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01 主要特性

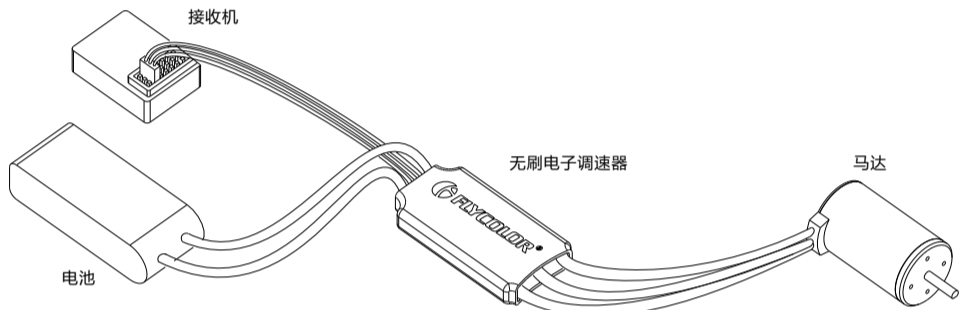
- 采用功能强大C8051F850 MCU, 8位C8051核心;
- FlyDragon 筒装系列 (FlyDragon Lite系列), 电调尺寸小, 重量轻;
- 精心的电路设计, 抗干扰性超强。
- 启动方式可设置, 油门响应速度快, 并具有非常平稳的调速线性。
- 低压保护阈值可设置。
- 具备多种保护功能: 启动保护, 温度保护, 油门信号丢失保护, 电池低压保护等。
- 通电安全性好: 接通电源时无论遥控器油门拉杆在任何位置不会立即启动马达。
- 设置报警音判断通电后工作情况。
- 用户可以根据自身需求设置使用功能。循环菜单设置, 操作简单。
- 内置BEC, 带舵机负载功率大、功耗小。

02 产品规格

型号	持续电流 (散热良好)	瞬间电流 (散热良好)	BEC	锂电池	重量 (供参考)	尺寸 (供参考)
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

