

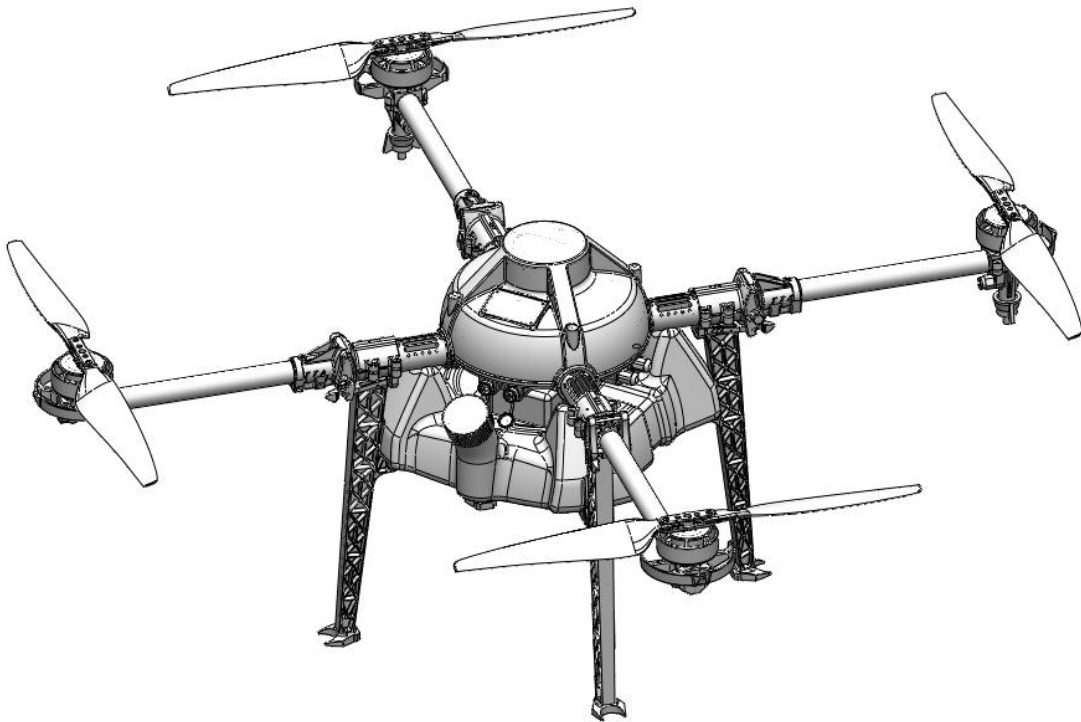


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M4E Manual



Beijing TT Aviation Technology Co.,Ltd.

Make sure the pilot is well-trained in operating UAVs before going on mission.



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1.Use Instruction

1.1 Safety Instruction

- ◆ The product is not suitable for the ones who are less than eighteen or who do not have full capacity for civil conduct.
- ◆ The product have bigger fuselage size, high speed rotary and strong flight dynamics. At runtime have a certain dangerousness . Not in accordance with the requirement operation and usage will cause to potential danger and hurt.
- ◆ When using this product, please keep away from airport, railroad, high speed road, high buildings ,electric wire and other dangerous environments.
- ◆ When using this product, please keep away from mobile phone base stations, high power transmitting equipment, and other high electromagnetic interference environments.
- ◆ When using this product, please keep away from army and kinds of manned craft flight area.
- ◆ Don't use this product in rain, thunder, sandstorm, fog snow ,high wind ,and low temperature and other bad environments.
- ◆ When flying in more than three kilometers. Environmental factors can lead to flight performance degradation, please care of using it.
- ◆ When operating this product fly in low sky .Please always keep UAV and people & animals in a safe distance of ten meters
- ◆ When using this product in desert area, please keep UAV within the range of operator's eyes
- ◆ Don't hover or fly over the crowd, Don't be delight in scaring others.



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- ◆ When it is close to the crowd ,please land this UAV as soon as possible and guide people to keep and avoid potential accident.
- ◆ Don't operate it in the area of children playing.
- ◆ If not in the extreme necessary condition, please do not power off when flying in the air.
- ◆ You can not fly it you are in drinking , tired, drugs, physical ,discomfort, etc. .
- ◆ Please inspect it before using very time, including but not limited to parts of fastness, organism and propeller of cracks, and abrasion ,battery ,the effectiveness of light. When error happens, please stop using immediately and replace the corresponding parts.
- ◆ Abnormal working state of the UAV maybe happen accidentally, don't open the propellers and forcibly fly with wrong.
- ◆ Do not try to prevent the moving parts while working.

1.2 Pesticide Usage

- ◆ All pesticides are poisonous. Please be careful and work strictly according to the safety instructions of pesticides.
- ◆ When dispensing, please use clear water. If not, will cause jams mesh of impurities. If it is blocked, please clear it before reuse
- ◆ When dispensing , please note that liquid sparks and the pesticide residue in fuselage will be harmful to human body.
- ◆ When dispensing, please pay more attention and use protective tools, and do not let body directly touch with the pesticides; After pesticide spraying, please clear your skin, copter and remote control.
- ◆ When using pesticide, there will be interaction between different pesticides , user



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should clear cartridge or keep a certain interval time。

- ◆ Spraying shall be carried out in windless sunny day, don't spray under high temperature at noon. While breezing, the operator should be standing above the wind and spraying; do not work when wind is four.
- ◆ When spaying ,if you feel uncomfortable ,headache or dizzy, please leave the site at once and rest. If once severe symptoms occur, immediately be sent to hospital.
- ◆ Pesticide effect and the solution concentration, spray rate ,copter high from crops ,wind direction, wind speed and so on are close related. When using pesticide should consider the above factors, to achieve the best effect. Please make sure that do not damage the human beings and animals and surroundings during the process of sprayings.
- ◆ When using pesticide , do not pollute river and drinking water

1.3 Inspection

- ◆ Before flying, ensure the battery is enough
- ◆ Ensure all the parts are installed firmly, and all the screws are tight as required.
- ◆ Ensure all the wires are correctly linked.
- ◆ Ensure all parts goes well. If it is broken or aging, please replace timely.
- ◆ Before flying, carefully check the propellers installation direction 、 rotation direction, control and others.
- ◆ Ensure all the propellers are fine, no any scratch and tightly installed.
- ◆ Ensure the sprayer is fluent without any clogging and work normally.

1.4 Environment

- ◆ While flying, please ensure the drone away from the crowds, dangerous goods, high



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buildings, high-voltage wires and others. Please fly the drone in a dedicated space.

- ◆ Please ensure the drone fly within the operator's eyesight.
- ◆ The drone working temperature is between 0°C-40°C.
- ◆ Ensure the drone fly within the permit of local law and regulations.
- ◆ To fly the drone safely as required, please fly it within in the height of 50 meters. If it has local flying height limit within 50meters, please make sure obey the related regulations.

1.5 Operation

- ◆ Please ensure the multi-rotor drone flying height is within 8 meters, except the special requirements.
- ◆ Before remote control calibration、 hardware update, parameter setup, please remove the propellers and avoid the potential moving suddenly.
- ◆ Remove the battery if it does not fly, to avoid flying it when touching the remote control once.
- ◆ Please remove the batteries once landing. Do not move the drone when it is in power.
- ◆ Do not touch the joy stick mistakenly, and prevent start the drone.
- ◆ When it is powered, please stand in the safe distance of above 10 meters.
- ◆ Ensure the propellers completely stop and power off.
- ◆ Please switch it to the manual operation mode when errors happen. Please keep away from the crowd.
- ◆ When the battery is damaged, please ensure it is stored in the disposal area and avoid spontaneous combustion. In order to protect environment, please don't throw batteries randomly. And consult the maker about the proper disposal method.



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- ◆ During the flight, don't fly overload and do not cause any potential dangers.
- ◆ When low battery is warning, please return as soon as possible.
- ◆ Ensure that the remote control and battery is enough, to ensure that firmware has been updated to the latest version.
- ◆ Ensure flying sites outside of the restricted areas and is proper for flight . .
- ◆ Please make sure do not fly or operate the drone when you are drunk or with medicine limitation.
- ◆ Be familiar with the remote control operation & each flight mode, and ensure you know how to operate the control condition.
- ◆ User shall know and obey all the law and regulations in flying location.

1.6 Compass Calibration Requirements

- ◆ Compass has to be calibrated before using the first time. If else, it cannot work and will affect flying safety.
- ◆ Please do not calibrate it in the place close to the high-magnetic field or big metal materials, such as high-voltage, magnet, parking lot, concrete iron building, etc.
- ◆ When calibrating, please do not bring the magnetic materials, such keys and cellphone.
- ◆ If it is calibrated indoor, please do not re-calibrate it outdoor. It prevents that the two magnet differences cause the potential flying data errors.
- ◆ Magnetic field location is different, please make sure re-calibrate when it changes to the place from the previous one.



2. Product Introduction

TIANNONG M4E, the multi-rotor UAV, is the most economic integrated solution for all the agriculture spraying services. This UAV is waterproof and easy to repair, long-time flight with high-strength & light fuselage material. The big power brushless motor guarantees the sensitiveness and flexibility. The Lipo batteries guarantee the power supply and easy to repair and maintain. Various spraying tests proves the best performances of this UAV.

2.1 M4E Parameters

Weight (without battery)	7KG	Max Pitch Angle	≤35°
Standard Takeoff Weight	14KG	Best Spraying Speed	4--6m/s
Max Takeoff Weight	15KG	Max Spaying Speed	10m/s
Max Thrust-weight Ratio	2.2	Working Time	1~5min/ flight
Battery	6S	Max Climbing Speed	5m/s
Max Power	9440W	Max Landing speed	3m/s
Hovering Power	1600W	Max Flying Speed	10m/s
Hovering Time	Empty flight ≥15min Full flight ≥5.5min	Recommended Working Temperature	10-35C°
Hovering Accuracy	Horizontal ±1.0m Vertical ±0.5m	Max Anti-wind Strength	12m/s
Spraying Height	2--4m	Max Flying Altitude	3500m
Max rotation angle	360°	Best Storage Temperature	10-25C°



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2.2 TIANNONG M4E Agriculture UAV Specification

Frame		Diagonal Wheelbase	1090mm
		Arm Length	368mm
		Unfolded Height	485mm
		Folded Height	495mm
		Folded Width	577mm
		Sprayer Distance	771mm
Power System	Motor	Motor Model	TTA6215
		Stator Size	62mm
		KV	340KV
		Max Thrust	8KG
		Max Power	1700W
		Weight	325g
	ESC	Max Continuous Working Current	50A
		Max Peek Current(3s)	100A
		Working Voltage	6S LiPo
		Working Pulse Width	1000--2000us
		Compatible Signal Frequency	50--400Hz
		Drive PWM frequency	400Hz
	Foldable Propellers	Material	High strength engineering plastic
Diameter /Screw pitch		2388	
Weight		95g	
Battery	Capacity	16000/17000MAh	
Spraying System	Tank	Rated Payload	5KG
	Sprayer	Model No.	Pressure Type (Sector)
		Quantity	2 pcs
		Sprayer Diameter	1.0-2.0mm
		Spraying Speed	4--6m/s
		Spraying Volume	1.8--2.2L/min
		Spraying Width	4-5m (up to height)
		Spraying Droplet Diameter	80--200μm (adjustable)
Remote Controller	Remote Controller	Model No.	R4
		Working Frequency	2.4Ghz
		Working duration	10h
		Effective Signal Distance(without interference and shelter)	1.2KM



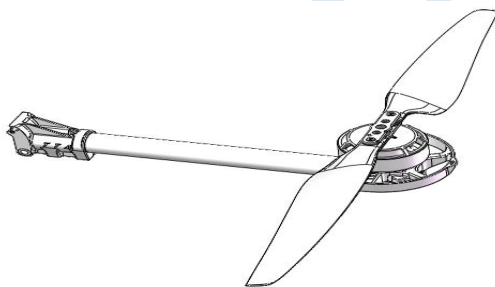
		Battery volume	3.7V,4000mAh
		Charging type	DC 5V, 2A
		Working Environment Temperature	0--40C°
		Storage Temperature	10--25C°
		Best Charging temperature	10--25C°

2.3 Preparation Before Takeoff

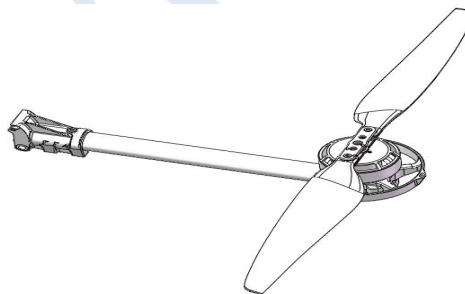
2.3.1 Arm Installation

1) Main fuselage should be prepared well(**the position with name plate is the head direction,the other end is tail direction**)

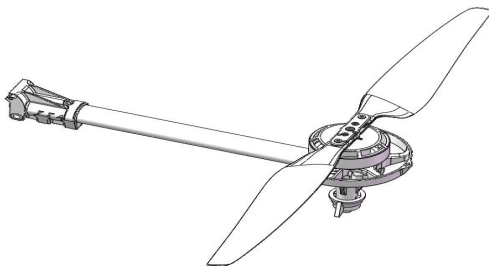
2) Prepare one piece of arm(CW with nozzle),one piece of arm(CCW with nozzle),one piece of arm(CW),one piece of arm(CCW)



