FLYCOLOR®

无刷电子调速器 说明书

Francy 2 系列

BL-32

FRANCY 2

*图片仅供参考，产品以实物为准

ATTENTION 感谢您购买本产品！本产品功率强大，错误的使用可能导致人身伤害和设备损坏，强烈建议您在使用设备前仔细阅读本说明书并保存，严格遵守规定的操作程序。我们不承担因使用本产品或擅自对产品进行改造所引起的任何责任，包括但不限于对附带损失或间接损失的赔偿责任。我们有权在不经通知的情况下变更产品的设计、外观、性能及使用要求。

01 主要特性

● ARM 32-bit Cortex 核心MCU，工作频率高达64MHz，较上一代MCU提升25%；
● PWM 频率最高支持128K，大油门运行更顺滑、更稳定；
● 优化了ESC固件，油门线性更加顺滑，响应速度更快；
● 电调上电自动检测油门信号，支持普通PWM油门模式（1-2ms）的脉宽输入、Oneshot125（125-250us）、Oneshot42（41.7-83.3us）和 Multshot（5-25us）；
● 支持所有Dshot和Proshot 数字信号；
● Damped light再生制动，使得效率更高，油门从大到小变化时电机减速响应更加迅速，稳定性和灵活性显著增强；
● 体积小、重量轻；支持更高KV电机和更大功率负载；
● 模块化BEC，BEC输出可供电给接收机、舵机等外部设备，使得电调应用更加广泛；
● BEC 输出5V/3A；12V/2A可调节，应用更灵活。

02 产品规格

型号	持续电流 (散热良好)	瞬间电流 (10S 散热良好)	BEC/锂电池节数	重量 (供参考,含线材)	尺寸 (供参考)
Francy 2-20A	20A	25A	5V,3A / 3-6S 12V,2A / 4-6S	12.5g	29x14x9mm
Francy 2-30A	30A	35A	5V,3A / 3-6S 12V,2A / 4-6S	12.5g	29x14x9mm
Francy 2-40A	40A	50A	5V,3A / 3-6S 12V,2A / 4-6S	16.5g	33x16x10mm
Francy 2-50A	50A	60A	5V,3A / 3-6S 12V,2A / 4-6S	16.5g	33x16x10mm

● 固件:**Flycolor_Raptor_5**；
● 当选择5V/3A BEC输出时，工作电压支持3-6S锂电池；当选择12V/2A BEC输出时，工作电压支持4-6S锂电池。

03 连线示意图

*为避免短路和漏电，请确保连接处绝缘良好

接收机
电池
电子调速器
马达

50A·40A
30A·20A

*图片仅供参考，产品以实物为准

开路=5V
短路=12V
默认开路 NC=5V
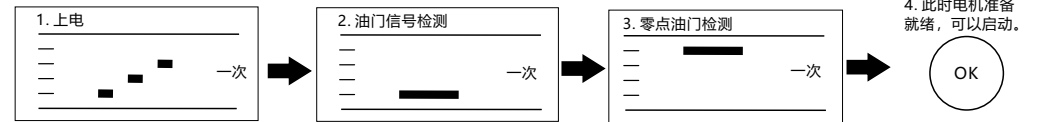5V/12V 输出
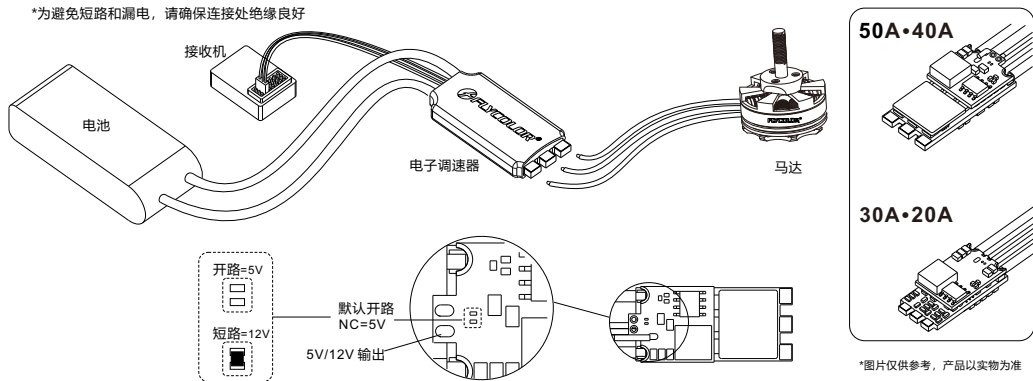
04 编程参数值

