USER MANUAL

EZRUN Series

Brushless Speed Controller

EZRUN-80A
EZRUN-150A

Declaration

Thanks for purchasing our Electronic Speed Controller (ESC). High power system for RC model can be very dangerous, so we strongly suggest you read this manual carefully. 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. Any claims arising from the operating, failure of malfunctioning etc. will be denied. We assume no liability for personal injury, consequential damages resulting from our product or our workmanship. As far as is legally permitted, the obligation to compensation is limited to the invoice amount of the affected product.

Features

- ★ Compatible with all sensorless brushless motors and most of sensored brushless motors such as Novak, LRP and Feigao, etc.
- ★ Excellent start-up, acceleration and linearity features.
- ★ 3 running modes (Forward only with brake, Forward/Reverse with brake, Forward/Reverse immediately)
- ★ 4 steps of maximum reverse force adjustment.
- ★ 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.
- ★ 9 start modes (Also called “Punch”) from “very soft (Level 1)” to “very aggressive (Level 9)”.
- ★ Multiple protection features: Low voltage cut-off protection / Over-heat protection / Throttle signal loss protection / Motor blocked protection.
- ★ 8 steps of timing adjustment by software. You can even use this programmable item to adjust the timing value even for sensored brushless motor. (Traditionally, you must turn the rear cover of the motor to change the timing value for a sensored brushless motor).
- ★ Built-in switch mode BEC has a powerful output to supply all the electronic equipments.
- ★ Easily program with only one button and compatible with pocket-sized Program Card.
- ★ Firmware can be updated through an USB adapter (Optional equipment).
- ★ Splash proof and dustproof.

Specifications

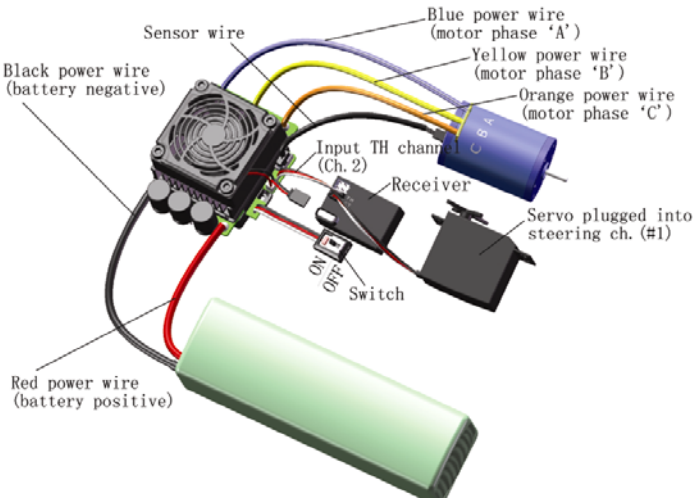
Model	EZRUN-80A	EZRUN-150A
Cont./Burst Current	80A/270A	150A/1080A
Resistance	0.0018 ohm	0.0002 ohm
Suitable Car	1/8 on-road and off-road cars / trucks for general race or RTR application	1/5, 1/8 on-road and off-road cars / trucks for competitive race
Suitable Brushless Motor	≥8T (***Note 1***)	≥3.5T (***Note 1***)
Battery	6-12 cells Ni-xx (NiMH or NiCd) 2-4 cells Li-Po	6-18 cells Ni-xx (NiMH or NiCd) 2-6 cells Li-Po
BEC Output	5.75V/3A of switch mode built-in BEC (***Note 2***)	
Motor Type	Sensorless and sensored brushless motor	
Dimension	68(L)×55(W)×45(H)	
Weight	150g(Without wires)	

Note 1: *The value of “T” number is tested under the input of 4 cells Lipo battery;*
Note 2: *The cooling fans of ESC and motor are supplied by the built-in BEC, so they are working under 5.75V.*

