User Instruction for R/C Model Car ESC

Specification

Item	Continuous current	Battery Cell		Dimension (mm) L×W×H	Weight（g）	BEC	Program By key
		Li-XX	Ni-Mh /Ni-Cd				
EMAX-6A	6A	1-2	3-8	12 x 20 x 5	4	1A/5V	NO
EMAX -10A	10A	1-2	3-8	22 x 17 x 7	8	1A/5V	NO
EMAX -30A	30A	2-3	4-9	45x32x20	50	2A/5V	Yes
EMAX -45A	45A	2-3	4-12	45x32x20	50	2A/5V	Yes
EMAX -60A	60A	2-4	4-15	47x41x29	80	2A/5V	Yes
EMAX -80A	80A	2-4	4-15	47x41x29	80	2A/5V	Yes
EMAX -100A	100A	2-4	4-15	47x41x29	80	2A/5V	Yes

- Full protection features including low voltage, over-heat, throttle signal loss, startup protection and self-check.
- Compatible with sensor-free brushless motors.
- Excellent startup performance, great throttle linear and quick throttle response.
- Support highest motor speed 240,000RPM (2 poles), 80,000RPM (6 poles) and 40,000RPM (12 poles).
- The parameters of ESC can be configured via pressing the keys.
- System can automatically detect throttle neutral point and neutral range is adjustable.
- Three working modes can meet different requirements.
- 4 steps of maximum reverse force adjustment, 5 steps of maximum start force adjustment.
- 3 steps of maximum brake force adjustment, 5 steps of drag brake force adjustment, 4 steps of initial brake force adjustment.
- Support 1 cell operation (min voltage: 3V, only available for EMAX-6A and EMAX-10A).

Instructions

Normal Startup Procedure

Move throttle stick to the neutral position → Switch on the transmitter →Connect battery pack to ESC → System detects the neutral throttle signal, makes **a long** "**beep-**" sound → System detects battery voltage and makes several short "**beep-**" sounds, which denotes the number of battery cells → when self-test is finished → **"♪1 2 3"** tone should be emitted →ready for start.

Setting Throttle Range (Throttle range should be setup when a new transmitter is being used)

Switch off the ESC → Switch on the transmitter → Press and hold the " **SET "** key → Switch on the ESC → Push the throttle stick to the top point of forward within two seconds → wait for one second → System detects the Max throttle signal, and makes two "**beep-**" sounds, which denotes that Max throttle has been confirmed and saved → Pull the throttle stick to the top point of backward →System detects the Min throttle signal, makes two "**beep-**" sounds, which denotes that Min throttle has been confirmed and saved → Release the " **SET "** key → Setting is finished**.**

Push the throttle stick to the neutral position → System detects the neutral throttle signal, makes a long "**beep-**" sound → System detects battery voltage and makes several short "**beep-**" sounds, which denotes the number of battery cells →when self-test is finished → **"♪1 2 3"** tone should be emitted → Ready for start.

If the system doesn't detect the throttle signal, it will make "beep-" sounds continuously.

Any fault in self- test, or excessive voltage, it will make 20 very short "beep-" sounds.

Meanwhile, the LED will be on.

The LED Status

1 The green LED is on when the car goes forward, the red LED is on when the car goes backward, and both are on when the car is braking

2 when the car stops, both red LED and green LED are off.

3 both the red and green LED are on when the voltage is inadequate or excessive, or the ESC is over-heat.

Protection

A. Low voltage protection: When power voltage is lower than the cutoff threshold, ESC will cut off output power.

B. Throttle signal lose protection: The ESC will cut off the motor, if throttle signal lost for 0.5 second.

C. Over-heat protection: output power will be reduced to cool down if temperature of the board of CPU reaches 100℃, and the output power will rise after temperature gets lower.

D. Self-check: ESC will start self-test when power on, if self-test fails, ESC will continuously emit 20 short "**beep-**" tones.

Configurable Parameters

1. Off Volt (Low voltage Protection threshold, Cutoff voltage): User can set proper cutoff voltage according to cell quantity in range of 00.0-49.9V, the default is 00.0V。

Note: System will detect battery cells and calculate proper threshold automatically if this setting is 00.0V, protection threshold for each Li-XX cell is 2.8V. For example: if the battery pack is 3 cells Li-xx, cutoff voltage will be: 2.8V*3=8.4V.

