FLYCOLOR®

User Manual
Brushless ESC for airplane

FlyDragon Lite

Thank you for using our product. Any improper operation may cause personal injury or damage the product and relevant equipments. This high power system for RC model can be dangerous ,we strongly recommend reading the user manual carefully and completely. We will not assume any responsibility for any losses caused by unauthorized modifications to our product. We have the right to change the design, appearance, performance and usage requirements of the product without notice.

01 Main features

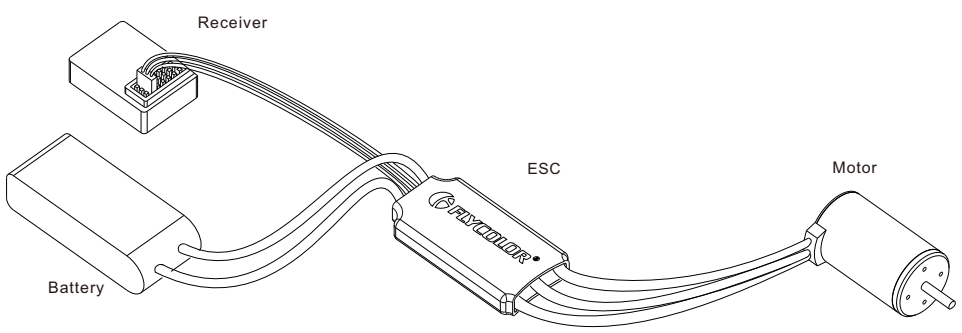
- Using C8051F850 MCU ,pipelined 8-bit C8051 core .
- FlyDragon Lite series,small size and light weight.
- Unique circuit design,strong anti-interference.
- Start mode can be set, throttle response is fast and speed control is linear smooth.
- Low-voltage protection threshold value can be set.
- Multiple protection features: Abnormal startup protection, over-heat protection, throttle signal loss protection, low-voltage cut-off protection etc.
- High power safety performance: wherever the throttle lever is,the motor will not start immediately.
- Judge the working condition via alarm.
- Users can set functions as their demand, Cycle programming menu which easy to operate .
- Built-in BEC,high output power,less power loss.

02 Specifications

Model	Con. Current (Good heat dissipation)	Burst Current (Good heat dissipation)	BEC	LiPo	Weight (For reference)	Size (For reference)
FlyDragon Lite 20A	20A	30A	5V / 2A	2-4S	23g	49x25.5x10.5mm
FlyDragon Lite 30A	30A	40A	5V / 2A	2-4S	25g	49x25.5x10.5mm
FlyDragon Lite 40A	40A	50A	5V / 3A	2-4S	51g	65x26x15.5mm
FlyDragon Lite 50A	50A	60A	5V / 3A	2-4S	46.5g	65x26x15.5mm

03 Wiring Diagram

*Please ensure all solder joints are insulated with heat shrink where necessary.



*The appearance of each model is different, the picture is a typical model for reference only.

04 Operation instruction

1.Normal start-up

Turn on the transmitter, move the throttle stick to the bottom position. → Connect ESC with battery, wait for 2 seconds,motor emits short "BEEP-" few times, sound times is Lipo battery cells. → Wait for 1 second, It means "No Brake" when motor emit continuously 1 long and 1 short tone. It means "Brake is available" when motor emits a long tone. ESC is ready for working now. → ESC is ready for working now

2.Throttle Range calibration

Turn on the transmitter, move the throttle stick to the top position. → Connect ESC with battery. Wait for 2 seconds, after motor emits 2 short "BEEP-BEEP",the full throttle position is memorized. → Move the throttle stick to the bottom position in 3 seconds. Then waits for 1 second, the"zero throttle" position is memorized. Motor emits short "BEEP-" few times, sound times is Lipo battery cells. → Wait for 1 second, It means "No Brake"when motor emit continuously 1 long and 1 short tone. It means "Brake is available" when motor emits a long tone. ESC is ready for working now.

3.Programming

Turn on the transmitter, move the throttle stick to the top position. → Connect ESC with battery. Wait for 2seconds, motor emits 2 short "BEEP-BEEP". Then still wait for 5 seconds. motor emits special tone "♪12321",it has entered programming mode.

Select Items

After entering programming mode, you will hear groups tone which emits in a loop as following sequence .

	♪12321		
1	Brake	1short	Beep-
2	Battery type	2short	Beep-Beep-
3	Cutoff voltage	3short	Beep-Beep-Beep-
4	Timing	4short	Beep-Beep-Beep-Beep-
5	Startup mode	1long	Beeeep--
6	PWM frequency	1long&1short	Beeeep--Beep
7	Voltage cutoff option	1long&2short	Beeeep--Beep-Beep
8	Battery cells	1long&3short	Beeeep--Beep-Beep--Beep
9	Restore factory defaule	1long&4short	Beeeep--Beep-Beep--Beep-Beep
10	Exit	2long	Beeeep--Beeeep--

Note: Usually,1 long tone "Beeeep--" equals to 5 short tone"beep-", for example:1 long tone"Beeep--" and 1 short tone "beep-" equals to 6.