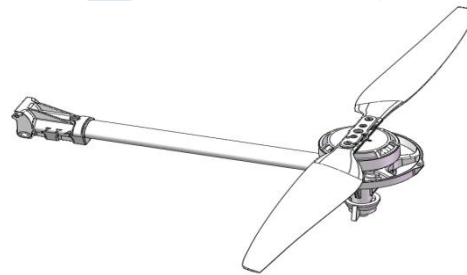
CCW arm assembly



CW arm assembly



CCW with nozzle arm assembly



CW with nozzle arm assembly

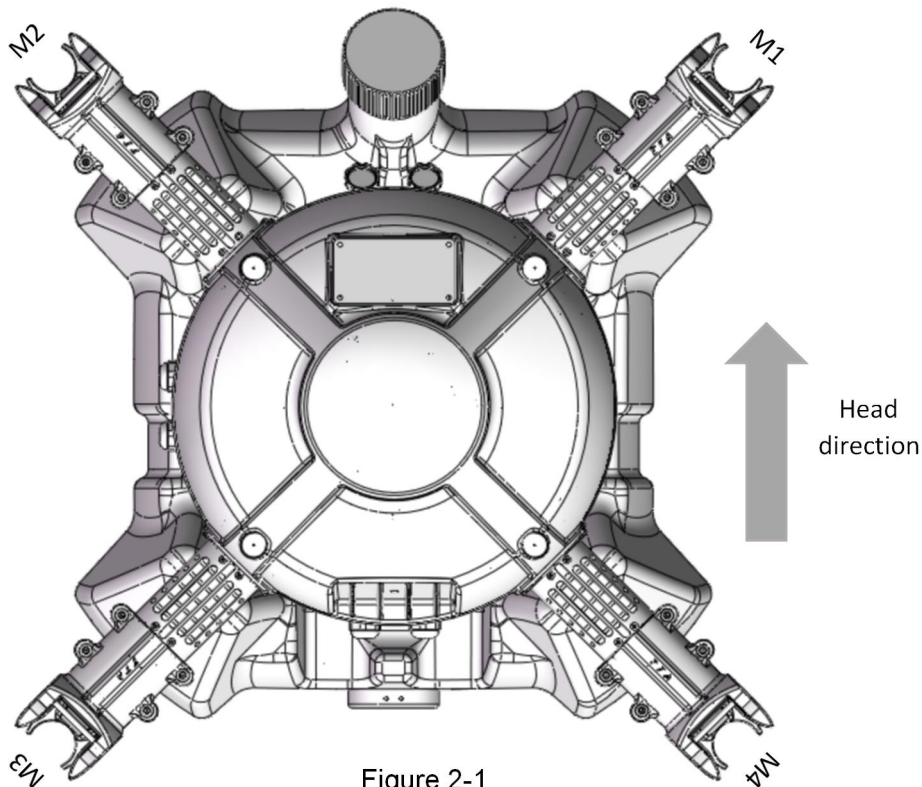


Figure 2-1

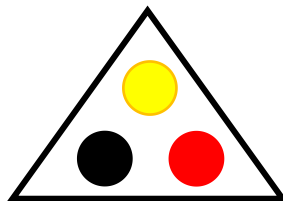


Figure 2-1.1 Ordering of arm connectors

- 3) Plug the male banana connectors of each arm into the according female ports as figure 2-1.1 above.
- 4) Align 6mm inner bore of arm pipe clamp and 6mm hole of copter main part.
- 5) M5*49 shutter screw should be plugged into hexagon part of pipe clamp 6mm hole in main part.
- 6) M5 nut should be tightened from the other side,see figure 2-2.
- 7) The other three arm should be installed as this method,see figure 2-3.

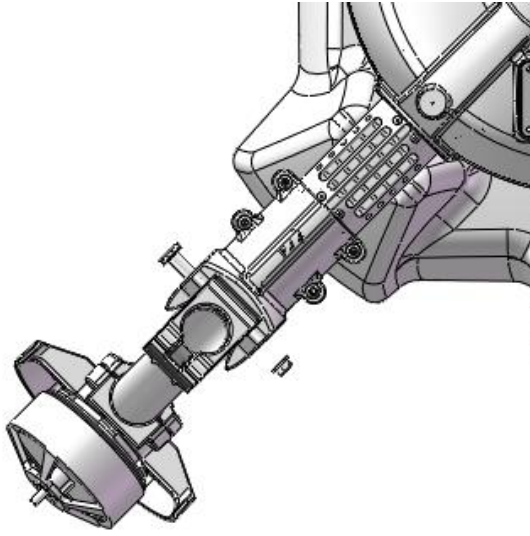


Figure 2-2

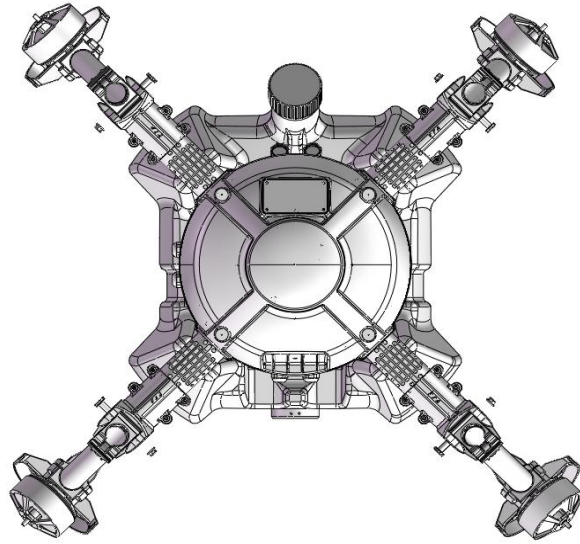


Figure 2-3

Attention:

- 1) The difference between CCW arm and CWW arm is that propeller rotation is difference. There is an arrow label on the motor cabinet, same sequence with the propeller.
- 2) M1 should be CCW arm, M2 should be CW arm, M3 should be CCW with nozzle arm, M4 should be CW with nozzle arm, see figure 2-1.
- 3) Be aware of the ordering of each arm's banana plugs when connecting. Wrong ordering may lead to reverse motor spinning direction or even crash.
- 4) Arm could not bend up during arm installation, maximum angle of arm is horizontal, arm could only be fold downward.

2.3.2 Spraying Tube Installation

Connect $\Phi 8$ pipe with pipe connector of M3 arm (CW with nozzle) and M4 arm (CCW with nozzle).



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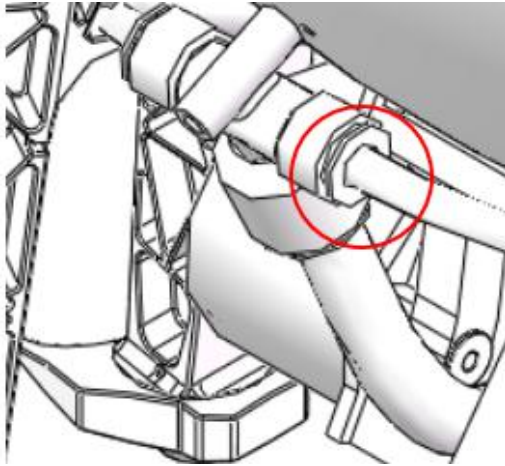


Figure2-4

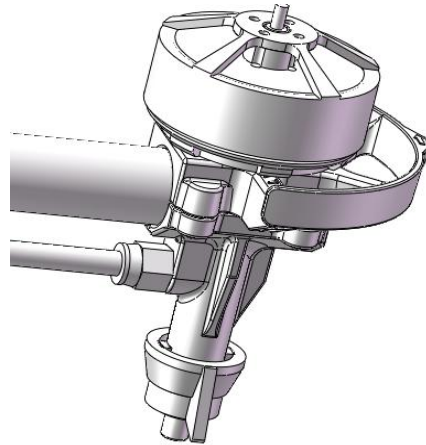


Figure 2-5

2.3.3 Battery Installation

Battery should be fixed along with curve of tank by bandage,see figure 2-6.

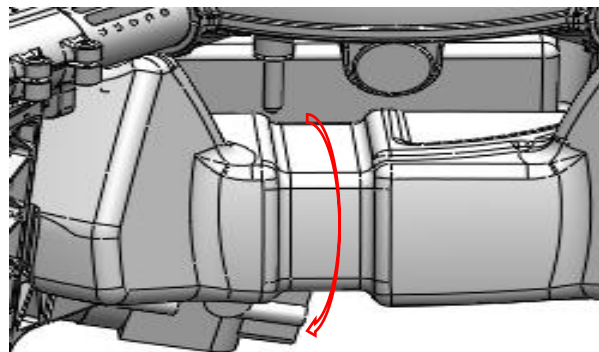


Figure 2-6

3. Charger Instruction

3.1 Product Application

LiPo 6s balance charger

3.2 Product Features

1. balance charging
2. quick charging
3. input and output reverse polarity protection



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4. Over-heat protection

3.3 Main Technical Parameters and Application Demand

1. Input voltage: AC 220V or AC110V
2. Max charging current: 5A/10A/15A/20A/25A
3. Max charging power: CH1:600W;CH2:600W
4. Discharge Power: 80W(40WX2)
5. Battery Type: LiPo / LiHV
6. Support battery cell number:2~6S
7. Net Weight: 3.1KG

3.4 Operating Procedure

1. Power on: Connect to the power source and turn on the power switch. All indicators will illuminate for 2 seconds.



2. Battery connection: Please connect your batteries according to below picture.



- 1) Connect battery power connector to XT90 port
- 2) Connect battery balance port to the balance socket



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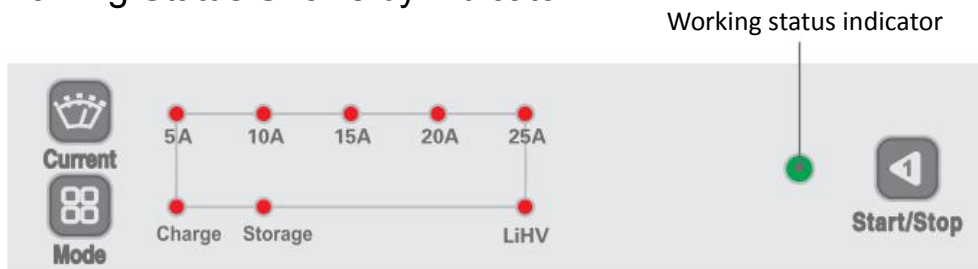
3.Setting the charging parameter



- 1) Press button to choose the appropriate current,5A,10A,15A,20A,25A, the chosen current indicator will light up (Normally, we suggest to charge “1C” charge current).
- 2) Press button to choose the mode you need, the default mode is charge mode.
- 3) Long press for 2 seconds until heard “beep” sound, the charger is under charging process now, the indicator flash in red, the indicator will become green color when fully charged.

Stop: If you want to stop in working process, please press button

3.5 Working Status Shows by Indicator



Battery Capacity Status	Indicator Status
0%~30%	flash in red color, once a time
30%~60%	flash in red color, twice a time
60%~90%	flash in red color, three times a time
Over 90%	flash in red color, four times a time
100%	Green color

3.5 Storage Mode

If a Lithium battery will not be used for long time, it's highly recommended to charge or discharge the battery to 3.80~3.85V with Storage mode so as to extend the battery's life.



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when the battery voltage is higher than 3.80V per cell, the charger will discharge the battery; on the opposite, when the battery voltage lower than 3.80V per cell, the charger will charge the battery under Storage mode.



Press the “Mode” button, choose the Storage mode, the LED will be lighted.



Long press the “Start/Stop” button, enter into the Storage mode.

3.6 Indicator Specifications

When the charger appear below abnormal situations, all the 5 current indicators and 2 mode indicators (totally 7 indicators) flash in red color simultaneously except the LiHV indicator, please refer to below specific message notification and reasons.

Indicator Status	Specifications
7 indicators flash in red once,stop one second, circulate all the time	No battery connected: check if the battery port correctly connected to the device .
7 indicators flash in red two times, stop one second, circulate all the time	Battery polarity reversed: check the battery main port, polarity connected.
7 indicators flash in red three times, stop one second, circulate all the time	Abnormal voltage at balance port: check if the battery balance port connected to the device correctly, check whether the battery voltage is normal or not.
7 indicators flash in red four times, stop one second, circulate all the time	Temperature protection: check the cooling fan running is normal or not and check if the external environment temperature is too high.
7 indicators flash in red five times, stop one second, circulate all the time	Current overload protection: the device will stop charging once the current over 30A.

3.7 Warning and Safety Instruction

These warnings and safety instructions are particularly important. Please follow the instructions for maximum safety. Otherwise the charger and the battery can be damaged or at worst it can catch fire.

- 1.Never leave the charger unattended when it is connected to its power supply. If any malfunction is found, cut off power supply immediately and contact TTA AS.
- 2.Keep the charger away from dust, moist, rain, heat, direct sunshine and vibration.
- 3.The input voltage is AC 110V or AC 220V, before connect to the power source, please keep its input voltage is the same as the charger rated input voltage.



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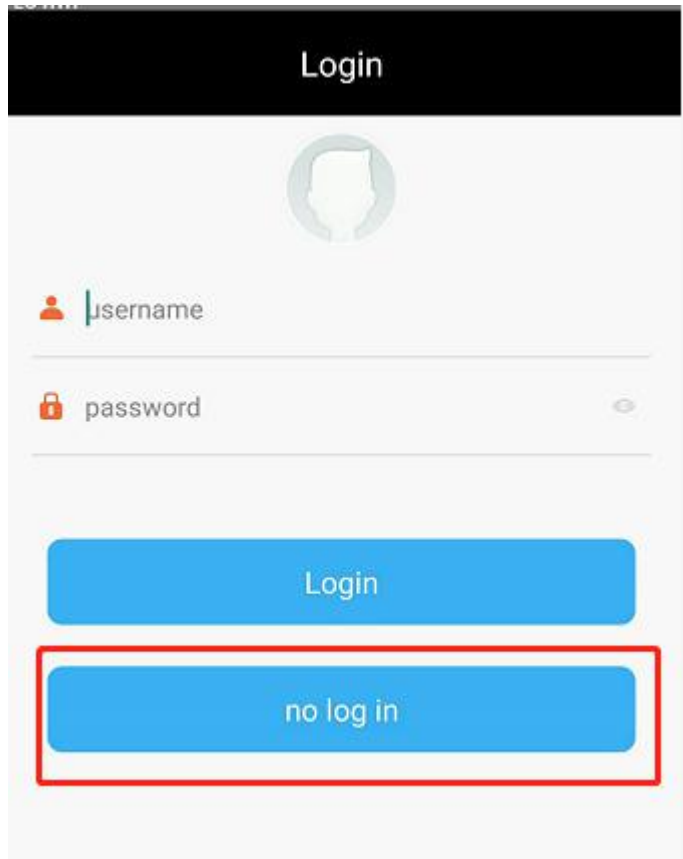
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4.Default battery type is standard LiPo battery type in charge mode. Before connecting the battery, please keep the battery type comply with the charger setting.

