

# XDFLY HPro ESC User Manual

Thank you for purchasing XDFly HPro300 brushless electronic speed controller(ESC). For safety reasons, we strongly recommend that please read this manual carefully before use. We do not assume any liability arising from the use of this product or unauthorized modifications to the product, including but not limited to liability for incidental or indirect losses. We reserve the right to change product design, appearance, performance and usage requirements without notice. Product use constitutes approval and acceptance of all content.

## Important Warnings

- Always place safety as priority when you use the product.
- An electric motor that is connection with battery pack and ESC may start unexpectedly and cause serious danger. Always treat a powered system with respect.
- Always remove the propeller or disengage the pinion gear before the battery connected if you need to working on a plane or helicopter at short range.
- Please observe all local laws regarding the flying of remote control aircraft.
- Never fly over or near crowds.

## Key Features

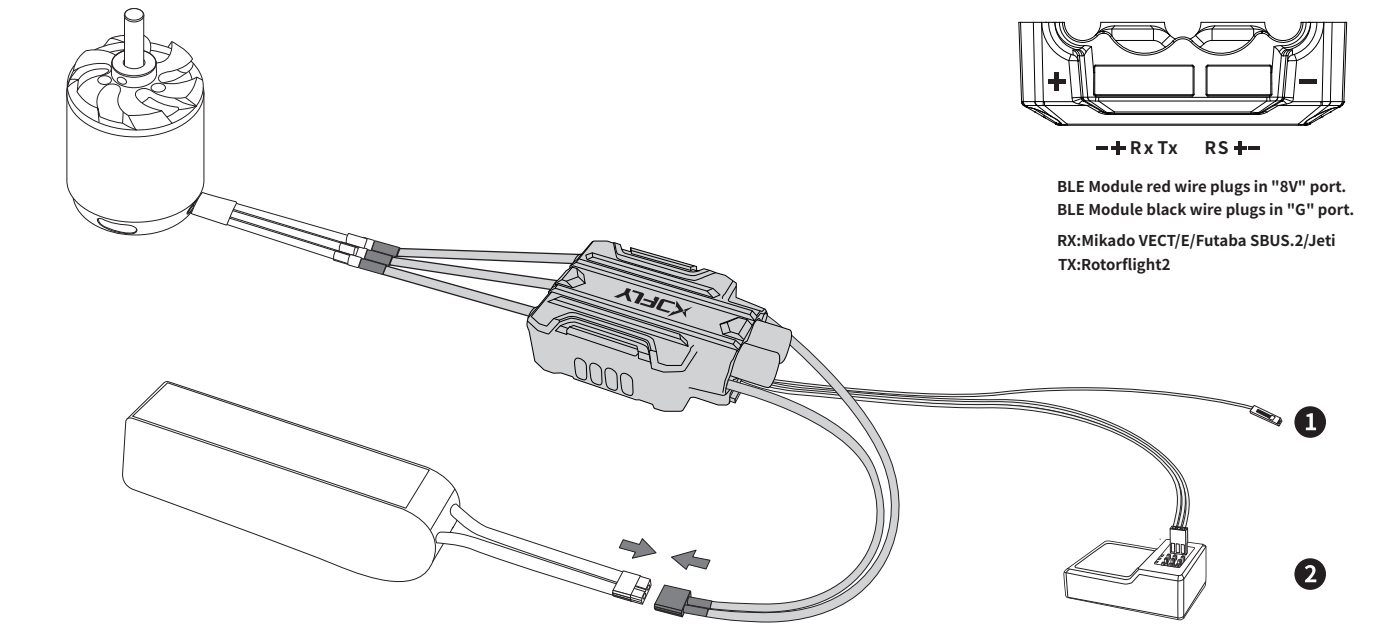
1. Equipped with high-performance 32-bit G4 processor with operating frequency of up to 170MHz.
2. Adopting new generation of power MOSFET, it features low heat generation, high instantaneous current endurance and high reliability.
3. Self-check function: After power-on, the ESC will automatically self-check for power supply short circuit, motor phase loss, throttle zeroing, and voltage range.
4. The special and unique case design greatly increase the heat dissipation area and significantly enhance the heat dissipation performance of the ESC.
5. With helicopter speed governor function, the constant speed sensitivity can be adjusted and is easy to operate.
6. Equipped with the time selection function for stall landing, it can be manually adjustable within the time set to avoid a crash due to handling errors.
7. The ESC has an independent programming interface, it supports parameter adjustment via Phone APP/Mikado VBCT/E/Rotorflight2/Jeti remote control devices.
8. With telemetry function for Mikado VBCT/E, Rotorflight2, Futaba SBUS2, Jeti, MSH Brain, and iKon, allowing users to check data in real time.
9. Equipped with colorful LED lights, and indicate the ESC status through flashing modes.
10. Multiple protections: abnormal power-on voltage, start-up, temperature, throttle signal loss, over-load, low-voltage, over-current.