2. Brake Force: 50%, 75%,100%. Default is 100%. The ESC provides proportional brake function. The brake force is related to the position of the throttle stick. It refers to the maximum brake force when the throttle stick is pushed to the top point of the backward zone.

3. Drag Brake: 0、5%,10%,15%,20%. Default is 0. When the throttle stick is located at the neutral zone, the ESC provides a slight brake force.

4. Run Mode: One, Two, Two2. Default is **Two2**.

One: the car can go forward only, and brake continuously if push the throttle stick to backward zone.

Two: Bi-directional mode, the car go forward when the throttle stick is located at the forward zone, when the throttle stick is located at the backward zone, the car will go backward, the brake will occur when direction change.

Two2: Conditional Bi-directional mode. With this option, the car go backward only when car is stop and throttle stick is pushed from neutral zone to backward zone. When car is running forward, push throttle stick to backward zone, car will keep brake until it stops, the throttle stick return the neutral zone, and push the throttle stick to the backward zone, then the car will go backward

5. Start Force: 20%,25%,30%,35%,40%. Default is 30%. It refers to the maximum force when the car start.

6. Timing : low, middle ,high and highest. Default is middle. Low advance timing is recommended for high inductance and low KV motors. High advance timing is recommended for low inductance and high KV motors.

7. Neutral Range: 6%,8%,10%. Default is 8%. Within this zone, the motor will be turned off.

8. Initial Brake Force: 5%,10%,20%,30%. Default is 5%. It refers to the brake force when the throttle stick is located at the initial position of the backward zone.

9. Reverse Force: 25%,50%,75%,100%. Default is 50%. It refers to the maximum force when car run in reverse direction.

Programming the ESC with keys

1.Enter program mode

1 Turn off the ESC, Switch on transmitter, keep throttle stick to the neutral position

2 Press and hold the "**SET" KEY**, Switch on the ESC

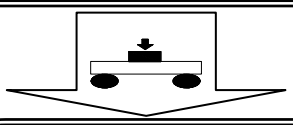
3 Wait for 3 seconds, special tone like **"♪ i3i3"** should be emitted, which means program mode is entered

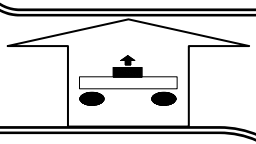
4.Exit program

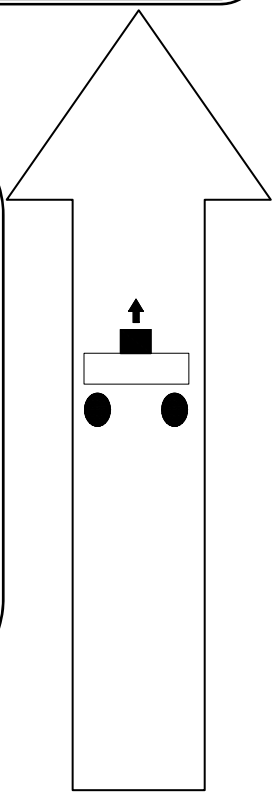
There are two ways to exit program mode:

1 In step 2, after 3 long tone (The item #11)，please release the **KEY** within 2 seconds.

2 In step 3,after special tone **"♪ 5 6 5 6" ,** please release the **KEY** within 2 seconds.







2.Select programmable items

After entering program mode, hold the "**SET" KEY** continuously, you will hear 11 tones and **red led** flash in a loop in the following sequence. If you release the "**SET" KEY** within 2 seconds after one kind of tone, this item will be selected, and enter step 3

⑴ "beep-" (1 short tone, **red led** flash 1 short times) **Brake Force**

⑵ "beep- beep-" (2 short tone, **red led** flash 2 short times) **Drag Brake**

⑶ "beep- beep- beep-" (3 short tone, **red led** flash 3 short times) **Run Mode**

⑷ "beep- beep- beep- beep-" (4 short tone, **red led** flash 4 short times) **Start Force**

⑸ "beep----- " (1 long tone, **red led** flash 1 long times) **Li-xx cells**

⑹ "beep----- beep- " (1 long 1 short tone, **red led** flash 1 long times and 1 short times) **Cutoff threshold**

⑺ "beep----- beep- beep-" (1long 2 short tone, **red led** flash 1 long times and 2 short times) **Timing**

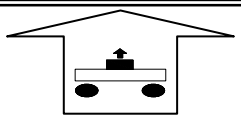
⑻ "beep----- beep- beep- beep-" (1 long 3 short tone, **red led** flash 1 long times and 3 short times) **Neutral Range**

