Zone Top Way

GECKO Series

Brushless ESC User Manual

V1.0

Shenzhen ZTW Model Science & Technology Co.,Ltd

Thank you for purchasing ZTW Gecko Series Brushless Electronic Speed Controllers (ESC). This is a high-quality, efficient brushless electronic speed control with an integrated switch-mode BEC. It can operate without the need for a seperate receiver battery to power your servos and receivers, saving you weight and complication. GECKO series also include ESC OPPTO for giant flying. This series of ESC also features an exposed, finned heat sink aluminum case with lightweight plastic endcaps. Additional features include safe power arming along with advanced programmable, data logging system, low voltage cutoff, braking, timing, throttle input range, and more, making this series truly a pro series speed control.

As the development of the electronic and popular demand of the market, our BEC has been specifically designed for extreme aerobatics and therefore has the capability to support the higher current applications to eliminate the possibility of unwanted shutdowns, and is also capable of supporting continuous simultaneous multiple servo operations typically found in CCPM equipped hardcore 3D E-helicopters.

In order to obtain better understanding of our product and use it properly, we strongly suggest that you reading this manual thoroughly before use. You must ensure that you connect the battery polarity properly to prevent damage to your ESC. Reversing polarity will void your warranty, so always double check this connection.

Important Warnings

- ZTW and their re-sellers are not responsible for your use of this product, or damage or injury you may cause or sustain as a result of it's usage.
- ZTW controllers are for use by adults only.
- Always remove the propeller or pinion when working on a power system with the battery connected.
- Never use ruptured or punctured battery cells.
- Never use battery packs that are known to overheat.
- Never use short circuit battery or motor terminals.
- Always use proper insulation material for cable insulation.
- Always use proper cable connectors.
- Do not exceed the number of cells or servos specified by the ESC.
- Install the ESC in a suitable location with adequate ventilation for cooling. This ESC has a built-in over temperature cutoff protection feature that will immediately cut power to the motor once the ESC temperature exceeds the 230 Deg F/ 110 Deg C high temperature limit.
- Use only batteries that are supported by the ESC and ensure the correct polarity before connecting.
- Never switch your transmitter OFF while the battery is connected to your ESC.
- Only connect your battery pack just before flying and do not leave your battery pack connected after flying.
- Handle your model with extreme care once the battery is connected and keep away from the propeller at all times. Never stand in-line or directly in front of any rotating parts.
- Always fly at a designated flying site and abide by the rules and guidelines set by your flying club.

GECKO Series Specs:

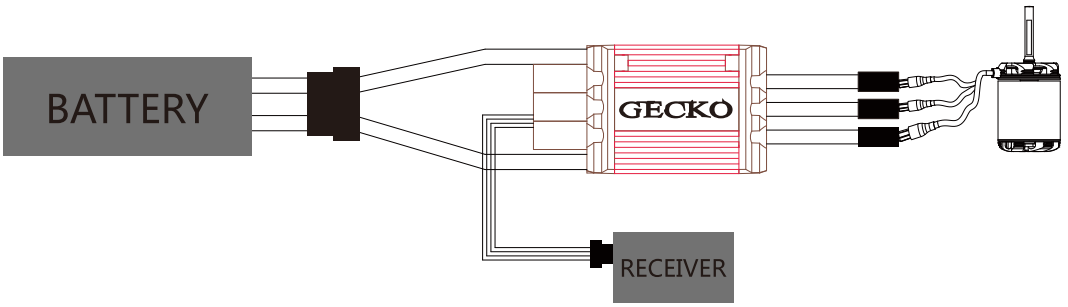
Type	PN#Model	Cont./Burst Current(A)	Battery cell NiXX/Lipo	Weight (g)	BEC Output	Size(mm) W*L*H	User Program
Gecko 45A SBEC 5A	4045201	45A/65A	5-18NC 2-6Lipo	58	5.0V,6.0V adjustable/5A	33*59*13	Yes
Gecko 65A SBEC 8A	4065201	65A/85A	5-18NC 2-6Lipo	67	5.0V,6.0V,7.4V, 8.4V,adjustable/8A	33*68*13	Yes
Gecko 85A SBEC 8A	4085201	85A/100A	5-18NC 2-6Lipo	74	5.0V,6.0V,7.4V, 8.4V,adjustable/8A	33*66*16	Yes
Gecko 125A SBEC 8A	4125201	125A/150A	5-18NC 2-6Lipo	126	5.0V,6.0V,7.4V, 8.4V,adjustable/8A	46*65*17	Yes
Gecko 155A SBEC 8A	4155201	155A/200A	5-18NC 2-6Lipo	126	5.0V,6.0V,7.4V, 8.4V,adjustable/8A	46*65*17	Yes
Gecko 120A OPTO HV	4120401	120A/150A	18-38NC 6-12Lipo	121		46*65*17	Yes
Gecko 150A OPTO HV	4150401	150A/180A	18-38NC 6-12Lipo	123		46*65*17	Yes