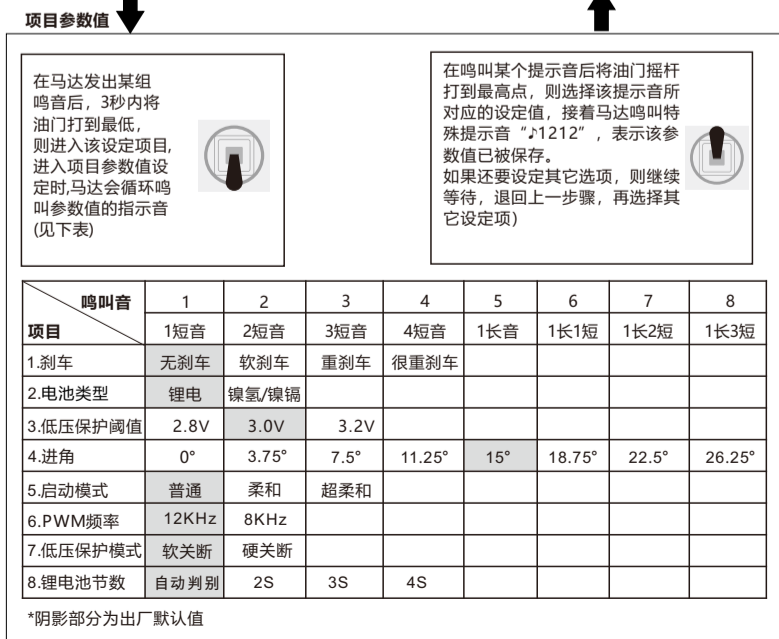
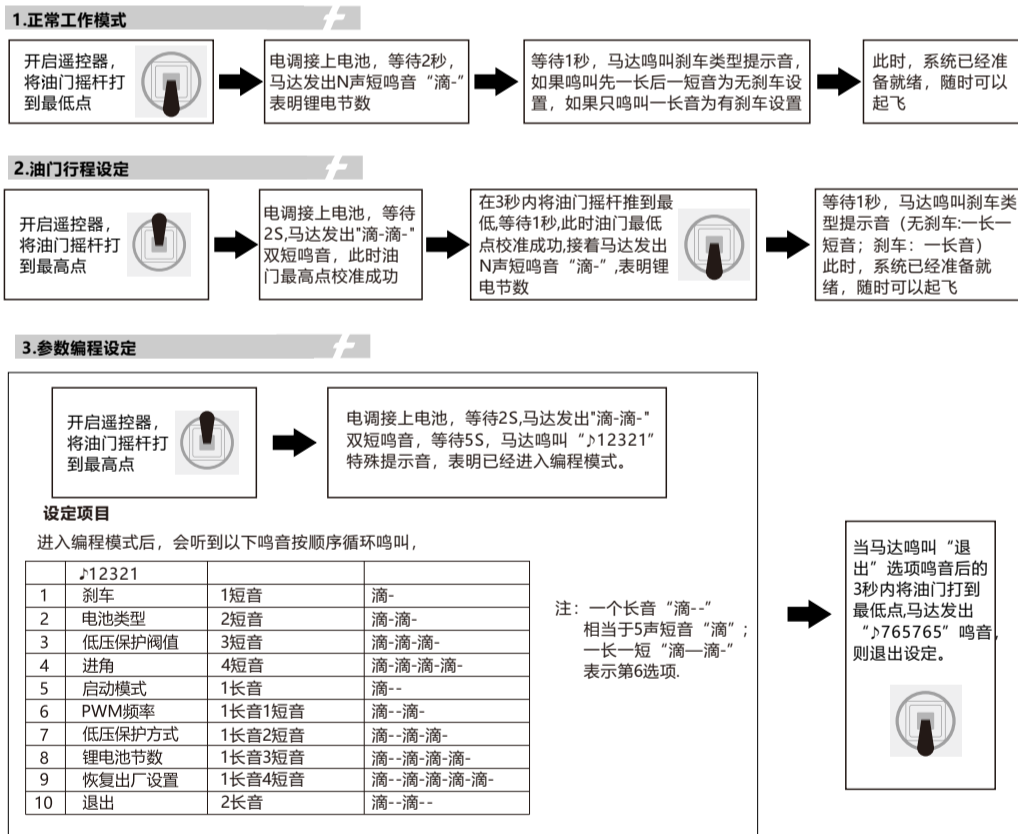
03 连线示意图

*为避免短路和漏电, 请确保连接处绝缘良好



*每种规格的产品外观有差异, 图片为代表型号仅供参考, 以实物为准

04 操作说明



05 编程参数值说明

- 刹车:** [1] 无刹车 [2] 软刹车 [3] 重刹车 [4] 很重刹车 (出厂默认值为无刹车)
- 电池类型:** [1] LiPo(锂电) [2] NiCb/NiMh(镍氢/镍镉) (默认值为LiPo)
- 低压保护阈值:** 低/中/高 [1] 2.8V [2] 3.0V [3] 3.2V ; 默认值为中 (3.0V/65%)
对于Ni-xx电池组: 低/中/高中止电压是电池组初始电压值的50%/65%/75%对于Li-xx电池组: 可自动计算电池数量, 除了确定电池类型外无需用户设置。电子调速器为低压保护点提供了三个选择档位: 低 (2.8V) / 中 (3.0V) / 高 (3.2V)。
例如: 对于一个14.8V/4节的Li-po电池组来说, 低压中止保护电压为11.2V低/12.0V中/12.8V为高。
- 进角:** [1] 0° [2] 3.75° [3] 7.5° [4] 11.25° [5] 15° [6] 18.75° [7] 22.5° [8] 26.25° (默认值为15°)
低 (0°/ 3.75°/ 11.25°/ 18.75°) --为大多数的内转子马达设置
高 (22.5°/ 26.25°) --为6级和6极以上的外转子的马达设置
大多数情况下, 15°进角适用于所有类型的马达, 但为了提高效率, 我们建议对2极马达使用低进角设置 (一般的内转子), 6级和6级以上 (一般的外转子) 马达使用高进角。对于要求较高转速的马达, 可以设定高进角。某些马达需要特殊的进角设置, 如无确定我们建议您采用马达制造商推荐的进角设置或使用15°进角设置。注: 马达的进角设置修改后, 请先在地面上进行调试成功后再试飞。
- 启动模式:** 提供带有线性油门响应的快速加速启动。(默认值为普通)
[1] 普通启动: 从开始到最大速度油门响应无滞后;
[2] 柔和启动: 从开始到最大速度油门响应滞后3秒;
[3] 超柔和启动: 从开始到最大速度油门响应滞后8秒;
- PWM频率** [1] 12KHz [2] 8KHz (默认值为12KHz)
对于一些极数多且转速高的马达, 设置12KHz可以使马达驱动更平滑, 但是也同时导致的开关损耗加大, 发热更严重。多数电机可用8KHz的PWM频率。
- 低压保护模式:** (默认值为软关断)
[1] 软关断: 当达到预设的低压保护阈值时, 电调便会减小马达的输出功率, 直至关断输出(推荐);
[2] 硬关断: 当达到预设的低压保护阈值时, 电调立即关断输出。
- 电池节数:** 此选项只有电池类型选择LiPo(锂电)才有效。
[[1] 自动判别 [2] 2S [3] 3S [4] 4S (默认值为自动判别)
- 恢复出厂默认设置**
马达鸣叫该选项提示音后5S内, 将油门拉杆拉到最低位置, 进入恢复出厂默认设置选项, 该选项没有二级菜单功能, 此时马达发出“>765765”提示音, 表明已经恢复出厂默认设置, 并且电调进入了正常工作模式。
- 退出**
听到该选项提示音后, 将油门拉杆拉到最低位置, 进入退出设置功能选项, 该选项没有二级菜单功能, 此时马达发出“>765765”提示音, 表明电调进入了正常工作模式。