Note:More details can be got in <Dual Channel 6S LiPo charger Manual>

4. App Setting of Copter



Please choose no log in.

4.1 Software Configuration

1. Please install the GCS software.
2. GCS Downloading Link: <https://www.ttaviation.org/downloadcat/app>
3. After GCS installation,the label will be appeared as figure 4-1.



TTA-M4E support Android 4.0 or above

4. Open GCS,enter into the start page.
5. Enter into the main page ,see figure 4-2.



Figure 4-1



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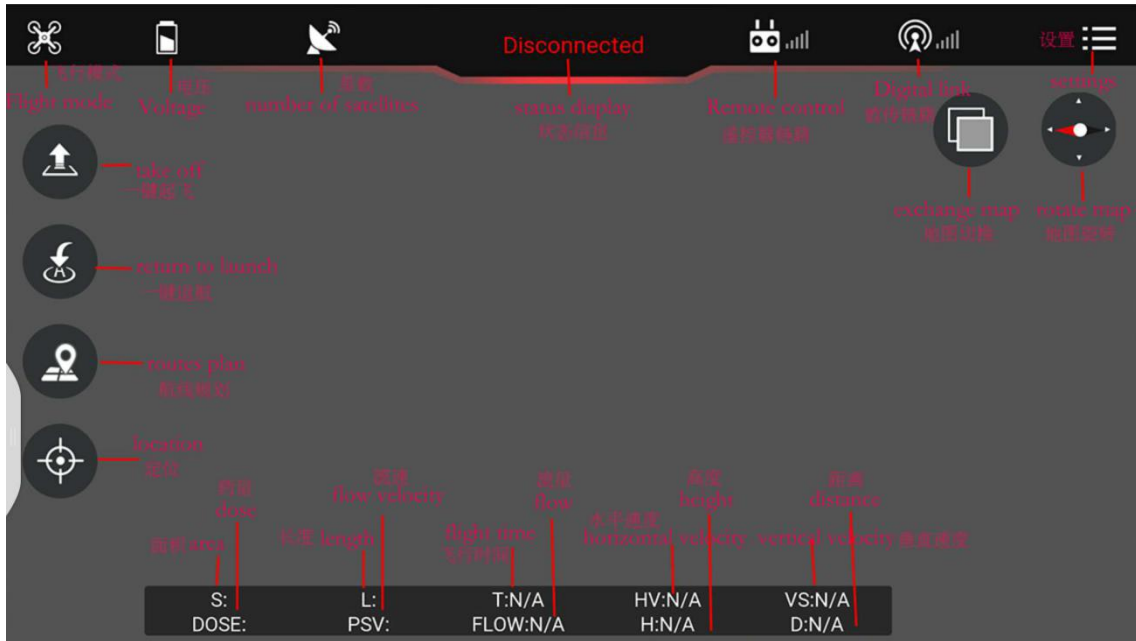


Figure 4-2

4.2 Parameters Adjustment



- Sensitivity should not be changed by common user,the unnecessary loss should be taken by user for authorized changing.
- Remote controller could not unlock before parameters adjustment.
- Exit could only be done when all of the parameters adjustment should be done and confirmed.Copter could only fly by restarting after parameters adjustment.

Parameters could be adjusted when copter connected,the steps are as followings:

1) Open the OTG function from cellphone SETTINGS---SYSTEM---OTG(the default is Off thus it should be opened every time),see figure 4-2-1.



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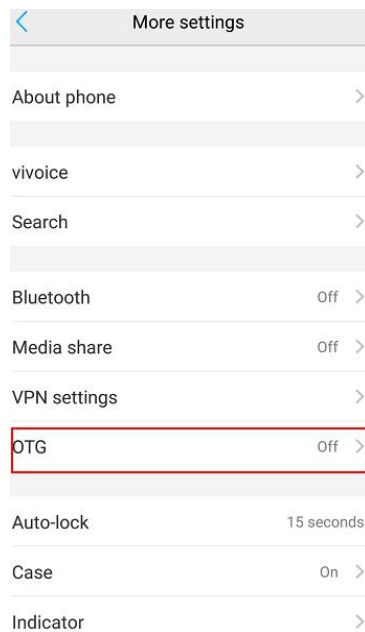
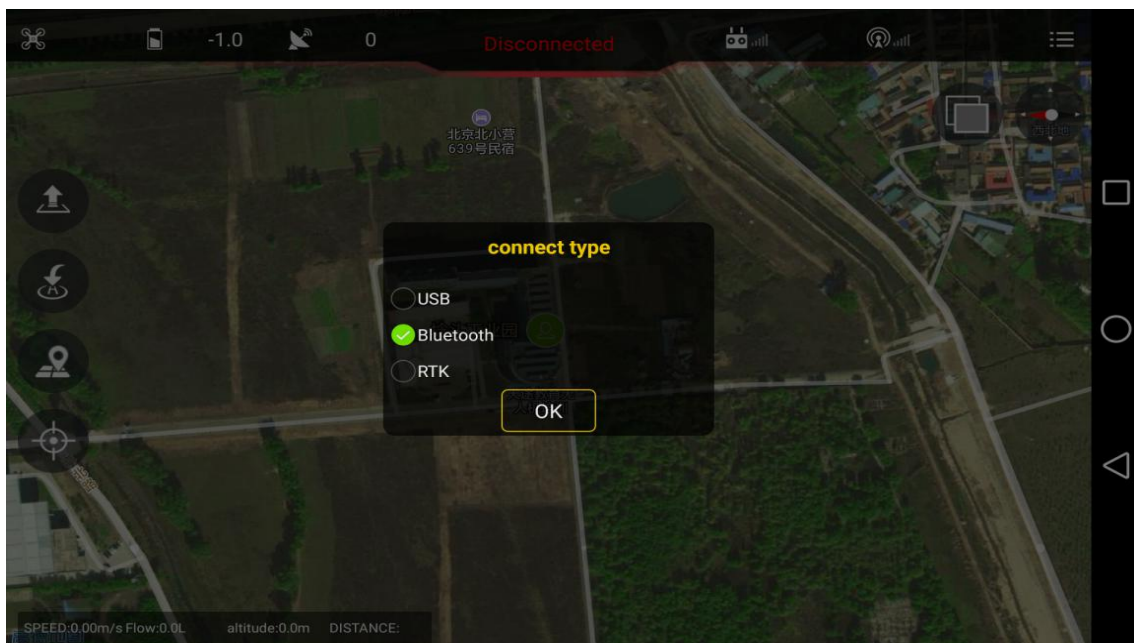


Figure 4-2-1

2) Built bluetooth connection between remote controller and cellphone

Open the bluetooth function in cellphone. Set the connect type of APP on Bluetooth mode.



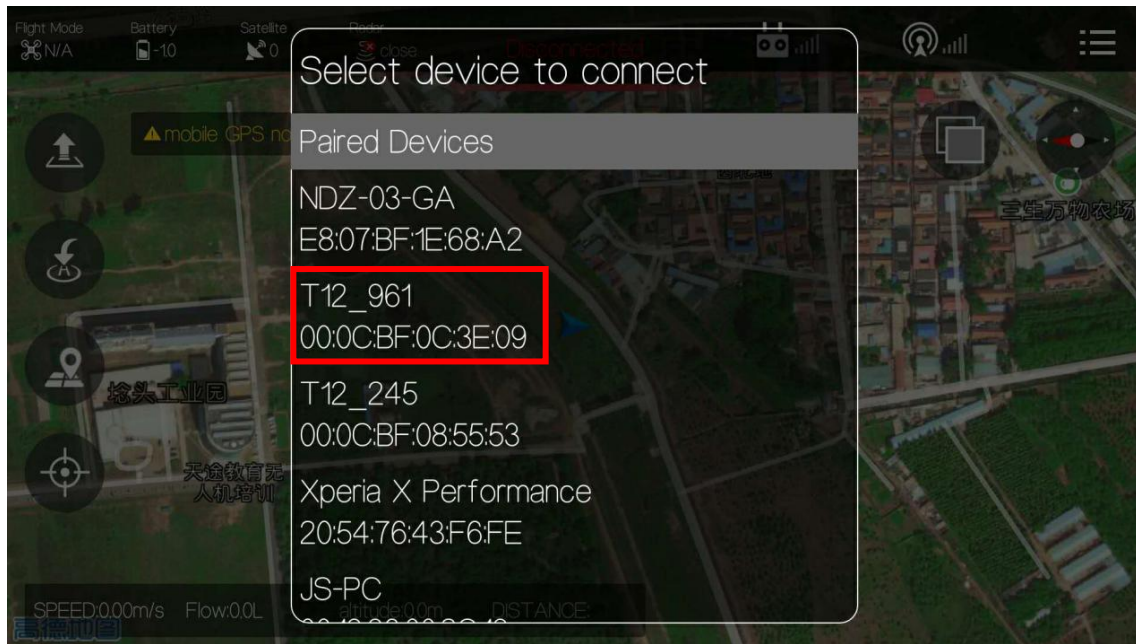
Connect the bluetooth of remote controller. Remote controller Bluetooth name: T12_***, password:1234



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After connection,app will be as followings,see figure 4-4

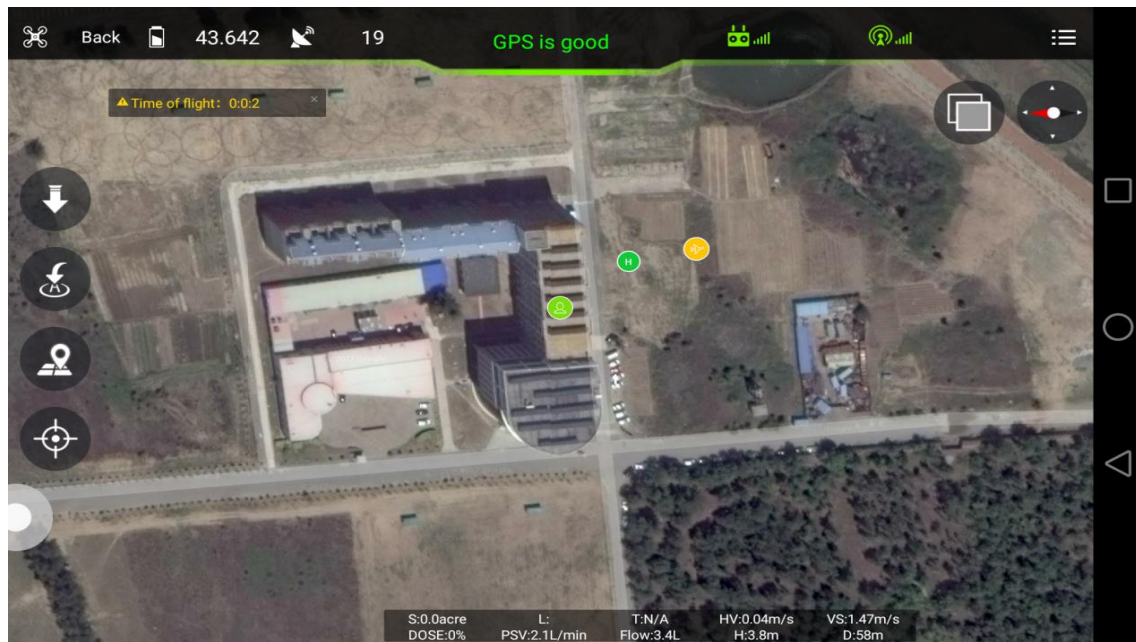



Figure 4-4

Click label  at up right corner to enter into parameters adjustment.

4.2.1 Remote Controller Calibration In GCS

Two kinds of calibration ways:

① Calibration In GCS. To keep synchronization with the Info of flight controller



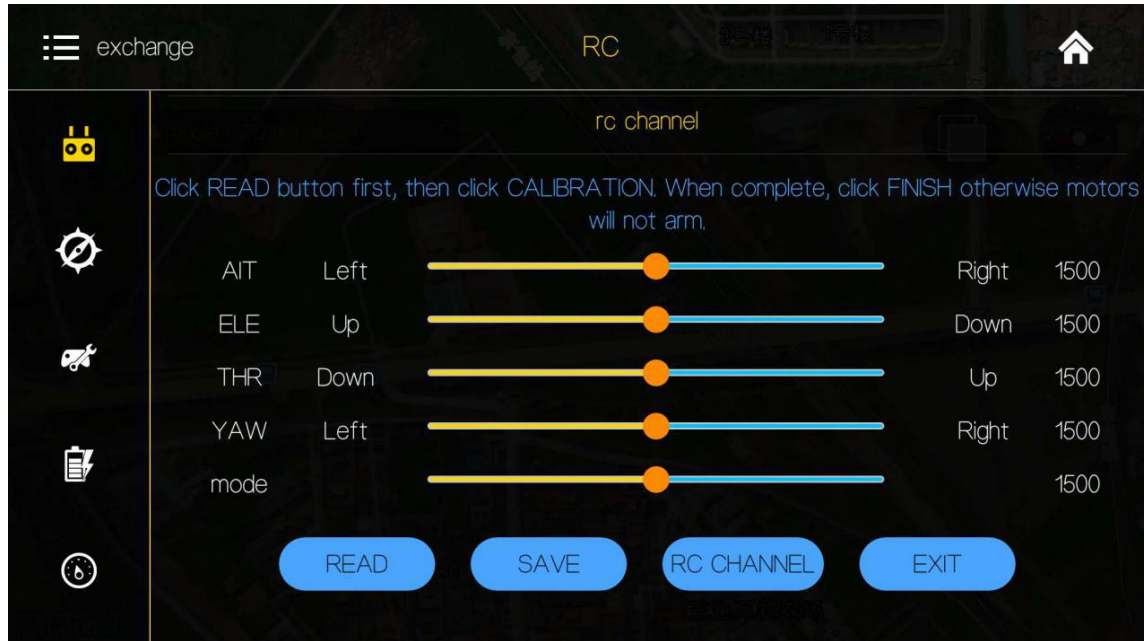
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② RC Hardware Calibration. To calibrate the channels of RC itself. (more details at chapter 5.3)

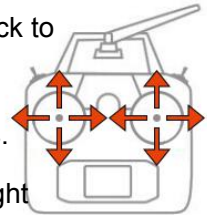
Remote controller calibration:click the button *READ* to get the data as following figure.



