BETAFPV Aquila16 FPV Drone User Manual

Aquila16
FPV Drone
User Manual
2023-10-16

Contents

Product List

1 x Aquila16 Brushless Quadcopter

Box Contents:

2 x Aquila16 Exclusive Battery 1100mAh
1x BT2.0 Battery Charger and Voltage Tester
2 x Charging adapter cable
4x Beta 45mm 3-Blades Prop (Spare Set)
1 x Prop Removal Tool
1 x Special Screw Package (Spare Set)
1 x Phillips screwdriver
1x 4Pin Adapter Cable
1x USB Type-C to FC Adapter (Used with 4Pin Adapter Cable to adjust configure quadcopter on BETAFPV Configurator)
1x User Manual

Pre-flight Checks

1. Verify that all components are included, without damage and the quadcopter's frame has no deformation.
2. Verify that propellers and motors are installed correctly and stably.
3. Ensure that propellers do not scratch against frame ducts and motors spin smoothly.
4. Verify batteries (of quadcopter, remote control radio transmitter, and FPV goggles) are fully charged.
5. Be sure pilot is familiar with all flight controls.
6. Always keep a safe distance in all directions around the quadcopter (1 meter or more) when having a test-flight. Operate the quadcopter carefully in open space.
7. Please click the below link and watch the instruction video, you can learn how to install and remove the battery from the quadcopter and how to bind the remote control radio transmitter to the quadcopter.
   https://www.youtube.com/watch?v=sVDAzZalURq

Flight Modes

The flight mode is displayed in the lower right corner of the flight screen, corresponding to the flight mode of quadcopter. Pilot can choose different flight modes according to different flight environments and their flight control skills.

1. Normal Mode: When the quadcopter ascends, center the two joysticks at the same time, and the quadcopter will maintain at a fixed point in a horizontal attitude. The position of the direction joystick controls the tilt direction and tilt angle of the quadcopter. The quadcopter has an auxiliary flight function that can assist in adjusting the altitude and horizontal position, which makes it easier for pilot to control. N MODE is displayed in the OSD.
2. Sport Mode: When the quadcopter ascends, pilot needs to operate the throttle joystick to control and adjust the altitude of the quadcopter. The position of the direction joystick controls the tilt direction and tilt angle of the quadcopter. When the direction joystick is moved back to the center, the quadcopter will return to a horizontal attitude. The quadcopter has no auxiliary flight function, which makes the operation relatively difficult for pilot. S MODE is displayed in the OSD.
3. Manual Mode: When the quadcopter ascends, pilot needs to operate the throttle joystick to control and adjust the flight altitude. Position of the direction joystick controls the roll direction and the roll speed of the quadcopter. The quadcopter will maintain its current attitude when the direction joystick is moved to the center. The quadcopter has no auxiliary flight function, and the flight attitude and altitude are completely dependent on the pilot to control the quadcopter by the remote contro! radio transmitter, which makes the operation very difficult for pilot. M MODE is displayed in the OSD.

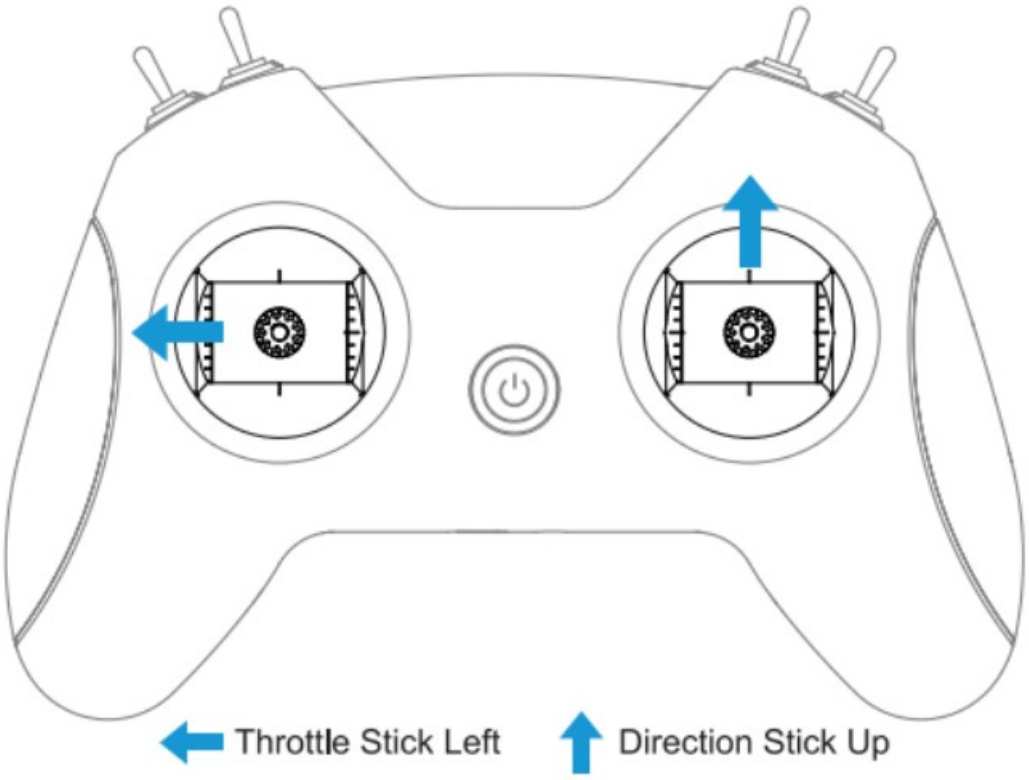
4. Turtle Mode: If the quadcopter crashes into the ground and the fuselage is flip, the turtle mode can be activated to reverse the motor and turn the quadcopter back to the front. When in use, the direction joystick is used to control the rotation of the motor to drive the blades to rotate in the reverse direction, thereby realizing the reverse rotation of the fuselage. TURTLE is displayed in the center of the OSD. For more details, please refer to the chapter “Turtle Mode”.

Notes Please keep the fignt aiftude within 0.3-3m when itis on the Mocral Mode. This can keep the quadcapter fly stably The outdoar fying height af the quadenpter should oct exceed Sm as far as possible.

