

# User Instructions for R/C Model Aircraft ESC

## 1. Features

- 1.1 Equipped with high-speed, small-sized, multifunctional MCU.
- 1.2 Low-voltage protection, over-heat protection, signal loss protection, safe power on protection, and self-check functions.
- 1.3 Excellent startup performance, great throttle linear and quick throttle response.
- 1.4 Excellent low-speed performance.
- 1.5 Max speed: 240,000 rpm for 2-pole, 80,000 rpm for 6-pole, 40,000 rpm for 12-pole.
- 1.6 Separate power supply for MCU and BEC, enhancing the ESC's ability of eliminating magnetic interference.
- 1.7 All parameters of the ESC can be configured via program card.
- 1.8 Throttle range can be configured to be compatible with different receivers.
- 1.9 GOVERNOR function makes helicopter control more flexible.

## 2. Product specification

Item	Continuous Current	Burst current (10S)	Li-xx Battery (cell)	Dimension (mm) L x W x H	Weight(g) Including wires	BEC (Linear)	Program-able
ESC-7A	7A	9A	1-2	12x20x5	4	1A	Yes
ESC-12A	12A	15A	1-3	22x17x7	7	1A	Yes
ESC -18A	18A	23A	2-3	46x28x9	22	2A	Yes
ESC -25A	25A	30A	2-4	46x28x9	25	2A	Yes
ESC -35A	35A	45A	2-4	58x27x10	35	3A	Yes
ESC -40A	40A	50A	2-5	58x27x10	35	3A	Yes
ESC -50A	50A	65A	2-5	58x27x10	36	3A	Yes
ESC -60A	60A	80A	2-5	58x27x15	50	3A	Yes
ESC -80A	80A	100A	2-5	58x27x20	60	3A	Yes

### Max. load of Built-in BEC (5V/3A):

Li-xx Battery (cell)	2	3	4	5
Qty of standard servo (Max.)	5	5	4	3

## 3. Instructions

### 3.1 Normal Startup procedures

- Step1: Push the throttle stick to the bottom position (full Off throttle),
- Step2: Switch the transmitter on,
- Step3: Switch the ESC on (normally by connecting batteries).
- Step4: System detects the Min. throttle signal, and makes a long “beep” sound.
- Step5: System detects battery voltage and makes several short “beep” sounds, which denotes the number of battery cells.

Step6: System conducts self-check. If it is normal, you will hear a long “beep” sound,  
Step7: Pull the throttle stick to the Startup position. (LED on the ESC flashes along with the “beep” sound.)

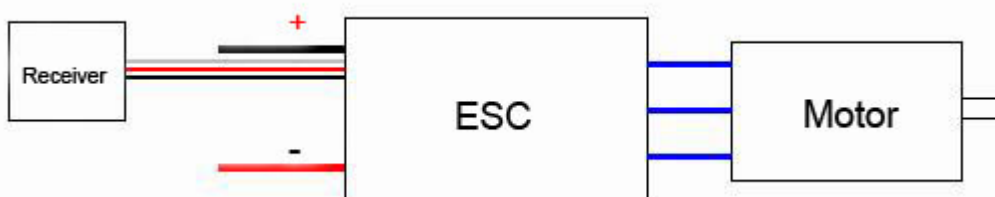
### 3.2 Throttle range setting procedures

Step1: Pull the throttle stick to the top position (full On throttle),  
Step2: Switch the transmitter on,  
Step3: Switch the ESC on (normally by connecting batteries)  
Step4: System detects the Max. throttle signal, and makes two “beep” sounds, which denotes that Max. throttle has been confirmed and saved.  
Step5: Push the throttle stick to the bottom position (full Off throttle),  
Step6: System detects the Min. throttle signal and makes a long “beep” sound.  
Step7: System detects battery voltage and makes several short “beep” sounds, which denotes the number of battery cells.  
Step8: System self-check occurs. If it is normal, you will hear a long “beep” sound,  
Step9: Pull the throttle stick to Startup position.  
If the system doesn’t detect the throttle signal, it will constantly make “beep” sounds without stopping.  
Any fault in self-check, it will make 20 short “beep” sounds.

### 3.3 Protection settings

**Low-voltage protection:** Whether the ESC will shut down immediately, or lower the power when the input voltage drops below the programmed low-voltage protection voltage depends on the values set as **Cutoff Type**.  
**Loss of signal protection:** Power will automatically lower to less than 20% when signal is lost for over 3 seconds, and resume when detecting the signal.  
**Over-heat protection:** When the temperature is above 110 Celsius degree, power will be lower to less than 50%, and will resume when the temperature decreases.  
**Hardware self-check:** The system will check by itself when the battery is connected. Any hardware fault, it will make 20 “beep” sounds.

