User’s Manual

Q10Plant protection drone

Model: 3WD4-QF-10B

Q10Plant protection drone controller

Model: QF-T-1000

V 1.0.0

Hangzhou Qifei Intelligence Technology Co.,Ltd.

Table of Contents

Legal Statement

Copyrights

Trademark

Update and Modification

In order to enhance the product security and provide better user experience, QiFei may improve the product via software auto update, but QiFei doesn't need to inform in advance and isn't liable to any responsibility.
QiFei reserves the right to modify any information in this document at any time, the modified contents will be added into the new version without prior announcement. There may be minor difference about some product functions after it is updated.

Document Overview

The document is to comprehensively introduce the product function features, structure parameters, installation dismounting and flight guide etc.

Applied Model

Q10Plant protection drone
Model: 3WD4-QF-10B

Q10Plant protection drone controller
Model: QF-T-1000

Application Objective

The main readers of the manual are terminal users.

Reading Guide

Chapter No.	Chapter Name	Main Content
1	Product Overview	It is to introduce the function features and application scenarios of the product.
2	Product Component	It is comprehensively to introduce the main components of the product. It is recommended to read the chapter before use, which is to understand the application methods of product structure and main components.
3	Flight Preparation	It is to introduce the complete flow of aircraft unlock before takeoff in details. It has to strictly conform to the installation debudding sequence of the chapter, install each component and make initial debugging before first use. If it is not the first time to use the device, you can select the installation content according to the dismounting situation last time, but it has to be confirmed that all the components (unnecessary steps excluded) listed in the chapter have been stably installed.
4	Enable Flight	It is to introduce the complete flow of aircraft formal launch and landing in details. It has to complete the preparation steps listed in the chapter 3. It needs to confirm that all the inspection items including environment and the device itself have conformed to flight requirements before enabling flight. Please operate by strictly conforming to the steps described in the chapter, the operation sequence can't be reversed.
5	End Flight	It is to introduce the operation steps after aircraft landing in details. Please operate by strictly conforming to the steps described in this chapter, the operation sequence can't be reversed.
6	Upgrade	It is to introduce upgrade methods and attentions.
7	Appendix 1	It is to introduce the technical parameters.
8	Appendix 2	It is to introduce the indicator definition of the aircraft.

Symbol Definition

The following symbol may appear in the document, please refer to the table below for the respective definition.

Symbol	Note
 Danger	It means highly potential danger. It will cause severe injury or casualties if it fails to avoid.
 Warning	It means moderate or low potential danger. It may cause slight or moderate injury if it fails to avoid.
 Caution	It means potential risk. It may cause device damage, weaker performance or other unpredictable consequences if it fails to avoid.
 Tips	It means that it can help you to solve some problem or save your time.
 Note	It means the additional information, which is the emphasis and supplement of the main body.

Document Material

The product includes the following document materials, you can search according to your requirements:

- <Quick Start Guide>

It can be applied to the first flight. Please refer to <User Manual> for operation details when it is used for the second time or it has to use some other advanced functions.

Check the paper material affiliated in the packaging or log in www.qifeizn.com to acquire more details.

- <User Manual> (the document it is)

It comprehensively introduces the product function features, structure parameters, installation dismounting and flight guide etc.

Log in www.qifeizn.com and search 3WD4-QF-10B to acquire more details.

Important Safeguards and Warnings

The following description is the correct application method of the device. Please read the manually carefully before use in order to prevent danger and property loss. It has to strictly conform to the manual during application and keep it properly after reading.

Danger

- Please fly the aircraft in an environment that meets the flight conditions, away from the no-fly zone.
- Please do not touch the rotating parts to prevent injury.
- The pesticide is toxic. Please use it with caution and operate according to the pesticide use specifications.
- When using pesticides, please wear protective equipment to prevent direct contact with pesticides.After the aircraft operation is completed, please clean the skin and clean the aircraft and remote control (wipe with a damp cloth).
- When using pesticides, it is strictly prohibited to pollute rivers and drinking water sources.
- The use of highly toxic and special fluids is prohibited.

Warning

- Please transport, use, and store the product and all other components in a compliant environment.
- When disassembling the device, strictly follow the procedures described in the manual. Do not unduly remove other components.
- The use of 3WD4-QF-10BPlant protection drone has security risks and is not suitable for people under 18 years of age.

Caution

- Please operate the device by strictly conforming to the steps described in the chapter, the operation sequence can't be reversed.
- It needs to understand the local laws and regulations before using the aircraft. Please apply to local authorities for flight permission if necessary.
- Please select open wide environment outdoors for the first flight. It is to unlock the aircraft and take off when the number of GPS satellites reaches more than 8.
- Please make sure the device antenna has been properly installed before enabling the power of remote control, ground station or aircraft, otherwise it may cause damage to internal module or make the control distance shorter.
- When dispensing, please use clean water, it may cause the nozzle to be blocked. If there is any blockage during use, please clean it up before use.
- Avoid using powder pesticides, it may affect the service life of the spraying system.

Flight Environment

Warning

Please make flight in the environment which meets the following conditions:

- Keep away from no-fly zone, please do not enter no-fly zone.
- Maximum flight radius: 1 km.
- Please do not fly the aircraft in rain, snow and thunder weather.
- Please do not fly in narrow and small space.
- Do not fly above the crowd to avoid personal injury or poisoning.
- Please do not get close to high-voltage power line.

Power Requirements

Caution

- Please strictly conform to your local electrical safety codes.
- Make sure the power supply is correct before operating the device.
- The power source shall conform to the requirement of the Safety Extra Low Voltage (SELV) standard, and supply power with rated voltage according to the Limited Power Source requirement of IEC60950-1. Please note that the power supply requirement is subject to the device label.
- Prevent the power cable from being trampled or pressed, especially the plug, power socket and the junction extruded from the device.

Battery Attentions

Warning

- It has to use the exclusive power adapter to charge the device provided by QiFei, otherwise it may cause damage to the battery or other unpredictable consequences.
- It has to charge the device at a temperature which is between 0 and 50℃.
- It has to distinguish positive and negative when charging the device, which is to prevent short circuit.
- Please do not place the device close to fire source or inflammables.
- Please do not charge and discharge the device in a situation where it is not guarded by people.
- Please do no use undesignated battery to the device.
- Please do not dismantle and destroy the battery without permission, water is not allowed to enter the device, damages caused by human is not covered by warranty.
- Please do not throw the battery into fire or make it exposed to the environment with high temperature.
- Please do not dismantle or modify the battery, or make the battery transformed.
- Avoid contact short circuit between positive and negative (Please do not place the battery together with the objects such as necklace and hairpin etc. when carrying or storing the battery).
- Please replace new battery in time when it is damaged.
- Please charge the battery or discharge it to 30%～40% of remaining battery if it won't be used for a long time, and place it in a dry and cool environment.
- If the battery leaks and the liquid enters eyes accidentally, please do not rub your eyes, you should wash your eyes with clean water and see a doctor immediately.

Caution

- It is normal the battery heats up after it is running for a period of time, because the discharge power is quite big.
- It is normal the battery heats up when it is being charged.

- The cycle times of power battery is 300 in normal application situation.

Application Environment Requirements

- Please transport, use and store the device in the allowed humidity and temperature range.
- Please do not let any liquid flow into the device.
- Please do not vibrate or soak the device.
- Please pack the device with default package or material with equivalent quality.

Operation and Maintenance Requirements

Warning

- Please do not dismantle the device unprofessionally.
- Please use soft dry cloth or use clean soft cloth and dip a little mild detergent to clean the device.
- Please use the accessories provided by manufacturer and it shall be installed and repaired by professional staff.

Disclaimer

- This manual is for reference only. Please refer to the actual product for more details.
- Minor differences might be found in user interface, and there might be deviation between the actual value of some data and the value provided in the manual due to the reasons such as the real environment is not stable. Please refer to the final explanation of the company if there is any doubt or dispute.
- All the designs and software are subject to change without prior written notice. The manual will be regularly updated according to the product upgrade without prior announcement.
- Please contact the supplier or customer service if there is any problem occurred when using the device.
- Other trademarks and registered trademarks mentioned in the document are the properties of their respective owners.
- Please use this product within the scope allowed by local laws. Qifei shall not be liable for any illegal use.
- This product belongs to a low-level crop protection UAS. Please strictly abide by the relevant product's operating specifications. Hangzhou Qifei Intelligence Technology Co., Ltd. shall not be responsible for any performance, safety and legal liability caused by any operation and usage control.
- Please fly under the guidance of professionals. Install and use this product according to this manual. Qifei is not responsible for accidents caused by improper installation, configuration, operation, etc.

1 Product Introduction

1.1Overview

The series is a four-axis unmanned aerial vehicle (UAV). It is designed for agriculture and forest areas. Drones are mainly divided into Two modes: automatic and manual flight mode.

The product consists of flight platforms, spray systems, remote controls and ground control stations (GCS).

- Flight platform: It consists of navigation system, flight control system and power system.
- Spray system: Spray control system, pump, pipeline, medicine box, nozzle and other components.
- Remote control: It consists of a remote controller and a digital radio station.
- GCS: Composed of a Android smart phone and APP software.

1.2Features

Integrated Design

- The propeller adopts a folded structure. No need to install a propeller before takeoff.
- The remote control integrates a mobile phone, a digital radio station, which is easy to operate.
- The pesticide tank is fixed on the body and is not disassembled.

Accurately Positioning

- GPS accuracy: 1.5m

Terrain Following Function

- Millimeter-wave radar

Wireless Transmission

The aircraft has several antennas. They are used for: remote control receiver, communication with ground station and GPS antenna, RTK spiral antenna (only RTK version includes this component).

Low Battery Level Protection

- When the low battery level triggers the aircraft to return to home, it can trigger low battery level protection such as alarm, return to home and landing.

Flight Log

The ground station automatically records the flight record logs.

Intelligent Battery

- Anti-shock and wear-resistant housing to extend battery life.
- LED automatic power display.
- Charging smart alarm to prevent overvoltage, overcurrent, and high temperature damage to the battery and eliminate potential safety hazards.
- Low-voltage smart alarm (buzzer).
- When the battery is not used for a long time, it will automatically discharge to the storage voltage, extending the battery life.
- Logging function.
- Automatic shutdown function.If it is not used for more than 3 minutes, the battery will automatically shut down to save power.

- Parameter specifications:

Output voltage: 39.6 ~ 50.4 V Nominal voltage: 44.4V

Charging voltage: 50.4V Battery weight: 4.40kg

Charge Current: MAX 24A (1.5C) Nominal Capacity: 16000mA

Battery alert				
LED1	LED2	LED3	LED4	Current power
○	○	○	○	0%-8%
●	○	○	○	8%-25%
●	○	○	○	25%-37.5%
●	●	○	○	37.5%-50%
●	●	○	○	50%-62.5%
●	●	●	○	62%-75%
●	●	●	○	75%-92%
●	●	●	●	92%-100%

Flight Control

- The aircraft adopts a four-axis structure and has multiple control modes，which is simple and safe.
- Maximum taking off weight 28.5kg.

Electronic Fence

- Support electronic fence (e-fence) function in case the aircraft is out of the specified flight zone.
- Support customized e-fence settings.

2 Structures and software

This series product includes aircraft, sprinkler systems, remote control, and ground control station (GCS).
This chapter introduces the structures of these four components and the software used for ground stations. The detailed operations will be introduced in chapter 3.

Note

All figures listed below and all dimensions listed here for reference only. The figure and the dimensions may be slightly different from the user data due to measure position, measure accuracy, and position indicator. Please refer to the actual product for detailed information.

2.1Aircraft

For detailed operation please refer to Chapter 3

2.1.1 Product Dimensions

The aircraft is shown as in Figure 2-1.

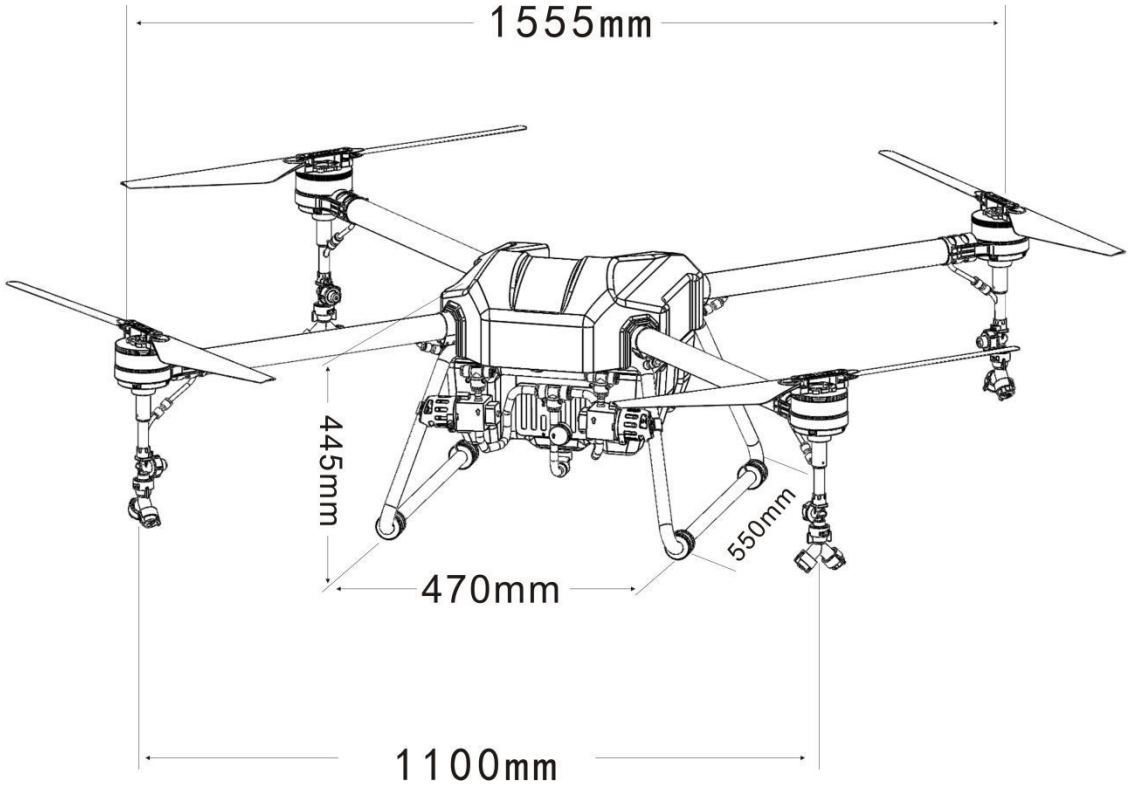

Figure 2-1

2.1.2 Structural Components

The structure of the aircraft is shown as in Figure 2-2.