以下的参数需要通过BLHeliSuite32调参软件设置

1. 启动功率(Rampup power)：
启动功率可以设置为从3%-150%的相对值。这是在启动和提高转速时允许最大功率。对于低转速，为了便于低反电动势电压检测，最大功率是被限制的。启动功率也影响双向操作，参数是用来限制在更改转向时的功率。
在启动过程中，实际的功率取决于油门输入，可低于设定的最大启动功率，但最低是设定的四分之一。

2. 电机进角(Motor timing)：
电机进角可以设置为：自动 或1°-31°，通常设置中等数值进角即适用于大部分电机，但如果电机运转不顺畅时，可以尝试改变进角。对于一些高感电机，其换向退磁时间较长，尤其在低速运转的时候，电机会在油门快速增加的情况下停转或者不顺畅。将进角改高会有助于改善这个现象，因为高进角允许更长的换向退磁时间。

3. PWM频率(PWM frequency)：
PWM frequency low - 低频率在低油门需要的时候提供良好的主动制动；PWM frequency high-高频率在更高的油门时使运行更平稳，或可设置为根据转速变化。

4. Demag补偿(Demag compensation)：Demag 补偿是防止电机由于换向引起停转的一个功能，典型的现象是在快速增加油门时电机停转或不顺畅，尤其在低转速运行时。如前面所述，设置高进角可帮助改善，但有可能降低效率。一般情况下Demag补偿参数的值越高，保护越好。如补偿值设置得太高，最大功率将有所降低。
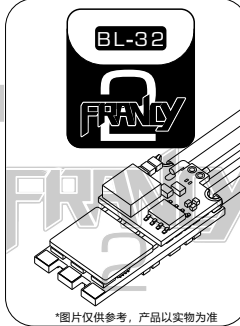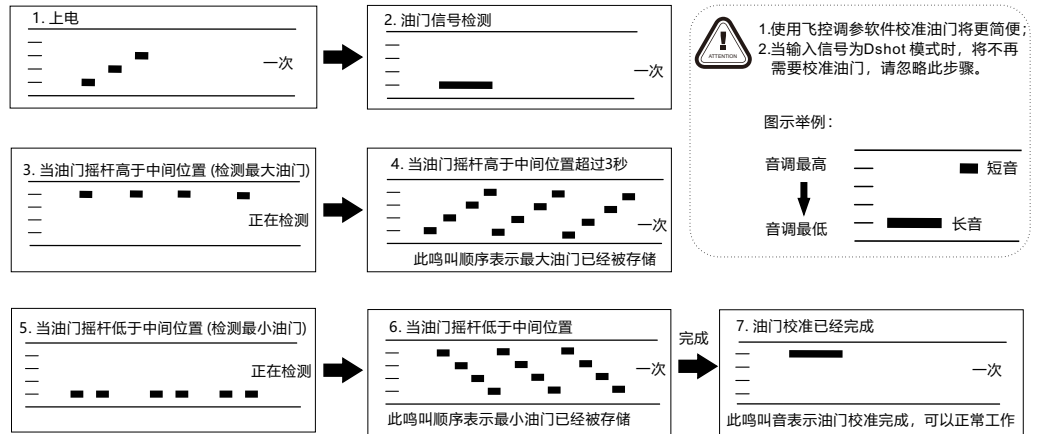
5. 正弦调制模式(Sine Modulation Mode)：正弦调制模式可以使运行效率提高百分之几，运行更平稳。注意：如果选择正弦调制模式，则可变pwm频率将不可用。

6. 最大加速度(Maximum Acceleration)：最大加速度可以设置在0.1% / ms-25.5% / ms之间，也可以设置为最大值，在这种情况下加速度不受限制。限制加速度的主要目的是避免在加速不一致造成失步的情况。例如：当设置为10% / ms时，这意味着对电动机施加的功率不允许每毫秒增加10%以上。

7. 电机转向(Motor Direction)：电机转向可以设置为正转/反转/双向3D/双向3D反转/双向soft/双向soft反转。在双向模式下，油门中点为零点，中点以上为正转，中点以下为反转；当选择双向操作时，不可油门校准。