## 4. Wiring your ESC



## 5. Programmable parameters

A number of the performance parameters for the ESC are set as Default values. By using a Program Card (available separately) these default values can be set to meet the users’ particular performance requirements. The following section will deal with these factors

**5.1 Brake Type:** There are three brake types including **OFF** (brake disable), **Soft** brake and **Hard** brake. The default is **OFF** (brake disable). **Soft** brake: discontinuous brake. **Hard** brake: continuous braking until the motor stops rotating.

**5.2 Timing Mode:** There are three options: **Low**, **Mid** and **High**. The default is **Mid**. **Low** advance timing is recommended for high inductance and low KV motors. **High** advance timing is recommended for low

inductance and high KV motors, e.g. high KV outrunner motors.

**5.3 Cutoff Mode:** There are two options: **Soft-Cut** and **Cut-Off**. The default is **Soft-Cut**.

**Cut-Off** option: immediate motor shutdown occurs in low-voltage.

**Soft-Cut** option: Reduce throttle power to below 50% of the full power at low-voltage if current output power is more than 50% of the full On throttle power, or else it will keep unchanged.

**5.4 Start Mode:** There are three options: **Fast** start, **Soft** start and **very Soft** start. The default is **very Soft** start.

**Fast** start is recommended for low inductance and low start loading motors. **Very Soft** start is recommended for high inductance and high start loading motors. **Soft** start is recommended for those motors with medium inductance and medium start loading.

**5.5 Governor Mode:** Recommended for setting governor mode in helicopters. Three options: **OFF**, **Gov-Low**, **Gov-High**. The default is **OFF**

Governor mode is a RPM control which means the throttle stick position determines the RPM that the motor runs and the controller will attempt to hold that RPM regardless of load changes. Governor mode is useful in collective pitch helicopters, making the control more easy and flexible.

**OFF** disables governor mode. It is usually used in airplanes or fixed pitch helicopters. **Gov-Low** has finer RPM control at lower RPMS, and the **Gov-High** has finer RPM control at higher RPMS.

**5.6 Li-XX Cells:** It is used to choose cells of Li-xx battery packs. Range : 0—12 cells. The default is 0 cell.

If the battery cell is 0, the system will automatically identify the battery cell as 0 and calculate the Low-voltage cutoff voltage. E.g. suppose the low-voltage cutoff voltage is 2.75V per cell (under Mid Low-voltage cutoff type), if there're 3 cells, the total Low-voltage cutoff voltage would be  $2.75 \times 3 = 8.25V$ .

**5.7 Cutoff voltage:** There're three options: **Low**, **Middle**, and **High**. The default is **Middle**.

**Low:** Low-voltage cutoff voltage is 2.5V per cell.

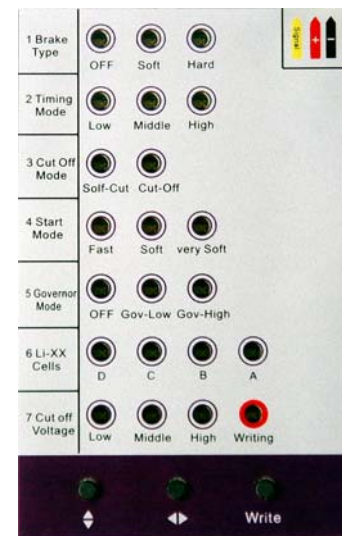
**Middle:** Low-voltage cutoff voltage is 2.75V per cell.

**High:** Low-voltage cutoff voltage is 3.0V per cell.

## 6. The instructions for program card

### 6.1 Programming the ESC

1. Disconnect the ESC from the battery
2. Pull the PPM signal wire out from the receiver, and plug it into the program card jack. Please pay attention to the direction
3. Connect the ESC to the battery (the first row of LED on the program card will flash)
4. The program card automatically reads parameters from the ESC and the corresponding LED will be on.
5. All parameters can be viewed and modified by pressing corresponding buttons.
6. Press the **“Write”** button to write the new parameters to the ESC.
7. Cut off the power



### 6.2 Functions of each button

◆ Button: Choose different parameters (7 in total). The corresponding LED will flash given the values chosen.

◆ Button: Choose the value of the parameter which is currently set

**Write** Button: when all the parameters are set, press this button to permanently save the new parameters to the ESC. **“Write”** LED will flash 3 times which indicates the setting is successfully written in.

●Li-xx battery cells

4 LED compound indication, 0-12 cells of Li-xx batteries

LED indicator				Li-xx battery (cell)
D	C	B	A	
○	○	○	○	0(system automatic detection)
○	○	○	●	1
○	○	●	○	2
○	○	●	●	3
○	●	○	○	4
○	●	○	●	5
○	●	●	○	6
○	●	●	●	7
●	○	○	○	8
●	○	○	●	9
●	○	●	○	10
●	○	●	●	11
●	●	○	○	12

● Indicates that LED is on