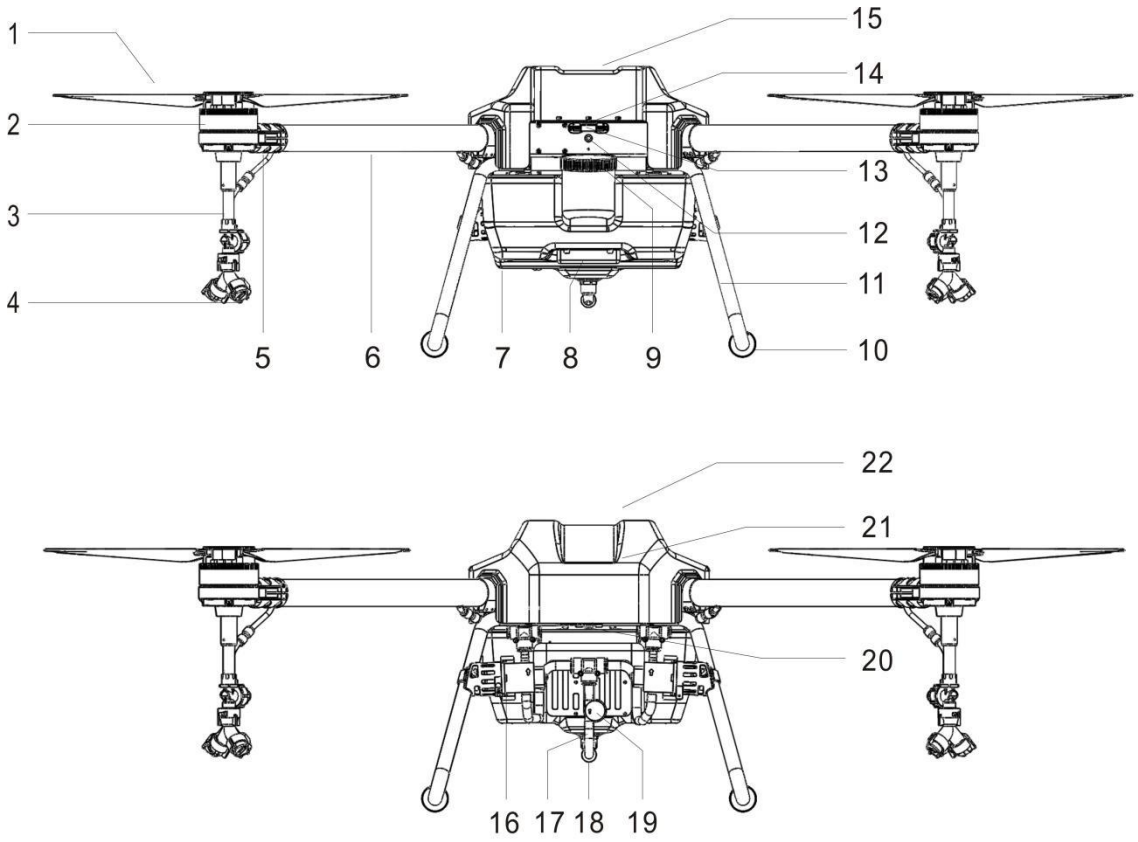

Figure 2-2

For details, please refer to the following table.

No.	Name	description
1	propeller	High-speed rotation provides lift,folding paddles to save space.
2	Motor	Drive propeller rotation.
3	Sprinkler pipe	Connecting pesticide pipes and nozzles.
4	nozzle	Spray and atomized pesticides.
5	Direction indicator	Indicate the direction.
6	Arm	Non-folding arm with higher strength, stronger and durable.
7	Pesticide tank	As a container for pesticides, volume: 10L.
8	radar	detect height and follow terrain.
9	Entrance for pesticide loading	Entrance for pesticide loading.
10	Landing gear cushion	Reduce shock when landing.
11	landing gear	Support the aircraft.
12	LED flight status indicator	Indicate the status of each flight. For details, please refer to the appendix *Instructions for indicating the status of the aircraft.*
13	Battery retention hook	To fix the battery
14	Battery installation position	Where to install the battery
15	Aircraft shell	Protect internal components
16	Pump	pumping pesticides.

No.	Name	description
17	Pesticide delivery pipeline	Transport pesticides
18	pesticide outlet connector	Connection of the pump and the pipe.
19	Flow Meter	Measure real-time flow data and feed back to the sprinkler system
20	Night light	Illumination at night
21	GPS	Positioning
22	Aircraft body	Support the overall structure of the aircraft

2.2spray system

3WD4-QF-10BPlant protection drone spray system adopts 12V diaphragm pump and Y-type pressure spraying, which can achieve forward and backward switchable spraying. During operation, parameters such as spray flow rate, spray width, and flight speed can be adjusted based on actual operating conditions.

Spraying flow: 1600-2000 ml/min.

Spray width: 1-20 meters (depending on flight altitude).

Flow meter: Real-time monitoring of the spray system (such as: flow , flow rate, remaining amount of pesticide, etc.), automatic return or hovering when the drug is broken.

See Figure 2-2 for details.

2.3 T1000 Remote Control and the GCS

2.3.1 Appearance and components

The remote control T1000 is shown as below. See Figure 2-3 ,Figure 2-4,Figure 2-5.

Figure 2-3

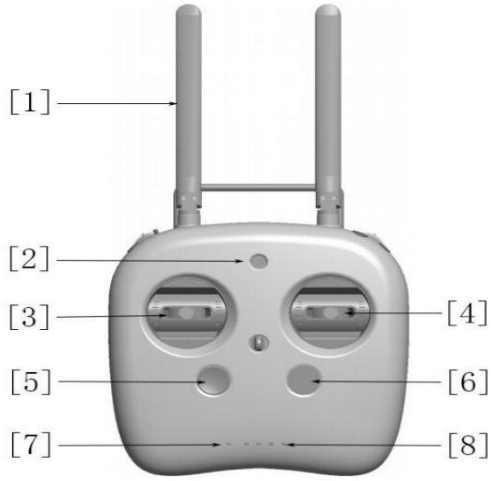

Figure 2-4

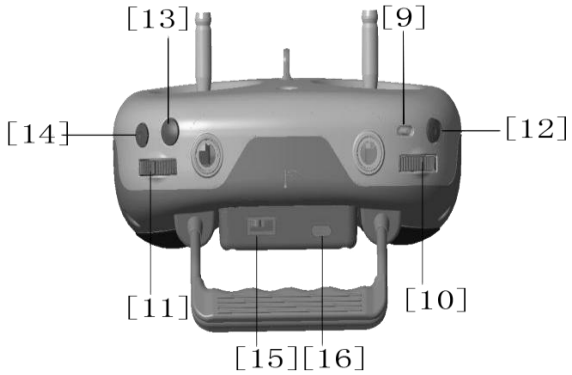

Figure 2-5

For details, please refer to the following table.

No.	Name	description
1	Remote control antenna	Communicate with aircraft
2	Phone bracket hole	The hole used to install the phone holder
3	Left stick	The default left stick's Y axis is channel 3 (THRO) and X axis is channel 4 (YAW).
4	Right stick	The default right stick's X axis is channel 1 (ROLL) and the Y axis is channel 2 (PITCH).
5	Power switch	Power switch of the remote control.
6	One-click return key	It defaults to channel 6 (return).
7	work indicator	It defaults to red
8	Power indicator	Display the power of the remote control.
9	Mode switch	It is also called a three-state switch and defaults to channel 5 (MODE)
10	Left wheel	Not Enabled
11	Right wheel	The switch is used to record the A, B points
12	Channel 9	Not Enabled

No.	Name	description
13	Channel 10	Pump switch
14	Channel 11	Not Enabled
15	Micro USB Socket	It is used to connect the phone. Remote control software can be used to adjust the mode.
16	USB TYPE C Socket	It is used to connect the phone,and communicate with your smart phone.

2.3.2 Charger

The shape and size of the charger are shown in Figure 2-6.

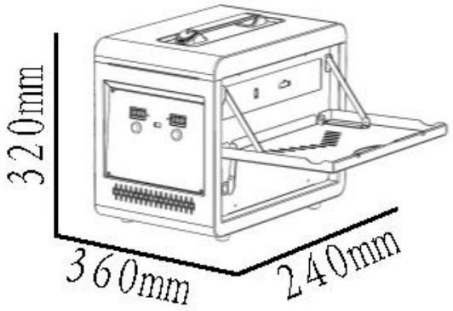

Figure 2-6

Product parameters

1. Input voltage: AC 190 ~ 220V
2. Maximum charging current: Channel CH1: 20.0A; Channel CH2: 20.0A
3. Average output voltage: Channel CH1: 50.4V; Channel CH2: 50.4V
4. Maximum balanced current: 400mA
5. Maximum static power consumption: 320mA
6. Display mode: LED display
7. Support battery type: 12S
8. Working environment temperature: 0 ~ 40 ℃
9. Weight: 12KG

2.3.3 APP interface

✧ Advantages: simple operation, high degree of intelligence (voice broadcast the real-time data of each module), complete functions.

2.3.3.1 Flight data interface

This screen shows the aircraft's flight status and basic flight operation buttons. At the top , the icons from left to right are flight mode, battery voltage value, GPS star number (satellite display), connection status (all sensors are displayed abnormally), remote control signal (connection will turn green), data link status(the connection will turn green), parameter settings. On the left side, From top to bottom there are take-off button, return flight button, route planning function button and human/aircraft positioning button. The upper right side is the status information bar, and the two buttons at lower right are the map type switching button and the map rotation button. See Figure

2-7 and Figure 2-8.

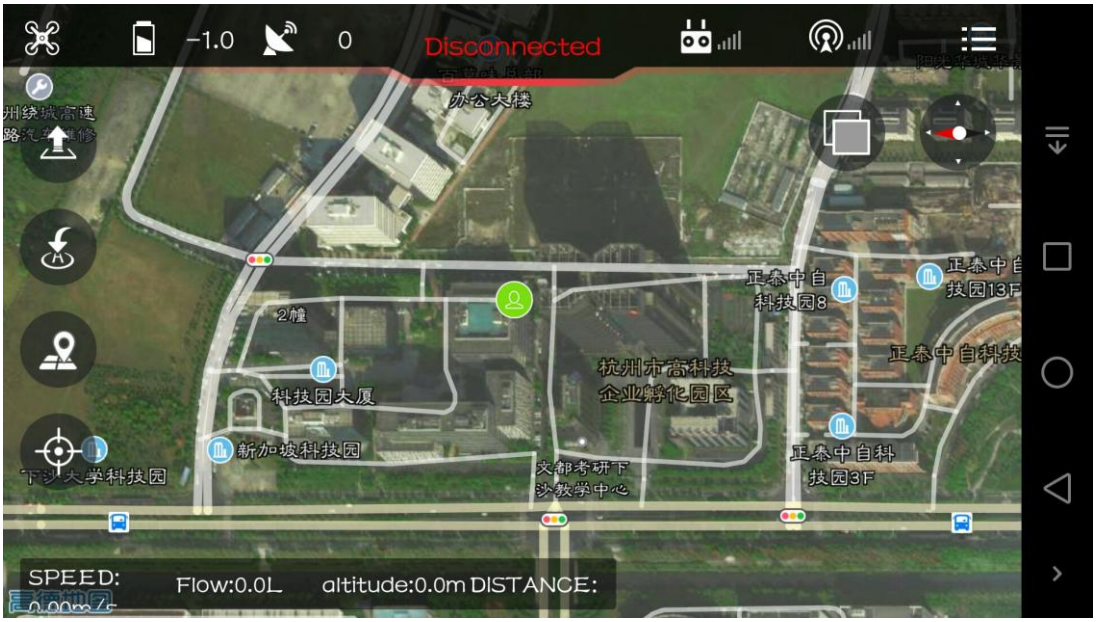

Figure 2-7

Figure 2-8

2.3.3.2 Description of the top menu bar

Flight Mode: Displays the flight mode of the current aircraft.

Battery voltage value: Displays the current battery level.

Satellite display: Displays the current number of searched stars for flight control.

Connection Status: Displays the status of all sensors connected to the flight controller. The icon turns green when the connection is normal.

Remote control signal: Displays the remote control signal status.

Digital Radio Link: Shows the connection status of the data link. After the connection is normal, the icon will turn green.

Parameter settings: Click to set the relevant parameters of the flight control.

2.3.3.3 Route planning interface

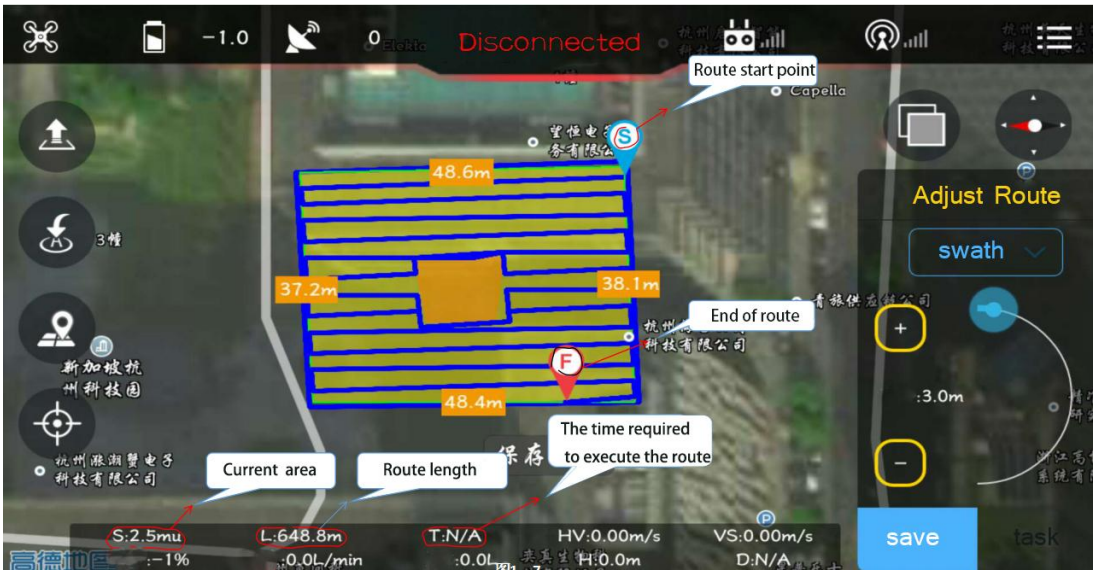

Figure 2-9

3 Flight Preparation

Note

The following chapter is going to introduce complete flow in details before the aircraft unlocked and takes off. Please select operation according to the actual situation after the first flight is over if it is not the used for the first time.

