ZTW 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

- ZTW is not responsible for your use of this product, or any damage or injuries you may cause or sustain as a result of its usage.
- Always place safety as priority when you use the product.
- An electric motor that is connection with battery pack and ESC may start unexpectedly and cause serious danger. Always treat them with enough respect.
- We recommend you to remove the propeller when you working on the plane that with power source connected.
- Observe all local laws when you fly a RC airplane.
- Never fly over others or near crowds.

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

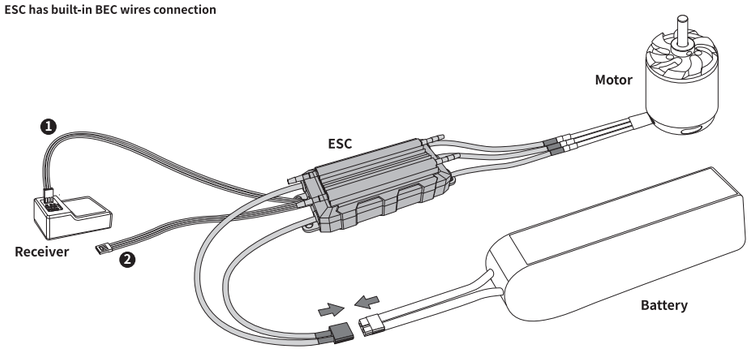
Type	PN# Model	Cont./Burst Current(A)	Battery cell Lipo/LiHV	Weight (g)	BEC	Size(mm)	User Program
Seal 70A SBEC 3-6S G2	7070210	70A/420A	3-6S Lipo/LiHV	109	6V/7.4V/8.4V 8A	60*36*20	Yes
Seal 90A SBEC 3-8S G2	7090210	90A/540A	3-8S Lipo/LiHV	203	6V/7.4V/8.4V 8A	88*38*24	Yes
Seal 105A SBEC 3-8S G2	7105210	105A/630A	3-8S Lipo/LiHV	205	6V/7.4V/8.4V 8A	88*38*24	Yes
Seal 130A SBEC 3-8S G2	7130210	130A/780A	3-8S Lipo/LiHV	208	6V/7.4V/8.4V 8A	88*38*24	Yes
Seal 130A HV 6-14S SBEC G2	7130310	130A/780A	6-14S Lipo/LiHV	275	6V/7.4V/8.4V 10A	126*52*30	Yes
Seal 160A HV 6-14S SBEC G2	7160310	160A/1080A	6-14S Lipo/LiHV	280	6V/7.4V/8.4V 10A	126*52*30	Yes
Seal 200A 6-8S SBEC G2	7200210	200A/1200A	6-8S Lipo/LiHV	285	6V/7.4V/8.4V 10A	126*52*30	Yes
Seal 300A HV 6-14S OPTO G2	7300410	300A/1800A	6-14S Lipo/LiHV	531	NONE	118*59*37	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.

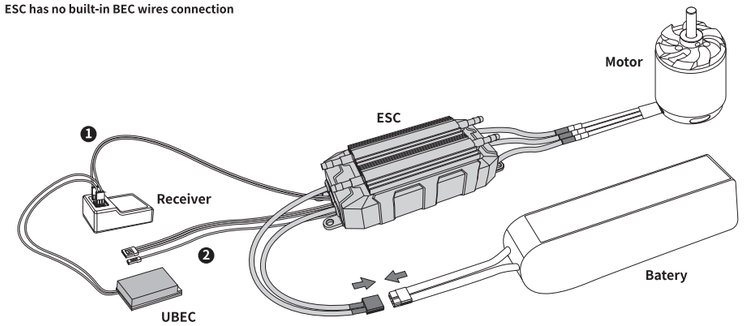
- Solder controller to the motor wires.
- Solder appropriate connectors to the battery wires.
- Insulate all solder connectors with heat shrink tubes.
- Plug the "JR" connector into the receiver throttle channel.
- Controller Red and Black wires connects to battery pack Red and Black wires respectively.

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

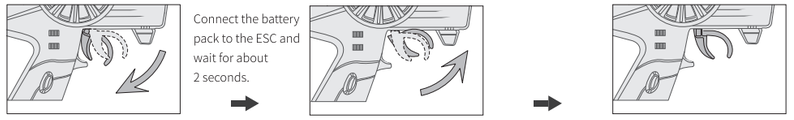
ESC has no built-in BEC wires connection



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:



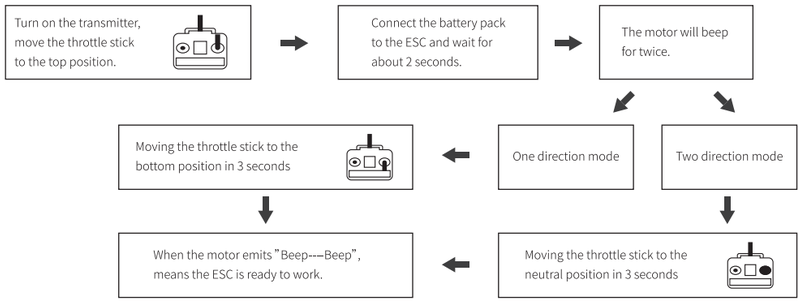
Turn on the transmitter, move the throttle stick to the top position

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

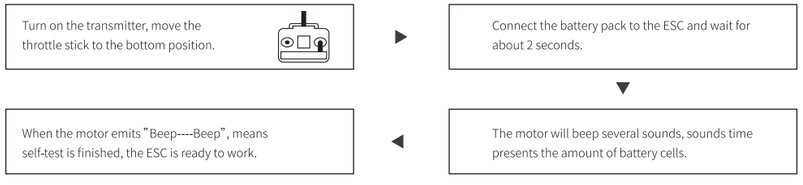
The motor will beep for twice, then release the throttle stick to the neutral position in 3 seconds.

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.
Motor stops running in flight.	Lost throttle signal	Check proper operation of the radio equipment. Check the placement of the ESC and the Receiver and check the route of the receiver' s aerial and ESC

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