Binding the Quadcopter and Transmitter

The Aquila16 quadcopter integrated ExpressLRS 2.4G receiver with the default ExpressLRS 3.0 protocol.
Ensure that your transmitter is on the same protocol as Aquila16 quadcopter, which has all the channels preset beforshand (default channel map is AETR1234).
The following demonstrations are based on LiteRadio 2 SE transmilter (Mode 2 Left Stick Throttle) as an example to explain the binding process.
The binding steps are as follows:

- Ensure that the curent protocol on the transmitter is ExpressLRS 2.4G 3.0 protocol;
- Power on and off the quadcopter 3 times rapidly. The status light on the quad turns green and starts to flash slowly, which means it enters the binding mode;
- Power on the transmitter and wait for the initialization to complete.
- Gently press the BIND button on the back of the transmitter, and the red LED on the transmitter will flash rapidly.
- If the status light on the quad tums solid blue, then the binding is successful.

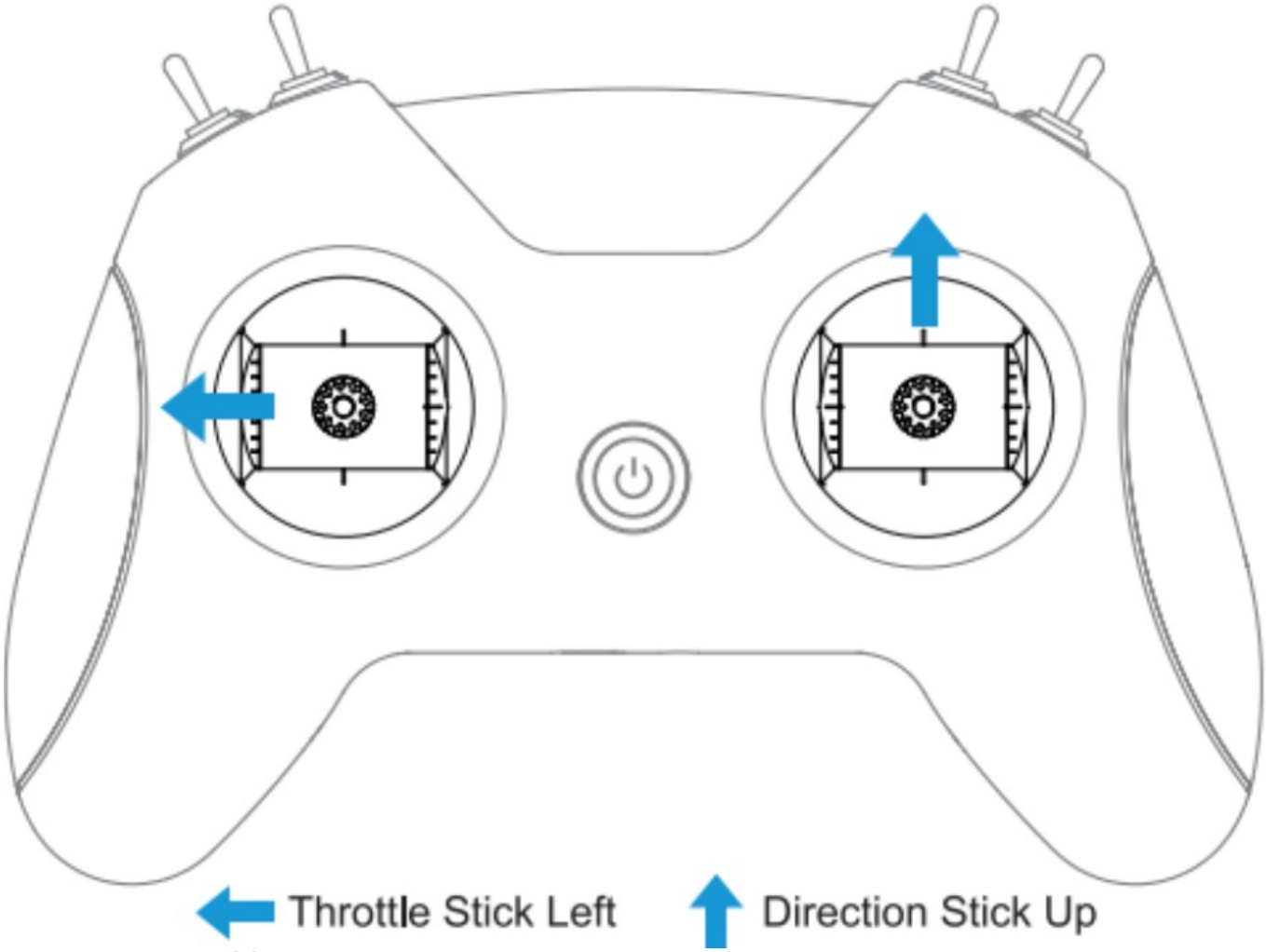


N0te :

