

# **SENSORLESS BRUSHLESS SPEED CONTROLLER FOR CAR AND TRUCK USER MANUAL**

**High power system for RC model can be very dangerous, so please read this manual carefully.**

## **【FEATURES】**

1. Specially designed for RC car and truck, with excellent start-up, acceleration and linearity features.
2. Compatible with sensorless brushless motor.
3. 3 running modes suitable for different applications (“Racing” mode, “General” mode and “Rock crawler” mode).
4. 4 steps of maximum reverse force adjustment.
5. Proportional ABS brake function with 4 steps of maximum brake force adjustment, 8 steps of drag-brake force adjustment and 4 steps of initial brake force adjustment.
6. 9 start modes (“Punch”) from “Soft” to “Very aggressive” to be suitable for different chassis, tires and tracks.
7. Multiple protection features: Low voltage cut-off protection for lithium or nickel battery / Over-heat protection / Throttle signal loss protection / Motor blocked protection.
8. 8 steps of timing adjustment.
9. User programmable. Two program methods are supported: The “SET” button on the ESC, the digital LED program card. The program card is pocket-sized and has friendly user interface to be easily used.
10. Waterproof and Dustproof.

## **【SPECIFICATIONS】**

Continous Current: 45A.  
Burst Current: 380A.  
Resistance: 0.0007ohm.  
Suitable Car: 1/10car.  
Battery: 4-9 Cells NiMH or 2 Cells Li-Po.  
BEC Output: 6V/1.5A.

Motor Type: Sensorless Brushless Motor.  
Dimension: 54.80\*41.20\*32.40mm.  
Weight: 90g.

### 【BEGIN TO USE THE ESC】

1. Connect the ESC, motor, receiver, battery according to the following diagram.

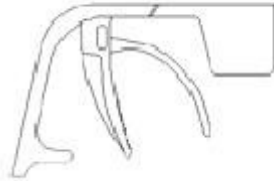

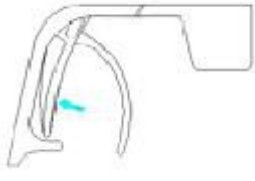





### 2. Throttle Range Setting (Throttle Range Calibration)

In order to make the ESC fit the throttle range, you must calibrate it for the following cases; otherwise the ESC cannot work properly.

- 1) Begin to use a new ESC;
  - 2) Begin to use a new transmitter;
  - 3) Change the settings of neutral position of the throttle stick, ATV or EPA parameters, etc.
- There are 3 points need to be set, they are the top point of “forward”, “backward” and the neutral point.

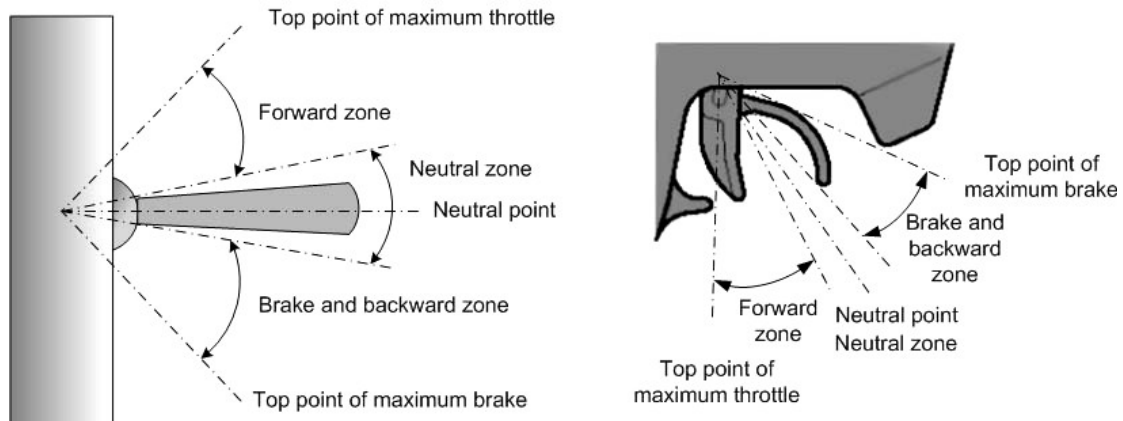
The following pictures show how to set the throttle range with a transmitter.

