Seal G2 Series ESC User Manual

Thank you for purchasing ZTW Seal G2 Brushless Electronic Speed Controller (ESC). Please read this manual carefully before using this product for the sake of safety. ZTW Model have no control over the use, installation, application, or maintenance of these products, thus no liability shall be assumed nor accepted for any damages, losses of costs resulting from the use of this item.

Important Warnings

- 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 boat to lose control or other unpredictable issues like damage to the device.
- Please use a soldering iron with the power of at least 60W to solder all input/output wires and connectors.
- Never attempt to drive two brushless motors with only one ESC, otherwise the ESC will fail.
- Please keep the propeller away from your body and other objects.

Key Features

1. Adopting new generation craft on the MOSFET, low heat generation, withstand large current instantly, and high reliability.
2. Adopting high performance 32 bit microprocessor, the operation frenquency is up to 170MHz which makes the ESC stronger computing ability and faster running speed.
3. The ESC is fully waterproof, the waterproof level is up to IP67, and it is equipped with metal water cooling to ensure efficient heat dissipation.
4. Super smooth start-up and accurate throttle linearity make the ESC suitable for various of applications such as, all kinds of RC boat models, electric surfboard and other underwater applications.
5. The ESC has two running modes for different applications:“Forward Only” and “Forward and Backward”.
6. The ESC has freewheeling which makes the ESC with higher driving efficiency and more energy-saving.
7. Adjustable SBEC 6V/7.4V/8.4V output voltage provides more powerful power to the servo. (OPTO ESC doesn’ t have built-in BEC)
8. Multiple protections: start-up, over-heat, low-voltage cutoff, signal loss, phase loss, over-current, abnormal power-on voltage, over-load protection.
9. Support high RPM motors, and compatible with most motors in the market.
10. Support programming via Phone App or LCD program card, easier and more convenient operation(Extra ZTW App adapter or LCD program box G2 needed.)
11. Support data communication with Futaba remote control (S.BUS2 protocol). (Only 130A HV,160A HV, 300A HV 6-14S ESCs have this feature.)
12. Support CAN protocol makes the ESC can be widly used for various of applications.
13. The ESC has data returning feature, it can send data in real-time: current, voltage, temperature, RPM, throttle and ESC status. And you can check the data via ZTW App or LCD program Box G2 in real-time.

Specification

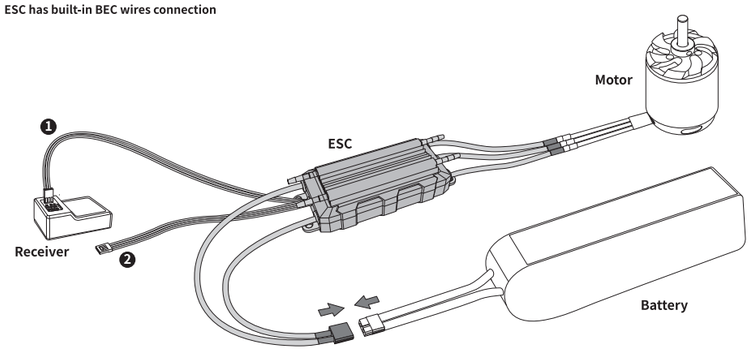
Type	PN# Model	Cont./Burst Current(A)	Battery cell Lipo/LiHV	Weight (g)	BEC	Size(mm)	User Program
Seal 70A SBEC 3-6S G2	7070210	70A/420A	3-6S Lipo/LiHV	107	6V/7.4V/8.4V 8A	64*38*26	Yes
Seal 90A SBEC 3-8S G2	7090210	90A/540A	3-8S Lipo/LiHV	196	6V/7.4V/8.4V 8A	95*44*27	Yes
Seal 105A SBEC 3-8S G2	7105210	105A/630A	3-8S Lipo/LiHV	199	6V/7.4V/8.4V 8A	95*44*27	Yes
Seal 130A SBEC 3-8S G2	7130210	130A/780A	3-8S Lipo/LiHV	205	6V/7.4V/8.4V 8A	95*44*27	Yes
Seal 130A HV 6-14S SBEC G2	7130310	130A/780A	6-14S Lipo/LiHV	296	6V/7.4V/8.4V 10A	106*52*30	Yes
Seal 160A HV 6-14S SBEC G2	7160310	160A/1080A	6-14S Lipo/LiHV	304	6V/7.4V/8.4V 10A	106*52*30	Yes
Seal 200A 4-8S SBEC G2	7200210	200A/1200A	4-8S Lipo/LiHV	306	6V/7.4V/8.4V 10A	106*52*30	Yes
Seal 300A HV 6-14S OPTO G2	7300410	300A/1800A	6-14S Lipo/LiHV	542	NONE	130*64*38	Yes

Wires Connection

The speed controller can be connected to the motor by soldering directly or with high quality connectors. Always use new connectors, which should be soldered carefully to the cables and insulated with heat shrink tube. The maximum length of the battery pack wires shall be within 6 inches.