1) Start to calibrate:connect copter with GCS,click *RC CHANNEL*,move the stick to maximum and minimum position 4 to 5 times.

2) Stop calibration:click Finish after calibration. Then check the channel status.

3) Normal or reverse setting of remote controller is set to check whether it's right



4.2.2 IMU Calibration

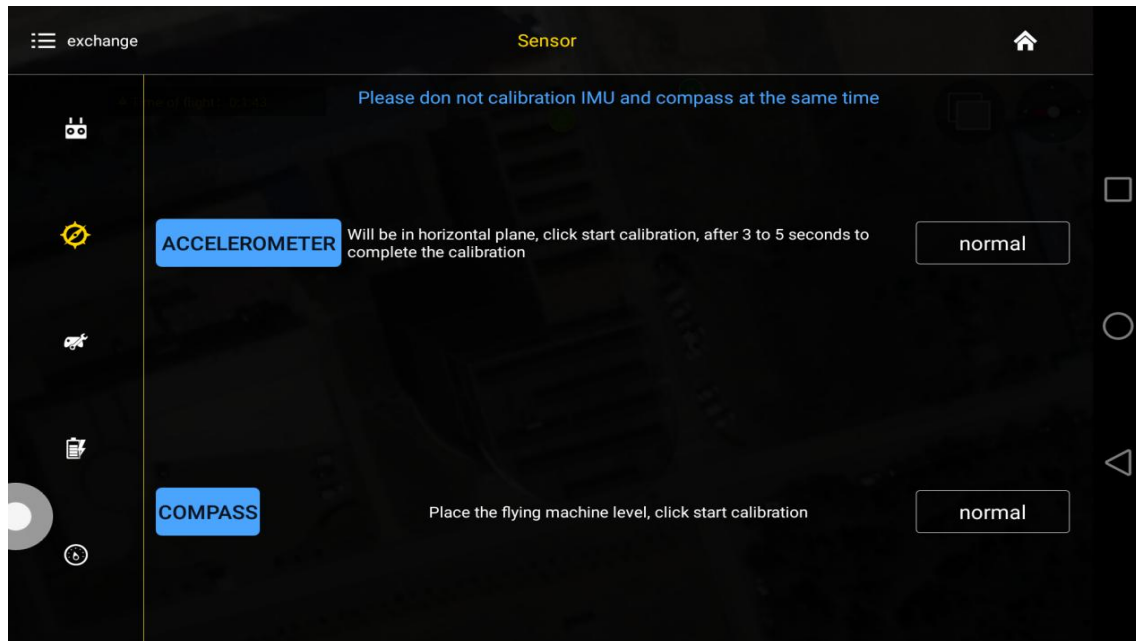
Leave the copter in a horizontal position,click the button *ACCELEROMETER*,LED will flash in red,green,yellow alternately,LED *green* means successful calibration,data will be stored by restart.



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4.2.3 Compass Calibration

▼ Situations when need calibration

- 1) Everytime you transport the drone to another place, the compass have to be calibrated .
- 2) If you fly in the mountain , every time you move from one hill to the other one , do the compass calibration .
- 3) Everytime you get new drone or a repaired drone , do the compass calibration .
- 4) Once you find that the drone cannot stay when it's hover in GPS (it might be moving like a cycle), do the calibration .

▼ Calibration order

Click the button *COMPASS* to enter into calibration status.

▼ Calibration Steps

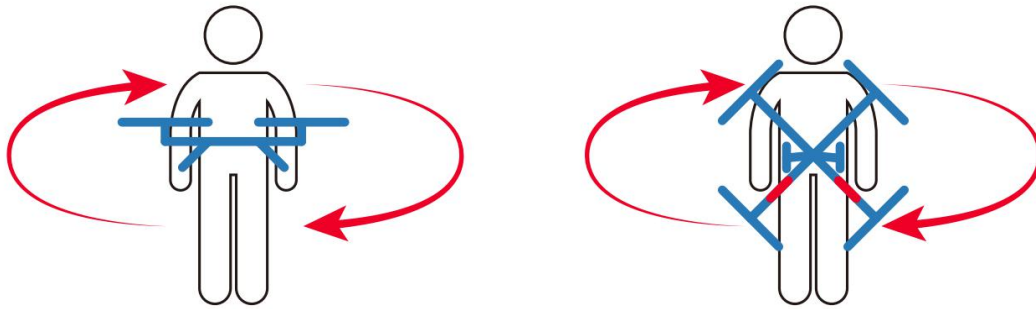
- 1) Confirm GCS communication well, compass installation correct and copter outside.
- 2) Clicking calibration, yellow LED of copter is on, hold and keep copter rotating clockwise and slowly, leave copter head to the ground when green led is on, rotate copter clockwise and slowly till LED flash in red,green and yellow alternately.



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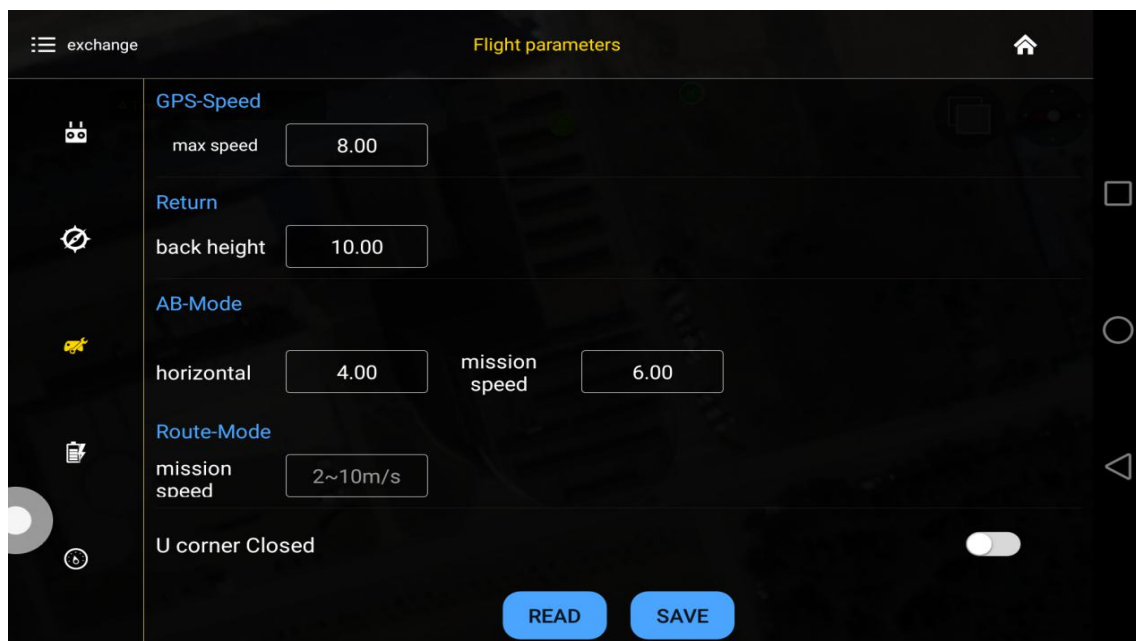
3) After vertical calibration, calibration mode will be exited automatically and LED will flash normally if successful. If fails, LED will keep red for 3 seconds, then user need to re-calibrate.

4) Please power again after successful calibration.

Attention:

- 1) Compass should be done after changing flying area.
- 2) Calibration should be done in outdoor, wild and far away from high tension line tower which is easy influenced by magnetic interference.
- 3) Keep horizontal and vertical during the slow calibration.
- 4) Clockwise is the only direction.

4.2.4 Flying Parameters Adjustment





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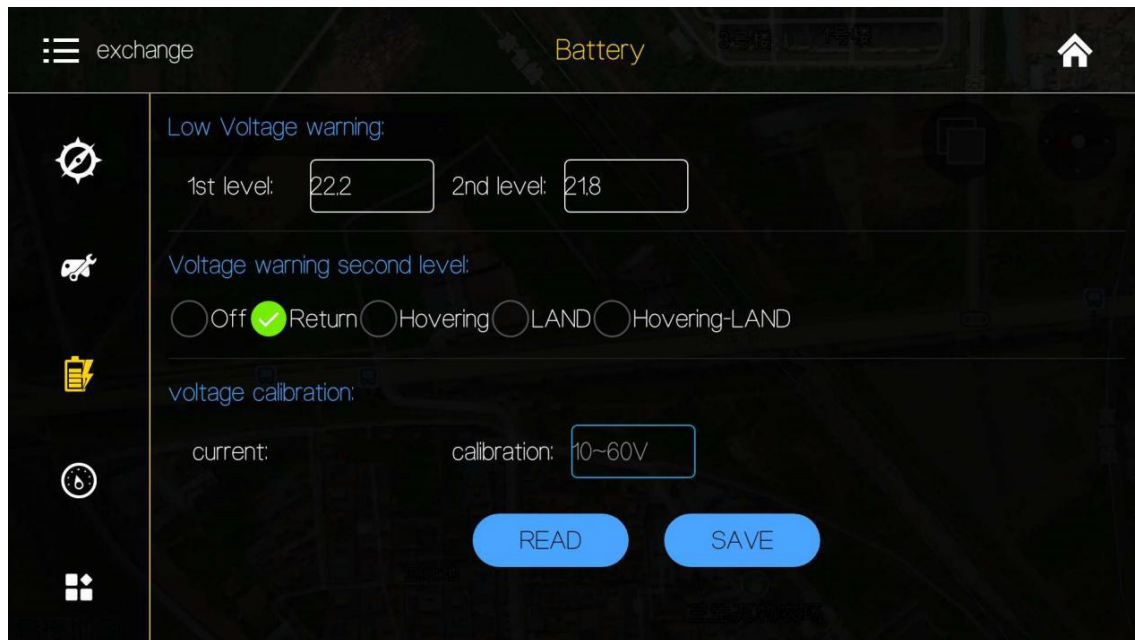
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Click the button *READ* to obtain the current flying parameters,click button *SAVE* to save the parameters.

The default number of back landing height is 20 meters,AB swath is 4 meters,route speed is 5m/s.

4.2.5 Low Voltage and Liquid Protection



4.2.5.1 Low Voltage Protection Settings

Five voltage protection options for user to select: Close(close the protection), return(return to home point), Hang(hovering),Land(auto landing), Hang-Land(hovering and then landing). User could choose the one suitable..**The default is auto home landing.**

4.2.5.2 Alarm Voltage Settings

Settings of first alarm and second alarm.It's recommended to 22.2V for the first alarm and 21.8V for second alarm.

LED will flash yellow triple when get to the first alarm level;LED will flash rapidly when get to the second alarm level,copter will react as the low voltage settings,such as return to home or landing.

4.2.5.3 Voltage Calibration Settings

Flight controller voltage sensor need to be calibrated if flight controller voltage sensor result is different from real voltage.Real battery voltage should be filled in measured



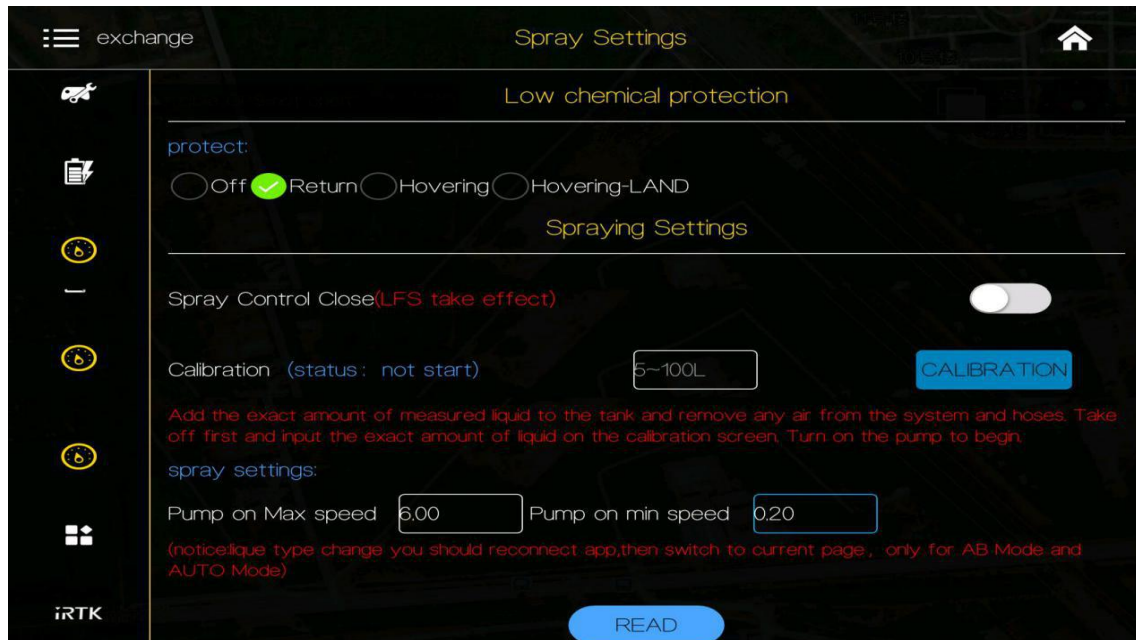
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voltage,flight controller voltage will be calibrated by clicking save. **It's unnecessary to set by user as calibration has been done before delivery.**

4.2.5.4 Low Liquid Protection



When liquid is nearly out, the following reaction could be set: Off(Close the protection), Return (auto home landing), Hovering, Hovering & landing. The default is Off, which means only LED flash as alarm. **We suggest you to set it on Return option.**

4.2.5.5 Spraying Mode

The drone has 2 spraying mode: Combination & Manual mode.

Combination mode: Spraying rate will follow flying speed. Faster speed, bigger flow rate.

Manual mode: Spraying always work under the biggest flow rate when in this mode.

Combination control of the pump,max flow rate match to max flying speed. The maximum default combination number is 6m/s,minimum default combination number is 0.2m/s.