06 保护功能

保护功能	说明
启动保护	当加大油门时, 三秒内未能正常启动马达, 电调将会关闭动力输出, 油门摇杆需再次置于最低点后可以重新启动马达 (出现这种情况的原因可能有: 电调和马达连线接触不良或有断开、螺旋桨被其他物体阻挡等)。
温度保护	当电调工作温度超过100°C时, ESC将自动降低输出功率进行保护, 但不会将输出功率全部关闭, 最多降到全功率的40%, 以保证马达留有一定动力, 避免摔机。当温度下降后, 电调将逐渐恢复到最大动力。
油门信号丢失保护	当ESC检测到油门信号丢失1秒以上即立即关闭输出, 避免因螺旋桨继续高速转动而造成更大的损失。如果油门信号恢复, ESC可以立即恢复相应的功率输出。

- 报警音: 设计可听见的报警音, 供使用者判断通电后的异常情况
- 油门信号丢失警告音: 当电调未检测到油门信号时, 电调会作如下警示: “滴-、滴-、滴-” (每声之间的间隔为2秒)
 - 油门未归零 (油门摇杆未置于最低位置警告音): 当油门未打到最低时, 电调会做好如警示: “滴-滴-滴-滴-” (很急促的单短音鸣叫)
 - 油门行程过小警告音: 当所设定油门总行程过窄时 (电调设计时, 要求油门总行程不得小于三格油门), 电调会做警示, 表明本次行程设定无效, 需要重新设定。警示方式: “滴-滴-滴-” (每声之间的间隔为2秒)

07 首次使用电子调速器注意事项

- 第一次接通电调建议设置油门行程
飞盈佳乐电调的特点是根据不同的发射机设置最佳油门行程, 电调才能够通过发射机的整个油门行程来获取最平稳的油门线性, 目的是让电调获取并记忆发射机的油门输出信号, 此操作只需要进行一次, 更换发射机时需重复此操作步骤。
- 使用时, 连接电池组之前, 务必仔细检查所有插头连接的极性是否正确, 以及安装是否牢固, 防止因为错误连接极性或短路而损坏电子调速器。
- 您的航模如果在飞行过程中马达突然停转, 应当立即将油门拉杆拉到最低位置, 再推起油门拉杆, 这样马达将重新启动, 此时将油门控制在较小位置, 立即降落航模飞机。