## Product Specification

Model	Continuous/ Peak Current	Input voltage	BEC Output	Power Wires	Motor Wires	Programming Way	Size	Weight	Applications
XDF-Hpro 35A SBEC	35A/55A	3-6S Lipo	6V-12V adjustable /8A	16# 95mm (red*1/black*1)	18# 95mm (black*3)	XDFly Android&iOS APP /VBCT/E/RF2/Jeti	48*25*16mm	40g	250-300 class electric helicopters , or fixed-wing aircrafts
XDF-Hpro 65A SBEC	65A/130A	3-6S Lipo	6V-12V adjustable /10A	14# 85mm (Red*1/Black*1)	14# 62mm (Black*3)	XDFly Android&iOS APP /VBCT/E/RF2/Jeti	60*36*19mm	63g	325-380 class electric helicopters , or fixed-wing aircrafts
XDF-Hpro 85A SBEC	85A/160A	3-6S Lipo	6V-12V adjustable /10A	12# 130mm (Red*1/Black*1)	12# 92mm (Black*3)	XDFly Android&iOS APP /VBCT/E/RF2/Jeti	70*36*21mm	93g	380-420 class electric helicopters, or fixed-wing aircrafts
XDF-Hpro 125A SBEC	125A/200A	3-8S Lipo	6V-12V adjustable /10A	10# 145mm (red*1/black*1)	10# 110mm (black*3)	XDFly Android&iOS APP /VBCT/E/RF2/Jeti	90*43*36mm	158g	500-550 class electric helicopters , or fixed-wing aircrafts
XDF-Hpro 155A SBEC	155A/260A	3-8S Lipo	6V-12V adjustable /10A	10# 145mm (red*1/black*1)	10# 110mm (black*3)	XDFly Android&iOS APP /VBCT/E/RF2/Jeti	90*43*36mm	168g	550-580 class electric helicopters , or fixed-wing aircrafts