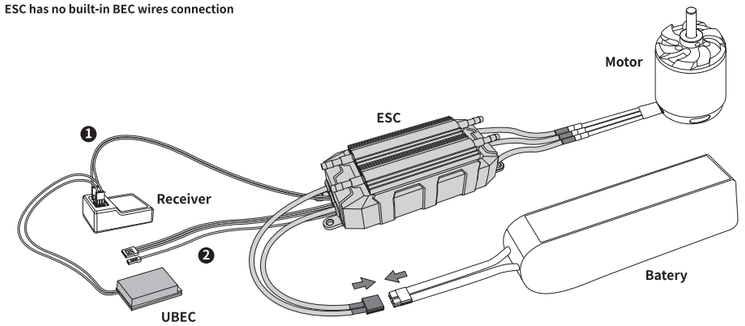
- Solder controller to the motor wires.
- Solder appropriate connectors to the battery wires.
- Insulate all solder connectors with heat shrink tubes.
- Plug the “JR” connector into the receiver throttle channel.
- Controller Red and Black wires connects to battery pack Red and Black wires respectively.

ESC has built-in BEC wires connection



❶ Black: ground wire/White: signal wire/red: BEC wire
❷ Yellow: receiver wire/White: transmiter wire/Black: negative wire/Red: positive wire

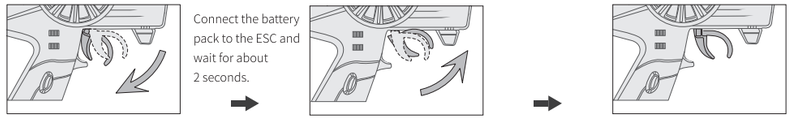
ESC has no built-in BEC wires connection



❶ Black: ground wire/White: signal wire
❷ Yellow: receiver wire/White: transmiter wire/Black: negative wire/Red: positive wire

Throttle calibration

Important: Please make the throttle calibration for the first time using ESC.
Throttle calibration by pistol transmitter:



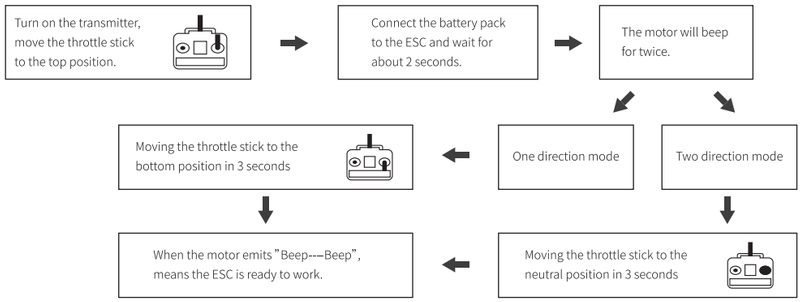
Turn on the transmitter, move the throttle stick to the top position

Connect the battery pack to the ESC and wait for about 2 seconds.

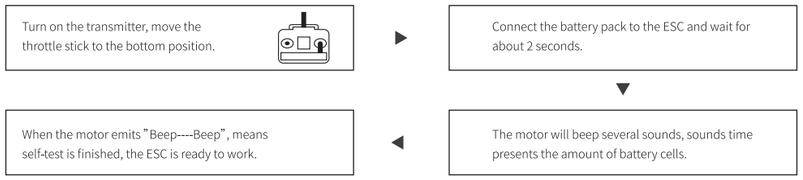
The motor will beep for twice, then release the throttle stick to the neutral position in 3 seconds.

When the motor emits a long “Beep----Beep”, means the ESC is ready to work.