8. 启动音量(Startup Beep Volume)：设置通电期间的蜂鸣音音量。

9. 警报音音量(Beacon/Signal Volume)：设置警报音的音量。如果油门信号在零点位置超过一个设定的时间，电调将开始报警。高音量将会导致电机或电调发热。

10. 警报音延迟(Beacon delay)：设置报警音开始之前的延时。

11. 启用油门校准(Throttle Cal Enable)：如果禁用，将不能油门校准。

12. 最小油门，最大油门和中心油门(Min throttle, max throttle and center throttle)：
设置电调的油门范围；中点油门只用于双向操作；设置值正常的为1000us 到 2000us 的输入信号。对于其他输入信号，该值必须按比例设置。
对于Dshot输入信号，这些设置无效

13. 温度保护(Temperature Protection)：
可以启用或禁用。温度保护阈值可以设置，当温度高于阈值时,电机功率降低；当温度高于阈值15℃时,电机功率降低到25%；电机功率不会低于25%。

14. 低转速功率保护(Low RPM power protect)：
可以启用、禁用或自适应启用。禁用它可以保证低KV电机在低电压运行时实现全功率，然而将增加同步失步的风险并伴随着电机或ESC发热。

15. 低压保护(Low Voltage Protection)：
低压保护可以设置2.5V/节-4.0V/节锂电池，或者可以禁用。当启用时，如果电池电压低于设定阈值将限制电机的功率。此功能主要用于固定翼飞机。

16. 电流保护(Current Protection)：对于此系列ESC该设置无效。

17. 停车制动(Brake on stop)：可以启用或禁用。当设置启用时，在通电状态，油门在零点位置电机将会有拖剎，阻止电机转动。如果油门没有零点，此项设置无效。

18. 自动遥测(Auto Telemetry)：启用自动遥测时，ESC将以32毫秒的间隔自动输出遥测，无论是否有来自输入信号的遥测请求。

19. LED控制(LED Control)：可以控制发光二极管（如果ESC支持）。

20. 堵转保护(Stall Protection)：可编程为Normal或Relaxed，Relaxed的堵转保护会增加ESC或电机损坏的风险，但当桨叶遇到障碍物时可以更快地恢复

21. 无阻尼模式(Non Damped Mode)：通过进行再生制动来实现阻尼模式，并实现固有的主动自由转动；由于制动而产生的损失会被主动自由转动减少的损失抵消。OFF-开启阻尼模式；ON-关闭阻尼模式。

22. S.BUS：如果选择了有效的S.BUS通道（0至16），则输入信号将被释放为SBUS。

23. S.PORT：如果选择了有效的S.PORT物理ID（1到28），则遥测格式将为S.PORT。请注意，只有使用USART1（端口PB6）进行遥测的ESC支持S.PORT，如果BLHeliSuite32中显示"S.PORT Physical ID"编程参数，则表示ESC支持该项。

24. 音乐配置(Music Note Config)：可以设置个性化音乐。

05 正常工作及提示音

1. 上电 一次
2. 油门信号检测 一次
3. 零点油门检测 一次
4. 此时电机准备就绪，可以启动。 OK

06 油门校准

1. 上电 一次
2. 油门信号检测 一次

ATTENTION 1.使用飞控调参软件校准油门将更简便；
2.当输入信号为Dshot 模式时，将不再需要校准油门，请忽略此步骤。

图示举例：
音调最高 ■ 短音
音调最低 ▬ 长音

3. 当油门摇杆高于中间位置 (检测最大油门) 正在检测
4. 当油门摇杆高于中间位置超过3秒 一次
此鸣叫顺序表示最大油门已经被存储

5. 当油门摇杆低于中间位置 (检测最小油门) 正在检测
6. 当油门摇杆低于中间位置 一次
此鸣叫顺序表示最小油门已经被存储
7. 油门校准已经完成 一次
此鸣叫音表示油门校准完成，可以正常工作

07 注意事项

● 每次上电会自动检测输入的油门信号，然后执行相应的油门模式；
● 首次使用无刷电调或更换遥控设备后需要进行油门行程校准；
● 请勿刷写除其它的固件，以免损坏电调；
● 无论任何时候都要注意极性，供电之前一定要反复检查；
● 在插拔或者做任何连接时，请关闭电源；
● 请不要超出ESC工作电流、电压范围使用；
● 所有焊接要求良好的焊接技术，任何时候都需要避免因焊接而造成元件或线材之间短路；
● 请确保所有电线和连接部件绝缘良好，避免短路造成产品损坏；
● 请避免在潮湿、高温等恶劣环境下使用产品，避免造成产品损坏
● 如需更多信息，请联系飞蓝佳乐售后或者技术支持。