When motor emits "Exit" tone, move throttle to the zero position in 3 seconds, then motor emits special tone "♪765765", it will exit the programming mode.

Item parameter

After motor emits a Item tone ,move the throttle to the zero throttle position, then will enters this item, and motor will emits the parameter tone in a loop . please see the table below)

Move throttle stick to the top position after a certain tone that the parameter you want, the parameter is selected, then motor emits special tone "♪1212", this parameter will be stored. Just wait If you still want select other item, it will go back to the Level 1 menu to select item, the operate method is the same.

Prompt tone / Iterm	1 (1short)	2 (2short)	3 (3short)	4 (4short)	5 (1long)	6 (1long&1short)	7 (1long&2short)	8 (1long&3short)
1.Brake	NO	Soft	Heavy	Very Heavy				
2.Battery type	Lipo	NiCb/NiMh						
3.Cutoff voltage	2.8V	3.0V	3.2V					
4.Timing	0°	3.75°	7.5°	11.25°	15°	18.75°	22.5°	26.25°
5.Startup mode	Normal	Soft	Very Soft					
6.PWM frequency	12KHz	8KHz						
7.Voltage cutoff option	Reduce cutoff	Cut off						
8.Battery cells	Auto	2S	3S	4S				

*Shadow parts are factory default value

If don't want select other parameter, move throttle to the zero position in 3 seconds, then motor emits special tone "♪765765", it will exit the programming mode.

05 Programming parameter

1. Brake: [1]NO(default) [2]Soft [3]Heavy [4]Very heavy

2. Battery type: [1] LiPo(default) [2] NiCb/NiMh

3. Cutoff voltage: Low-voltage protection threshold, [1] Low [2] Medium (default) [3] High
For Ni-xx battery packs: Low/Medium/High cut off voltage is 50%/65%/75% of the battery packs' initial voltage.
For LiPo battery: can count battery cells automatic. Low voltage protection threshold :Low (2.8V) / Medium (3.0V) / High (3.2V) .Eg:For 4S/14.8V Lipo battery packs, low voltage protection threshold is 11.2V low/12.0V medium /12.8V high.

4. Timing:
[1]0° [2]3.75° [3]7.5° [4]11.25° [5]15°(default) [6]18.75° [7]22.5° [8]26.25°
Low (0°/ 3.75°/ 11.25°/15°/ 18.75°) --for most inner rotor motors
High (22.5°/ 26.25°) --For 6 poles or higher poles outer rotor motors
As usual, 15° applies to all the outer rotor motors , but for improving efficiency ,recommend that set low timing for 2 poles motor(most inner rotor motors), set high timing for 6 poles and high poles motors(most outer rotor motors). If need high speed motor, you can set high timing. Some motors should set special timing, if not sure, you'd better to set timing as motor manufacturer recommended ,or set 15°.
Note: After changing timing, please test on the ground before flying.

5. Startup Mode : Start up with linear accelerator
[1] Normal: No latency from 0% throttle to 100% throttle. (default)
[2] Soft: It takes 6 seconds from 0% throttle to 100% throttle.
[3] Very soft: It takes 12 seconds from 0% throttle to 100% throttle.

6. PWM frequency: [1]12KHz (default) [2]8KHz
For high poles and high speed motors, the higher PWM frequency can make motor drive smoothly, but the higher PWM frequency will make ESC hotter .

7. Voltage cutoff option:
[1] Reduce cutoff(default): the voltage drops to the set low-voltage protection threshold , ESC will reduce the power then cut off the motor output
[2] Cut off: the voltage drops to the set low-voltage protection threshold , ESC will cut off the motor output immediately.

8.Battery cells: Available for Lipo battery only.
[1] Automatic judgment(default) [2]2S [3]3S [4]4S .
You also can select the options according to your battery cells.

9.Restore default settings
When the beeping indicates the mode of "Restore default settings", move the throttle stick to zero position in 5 seconds after the beeping can activate the mode. There is no sub-menu under this mode. Then the motors makes indication tones of "♪765765" which means default settings are restored.

10.Exit program mode
After a sound "Beep-" , move throttle stick to the bottom position, enters the item of exit program mode, motor emits sound "♪765765" the same time, it represents ESC enters normal operation mode.

