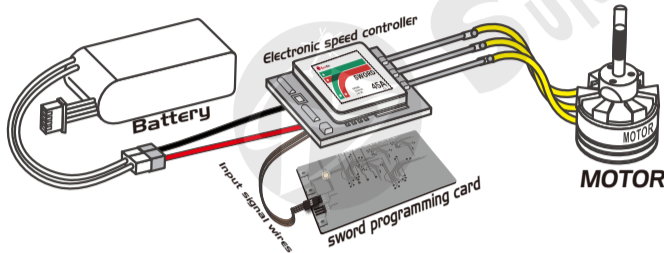


— Advantages of Programming Card —

With the programming card, you can adjust various settings of the ESC. A special feature is to adjust the two type of Lithium batteries cutoff voltage accurately. Also you can adjust timing, different brake modes and governor speed by selection buttons. Present settings can be read back from ESC with the LED display. Also you can connect PC with the USB port to upgrade the ESC firmware and set with the fine settings.

— Connection Diagram —



— Instruction —

Connect with battery, after 3S, motor beeps and one light in the first row is on, this means ESC and programming card is connected successfully or if the first row lights are all off, means not connect successfully, you need power again. After successfully connected, you can set the parameters of ESC through programming card, Up and Down button for function selections. Left and Right button for the details, confirmation button is to confirm and store the data in ESC.

Tips-1: While the parameters can't be stored successfully to ESC, a short beep from motor to alert an error, if stored successfully, there will be a long beep.

Tips-2: You can press confirmation button to read back and show the parameters while one whole line of programming card LED lights are off or one cell of the table is empty(ex: line 6, column 7), this is another way to manage ESC settings in the case of none cutting off power.

Tips-3: Before disconnecting ESC and programming card, you can roll down and up each line of the menu to confirm the settings. This is only for the latest setting records, not for all the ESC settings.

Tips-4: Some parameters settings rely on the other parameters; such like Brake, only at plane mode can be set, if not plane mode, will alert an error with a short beep.



After all adjustments, we strongly suggest you to cut the power and power again to confirm all the settings.

— Programmable Parameters —

START SPEED	PLANE FAST	PLANE MID	PLANE SLOW	HELI FAST	HELI MID	HELI SLOW	HELI X-SLOW
CUTOFF TYPE BAT. TYPE	OFF	SLOW DOWN	CUT OFF	NIMH	LIFE	LIPO	
CUT OFF VOLTAGE	2.2 2.9	2.3 3.0	2.4 3.1	2.5 3.2	2.6 3.3	2.7 3.4	2.8 3.5
CELLS	2	3	4	5	6	7	8
CELLS	9	10	11	12	13	14	AUTO
BEC VOLTAGE	5	5.5	6	7.4	8.4		
TIMING	0°	6°	12°	18°	24°	30°	AUTO
PWM FREQ.	8K	9K	10K	12K	14K	16K	18K
GOV. MODE & FREEW.	GOV OFF	GOV ON	GOV FAST	GOV STORE	FREEW. ON	FREEW. OFF	
GOV P-GAIN	0.5	0.7	0.9	1.2	1.4	1.6	1.9
GOV I-GAIN	0.02	0.03	0.04	0.05	0.06	0.08	0.09
BRAKE	OFF	ACRO	ACRO HARD	SMOOTH	MID	HARD	F3A BRAKE
AUTO ROT. REST. TIME	OFF	5s	10s	15s	25s	35s	60s
AUTO ROT ACCELERATE TIME	1s	1.5s	2s	2.5s	3s	3.5s	4s

In the table with "&" as two different functions

1 Start Speed

The time for Motor speed from 0 to max, plane fast is fastest which can reach the max speed the soonest. Heli extremely slow is the slowest and spend the most time to reach max speed. For Startup Speed, the faster, the sooner for motor to reach max speed, but start more crudely. Conversely, motor starts up more softly.

2 Cutoff type&BAT.Type

They are two different parameters. Cutoff is for lower voltage protection. It protects the motor while battery voltage is lower than the set cutoff voltage. There are three options: None protection, Soft shutdown, Hard shutdown. None protection: if the battery voltage is lower than set cutoff voltage, ESC doesn't stop motor and motor will stop until no power. Soft shutdown: if the battery voltage is lower than set cutoff voltage, ESC will stop the motor slowly and the throttle will set below the start throttle, there will be two short beeps to alert low-voltage and need to replace or charge the battery. Hard shutdown: if the battery voltage is lower than set cutoff voltage, ESC will stop the motor immediately.

3 Cut off voltage

This setting is only available if battery types are LiFe and Lipo. If battery type is Nimh, the light is not on and can not set, if set compulsively, there will be a short beep to alert error. The default cutoff voltage is 2.4/3.1. If battery type is LiFe and one cell battery voltage is lower than 2.4V will activate cutoff. If battery type is Lipo, one cell battery voltage is lower than 3.1V will activate cutoff.

4 Cells

This setting is also only available if battery types are LiFe and Lipo. If battery type is Nimh, the light is not on and can not set, if set compulsively, there will be a short beep to alert error. Select the correct cells number according the actual battery connected. The number of battery cell is 2-8.

5 Cells

This setting is also only available if battery types are LiFe and Lipo. If battery type is Nimh, the light is not on and cannot set, if set compulsively, there will be a short beep to alert error. Set the cells number according the a ctual battery cells connected. The number of battery cell is 9-14. The last parameter is automatically detect with the numbers of battery cell.