4.2.6 Fail-Safe

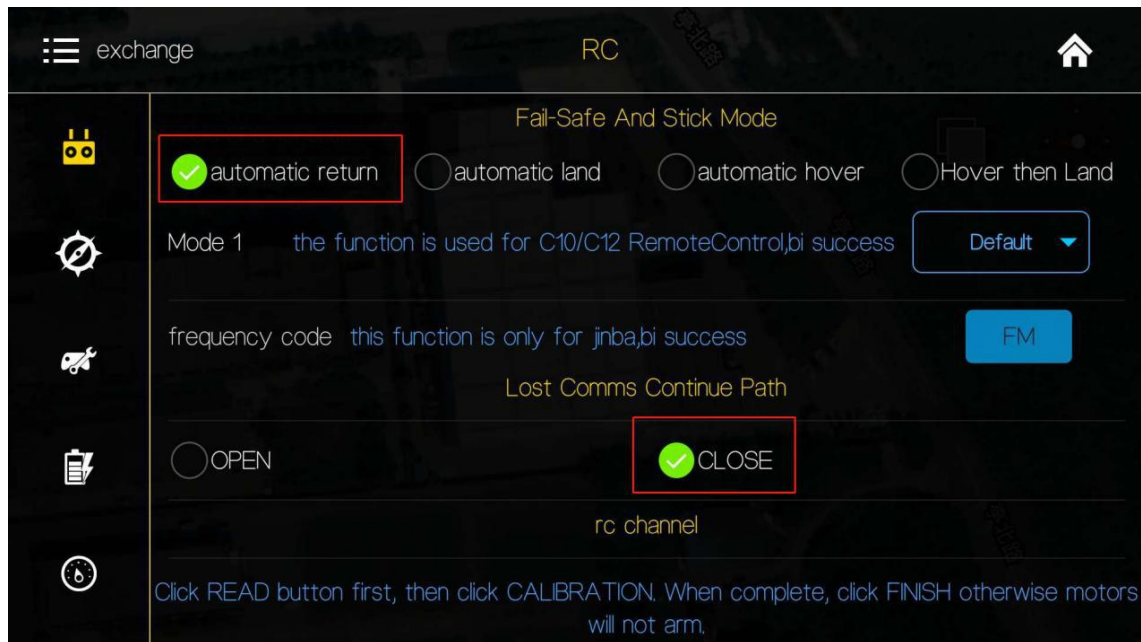
When lost signals of RC, aircraft will enter into Fail-Safe status and execute the set Fail-Safe action. The default set is "Automatic return" which means Return To Home automatically. Besides,"Lost Comms Continue Path" is used to set whether drone will continue the mission after lost-control during a mission flight. If opened, drone won't execute Fail-Safe action until mission has been completed. The default setting is **Close**.



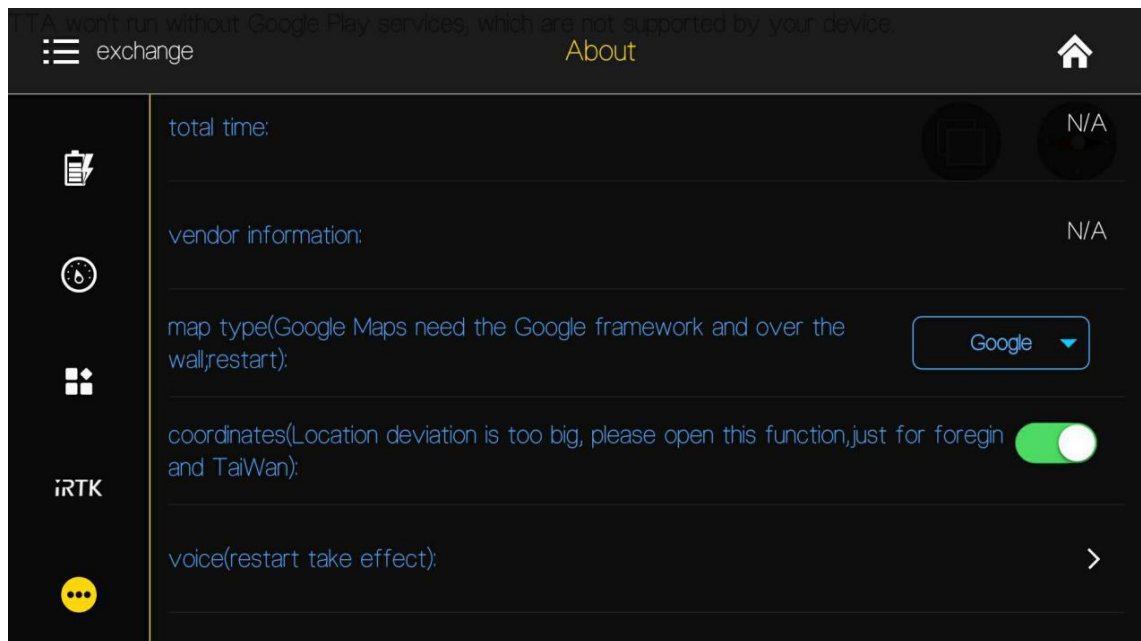
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4.27 Map & Coordinates Offset



Open about interface,choose **map type**,choose **Google map**. Voice alarm should be opened. It is suggested to open “**coordinates**” function if position deviation is obvious.

4.3 Route Establish

Four Automatic Operation modes: **Map Point**, **Dot Equipment**, **Drone Point**, **Phone Dot**.

Map Point mode: Dot on a built-in map to plan route.



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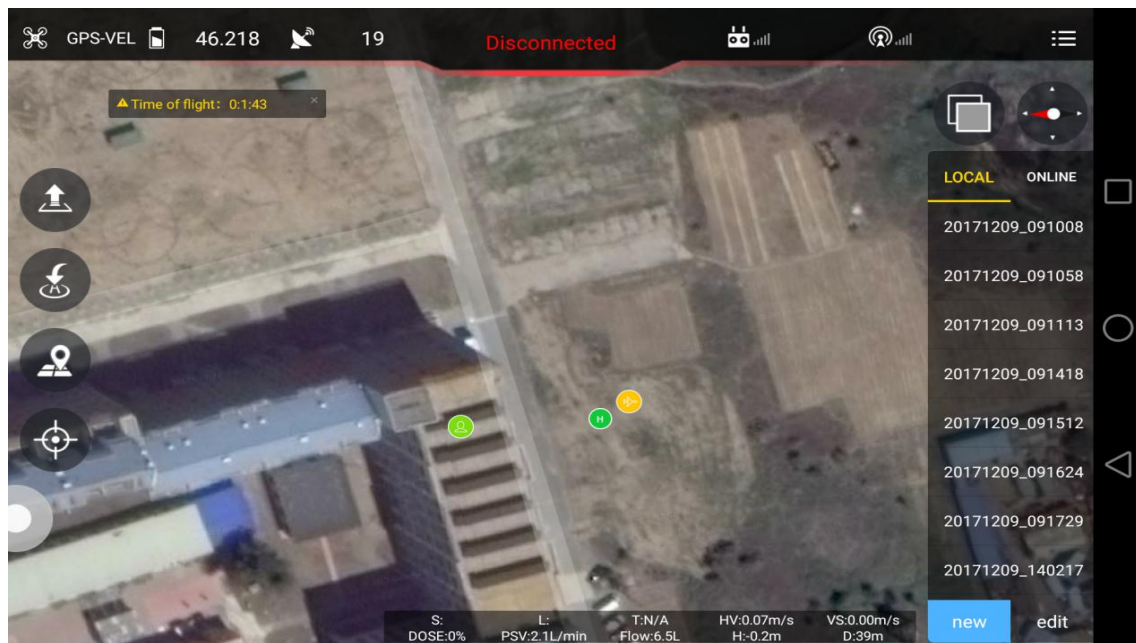
Dot Equipment: Use a Dot Equipment to make boundary points.

Drone Point: Drive drone to mark boundary points.

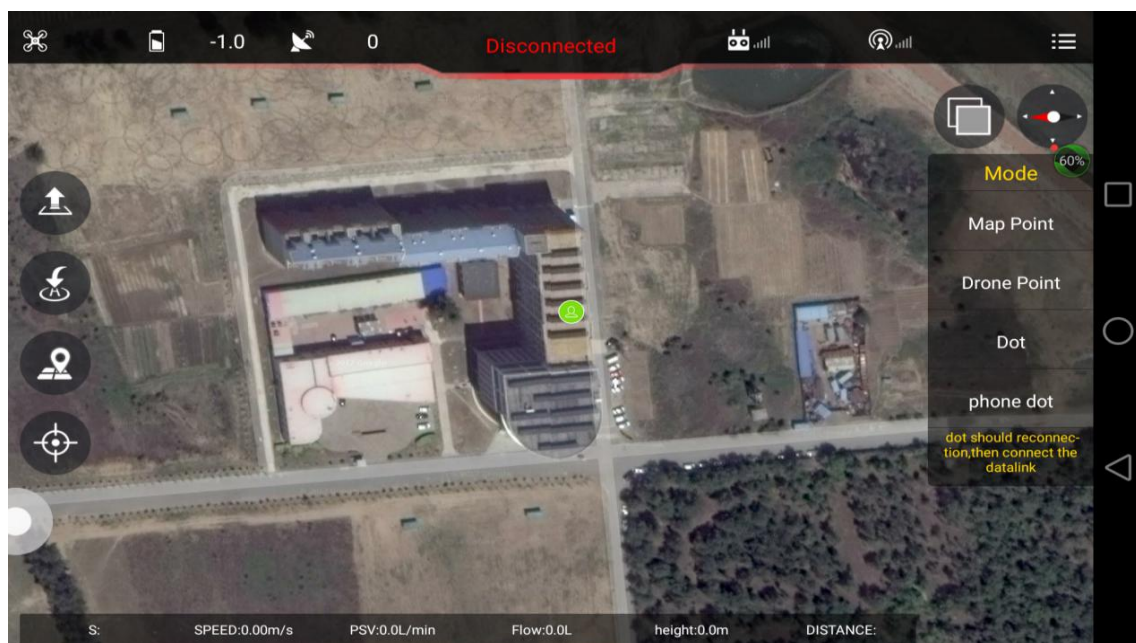
Phone Dot: Use Phone to mark boundary points.

4.3.1 Start Route Establish

1. Click  to enter into route interface.



2. Click *new* to select point making type.



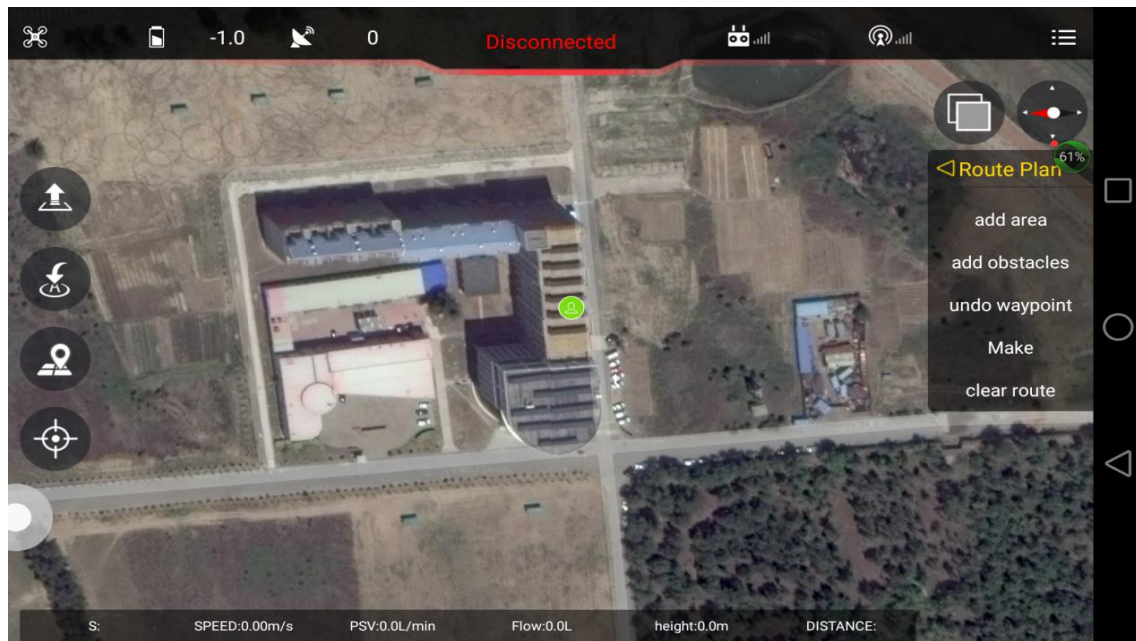


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4.3.2 Map point



- 1) Select **Map Point**.
- 2) Click **adding area** and click the boundary point on map to set the working area. Obstacles could be added by clicking **add obstacles**.



