Manual of Brushless Motor Speed Controller

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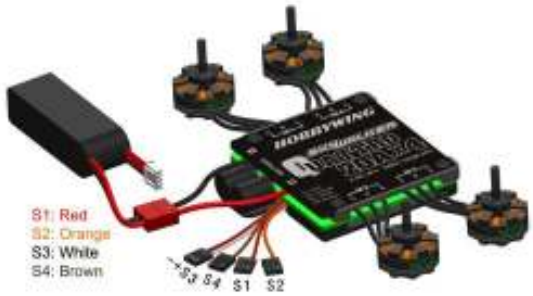
Features

1. 4 speed controllers in1board, only 1 pair of battery wire is needed.
2. Powerful switch mode built-in BEC (the BEC voltage outputs from the S3 connector).
3. Multiple protection features: Low voltage cut-off protection / over-heat protection / throttle signal loss protection.
4. The throttle range of each ESC can be calibrated to be suitable for different multi-rotor flying control systems / transmitters.
5. Maximum speed: 210000 RPM (2 poles motor), 70000 RPM (6 poles motor), 35000 RPM (12 poles motor).



Specification

Model	Cont. Current	Burst Current (>10s)	BEC Mode	BEC Output	BEC Output Capability			Battery Cell		Weight	Size
					2S Lipo	3S Lipo	4S Lipo	Lipo	NiMH		L*W*H
Skywalker Quattro 20A*4-UBEC	20A*4	25A*4	Switch mode	5V@3A	5 servos	5 servos	4 servos	2-4S	5-12 cells	112g	70*62*11

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

1. Brake：**Disabled** / Enabled
2. Battery Type：Lipo / **NiMH**
3. Low Voltage Protection Mode (Cut-Off Mode)：**Soft Cut-Off (Gradually reduce the output)** /Cut-Off (Immediately stop the output)
4. Low Voltage Protection Threshold (Cut-Off Threshold)：**Low** / Medium / High
   a) For lithium battery, the battery cell amount is calculated automatically. Low / medium / high cutoff voltage for each cell is: 2.85V/3.15V/3.3V. For example: For a 3S Lipo battery, when “Medium” cutoff threshold is set, the cut-off voltage will be: 3.15*3=9.45V
   b) 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” cut-off threshold is set, the cut-off voltage will be 8.64*50%=4.32V。

   Warning! In order to protect the expensive multi-rotor, the default settings (i.e. **Battery Type** = “NiMH” and **Cut-Off Threshold** = “Low”) don’t take any protection even if the Lipo battery is over discharged. If you do need to activate the battery protection function please change the default settings.
5. Startup Mode：**Normal** /Soft /Super-Soft (300ms / 1.5s / 3s)
   The initial acceleration of the Soft and Super-Soft modes are slower than the Normal mode, 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, the default timing is suitable for most motors. To get higher speed, High timing can be chosen.

Begin To Use Your New ESC

Because different transmitters / flying control systems have different throttle ranges, please calibrate the throttle range for each speed controller before flying.

Throttle range setting:

Note: The throttle range of each speed controller in the Quattro should be set separately. When the Quattro is installed in a multi-rotor, you should set the throttle range of each ESC via the flying control system.

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 failed to start within 2 seconds of throttle application, the ESC would cut-off the output power. In such a case, the throttle stick **MUST** be moved to the bottom position 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, etc.)
2. Over-heat protection: When the temperature of the ESC is higher than 110 Celsius degrees**,** the ESC will reduce the output power.
3. Throttle signal loss protection: The ESC will reduce the output power if the 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 doesn't 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 doesn't 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 doesn't work, such an alert tone is emitted: "beep-, beep-, beep- "(Every "beep-" has a time interval of about 2 seconds)	Throttle signal is abnormal.	Check the receiver / transmitter / flying controller Check the cable of throttle channel
After power on, motor doesn't 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 doesn't work, a special tone " ♪ 5671̇2̇" is emitted after 2 beep tone (beep-beep-)	The Direction of throttle channel is reversed, so the ESC enters 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 ESC With Transmitter (4 Steps)

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

1. Enter program mode
2. Select programmable items
3. Select options (Programmable value)
4. Exit program mod

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 " ♪5671̇2̇" 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 "beep-"

3. Select option (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 " ♪1̇5̇1̇5̇" 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)

Tones / Items	"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 " ♪1̇5̇1̇5̇", please move throttle stick to the bottom position within 2 seconds.
2. In step 2, after tone "beep-----beep-----"(ie. The item #8), move throttle stick to bottom within 3 seconds.

NOTE:

1. Each speed controller in the Quattro must be programmed separately.
2. Please make sure the settings for each speed controller in the Quattro are same.