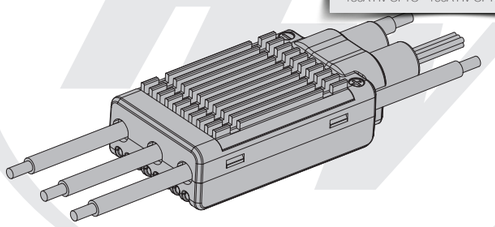
HOBBYWING®

USER MANUAL
FLYFUN V5

Brushless Electronic Speed Controller

60A · 80A · 80A OPTO · 120A · 120A OPTO

130A HV OPTO · 160A HV OPTO



ATTENTION

CAUTIONS

Thank you for purchasing this HOBBYWING product! Brushless power systems can be very dangerous. Any improper use may cause personal injury and damage to the product and related devices. We strongly recommend reading through this user manual before use. Because we have no control over the use, installation, or maintenance of this product, no liability may be assumed for any damages or losses resulting from the use of the product. We do not assume responsibility for any losses caused by unauthorized modifications to our product. Besides, we have the right to modify our product design, appearance, features and usage requirements without notification. We, HOBBYWING, are only responsible for our product cost and nothing else as result of using our product.

01 Warnings

- Read through the manuals of all power devices and aircraft and ensure the power configuration is rational before using this unit.
- Ensure all wires and connections are well insulated before connecting the ESC to related devices, as short circuit will damage your ESC.
- Ensure all devices are well connected, in order to prevent poor connections that may cause your aircraft to lose control or other unpredictable issues like damage to the device. If necessary, please use a soldering iron with enough power to solder all input/output wires and connectors.
- Never get the motor locked up during high-speed rotation, otherwise the ESC may get destroyed and may also get your motor damaged. (Note: move the throttle stick to the bottom position or disconnect the battery immediately if the motor really gets locked up.)
- Never use this unit in the extremely hot weather or continue to use it when it gets really hot. Because high temperature will activate the ESC thermal protection or even damage your ESC.
- Always disconnect and remove batteries after use, as the ESC will continue to consume current if it's still connected to batteries. Long-time contact will cause batteries to completely discharge and result in damage to batteries or/and ESC. This will not be covered under warranty.
- When using EDF airplanes, the "Normal Start-up" mode is not avaialbe due to the characteristics of the ducted fan & motor. If the diameter of the ducted fan is between 75mm to 90mm (90mm is not included), pls ensure to select the "Soft Start-up" or "Very Soft start-up" mode. If the diameter of the ducted fan is 90mm or above, then pls ensure to select the "Very Soft start-up" mode.

02 Features

- ESC which features a high performance 32-bit ARM M4 microprocessor (with a running frequency of up to 72MHz) is compatible with various brushless motors.
- Microprocessor powered by a separate DC regulator has better anti-interference performance greatly reduces the possibility of losing control.
- DEO (Driving Efficiency Optimization) Technology greatly improves throttle response & driving efficiency and reduces ESC temperature.
- Built-in high-power BEC with output voltage adjustable among 5.2V, 6.0V and 7.4V. The BEC module is separate from other circuits on the ESC, so the normal BEC output can be guaranteed (when issue like burnt power board happens) to allow users to get the aircraft back before crash. (Note: the FLYFUN 80A/120A/130A/160A-HV-OPTO-V5 doesn't have this function.)
- Normal/Soft/Very Soft start-up modes are compatible with regular propeller airplanes and EDF jet airplanes (pls ensure to select the "Very Soft Start-up" mode when using EDF jet airplanes).
- Separate programming cable for connecting ESC to a LED program box and allows users to program the ESC anytime, anywhere. (For detailed info, please refer to the user manual of HOBBYWING LED program box.)
- Normal/proportional/reverse brake modes (esp. reverse brake mode) can effectively shorten the landing distance for the aircraft. (Note: the FLYFUN 130A/160A-HV-OPTO-V5 doesn't have this function.)
- Multiple protection features like start-up, ESC thermal, capacitor thermal, over-current, over-load, abnormal input voltage and throttle signal loss effectively prolong the service life of the ESC.