Throttle calibration by stick transmitter:



Normal Startup Procedure



Programming Items(The option written in bold font is the default setting)

1. Running Mode: Forward Only/**Forward and Backward**
2. Brake Force: **0%**/0-100%
3. Timing: **15**/0-30 degrees
4. Motor Rotate: **CW**/CCW
5. SR function: ON/**OFF**
   The synchronous rectification function makes ESC with higher driving efficiency and more energy-saving.
6. Battery cells: **Auto**/Set this item manually
7. Low Voltage Cutoff Threshold: OFF//NIMH 60%/**3.0V**/3.2V/3.4V/3.6V/3.8V
   For example: using 3 lithium batteries and setting 3.0V as the low voltage cutoff value, then the low voltage protection threshold is: 3*3.0 = 9.0V
8. Low Voltage Cutoff Type: **Reduce Power**/Cut Off Power
   Reduced power: When the voltage drops to the set low-voltage protection threshold, the ESC will reduce power to 70%.
   Cut Off power: When the voltage drops to the set low-voltage protection threshold, the ESC will cut off the power immediately.
9. BEC: **6V**/7.4V/8.4V
   The OPTO ESC doesn’ t have built-in BEC.
10. Acceleration: **0**/1/2/3
11. Startup Power:1/**2**/3
12. Telemetry: **RealTime**/SUBS2
    RealTime: When this item is set, it means you can check the data of ESC in real-tim via ZTW LCD program card G2: current, voltage, temperature, RPM, throttle and ESC status.
    SBUS2: When this item is set, it means you can date communication with Futaba remote control(S.BUS2 protocal)

Entering The Programming Mode

1. Turn on the transmitter, move the throttle stick to the top position.
2. Connect the battery pack to ESC.
3. Wait for 2 seconds, the motor will emit special tone like “ beep-beep beep”
4. Wait for another 3 seconds, the motor will emit special tone like “123”, which means program mode entered.

Programming Items

Running Mode	Fwd. Only					***Fwd. & Bwd**	
Brake Force	***0%**					0-100%	
Motor Timing	***15**					0-30 degrees	
Motor Rotate	***CW**					CCW	
SR Function	ON					***OFF**	
Battery Cells	***Auto**	3S		6S		8S	
		6S	8S	10S	12S	14S	
Low voltage Cutoff Threshold	OFF	NIMH 60%	***3.0V**	3.2V	3.4V	3.6V	3.8V
Low Voltage Cutoff Type	***Reduce Power**					Cut off Power	
BEC Voltage	***6V**			7.4V		8.4V	
Acceleration	***0**		1		2		3
Startup Power	1			***2**		3	
Telemetry	***RealTime**					SUBS2	
Restore Factory Setup Defaults	***Restore**						

❶ Note: " * " value means default settings.

Protection Function

1. 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.)
2. 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.
3. 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 recovers during power down, the ESC will immediately resume 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 certain amount of time to save the plane, taking into account safety and practicality.
4. 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.

Trouble Shooting

Trouble	Possible Reason	Action
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, motor doesn't run and doesn't emit any sound.	1. Bad connection between ESC and battery. 2. Bad soldering cause bad contact. 3. Low voltage of the battery. 4. Quality problem of ESC.	1. Clean the connectors or replace them, check the connection polarity. 2. Solder the wires again. 3. Check battery pack, use full-charged battery. 4. Change ESC.
Motor does n’ t work and no audible tone emitted after connecting the battery. Servos are not working either.	1. Poor/loose Connection between battery Pack and ESC. 2. No power 3. Poor soldered connections 4. Wrong battery cable polarity 5. ESC throttle cable connected to receiver in the reverse polarity	Check all the connections make sure you are doing it right.
Motor does not work but servos do	1. Poor / loose connection between ESC and motor 2. Burnt motor coils 3. The battery pack voltage exceeds the acceptable range. 4. Throttle stick is not at the lowest position 5. The ESC throttle calibration has not set up	1. Check all the connections make sure you are doing it right. 2. Change a new motor. 3. Solder the wires again. 4. Check the battery pack, use full-charged battery. 5. Set throttle range again.
When the ESC is powered on, the motor does not work and an alarm sound (continuously beeping) will sound.	The throttle stick is not in the bottom position after power on.	Move the throttle stick to the bottom position.
Motor runs in reverse rotation	Wrong cables polarity between the ESC and the motor.	Swap any two of the three cable connections between the ESC and the Motor or access the Motor Rotation function via the ESC programming mode and change the pre-set parameters.

DOWNLOAD HERE THE ZTW APP

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ZTW Technology Co.,Ltd.