FLYCOLOR®

Brushless ESC User Manual

Francy 2 series

BL-32

2 FRANCY

FRANCY 2

*All pictures are for reference only

01 Main features

- RM 32-bit Cortex MCU, frequency up to 64 MHZ, 25% higher than the previous generation of MCU.
- PWM frequency up to 128k, high frequency for higher throttle makes running smoother.
- ESC firmware is optimized, makes the throttle linearity smoother and the response faster.
- Supports regular 1-2ms pulse width input, as well as Oneshot125 (125-250us), Oneshot42 (41.7-83.3us) and Multshot (5- 25us). The input signal is automatically detected by the ESC upon power up.
- All Dshot and Proshot signals are supported .
- Damped light does regenerative braking, causing very fast motor retardation, and inherently also does active freewheeling.
- Small size and light weight, support higher KV motor and more power load .
- The output of the modular BEC can supply power to the receiver, steering gear and other external devices, which makes the application of the ESC more extensive;.
- Adjustable BEC output 5V / 3A or 12V / 2A , more flexible application.
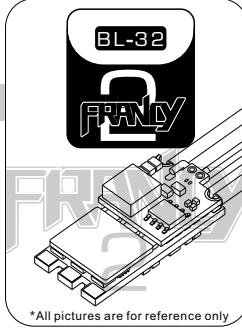
02 Specifications

Model	Con. Current (Good H.D.)	Burst Current (10S,Good H.D.)	BEC / LiPo	Weight (For reference)	Size (For reference)
Francy 2-20A	20A	25A	5 V , 3 A / 3 - 6 S 12V, 2A/ 4 -6S	12.5g	29x14x9mm
Francy 2-30A	30A	35A	5 V , 3 A / 3 - 6 S 12V, 2A/ 4 -6S	12.5g	29x14x9mm
Francy 2-40A	40A	50A	5 V , 3 A / 3 - 6 S 12V, 2A/ 4 -6S	16.5g	33x16x10mm
Francy 2-50A	50A	60A	5 V , 3 A / 3 - 6 S 12V, 2A/ 4 -6S	16.5g	33x16x10mm

- Firmware:**Flycolor_Raptor_5.**
- The supported working voltage is 3-6s liPo when 5V / 3A BEC is selected, it is 4-6s liPo when 12V / 2A BEC is selected .

03 Wiring diagram

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

Receiver

Battery

ESC

Motor

50A•40A

30A•20A

NC=5V

SC=12V

Default NC=5V

5V-12V Output
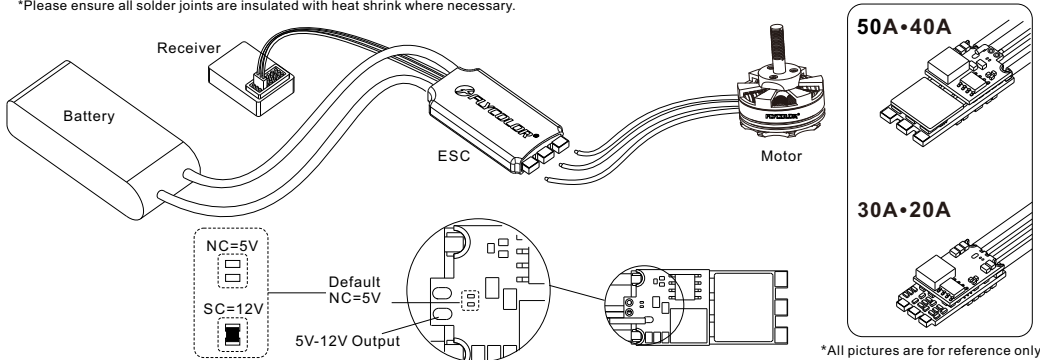
*All pictures are for reference only
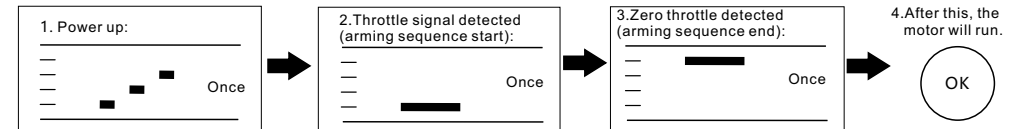
04 Programming parameter

Programming parameters below can be accessed from the configuration software (BLHeliSuite32).