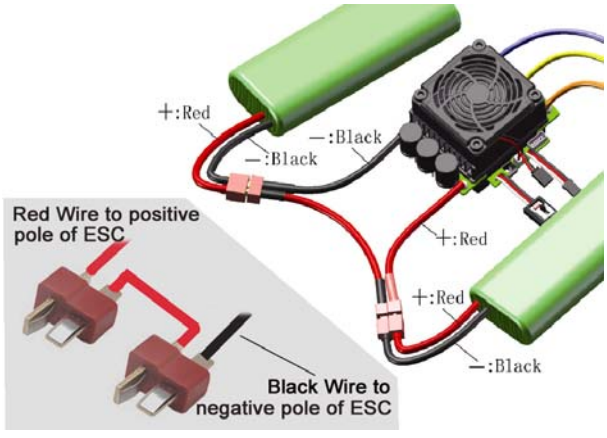
Begin To Use The New ESC

WARNING! THIS BRUSHLESS SYSTEM IS VERY POWERFUL! FOR SAFETY, PLEASE ALWAYS KEEP THE WHEELS AWAY FROM THE TRACK WHEN YOU BEGIN TO SWITCH ON THE ESC.

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



If there are 2 battery packs need to be connected in series, please refer to the following picture:



Note3: There is a small female connector that coming out from the "FAN" socket, this is used for connecting with the cooling fan of the brushless motor.

a) Sensored brushless motor wiring

When using brushless motor with Hall Sensor，it is necessary to connect the sensor cable to the "SENSOR" socket on the ESC, and ESC can automatically identify the motor type (sensored or sensorless) by detecting the signal coming from the SENSOR socket.

WARNING! When using sensored brushless motor, the #A, #B, #C wires of the ESC MUST connect with the motor wire #A, #B, #C respectively. Do not change the wires sequence optionally!

b) Sensorless brushless motor wiring

When using brushless motor without Hall Sensor, the #A, #B, #C wires of the ESC can be connected with the motor wires freely (without any order). If the motor runs in the opposite direction, please swap any two wire connections.

Note: For SENSORLESS motor, you can also set the throttle channel of your transmitter to the "Reverse" direction, and then the motor will run oppositely. Please calibrate the throttle range again after changing the direction of throttle channel. Please keep in mind that this method is ONLY available for SENSORLESS motor.

2. Throttle Range Setting (Throttle Range Calibration)

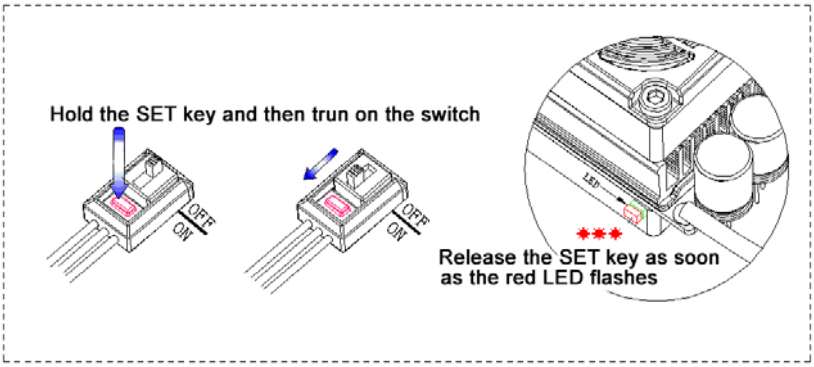
In order to make the ESC fit the throttle range, you must calibrate it when you begin to use a new ESC, or a new transmitter, or change the settings of neutral position of the throttle stick, ATV or EPA parameters, etc. Otherwise the ESC cannot work properly.

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 **Futaba**™ transmitter.

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 function of your transmitter.

B) Hold the "SET" key and then switch on the ESC, and release the "SET" key as soon as possible when the red LED begins to flash. (***Note 4***)



Note4: *If you don't release the "SET" key after the red LED begins to flash, the ESC will enter the program mode, in such a case, please switch off the ESC and re-calibrate the throttle range again from step A.*

C) Set the 3 points according to the steps shown as the pictures on the right side.

1) **The neutral point**

Move the throttle stick at the neutral point, and then click the SET key, the green LED flashes 1 time.