Caution

Please operate by strictly conforming to the steps described in this chapter; the operation sequence can't be reversed.

3.1preparation and inspection

3.1.1 T1000 remote control settings

There are 6 steps (as shown in Figure 3-1 to Figure 3-11):

Figure 3-1

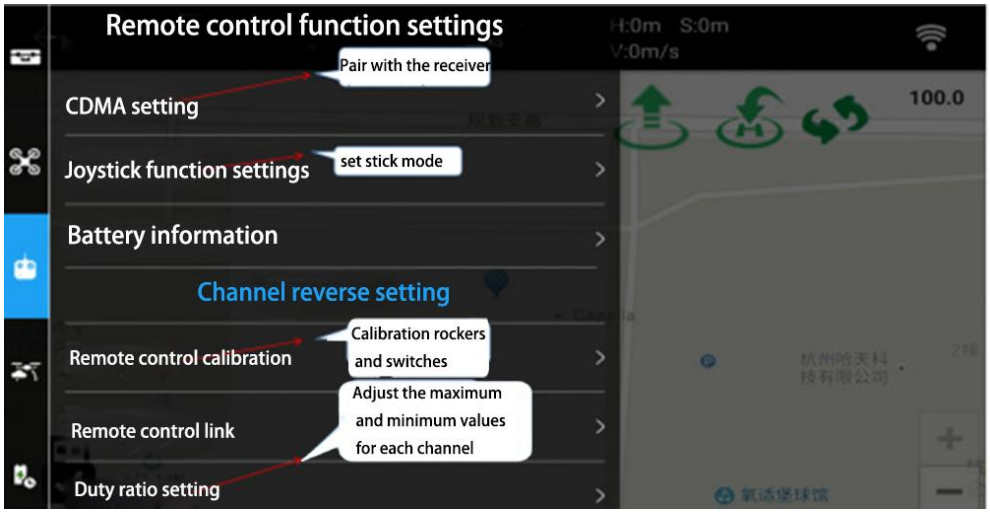

Figure 3-2

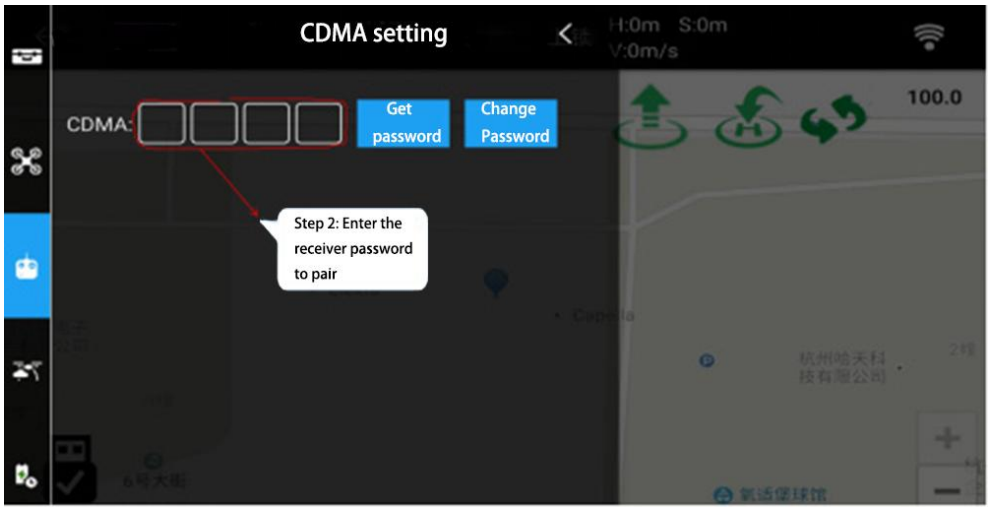

Figure 3-3

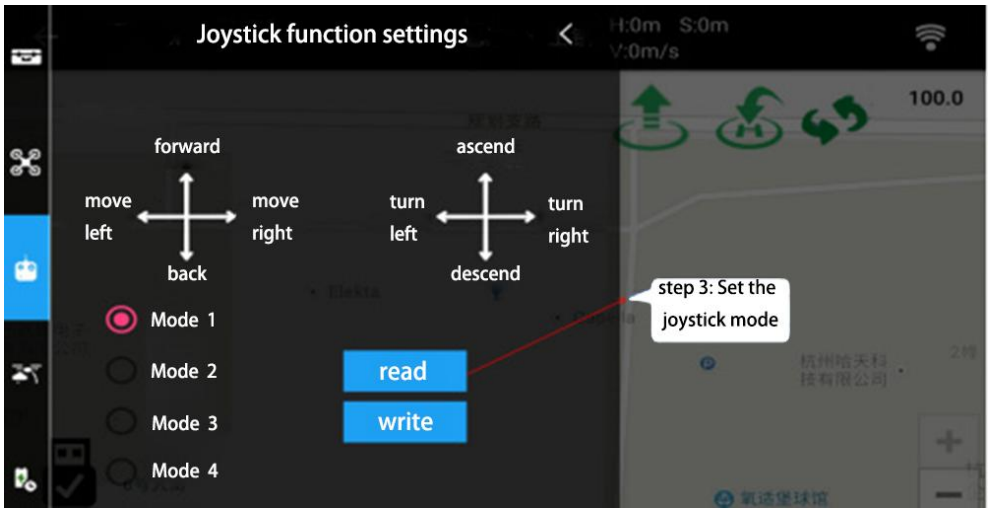

Figure 3-4

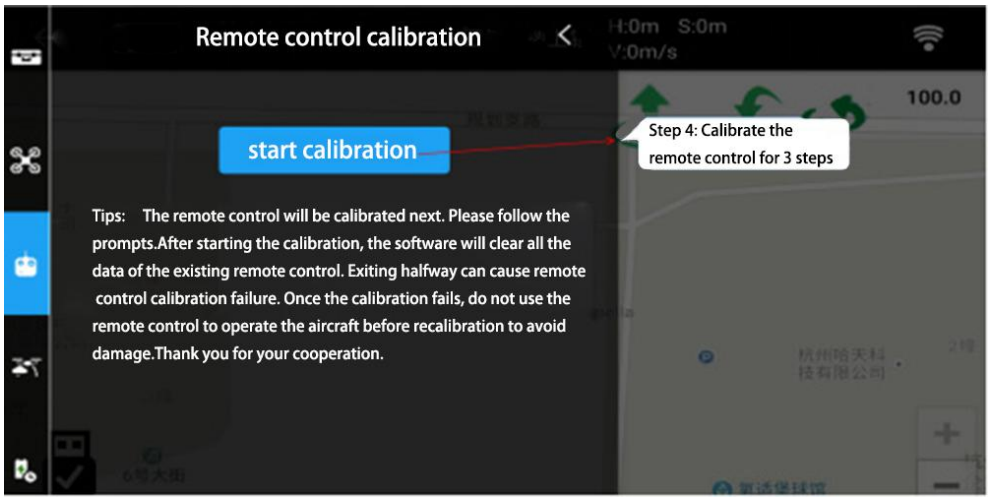

Figure 3-5

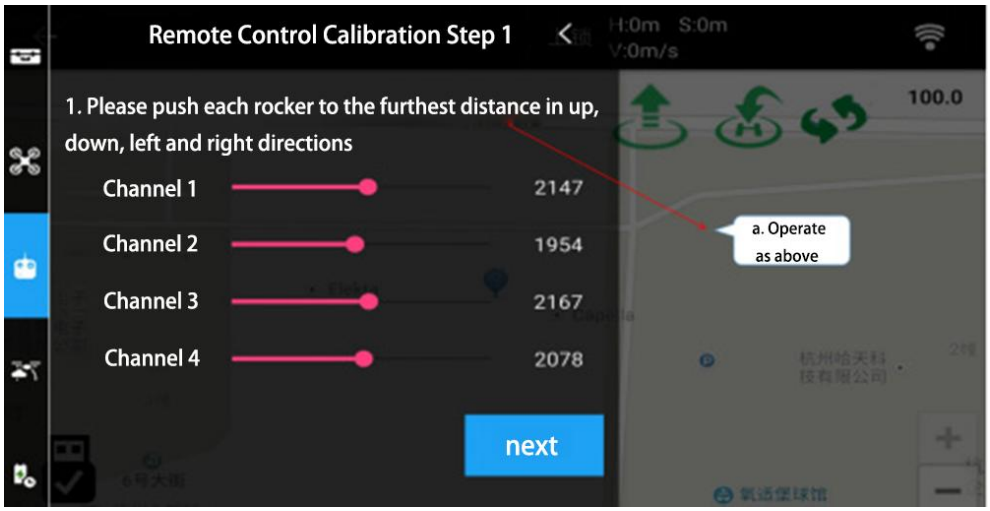

Figure 3-6

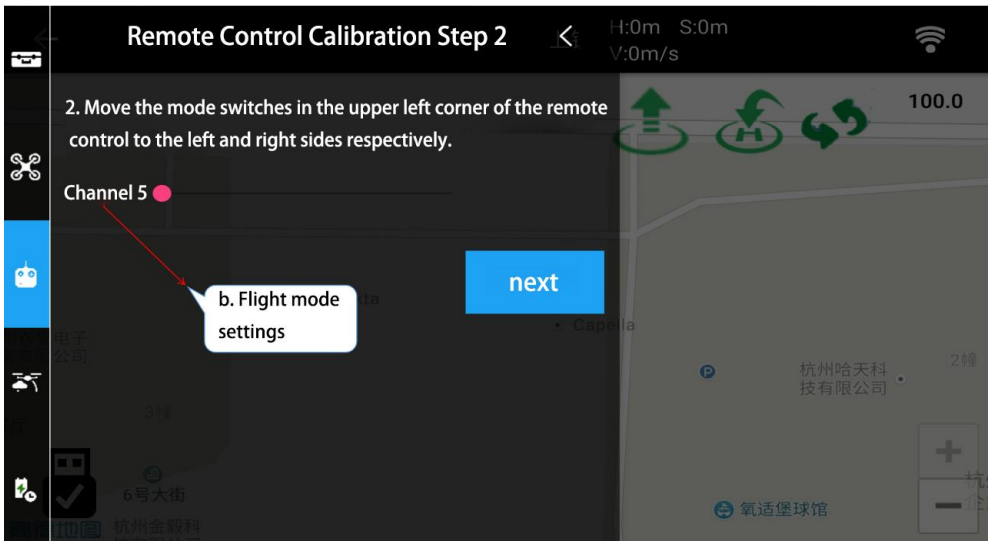

Figure 3-7

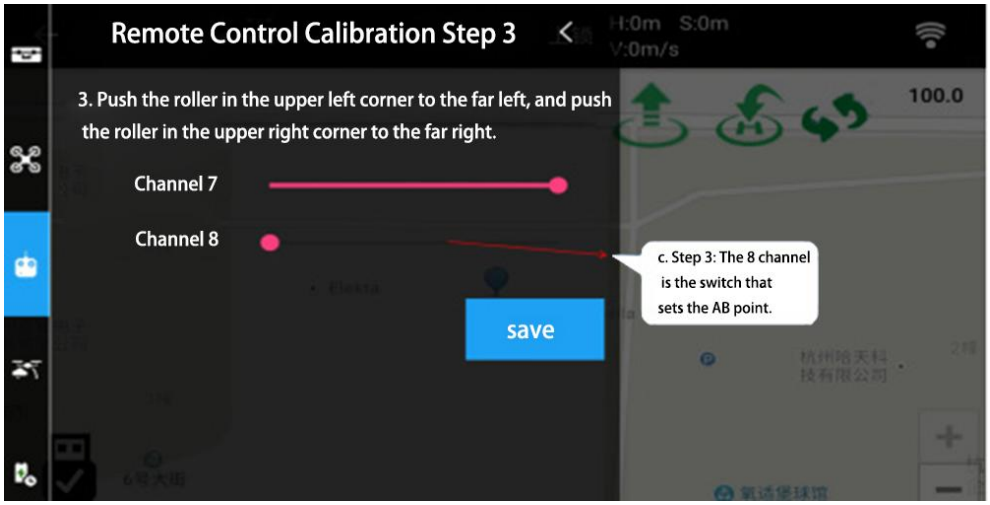

Figure 3-8

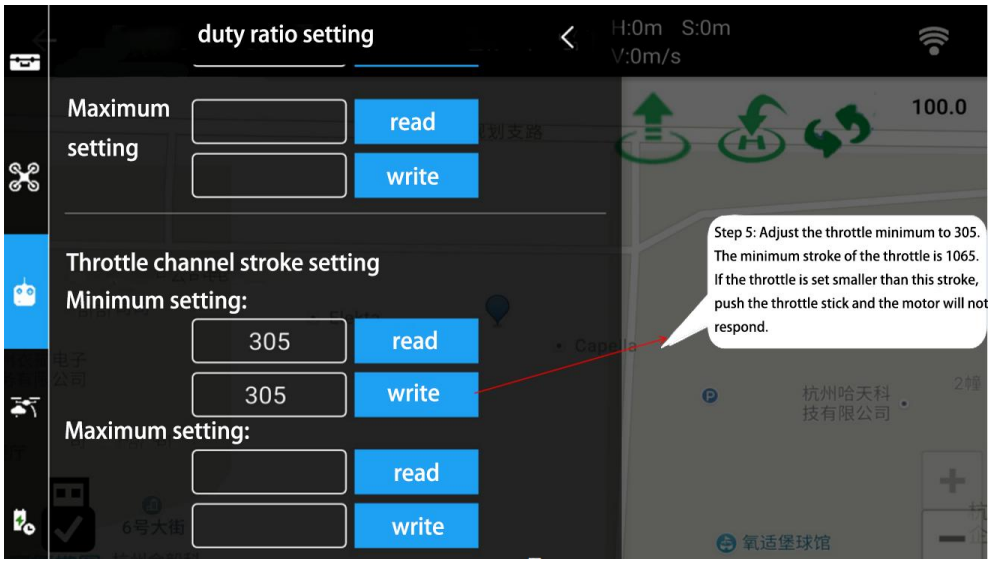

Figure 3-9

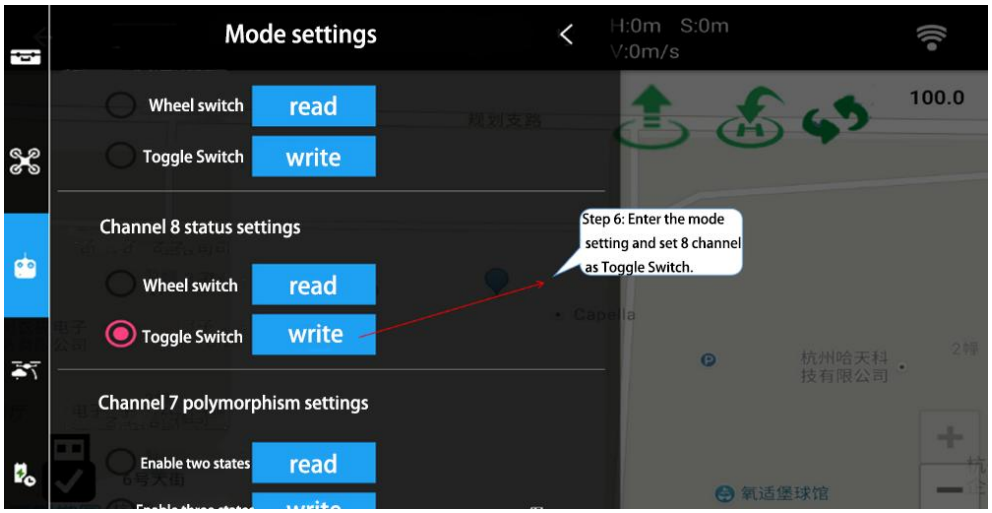

Figure 3-10

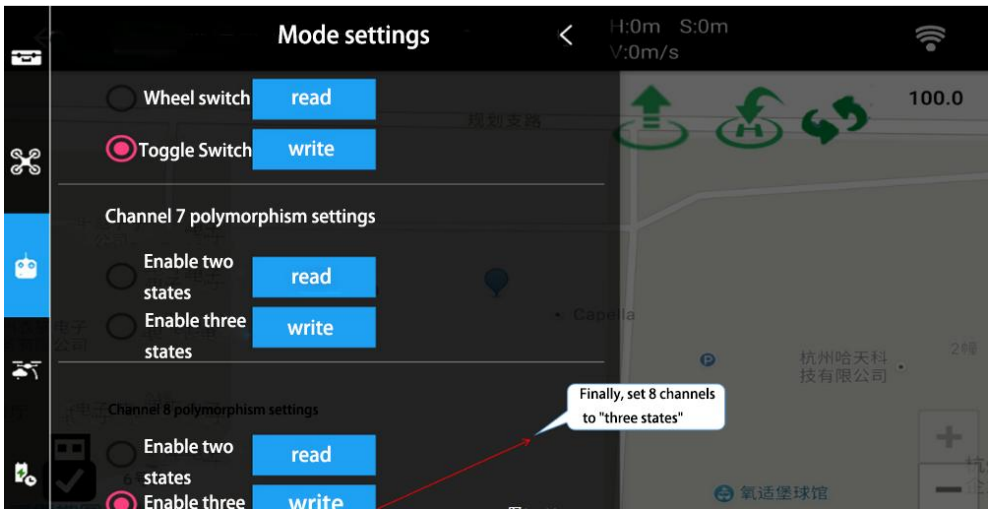

Figure 3-11

3.1.2 T1000 Remote Control Calibration

Warning

- If the flight control or digital radio is not fully activated, you will not find the available device by clicking the Bluetooth button.
- The airborne and ground-side digital radio must be successfully paired with the code to use the Bluetooth connection; otherwise, the connection cannot be successfully established.
- The ground control station(GCS) uses the smart phone's own map. Just connect to the network to load the map.
- In order to ensure flight safety, the flight controller must connect the remote controller before using the GCS.
- When the aircraft enters the waypoint, it will fly in a straight line with the shortest distance. In order to ensure flight safety, it is important to plan the route reasonably and not to draw folded overlapping polygons.
- Do not change the parameters while the aircraft is in the air.

Tips

After connecting the mobile phone and remote controller, click the parameter setting button in the upper right corner of the IFLY (APP)flight interface to enter the parameter adjustment interface. The icons in the left menu bar are model selection, remote control calibration, accelerometer calibration and magnetic compass from top to bottom. Reading and writing of parameters such as calibration and sensitivity, reading and writing of voltage, reading and writing of plant protection functions, flight control firmware versions and flight control serial numbers.

Calibration rocker:

Click "Calibrate Joystick" to start the calibration of the remote controller, and toggle the joystick to the maximum and minimum value of each channel. After clicking this button again, the value of each channel will be back to the middle, and the last time to click, if the prompt fails, it means there is a problem with the value of each channel. If successful, the calibration is written successfully. (Requires 3 clicks)