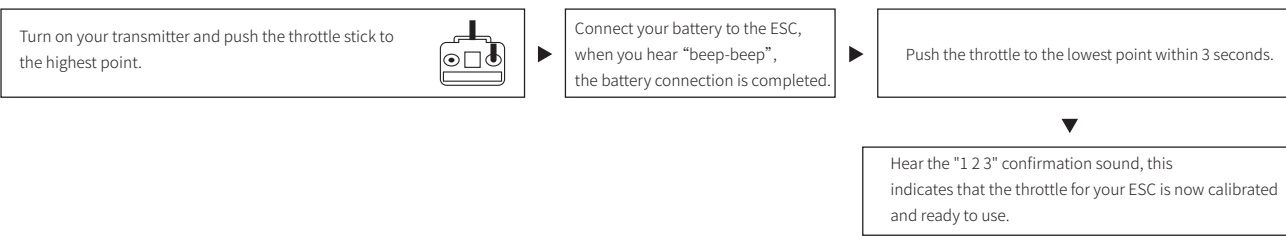
## User Guide

### Wiring Diagram

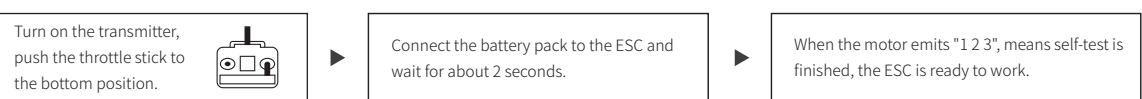


- ① RPM signal wire (yellow, red, black): Insert into the rotational speed input channel of the aileronless system; (When using external constant speed,it can be used to provide rotational speed signal input.)The yellow wire is RPM signal, the red and black are BEC wire.
- ② Throttle signal wire (white, red, black): Plug into the receiver throttle channel or aileronless system throttle channel, depending on the type of receiver and aileronless system. The white wire is used to transmit the throttle signal, while the red wire and black wire are connected in parallel to the output terminal of the internal BEC (i.e., BEC voltage output wire and ground wire).

## Throttle Calibration

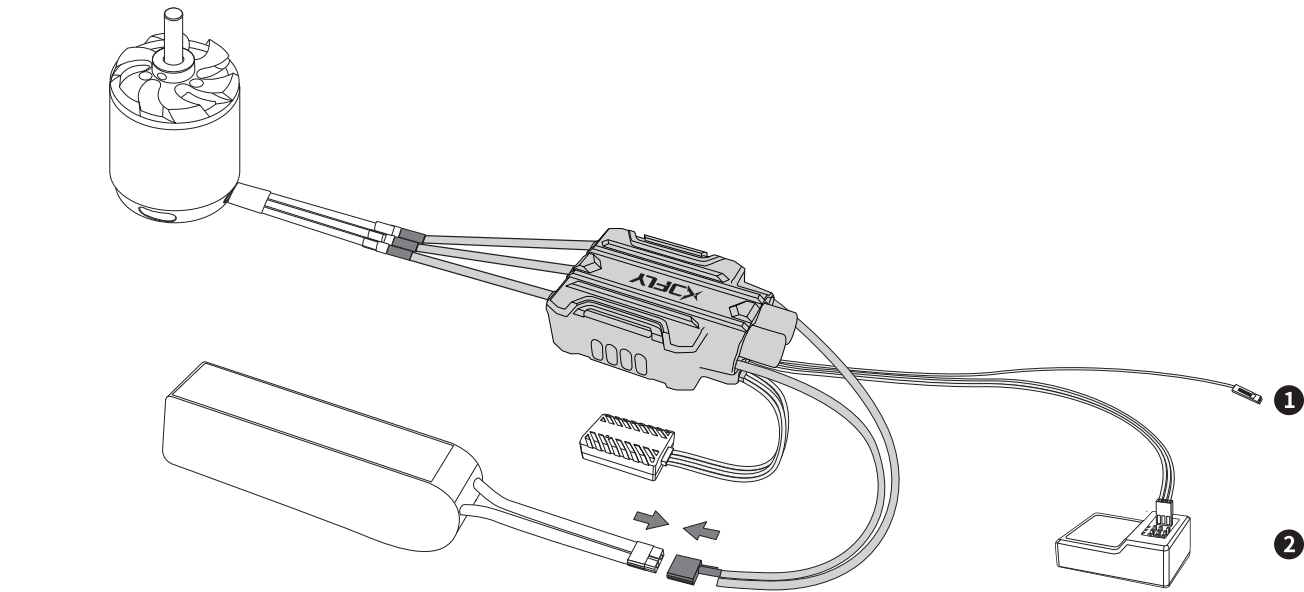


## Normal Startup Procedure



## 2. Using Mobile phone APP to set the ESC parameters and view real time data (need to purchase the Bluetooth module separately)

### A. Wire connection diagram



### B. Operating steps

1. Connect the ESC to the Bluetooth module and battery correctly base on above wire connection diagram.
2. Download and install XDFly APP well, open APP and connect it with Bluetooth, then you can start to set the ESC parameters and check the real time data by APP.
3. After set the new ESC parameters, need to re-power the ESC, then the new set parameters will take effect.