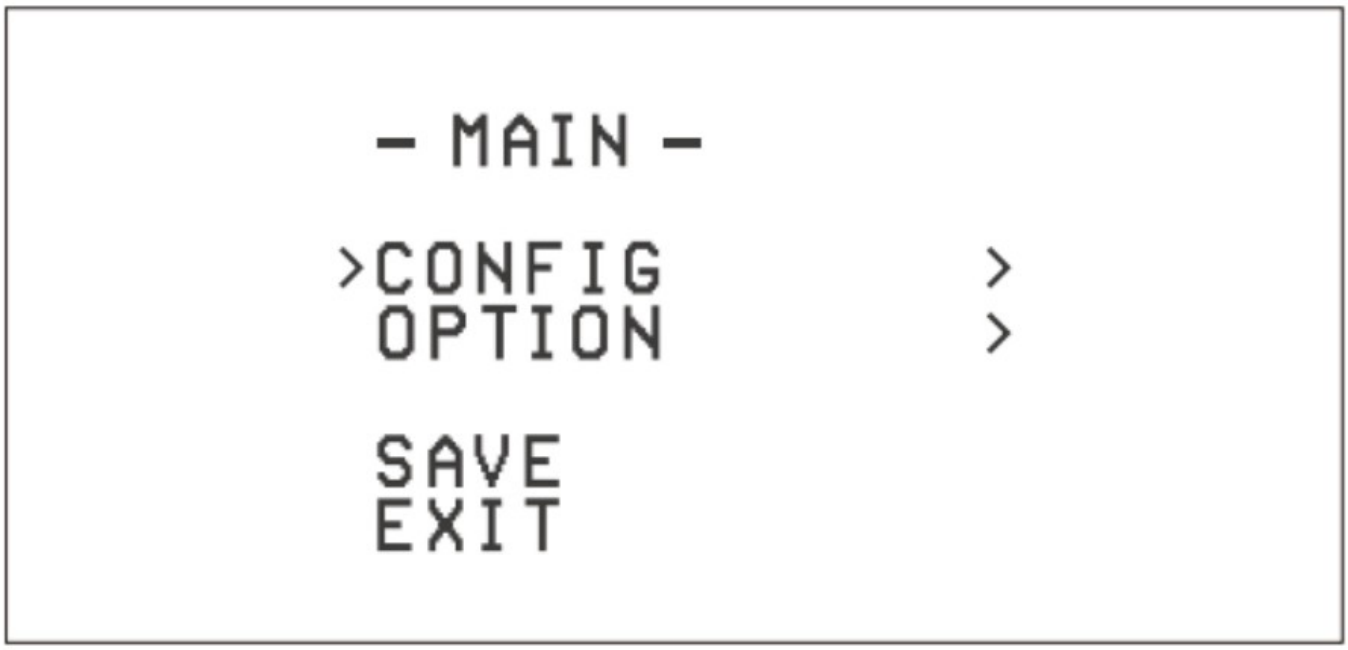
1. The SPI ELRS 2.4G receiver integrated in Aquila16 supports the default ExpressLRS 3.0 protocol. It is not compatible with ExpressLRS 1.X or ExpressLRS 2.X protocols for frequency connection.
2. The SPI ELRS 2.4G receiver integrated in Aquila16 can use the Passthrought function through the ExpressLRS . It is recommended to only flash ExpressLRS 3.X firmwares. Down-grading to ExpressLRS 2.X may have the risk of firmware failure;
3. After one successful binding, restarting the quadcopter or transmitter will automatically binded. Re-bind is not needed.
4. The re-binding of the remote control radio transmitter and the quadcopter may not be successful after pressing the BIND button of the remote control radio transmitter once. In this situation, pilot need to repress the BIND button to complete binding.
5. Kindly scan the QR code provided in point 7 of “Preflight Checks” to learn how to bind the transmitter to the quad through the instructional video.

How to Access/Operate OSD Setting Menu

Below instruction applies to LiteRadio 2 SE Mode 2 Transmitter(Left Throttle).
The position of joysticks to access the OSD setting menu is shown below. The throttle Joystick is moved to the left center and the direction joystick is towards the upward center.
Note: Make sure the quadcopter s disarmed before accessing sing the OSD menu.

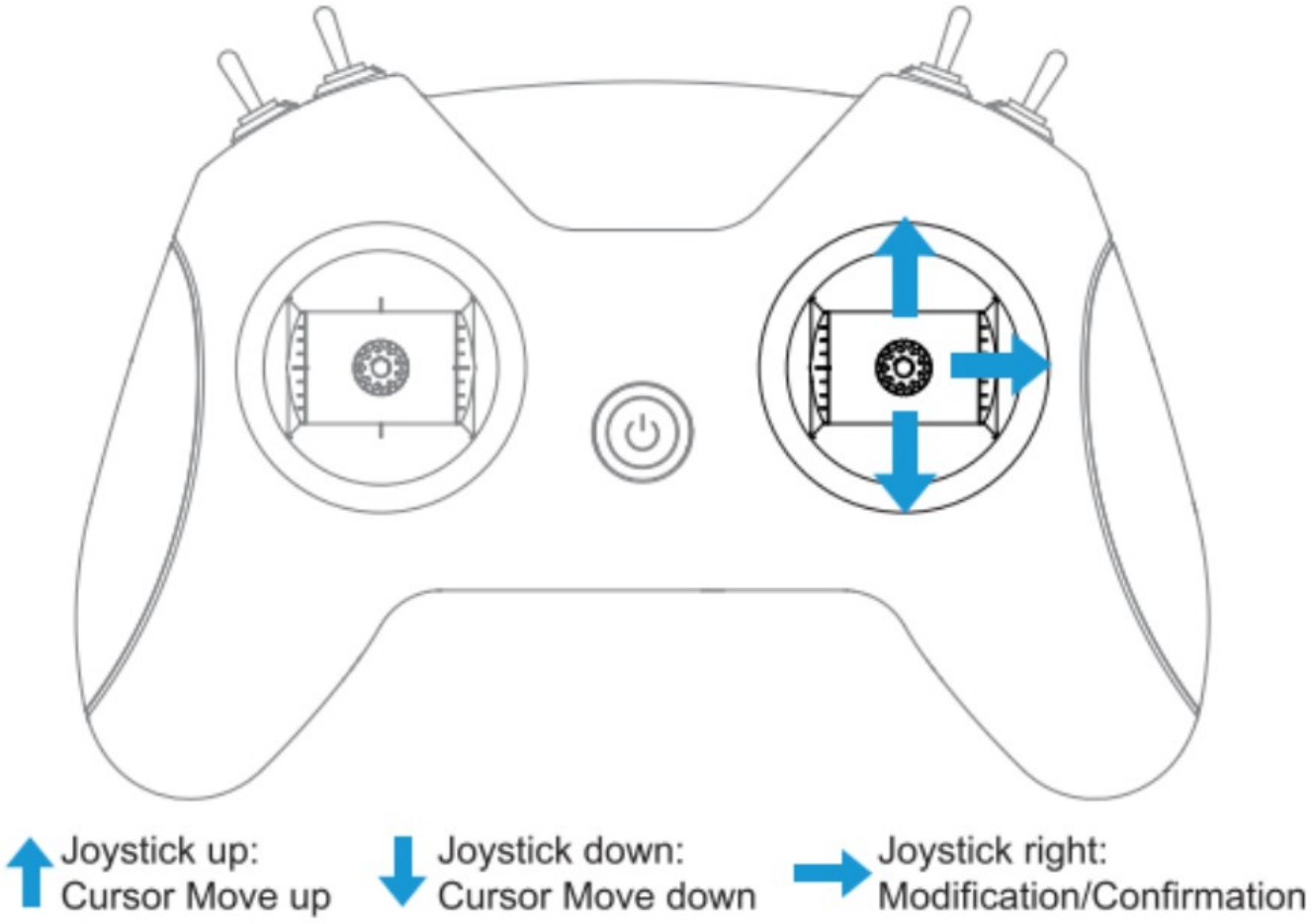


After accessing the OSD menu,
pilot will see the following menu interface on the FPV screen.