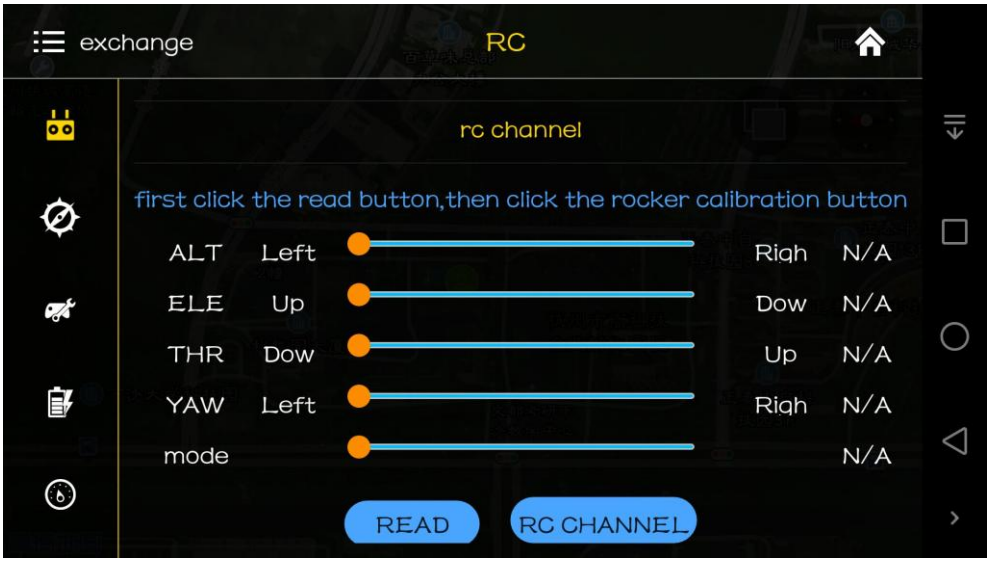

Figure 3-12

3.1.3 Accelerometer Calibration

After the aircraft is powered on and the ground station is connected to the aircraft, click the acceleration calibration and a prompt will pop up. Accelerometer calibration will be performed as prompted.

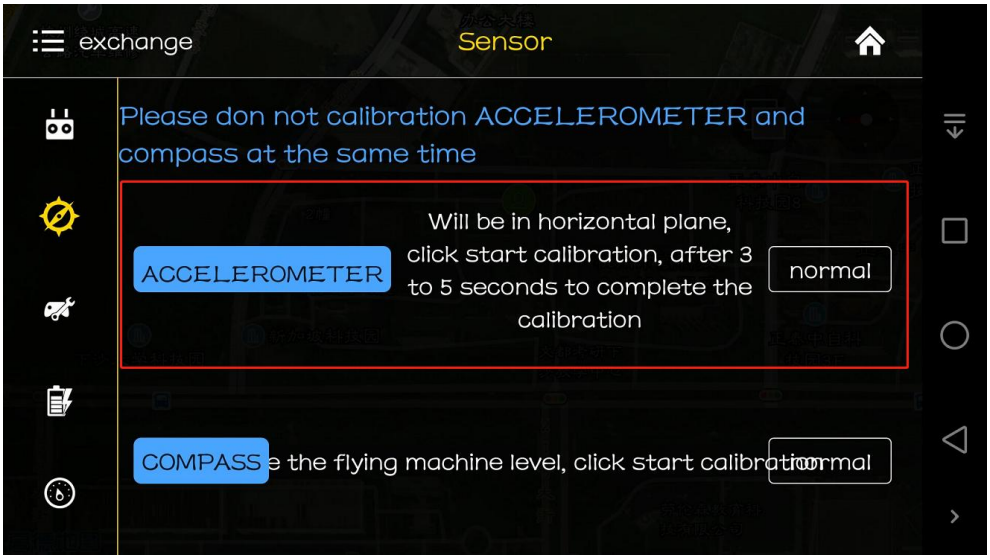

Figure 3-13

3.1.4 Magnetic Compass Calibration

The magnetic compass is integrated in the GPS module. For first time use, magnetic compass calibration must be performed ,otherwise, the system may not work properly, affecting flight safety. The magnetic compass is easily disturbed by other electronic devices, which affects flight and even causes flight accidents. Regular calibration can make the aircraft work in the best condition.

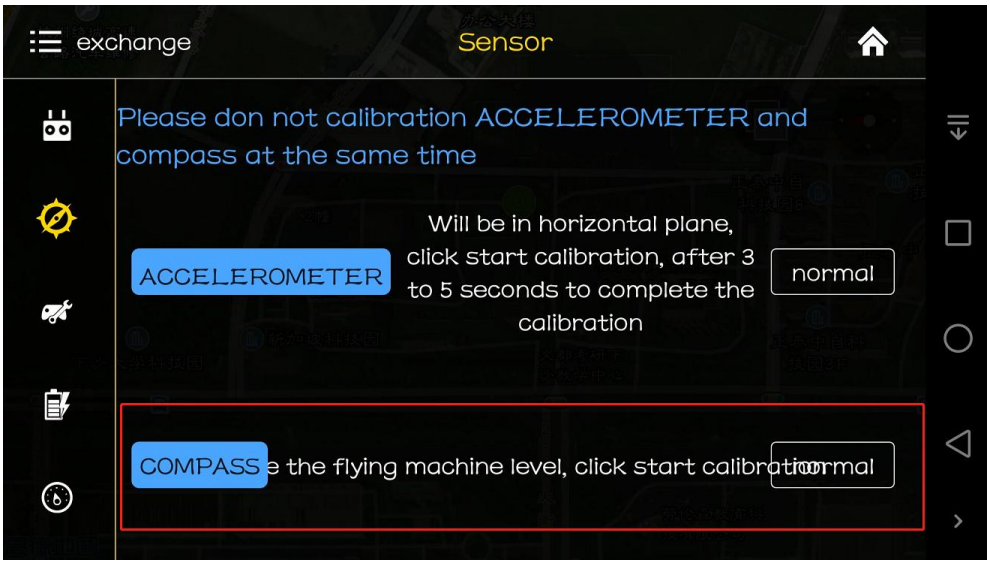

Figure 3-14

Warning

- Do not calibrate in areas with strong magnetic fields, such as magnetic mines, parking lots, and construction areas with underground reinforcement.
- Do not carry ferromagnetic materials, such as mobile phones.

- Do not calibrate near bulk metal.
- Do not calibrate the compass indoors.

Calibration procedure:

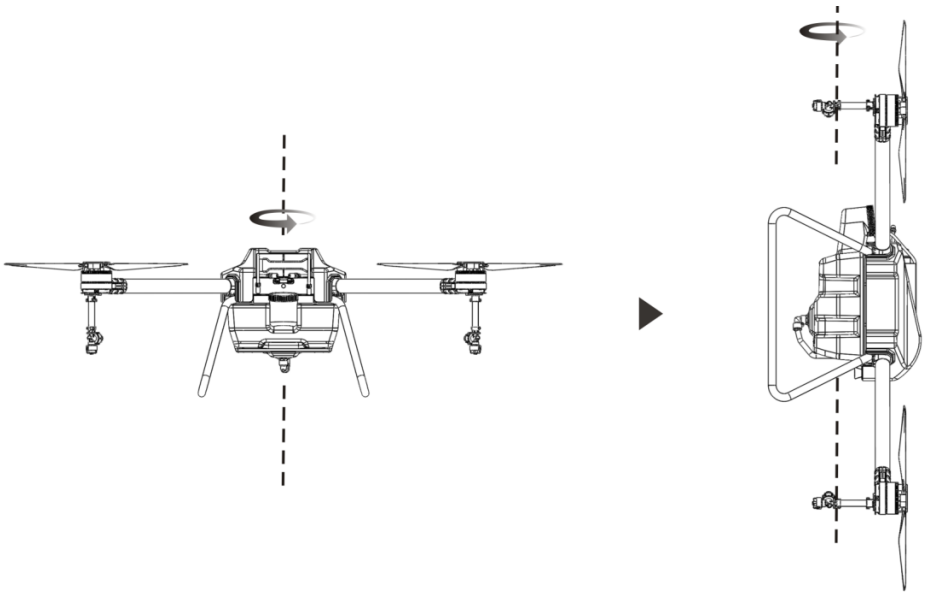

Figure 3-15

Caution

Please vacate the venue and follow the steps below to calibrate the compass. It is recommended that the calibration be performed with no liquid in the pesticide tank.

1. Click Compass Calibration on the Magnetic Compass Calibration page in the APP, then enter calibration mode.

2. Rotate the aircraft 360 ° horizontally. When the status indicator of the aircraft is steady green, horizontal calibration is successful.

3. With the nose of the aircraft facing upwards, rotate 360 ° horizontally. When the red, yellow, and green indicators flash alternately, the vertical calibration is successful.

4. Complete the calibration. If the aircraft status indicator flashes alternately red, yellow and green, it means that the calibration was successful and you need to power on again. If the status indicator of the aircraft shows a steady red light, it means that the calibration failed. Please power off and restart, and follow the above steps to recalibrate the compass.

Need to recalibrate:

1. The magnetic compass is abnormal, and the aircraft status indicator shows that the yellow light flashes rapidly or the red light flashes rapidly.

2. The site of this flight is far away from the site where the magnetic compass was calibrated last time.

3. The mechanical structure of the aircraft has changed.

4. The route is not straight during flight.

3.1.5 Setting Control Parameters

Click "Switch settings" in the upper left corner, and you can follow the instructions to read and adjust parameters such as sensitivity.