<p><i>Move the throttle stick to the neutral position</i></p>  <p></p> <p><i>Press "SET" key, the Green LED flashes once and motor emits "Beep" tone</i></p>	<p><i>Move the throttle stick to the end position of forward.</i></p>  <p></p> <p><i>Press "SET" key, the Green LED flashes twice and motor emits "Beep-Beep" tone</i></p>	<p><i>Move the throttle stick to the end position of backward.</i></p>  <p></p> <p><i>Press "SET" key, the Green LED flashes thrice and motor emits "Beep-Beep-Beep" tone</i></p>
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A) Switch off the ESC, turn on the transmitter, set the direction of throttle channel to "REV", set the "EPA/ATV" value of throttle channel to "100%", and disable the "ABS" brake function of your transmitter. (\*Note2)

B) Hold the “SET” key and then switch on the ESC, when the red LED begins to flash, release the key immediately.

C) Set the THREE points according to the steps shown in the picture.



- 1) Neutral point
- 2) End point of forward direction
- 3) End point of backward direction

D) When the process of calibration is finished, the motor can be started after 3 seconds.

#### 【LED Status in Normal Running】

- a) In normal use, if the throttle stick is in the neutral range, neither the red LED nor the green LED lights.
- b) The red LED lights when the car is run forward or backward and it will flash quickly when the car is braking.
- c) The green LED lights when the throttle stick is moved to the top point of the forward zone.

#### 【ALERT TONES】

- a) . Input voltage abnormal alert tone: The ESC begins to check the input voltage when power on, if it is out of the normal range, such an alert tone will be emitted: “beep-beep-, beep-beep-, beep-beep-” (There is 1 second time interval between every “beep-beep-” tone).
- b). Throttle signal abnormal alert tone: When the ESC can’t detect the normal throttle signal, such an alert tone will be emitted: “beep-, beep-, beep-” (There is 2 seconds time interval between every “beep-” tone).

#### 【PROTECTION FUNCTION】

- a). Low voltage cut-off protection: If the voltage of a lithium battery pack is lower than the threshold for 2 seconds, the ESC will cut of the output power. Please note that the ESC cannot be restarted if the voltage of each lithium cell is lower than 3.5V.

For NiMH battery packs, if the voltage of the whole NiMH battery pack is higher than 9.0V but lower than 12V, it will be considered as a 3 cell lithium battery pack; If it is lower than 9.0V, it will be considered as a 2 cell lithium battery pack. For example, if the NiMH battery pack is 8.0V,

