User Manual of Brushless Speed Controller (www.freewing-model.com)

Thanks for purchasing our Electronic Speed Controller (ESC). High power system for RC model is very dangerous, please 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 or malfunctioning etc. will be denied. We assume no liability for personal injury, property damage or 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.

Specifications

Model	Cont. Current	Burst Current (>10s)	BEC Mode	BEC Output	BEC Output Capability				Battery Cell		Weight	Size
					2S Lipo	3S Lipo	4S Lipo	6S Lipo	Lipo	NiMH		L*W*H
RTF 40A-UBEC	40A	55A	Switch	5V/3A	5 servos	5 servos	5 servos		2-4S	5-12 cells	43g	65*25*12
RTF 60A-UBEC	60A	80A	Switch	5V/5A	8 servos	8 servos	6 servos	6 servos	2-6S	5-18 cells	63g	77*35*14
RTF 80A -OPTO+UBEC5A	80A	100A	Switch	5V/5A	8 servos	8 servos	6 servos	6 servos	2-6S	5-18 cells	77g	83*31*14
RTF 100A-OPTO+UBEC8A	100A	120A	Switch	5V/8A	12 servos	12 servos	10 servos	10 servos	2-6S	5-18 cells	77g	75*40*17.5
RTF 130A-OPTO+UBEC8A	130A	160A	Switch	5V/8A	12 servos	12 servos	10 servos	10 servos	2-6S	5-18 cells	77g	75*40*17.5

Programmable Items (The option written in bold font is the default setting)

1. Brake Setting：**Enabled** / Disabled
2. Battery Type：**Lipo** / NiMH
3. Low Voltage Protection Mode(Cut-Off Mode)： **Soft Cut-Off (Gradually reduce the output power)** /Cut-Off (Immediately stop the output power)
4. Low Voltage Protection Threshold(Cut-Off Threshold)：Low / **Medium** / High
   1) For lithium battery, the battery cell number is calculated automatically. Low / medium / high cutoff voltage for each cell is: 2.85V/3.15V/3.3V. For example: For a 3S Lipo, when "Medium" cutoff threshold is set, the cut-off voltage will be: 3.15*3=9.45V
   2) For NiMH battery, low / medium / high cutoff voltages are 0%/50%/65% of the startup 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 NiMH battery, fully charged voltage is 1.44*6=8.64V, when "Medium" cutoff threshold is set, the cut-off voltage will be: 8.64*50%=4.32V。
5. Startup Mode：**Normal** /Soft /Super-Soft (300ms / 1.5s / 3s)
   a) Normal mode is suitable for fixed-wing aircraft. Soft or Super-soft modes are suitable for helicopters. The initial acceleration of the Soft and Super-Soft modes are slower, it takes 1.5 second for Soft startup or 3 seconds for Super-Soft startup from initial throttle advance to full throttle. If the throttle is completely closed (throttle stick moved to bottom position) and opened again (throttle stick moved to top position) within 3 seconds after the first startup, the re-startup will be temporarily changed to normal mode to get rid of the chance of a crash caused by slow throttle response. This special design is suitable for aerobatic flight when quick throttle response is needed.
6. Timing：**Low** / Medium / High,(3.75° /15° /26.25°)
   Usually, low timing is suitable for most motors. To get higher speed, High timing value can be chosen.

Begin To Use Your New ESC

IMPORTANT! Because different transmitter has different throttle range, please calibrate throttle range before flying.
Throttle range setting (Throttle range should be reset whenever a new transmitter is being used)

Switch on the transmitter, move throttle stick to the top position	Connect battery pack to the ESC, and wait for about 2 seconds	The "Beep-Beep-" tone should be emitted, means the top point of throttle range has been confirmed	Move throttle stick to the bottom position, several "beep-" tones should be emitted to present the amount of battery cells	A long "Beep-" tone should be emitted, means the lowest point of throttle range has been correctly confirmed

Normal startup procedure

Move throttle stick to bottom position and then switch on transmitter.	Connect battery pack to ESC, special tone like "♪ 123" means power supply is OK	Several "beep-" tones should be emitted to present the amount of lithium battery cells	When self-test is finished, a long "beep-----" tone should be emitted	Move throttle stick upwards to go flying

