Skylord Series Brushless Electronic Speed Controller

User Manual

Thanks for purchasing the Electronic Speed Controller (ESC). High power system for RC model can be very dangerous, please read the manual carefully before use, since incorrect use can cause personal injury and equipment damage. We assume no liability for personal injury, property damage or consequential damages resulting from use of the product or unauthorized alteration of the product. Products and the user manual shall be subject to any changes without additional notices.

1 Product Introductions

1.1 Features

- All the electronic components in ESCs are genuine original, to ensure the ESCs working with high quality and reliability.
- Microprocessor in the ESC is powered by separate voltage regulator IC, with better anti-jamming capability, greatly reducing the possibility of out of control.
- The ESCs have three start modes: Normal, Soft, and Super-soft, it can be used for both fixed-wing aircraft and helicopter.
- The ESCs have full protection features such as low voltage protection, over-heat protection, over-load protection, and throttle signal lost protection, it can effectively extend the service life of the ESCs.
- The ESCs support selectable timing, compatible with aircraft motors and disc-type motors.
- The throttle range can be configured, fully compatible with the available transmitters. The ESCs have smooth and accurate speed control, and excellent throttle linearity.
- The highest motor speed: 210000 RPM (2 poles), 70000 RPM (6 poles), 35000RPM (12 poles).
- A programming card with a very small size and intuitive interface can be purchased additionally for easily programming the ESC (For details, please see the user manual of program card).

1.2 Programmable Items

Table 1-1   Programmable Items

Items	Parameter Description
Brake	Values: **OFF**, **ON**. The default is **OFF**.
Battery Type	Values: **Li-Po**, **Ni-MH**. The default is **Li-Po**.
Low Voltage Protection Mode (Cut Off Type)	Values: • **Soft-Cut**: Gradually reduce the output power. • **Cut-Off**: Immediately shut off the output power. The default is **Soft Cut**. ⚠️ **Attention:** When the ESC is in low voltage protection mode, you need to move the throttle stick to the bottom to restart the motor. After the restart, the ESC will still be in low voltage protection mode, so the output power will be low.
Low Voltage Protection Threshold (Cut Off Voltage)	Values: **Low**, **Middle**, **High**. The default is **Middle**. • When the **Battery Type** is **Li-Po**, the number of battery cells is calculated automatically. Low, middle and high cut off voltages for each cell are 2.85V, 3.15V and 3.3V. For example, for a 3S Li-Po battery pack, when **Middle** cut off threshold is set, the cut off voltage will be 3.15*3=9.45V. • When the **Battery Type** is **Ni-MH**, low, middle and high cut off voltages are 0%, 50% and 65% of the start voltage (i.e. the initial voltage of battery pack), and 0% means the low voltage cut off function is disabled. For example, for a 6 cells Ni-MH battery pack, fully charged voltage is 1.44*6=8.64V, when **Middle** cut off threshold is set, the cut off voltage will be 8.64*50%=4.3V.
Start Mode	Values: **Normal**, **Soft**, **Very Soft**. The default is **Normal**. It takes 300 milliseconds for **Normal** mode, 1.5 seconds for **Soft** mode, or 3 seconds for **Very Soft** mode from initial throttle advance to full throttle. **Normal** mode is suitable for fixed-wing aircraft. **Soft** or **Very Soft** mode are suitable for helicopters.
Timing Mode	Values: **Low**, **Middle**, **High**. The default is **Middle**. Low, middle and high timing values are 3.75°, 5° and 26.25°. Usually, **Low** timing value can be used for most motors. Due to the large difference of the motor structure, please try each timing value to get satisfactory effect. To get higher speed, **High** timing value can be chosen. ⚠️ **Attention:** After changing the timing setting, please test your RC model on ground prior to flight.

1.3 Protection Functions

- Start protection: If the motor fails to start up within 2 seconds while pushing up the throttle stick, the ESC will cut off the output power and then try to restart the motor after 2 seconds. Such a situation happens in the following cases:
  - The connection between the ESC and the motor is loose.
  - The propeller is blocked by other objects.
  - The gearbox is damaged.
- Over-heat protection: When the temperature of the ESC is over about 110 Celsius degrees, the ESC will gradually reduce the output power. To ensure that the motor can still get power to avoid a crash, the ESC will not shut down all the output power, maximum reducing to 40% of the full power. After the temperature drops, the ESC will gradually recover to maximum power.
- Low voltage protection: If the battery voltage is lower than the cut off threshold, the ESC will reduce the output power to zero according to the pre-set cut off type.