1. **Rampup power:** Rampup power can be set to relative values from 3% to 150%. This is the maximum power that is allowed when ramping up at low rpms and during startup. For low rpms, the maximum power to the motor is limited, in order to facilitate detection of low BEMF voltages.
Rampup power also affects bidirectional operation, as the parameter is used to limit the power applied during direction reversal.
During startup, the actual applied power depends on throttle input, and can be lower than the maximum level set by the rampup power parameter, but the minimum level is a quarter of the maximum level.

2. **Motor timing:** Motor timing can be set between approximately 1° and approximately 31° in approximately 1° increments (actual accurate values here are 15/16ths of a degree). Typically a medium setting will work fine, but if the motor stutters it can be beneficial to increase timing. Some motors with high inductance can have a very long commutation demagnetization time. This can result in motor stop or stutter upon quick throttle increase, particularly when running at a low rpm. Setting timing to high will allow more time for demagnetization, and often helps. Motor timing can also be set to auto.

3. **PWM frequency:** Motor pwm frequency can be programmed in a range. Support variable pwm frequency where the pwm frequency is controlled by motor RPM. -Low frequency for low throttle gives good active braking where it is most needed. -High frequency for higher throttle makes running smoother

4. **Demag compensation:** It is a feature to protect from motor stalls caused by long winding demagnetization time after commutation. The typical symptom is motor stop or stutter upon quick throttle increase, particularly when running at a low rpm. As mentioned above, setting high commutation timing normally helps, but at the cost of efficiency. Generally, a higher value of the compensation parameter gives better protection. If demag compensation is set too high, maximum power can be somewhat reduced.
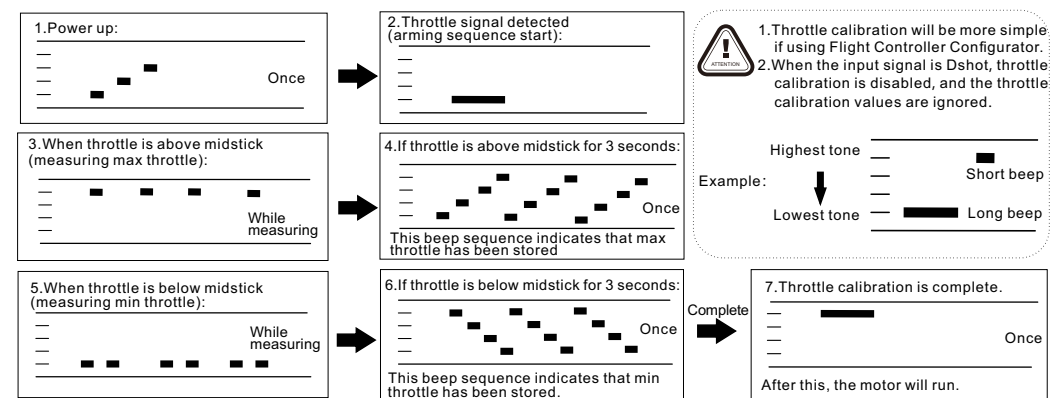
5. **Sine Modulation Mode:**
Sine modulation mode can give a few percent more efficient running &smoother running. Note: if sine mode is chosen, then variable pwm frequency is disabled.

6. **Maximum Acceleration:** Maximum acceleration can be set between 0.1%/ms and 25.5%/ms. It can also be set to maximum, in which case acceleration is not limited. Limiting acceleration is primarily intended as a backup parameter that can be used in cases where too hard acceleration gives desyncs. When setting to e.g. 10%/ms, it means that the power applied to the motor is not allowed to increase by more than 10% per millisecond.

7. **Motor Direction:** Motor direction can be set to fwd/rev/bidirectional 3D/bidirectional 3D rev/bidirectional soft and bidirectional soft rev. In bidirectional mode, center throttle is zero and above is fwd rotation and below is reverse rotation. When bidirectional operation is selected, throttle calibration is disabled.

8. **Startup Beep Volume:** Sets the volume of beeps during power up.

9. **Beacon/Signal Volume:** Sets the volume of beeps when beeping beacon beeps. The ESC will start beeping beacon beeps if the throttle signal has been zero for a given time. Note that setting a high beacon strength can cause hot motors or ESCs!