Figure 3-16

3.1.6 Voltage Reading and Setting

Click “read” to display the write button, current voltage, voltage protection type, and alarm voltage. Click the input box to enter the value and click Write to set it up.

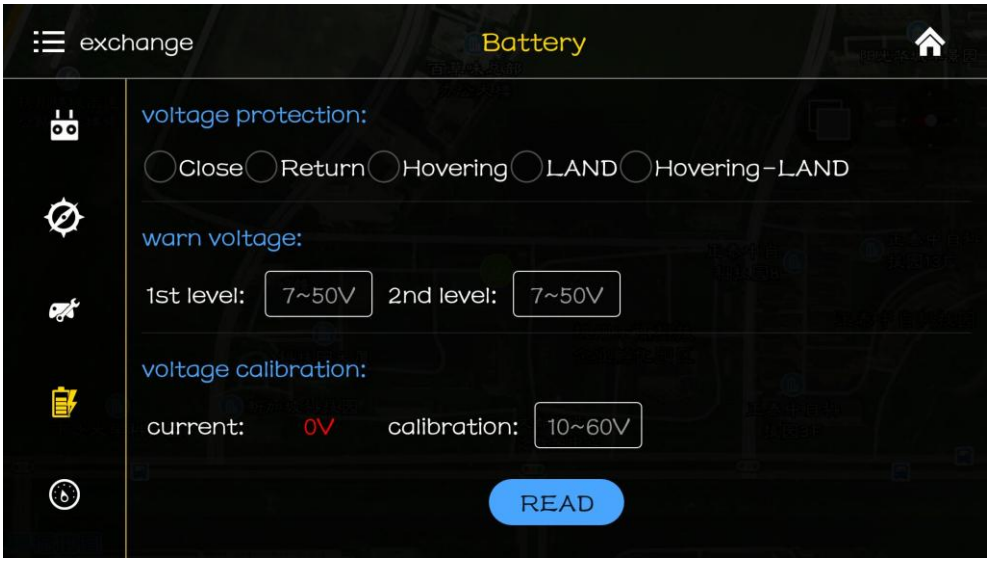

Figure 3-17

3.1.7 Setting crop protection Functions

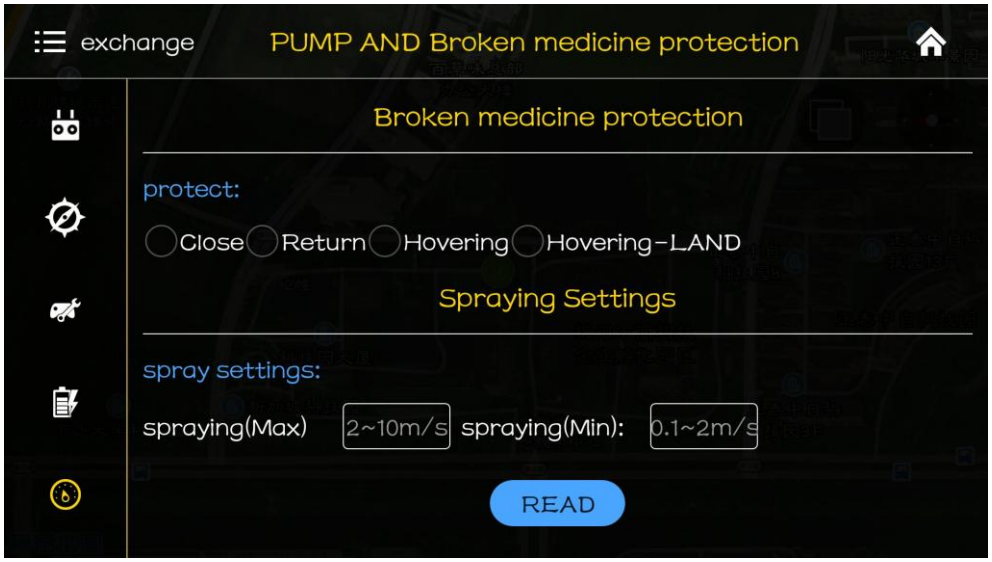

Figure 3-18

3.1.8 Setting flight parameters

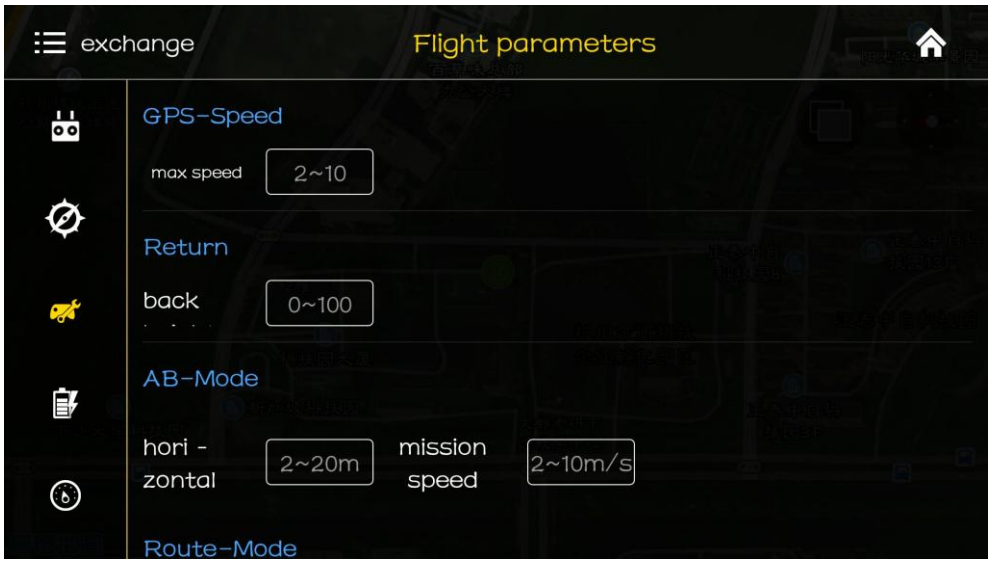

Figure 3-19

3.1.9 Starting/stopping the motor

Unlock and lock:

Unlock as shown below. After unlocking, the motor will change to a low-speed rotation.

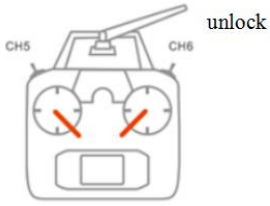

Figure 3-20

In all modes, as long as the motor is started, the operation of the rocker as shown below will stop the motor immediately.

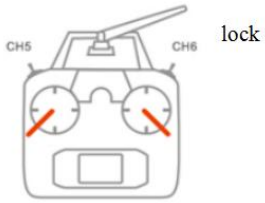

Figure 3-21

Danger

Do not perform the above operation during the flight, otherwise the motor will stop immediately and cause irreversible consequences.

Automatic locking:

1. In any flight mode, after the aircraft is unlocked, the aircraft does not take off, the throttle is the lowest, and the motor will automatically lock in 3 seconds without any operation;
2. In addition to the attitude mode, all other flight modes have the function of automatic landing recognition and will automatically stop the rotation;
3. In addition to the attitude mode, the lowest throttle of the aircraft during flight will not cause the motor to stop.

3.1.10 Motor Test

The motor test function includes the motor sequence test and the movement direction test. It is mainly used to detect whether the motor installation serial number and rotation direction are correct, so as to avoid accidents due to installation errors.

Motor sequential test:

When it is locked, please push the left joystick of the remote control to the lower left↙, and then make the right joystick do counterclockwise coiling (U.S. hand mode)↗↖↙↘, then the motor sequential test will be triggered, and the motor will rotate at a low speed according to 1 to 4 Order.

Japanese hand mode, motor test method:

1. Put the left rocker to the bottom left↙, and turn the right rocker to the bottom right ↘and keep the position of the rocker;
2. Then put the left rocker to the top left↖, and put the right rocker to the bottom left↙, then put the left rocker to the bottom left↙, the right rocker dial to the bottom right↘. During the operation to the joystick, the left joystick is left on the left and the right joystick is kept on the bottom. Repeat step 2 in order to trigger the motor sequence detection.

Uniform

Caution

Normally only one rocker operation is required to trigger the motor sequence detection. If the rocker position is operated incorrectly, you need to repeat step 2 to trigger the detection.

Direction test：

After unlocking, the aircraft propellers rotate at a low and constant speed (if there is no operation, the power output will be turned off within 3 seconds). Operate the four channels of the remote controller to determine whether the forward whether the rotation direction is correct. For example, when the propeller is rotated at the lowest speed, Push up the "forward rocker", and the two propellers on the back side of the aircraft will rotate, and the propellers on the front side will stop. In the same way, when the roll rocker is pushed to the left, the propellers on the left side will stop and the propellers on the right side will rotate.

3.2 Charge

Note

If the remaining power is sufficient, you do not need to perform the following sections.

3.2.1 Charge the Aircraft Battery

The connection of the smart battery and charger is shown below.

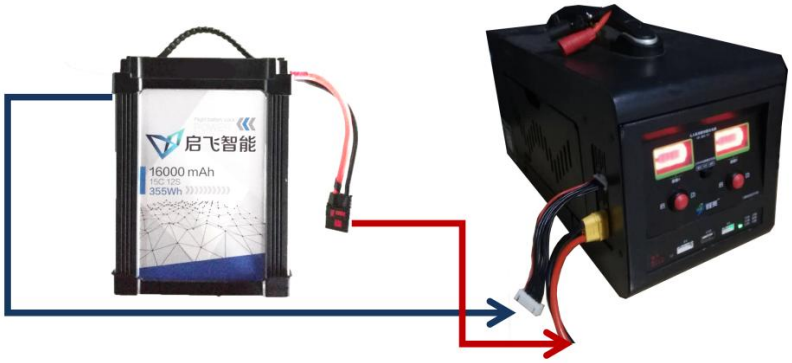

Figure 3-22

Instructions:

1. Before connecting the 220V power supply, place the switch in the OFF position (0). At this time, the external power supply channel is cut off and the charger does not work.
2. After connecting the 220V power supply, place the switch in the I position to open the external power supply channel. The battery indicator L0 is lit and the internal fan starts to rotate. At this time, the charging channel is closed.
3. Connect the battery's wiring to the output port and the equalizer port. The charging channel will be opened, the battery charging progress bar will be wave-type flashing, the battery indicator light will be bright red, the internal and external fans will rotate at the same time, and it will enter the charging state.When the battery indicator is full and constant, charging is complete.
4. During the charging process, press the start button to exit the charge mode. If any abnormality occurs, press the start button to exit the exception.

5. After the prompt is full, if the charging status is indicated (normal/very bad), it is not recommended to remove the battery when it is not needed. The charger will further equalize the battery pack ,and extend the life of the battery.

6. When the storage battery is full, the charger will discharge the battery pack.

7. End of discharge storage conditions: If the voltage of a single battery is lower than 3.85V or the battery pack is lower than 46.2V, the discharge will stop, but the equilibrium will continue until the battery is balanced or removed; if the battery is very unbalanced, it will appear The entire battery voltage is far less than 46.2V, and the charger has reported the end of the storage; in this case, please do not remove the battery, the charger will further balance the battery pack, the duration will be longer.

LED indicator:

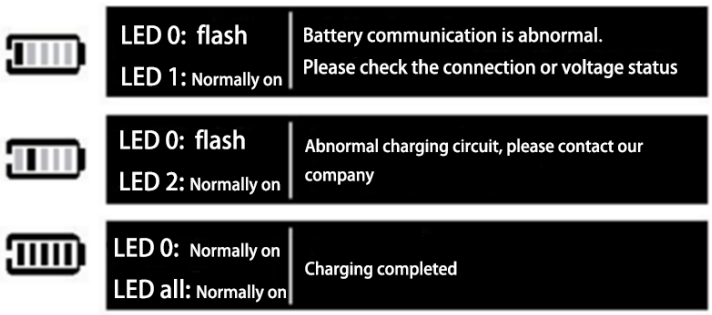

Figure 3-23

Warning

The following warnings are especially important. To ensure maximum safety, strictly follow the instructions below, otherwise the charger or battery may be damaged or even cause a fire.

- If the charger's input voltage is too high or too low, it will cause the charger to work abnormally or cause damage to the charger.
- Do not short-circuit the positive and negative terminals of the charger or the positive and negative terminals of the battery.
- This product is compatible with 12S (50.4V) lithium battery. Please select the right battery for charging.
- When the charger is connected to the power supply, always pay attention to the charging status, find any abnormalities, immediately stop the operation, and consult the operating instructions.
- Ensure that the charger is away from dust, moisture, rain, heat, direct sunlight, vibration, and other adverse environments. Handle it carefully to avoid dropping it.
- The battery and charger must be placed on a non-flammable, insulated surface.
- Please follow the instructions strictly .

3.2.2 Charge the Remote Controller

After connecting the charger to the remote control, plug the charger into a power outlet (Android micro usb is also available). There is no need to open the remote control.

Caution

- If you charge without turning on the remote control, the remote control does not have a charging indicator. You can observe the indicators of the remote control and determine the charge level when the remote control is turned on.

- The embedded battery is 2S 5000mAh. As the number of charge and discharge cycles increases, the capacity will gradually decrease.
- If you do not use it for a long time, it will affect the service life of the battery.
- Generally not used for a long time, it is recommended to discharge each battery to 3.7~3.8V.
- Charge and discharge once per month at least.

3.3Prepare Aircraft

3.3.1 Unfold propeller

For easier transportation and storage, the propeller is folded. Unfold the propeller before take off as shown in Figure 3-24:

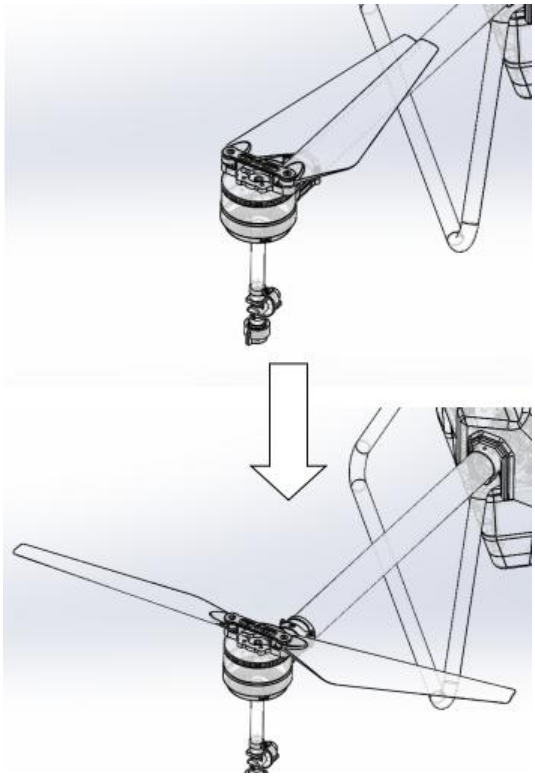

Figure 3-24

3.3.2 Install smart battery

As is shown in Figure 3-25, the smart battery is installed. Place the smart battery on the battery's mounting position. Attach the strap to one end of the fuselage and the other through the battery strap. Then plug in the battery and power on the aircraft.