- Throttle signal loss protection: The ESC will gradually reduce the output power if the throttle signal is lost for 1 second, further loss for 2 seconds will cause the output cut off. If the throttle signal is recovered within 2 seconds, the throttle control will be recovered immediately.
- Over-load protection: If the load of motor increases suddenly, the ESC will cut off the output power and then try to restart after 2 seconds.

1.4 Specifications

Table 1-2   Specifications

Model	Cont. Current	Burst Current (10s)	BEC Mode	BEC Output	BEC Output Capacity 2S Li-Po	3S Li-Po	4S Li-Po	5S Li-Po	Battery Cell Li-Po	Ni-MH	Weight	Size (L*W*H, unit: mm)
Skylord-6A	6A	8A	Linear	5V/1A	3 servos	-	-	-	2	5-6	5.5g	32*12*4.5
Skylord-12A	12A	15A	Linear	5V/2A	5 servos	4 servos	-	-	2-3	5-9	10g	38*18*7
Skylord-15A	15A	20A	Linear	5V/2A	5 servos	4 servos	-	-	2-3	5-9	17g	48*23*6
Skylord-20A	20A	25A	Linear	5V/2A	5 servos	4 servos	-	-	2-3	5-9	20g	42*25*8
Skylord-30A	30A	40A	Linear	5V/2A	5 servos	4 servos	-	-	2-3	5-9	38g	65*25*12
Skylord-40A-UBEC	40A	55A	Switch	5V/3A	5 servos	5 servos	5 servos	-	2-4	5-12	42g	65*25*12
Skylord-50A-UBEC	50A	65A	Switch	5V/3A	5 servos	5 servos	5 servos	-	2-4	5-12	42g	65*25*12
Skylord-60A-UBEC	60A	80A	Switch	5V/5A	8 servos	8 servos	6 servos	6 servos	2-6	5-18	62g	77*35*14
Skylord-80A-UBEC	80A	100A	Switch	5V/5A	8 servos	8 servos	6 servos	6 servos	2-6	5-18	80g	86*38*12

📖 **Note:**

The ESC suffixed by **UBEC** means this is an ESC with a built-in UBEC. The ESC model without a suffix means this is an ESC with a built-in BEC.

Ultra battery elimination circuit (UBEC) uses a switch-mode DC-DC regulator to output the power supply. Compared with the traditional linear mode BEC, The UBEC has higher efficiency, lower loss, and higher output driver capability. In heavy load conditions, the UBEC is more stable and reliable.

2 Instructions

As shown in Figure 2-1, the ESC is connected with battery pack, brushless motor and receiver to form a brushless power system.

- The input lines of ESC are connected with the battery pack.
- The output lines of ESC are connected with the motor.
- The signal lines of ESC are connected with the throttle channel of the receiver.
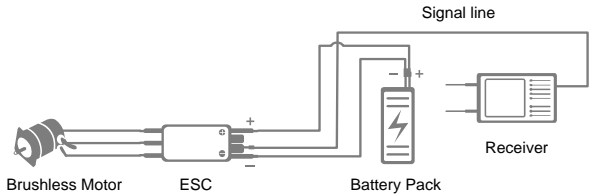

Figure 2-1   Connection Diagram

2.1 Begin to Use the ESC

⚠️ **Attention：**

Different transmitters have different throttle ranges, when you use the ESC first time, or change a new transmitter, please calibrate throttle range before flying.

The throttle range setting is as shown in Figure 2-2. After setting the throttle range, you can begin to use the ESC according to the normal start procedure as shown in Figure 2-3.
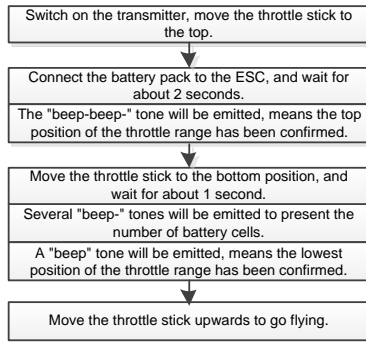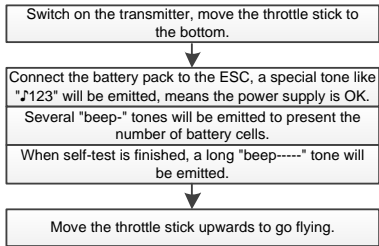

Figure 2-2   Throttle Range Setting   Figure 2-3   Normal Start Procedure

2.2 Program the ESC with transmitter

📖 **Note：**

Before programming the ESC with transmitter, please check the throttle curve of transmitter, and make sure the throttle output is set to 0 when the throttle stick is at bottom position and 100% at the top position.

