	83.1dB(A)
● The measurement environment is outdoor, and the site is concrete.		

13.5 UniDrone E900 functional parameter list

Functions	Parameters
RTK	EK3_SRC1_YAW 2 GPS_TYPE1 25 GPS_MB1_TYPE 1 GPS_MB1_OFS_X 0 GPS_MB1_OFS_Y 0.668 GPS_MB1_OFS_Z 0 GPS_POS1_X 0.3 GPS_POS1_Y 0.334 GPS_POS1_Z 0
Gimbal Camera Control	SERIAL6_PROTOCOL 2 SERIAL6_BAUD 115 MNT1_TYPE 8 MNT1_PITCH_MIN -90 MNT1_PITCH_MAX 25 MNT1_YAW_MIN -160 MNT1_YAW_MAX 160 MNT1_RC_RATE 90
Fusion of Flight Control Attitude Data	SERIAL6_BAUD 115 SR2_EXTRA1 50
Propulsion System (CAN)	CAN_P1_DRIVER 1 CAN_D1_PROTOCOL 1 CAN_P1_BITRATE 1000000 CAN_D1_UC_ESC_BM 15 TKOFF_RPM_MIN 835 CAN_D1_UC_OPTION 1
Data Transmission	SERIAL1_PROTOCOL 2 SERIAL1_BAUD 115
Smart Battery	CAN_P1_DRIVER 1 CAN_D1_PROTOCOL 1 BATT_MONITOR 8

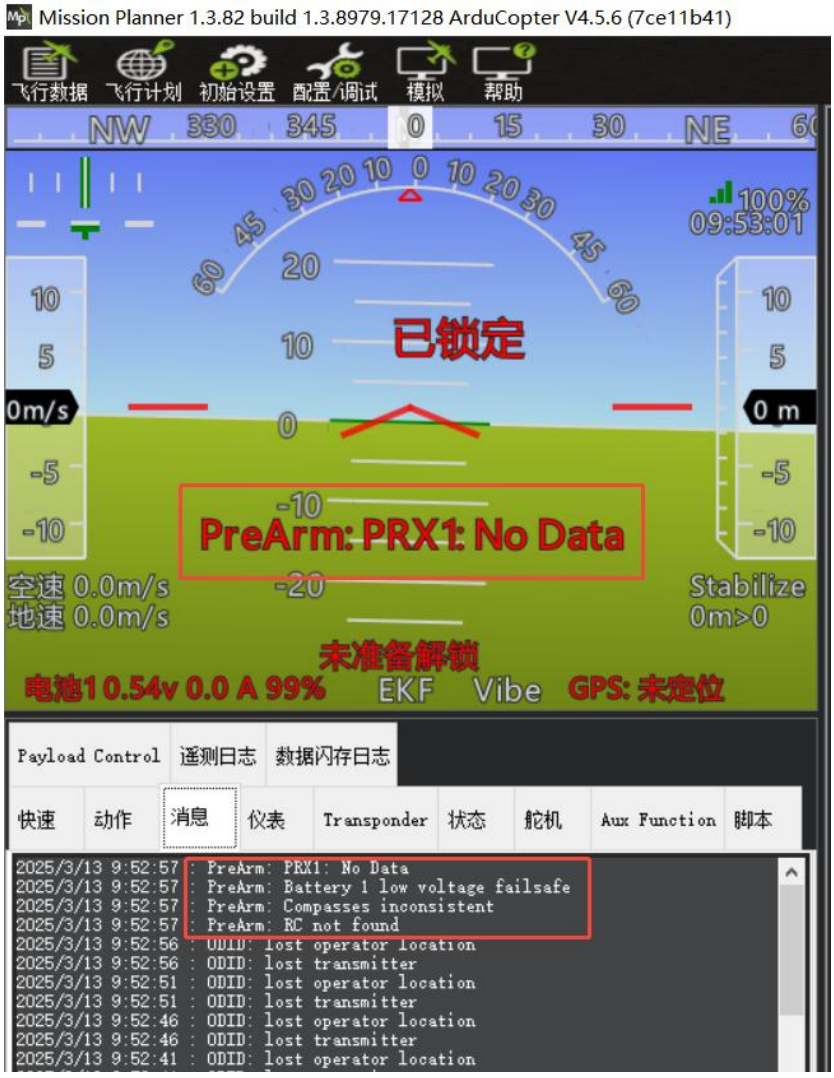
Laser Obstacle Avoidance (IIC)	AVOID_ENABLE	3
	AVOID_MARGIN	8
	AVOID_DIST_MAX	8
	AVOID_ACCEL_MAX	0
	AVOID_BACKUP_SPD	0
	AVOID_BEHAVE	1
	PRX_TYPE	4
	RNGFND1_ADDR	16
	RNGFND1_MAX_CM	1200
	RNGFND1_MIN_CM	30
	RNGFND1_ORIENT	0
	RNGFND1_TYPE	25
Geofencing	FENCE_ACTION	1
	FENCE_ALT_MAX	135
	FENCE_ENABLE	1
	FENCE_MARGIN	15
	FENCE_TYPE	5

13.6 Common Unlock Prohibition Messages, Their Causes, and Corresponding Solutions Flight Controller Unable to Unlock

Flight Controller Unable to Unlock

When attempting to unlock the flight controller via the remote controller or ground control station, the flight controller may fail to unlock.