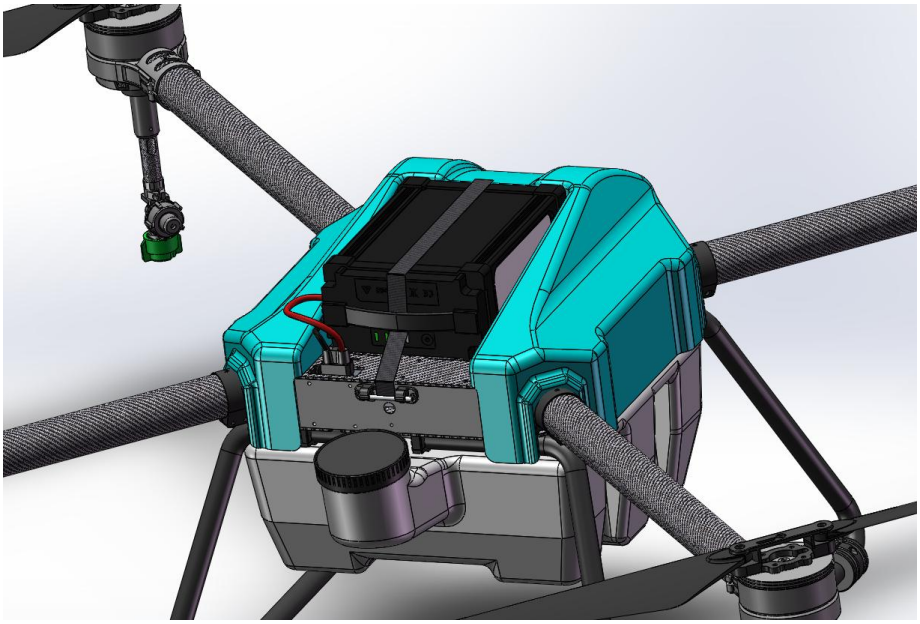

Figure 3-25

4 Enable Flight

Note

This chapter will introduce the complete flow of formal takeoff and landing of the aircraft in details.

Danger

- Please do not get close to the rotating propellers or motor, which is to avoid personal injury.
- Please operate the drone independently after training to avoid danger.

Warning

Please make sure to check the following items carefully before enabling flight for your personal and property safety.

- The flight preparations listed in chapter 3 are all completed.
- All the components have been correctly and stably installed.
- Make sure each spare part is in good condition, please do not fly the aircraft if some part is aged or damaged.
- The flight environment meets the requirements listed in the important safeguards and warnings.

4.1 Overview

Take-off process as shown below:

Enable Flight

Unlock
↓
Take off
↓
Flight
↓
RTH and Landing
↓
Lock

1. Place the aircraft near the work area with the user facing the back.
2. Check the structure:
    1) Check if the blades are unfolded and damaged.
    2) Check if the shell is fixed firmly.
3. Turn on the remote control first and then connect the aircraft power supply. When connecting the aircraft power supply, first insert the black connector (negative) and then insert the red connector (positive).
4. Open IFLY APP.
5. When the number of search satellites is more than 10, and the status indicator of the aircraft has no red light, the GPS signal is good. Perform an unlock operation to start the motor.
6. Push the throttle rocker upwards to make the aircraft take off .
7. According to the need to choose the aircraft operating mode.
8. When landing, make sure that the operation mode switch is in the manual operation mode, slowly pull down the throttle stick, and make the aircraft land on the flat ground slowly.

9. After landing, please power off the aircraft and then turn off the remote control.

4.2 Manual Mode

4.2.1 Flow Introduction of Manual Flight

Manual Flight Mode	Manual Unlock ↓ Manual Takeoff ↓ Manual Flight Control ↓ Manual RTH and Landing ↓ Manual Lock (Auto Lock Available)

4.2.2 Unlock Flight Control

Unlock and lock:

Unlock as shown below. After unlocking, the motor will change to a low-speed rotation.

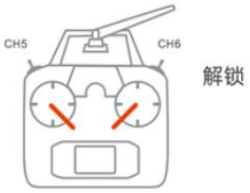

Figure 4-1

Note

If there is a significant difference in the rotation speed between the propellers, move the left joystick to the lower left corner while moving the right joystick to the lower right corner and then hold it until the propellers stop rotating. Turn off the aircraft and contact our company.

4.2.3 Manual Takeoff

Slight push the throttle to mid-point or higher, which is shown in the following figure.

Figure 4-2

4.2.4 Manual Flight Control

Here it can set remote control mode and control flight direction of the aircraft.

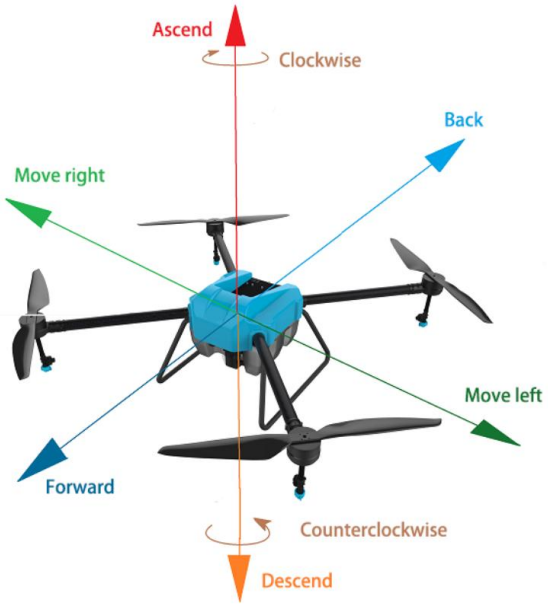

Figure 4-3

The stick presets two remote control modes.

- Mode1（Japanese hand）：
  - ✧ Moving the left stick up and down to control aircraft's forward and backward horizontally.
  - ✧ Moving the left stick left and right to control aircraft's left and right turn horizontally.
  - ✧ Moving the right stick up and down to control aircraft's ascend and descend respectively.
  - ✧ Moving the right stick left and right to control aircraft's left and right movement horizontally.

Figure 4-4

- Mode 2（American hand）：
  - ✧ Moving the left stick up and down to control aircraft's ascend and descend respectively.
  - ✧ Moving the left stick left and right to control aircraft's left and right turn horizontally.
  - ✧ Moving the right stick up and down to control aircraft's forward and backward horizontally.
  - ✧ Moving the right stick left and right to control aircraft's left and right movement horizontally.

Figure 4-5

- Mode 3（Chinese hand）:
  - ✧ Moving the left stick up and down to control aircraft's forward and backward horizontally.
  - ✧ Moving the left stick left and right to control aircraft's left and right movement horizontally.
  - ✧ Moving the right stick up and down to control aircraft's ascend and descend respectively.
  - ✧ Moving the right stick left and right to control aircraft's left and right turn horizontally.

Figure 4-6

4.2.5 Manual RTH and Landing

Step 1

Manual RTH: Control the aircraft to hover over the proper landing point.

Step 2

Manual landing: Reduce the throttle to make the aircraft land slowly.

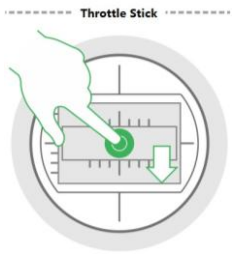

Figure 4-7

4.2.6 Manual Lock

Move the left stick to lower left and move the right stick to lower right at the same time ,Hold for two seconds.

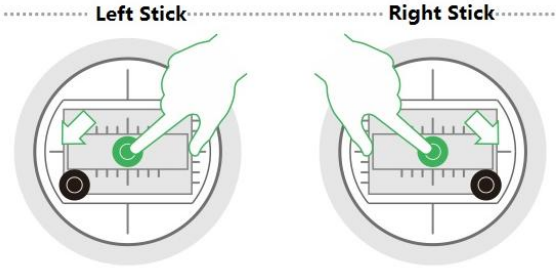

Figure 4-8

Danger

Except for special circumstances such as emergency crash, do not perform the above operation during the flight, otherwise the motor will stop immediately, resulting in damage to the aircraft or other accidents.。

4.3Intelligent Mode

4.3.1 Overview

4.3.1.1 Process

1. Preparation before operation: Prepare aircraft, batteries, medicine boxes, tools and pesticides, and complete the pre-flight inspection.
2. Surveying and Mapping: Enter the surveying and mapping interface, measure the required land (editing routes), and upload the task.
3. According to the mapping area to configure the amount of pesticide required for plots, there should be protective measures when dispensing, after the completion of dispensing, pesticide bottles should be centralized treatment, prohibiting litter bottles.
4. Click on "Start Mission" and the aircraft will operate automatically.

4.3.1.2 Automatic take-off

Connect the remote control and mobile phone, open the IFLY app, connect the aircraft and complete a series of checks and settings before take-off. After planning the route, click “Start Mission” and the aircraft will automatically take off.

4.3.1.3 Automatic Return and Landing

Note

Each time the user unlocks, the flight controller automatically records the current position as the home point point.

The automatic return mode can be triggered by a joystick or triggered by a loss of control. When the remote controller’s CH6 switch is set to the one-stroke return position or the flight controller enters runaway protection, once the aircraft is more than 2 meters away from the home point, the aircraft will automatically rise to the set altitude (if the current altitude is higher than the set return altitude, keep the current altitude.And the aircraft does not accept manual intervention during the return flight. When the aircraft arrives at the home point, it will hover for about 3 seconds in the air, and then it will descend slowly. At this time, the aircraft can be controlled by the remote control(but the throttle stick will not work), so that the aircraft can find more suitable landing point. Until the aircraft is fully grounded, the aircraft will automatically lock. If the aircraft is less than 2 meters away from the return point, the aircraft will land and lock automatically.

4.3.2 Intelligent Flight Mode

4.3.2.1 Introduction of Ground Station Software and Notes

1. Connect the USB and open the IFLY APP, as shown in Figure 4-9:

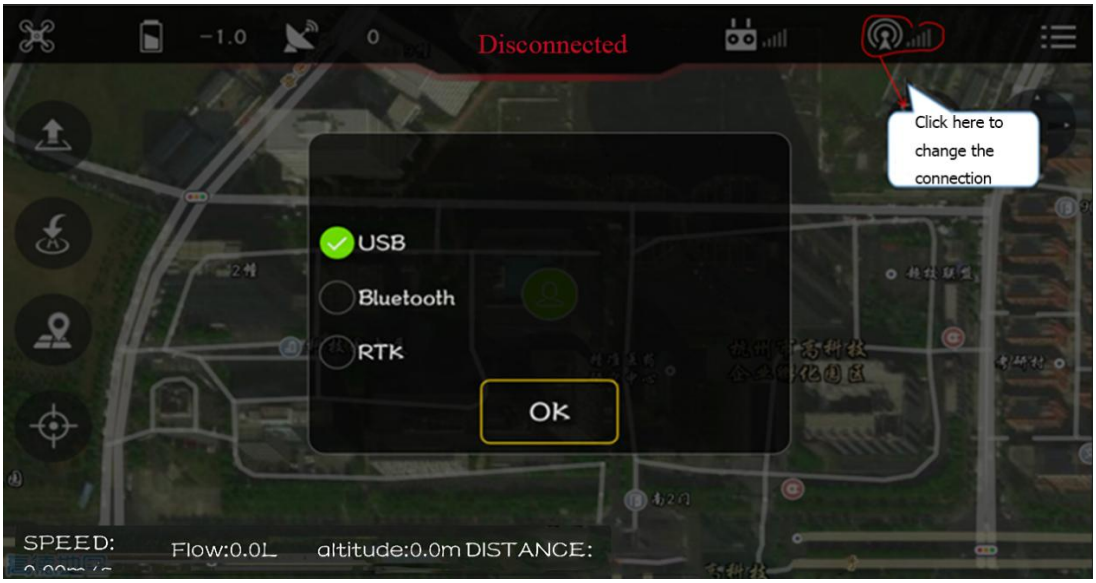

Figure 4-9

2. Icon Description:

Figure 4-10

3. Precautions:

The attentions for using the ground station APP are shown in Figure 4-11~Figure 4-18.