4.3.3 Drone Point

- 1) Select **Drone Point**
- 2) Click **adding area** to set working area. Obstacles could be added by clicking **add**



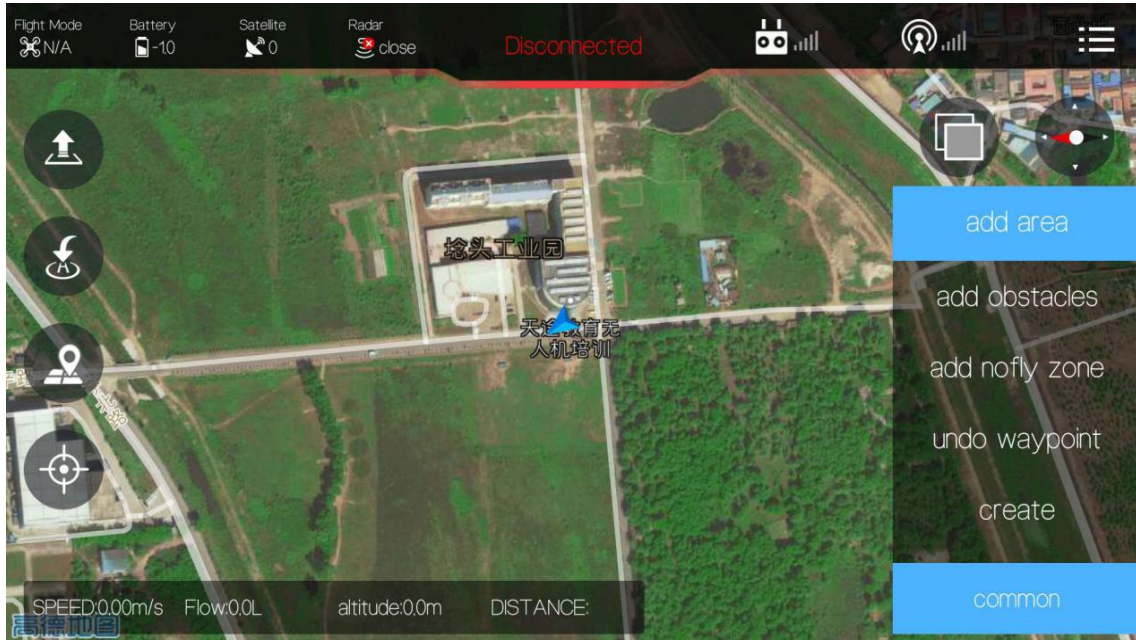
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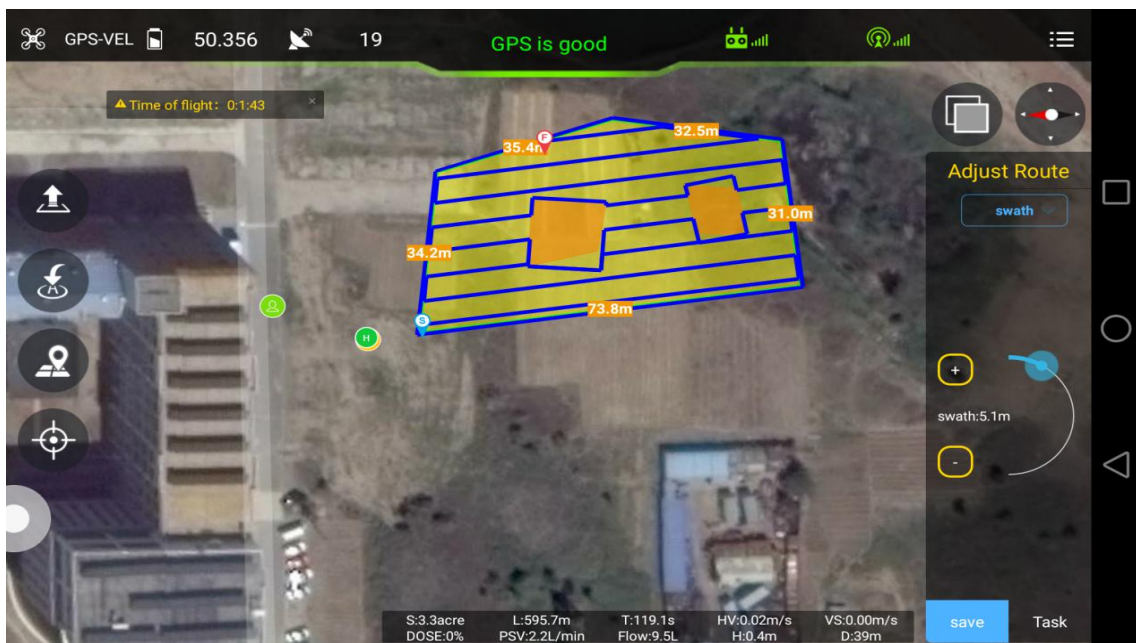
obstacles.

3) Fly drone to the first boundary point, Click “**Common**” to make the first boundary point. Then the second, third, fourth...



4.3.4 Route Making

Click “**Create**” to confirm the chosen area and enter into “**Adjust Route**” interface.



Swath:Distance between 2 spraying routes



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Obstacle gap: Distance around the obstacle

Target gap: Distance between working area and boundary

Offset: Translation of working area

Save: Save the task

After editing completed, click **Save** to save the task.

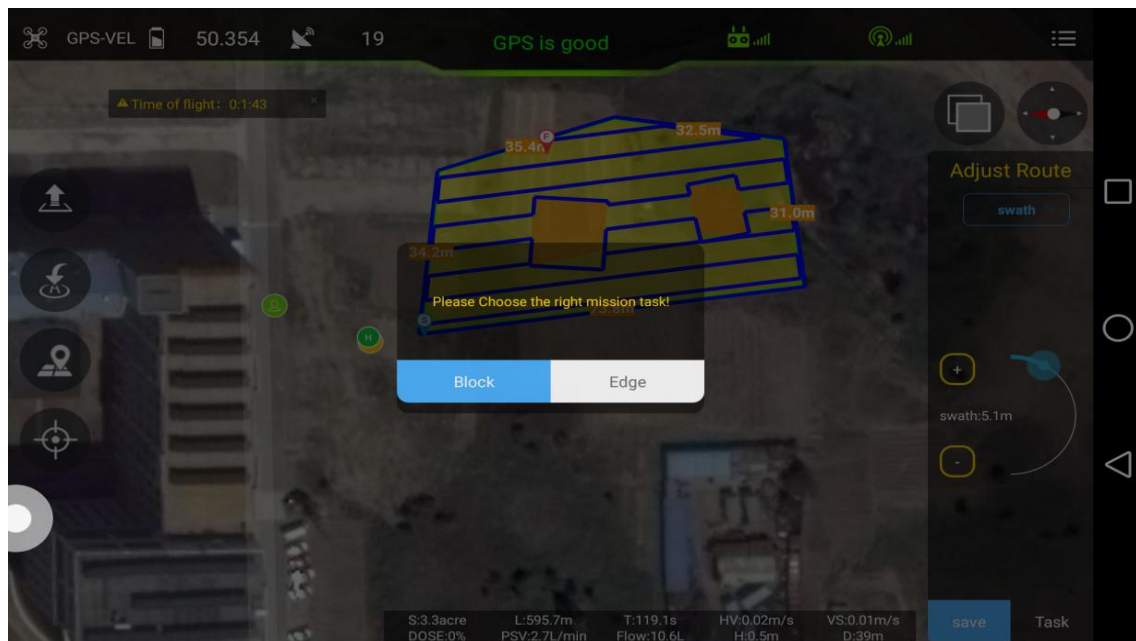
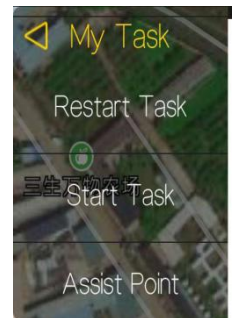
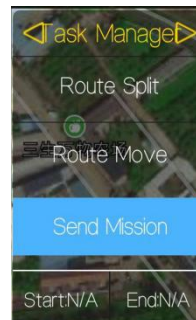
4.3.5 Executing Mission

1) Click **Task** to enter into **Task Management** interface. Click “Send Mission” to upload the task.

Two Mission Task Modes: **Block** and **Edge**.

Block mode: Drone will only fly along the route.

Edge mode: Drone will automatically fly along the boundary line after finishing the route .

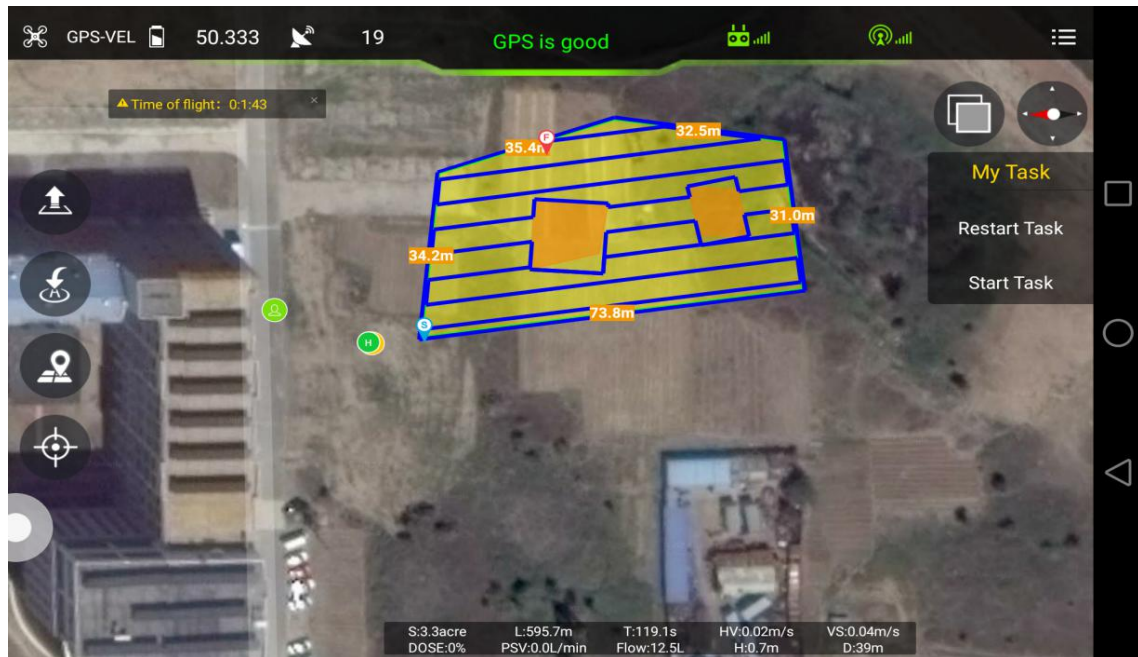





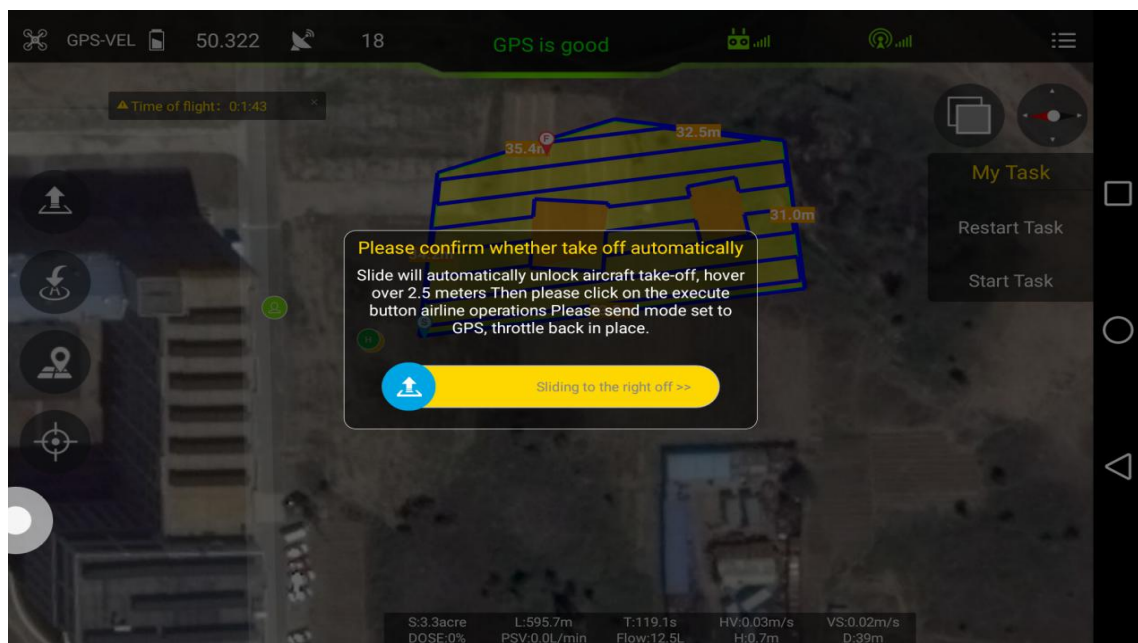
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2) Click  to take off from GCS or remote controller,click *start task* to execute the route





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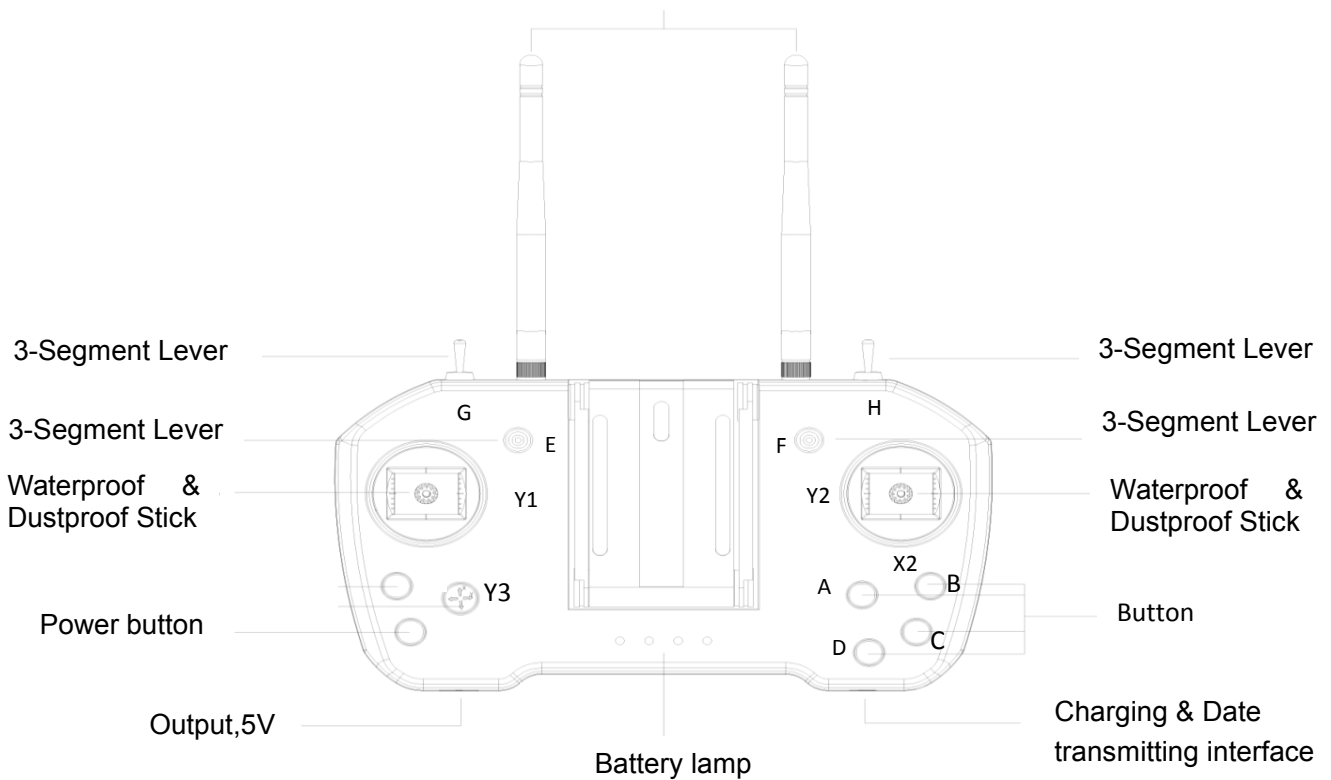
Rudder and **Throttle** could be operated during flying,obstacles could also be avoided by moving the **Aileron** stick.