**Note:** Please turn off the throttle or disconnect one motor wire, then turn on the power to let the ESC self-check is failed, ensuring the fan port is powered.

## Programmable parameters items and instructions

Govmode	<b>*ESC-StoGov</b> ; Ext-Gov; Fixed-Wing
Cutoff Volt	OFF; 2.7V; <b>*3.0V</b> ; 3.2V; 3.4V; 3.6V
Timing	<b>*Auto</b> ; Low; Middle; High
BEC Voltage	6.0V-12.0V; <b>*Default 8.4V</b>
Motor Rotate	<b>*CW</b> ; CCW
GovParamP	<b>*4</b> ; 1-10
GovParamI	<b>*3</b> ; 1-10
Acceleration	Fast; <b>*Normal</b> ; Slow; Very Slow
ARTime	OFF; <b>*90S ON</b>
Startup Power	Low; <b>*Middle</b> ; High
Brake Type	<b>*Normal</b> ; RVS
Brake Force	<b>*0%</b> ; 0% - 100%
SR Function	<b>*ON</b> ; OFF
Cap Correction	<b>*0%</b> ; 0% - 10%
LED Colour	<b>*Red</b> ; Yellow; Orange; Green; Jade Green; Blue; Cyan; Purple; Pink; White
Temp Fan	<b>*ON</b> ; OFF
Pole Pairs	<b>*1</b> ; 1-30
Gear 1	<b>*1</b> ; 1-255
Gear 2	<b>*1</b> ; 1-255

- ① The option marked with "\*" is the factory default setting.

## Programmable parameters description

### 1. Govmode:

**ESC Store Governor mode:** Suitable for helicopters flying at a fixed headspeed. The throttle in this mode has to be more than 30% (including 30%) before starting the motor. The motor starts in an ultra-smooth manner. After the soft start, the governor will be activated, the factory default is ESC Store Governor mode.

**Gyroscope Governor mode:** Suitable for helicopters without any governor or helicopters using external governors. The throttle has to be higher than 5% (including 5%) before starting the motor. After the slow start is completed, the motor will start off with a smoother manner, followed by a faster throttle response accelerated to the current throttle value.

**Fixed-wing mode:** Suitable for fixed-wing aircrafts. In this mode, the throttle has to be more than 5% (including 5%) to start the motor and the throttle response is rapid.

### 2. Low Voltage Cutoff Threshold:

OFF/2.7V/3.0V/3.2V/3.4V/3.6V adjustable, the voltage means each cell voltage. For example if you use 6 cells Lipo battery, then the low voltage threshold value is 6 x set voltage value, default setting is 3.0V.

### 3. Timing:

Adjust the ESC timing with the range of 0°-30°, the default setting is Auto.

### 4. BEC Voltage:

The ESC is built-in with a BEC of 6-12V and has the capability to adjust 0.2V per step.

### 5. Motor Rotate:

This item is for setting the rotation direction of the motor, and it's "CW" by default. After connecting the motor to the ESC, (if the motor rotates clockwise); when setting this item to "CCW", the motor will rotate counterclockwise; (if the motor rotates counterclockwise), when setting this item to "CCW", the motor will rotate clockwise.

### 6. GovParamP:

This parameter is for controlling the ESC to compensate the amount of the motor speed during the process of maintaining the speed-governing effect; the higher the value, the bigger the amount; and vice versa. This function needs to be combined with the Governor Parameter I.1-10 Adjustable, and the default setting is 4.

### 7. GovParamI:

When the speed falls below, or exceeds the value set, the speed is compensated by the ESC. This parameter is used to resize the degree of rotation. Too large parameters will cause excessive make-up, and too small parameters will cause insufficient replacement. 1-10 Adjustable, and the default setting is 3.