Figure 4-11

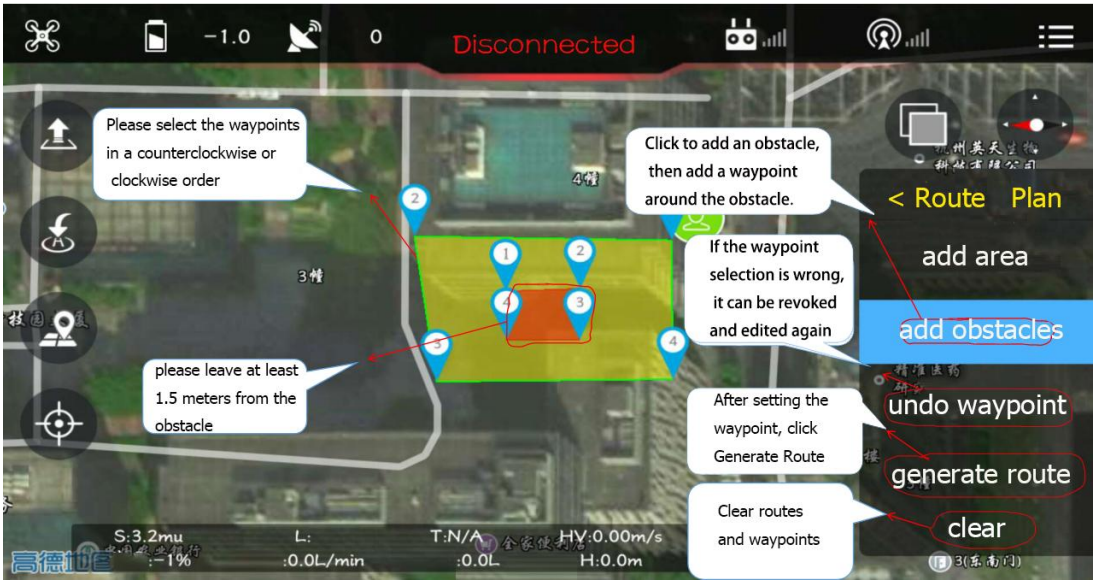

Figure 4-12

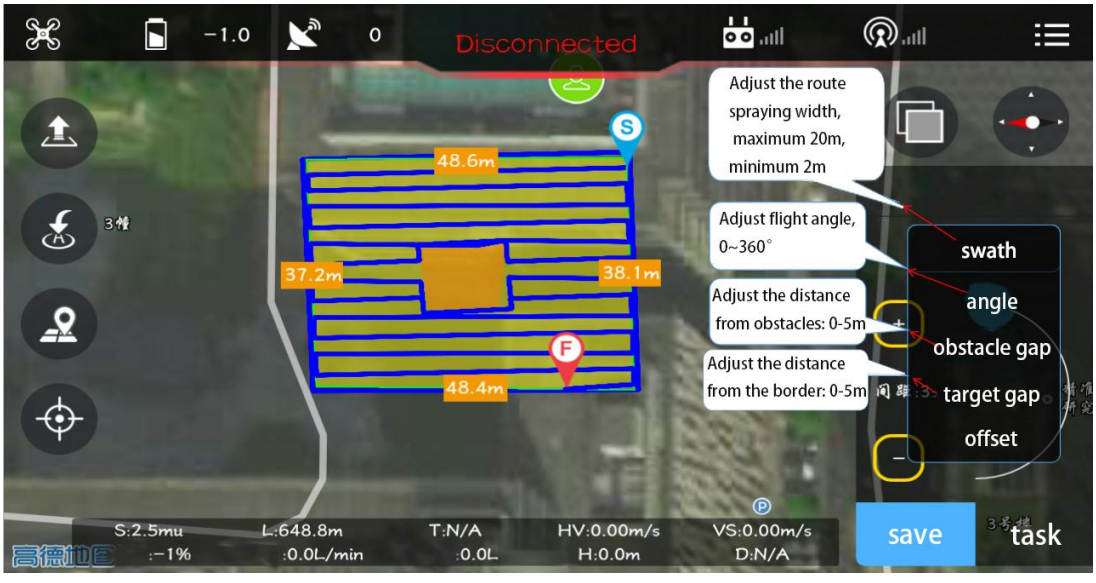

Figure 4-13

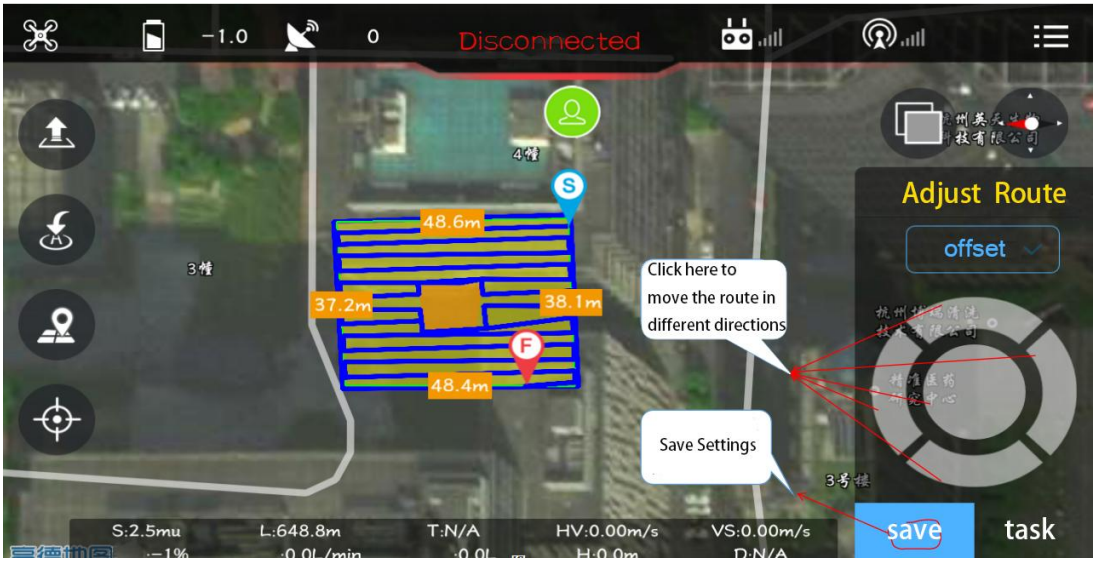

Figure 4-14

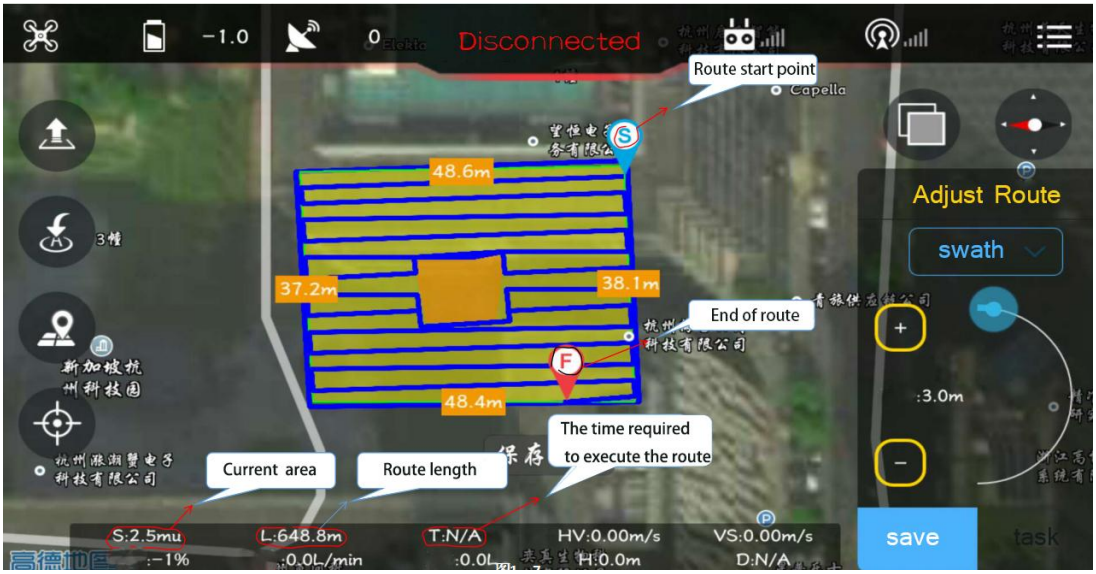

Figure 4-15

4.3.2.2 Route Planning

Click on the “Route Plan” button to carry out plot measurement and route planning. You can set flight parameters (such as: spacing (blade), angle, obstacle margins, work margins, etc.), mainly in three steps (Figure 4-18 ~ 4-20):

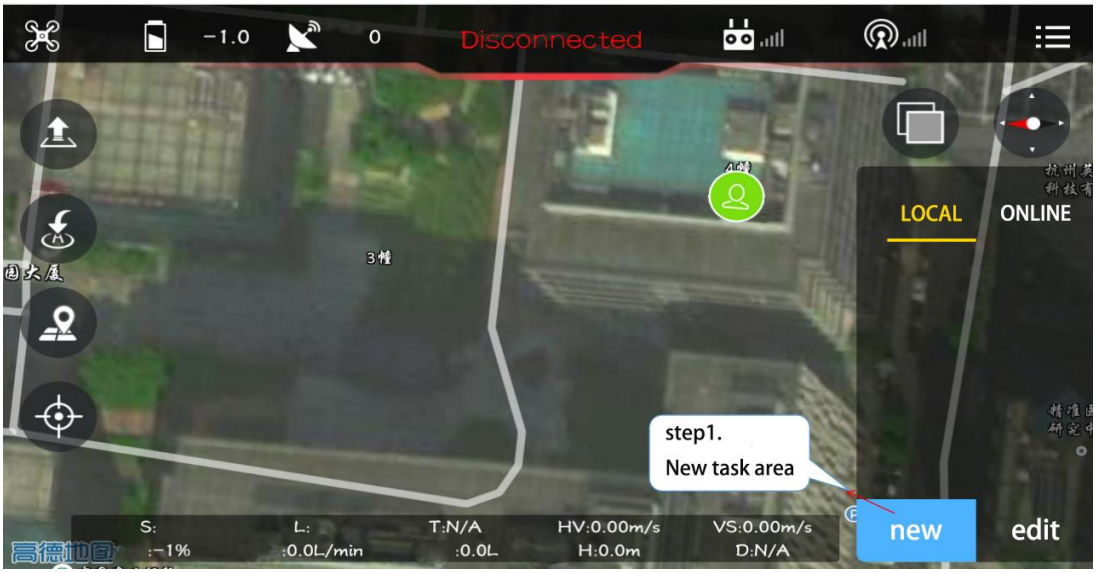

Figure 4-16

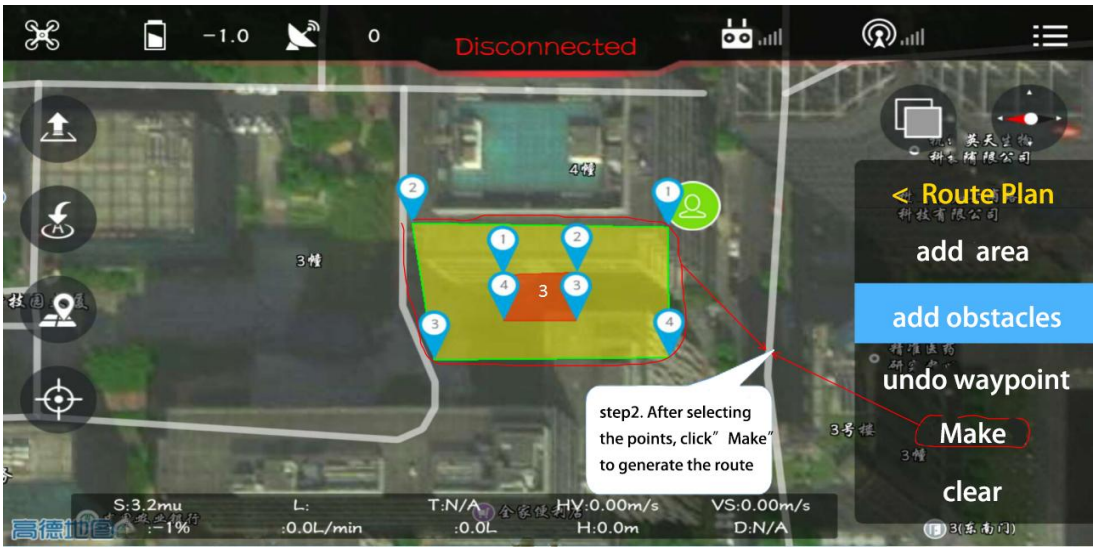

Figure 4-17

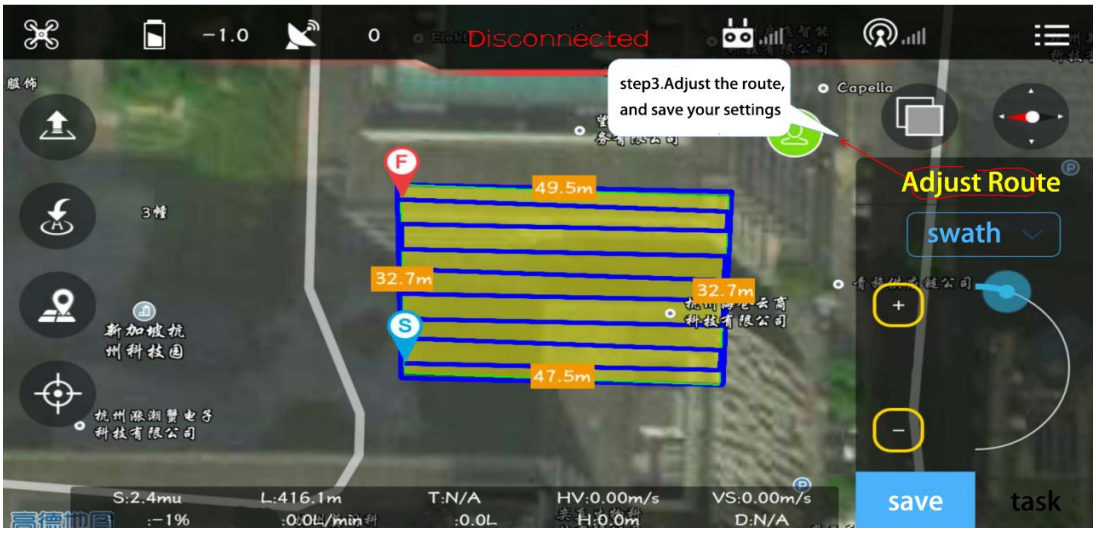

Figure 4-18

4.3.2.3 Start Mission

After the pre-flight inspection, power up the plant protection drone, click APP to plan the route, open the plot of the surveying and mapping route, click the edit icon, and click the task icon after the editing is completed. The steps are divided into three steps (see the figure below for the specific operation steps):

Figure 4-19

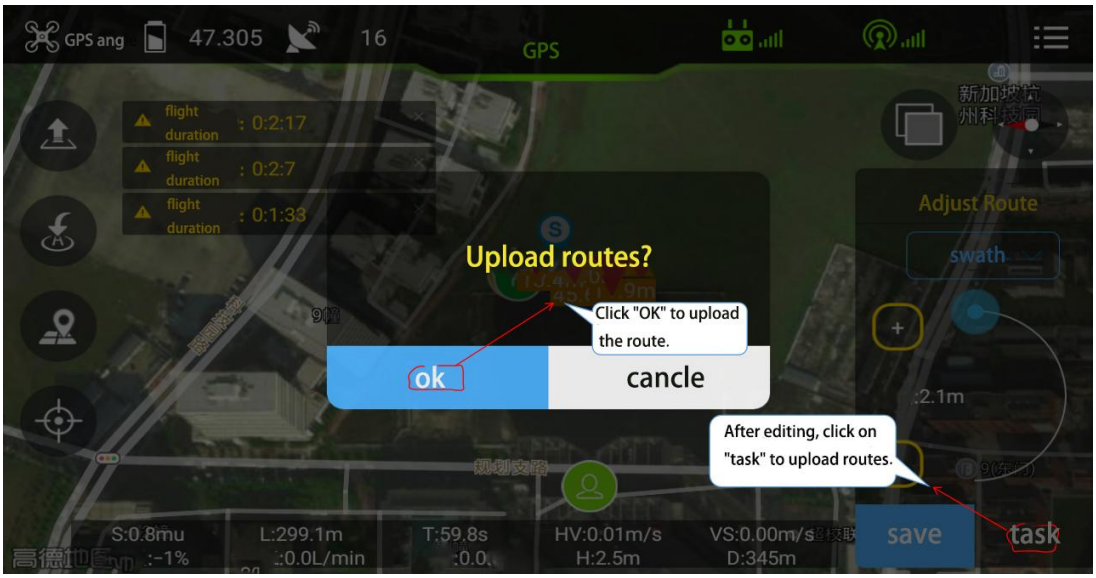

Figure 4-20

Figure 4-21

At this point, the UAV began to operate automatically.