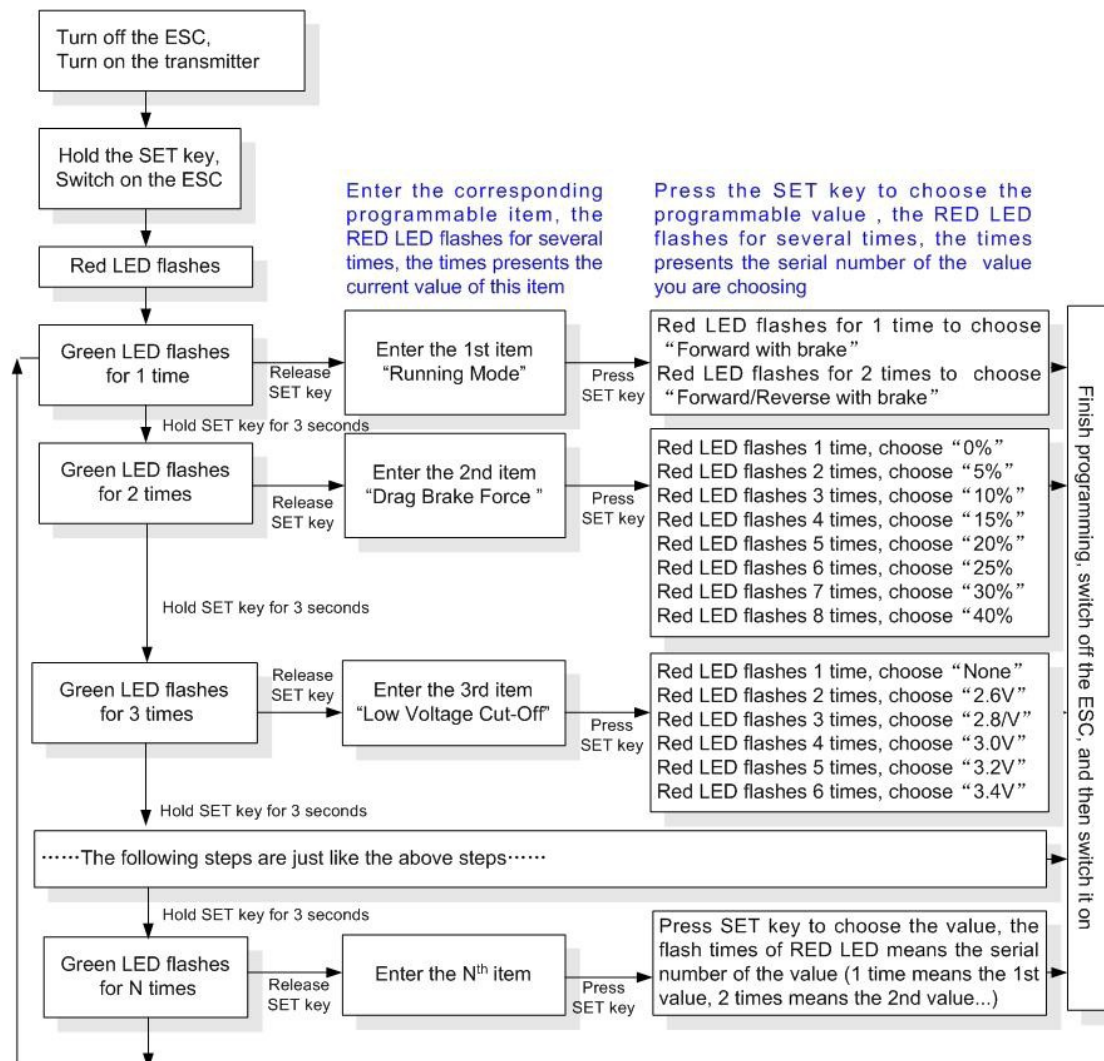
and the threshold is set to 2.6V/Cell, so it will be considered as a 2 cell lithium battery pack, and the low-voltage cut-off threshold for this NiMH battery pack is  $2.6 \times 2 = 5.2V$ .

b). Over-heat protection: When the temperature of the ESC is over a factory preset threshold for 5 seconds, the ESC will cut off the output power. You can disable the over-heat protection function for competition race.

c). Throttle signal loss protection: The ESC will cut off the output power if the throttle signal is lost for 0.2 second.

### 3. Program the ESC

a). Program by the ESC “SET” key



#### Note:

★ In the program process, the motor will emit “Beep” tone at the same time when the LED is flashing.

★ If the “N” is bigger than the number “5”, we use a long time flash and long “Beep---” tone to represent “5”, so it is easy to identify the items of the big number.

For example, if the LED flashes as the following:

“A long time flash + a short time flash” (Motor sounds “Beep---Beep”) = the No. 6 item

“A long time flash + 2 short time flash” (Motor sounds “Beep---BeepBeep”) = the No. 7 item

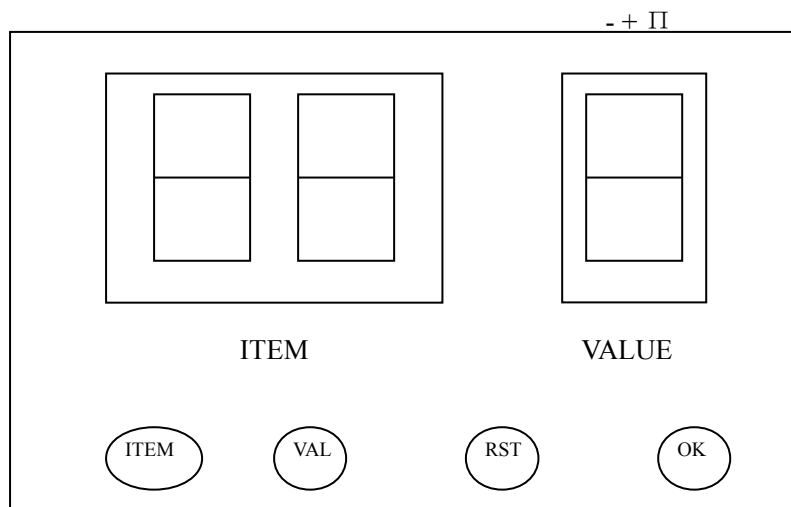
“A long time flash + 3 short time flash” (Motor sounds “Beep---BeepBeepBeep”) = the No. 8 item

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And so on.