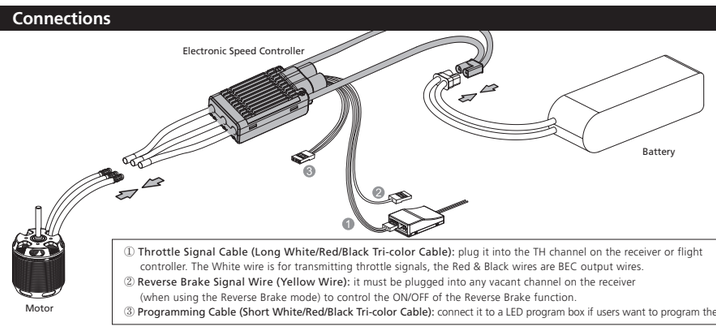
03 Specifications

Model (Regular)	Cont. Current	Peak Current	Input Voltage	BEC Output	Weight	Size (L*W*H)
FLYFUN 60A V5	60A	80A	3-6S LiPo	5.2V/6V/7.4V Adjustable, Continuous/Peak Current of 8A/20A (Switch-mode)	73.5g	68.8x34.6x18mm
FLYFUN 80A V5	80A	100A			92g	69.8x34.6x19.2mm
FLYFUN 80A OPTO V5				No	87g	69.8x34.6x19.2mm
FLYFUN 120A V5	120A	150A		5.2V/6V/7.4V Adjustable, Continuous/Peak Current of 8A/20A (Switch-mode)	93g	77.2x34.6x19.2mm
FLYFUN 120A OPTO V5				No	88g	77.2x34.6x19.2mm
Model (HV)	**Cont. Current**	**Peak Current**	**Input Voltage**	**BEC Output**	**Weight**	**Size (L*W*H)**
FLYFUN 130A HV OPTO V5	130A	160A	6-14S LiPo	No	221.5g	110x50.3x33.2mm
FLYFUN 160A HV OPTO V5	160A	200A	6-14S LiPo	No	221.5g	110x50.3x33.2mm

04 User Guide

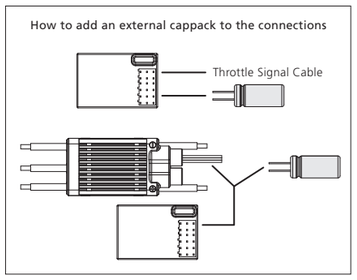
Attention! The default throttle range of this ESC is from 1100μs to 1940μs (Futaba's standard); users need to calibrate the throttle range when they start to use a new FLYFUN brushless ESC or another transmitter.

1 Connections



① **Throttle Signal Cable (Long White/Red/Black Tri-color Cable):** plug it into the TH channel on the receiver or flight controller. The White wire is for transmitting throttle signals, the Red & Black wires are BEC output wires.
② **Reverse Brake Signal Wire (Yellow Wire):** it must be plugged into any vacant channel on the receiver (when using the Reverse Brake mode) to control the ON/OFF of the Reverse Brake function.
③ **Programming Cable (Short White/Red/Black Tri-color Cable):** connect it to a LED program box if users want to program the ESC.

How to add an external cappack to the connections



2 External Capacitor Module (also called Cappack) Wiring (Optional)

For the FLYFUN 80A/120A-V5, its BEC load capacity may be insufficient when using high power servos. In that case, we suggest connecting the stock external cappack to the BEC's output end (i.e. any idle channel on the receiver ***note 1**) in parallel. Users can check if the BEC is working in overload condition by the following method: keep moving relevant throttle sticks (that control servos) to start/stop those servos and change directions quickly to see if the receiver or flight control system (if exists) will be restarted during the process. If restart occurs, then it means that the sudden load of the electronic system exceeds the BEC's output capability and an external cappack is needed.

Note 1: if there is no vacant channel on the receiver, then users can connect a short, thick Y cable (as thin, long cable may affect the capacitor's performance, so we don't recommend it) to the BEC's output wires in parallel.

ATTENTION Please carry out the mentioned test before trial flight, and keep the output signals from throttle channel at 0% throttle during the test.

3 ESC/Radio Calibration

Turn on the transmitter and move the throttle stick to the top position. → Connect a battery to the ESC; the motor will sound "♪123" to indicate the ESC is normally powered on. → Then the motor will beep two short beeps to indicate the maximum throttle endpoint is accepted. → Move the throttle stick to the bottom position within 5 seconds after the two short beeps, the minimum throttle position will be accepted 1 second later. → The motor will beep "Number" beeps to indicate the number of LiPo cells you have plugged in. → The motor will beep a long beep to indicate the calibration is complete.