海豹 SEAL G2 系列

无刷电子调速器说明书

感谢您使用中特威科技有限公司设计、制造的无刷电子调速器(ESC)。我们强烈建议您在使用之前阅读本使用手册。深圳市中特威科技有限公司有权不经通知变更其产品，包括其外观和性能参数及使用要求；对其产品是否适合特定用途不作任何保证、申明或承诺。不承担因第三方产品相关修改所引起的任何责任，中特威科技有限公司也不承担因应用该产品而产生的任何责任，包括直接损失或间接损失的赔偿责任。

注意事项

- 电调与相关连接部件连接前，请确保所有电线和连接部件绝缘良好，短路会毁坏电调。
- 请务必仔细连接好各部件，若连接不良，您可能不能正常控制遥控船，或出现设备损坏等其他不可预知的情况。
- 若需对电调的输入输出线、插头做相关焊接时，为保证焊接牢靠，请使用至少60W功率的焊接设备进行焊接。
- 请勿尝试单个电调驱动两个无刷马达，否则将会导致电调出现故障。
- 调试请将船模架起，确保船桨不会碰到人或其他物体，以免发生安全事故。

主要特性

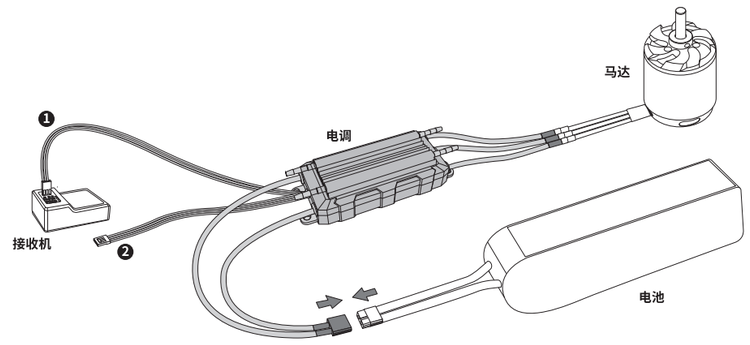
1. 采用功率输出元器件(MOSFET)选用新一代的制作工艺，发热低，瞬间承受电流大，可靠性高。
2. 采用高性能32位处理器，运行频率高达170MHz，运算能力极强，运行速度更快。
3. 电调采用全防水设计，防水等级高达IP67，搭配金属水冷散热，确保高效散热效果。
4. 超流畅的启动与精准的油门线性，适用于各种船模、电动冲浪板等各类水下设备。
5. 具有正转(单向)和正反转(双向)两种运行模式。
6. 具有同步整流，效率高，电调更节能，续航时间更长。
7. SBEC 6V/7.4V/8.4V三档可调，持续8A电流供应，给舵机提供更强劲的动力(OPTO高压电调无此功能)。
8. 多重保护：启动保护，过温保护，低压保护，缺相保护，信号丢失保护，过流保护，上电电压异常保护，过负荷保护。
9. 自动识别马达进角，支持高RPM马达，可兼容市面上绝大多数马达。
10. 支持手机App或LCD编程，操作更简单方便(需单独购买ZTW蓝牙模块或LCD编程卡)。
11. 支持与Futaba遥控器进行数据通信 (S.BUS2协议)。(130A HV,160A HV,300A HV 6-14S此三款才有此功能)。
12. 具有数据回传功能，可实时发送数据：电流、电压、温度、转速、油门、电调状态，且可用手机App或LCD编程卡上实时查看以上数据。
13. 支持CAN协议，应用范围更广。

产品规格

Type	编号	持续电流 峰值电流 (A)	电池节数	重量 (g)	BEC输出	尺寸(mm) (长*宽*高)	支持编程卡
Seal 70A SBEC 3-6S G2	7070210	70A/420A	3-6S Lipo/LiHV	107	6V/7.4V/8.4V 8A	64*38*26	是
Seal 90A SBEC 3-8S G2	7090210	90A/540A	3-8S Lipo/LiHV	196	6V/7.4V/8.4V 8A	95*44*27	是
Seal 105A SBEC 3-8S G2	7105210	105A/630A	3-8S Lipo/LiHV	199	6V/7.4V/8.4V 8A	95*44*27	是
Seal 130A SBEC 3-8S G2	7130210	130A/780A	3-8S Lipo/LiHV	205	6V/7.4V/8.4V 8A	95*44*27	是
Seal 130A HV 6-14S SBEC G2	7130310	130A/780A	6-14S Lipo/LiHV	296	6V/7.4V/8.4V 10A	106*52*30	是
Seal 160A HV 6-14S SBEC G2	7160310	160A/1080A	6-14S Lipo/LiHV	304	6V/7.4V/8.4V 10A	106*52*30	是
Seal 200A 4-8S SBEC G2	7200210	200A/1200A	4-8S Lipo/LiHV	306	6V/7.4V/8.4V 10A	106*52*30	是
Seal 300A HV 6-14S OPTO G2	7300410	300A/1800A	6-14S Lipo/LiHV	542	NONE	130*64*38	是