### 8. Acceleration:

Fast/Normal/Slow/Very Slow adjustable, the default setting is Normal.

### 9. ARTime:

This feature is only available in ESC Store Governor mode. It is the time set to push the throttle from more than 30% to 25% to 30% throttle range, and then push back more than 30%. The parameter will not take effect when the throttle range is below 25% or between 25%-30% beyond the set time. The ESC will execute the ESC Store Governor mode of the default start-up process only if the throttle range is above 30%, the default setting is 90s ON.

### 10.Startup Power:

Low/Middle/High adjustable, the default setting is Middle.

### 11. Brake Type

1.1 Normal Brake:When "Normal Brake" is turned on, after the throttle trigger return to zero position, it will make the motor stop running according to the parameter of brake force set, the default setting is Normal brake.

1.2 Reverse Brake:Plug the 3Pin signal wire into the throttle channel, and plug the RPM signal wire into any 2-stage switch channel of the receiver, then turn on the transmitter 2-stage switch. The Reverse Brake function is turned on now, you can change the forward and reverse directions of the motor by flipping the 2-stage switch of the transmitter.

**Warning:** This function can only be effective when the throttle is below 50%, and it is only allowed to be used when the airplane is landing on the ground, otherwise it may cause the ESC to burn!

### 12. Brake Force:

After throttle trigger is pulled to zero position, the higher value means the stronger brake force, and it will take shorter time to make the motor from running to standstill. 0%-100% adjustable, 1% as 1 step, the default setting is 0%.(This function only valid under normal brake mode.)

### 13. SR Function:

The synchronous rectification function makes the ESC with higher driving efficiency and more energy-saving, and support longer flight time, the default setting is ON.

### 14. Cap Correction:

When the battery consumption value recorded by the ESC is different with the actual battery consumption, the capacity adjustment can be applied to correct the discrepancy. This value ranges from -10% to 10%, the default setting is 0.

### 15. Pole Pairs:

This value is necessary for calculating the actual RPM of the propeller, and it is usually indicated in the motor parameter table, the default setting is 1.

### 16. LED Colour:

Multiple colors adjustable, and it is used to display the ESC operation status and errors, the default setting is red.

### 17. Temp Fan:

When this function is turned on, the smart fan automatically detects the temperature after power-on, and automatically starts only when the temperature exceeds 40 degrees, but does not start below 40 degrees; when this function is turned off, the fan starts directly after power-on. The default setting is ON.

## The Fixed Speed Function Settings

### 1. Fixed speed description

By speed calibration, the motor speed-throttle value corresponding curve is established. The throttle value is set to a fixed value on the remote control, the output of the throttle value corresponds to the speed, and the motor load changes to maintain the same speed.

Note: The factory default setting is ESC store governor mode, you need to do the speed calibration for the first time, and the ESC will stores the motor speed throttle value corresponding curve after the speed calibration.

If adjusting to any other mode from this mode and saving the "Motor RPM-Throttle" curve, and then adjusting back to this mode, the "Motor RPM-Throttle" curve saved by the ESC will be cleared, and you need to do the speed calibration once again.

### 2. Speed calibration process

- ① Need to do the throttle calibration first before the speed calibration (if already done, just skip this step).
- ② Make sure the main rotor pitch is at 0 degrees.
- ③ Pull the throttle stick to the minimum position, waiting for the esc self-check process.
- ④ Push the throttle to 50%, the rotor of the helicopter will start to slowly accelerate (the main rotor pitch is zero degrees, the helicopter will not lift off) and wait for the acceleration to complete, When the rotor speed is stable, push the throttle stick to the minimal position.
- ⑤ Speed calibration is finished.

### 3. How to calculate the main rotor RPM at 100% throttle

- ① Connect Our APP after the speed calibration is completed

to find the records as shown:

The values in the figure is just an example, depending on the actual display values.