Features:

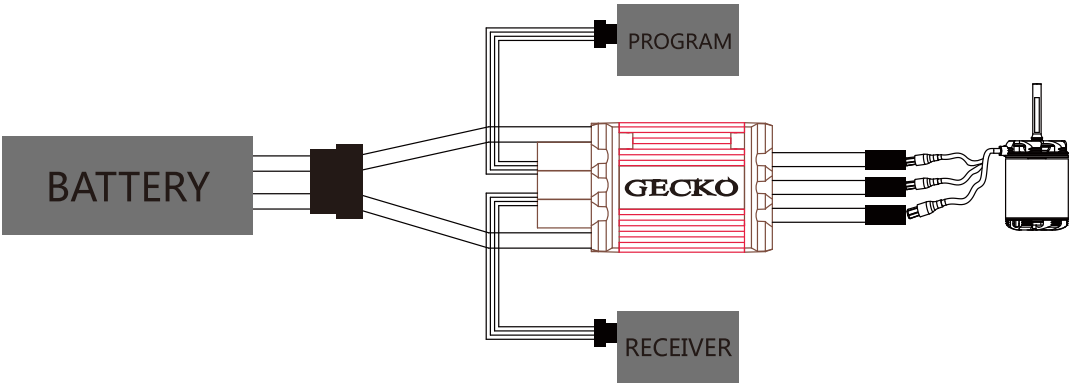
1. Data logging system such as temperature, voltage, current, RPM.
2. SBEC Voltage Output 5.0, 6.0, 7.4, 8.4V adjustable.
3. High SBEC Current Output, continuous 8A and burst 16A, designed to meet your high current application.
4. Power arm protection, over-heat protection, low-voltage protection and lost-signal protection.
5. Secondary sub-menu setting by LCD program card or PC interface.
6. Firmware updating by PC interface.
7. Unique metal shape designing gives your new fashion visual impact.
8. Super smooth and accurate throttle linearity.
9. Support and match with most of the motors, including high RPM motors.
10. Advanced Governor Mode and soft start.
11. Programmable motor timing.
12. Utilizes new smaller MOSFET technology to minimize weight.
13. Finned heat sink.
14. Programmable throttle input range.
15. Auto motor shut down if signal is lost or there is interference.
16. Anti-spark circuit eliminates (HV OPTO version only).

Connecting Your ESC:

1. 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.

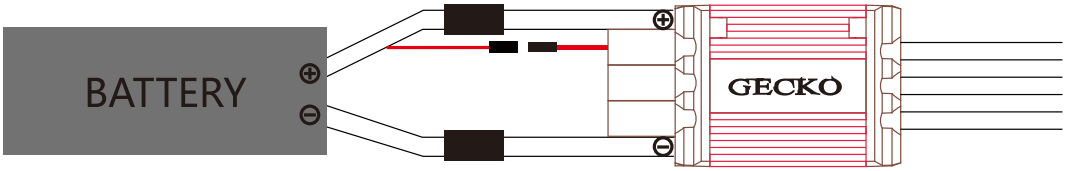


2. For the OPTO HV ESC, There are total two signal wires .The longer one can be connected to receiver ,the shorter one can be connected to programmcard or PC. All of the other Items just have one signal wire which can be connected to receiver ,programme card and PC.Anti-spark circuit also added to our HV version to eliminate the spark.