5. Remote Controller

- ◆ Charger output more than 5V-2A should not be used.
- ◆ Remote controller charging current should be not more than 2A.
- ◆ Any damaged,smoking or abnormal heating charger should not be used.
- ◆ Charging should not be continued in condition of smoking,smelly,weeping.
- ◆ Charging should not be in the area of baby playing.
- ◆ Charging should not at temperature more than 60℃.

2.4G 3db Antenna



5.1 Function Description

Channel	Top	Middle	Bottom
E: Flying mode	Attitude mode	GPS mode	AB mode
F: AB recording	/	Recording Point A	Recording Point B
Y3/A: Flow rate	Higher/OFF	/	Lower/MAX
D: Home landing	OFF	/	ON
Channel	Left	Middle	Right
G: Pump mode	OFF	Combination	Manual



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H: Terrain following	ON	/	OFF
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5.2 Bind

Before binding, remove all propellers for safety.

- ◆ Power on drone for 1 second and cut off immediately, repeating this step for five times. Then power on the drone for the sixth time and keep the power connection. Drone will enter into binding mode automatically.
- ◆ Power on remote controller. Drone will bind the remote controller successfully with seven beeps from the remote controller.

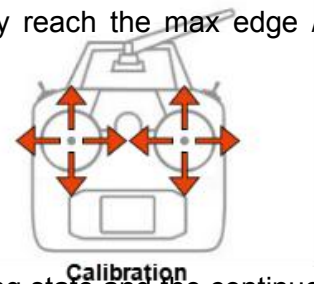
Remote controller need to be calibrated after binding.

Remark: Binding remote controller can not be operated for more than one pair at the same time. Only one-to-one pairing is allowed.

5.3 RC Hardware Calibration

The following method is to calibrate the channels of RC itself.

- 1) keep pressing both button C and button D until switching on the power of Remote Control successfully.
- 2) After power on, give a long press on the button D until hearing continue beeping.
- 3) Start to do joystick calibrating:
- 4) Move the joysticks around in cycle and make sure they reach the max edge / corner.
- 5) Leave the joysticks back to center.
- 6) Move the switches up and down to calibrate the them.
- 7) Give a long press on the button D to end the RC calibrating state and the continue beeping will be stopped at the same time.
- 8) Restart the RC.



5.4 RC Connection & Device Helper.APP Introduction

- 1). Turn on remoter controller (short-press + long-press). Open bluetooth, search and



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connect bluetooth of remote controller (T12-*** , password: 1234).

2).Device Helper introduction.

ADJUST PARAMETERS ----- Adjusting channels, rudder value, fail-safe value.

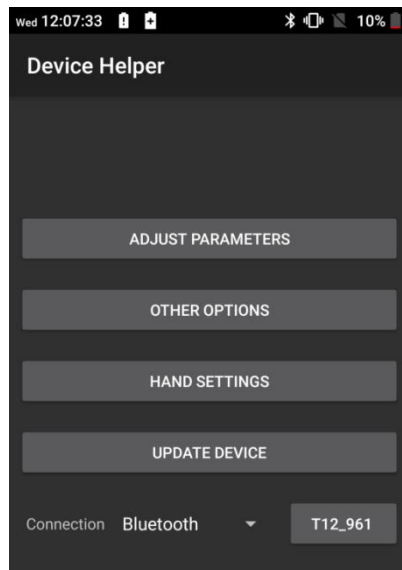
OTHER OPTIONS ----- Selecting SBUS or PPM output mode of receiver, and telemetry baud rate.

HAND SETTINGS ----- Select hand mode, USA, Japan ect.

UPDATE DEVICE ----- Update firmware online

Connection mode ----- Bluetooth mode, SBUS receiver mode.

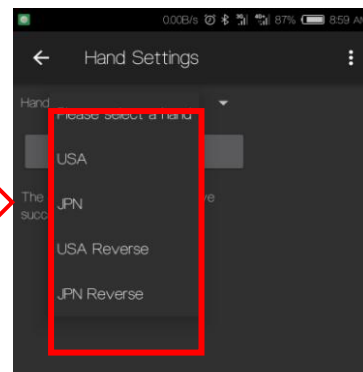
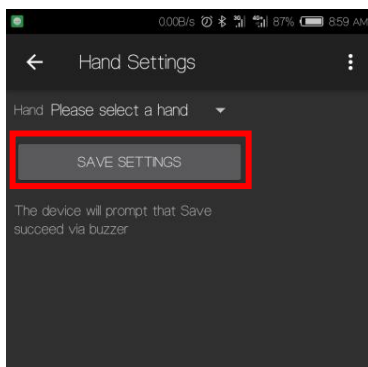
Cautions: Don't do any adjustment, unless under professional introduction. Otherwise,any consequences caused are undertaken by its users.



5.5 Hand Mode Settings Introduction

1) Connect user's phone, remote controller and drone

2) Open Device Helper.APP, click HAND SETTINGS and select hand mode: USA or JPN.

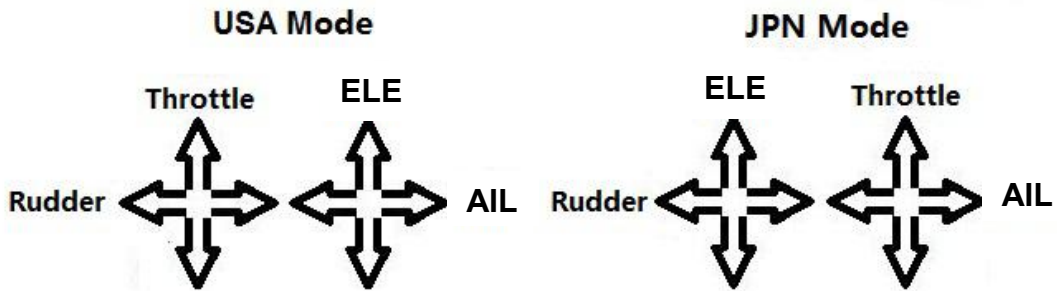




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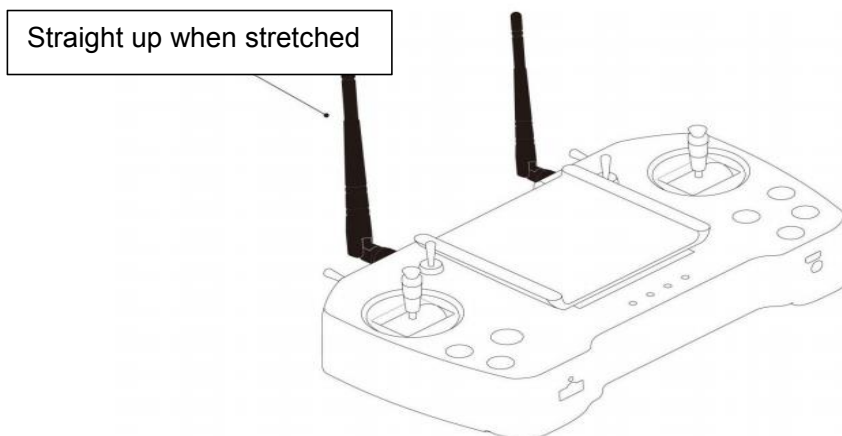
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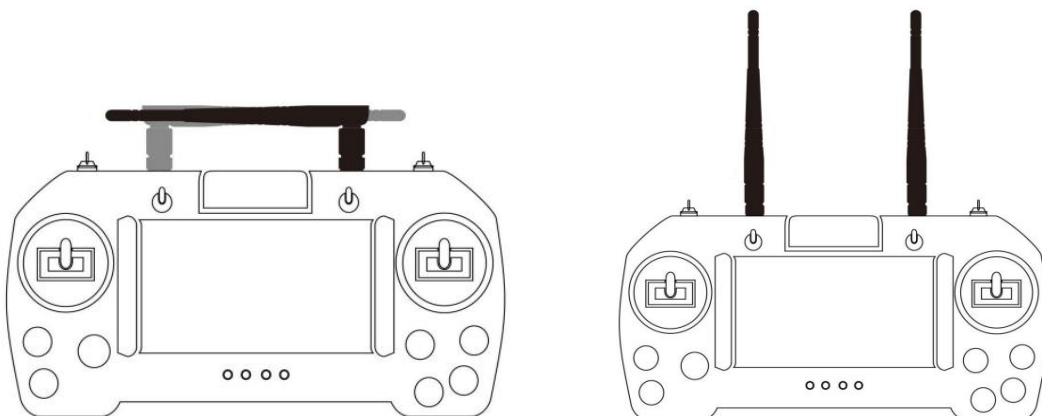


5.6 Remote Controller Antenna

Remote controller antenna should straight up when it is stretched.

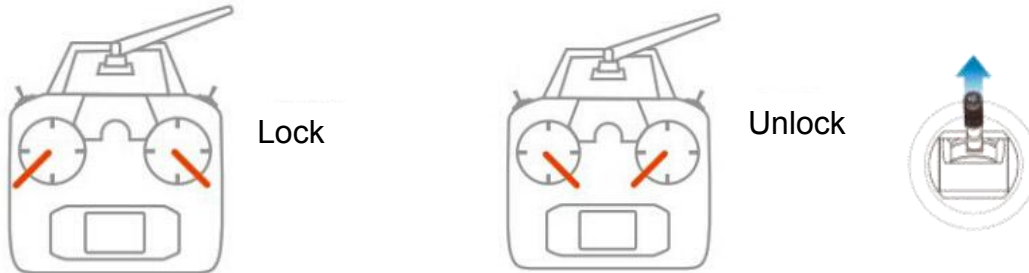


Caution: Incorrect directions as the two pictures below.





5.7 Flight Control



- 1) Pull control sticks to the bottom inside corners to unlock drone. **Meanwhile,Keep away from the drone to avoid any injuries.**
- 2) Pull control sticks to the bottom outside corners to lock drone(**only for emergency use**).While flying, this operation can also stop motors immediately).
- 3) After unlocked, push the throttle above the neutral position to make the aircraft take off.
- 4) After unlocked, motor will be stopped and locked automatically if user do not push the throttle above the 10% position from neutral in 3 seconds.
- 5) After landing the aircraft, push the throttle down and hold for 3 seconds. The motors will be stopped.

Cautions:

1. It is suggested to take off in **GPS mode** if satellites is more than 14, no magnetic field interference and all parts of aircraft are in good condition.
2. Before take off, please check the **stick mode** and confirm the current settings is the mode you want. If not, never reset by yourself without the introduction of TTA after-sales engineer.
3. During autonomous mode or AB mode, missions can be **interrupted** by switching the flight mode manually. After that, operator can **fully control** the aircraft.
4. When drone executes protection action such as low-voltage protection and low-liquid protection, operator can **take over control** by switching the flight mode manually if needed.



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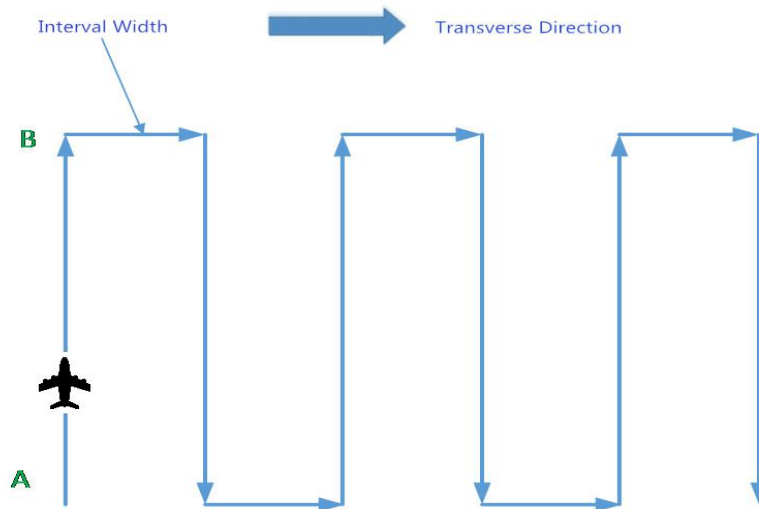
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6. Function Control

6.1 Flight Mode

Flight mode	Instruction	Operate	Condition
Altitude mode	Horizontal stabilization,yaw locked,fixed altitude	By transmitter	GPS satellite enough, LED does not flash red
GPS mode	Fixed horizontal point,yaw locked,fixed altitude	Transmitter operation/empty tank reaction/others	GPS satellites enough,LED does not flash red
AB mode	Copter will fly and spray along with AB point	Record point A and B and switch to AB mode,choose left or right for roll	GPS satellites enough, LED does not flash red
Return mode	Copter will fly back home point automatically,flying back tail to home point and then descend slowly, it could be controlled after arriving on the top of home point except throttle	Press button Home continuously/empty tank reaction/low voltage reaction/reaction of losing transmitter signal	GPS satellites enough, LED does not flash red

6.2 AB Mode



AB mode is a more simple efficient mode with fault tolerance to operate. The working theory is above in the picture. Record the point A and B, the UAV will plan the flight line.