The OSD menu cursor can be controlled by the right joystick to operate the OSD interface:

- Up: move the cursor up
- Down: move the cursor down
- Right: confirmimodify sefection

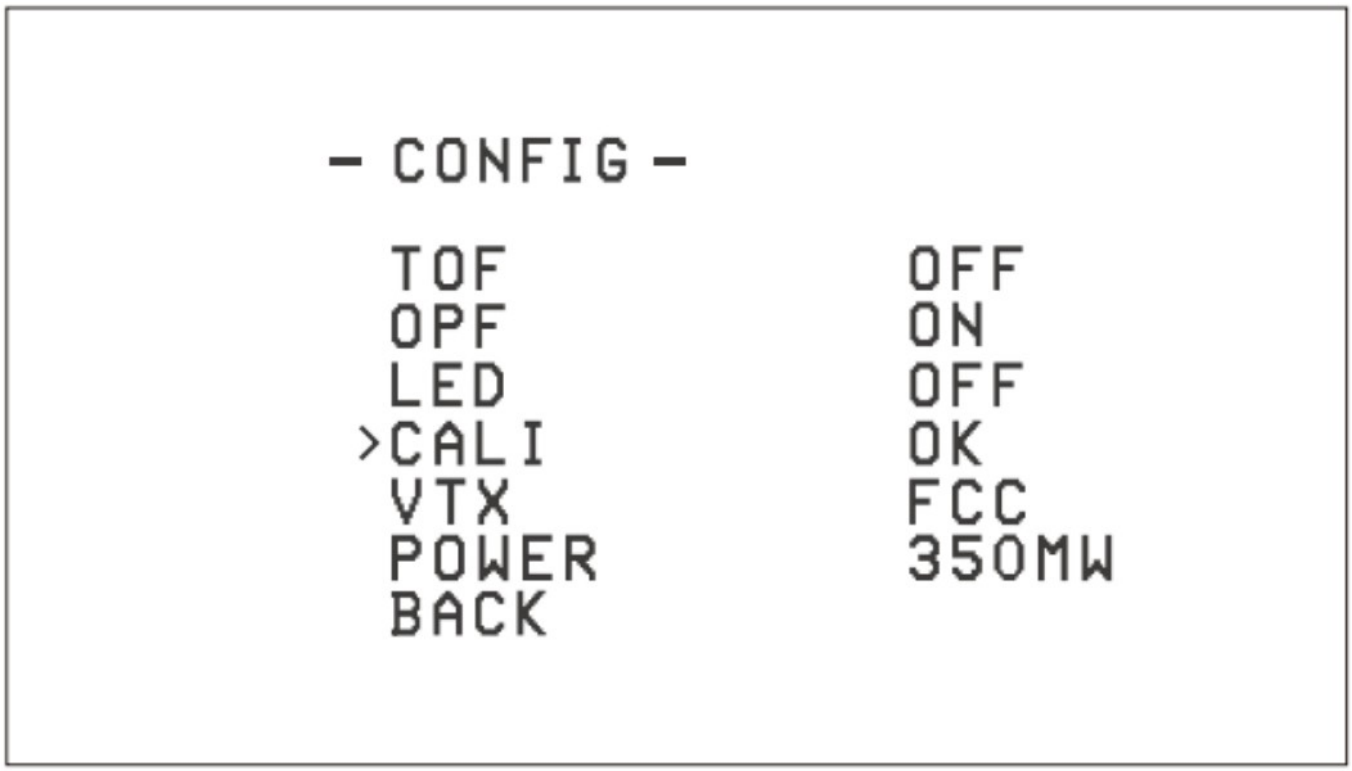


5.1 Quadcopter Level Calibration

After the quadcopter has taken off and landed several times, the quadcopter gyroscope might be offset. This will

cause the quadcopter to always titin the same direction during a flight. To fix i, the quadcopter gyroscope can be recalibrated. The stops are as follows

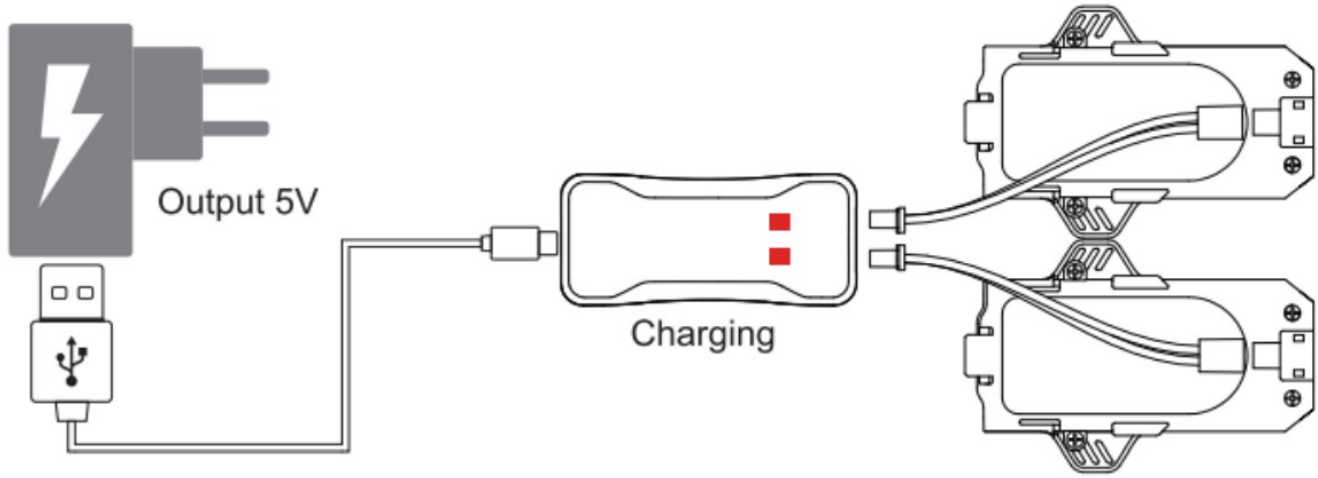
- Tum on the quadcopter and the remote control radio transmitter, and ensure that both devices are binded;
- Place the quadcopter on a horizontal plane;
- Enter the quadcopter's OSD menu (Refer to "OSD Menu Operation®);
- In the MAIN menu, select CONFIG, then CALI;
- Push the direction joystick to the right to enter level calibration mode. The quadcop- ter's LED flashes blue;
- When the OK prompt appears and the LED retums to solid blue, the calibration is complete. Pilot can exit the OSD menu.