06 Protections

Start-up Protection	ESC will cut off output if it fails to start the motor within 3 seconds by accelerating throttle. you need to move the throttle stick back to the bottom position and restart the motor.(The possible causes : Bad connection or disconnection between ESC & motor , propellers are blocked, etc)
Over heat protection	When ESC temperature is higher than 100 ℃,it will reduce output power (throttle will be limited below 40%) for protection, leave some power for motor to land , when the temperature Reduced to 80℃ , ESC recover to normal running mode.
Throttle Signal Loss Protection	When ESC detects the loss of throttle signal for over 1 seconds, it will cut off power or output immediately to avoid an even greater loss caused by the continuous high speed rotation of propellers. ESC will resume the corresponding output after the normal signal is restored.

Alarm tone: (To judge the abnormal cases via alarm tone)
1.Alarm tone of signal loss : when ESC detects no signal , motor will emit the alarm tone "Beep-、Beep、-Beep-"(alarm tone emits every 2 seconds).

2.Alarm tone of throttle not in the zero throttle position: throttle not in the zero throttle position, motor will emit "Beep-Beep-Beep-Beep-Beep-" (urgent single short tone).

3. Alert tone of narrower throttle range: when throttle range is set too narrow, motor emits "Beep-Beep-Beep"(harried alarm tone emits last for 2 seconds). You must set throttle range again.

07 First time to use ESC

1.When first time to use ESC, you must set throttle range.
You just need to calibrate throttle range only once, but you must set again if you change transmitter.

2.Before connecting battery packs, please check if all the connectors polarity are correct , to avoid ESC damage for false connection or short circuit .

3. If motor stops suddenly during flying, please move throttle stick to the zero position immediately, then push the throttle stick to make the motor restart, then move throttle tick to a small range to land the aircraft immediately.

08 Safety Cautions

- Please don't remove or modify any components on ESC, or it may cause permanent damage or data losing.
- First time to test ESC and motor, please don't install propeller and driving gear before receiver is set correct .
- Please don't use broken, short-circuited and over-heated battery pack.
- Please don't use substandard cables and cords and connectors.
- Battery cells and servo number can't be exceed ESC's requirement.
- Please pay attention to the polarity of the battery, wrong polarity connection will damage ESC.
- Please don't put ESC in a moist and highlight place.
- Please don't remove battery when motor is rotating, it will cause the huge peak current and ESC burning.
- Please install ESC in the ventilated place, don't wrap anything around the ESC.

09 Trouble Shooting

Troubles	Possible causes	Solutions
After powering up, motor doesn't run and doesn't emit any sound.	Bad connection between ESC and battery.	Clean the connectors or replace them, check the connection polarity.
	Bad soldering cause bad contact.	Solder the wires again.
	Low voltage of the battery.	Check battery pack, use full-charged battery.
	Quality problem of ESC.	Change ESC.
After powering up, ESC emits the sound of battery cells, but motor can't run.	ESC doesn't set throttle range.	Set throttle range again.
After powering up,ESC works ,but motor can't run and doesn't emit any sound. After powering up ESC, motor doesn't run and emits warning tone"Beep-Beep".(a short stop after "Beep-Beep")	Bad connection between ESC and motor, or bad soldering.	Check the connectors or replace the connectors or solder the motor wire again.
	Bad motor.	Change motor.
	Battery voltage out of range	Check the battery voltage is within the range of ESC.
After powering up, motor doesn't work and emits warning tone"Beep-,Beep-,Beep-"(emits every 2 seconds).	No output throttle signal from receiver.	Check if right connection between signal wire and receiver throttle channel. Check transmitter and receiver, make sure there are signal outputs.
After powering up, motor doesn't work and emits continuous warning tone"Beep-"	Throttle doesn't in the zero position.	Push the throttle to the zero position, or set throttle range again.
After powering up, motor doesn't work .ESC emits 2 long "Beep" and 2 short "Beep".	The positive and negative of throttle channel is wrong. So ESC enters programming mode.	Refer to the user instruction of transmitter, adjust the setting of throttle channel.
Motor rotates in the opposite direction.	The wrong sequence of connection wires between motor and ESC.	1.Exchange random 2 of the 3 connection wires between ESC and motor. 2.Change motor rotation direction via transmitter .
Motor stops during running	Battery voltage is lower than low-voltage protection threshold and low-voltage protection mode is cutoff output.	1.Set right low-voltage protection threshold. Run with full-charged battery pack. Choose reduce power as Low-voltage protection .If power is decreasing during running, please fly back soon. 2.Make sure your aircraft in the range available to control with your transmitter. 3.Attention to the voltage of transmitter, if it will run out of the battery, please fly back soon.
	Loss throttle signal	1.Check if the transmitter operation correct. 2.Check if transmitter match with receiver. 3.Strong electromagnetic interference around the used environment, try to turn off and power up again, to see if it recovers normal work, if the problem come up again and again, please change to another field.
	Bad connection between wires	Check the connectors of battery pack, battery wires ,motor wires connections are good.