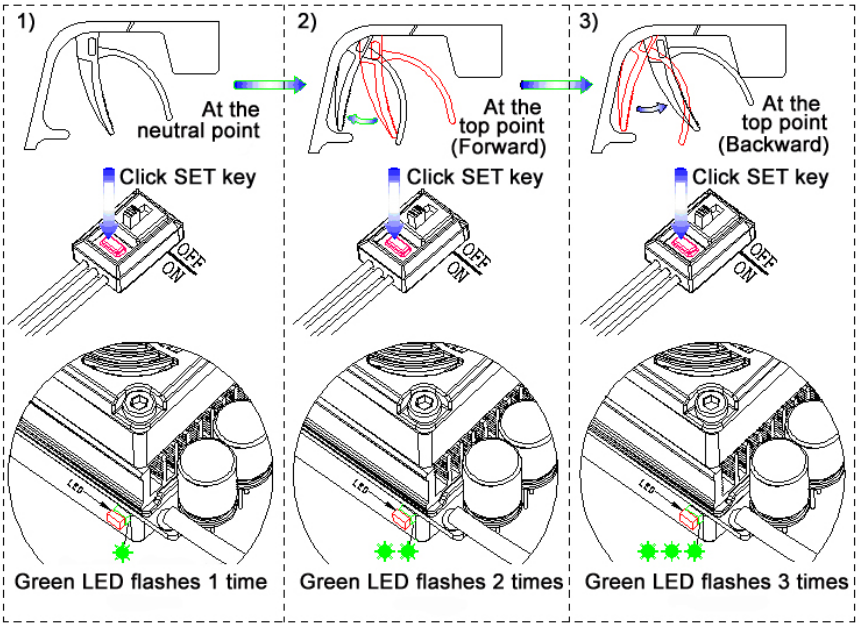
2) **The end point of forward direction**

Move the throttle stick at the end point of forward direction, and then click the SET key, the green LED flashes 2 times.

3) **The end point of backward direction**

Move the throttle stick at the end point of backward direction, and then click the SET key, the green LED flashes 3 times.

D) Throttle range is calibrated; motor can be started after 3 seconds.



3. Check the LED Status in Normal Running

- ★ Normally, if the throttle stick is in the neutral range, neither the red LED nor the green LED lights.
- ★ The red LED lights when the car is running forward or backward and it will flash quickly when the car is braking.
- ★ The green LED lights when the throttle stick is moved to the top point (end point) of the forward zone or backward zone.

4. Check the Lipo Cells Setting if You Are Using Lithium Battery

If you are using Lipo battery, we strong suggest setting the “Lipo Cells” programmable item manually to avoid the over-discharge problem. Please read the instructions on page 6.
In normal case, when the ESC is switched on, the motor will emit several “Beep” tones to express the cells number of the battery pack. For example, “Beep-Beep-” means 2s Lipo, “Beep-Beep-Beep-” means 3s Lipo, etc.