1. Operate Steps:

- 1) Record the point A, switch the mode to GPS mode. Until the drone self-hovering steadily, switch F to "Point A memorized". After that, the LED flash yellow for 2 seconds. The controller have voice prompt.
- 2) Record the point B, drive the drone to the position you want, **be sure it is at least 10 meters away from point A**. Until the drone self-hovering steadily, switch F to "Point B memorized". After that, the LED flash yellow for 2 seconds. The controller have voice prompt.
- 3) Select the direction, switch E (Flight mode) to AB mode, move the roll joystick to select the roll direction. Move the joystick to the left limitation, the drone rolls to the left side, move the joystick to the right limitation, the drone rolls to the right side. While the drone doing AB point flight mode, the user can stop controlling the joystick. **Make sure that the water enough, the pump is under auto-controlled or manual-controlled.**
- 4) AB Mode Correction
 - ① Altitude correction: Control the flight altitude by the throttle joystick, "up" for the drone to rise, the "down" for the drone to set ;



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- ② Operate the the rudder to control the direction;
 - ③ Adjust point A: while the drone moving from point B to Point A, push up the Elevator stick to move point A closer to point B, pull down the Elevator stick to move point A further away from point B.
 - ④ Adjust point B: while the drone moving from point A to Point B, push up the Elevator stick to move the point B further away from point A, pull down the Elevator stick to move point B closer to point A.
- 5) Shut Down and Quit
- ① When set the “no pesticide” action to self-hovering or return, in AB mode this function still works.
 - ② When set the “low battery” action to return, in AB mode the this function still works.
 - ③ After the spraying work is done, AB mode can be shut down by switching into altitude mode.
- 6) To return to the breakpoint, after broke the AB mode route automatically or manually.. Filling the pesticide in the tank and taking off, then switch E (flight mode) to AB mode directly ,the drone would return right to the breakpoint.

2. Delete Point A and B

Move stick F (AB mode) for 4-5 times rapidly, LED alternately flash red green and yellow, AB mode removed. **Without removing last AB point, user can not set new AB point.**

3. Set the Interval Width

From the software->Flight parameters to set the spraying width and working speed

Attention:

- 1) Be sure to start AB mode within turning on the pump.
- 2) Be sure it is at least 10 meters away from point A to point B.
- 3) Every time recording point A and B, be sure to wait until the drone self-hovering steadily in GPS mode.
- 4) Without removing last AB point data, can not set new AB point.



Appendix I Key Parts Maintenance

1.Propellers

(1) Blades of propeller should keep intact. If there are any cracks or missing parts, the propeller should be replaced.

(2) Tightness of all the blades should be suitable and be similar. Replace the propeller gaskets/washer with new ones when blades cannot spin smoothly.

(3) Blades should be folded well and be held by the blade holder or belts after flight, and should be released and put straight before take off.

2.Motors

(1) Motors should be or be suggested to be replaced:

(2) Before the rotor clearance get loose or running after 3000 hours.

(3) The rotor movement get blocked.

3.ESC should be or be suggested to be replaced:

(1) When Esc output obviously different from other ones.

(2) Damaged in crash

4.Flight Controller should be or be suggested to be replaced:

(1) When IMU is not able to be calibrated to normal.

(2) When the I/O ports is not capable to communicate with other devices on drone as normal as before.



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Appendix II Implication of Indicator Light

Items	Indicator light	Priority
Flying Mode		
Gyro mode(stabilization,attitude)	Green light single flash ●	Low
GPS mode (angle,speed)	Green light double flash ●●	Low
AB mode	Green light triple flash ●●●	Low
GPS		
GPS unconnected/GPS receive no satellite	Red light triple flash ●●●	Low
GPS bad signal	Red light double flash ●●	Low
GPS general signal	Red light single flash ●	Low
GPS Good signal	Red light off ○	Low
Low Voltage Warn(alarm)		
First alarm level	Yellow light triple flash ●●●	Low
Second alarm level	Yellow light quick flash ●●●●●	High
Compass Calibration		
Horizontal calibration	Yellow light constant light ● ———	Middle
Vertical calibration	Green light constant light ● ———	Middle
Calibration failed	Red light constant light ● ———	Middle
Calibration succeed	Red,green and yellow light alternating flash ●●●	Middle
Accelerator Calibration		
Calibrating	Red,green and yellow light alternating flash ●●●	Middle
Calibration succeed	Green light constant light ● ———	Middle
Error		
Remote controller lose control	Red light quick flash ●●●●●	High
Compass interfered/error	Yellow and green light alternating flash ●●●●●	High
GPS lose satellite/error	Red and green light alternating flash ●●●●●	High



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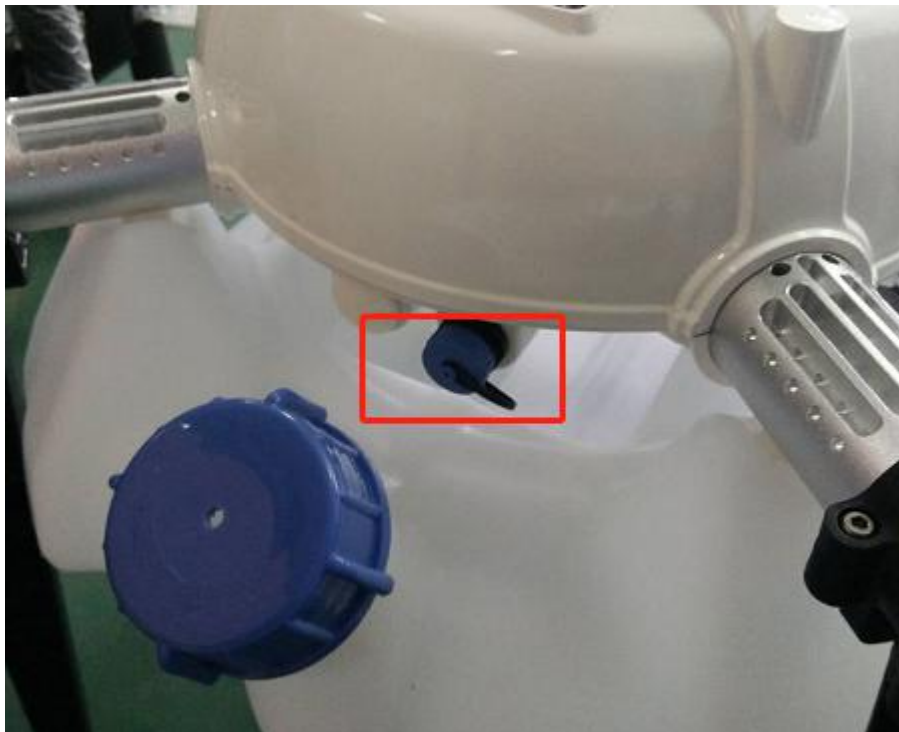
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IMU over vibration/error	Red and yellow light alternating flash ●●●●	High
Other Situations		
Initializtion of power on	Red,green and yellow light alternating flash ●●●	High
Unlock	Red,green and yellow light alternating flash ●●●	High
Unlock failed	Red light constant light ●——	High

Appendix III How to connect copter to PC GCS

1.Download the PC GCS:

2.Find the correct port from the copter and open the protection cover,see figure 1:



3.Find the computer connection cable from the attached bag,see figure 2:



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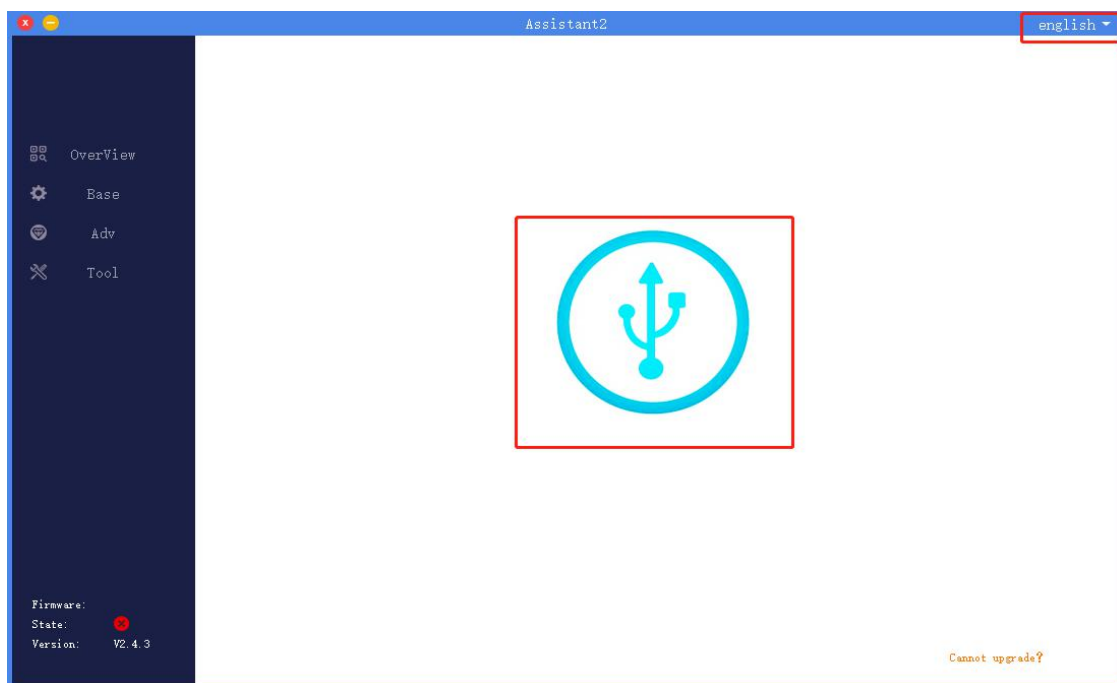
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4. One connect to computer, another end connect to copter. Waiting for a moment (It takes few minutes to install the driver for the first connection with a new computer)

5. Open PC GCS, select the language you need. Click the connection button, see figure 3:



Appendix IV How to download log from PC GCS

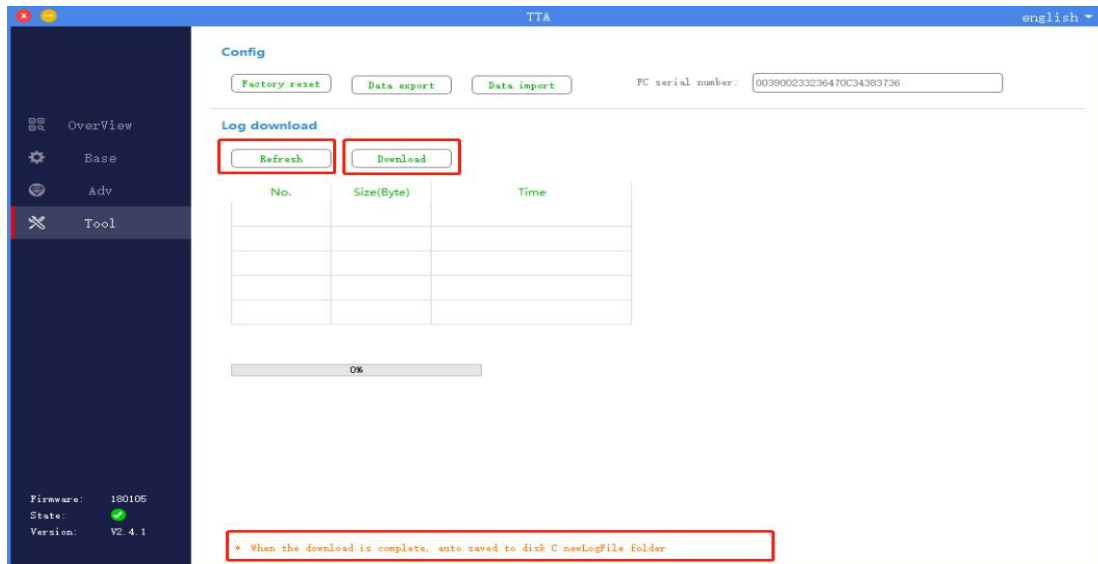
1. Open the PC GCS, select Tool menu
2. Click Refresh button
3. Click Download button
4. Log is saved in the position as the orange word



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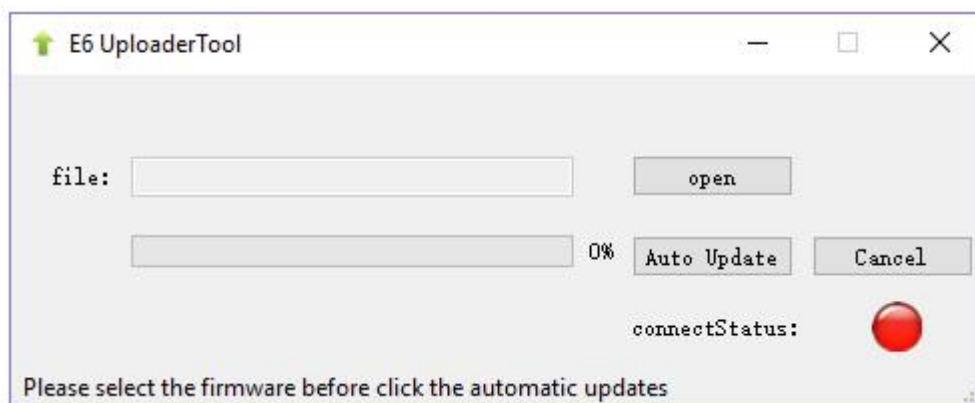


Appendix V How to upgrade the firmware

1 download the upgrading tool from the following address:

<https://www.ttaviation.org/wp-content/uploads/2018/08/firmware-upgrading-tool.zip>

2 Open the upgrading tool,see the following picture:



3 Click the button *open*,select the correct firmware.

4 Click the button *Auto Update*,then the circular indicator will turn to be green.LED of copter usually is OFF during upgrading.

5 Waiting until the down left corner to 100%.The circular indicator will also turned to red and LED will flash red yellow green to self inspection. Waiting for a moment,the led will flash normally,then upgrading is finished.

6 Close the upgrading tool and disconnect the upgrade cable.



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2. The users use this product directly or indirectly, any violation of the law, TTA company will not bear any responsibility.
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