In this case, the message interface and HUD interface on the ground control station will display an unlock prohibition message: "PreArm: XXXXXX", as shown below:



If this message does not appear, it indicates that no unlock command has been sent to the flight controller. Please first check whether the remote controller operation is correct.

Common Unlock Prohibition Messages
PreArm: 3D Accel calibration needed
Cause: Accelerometer calibration not completed
Solution: Perform accelerometer calibration and restart the flight controller

PreArm: Accels calibrated requires reboot
Cause: The two accelerometers differ by 0.75 m/s²
Solution: Recalibrate the accelerometer. Preheat and restart the flight controller. If the issue persists, reflash the flight controller firmware

PreArm: AHRS: waiting for home
Cause: GPS fix not acquired
Solution: If indoors, move outside. Ensure compass and accelerometer calibration is completed. Eliminate potential RF interference sources for GPS

PreArm: Battery critical voltage failsafe
Cause: Battery voltage is below BATT_CRT_VOLT
Solution: Replace the battery or adjust the BATT_CRT_VOLT parameter

PreArm: Battery low voltage failsafe
Cause: Battery voltage is below BATT_LOW_VOLT
Solution: Replace the battery or adjust the BATT_LOW_VOLT parameter

PreArm: Battery unhealthy
Cause: Battery is not providing data
Solution: Check the battery monitor's physical connection and configuration

PreArm: Check fence
Cause: Fence initialization failure
Solution: Restart the flight controller

PreArm: Compass not healthy
Cause: At least one compass is not providing data
Solution: Check the compass connection and configuration with the flight controller

PreArm: Compasses inconsistent
Cause: Compass angles or magnetic field strengths are inconsistent
Solution: Check compass orientation (e.g., COMPASS_ORIENT). Move the compass away from metal parts in the frame. Repeat compass calibration. Disable the internal compass

PreArm: CrashDump data detected
Cause: Crash dump data has been recorded
Solution: A CPU crash has occurred, and data has been recorded. The aircraft may be unsafe to fly. Reflash the flight controller firmware

PreArm: DroneCAN: Duplicate Node x../y!
Cause: DroneCAN detects two devices using the same node ID
Solution: Clear the DroneCAN DNS server by setting CAN_D1_UC_OPTION = 1 and restart

PreArm: Duplicate Aux Switch Options
Cause: Two auxiliary switches are set for the same function
Solution: Check auxiliary function settings. Inspect RCx_OPTION parameters for duplicate values

PreArm: Fence requires position
Cause: Fence feature requires position estimation
Solution: Wait or move the vehicle to a location with a clear view of the sky. Reduce potential RF interference

PreArm: GPS x: Bad fix
Cause: GPS signal check failed when GPS has no fix or is unavailable
Solution: Move to an open outdoor area to obtain a GPS fix before unlocking
Disable the GPS signal unlock check

PreArm: Gyros inconsistent
Cause: The two gyros differ by at least 5 degrees/second
Solution: Restart the autopilot and keep the drone stationary until gyro calibration is complete. Allow the flight controller to warm up and restart

PreArm: Gyros not calibrated
Cause: At least one gyro is not providing data
Solution: Restart the flight controller

PreArm: Logging failed
Cause: Failed to write logs, possibly due to hardware failure
Solution: Restart the flight controller. If the issue persists, check if the flight controller has a TF card inserted or format the TF card

PreArm: PRXx: No Data
Cause: Proximity sensor is not providing data
Solution: Try restarting the flight controller and check if the LiDAR is powered

PreArm: PRXx: Not Connected
Cause: Proximity sensor is not providing data
Solution: Try restarting the flight controller and check if the LiDAR is powered

PreArm: Radio failsafe on
Cause: RC failsafe triggered
Solution: Turn on the RC transmitter or check the RC failsafe configuration

PreArm: Rangefinder x: Not Connected
Cause: Rangefinder is not providing data
Solution: Check the rangefinder's physical connection and configuration with the autopilot

PreArm: Rangefinder x: Not Detected
Cause: Rangefinder is not providing data
Solution: Check the rangefinder's physical connection and configuration with the autopilot

PreArm: Vehicle outside fence
Cause: The aircraft is outside the fence boundary
Solution: Move the aircraft inside the fenced area

PreArm: AHRS not healthy
Cause: AHRS/EKF not yet ready
Solution: Wait and restart the flight controller

PreArm: Battery failsafe
Cause: Battery failsafe triggered
Solution: Insert the battery and check its voltage and capacity

PreArm: Altitude disparity
Cause: Barometer and EKF altitude differ by at least 1 meter
Solution: Wait for EKF altitude to stabilize. Restart the flight controller

PreArm: Need Alt Estimate
Cause: EKF has not yet calculated altitude
Solution: Wait. Allow the autopilot to warm up. Ensure the accelerometer calibration is completed

PreArm: Need Position Estimate
Cause: When unlocking in position-hold modes (e.g., Loiter, PosHold), the flight controller lacks valid sensor data sources (e.g., GPS not fixed, EKF configured data source unavailable, or incorrect data source settings)
Solution: Wait. If indoors, move outdoors. Ensure compass and accelerometer

calibration is completed. Eliminate potential RF interference sources for GPS

13.7 ground station download

UniDrone the ground station control software of E900 is Mission Planner and UniGCS software (Android remote controller is pre-installed with UniGCS ground station software), you can also go to the ArduPilot firmware : /Tools/MissionPlanner to download MP ground station.