Connecting your Anti-spark Circuit

1. Solder an extra wire to the positive wire (Red) of the battery for sake of best use of the circuit
2. Connect the extra wire with our anti-spark wire from the ESC before you plug your battery into your ESC
3. Plug your batter into the ESC connector, you will find the spark is completely eliminated
4. Do unplug the anti-spark wire before you take further steps.



Mounting Your ESC

Choose a location that has good airflow and offers good protection. Mount the ESC with heat sink side facing outward. Do not cover the heat sink as it will greatly reduce its efficiency. We recommend using velcro, double-sided tape, tie wraps to secure the ESC or their combination.

Starting Your Power system

1. Turn on your transmitter and ensure that throttle stick is set to idle/off position.
2. Plug the battery pack into the controller. You will hear the beeps of counting the battery cells first then follows a beep confirms that your controller is armed and ready to use.
3. When you move throttle upward, the motor will run. If you continue to push the throttle stick the motor will run faster. If you lower the throttle stick below the start-up position, the motor will stop running.

Throttle Curve Calibration

1. Turn on your radio and set the throttle stick to its maximum position.
2. Connect the battery pack to the ESC. Wait for about 2 seconds, the motor will beep for twice, then put the throttle in the minimum position, the motor will also beep, which indicates that your ESC has got the signal range of the throttle from your transmitter.

***Note**: You only need to do this once as throttle range will be stored in the memory of the speed controller. You can reset the throttle range by performing steps stated above.*

Entering the programming Mode

1.Turn on your radio and set the throttle stick to top positon (100%).
2.Plug the battery pack into your controller.
3.Wait for 2 seconds, you will hear 4 groups of two sets of fast beeps, after this you will hear four single beeps to indicate you have successfully entered the programming mode.

Selecting the Programmable Item

The Programming items are arranged in Sequence, each Programmable Item is equivalent to an audible tone emitting for four times. You will hear 10 tones in a loop with the following sequence. When the desired tone for the Programmable Item is reached, move the throttle stick down to its minimum position. The motor will emit one special tone confirming the desired programmable item has been entered.

Selecting the Desired Value

The motor has been emitting sequentially. If the desired value of the programmable item is reached, set the throttle stick to its maximum position. The motor will emit one special tone confirming the new setting is saved.

Disconnecting the Battery

If you don't want to go on to programming, disconnect the battery pack directly. If you want to go on to programming, keep waiting to the next programmable item to select the value you need.
Note: You could also select the LED program card to program your desired function. Program card is as the option spare part, its programming procedure is described in the LED program card user manual.

Built-in Intelligent ESC Safety Functions

1. **Over-heat protection**: When the temperature of ESC exceeds 110 deg C, the ESC will reduce the output power to allow it to cool.
2. **Lost Throttle signal protection**: The ESC will automatically cut power to the motor when it detects a lost of throttle signal for 2 seconds.

Programming Menu 1- Brake Type

1.Turn on your radio and set the throttle stick to top positon (100%).
2. Plug the battery pack into your controller.
3. Wait for 2 seconds, you will hear 4 groups of two sets of fast beeps, after this you will hear single short beep indicates you are at Brake menu, You will hear this beep four times please make choice before it enters into next selection.
4. Then pull the throttle stick to minimum position, you will hear a music tone to confirm you enter into the Brake sub-menu.
5. Brake type options will be indicated in beeps in sequence (For beeps code please refer to “The Tones Sequence and Code”).
6. Move your stick to top position when you hear the desired option, then you will hear a music tone to confirm that you have set your brake type and saved.
7. You will enter into next menu after short moment for further settings; or unplug the battery to exit the programmable mode.

Programming Menu 2- Battery Type

1.Turn on your radio and set the throttle stick to top positon (100%).
2. Plug the battery pack into your controller.
3. Wait for 2 seconds, you will hear 4 groups of two sets of fast beeps, after this you will hear 2 short beeps indicates you are at Battery menu. You will hear this beep four times please make choice before it enters into next selection.
4. Then pull the throttle stick to minimum position, you will hear a music tone to confirm you enter into the Battery Type sub-menu.
5. Battery type options will be indicated in beeps in sequence (For beeps code please refer to “The Tones Sequence and Code”).
6. Move your stick to top position when you hear the desired option, then you will hear a music tone to confirm that you have set your brake type and saved.
7. You will enter into next menu after short moment for further settings; or unplug the battery to exit the programmable mode.