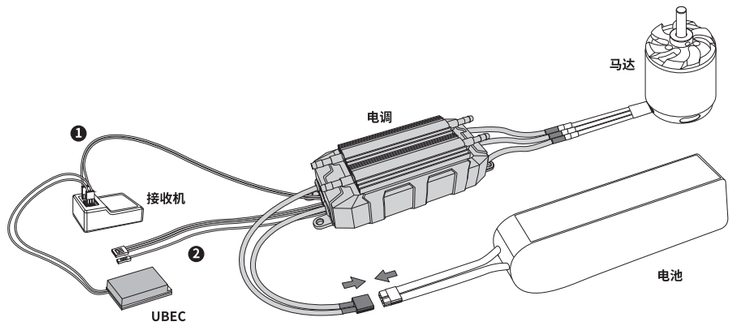
调速器连接线说明(线连接用热缩管收缩使其绝缘，避免短路烧毁调速器)

无刷电调具备BEC时线路连接图



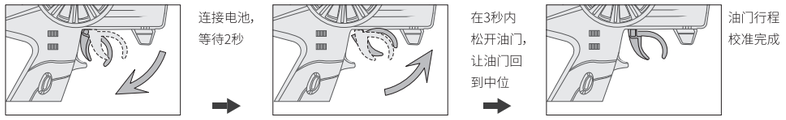
❶ 黑:地线/白:信号线/红:BEC线
❷ 黄:接收机线/白:遥控器线/黑:负极线/红:正极线

无刷电调不具备BEC时线路连接图



❶ 黑:地线/白:信号线
❷ 黄:接收机线/白:遥控器线/黑:负极线/红:正极线

首次使用电调并设置油门行程

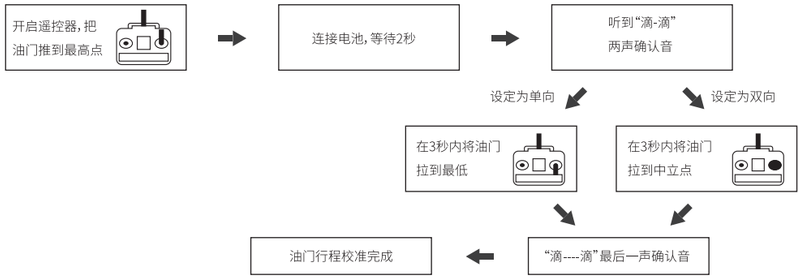


开启遥控器，把油门推到最大油门点

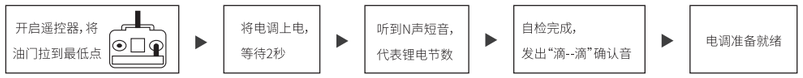
听到“滴-滴”两声确认音

电机发出“滴----滴”一声长鸣音

使用板控遥控器时，油门行程设置方法如下：



电调的正常启动程序



编程项简要说明(黑体字为出厂默认值)

1. 油门类型: 单向/**双向**
2. 刹车力度: **0%**/0-100%
3. 进角: **15**/0-30 degrees
4. 马达方向: **正向**/反向
   正向：电机默认旋转方向
   反向：将电机旋转方向更改
5. 动能回收:打开/**关闭**
   效率更高，更节能，续航时间更长
6. 锂电节数: **自动**/手动设置
   自动：按单节电池3.8V计算电池节数
   手动设置：根据不同电调电压范围进行手动设置
7. 低压保护点: 关闭/NIMH 60%/**3.0V**/3.2V/3.4V/3.6V/3.8V
   例如：使用3节锂电，设定为3.0V为低电压保住值，则低压保护阈值为: 3*3.0 = 9.0V
8. 保护方式: **降低功率**/立即关断
   降低功率: 当达到预设的低压保护阈值时，电调减少输出功率至70%
   立即关断: 当达到预设的低压保护阈值时，电调立即关断输出功率
9. BEC: **6V**/7.4V/8.4V
   OPTO高压电调无内置BEC
10. 加速度: **0**/1/2/3
11. 启动速度：1/**2**/3
12. 遥控回传：**RealTime**/SUBS2
    RealTime: 选择此选项时表示可以通过连接ZTW LCD编程卡，实时查看电调数据: 电流、电压、温度转速、油门、电调状态。
    SBUS2: 选择此选项时，表示可以连接S.BUS2协议的Futaba遥控器进行数据通信。