4 Normal Start-up Process

Turn on the transmitter, and then move the throttle stick to the bottom position. → After connected the ESC to a battery, the motor will emit "♪ 123" to indicate the ESC is normally powered on. → The motor will emit several beeps to indicate the number of LiPo cells. → The motor emits a long beep to indicate the ESC is ready to go.

05 ESC Programming

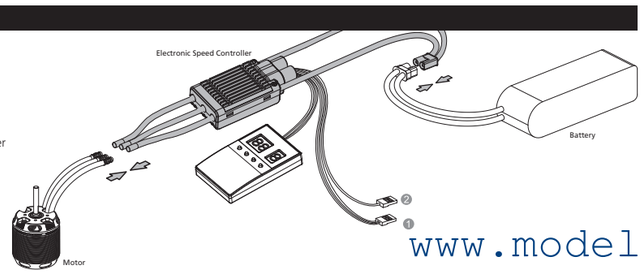
There are two ways to program the ESC. One way is to program it with a LED program box; the other way is to program it with the transmitter. The ESC has many programmable items, so we recommend using the LED program box to do the ESC programming.

1 Program your ESC with a LED Program Box

- Plug the programming cable (on your ESC) into the programming port on the LED program box.
- (With a battery connected to your ESC), after connected a LED program box to the ESC, you need to disconnect the battery first and then reconnect it to the ESC to enter the programming mode to check and set parameters.

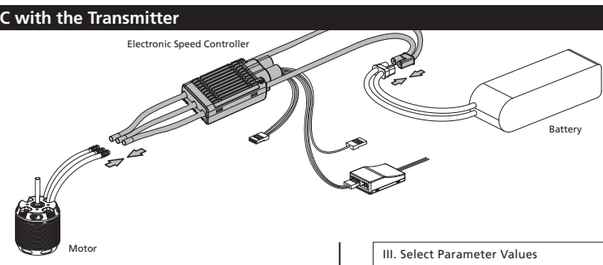
The portable program box is an optional accessory applicable for field use. Its friendly interface makes the ESC programming easy and quick. Connect a battery to your ESC after connecting a LED program box to the ESC, all programmable items will show up a few seconds later. You can select the item you want to program and the setting you want to choose via "ITEM" & "VALUE" buttons on the program box, and then press the "OK" button to save all new settings to your ESC.

Attention! You need to power your ESC off and then on after adjusting parameters. Otherwise, new parameters won't take effect.



2 Program your ESC with the Transmitter

1. Wiring:



2. ESC Programming via the Transmitter (Throttle Stick)

I. Enter the Programming
Turn on the transmitter, move the throttle stick to the top position, and connect a battery to the ESC, 2 seconds later, the motor will beep "B-B-" first, then emit "567i2i" 5 seconds later to indicate that you are in the ESC programming mode.

II. Select Parameter Items
After entering the programming, you'll hear the following 12 kinds of beeps circularly. Move the throttle stick to the bottom position within 3 seconds after you hear some kind of beeps, you'll enter the corresponding parameter item.
1. "B-", Brake Type (1 Short B)
2. "B-B-", Brake Force (2 Short Bs)
3. "B-B-B-", Voltage Cutoff Type (3 Short Bs)
4. "B-B-B-B-", LiPo Cells (4 Short Bs)
5. "B——", Cutoff Voltage (1 Long B)
6. "B——B-", BEC Voltage (1 Long B & 1 Short B)
7. "B——B-B-", Start-up Mode (1 Long B & 2 Short Bs)
8. "B——B-B-B-", Timing (1 Long B & 3 Short Bs)
9. "B——B-B-B-B-", Motor Direction (1 Long B & 4 Short Bs)
10. "B——B——", Freewheeling (2 Long Bs)
11. "B——B——B-", Factory Reset (2 Long Bs & 1 Short B)
12. "B——B——B-B-", Exit (2 Long Bs & 2 Short Bs)

Note: A long "B——" equals to 5 short "B-", so a long "B——" and a short "B-" represent the 6th item in "Select Parameter Items".

III. Select Parameter Values
The motor will beep different kinds of beeps circularly, move the throttle stick to the top position after you hear some kind of beeps will get you to the corresponding parameter value, then you'll hear the motor emit "i5i5 " to indicate the value is saved, then get back to "Select Parameter Items" and continue to select other parameter items that you want to adjust.