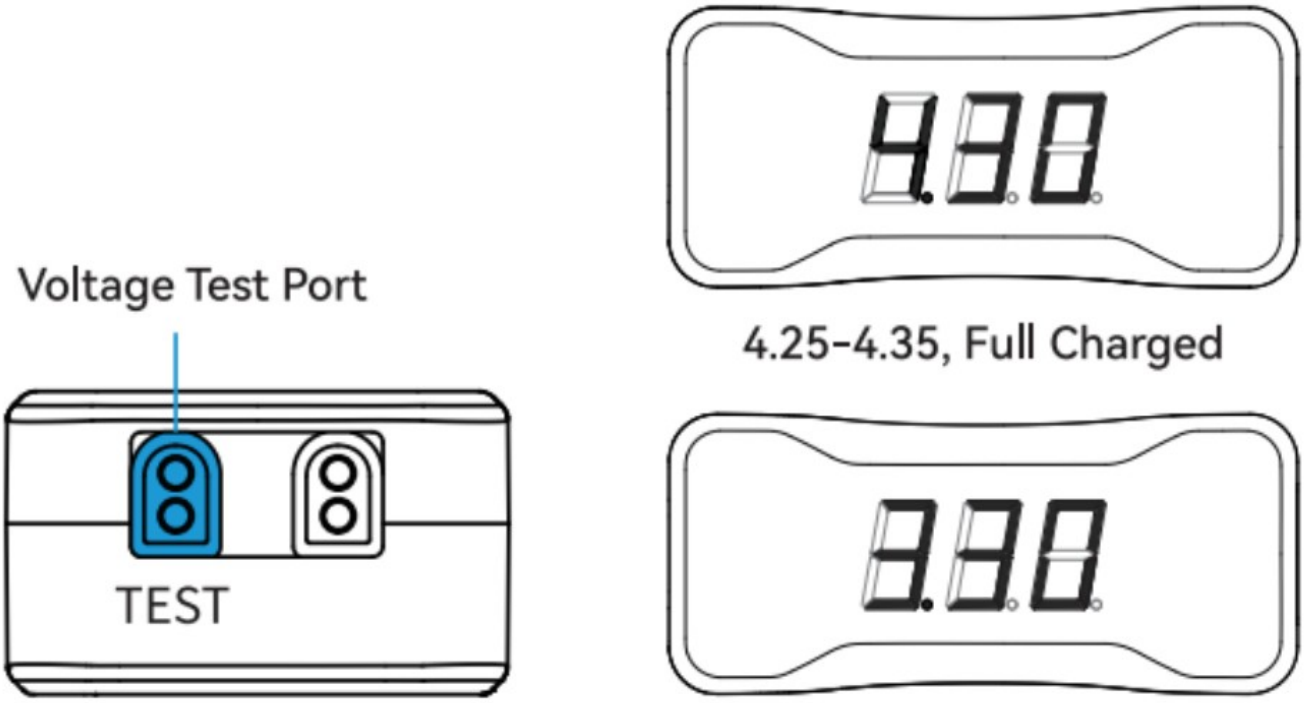
5.2 Battery Charging

Each battery provides 8 minutes of smooth flight. When LOW VOL is displayed in the OSD flight interface, whi indicates that the battery is too low and needs to be charged. Charging steps are shown as below

- Plug the charger into the Type-C port through a USB cable;
- Connect one or two batteries to the port on the right of the charger and the charger's LED will tun solid red while charging;
- When the charger's LED tums solid green, charging is complete.



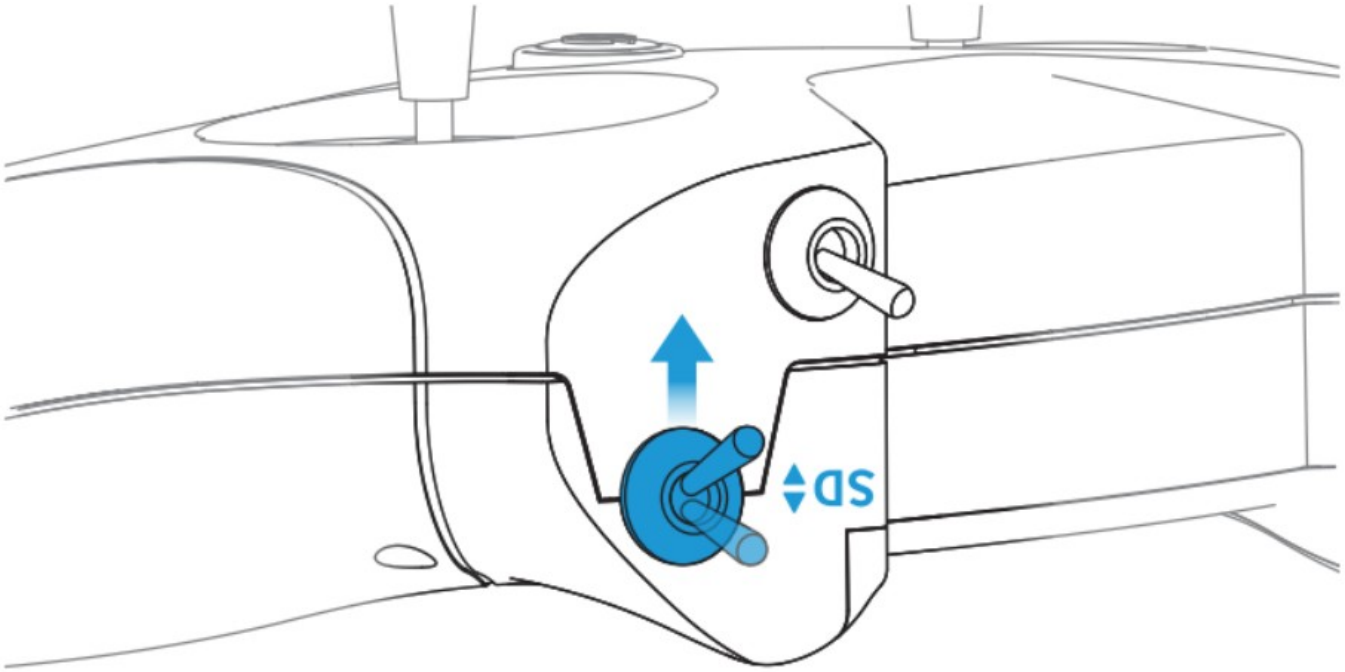
Two batteries can be charged at the same time. Charging a fully discharged battery takes approximately 60 minutes. When the battery s inserted into the TEST port and the charger is not plugged in via USB cable, the current battery level will be displayed.
“The number of 4.25-4.35 represents a fully charged battery while 3.30 or lower indicates a low battery.