08 安全常识

- 请勿私自拆卸电子调速器上的任何电子元件, 由此会造成永久性的损坏或信息丢失。
- 检验接收机装置设置正确, 首次测试ESC和马达时, 如果尚未确认接收机装置上的设置正确, 勿在马达上安装螺旋桨或传动小齿轮。
- 勿使用裂开或被刺破的电池组。
- 勿使用容易过热的电池组。
- 勿使用短路电池。
- 勿使用不合乎标准的电缆绝缘材料。
- 勿使用不合乎标准的电缆连接器。
- 电池或伺服系统的数量不要超过电子调速器的规定。
- 电池电压值不要超出电子调速器的工作电压范围。
- 注意电池极性, 错误的电池极性会损坏电子调速器。
- 请确保该电子调速器不会用于载人飞行器及其他载人机器上。
- 勿将ESC置于潮湿或强光地方。
- 勿在马达转动条件下抽掉电池, 这样可能引发大的峰值电流导致ESC烧坏。
- 勿在ESC外包装任何物品, 尽量将ESC安装在通风散热好的位置。

09 故障快速处理

故障现象	可能原因	解决办法
上电后, 马达不工作, 并未发出任何音乐声, 伺服系统也未接通。	电池组与ESC之间接触不良, 电源没有接通。	重新清理插头或更换插头, 检查并确认接线极性正确。
	焊接不牢固, 容易造成接触不良。	再次焊接连接线。
	电池电压不足。	检查电池组, 用符合规格满电的电池组替换。
上电后, ESC有自动检测电池节数声音, 但马达不能启动。	ESC有其他质量问题。	更换ESC。
	ESC没有设置油门行程。	重新进行油门行程设置。
上电后, 马达不工作, 未发出音乐声; ESC上电后, 马达不工作, 发出报警音。(滴滴两声响后有短暂停顿)	ESC与马达之间接触不良, 或焊接不牢。	检查连接器终端或替换连接器或再次焊接马达接线。
	马达不良。	更换马达。
上电后, 马达不工作但发出报警音。(滴-、滴-、滴-, 每声之间的间隔为2秒)	电池电压超限。	检查电池组电压是否在ESC工作范围内。
	接收机油门信号无输出。	检查并确认信号线与接收机油门通道是否连接正确; 检查发射器和接收机, 确认有信号输出。
上电后, 马达不工作, 发出持续地滴滴响。	油门摇杆未放置最小位置上。	将油门摇杆移至“零点”位置或者重新设置油门行程。
上电后, 马达不工作, ESC发出两声长响之后, 有两声短暂的滴滴响。	油门通道正反被错置, 导致ESC进入编程模式。	参考遥控器的说明书, 调整油门通道正反设置。
马达反向运行。	马达与ESC连接线顺序错误。	1. 将ESC与马达之间三条连接线中的任意两条调换。 2. 直接用遥控器通过改变马达转向设置, 改变方向。
飞行过程中, 马达中途停转。	电池电压低于设定的低压保护电压阈值, 且低压保护模式为关断方式。	1. 正确设置低压保护电压阈值; 电池充满飞行; 低压保护模式设为降低功率模式。如果在飞行中发现功率降低, 请及时降落。 2. 控制模型飞机飞行在遥控器遥控的范围内注意遥控器电池电压, 若电压降低较多, 需及时降落。
	油门信号丢失。	1. 检查遥控器是否操作得当。 2. 检查遥控器与接收机配合是否正确。 3. 使用环境中存在极强烈的电磁干扰, 尝试重新上电启动以恢复正常工作, 若该问题反复出现, 说明飞行地外部干扰过于强烈, 请更换飞行场地。
接线接触不良。	检查电池组插头, 电池输出线和马达连接线是否连接可靠。	