编程参数表

油门类型	单向						双向
刹车力度	0%						0-100%
进角	15						0-30 degrees
马达转向	正向(CW)						反向(CCW)
SR功能	打开						关闭
电池节数	自动计算	3S		6S		8S	
		6S	8S	10S	12S	14S	
低压保护值	关闭	NIMH 60%	3.0V	3.2V	3.4V	3.6V	3.8V
电压保护类型	降低功率						立即关断
BEC输出	6V			7.4V			8.4V
加速度	0		1		2		3
启动力度	1			2			3
遥控回传	RealTime						SUBS2
恢复出厂默认	复位						

❗ 注: 灰颜色为出厂默认选项参数。

保护功能

1. 启动保护：当推油门启动后，如在两秒内未能正常启动电机，电调将会关闭电机，油门需要重新设置，才可以重新启动。可能原因：电调与电机接线断开或接触不良、螺旋桨被其他物体阻挡、减速齿卡死等。
2. 温度保护：当电子调速器工作温度超过 110 度时，电调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 70%，以保证电机留有一定动力，避免摔机。
3. 油门信号丢失保护：当电调检测到油门信号丢失1秒后，将自动减少对马达的输出功率，然后油门信号丢失超过2秒，电调将自动关断马达。如果在降功率过程中油门信号恢复，电调可以立即恢复油门控制。这样在瞬间信号丢失情况下 (2秒以下)，电调并不会进行油门保护；只有当遥控信号确实长时间丢失，才进行保护，但电调不是立即关闭输出，而是有一个逐步降低输出功率的过程，给玩家留有一定的救机时间，兼顾安全性和实用性。
4. 过负荷保护：当负载突然变得很大时，电调会切断动力，或自动重启，出现负载急剧增加的原因通常是马达堵转。
5. 上电电压异常保护：电调连接电池或电源时，会检测输入的电压，若输入电压不在电调的工作电压范围，则判断上电电压异常，进入保护状态，并闪灯鸣叫提示。
6. 低压保护:当电调工作电压低于设定的保护电压时，电调会逐渐降低输出功率进行保护，但不会将输出功率全部关闭，最多只降到全功率的50%，保证仍有动力可以降落，更换新电池重新上电后恢复正常。
7. 过流保护：使用过程中，若电流超过规定值以后，电调会立即切断输出，然后快速恢复动力，再次超过规定值将彻底切断动力不再恢复，断电重连后恢复正常。有可能是因为过载，马达烧了等原因造成的。

常见问题解答

出现的问题	可能的原因	解决方法
接通电调后有自动检测电池节数声音，但马达不能启动	电调没有油门行程设置	对电调进行油门行程设置
马达不工作，连接电池后马达未发音乐声，伺服系统也未运行	电池组与电调之间接触不良 没接通电源 焊接不牢固 (接头易断) 电池电缆极性错误 电调信号线与接收机连接极位相反 电调有问题	清理连接器终端或替换连接器 用刚充满电的电池组替换 再次焊接电缆连接 检查并确认电缆极性 检查连接在电调上的信号线以确保处于正确极性 更换电调
马达不工作，连接电池后马达未发出音乐声，但伺服系统在运行接通电调后马达不工作，发出警报音 (两声滴滴响后有短暂停顿)	电调与马达之间接触不良 马达线圈被烧 焊接不牢固 (接头易断) 电池组电压超出正常范围	检查连接器终端或替换连接器 替换马达 再次焊接电缆连接 更换为刚充满电的电池组 检查电池组电压
接通电调后马达不工作，发出警报音 (持续地滴滴响)	通电后油门拉杆不在最小位置	将油门拉杆移至最小位置
接通电调后马达不工作，电调发出两声长响之后，有两声更长点的滴滴响	被颠倒的油门通道导致电调进入程序设计模式	进入发射器上的伺服系统 倒转菜单并倒转油门通道
马达反向运行	电调与马达之间错误的电缆连接	交换电调与马达之间三条电缆连接中的任意两条或者通过电调程序设计模式进入马达旋转功能并改变预设参数

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