Turtle Mode

When the quadeopter falls to the ground and is facing down, we can activate turtle mode with the remote control radio transmitter to turn it over. To activate turtle mode:
The following example uses LiteRadio 2SE(Left Throttle) to demonstrate.

- Toggle switch SD from down to up to activate turtle mode. TURTLE is. the OSD, as shown below;
- Move the direction joystick towards either dire quadcopter will reverse;
- Move switch SD down to tum off turtle mode;
- Arm the quadcopter and operate normally. ion. The motor will spin, and the played in



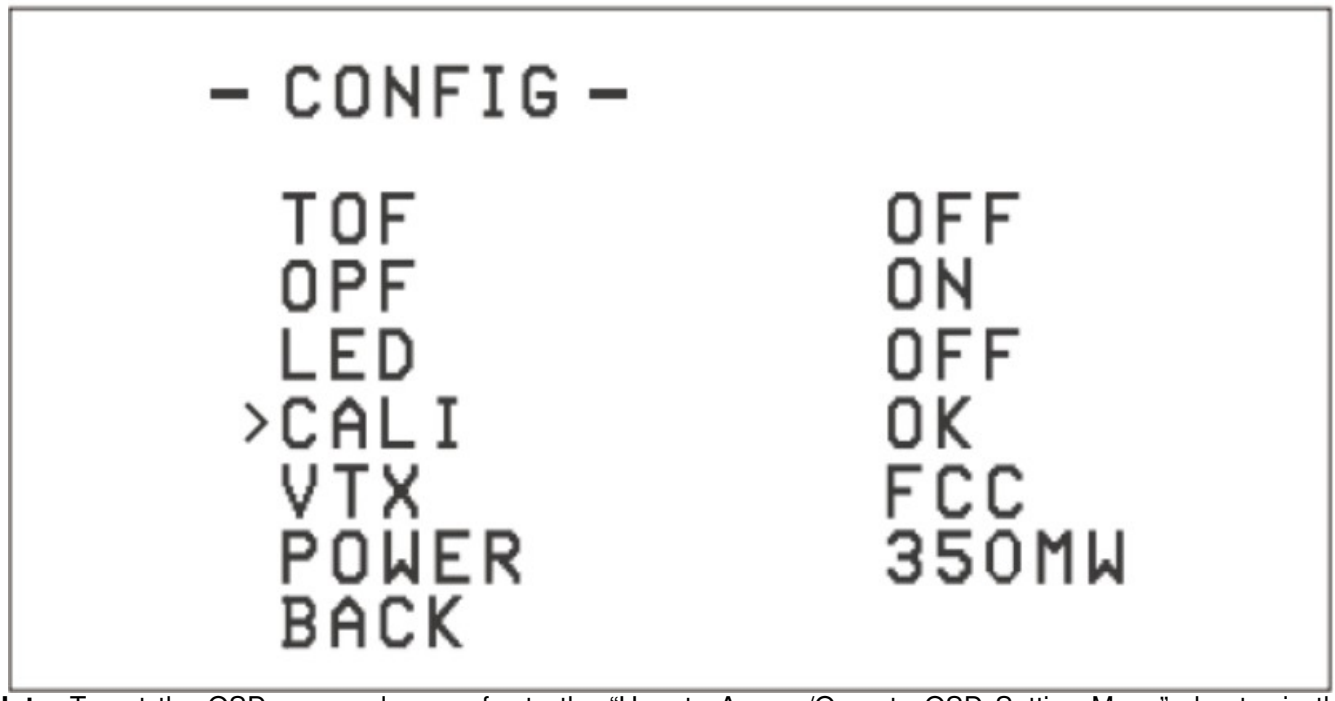
Quadcopter in Flip State:Toggle Switch SD
from Down to Up to Activate Turtle Mode

Note:

1. Turtle mode is suitable for flat ground and it's not recommended to activate this mode on grass or fabrics as the motor may be obstructed, resulting in damage of the motors and ESC.
2. When the battery power of the quad is too low, such as ≤ 3.5V, the quad may not be able to complete the Turtle action. At this time, it is necessary to manually flip the quadcopter to the right position.