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

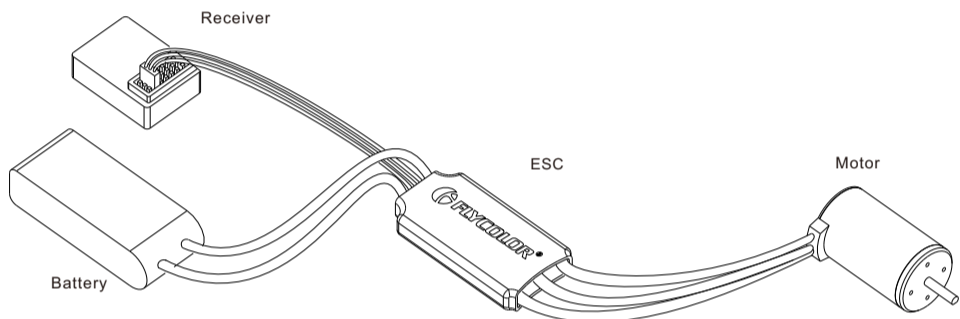
- Using C8051F850 MCU ,pipelined 8-bit C8051 core .
- FlyDragon Lite series,small size and light weight.
- Unique circuit design,strong anti-interference.
- Start mode can be set, throttle response is fast and speed control is linear smooth.
- Low-voltage protection threshold value can be set.
- Multiple 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

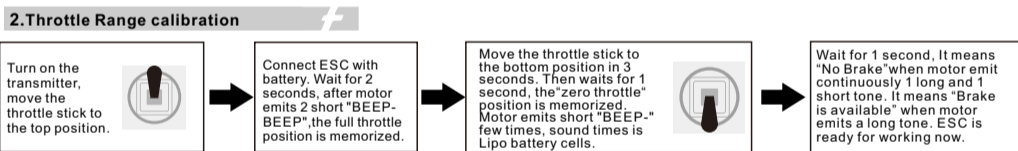
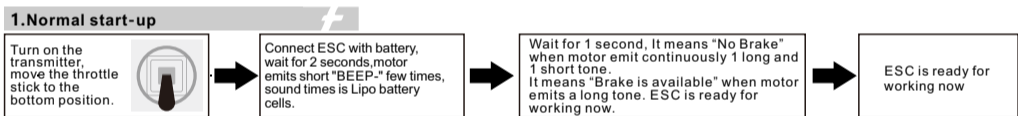
03 Wiring Diagram

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

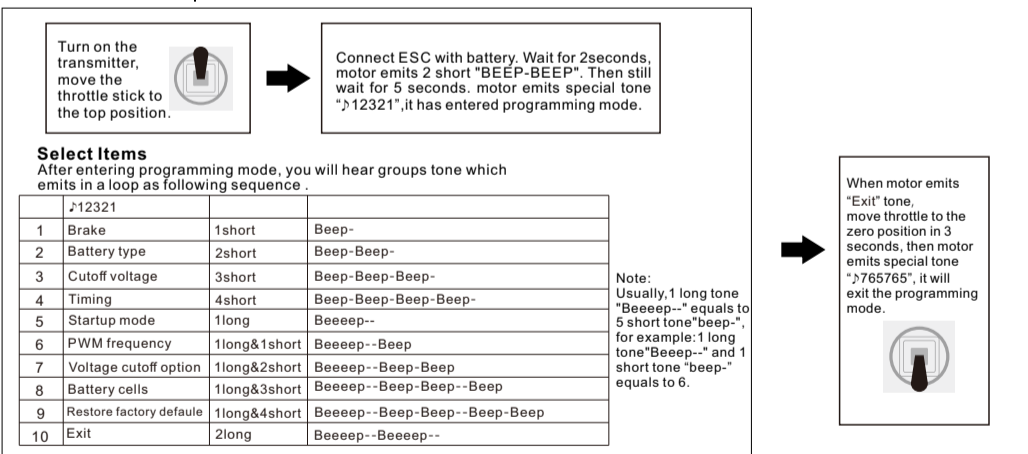


*The appearance of each model is different, the picture is a typical model for reference only.

04 Operation instruction



3.Programming



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	Beeperp--
6	PWM frequency	1long&1short	Beeperp--Beep
7	Voltage cutoff option	1long&2short	Beeperp--Beep-Beep
8	Battery cells	1long&3short	Beeperp--Beep-Beep--Beep
9	Restore factory default	1long&4short	Beeperp--Beep-Beep--Beep-Beep
10	Exit	2long	Beeperp--Beeperp--

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

Item parameter

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

Item	Prompt tone							
	1	2	3	4	5	6	7	8
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

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

Protection	Description
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 °C,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°C , 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 standard cables and cords and connectors.
- Battery cells and servo number can't 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.