Programming Menu 3- Voltage Cutoff Threshold

2.8V/50%/ 3.0V/60%/ 3.2V/65%/No Protection

1.Turn on your radio and set the throttle stick to top positon (100%).
2. Plug the battery pack into your controller.
3. Wait for 2 seconds, you will hear 4 groups of two sets of fast beeps, after this you will hear 3 short beeps indicates you are at Voltage Cutoff Threshold menu.You will hear this beep four times please make choice before it enters into next selection.
4. Then pull the throttle stick to minimum position, you will hear a music tone to confirm you enter into the Voltage Cutoff Threshold sub-menu.
5. Voltage Cutoff Threshold will be indicated in beeps in sequence (For beeps code please refer to “The Tones Sequence and Code”).
6. when you hear the desired option move your stick to top position, then you will hear a music tone to confirm that you have set your Voltage Cutoff Threshold and saved.
7. You will enter into next menu after short moment for further settings; or unplug the battery to exit the programmable mode.

Note:

1) For Li-xx packs- number of cells are automatically calculated and requires no user input apart from defining the battery type. This ESC provides 4 setting options for the low voltage protection threshold; 2.8V/ 3.0V/3.2V/No Protection. For example: the voltage cutoff options for an 11.1V/ 3 cell Li-Po pack would be 8.4V (Low)/ 9.0V (Med)/ 9.6V (High)

2) For Ni-xx/Life packs-low / medium / high cutoff voltages are 50%/60%/65% of the initial voltage of the battery pack. For example: A fully charged 6 cell NiMh pack's voltage is 1.44V x 6=8.64V, when “LOW” cutoff voltage is set, the cutoff voltage is: 8.64V x 50%=4.3V and when “Medium” of “High” is set, the cutoff voltage is now 8.64V X 65%=5.61V.

Programming Menu 4-Restore Factory Setup

1.Turn on your radio and set the throttle stick to top positon (100%).
2. Plug the battery pack into your controller.
3. Wait for 2 seconds, you will hear 4 groups of two sets of fast beeps, after this you will hear four 4 short beeps indicates you are at Restore Factory Setup menu.You will hear this beep four times please make choice before it enters into next selection.
4. Then pull the throttle stick to minimum position, you will hear a music tone to confirm you enter into the Restore Factory Setup sub-menu.

5. There is only one option for this selection(For beeps code please refer to “The Tones Sequence and Code”).
6. when you hear the desired option move your stick to top position, then you will hear a music tone to confirm that you set it back to the default setting and saved.
7. You will enter into next menu after short moment for further settings; or unplug the battery to exit the programmable mode.

Default Settings As follows:

Restore- Sets the ESC back to factory default settings;

Brake Type:	Brake Off
Battery Type:	LiPo with Automatic Cell detective
Cut Off Voltage Threshold:	3.0V/60%
Motor Timing:	Auto
SBEC Voltage Output	5.0V
Governor Mode:	RPM OFF
Motor Rotation:	Forward
Start Up Strength:	30%
Low Voltage Cut Off Type:	Reduce Power

Programming Menu 5- Motor Timing

1. Turn on your radio and set the throttle stick to top positon (100%).
2. Plug the battery pack into your controller.
3. Wait for 2 seconds, you will hear 4 groups of two sets of fast beeps,after this you will hear long beeps indicates you are at Motor Timing menu. You will hear this beep four times please make choice before it enters into next selection.
4. Then pull the throttle stick to minimum position, you will hear a music tone to confirm you enter into the Motor Timing sub-menu.
5. Motor Timing selections will be indicated in beeps in sequence (For beeps code please refer to “The Tones Sequence and Code”).
6. when you hear the desired option move your stick to top position, then you will hear a music tone to confirm that you have set your Motor Timing and saved.
7. You will enter into next menu after short moment for further settings; or unplug the battery to exit the programmable mode.

* Auto – ESC determines the optimum motor timing automatically.
* 2° and 8° – Set for most of in-runner motors.
* 15° and 22° –Set for motors with 6 or more poles.
* 30° – Setting for motors with more poles.