How to Fix Quadcopter Drift

In Normal Mode, the optical flow positioning function of quadcopler is tumed on by default. When the drone starts to drift, here is a checklist you should look for to understand why your drone drift sideways and how to fix them.
Q1: The blades are blocked or camaged;
A1: Common solutions include cleaning hair and other foreign objects wrapped around the motor, or replacing damaged blades to avoid friction with the frame protection guard when the blades rotate;
Q2: The ambient light is too dark, or flying above water, causing the optical flow sensor of the hover positioning function to fail.
A2: Please fly in an environment with obvious ground features and sufficient light. Try to avoid adverse environments where it difficult to identify ground features (such as dark environments or above waler), otherwise the quad may drift or have difficulty controlling.
If you need to fly in the above-mentioned adverse environments, please turn off the quad's optical flow positioning function. After the optical flow positioning function is tumed off, the quad will lose flight assistance in the horizontal direction. A good flying skillis required from pilot in such scenario. You can enter the OSD setting interface to tum offfon the optical flow positioning function.
Q3: When the quad colides or falls. strong vibration causes the gyro sensor data to shift, and it cannot be automatically repaired.
A3: Enter the OSD menu to manually calibrate the gyroscope.
Enter the OSD menu, CONFIG page, select CALI, turn the joystick to the right to enter manual gyro calibration, the blue light on the quad flashes quickly; After the calibration is completed, the blue light stays on, and the word *OK' is displayed in the OSD menu
(Please change Place the quad on a horizontal surface for calibration, do not move the. quad during **calibration);**



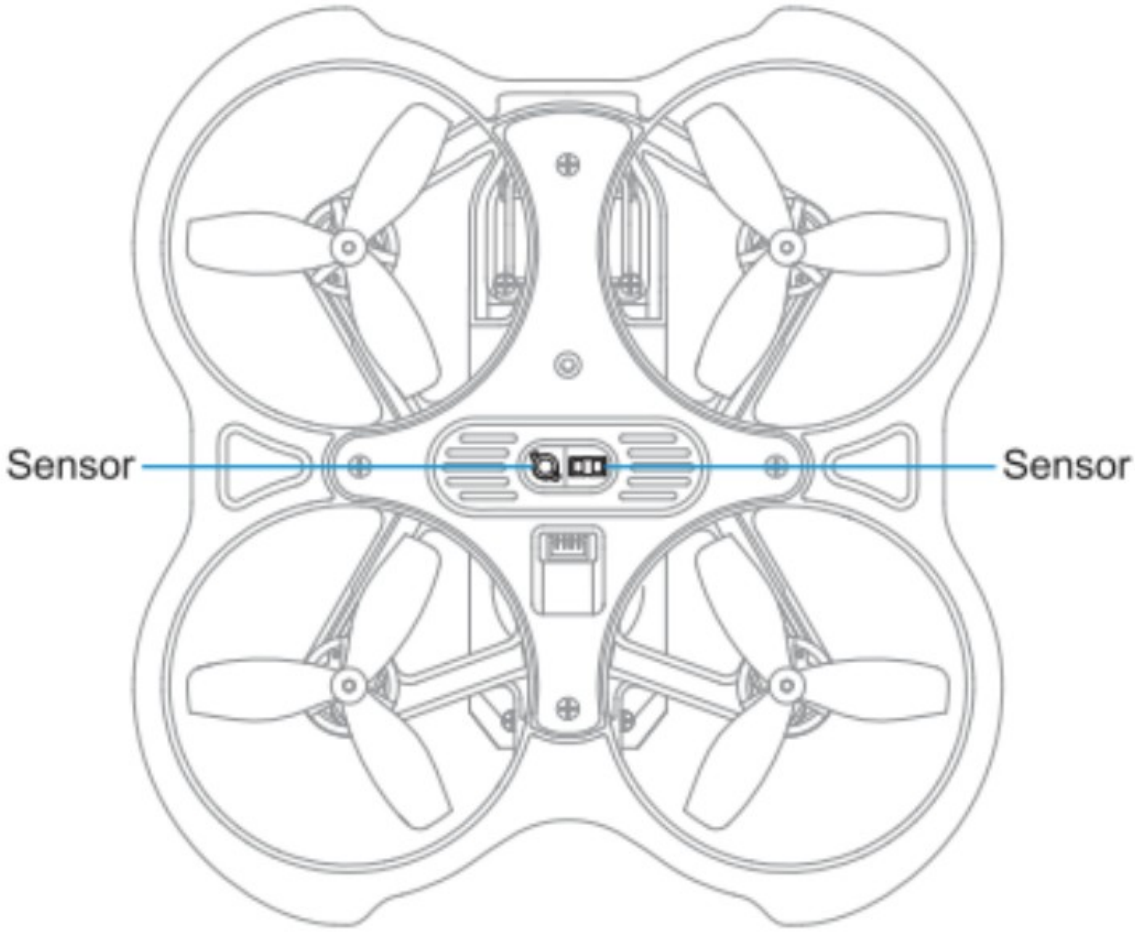
Note: To set the OSD menu, please refer to the “How to Access/Operate OSD Setting Menu” chapter in the manual. For the detailed gyroscope calibration process, please refer to the “Quadcopter Level Calibration” chapter in the manual.

Q4: The ambient wind speed s greater than level 3, resulting in unstable hovering.

A4: In an environment with excessive wind speed, it is recommended to fly in S or M mode. Or tun off the optical flow positioning function and manually control the horizontal position of the flight. Kindly enter the OSD setting interface to tun off/on the
optical flow positioning function.

Qs: Hovering is unstable due to dirty sensors.

AB: Please ensure that there is no covering object underneath the sensor and no dirt or dust on the sensor surface that affect ts acouracy. When flight assistance is abnormal, please kindly wipe the sensor clean before continuing to use it



Disclaimer and Warning

Disclaimer

This product is a mult-rotor arcaf. equipped with powerful motors and sharp propeller,hes fastfight speed but also has a certain hazard when operating. need o be usedt with caution.
This product i not toy and requires some basi knowledge to control, 5o please pay special attenton 1o the warnings and cautions before you start using it BETAFPY reserves the g to update this Dsclimer.
By using this product. you are deemed to have ungerstoos. acknowledged and accepted al of the terms and conditions of this document and you undortake to be responsiole for your own actions and allconseduences arksing thereffom. You undertake to use this product only for egitimate purposes and agree to al of the terms and conditons o tis Gocurment and any related poles or guidelnes that BETAFPY may establs
BETAFPV reserves he right 10 update this discaimer and the safety quidelines Vist **https://becafpy.com** fo the: latest version

Individual Parts

Remote Controller

1. Make sure remote controller batteries are full charged before ficht.
2. It is necessary to be re-bind 1 the remote cortrallr has been replaced.
3. Do NOT black or cover e buit-in antenna of the femote contol for strong antenna reception.