Alert Tones

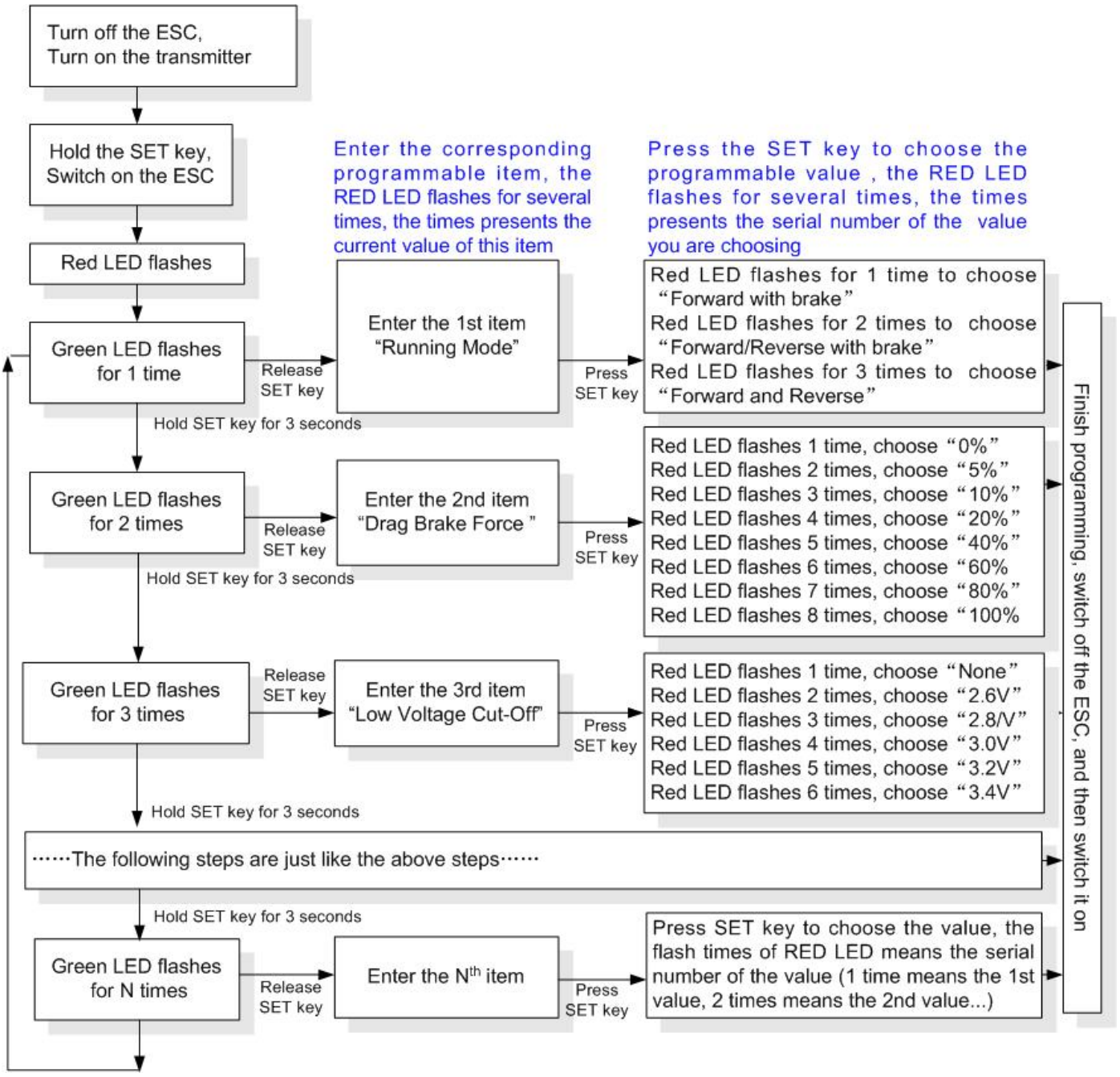
1. Input voltage abnormal alert tone: The ESC begins to check the input voltage when power on, if the voltage is out of the normal range, such an alert tone will be emitted: “beep-beep-, beep-beep-, beep-beep-” (There is 1 second interval between every “beep-beep-” tone).
2. Throttle signal abnormal 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 interval between every “beep-” tone).

Trouble Shooting

Trouble	Possible Reason	Solution
After power on, motor doesn’t work, and the cooling fan doesn’t work	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, red LED always lights, the motor doesn’t work	Throttle signal is abnormal	Plug the control wire into the throttle channel of the receiver correctly.
The motor runs in the opposite direction when it is accelerated	1)The wire connections between ESC and the motor are not correct 2)The chassis is different from the popular design	1) For sensorless motor: Swap any two wire connections between the ESC and the motor. Or use the method #2 2) For sensored motor: Please check the wire connections, they must be A-A, B-B, C-C respectively. If the connections are correct, please change the “Motor Rotation” programmable item to “CW(Clockwise)”
The motor suddenly stops running while in working state	The throttle signal is lost	Check the transmitter and the receiver Check the signal wire from the throttle channel of your receiver
	The ESC has entered the Low Voltage Protection Mode or Over-heat Protection Mode	Red LED flashing means Low Voltage. Green LED flashing means Over-heat
When accelerating quickly, the motor stops or trembles	1) The battery has a bad discharge performance 2) The gear rate is too small 3) The “Start Mode (Punch)” of the ESC is too aggressive	1) Use a better battery 2) Use lower KV motor or change the gear rate 3) Set the “Start Mode (Punch)” to a softer value
When the throttle stick is in the neutral range, the red LED and the green LED flashes synchronously	The motor is a sensored motor, but the ESC detects abnormal signal from the sensor, so it changes to sensorless mode automatically	1) Check the connection of Hall sensor cable to make it firmly connect the motor with the ESC 2) The Hall sensors in the motor are damaged, please change the motor

Program The ESC

1. Program Method



Note5:

- ★ 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

  ……

  And so on.