This value is the maximum electrical speed that the motor can achieve at 100% throttle.

- ② For example, if motor has 10 poles, using 13 motor teeth with main teeth of 120T, the gear ratio is around 9.23.

And Formula:

100% throttle speed of the main rotor=MAX RPM ÷ (motor poles ÷ 2) ÷ gear ratio

Then the main rotor 100% throttle speed is 151000 ÷ (10 ÷ 2) ÷ (120 ÷ 13) is around

3272RPM

If the main rotor during 3D flight requires to be maintained at 2500 rpm, the fixed speed

throttle needs to be set at 2500 ÷ 3272 to get about 0.76. At 0.76, the throttle value needs to be set at 80%.

- ③ You can set motor poles and the gear ratio (GR) via our APP to get the speed of the main rotor at 100% throttle.

(1) Connect the ESC to Our APP after the speed is calibrated, and then enter the interface as shown above.

(2) Select options related to "motor poles", scroll screen select

gear ratio (GR) by, then press "Save" will show the speed of the main rotor at 100% throttle.

### 4. Telemetry Instruction

- (1) When using Mikado VECT/E, Futaba SBUS.2, or Jeti transmitter, please connect the telemetry wire to the ESC's RX port.
- (2) When using Rotorflight2, please connect the telemetry wire to the ESC's TX port.

## Protection Function

1. **Abnormal power-on voltage protection:** The ESC enters a protective state once the input voltage detected is not in the operating voltage, Prompting LED light to flash.

2. **Start-up protection:** If the motor fails to start normally within 2 seconds after pushing the throttle to start, the ESC will cut off the output power, and you need to make the throttle calibration again, then ESC can be restarted. Possible reasons: disconnection or poor connection between ESC and motor, the propeller or motor is blocked by other objects, the gearbox is damaged, etc.

3. **Over-heat protection:** When the temperature of the ESC is over about 110°C, the ESC will automatically reduce the output power for protection, but will not fully shut down the power, reduce it to 70% of the full power at most to ensure the motor has enough power to avoid crashes.
4. **Throttle signal loss protection:** The ESC will reduce the output power if throttle signal is lost for 1 second, will cut off output to the motor if the throttle signal is lost over 2 seconds. If the throttle signal restored during power down, the ESC will immediately restored throttle control. In this way, the ESC will not protect when the signal loss less than 2 seconds, only when the signal lost is over 2 seconds or longer time. And the ESC will reduce the output power gradually instead of cutting off it immediately, so the player has enough of time to save the plane, taking into account safety and practicality.

5. **Over load protection:** The ESC will cut off power or restart automatically when the load increased a lot suddenly, possible reason is the motor blocked.

6. **Low voltage protection:** When the operating voltage of the ESC have exceeded the protection voltage set, power will be gradually reduced for safety, but will not be turned off, These will still be up to 50% of power, to ensure that the motor has the power to land.

7. **Over-current protection:** When the peak current exceeds the specified value, the ESC will immediately cut off the output power, and then restart to restore the power. If the current exceeds the specified value again, the output power will be completely cut off. Possible reason is overload, burnt motor and so on.

8. **Break Protection:** If there is a break in the connection between the motor and ESC. Check the motor is fully connected,check connectors or solder joints are as they should be.

## Explanations for Warning Tones

Warning Tones:	Troubles:	LED Indicator:
"Beep-Beep--" (every two seconds)	1.Throttle signal loss	Red LED,followed by the tone
"Beep Beep-Beep Beep--" (every two seconds)	2.Temperature protection	Red LED,followed by the tone
"Beep Beep Beep-Beep Beep Beep--" (every two seconds)	3.Low voltage protection	Red LED,followed by the tone
"Beep-Beep--" (every 200 milliseconds)	4.The throttle value is not at 0% throttle	Red LED,followed by the tone
"123-123-" (every 200 milliseconds)	5.The voltage is not within the range	Red LED,followed by the tone

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