In most cases, automatic timing works well for all types of motors. However for high efficiency we recommend the Low timing setting for 2 pole motors (general in-runners) and high timing for 6 poles and above (general out-runners). For higher speed, High timing can be set. Some motors require different timing setups therefore we suggest you to follow the manufacturer recommended setup

***Note**: Run your motor on the ground first after making any changes to your motor timing!*

Programming Menu 6- BEC Voltage Output

1. Turn on your radio and set the throttle stick to top positon (100%).
2. Plug the battery pack into your controller.
3. Wait for 2 seconds, you will hear 4 groups of two sets of fast beeps, after this you will hear 1 long beep and 1 short beep indicates you are at Menu 6. You will hear this beep four times please make choice before it enters into next selection.
4. Then pull the throttle stick to minimum position, you will hear a music tone to confirm you enter into the Motor Timing sub-menu.
5. Motor Timing selections will be indicated in beeps in sequence (For beeps code please refer to “The Tones Sequence and Code”).
6. when you hear the desired option move your stick to top position, then you will hear a music tone to confirm that you have set your Motor Timing and saved.
7. You will enter into next menu after short moment for further settings; or unplug the battery to exit the programmable mode.

Note:

5.0V/6.0V/7.4V/8.4V for Gecko Series ESC above 45A.

5.0V/6.0V for Gecko 45A.

There are the four different levels of SBEC voltage output can be selected.

*** The 1st Level: 5.0V**

*** The 2nd Level: 6.0V**

*** The 3rd Level: 7.4V**

*** The 4th Level: 8.4V**

Programming Menu 7- Governor Mode (Heli)

Turn on your radio and set the throttle stick to top positon (100%).

2. Plug the battery pack into your controller.
3. Wait for 2 seconds, you will hear 4 groups of two sets of fast beeps, after this you will hear11ong beep and 2 short beeps indicates you are at

Menu 7. You will hear this beep four times please make choice before it enters into next selection.

4. Then pull the throttle stick to minimum position, you will hear a music tone to confirm you enter into the Governor Mode sub-menu.

5. Governor selections will be indicated in beeps in sequence (For beeps code please refer to “The Tones Sequence and Code”).

6. when you hear the desired option move your stick to top position, then you will hear a music tone to confirm that you have set your Voltage Cutoff Threshold and saved.

7. You will enter into next menu after short moment for further settings; or unplug the battery to exit the programmable mode.

* RPM OFF

* Soft Start:

For 1st Soft Start, there will be 8-second delay from start to full rpm;

For 2nd Soft Start, there will be 15-second delay from start to full rpm;

Note: If the throttle is cut off after starting less 3 Seconds, then the next start will be as normal start. If the throttle is cut off after starting more than 3 Seconds, the next start will be as soft start.

● **Governor Mode 1**: There will be a 15-second delay from start to full rpm; If lower the throttle to the 80% position of the full throttle or lower than 80% position, the RPM would be definitely changed, the lost RPM will be detected and compensated automatically by the ESC that makes sure to keep the RPM at the same speed. (Note: This function is only for Low KV motor).

● **Governor Mode 2**: There will be a 15-second delay from start to full rpm; If lower the throttle to the 80% position of the full throttle or lower than 80% position, the RPM would be definitely changed, the lost RPM will be detected and compensated automatically by the ESC that makes sure to keep the RPM at the same speed. (Note: This function is only for High KV motor).

Note 1: *If the throttle is cut off after starting less 3 Seconds, then the next start will be as normal start. If the throttle is cut off after starting more than 3 Seconds, the next start will be as soft start.*

Note 2: Once the Governor Mode is enabled, the ESC's Brake and Low Voltage Cutoff Type settings will automatically be reset to Brake Off and Reduce Power respectively, regardless of what settings they were previously set.

Note 3: Lower 50,000 turns is considered as Low KV motor,

100,000-200,000 turns is considered as High KV motor.

Formula: Pole's qty of motor x KV value x Voltage= Motor turns
For example: we test 8 pole motor 1040KV with 6S Lipo, its turns will be 8x1040KVx25v=208,000 turns, so you can choose Governor Mode 2.

Programming Menu 8-Motor Rotation

In most cases motor rotation is usually reversed by swapping two motor wires. However, in cases where the motor cables have been directly soldered the ESC cables, motor rotation can be reversed by changing the value of setting on the ESC.