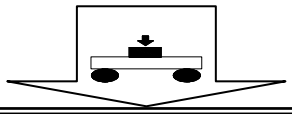
⑼ "beep----- beep- beep- beep- beep-" (1 long 4 short tone, **red led** flash 1 long times and 4 short times) **Initial Brake Force**

(10) "beep----- beep-----" (2 long tone, **red led** flash 2 long times) **Reverse Force**

(11) "beep----- beep----- beep-----" (3 long stone, **red led** flash 3 long times) **Restore all to default and Exit**

Note: 1 long "beep-----" = 5 short "beep-", flash 1 long times=5 short times





3.Set item value

After entering the item, you will hear several tones and **green led** flash in loop, Set the value matching to a tone by press the "**SET" KEY** within 2 second when you hear the tone, then you will hear special tone like **"♪ 5 6 5 6".** It means the value is set and saved.

Hold the **SET KEY** for 3 second, you will go back to step 2. if release the **SET KEY** within 2 second, you will exit the program mode quickly.

Tone / Items	**beep-,1 tone** **green led** flash 1 short time	**beep-beep-,2 tone** **green led** flash 2 short times	**beep-..,3 tone** **green led** flash 3 short times	**beep-….,4 tone** **green led** flash 4 short times	**beep-----,1 long tone green led** flash 1 long time	**beep-…..,N tones** **green led** flash N times
1. Brake Force	50%	75%	**100%**			
2. Drag Brake	**0**	5%	10%	15%	20%	
3. Run Mode	ONE	TWO	**TWO2**			
4. Start Force	20%	25%	**30%**	35%	40%	
5.Li-xx Cells Number	**Auto detect**	2 cells	3 cells	4cells	5 cells	N cells
6.Cutoff threshold	2.5V	**2.8V**	3.1V			
7. Timing	Low	**Mid**	High	Highest		
8.Neutral Range	6%	**8%**	10%			
9.Initial Brake Force	**5%**	10%	20%	30%		
10.Reverse Force	25%	**50%**	75%	100%		

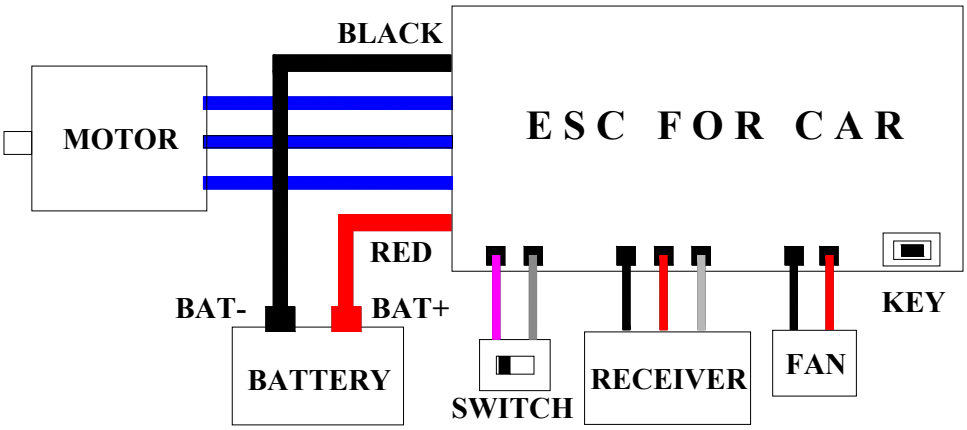
Note: 1. 1 long "beep-----" = 5 short "beep-". For example, in "Li-xx Cells Number" setting, 1 long "beep-----" plus 1 short "beep-" (5+1=6) means a 6 cells Li-xx battery pack.

2. The boldface in above form is the default value.

3. Low voltage Protection threshold (Cutoff voltage) = Li-xx Cells Number * Cutoff threshold. Cutoff threshold is Protection threshold for one cell Li-xx. For example: if Li-xx Cells Number is 3 and Cutoff threshold is 3.1V, the cutoff voltage will be: 3.1V*3=9.3V.

4. In step 2, after 3 long tone (The item #11)，if release the "SET" KEY within 2 seconds, you will exit program. But if you don't change other item value, the ESC will restore all items to default value, and makes two "beep-" sounds.

Wiring the ESC



Throttle Diagram