#### b). Program by LED Programming card

The process of programming the ESC becomes quite easy and fast with this pocket sized device. When the programmable value needs to be changed, please just plug the control wires of the ESC (trio wires with black, red and white color) into the socket of the program card (The socket is on the right corner, and marked with  $\Pi$ ), and then connect the main battery pack to the ESC, each item’s value will be shown on the program card. Use “ITEM” and “VALUE” buttons to select the programmable items and new values, and then press “OK” button to store the new settings into the ESC.



#### Programmable Items list

Item	Programmable Value								
	1	2	3	4	5	6	7	8	9
1. Running Mode	Racing	General	RockCrawler						
2. Drag BrakeForce	0%	5%	10%	20%	40%	60%	80%	100%	
3. Low Voltage Cut-Off Threshold	Non-Protection	2.6V/Cell	2.8V/Cell	3.0V/Cell	3.2V/Cell	3.4V/Cell			
4. Start Mode(Punch)	Level1 (Soft)	L2	L3	L4	L5	L6	L7	L8	L9 (Very Aggressive)
5. Maximum BrakeForce	25%	50%	75%	100%					
6. Maximum Reverse Force	25%	50%	75%	100%					

<b>7.Initial BrakeForce</b>	= <i>Drag BrakeForce</i>	0%	20%	40%					
<b>8.Neutral Range</b>	6% (Narrow)	<i>9% (Normal)</i>	12% (Wide)						
<b>9.Timing</b>	0.00 °	3.75 °	7.50 °	11.25 °	<i>15.00 °</i>	18.75 °	22.50 °	26.25 °	
<b>10.Over-heatProtection</b>	<i>Enable</i>	Disable							

Attention: The italics texts in the above form are the default settings.

1). **Running Mode:** With “Racing” mode, the car can go forward and brake, but cannot go backward, this mode is suitable for competition; “General” mode provides backward function, which is suitable for training. The “Rock Crawler” mode is only used for rock crawler. **Note: “General” mode uses “Double-Click” method to make the car go backward.** When you move the throttle stick from forward zone to backward zone for the first time, the ESC begins to brake the motor, the motor speeds down but it is still running, not completely stopped, so the backward action is NOT happened now. When the throttle stick is moved to the backward zone again (The 2<sup>nd</sup> “click”), if the motor speed is slowed down to zero (i.e. stopped), the backward action will be occurred. The “Double-Click” method can prevent mistakenly reverse when the brake function is frequently used in steering.

With “Rock Crawler” mode, the reverse action will be happened immediately when the throttle stick is moved to backward zone. Please set the “Drag Brake Force” to 100% if you choose the “Rock Crawler” mode.

2). **Drag Brake Force:** Set the amount of drag brake applied at neutral throttle to simulate the slight braking effect of a neutral brushed motor while coasting.

3). **Low Voltage Cut-Off:** The function is mainly to prevent the lithium battery pack from over discharging. When using lithium battery pack, please set the suitable value for low-voltage protection as your like. The ESC monitors the battery’s voltage at any time, if the voltage is lower than the threshold, the output power will be reduced to 50% in 2 seconds. Please drive and stop the car at the side of the racing track as soon as possible, the ESC will completely cut off the output power in 10 seconds.