Protection Function

1. Start up failure protection: If the motor fails to start within 2 seconds of throttle application, the ESC will cut-off the output power. In this case, the throttle stick **MUST** be moved to the bottom again to restart the motor. (Such a situation happens in the following cases: The connection between ESC and motor is not reliable, the propeller or the motor is blocked, the gearbox is damaged, etc.)
2. Over-heat protection: When the temperature of the ESC is over about 110 Celsius degrees**,** the ESC will reduce the output power.
3. Throttle signal loss protection: The ESC will reduce the output power if throttle signal is lost for 1 second, further loss for 2 seconds will cause the output to be cut-off completely.

Trouble Shooting

Trouble	Possible Reason	Action
After power on, motor does not work, no sound is emitted	The connection between battery pack and ESC is not correct	Check the power connection. Replace the connector.
After power on, motor does not work, such an alert tone is emitted: "beep-beep-, beep-beep-,beep-beep-" (Every "beep-beep-" has a time interval of about 1 second)	Input voltage is abnormal, too high or too low.	Check the voltage of battery pack
After power on, motor does not work, such an alert tone is emitted: "beep-, beep-, beep-" (Every "beep-" has a time interval of about 2 seconds)	Throttle signal is irregular	Check the receiver and transmitter Check the cable of throttle channel
After power on, motor does not work, such an alert tone is emitted: "beep-, beep-, beep-" (Every "beep-" has a time interval of about 0.25 second)	The throttle stick is not in the bottom (lowest) position	Move the throttle stick to bottom position
After power on, motor does not work, a special tone "♪ 5671i2" is emitted after 2 beep tone (beep-beep-)	Direction of the throttle channel is reversed, so the ESC has entered the program mode	Set the direction of throttle channel correctly
The motor runs in the opposite direction	The connection between ESC and the motor need to be changed.	Swap any two wire connections between ESC and motor

Program the ESC with your transmitter (4 Steps)

Note: Please make sure the throttle curve is set to 0 when the throttle stick is at bottom position and 100% for the top position.

1. Enter program mode
2. Select programmable items
3. Set item's value (Programmable value)
4. Exit program mode

1. Enter program mode

1) Switch on transmitter, move throttle stick to top position, connect the battery pack to ESC
2) Wait for 2 seconds, the motor should emit special tone like "beep-beep-"
3) Wait for another 5 seconds, special tone like "♪ 5671i2" should be emitted, which means program mode is entered

2. Select programmable items

After entering program mode, you will hear 8 tones in a loop with the following sequence. If you move the throttle stick to bottom within 3 seconds after one kind of tones, this item will be selected.

1. "beep" brake (1 short tone)
2. "beep-beep-" battery type (2 short tone)
3. "beep-beep-beep-" cutoff mode (3 short tone)
4. "beep-beep-beep-beep-" cutoff threshold (4 short tone)
5. "beep-----" startup mode (1 long tone)
6. "beep-----beep-" timing (1 long 1 short)
7. "beep-----beep-beep-" set all to default (1 long 2 short)
8. "beep-----beep-----" exit (2 long tone)

Note: 1 long "beep-----" = 5 short "beeeee"

3. Set item value (Programmable value)

You will hear several tones in loop. Set the value matching to a tone by moving throttle stick to top when you hear the tone, then a special tone "♪ i5i5" emits, means the value is set and saved. (Keeping the throttle stick at top, you will go back to Step 2 and you can select other items; or moving the stick to bottom within 2 seconds will exit program mode directly)

Items \ Tones	"beep-" 1 short tone	"beep-beep-" 2 short tones	"beep-beep-beep" 3 short tones
Brake	Off	On	
Battery type	Lipo	NiMH	
Cutoff mode	Soft-Cut	Cut-Off	
Cutoff threshold	Low	Medium	High
Start mode	Normal	Soft	Super soft
Timing	Low	Medium	High

4. Exit program mode

There are 2 ways to exit program mode:

1. In step 3, after special tone "♪ i5i5", please move throttle stick to the bottom position within 2 seconds.
2. In step 2, after tone "beep-----beep-----" (that is: The item #8), move throttle stick to bottom within 3 seconds.