Notices:

- While settings of cutoff voltage, battery type, cutoff voltage and cells are off, if need to turn on the cutoff voltage again, you need to firstly select the battery type, then select the protection type, if you don't select the battery type, the cutoff voltage will keep off, without protection.
- Only battery types are LiFe, Lipo, the cutoff voltage and cells can be set, Nimh battery cannot set the two parameters.
- While the 4th line lights are all off, you can press confirmation button to read back the ESC settings.

6 BEC Voltage

The ESC is with BEC and can supply power for servo. The default voltage is 5V and you can adjust the voltage with programming card.

7 Timing

While timing is higher, the motor speed is faster and more efficiency, but consume more power and require high for motors. Timing should set according the motor specs, the default is 18 C.

8 PWM FREQ.

While PWM frequency is higher, the motor runs smoother, but consume more power. You should set the frequency according the motor. Default set is 16K. While governor speed mode, default set is 8K. Please don't adjust the PWM frequency while governor speed mode as the parameters in ESC also will be modified.

9 GOV Mode&Freew.

Governor speed is only available for Heli mode, can be set as: GOV OFF, GOV ON, GOV FAST, GOV STORE. You need to set RPM value each mode then to use it. The four options act as below: GOV OFF: governor speed not set, the speed will vary according the environment condition, such like wind and battery voltage. GOV ON: the speed will keep stable, not vary because of wind and battery voltage. GOV FAST: works similar as Gov on, just adjust more quick to keep speed stable. GOV STORE: ESC will restore the speed sets for the next power on, we suggest to set GOV STORE mode as preferred selection.

Attention: Please demarcate governor speed with propeller is mounted. To ensure personal safe, please make sure no objects within the range of the propeller. Please set propeller pitch to zero to prevent the model take off.

Regular governor speed standardization & Fast governor speed standardization: After ESC armed, throttle reaches to 100%, RMP reaches max, governor speed standardization is finished and go into speed-governed running status. Repower will let the ESC go into governor speed standardization again.

Store governor standardization: After ESC is armed, a beep tone indicates the mode is Store governor mode, but do not standardize governor speed yet. Push the throttle to 100%, governor speed standardization will be done after the RPM reaches max and then the ESC go into speed-governed running status immediately. Then push the throttle to 0% to stop the motor, the ESC will save governor speed parameters. No need to standardize governor speed every time you power the ESC.

When feel the governor store effect is not satisfied or replace external parts (such as the replacement of the motor, battery for change, change gear, change different type blade, etc.), the governor store mode need to remove the last parameters, and operating calibration again, save the new governor store parameters. Operation: selected governor store off by programming card, press the enter key to confirm, selecting the governor store, and press the enter key to confirm then the last parameters was deleted, last, do the operation as the governor speed standardization.

Synchronous rectification, ESC can reduce the temperate value by this feature, opened by default.

10 GOV P-Gain

The parameter is for adjusting the governor speed performance, only available for Heli model and governor speed on. This can adjust the head wing speed change, speed change + or speed change -. This is actually controlled by the circuit power. For smaller helicopters and the rotor diameter is less than 1m, the parameter cannot set beyond 1. If for bigger helicopters, you can choose the max value. If the tail shake or swing, it means parameter need to be adjusted.

11 GOV I-Gain

This parameter can help to adjust the head wing speed faster or slower. This is supplement for GOV P-Gain. GOV P-Gain can adjust the speed efficiency but cannot meet the exactly required speed of the head wing, as it's required with offsets, GOV I-Gain can be set to eliminate the offsets.

Normally we need to adjust both of the two parameters. If you increase the GOV P-Gain, you also need to increase the GOV I-Gain or reduce both. If the parameters set too high, it will cause vibrate in resonance for the tail gyro and governor, which will result a noise or even tail shake and swing, the worse will lose control. So you need to adjust GOV P and GOV I step by step.

12 Brake

For Heli, cannot set brake, if you set, a short beep will alert error and if you read the parameters, you will find it's not actually set there. For plane, you can set the brake according motors, default is off. Brake also relates with throttle, it works if throttle is lower than brake throttle, means the start throttle must higher than min throttle. Only if throttle is higher than start throttle, it starts, if lower, it will stop but may not brake, only if throttle is lower than start throttle, the brake works. We suggest you to set the start throttle with 10% of full throttle.

Mini Throttle Start Throttle Max Throttle

13 Auto rot. Rest. Time

This is only available for Heli and set with governor mode. AR time means the time between pull down throttle to stop the running motor and restart the motor again. Motor can reach throttle speed quickly within the set time. If set off, no effect, motor will start according speed set. If set 10S, you can start motor quickly within 10S, the start speed is according the AR accelerate time.

14 Auto rot accelerate time

AR accelerate time is the time for motor restarting and reach full throttle, default is 2S.

— Warning —

If auto rotation lands within the AR time, please make sure don't restart throttle before cut off power, as it may cause damage by quick accelerate starting. Ex: if AR time is 10S and you land within 6S, you should wait at least 4S to start throttle again, as if you start the throttle within AR time, motor will start quickly according AR accelerate time and propellers will start rotate quickly, then the helicopter may fall down because of tail sway. To be safe, please don't use AR function at landing.



After programming, please reconnect the battery and connect ESC with receiver, then motor will start according the set parameters.