Items \ Values (Bs)		1 B-	2 B-B-	3 B-B-B-	4 B-B-B-B-	5 B——	6 B——B-	7 B——B-B-	8 B——B-B-B-
1	Brake Type	*Disabled	Normal	Proportional	Reverse				
2	Brake Force	*Disabled	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
3	Voltage Cutoff Type	*Soft	Hard						
4	LiPo Cells	*Auto Calc.	3S	4S	5S	6S			
			6S	8S	10S	12S	14S		
5	Cutoff Voltage	Disabled	2.8V	*3.0V	3.2V	3.4V	3.6V	3.8V	
6	BEC Voltage	*5.2V	6.0V	7.4V					
7	Start-up Mode	*Normal	Soft	Very Soft					
8	Timing	0°	5°	8°	12°	*15°	20°	25°	30 °
9	Motor Direction	*CW	CCW						
10	Freewheeling	*On	Off						

VI. Exit the Programming
Move the throttle stick to the bottom position within 3 seconds after you hear two long beeps and two short beeps (emitting from the motor) can get you exit the programming mode. The motor beeps "Number" beeps to indicate the number of LiPo cells you have plugged in, and then a long beep to indicate the power system is ready to go.

06 Programmable Items

Items \ Values (Bs)			1	2	3	4	5	6	7	8
1	Brake Type		*Disabled	Normal	Proportional	Reverse				
2	Brake Force		*Disabled	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
3	Voltage Cutoff Type		*Soft	Hard						
4	LiPo Cells	Regular	*Auto Calc.	3S	4S	5S	6S			
		HV		6S	8S	10S	12S	14S		
5	Cutoff Voltage		Disabled	2.8V	*3.0V	3.2V	3.4V	3.6V	3.8V	
6	BEC Voltage		*5.2V	6.0V	7.4V					
7	Start-up Mode		*Normal	Soft	Very Soft					
8	Timing		0°	5°	8°	12°	*15°	20°	25°	30 °
9	Motor Direction		*CW	CCW						
10	Freewheeling		*Enabled	Disabled						

1. Brake Type
Normal Brake: After selected this option, the brake function will be activated when you move the throttle stick to the bottom position. In this mode, the brake amount equals to the brake force you've preset.
Proportional Brake: After selected this option, the throttle range of 20% to 100% (on the transmitter) will correspond to the ESC throttle output of 0% to 100% while the throttle range of 20% to 0% (on the transmitter) will correspond to the brake force of 0 to 100%.
Reverse Brake: After selected this option, the Reverse Brake signal wire (its signal range must be the same as the throttle range) must to be plugged into any vacant channel on the receiver, and you can control the motor direction via that channel. The channel range of 0-50% is the default motor direction, the channel range of 50% to 100% will cause the motor to spin counterclockwise. The channel stick should be within the channel range of 0-50% (0 would be better) when the first time you power on the ESC. After the Reverse function is activated, the motor will stop first and then spin in the reversed direction and then increase to the speed corresponding to the throttle input. Either signal loss, no matter reverse brake signal loss or throttle signal loss during the flight, can cause the throttle signal loss protection to be activated.
2. Brake Force
This item is adjustable from level 1 to level 7. The higher the level, the stronger the braking effect. It's only effect in the "Normal brake" mode.
3. Voltage Cutoff Type
Soft Cutoff: After selected this option, the ESC will gradually reduce the output to 50% of the full power in 3 seconds after the low-voltage cutoff protection is activated.
Hard Cutoff: After selected this option, the ESC will immediately cut off the output when the low-voltage cutoff protection is activated.
4. LiPo Cells:
The ESC will automatically calculate the number of LiPo cells you have plugged in as per the "3.7V/Cell" rule if "Auto Calc." is selected, or you can set this item manually.
5. Cutoff Voltage
This item is adjustable from 2.8V to 3.8V (they are the cutoff voltages for one cell), it's 3.0V by default; or you can disable it if necessary.
6. BEC Voltage
This item is adjustable among 5.2V, 6.0V and 7.4V.
7. Start-up Mode
Normal Start-up: After selected this option, the motor will immediately start spinning and then quickly reach to the corresponding speed when you move the throttle stick from bottom position to top position.
Soft Start-up: After selected this option, the motor will slowly start spinning and then quickly reach to the corresponding speed when you move the throttle stick from bottom position to top position.
Very Soft Start-up: After selected this option, the motor will slowly (slower than in "Soft Start-up Mode") start spinning and then quickly reach to the corresponding speed when you move the throttle stick from bottom position to top position. We recommend selecting the "Soft Start-up" or "Very Soft Start-up" mode when you are flying an airplane with a big-sized ducted fan. Please ensure to select the "Very Soft Start-up" mode if the diameter of the ducted fan on your airplane is over 90mm.
8. Timing
This item is adjustable from 0 degree to 30 degrees, and it is 15 degrees by default.
9. Motor Rotation
This item allows you to adjust the rotation direction of your motor between CW and CCW, and it is CW by default.
10. Freewheeling
This item is adjustable between "Enabled" and "Disabled", and it is enabled by default. With it enabled, you can have better throttle linearity or smoother throttle response.