1.Turn on your radio and set the throttle stick to top positon (100%).
2. Plug the battery pack into your controller.
3. Wait for 2 seconds, you will hear 4 groups of two sets of fast beeps, after this you will hear 1 long beep and 3 short beeps indicates you are at menu 8. You will hear this beep four times please make choice before it enters into next selection.
4. Then pull the throttle stick to minimum position, you will hear a music tone to confirm you enter into the Motor Rotation sub-menu.
5. Motor Rotation options will be indicated in beeps in sequence (For beeps code please refer to “The Tones Sequence and Code”).
6. when you hear the desired option move your stick to top position, then you will hear a music tone to confirm that you have set your Motor Rotation and saved.
7. You will enter into next menu after short moment for further settings; or unplug the battery to exit the programmable mode.

Programming Menu 9- Start-up Rate

1. Turn on your radio and set the throttle stick to top positon (100%).
2. Plug the battery pack into your controller.
3. Wait for 2 seconds, you will hear 4 groups of two sets of fast beeps, after this you will hear 1 long beep and 4 short beeps indicates you are at menu 9. You will hear this beep four times please make choice before it enters into next selection.
4. Then pull the throttle stick to minimum position, you will hear a music tone to confirm you enter into the Start-up Rate sub-menu.
5. Start-up Rate options will be indicated in beeps in sequence (For beeps code please refer to “The Tones Sequence and Code”).
6. when you hear the desired option move your stick to top position, then you will hear a music tone to confirm that you have set your Start-up Rate and saved.

7. You will enter into next menu after short moment for further settings; or unplug the battery to exit the programmable mode.

Note:

***Low** (10%-15%-20%) Sets ESC start up strength for the motors which needs low start up current

***Mid** (25%-30%-35%) Sets ESC start up strength for the motors which needs mid start up current

***High** (40%-45%-50%) Sets ESC start up strength for the motors which needs high start up current

Programming Menu 10-Low Voltage Cutoff Type

1. Turn on your radio and set the throttle stick to top positon (100%).
2. Plug the battery pack into your controller.
3. Wait for 2 seconds, you will hear 4 groups of two sets of fast beeps, after this you will hear 2 long beeps indicates you are at menu 10. You will hear this beep four times please make choice before it enters into next selection.
4. Then pull the throttle stick to minimum position, you will hear a music tone to confirm you enter into the Low Voltage Cutoff sub-menu.
5. Low Voltage Cutoff type options will be indicated in beeps in sequence (For beeps code please refer to “The Tones Sequence and Code”).
6. when you hear the desired option move your stick to top position, then you will hear a music tone to confirm that you have set your Voltage Cutoff Threshold and saved.
7. You will enter into next menu after short moment for further settings; or unplug the battery to exit the programmable mode.

Note:

* Reduce Power – ESC reduces motor power when the pre-set Low Voltage Protection Threshold value is reached. (Recommended).
* Cut Off Power – ESC instantly cuts motor power when the pre-set Low Voltage Protection Threshold value is reached.

The Tones Sequence and Code:

1 Beep- Brake Type (1 short beep)

2 Beep-Beep- Battery Type (2 short beeps)

3 Beep-Beep-Beep- Cut off Voltage Threshold (3 short beeps)

4 Beep-Beep-Beep-Beep- Restore Factory Setup Defaults (4 short sheeps)

5 Beep----- Motor Timing (1 long beep)

6 Beep-----Beep- SBEC Voltage Output (1 long tone 1 short beep)

7 Beep-----Beep- Beep- Governor Mode (1 long tone 2 short beeps)

8 Beep-----Beep- Beep- Beep- Motor Rotation (1 long tone 3 short beeps)

9 Beep-----Beep- Beep- Beep- Beep- Start up Strength (1 long tone 4 short beeps)

10 Beep----- Beep----- Low Voltage Cut off Type (2 long beeps)

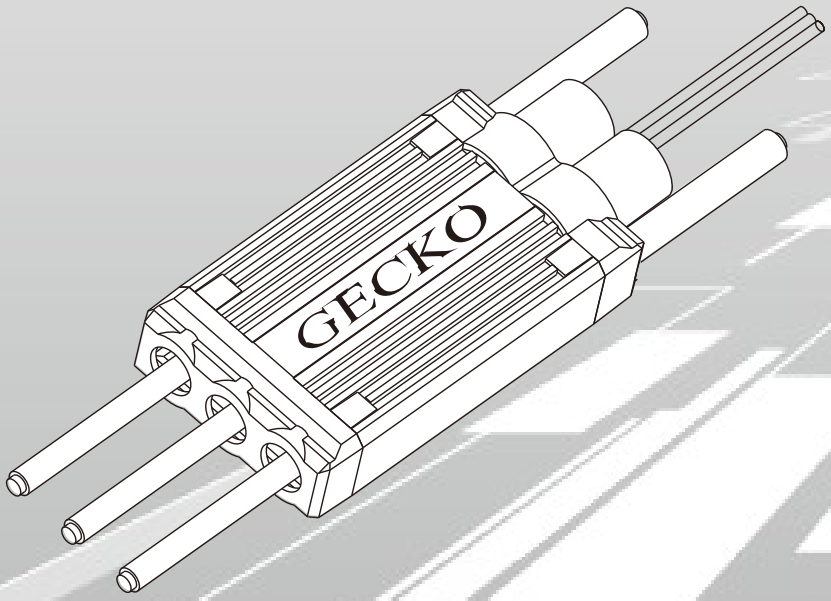
Remark: One long tone "Beep-----"is equal to five short tones "Beep-".

Tone of value / Prog.Item	BEEP-	BEEP- BEEP-	BEEP- BEEP- BEEP-	BEEP- BEEP- BEEP- BEEP-	BEEP -----	BEEP ----- BEEP-	BEEP ----- BEEP- BEEP-	BEEP ----- BEEP- BEEP- BEEP-	BEEP ----- BEEP- BEEP- BEEP- BEEP-
Brake Type	Brake OFF	Soft Brake	Mid Brake	Hard Brake					
Battery Type	NiCd/ NiMH	LiPo	LiFe						
Cut Off Voltage Threshold	2.8V/50%	3.0V/60%	3.2V/65%	No Protection					
Restore Factory Setup Defaults	Restore								
Motor Timing	Auto	2°	8°	15°	22°	30°			
SBEC Voltage Output	5.0V	6.0V	7.4V	8.4V					
Governor Mode	RPM OFF	1st Soft Start	2st Soft Start	Governor Mode 1	Governor Mode 2				
Motor Rotation	Forward	Reverse							
Start Up Strength	10%	15%	20%	25%	30%	35%	40%	45%	50%
Low Voltage Cut Off Type	Reduce Power	Cut Off Power							

Trouble Shooting

Trouble	Possible Reason	Action
Motor doesn't work and there are no audible tones while servos work properly after powering up ESC.	The ESC throttle calibration has been not set up.	Set up the ESC throttle calibration.
Motor doesn't work and no audible tone emitted after connecting the battery. Servos are not working either.	Poor/loose Connection between battery Pack and ESC.	Clean connector terminals or replace connector.
	No power	Replace with a freshly charged battery pack
	Poor soldered connections (dry joints)	Re-solder the cable connections
	Wrong battery cable polarity	Check and verify cable polarity
	ESC throttle cable connected to receiver in the reverse polarity	Check the ESC cable connected to the ESC to ensure the connectors are in the correct polarity.
	Faulty ESC	Replace ESC
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 cables to ensure there is adequate separation to prevent RF interference .Install a ferrite ring on the ESC's throttle cable.

Trouble	Possible Reason	Action
Motor stops running in flight	Battery Pack voltage has reached the Low Voltage Protection threshold.	Land the model immediately and replace the battery pack.
	Possible bad cable connection	Check and verify the integrity of the cable connections
Motor restarts abnormally ESC Overheats	Possible RF Interference at the flying field.	The normal operation of the ESC may be susceptible to surrounding RF interference. Restart the ESC to resume normal operation on the ground to verify recurrence. If the problem persists, test the operation of the ESC at a different flying field.
	Inadequate Ventilation	Relocate the ESC to allow better ventilation
	Servos drawing too much current and over loading the ESC.	Use servos that are adequately sized for the ESC. The maximum BEC current drawn should be within the BEC limits.
	Over sized motor or prop	Reduce Prop size or resize the motor



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