4.3.3 A、B point operation mode

4.3.3.1 Operation method

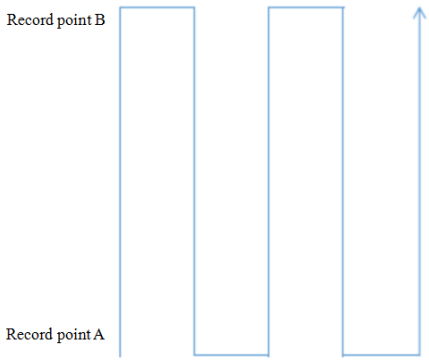

Figure 4-22

1. Record A point

   Hover in GPS mode, turn the AB stick to second gear. After completing the recording, the LED lights flash yellow for 2 seconds.

2. Record B point

   Hover in GPS mode and turn the AB stick to the third gear. After completing the recording, the LED flashes green for 2 seconds.

3. AB execution

   Turn on AB execution function.

4. Choose direction

   Operate the roll bar to select the direction. Move the left roll rocker to the left and the right roll rocker to the right. The premise of this step is to clear the previously recorded AB point, otherwise the aircraft will fly at the last AB point and skip this step.

5. Interrupt AB operation

Turning the CH5 rocker, turning off the AB operation lever and cutting to the return path can interrupt the AB operation.

The green LED flashes 4 times during execution.

During the execution, the remote control throttle channel and yaw channel can control the altitude and heading.

4.3.3.2 point correction function

- When flying from point A to point B:
  Push up the pitch joystick , then pull the B point forward 1 meter,
  pull the pitch joystick down, then shorten the B point by 1 meter.
- When flying from point B to point A:
  Push up the pitch joystick , then shorten the A point by 1 meter,
  pull the pitch joystick down, then pull the A point forward 1 meter.

4.3.3.3 AB Point Parameter Settings

Open the APP and connect the UAV, click the setting button in the upper right corner, and select the plant protection function in the left button bar to set the route spacing and speed of the AB point mode.

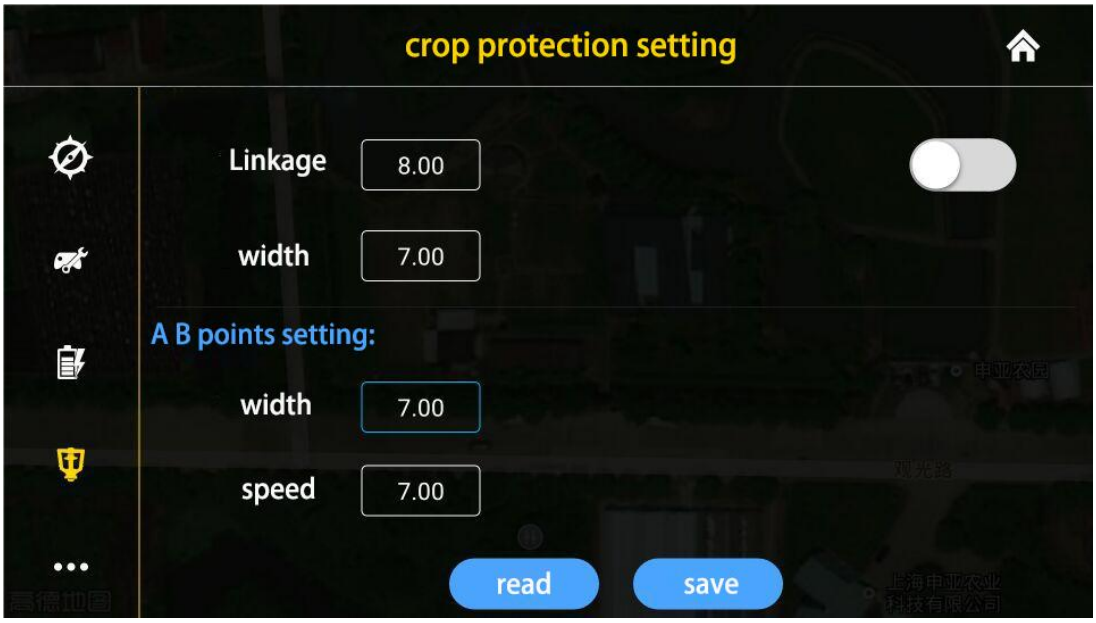

Figure 4-23

4.3.3.4 Others

- Clear the AB points：
  Quickly toggle the AB point recording switch 4-5 times, and the LED lights flash red, green and yellow alternately, then the AB point is cleared. The AB point cannot be re-recorded without clearing the last recorded AB point.
- Continue spraying after power off:
  After the AB operation is interrupted, and the battery is replaced, if the AB operation is performed without clearing the AB point, the last AB route of the previous job will be resumed.

4.3.4 Electric fence system

4.3.4.1 Flying restrictions and Special airspace restrictions

In accordance with administrative regulations of the International Civil Aviation Organization (ICAO) and national air traffic restrictions and UAV, the UAV must fly in the specified airspace. For flight safety consideration, also to help users to use this product more safely and legitimately, the flight limitation is working by default, including height and distance restriction and no fly zone. In the positioning mode (with GPS), altitude and distance constraints jointly affect flight. In attitude mode, it is limited by height, and the maximum height of actual flight will not exceed 20 m.

4.3.4.2 Height and distance restrictions

Height restrictions Used to limit the flight altitude of UAV, distance restrictions Used to limit Maximum flying radius. User can modify parameter by configuration software. After the configuration is completed, flying ranges is restricted a in cylindrical region, as shown below:

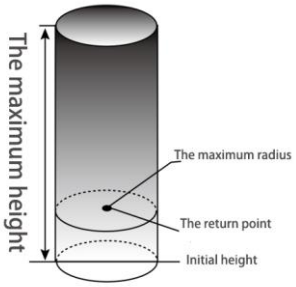

Figure 4-24

Attitude mode	
	Flight restrictions
The maximum height	Cannot exceed the setting in the software
The maximum radius	Cannot exceed the setting in the software

Positioning mode (GPS)	
	Flight restrictions
The maximum height	Cannot exceed the setting in the software
The maximum radius	Cannot exceed the setting in the software

Warning

The remote is also working when the aircraft is out of bounds on account of inertia, but you can't control the flight away from Restricted Area. If UAV located out of maximum radius areas, the flying attitude should switch from attitude mode to location mode (with GPS module), UAV return to a restricted area.

4.3.4.3 Special area flight restrictions

Special areas are divided into:

1. Airports:

Class A and Class B restrictions. For example, international large airports are Class A restricted flight areas, while Class B areas are smaller airports.

2. Special no-fly zones:

Beijing and major cities in Xinjiang.Level A airport restricted area.

- Level A airport restricted area

Includes: prohibited area and height restricted area. Prohibited area deny flight. restricted area limit flight height.

Specific Sites as the center of a circle, the radius of 8 KM area is restricted area, the radius of 2.4 KM area is prohibited area. prohibited area deny flight.

Aircraft is located in restricted area and out of prohibited area, flight height will be limited. Height decreases with distance from prohibited area at a rate, range from120m to 10.5m.

100m alert zones is set between restricted area and Unrestricted airspace, more information reference below picture.

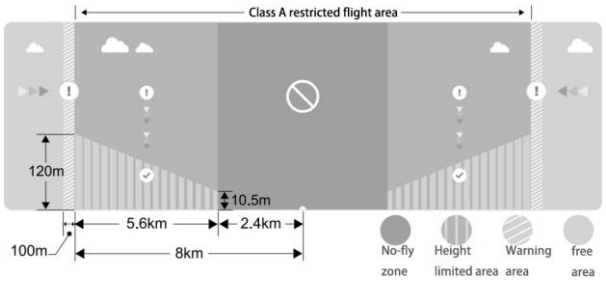

Figure 4-25

- Level B airport restricted area

Specific Sites as the center of a circle, the radius of 1 KM area is prohibited area. Prohibited area deny flight. 100m Alert zones is set between restricted area and Unrestricted airspace. Details reference below picture.

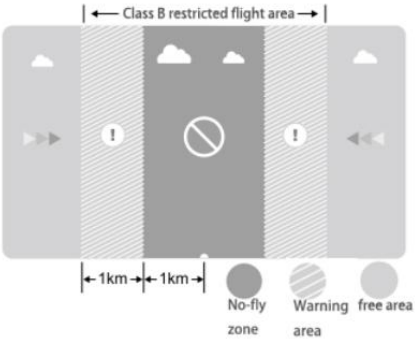

Figure 4-26

Positioning mode (GPS)		
area	**Flight restrictions**	**Flight status indicator**
No-fly zone	Motor will not start.	The red light flashes for 3 seconds before the normal flash.
	If you switch from attitude mode to GPS mode, the aircraft will automatically land.	
Height limited area	If you switch from attitude mode to GPS mode,The aircraft will automatically land at 5m and hover.	The yellow light flashes for 3 seconds before the normal flash.
Warning area	The aircraft can fly normally and issue a warning message.	
Free area	No flight restrictions.	No restriction indicator flashes.

5 End Flight

Note

- The chapter is going to introduce the operation steps after aircraft landing in details.
- Please operate according to the following flows to make sure normal application for the next time. Some of the operations are not necessary, please select according to the actual situation.

End Flight

Turn off power
↓
Take out batter
↓
Dismantle airborne equipment
↓
Fold aircraft
↓
Fold image transmission antenna
↓
Take out other components

5.1 Cleaning after work

- The spray pipe line should be cleaned immediately after spraying operations.(details: tank is filled with soapy water, Manually turn on the spray switch, Until Clean water flows out when the pesticide is cleaned.)
- The tank and Filling equipment clean residual pesticide (details: tank is filled with soapy water, then repeatedly shake tank. Manually turn on the spray switch, Until Clean water flows out when the pesticide is cleaned, Then rinse with water again.
- Clean the aircraft, wipe the remaining pesticide on the aircraft shell, inspect the air frame structure, replace the damaged pipes, check the tightness of the screws to eliminate the hidden dangers, and minimize the risk factor of the flight.
- If Long term non-use, store the aircraft in: clean, ventilated, away from high temperatures.

5.2 Maintenance

- After work season, inspect the components of the aircraft (if the spray piping is obviously worn, replace it in time).
- Check the updated of aircraft module and update it in time
- Check the Badly Damaged battery ,and return to the factory for repair in time .
- Repair the aircraft and prepare for the next operation After work season.

6 Upgrade

Update or upgrade equipment or ground station software, please contact your dealer or technical support engineer, please see the official network http://www.qifeizn.com/.

7 Appendix I Specifications

3WD4-QF-10BPlant protection drone	
Dimensions	1638mm×1638mm×440mm（Without propellers）
Symmetric motor wheelbase	1555mm
power system	
X8 Power Pack	
Spraying system	
tank	
Capacity	10L
nozzle	
type	Pressure nozzle
amount	4
length	1100mm
Flight parameters	
Remote control distance	≥1000
Aircraft weight	15.8kg
Full load takeoff weight	25.8kg
No-load endurance time	≥20min
full-load endurance time	≥10min
Best speed	4-6m/s
Spray flow	1.6-2.0L/min
Spray efficiency	0.16-0.25acre/min
Optimal flight height	1.5-2.0m（above the crops）
Safe wind speed	≤ 4 level
Recommended temperature	10-40℃
Spray width	3-4m
Continuous operating time for each battery	6.0-8.0min
Spray area per flight	0.5-0.7hm^2

8 Appendix II Description of Aircraft Status Indicators

Flight Mode	LED status	priority
Position (stabilize or fix) mode	● ● ●	low
GPS (angle or speed) mode	●● ●● ●●	low
Functional mode (circling, cruising, agriculture,)	●●● ●●● ●●●	low
Smart direction mode	●●●● ●●●● ●●●●	low
Intelligent mode (ground station control, return flight)	●●●●●●●●●●	middle
GPS status	LED status	priority
disconnected/Not found satellite	●●● ●●● ●●●	low
Poor GPS signal	●● ●● ●●	low
General GPS signal	● ● ●	low
GPS signal is good	● Normally on	low
RTK positioning	● ● ●	
Low voltage alarm	LED status	priority
Level 1 alarm	●●● ●●● ●●●	low
Level 2 alarm	●●●●●●●●●●	high
Magnetic compass calibration	LED status	priority
Horizontal calibration	● Normally on	middle
Vertical calibration	● Normally on	middle
Calibration failed	● Normally on	middle
Successful calibration	● ● ● ● ● ●	middle
Abnormal state	LED status	priority
Remote control loses control	●●●●●●●●●●	high
Magnetic compass is abnormal	● ● ● ● ● ●	high
Abnormal GPS	● ● ● ● ● ●	high
IMU is abnormal	● ● ● ● ● ●	high
Other states	LED status	priority
Initialization	● ● ● ● ● ● ● ● ●	high
Unlock	● ● ● ● ● ● ● ● ●	high
Failed to unlock	● Normally on	high

Note

- This manual is for reference only. Slight difference may be found in the user interface.
- All the designs and software here are subject to change without prior written notice.
- All trademarks and registered trademarks are the properties of their respective owners.
- If there is any uncertainty or controversy, please refer to the final explanation of us.
- Please visit our website or contact your local service engineer for more information.

Hangzhou Qifei Intelligence Technology Co.,Ltd.
Postcode: 310018
Tel: +0571-85239009
15757164322
Website: www.qifeizn.com

FCC Statement:

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

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

Caution: Any changes or modifications to this device not explicitly approved by manufacturer could void your authority to operate this equipment.

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