Programmable Items List (***The italics texts in the above form are the default settings***)

Programmable Items	Programmable Value								
	1	2	3	4	5	6	7	8	9
Basic Items									
1. Running Mode	Forward Only with Brake	***Forward/Reverse with Brake***	Forward and Reverse						
2.Drag Brake Force	***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	Level2	Level3	Level4	***Level5***	Level6	Level7	Level8	Level9
Advanced Items									
5.Max Brake Force	25%	50%	***75%***	100%					
6.Max Reverse Force	***25%***	50%	75%	100%					
7.Initial Brake Force	***= Drag Brake Force***	0%	20%	40%					
8.Neutral Range	6% (Narrow)	***9% (Normal)***	12% (Wide)						
9.Timing (Only for sensorless motor)	0.00 °	3.75 °	7.50 °	11.25 °	***15.00 °***	18.75 °	22.50°	26.25°	
10.Over-heat Protection	***Enable***	Disable							
11.Motor Rotation	***Counter Clockwise***	Clockwise							
12.Lipo Cells ***Note6***	***Auto Calculate***	2 Cells	3 Cells	4 Cells	5 Cells	6 Cells			

Note6: Because the normal voltage of each Lipo cell varies from 2.6V to 4.2V, it is quite difficult to calculate the cells number of a discharged Lipo battery pack. If it is calculated incorrectly, the Low Voltage Cutoff Protection function may work abnormally, so the option "Auto Calculate" is only available for 2s, 4s and 6s Lipo. If the voltage of the battery pack is lower than 8.8V, it is judged as a 2s Lipo; If the voltage is between 8.8V to 17.6V, it is judged as a 4s Lipo; If the voltage is higher than 17.6V, it is judged as a 6S Lipo. So in order to make the Low Voltage Cutoff Protection function always works correctly, we strongly suggest setting the "Lipo Cells" item manually.

2. Programmable Values

2.1.**Running Mode:** With "Forward Only with Brake" mode, the car can go forward and brake, but cannot go backward, this mode is suitable for competition; "Forward/Reverse with Brake" mode provides backward function, which is suitable for daily training.

Note: "Forward/Reverse with Brake" 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 1st "click"), 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 immediately. When the throttle stick is moved to the backward zone again (The 2nd "click"), if the motor speed is slowed down to zero (i.e. stopped), the backward action will happen. The "Double-Click" method can prevent mistakenly reversing action when the brake function is frequently used in steering.

By the way, in the process of braking or reversing, if the throttle stick is moved to forward zone, the motor will run forward at once.

"Forward/Reverse" mode uses "Single-click" method to make the car go backward. When you move the throttle stick from forward zone to backward zone, the car will go backward immediately. This mode is usually used for the Rock Crawler.

2.2.**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.

2.3.**Low Voltage Cut-Off:** The function prevents the lithium battery pack from over discharging. The ESC detects the battery's voltage at any time, if the voltage is lower than the threshold for 2 seconds, the output power will be cut off, and the red LED flashes in such a way: "☆-☆-, ☆-☆-, ☆-☆-".

There are 6 preset options for this item. You can customize the cutoff threshold by using a LCD program box (optional equipment) to trim it with a step of 0.1V, so it will be more suitable for all kinds of batteries (NiMH, NiCd, Li-ion, Lipo, LFP,etc). **Please always keep in mind that the customized value is not for each cell, it is for the WHOLE battery pack.**

2.4.**Start Mode (Also called "Punch"):** Select from "Level1" to "Level9" as your like, Level1 has a very soft start effect, while level9 has a very aggressive start effect. From Level1 to Level9, the start force is increasing. Please note that if you choose "Level7" to "Level9" mode, you must use good quality battery pack with powerful discharge ability, otherwise these modes cannot get the burst start effect as you want. If the motor cannot run smoothly (the