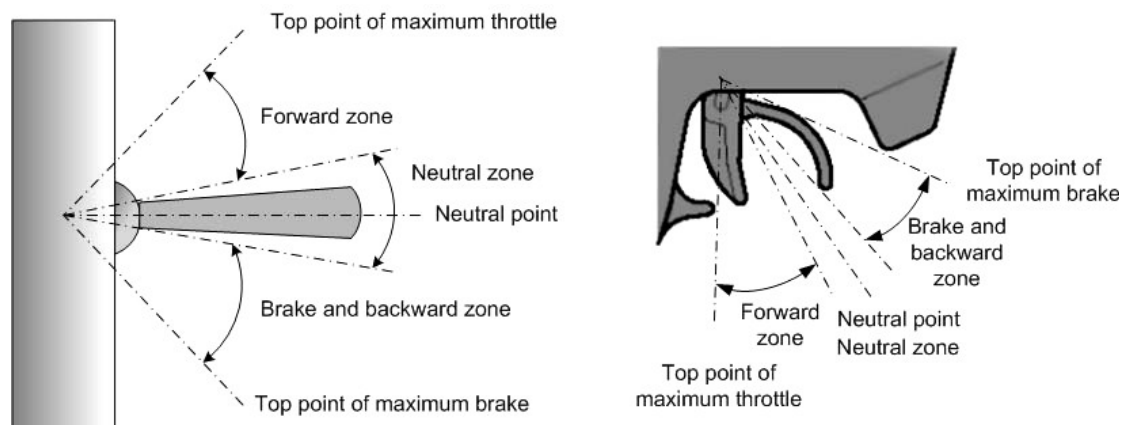
4). **Start Mode (Also called “Punch”):** Select from “Level1 (Soft)” to “Level 9 (Very aggressive)” start mode as your like. Please note that if you choose “Level 7” to “Level 9”, you’d better use good quality battery pack with powerful discharge ability, otherwise these modes cannot get the bursting start effect as you want. If the motor cannot run smoothly (the motor is trembling), it may caused by the weak discharge ability of the battery pack, please choose a better battery or increase the gear rate.

5). **Maximum Brake Force:** The ESC provides proportional brake function. The brake force is related to the position of the throttle stick. Maximum brake force refers to the force when the throttle stick is located at the top point of the backward zone. A very large brake force can shorten the brake time, but it may damage the gears.

6). **Maximum Reverse Force:** Sets how much power will be applied in the reverse direction. Different value makes different reverse speed.

7). **Initial Brake Force:** It is also called “minimum brake force”, and it refers to the force when the throttle stick is located at the initial position of the backward zone. The default value is equal to the drag brake force, so the brake effect can be very smooth.

8). **Throttle Neutral Range:** Please see the following illustrations to adjust the neutral range as your like.



9). **Timing:** There are many differences among structures and parameters of different brushless motors, so a fixed timing ESC is difficult to compatible with all brushless motors. It is necessary to make the timing value programmable. Please select the most suitable timing value according to the motor you are just using. Generally, higher timing value brings out higher power output, but the whole efficiency of the system will be slightly lower down.

10). **Over-Heat Protection:** If the function is activated, the output power will be cut-off when the temperature of the ESC is up to a factory preset threshold for more than 5 seconds. When the protection happens, the Green LED will flash.

**【Reset All Items To Default Values】**

At any time when the throttle is located in neutral zone (except in the throttle calibration or parameters program process), hold the “SET” key for over 3 seconds, the red LED and green LED will flash at the same time , which means each programmable item has be reset to its default value.

**4. TROUBLE SHOOTING**

Trouble	Possible Reason	Solution
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After power on, motor can't work, no sound is emitted	The connections between battery pack and ESC are not correct	Check the power connections Replace the connectors
After power on, motor can't work, but emits "beep-beep-, beep-beep-" alert tone. (Every "beep-beep-" has a time interval of 1 second )	Input voltage is abnormal, too high or too low.	Check the voltage of the battery pack
After power on, motor can't work, but emits "beep-, beep-, beep-" alert tone. (Every "beep-" has a time interval of about 2 seconds)	Throttle signal is abnormal	Check the transmitter and the receiver Check the wire of the throttle channel
The motor runs in the opposite direction	The wire connections between ESC and the motor need to be changed	Swap any two wire connections between the ESC and the motor.
The motor suddenly stops running while in working state	The throttle signal is lost  The ESC has entered the Low Voltage Protection Mode	Check the transmitter and the receiver Check the wire of the throttle channel Replace the battery pack
Random stop or restart or irregular working state	Some connections are not reliable  There is strong Electro - Magnetic interference in flying field.	Check all the connections: battery pack connections, throttle signal wire, and motor connections, etc.  Reset the ESC to resume normal operation. If the function could not resume, you might need to move to another area to run the car.

WARNING! Please note the original fan (6V) combined with the ESC can ONLY work with a 2 cells lithium battery pack or 4-6 cells NiMH battery pack. Please NEVER use it with a 3 cells lithium battery pack or NiMH battery pack more than 6 cells, otherwise it may be destroyed. Please check the label of the fan carefully to confirm its working voltage before using it. The 12V high voltage fan is necessary when you are using battery pack more than 6 cells of NiMH.

**In that we have no control over the correct use, installation, application, or maintenance of our products, no liability shall be assumed nor accepted for any damages, losses or costs resulting from the use of the product.**