10. **Beacon delay:** Beacon delay sets the delay before beacon beeping starts.

11. **Throttle Cal Enable:** If disabled, throttle calibration is disabled.

12. **Min throttle, max throttle and center throttle:**
These settings set the throttle range of the ESC. Center throttle is only used for bidirectional operation. The values given for these settings are for a normal 1000us to 2000us input signal, and for the other input signals, the values must be scaled. For Dshot input signal, these settings have no effect.

13. **Temperature protection:**
Temperature protection can be enabled or disabled. And the temperature threshold can be programmed The programmable threshold is primarily meant as a support for hardware manufacturers to use, as different hardwares can have different tolerances on the max temperatures of the various components used.

14. **Low RPM power protect:** It can be enabled,disabled or on adaptive. Disabling it can be necessary in order to achieve full power on some low kV motors running on a low supply voltage. However, disabling it increases the risk of sync loss, with the possibility of toasting motor or ESC.

15. **Low Voltage Protection:** It can be set between 2.5V and 4.0V per lipo cell. Or it can be disabled. When enabled, it will limit power applied to the motor if the battery voltage drops below the programmed threshold. This feature is primarily intended for fixed wing crafts.

16. **Current Protection:** Some ESCs do not support this function, For these ESC, the settings have no effect.

17. **Brake on stop:** Brake on stop can be set between 1% and 100%, or disabled. When not disabled, brake will be applied when throttle is zero. For nonzero throttle, this setting has no effect.

18. **Auto Telemetry:** When it is enabled, the ESC will autonomously output telemetry at 32ms intervals, regardless of whether or not there are telemetry requests from the input signal.

19. **LED Control:** LEDs can be controlled on ESCs that support it.

20. **Stall protection:** It can be set to normal or relaxed. Relaxed increases the risk of damage to ESC or motor but can recover faster when props hit obstacles.

21. **Non Damped Mode:** Damped light mode is implemented by doing regenerative braking, and inherently active freewheeling is also implemented. Then losses due to braking are counteracted by the reduced losses of active freewheeling. **OFF**- Damped light is available ; **ON**- No Damped light.

22. **S.BUS:** If a valid S.BUS channel (0 to 16) is selected, then the input signal will be interpreted as S.BUS.

23. **S.PORT:** If a valid S.PORT physical ID (1 to 28) is selected, then the telemetry format will be S.PORT. Note that only ESCs that use USART1 (port PB6) for telemetry support S.PORT. If the "S.PORT Physical ID" programming parameter shows up in BLHeliSuite32, then your ESC supports it.

24. **Music Note Config**: Set up personalized music.

05 Beeps-Normal operation

1. Power up:	2.Throttle signal detected (arming sequence start):	3.Zero throttle detected (arming sequence end):	4.After this, the motor will run.
Once	Once	Once	OK

06 Beeps - Throttle calibration

1.Power up:	2.Throttle signal detected (arming sequence start):	⚠ 1.Throttle calibration will be more simple if using Flight Controller Configurator. 2.When the input signal is Dshot, throttle calibration is disabled, and the throttle calibration values are ignored.
Once	Once	

3.When throttle is above midstick (measuring max throttle):	4.If throttle is above midstick for 3 seconds:	Example: Highest tone — Short beep Lowest tone — Long beep
While measuring	Once This beep sequence indicates that max throttle has been stored	

5.When throttle is below midstick (measuring min throttle):	6.If throttle is below midstick for 3 seconds:	7.Throttle calibration is complete.
While measuring	Once This beep sequence indicates that min throttle has been stored.	Once After this, the motor will run.

Complete

07 Attentions

- ESC will automatically detect the input throttle signals every time as soon as it powered on, and then execute the corresponding signal-receiving mode.
- User need to calibrate the throttle range when starting to use a new ESC or another transmitter.
- Please don't flash any other firmware to avoid product damage.
- Observe polarity at all times. Double check before applying power.
- Power off before unplugging ,plugging in or making any connections.
- Please do not exceed the current & voltage range.

- All welding requires good welding technology, short circuit between the element or the wire should be avoided at any time.
- Please ensure that all wires and connecting parts are well insulated to avoid product damage due to short circuit.
- Never use this product in harsh environments such as humidity, high temperature, and so on to avoid product damage.
- Please contact Flycolor sales or technical support for more information.