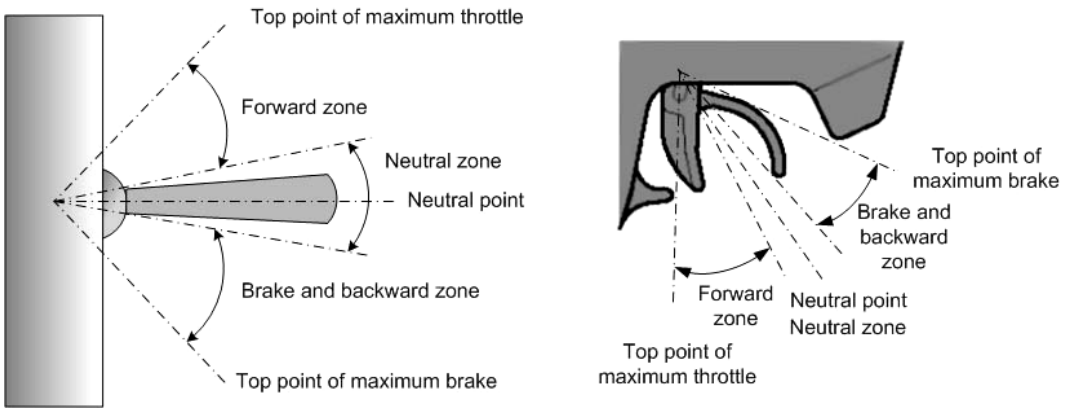
motor is trembling), it may caused by the weak discharge ability of the battery pack, please choose a better battery or increase the gear rate.

2.5. **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.

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

2.7. **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 smoothly.

2.8. **Throttle Neutral Range:** Please refer to the following picture to adjust the neutral range as your like.



2.9. **Timing:** The “timing” item is usable for both sensored and sensorless brushless motors. 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.

2.10. **Over-Heat Protection:** If the function is activated, the output power will be cut-off when the temperature of the ESC or the internal temperature of the sensored brushless motor is up to a factory-preset value for 5 seconds. When the protection happens, the Green LED will flash.

★ **When the ESC is over-heat:** The Green LED flashes as “☆-, ☆-, ☆-”.

★ **When the motor is over-heat:** The Green LED flashes as “☆-☆-, ☆-☆-, ☆-☆-”.

Note: The motor over-heat protection function is only available for the sensored brushless motor made by the same manufacturer of the ESC. For motors made by other manufacturers, this function maybe not available or the protection point doesn’t match the design of the ESC, please disable the over-heat protection function in such a case.

2.11. **Motor Rotation:** You can use this item to change the rotation direction. Face to the motor shaft (That means the rear cover of the motor is far from your face), and move the throttle stick to the top point of the forward zone. If this item is set to “CCW”, the shaft runs counter-clockwise; If this item is set to “CW”, the shaft runs clockwise.

2.12. **Lipo Cells:** We strongly suggest setting the “Lipo Cells” item manually.

3. 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. Set The ESC By Using Program Card

Program card is an optional equipment which needs to be purchased separately. It has a friendly user interface. 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 ⊖⊕𝐔), and then connect the main battery pack to the ESC. After several seconds, 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.

Main Applications

ESC	Motor	Pinion	Gear Rate	Applications
EZRUN-80A	EZRUN-3665SL KV＝2300	M1, 13T	1/8 Off-Road: 9.5-16 1/8 Monster: 16-21	1/8 EP Off-Road Truggy or Buggy. 1/8 NP Off-Road Truggy or Buggy changes to EP. 3 cells or 4 cells Lipo battery is recommended.
EZRUN-80A	EZRUN-3674SL KV＝2350	32Pitch, 19T	1/8 Off-Road: 10-15.5 1/8 Monster: 13-21	1/8 EP Monster. Normal powerful. 3 cells or 4 cells Lipo battery is recommended. Budget-friendly, suitable for sportful and RTR
EZRUN-150A	EZRUN-3674SL KV＝2350	32Pitch, 21T		1/8 EP Monster. Very powerful. 3 cells or 4 cells Lipo battery is recommended. Very reliable, bring you with incredible speed.
EZRUN-150A	EZRUN-4465SL KV＝2000	32Pitch, 19T	4 Cells Lipo: 12-19 6 Cells Lipo: 15-21	1/8 EP Monster. Super and crazy powerful. 4 cells or 6 cells Lipo battery is recommended.

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