Steps:

1. Enter the programming mode.
   (1) Switch on the transmitter, move the throttle stick to the top position, and connect the battery pack to the ESC.
   (2) Wait for about 2 seconds, the motor will emit a warning tone like "beep-beep-".
   (3) Wait for another 5 seconds, a special warning tone like "♪56712" will be emitted, means the programming mode is entered.
2. Select the programmable items.
   After entering the programing mode, you will hear 8 different tones in a loop in the following sequence as shown in Table

2-1. If you move the throttle stick to the bottom within 3 seconds after one of the tones, this programmable item will be selected.

Table 2-1   Tone Description of the Programmable Items

NO.	Tones	Items	Tone Description
1	beep-	Brake	1 short tone
2	beep-beep-	Battery Type	2 short tones
3	beep-beep-beep-	Cut Off Type	3 short tones
4	beep-beep-beep-beep-	Cut Off Voltage	4 short tones
5	beep-----	Start Mode	1 long tone
6	beep-----beep-	Timing Mode	1 long 1 short
7	beep-----beep-beep-	Restore Factory Default	1 long 2 short
8	beep-----beep-----	Exit	2 long tones

📖 **Note:**

A long tone "beep-----" is equal to five short tones "beep-", thus the tone "beep-----beep-" means the sixth item.

3. Set the item value.
   (1) After entering the programmable item, you will hear several tones in loop, for details please see Table 2-2.
   (2) Set the value by moving the throttle stick to the top when you hear the matched tone, then a special warning tone "♪1515" will be emitted, means the value is set and saved.
   - If you need to set other programmable items, keep the throttle stick at top, you will go back to **step 2**, and you can select other programmable items and set the value.
   - If you do not need to set other programmable items, move the throttle stick to bottom position within 2 seconds, you will exit the programming mode directly.

Table 2-2   Tone Description of the Item Value

Items \ Tones	"beep-" 1 short tone	"beep-beep-" 2 short tones	"beep-beep-beep-" 3 short tones
Brake	OFF	ON	-
Battery Type	Li-Po	Ni-MH	-
Cut Off Type	Soft-Cut	Cut-Off	-
Cut Off Voltage	Low	Middle	High
Start Mode	Normal	Soft	Very Soft
Timing Mode	Low	Middle	High

4. Exit the programming mode.
   There are two ways to exit the programming mode:
   - When set the item value in **step 3**, after the special warning tone "♪1515", please move the throttle stick to the bottom position within 2 seconds.
   - When select the programmable items in **step 2**, after the tone "beep----- beep-----" (i.e. the eighth item), please move the throttle stick to the bottom position within 3 seconds.

3 Trouble shooting

Table 3-1   Trouble Shooting

Faults	Possible Reasons	Solutions
After power on, the motor does not work, no sound is emitted.	The connection between the ESC and the battery pack is loose.	Check the connection between the ESC and the battery pack, plug in or replace the connector, make sure the connection is reliable.
After power on, the motor does not work, a warning tone "beep-beep-, beep-beep-, beep-beep-" (every "beep-beep-" has an interval of 1 second) is emitted.	The voltage of battery pack is abnormal (too high or too low).	Check the voltage of the battery pack.
After power on, the motor does not work, a warning tone "beep-, beep-, beep-" (every "beep-" has an interval of 2 seconds) is emitted.	The throttle signal is abnormal: • The throttle signal in ESC from the receiver is loss. • The throttle channel of the receiver does not output the throttle signal.	Check whether the transmitter and receiver are matched, and then check the connection of the throttle channel.
After power on, the motor does not work, a warning tone "beep, beep, beep" (every "beep" has an interval of 250 milliseconds) is emitted.	There are two possible reasons: • The throttle stick is not at the bottom. • The throttle range is too small.	Solution for each reason: • If the throttle stick is not at the bottom, move the throttle stick to the bottom. • If the throttle range is too small, reset the throttle range.
After power on, the motor does not work, a special tone "♪56712" is emitted after a warning tone "beep-, beep-".	The direction of the throttle channel is reversed.	Set the direction of the throttle channel correctly.
The motor runs in opposite direction.	The line sequence of connection between the ESC and the motor is wrong.	Swap any two wire connections between the ESC and the motor.