Aircraft

1. Make sure airraft batteries are flly charged before fight
2. Make sure propellers re in good condition and mounted nto the motors corectly and securely
3. Make sure the battery is mounted securely.

Battery

1. Only use a battery charger thot meets the specifications when charging.
2. Never leave while batiery is in charging process. Do not charge the battery unattended.
3. Do not over charge the battery.
4. Do not short circuit the battery Make sure the wire connection polarity is correct
5. Do not chargeicischarge battery at of recommended temperature range (Charge: 0 to 45C)
6. Always place the battery In o fr esistant surface o firesafety container alone when charging/discharging. The middle of a cement driveway i3 good example of safe location
7. Do not allow LiPo cels to everneat at any time Cells which reach greater than 60°C will usually become. Gemaged and wil catch fire.
8. Do not chargeldischarge battery inside house, garage, veficle, building end away from any combustible materal.
9. Do not over discharge the battery. Do not ischarge a battery pack (0 alevel below 33V per cell.
10. Do not alow the electralyte to get into eyes or an skin Wash affected areas immeciately f they come into. contact with electrolyte. Do notalter o modify connectors or wires of @ LiPo battery pack. Do not have contact with a leakyldamaged battery directly
11. D0 not assemble LiPo cells or pre-assembled packs together with ather LiPo cels or packs,
12. Inspect batteriesf crach, battery should b placed in safe area for observarion for atleast 30 minutes after crash.

Caution: The battery may be in high temperature!

Flight Condition Requirements

1. Do not fly in severe weather conditons including strong wind, snow, 3in, 03, et
2. Only fy in open areas wihout tall buidings and large metal structures around. BUidings with a lage nurber of concrete rons wil afect the signal and Interfere with the lght. It s recommended to Ty &t least 10m away from buildings, poles, obtacies, otc
3. When flying please keep control within sight and away from obstacles, crowds, water, etc.
4. Please do ot fly nareas with high voltage Ines, communication base Statons o tansmisson towers to avod iterference.
5. D0 not take off from moving objects, such as cars and ships.
6. Do not use the sircraf n an environment a risk of afr2 o explosion.
7. To avaid injury stay away from rolating propellers or motors.

Regulations

WARNING
To avoid non-compliant behavior, serious injury, and property damage, observe the following rules:

1. DO NOT modify the aircraft or use the aircraft for other illegal purposes.
2. DO NOT operate in the vicinity of manned aircraft, regardless of altitude. If necessary, land immediately.
3. DO NOT fly the aircraft in areas where the large events are being held, including but not limited to sporting events and concerts.
4. DO NOT fly the aircraft in areas prohibited by local laws.
5. Remain well clear of and DO NOT interfere with manned aircraft operations. Be aware of and avoid other aircraft and obstacles at all times.

CAUTION
To avoid non-compliant behavior, serious injury, and property damage, observe the following rules:

1. DO NOT fly the aircraft near or inside restricted zones specified by local laws and regulations. Restricted zones include, but are not limited to, airports, borders between two sovereign countries or regions, major cities, and areas where temporary events or activities are being held.
2. DO NOT fly the aircraft above the authorized altitude.
3. Make sure to keep your aircraft within VLOS, and use an observer to assist if needed.
4. DO NOT use the aircraft to carry illegal or dangerous payloads.

NOTICE

1. Make sure you understand the nature of your flight operation (such as for recreation, for public use, or for commercial use) and have obtained corresponding approval and clearance from the related government agencies before flight. Consult with your local regulators for comprehensive definitions and specific requirements.
   Note that remote controlled aircraft may be banned from conducting commercial activities in certain countries

and regions.
2. DO NOT fly around sensitive infrastructure or property such as power stations, water treatment facilities, correctional facilities, heavily traveled roadways, government facilities, and military zones.

Export Controls

Comply with Applicable Export Control Laws

You are advised that export, re-export, and transfer of the Products are subjected to Chinese export control law and other applicable export control laws and sanctions (hereafter collectively referred to as “Export Control Laws’). Prior to your use, sale, transfer, rental, or other conduct related to the Products, unless permitted by the Export Control Laws or with the license issued by competent authorities, you shall in particular check and guarantee by appropriate measures that:

1. There will be no infringement of an embargo imposed by the Export Control Laws;
2. The Products will not be provided to the entities, persons, and organizations listed in all applicable sanctioned party lists;
3. It is only for civilian use, and it is forbidden to directly or indirectly use BETAFPV products for or related to the following content (1) any military combat purpose or military combat-related purposes; (2) terrorist activities; (3) other criminal acts. The purchaser shall also require its customers or users to comply with the aforemen- tioned requirements.

Export Compliance, Disclaimer & Indemnity

You acknowledge it is your responsibility to comply with Chinese export control law and any other applicable export control laws. You shall solely be responsible for the legal responsibility if any of your use, sale, transfer, rental or other conduct related to the Products fail to comply with the applicable export control laws, BETAFPV shall, in no circumstances, be responsible for your violation of any applicable export control laws. Furthermore, you shall indemnity, defend, and hold harmless BETAFPY, its affiliates, directors. officers, employees, agents, and representatives, from and against any and all claims, demands, suits, causes of action, expenses (including reasonable attorneys’ fee), damages, losses, or liabilities of any nature whatsoever, arising from, or allegedly arising from, or related to, your failure to comply with applicable export control laws.

Compliance Information

FCC STATEMENT
This equipment 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 anterference that may cause undesired operation.

Warning: Changes or modifications not expressly approved by the party responsible for compliance could void the user’s authority to operate the equipment.
NOTE: 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 radiated 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.

FCC Radiation Exposure Statement
This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

Shenzhen Baida Moxing Co., Ltd.
Web betafpv.com
E-mail support@betafpv.com
Address' B1702A. Block ABCD. Building 3, Phase 1, Tian'an Cloud Park, Gangtou Community, Bantian Street, Longgang District. Shenzhen, Guangdong, China

Documents / Resources

	BETAFPV Aquila16 FPV Drone [pdf] User Manual 2AT6X-AQUILA16, 2AT6XAQUILA16, Aquila16, Aquila16 FPV Drone, FPV Drone, Drone

References

- User Manual