07 Troubleshooting & Multiple Protections

Troubles	Warning Tones	Causes	Solutions
The ESC didn't work after it was powered on while the motor kept beeping.	"BB, BB, BB……"	The input voltage was beyond the operating voltage range of the ESC.	Adjust the power-on voltage and ensure it's in the operating voltage range of the ESC.
The ESC didn't work after it was powered on while the motor kept beeping.	"B-, B-, B-, B-……"	The ESC didn't receive any throttle signal from the receiver.	Check if the transmitter and receiver are well bound, if any poor connection exists between the ESC and receiver.
The ESC didn't work after it was powered on while the motor kept beeping.	"B, B, B, B……"	The throttle stick has not been moved to the bottom position.	Move the throttle stick to the bottom position and calibrate the throttle range.
The ESC didn't work after the throttle calibration while the motor kept beeping.	"B, B, B, B……"	The throttle range you set was too narrow.	Re-calibrate the throttle range.
The motor "stuttered" during the flight. It would resume the normal operation if the throttle input was below 60% but re-start to stutter if the throttle input was over 60%. The motor started to beep when it stopped spinning.	"BB, BB, BB……" or "BBBB, BBBB……"	The ESC thermal protection has been activated.	Improve the heat dissipating condition (i.e. add a cooling fan) or reduce the ESC load.
The ESC output suddenly reduced to 50% during the flight, the motor kept beeping after the flight completed but the battery was still connected to the ESC.	"BBB, BBB, BBB……"	The low-voltage cutoff protection has been activated.	Change another pack; lower down the cutoff voltage or disable the LVC protection (we do not recommend this).

Multiple Protections
1. Start-up Protection:
The ESC will monitor the motor speed during the start-up process. When the speed stops increasing or the speed increase is not stable, the ESC will take it as a start-up failure. At that time, if the throttle amount is less than 15%, the ESC will try to restart automatically; if it is larger than 20%, you need to move the throttle stick back to the bottom position first and then restart the ESC.
(Possible causes of this problem: poor connection/ disconnection between the ESC and motor wires, propellers are blocked, etc.)
2. ESC Thermal Protection:
The motor will "stutter" when the ESC temperature goes above 110℃ to indicate that the ESC thermal protection is activated. If lower down the throttle input to below 60% at this moment, the "stuttering" will disappear and the ESC will output the corresponding power. The motor will re-start to "stutter" if the throttle input exceeds 60%. In this condition, disconnect the battery first and then re-connect it to the ESC after the ESC cools down (the ESC temperature cannot exceed 70℃, otherwise it cannot be started), it will resume the normal operation.
3. Throttle Signal Loss Protection:
When the ESC detects loss of signal for over 0.25 second, it will cut off the output immediately to avoid an even greater loss which may be caused by the continuous high-speed rotation of propellers or rotor blades. The ESC will resume the corresponding output after normal signals are received.
4. Overload Protection:
The ESC will cut off the power/output or automatically restart itself when the load suddenly increases to a very high value.
(Possible cause to the sudden load increase is that propellers are blocked or the motor and the ESC are out of sync.)
5. Over-current Protection:
The ESC will cut off the output immediately when the peak current exceeds the regulated value, and then restart to resume the output. If the current continues to go above the regulated value, then the output will be completely cut off. This protection may be activated by the burnt motor or some others.

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