

Speed Controller Protection Features

- 1. Start-Up Protection:** If the motor fails to start normally within 2 seconds of opening the throttle, the ESC will shut off the output power to protect the motor and speed controller from damage. To restart the motor, reduce the throttle to idle for 2 seconds and then try opening the throttle again.
- 2. Over-Temperature Protection:** If the ESC reaches an internal temperature in excess of 110C or 230F, the ESC will automatically limit the maximum output to 70% throttle to allow the ESC to cool down while still maintaining enough throttle to safely fly the plane and bring it in for a landing if needed.
- 3. Throttle Signal Loss Protection:** If the ESC loses the input throttle signal from the receiver, after 1 second it will reduce throttle momentarily. If the throttle signal resumes, the ESC will go back to normal operation. If the throttle signal is lost for more than 2 seconds, the ESC will turn off the motor to prevent a flyaway situation.
- 4. Current Overload Protection:** If the motor current rapidly increases to a large value, as it would if the prop were suddenly stopped, the ESC will cut power to the motor to prevent damage to the motor or ESC. Resetting the throttle to idle power will reset the ESC and the throttle will then work normally again.

Speed Controller Trouble Shooting

ESC Problem	Possible Cause of Problem	Action To Fix Problem
After powering up, the ESC counts out the number of battery cells, but the motor does not run.	1. ESC throttle range not calibrated properly.	1. Repeat throttle endpoint calibration procedure.
After powering up the ESC, the motor does not run or emit any sounds, but the receiver and servos work.	1. Bad Connection between Motor and ESC. 2. Cold Solder joint on motor/ESC connectors. 3. Low Voltage Battery below LVC cutoff. 4. Burned out FET transistors or FET drivers.	1. Check Motor to ESC connections. 2. Inspect solder joints on connectors. 3. Recharge battery or try different one. 4. Replace the ESC.
After powering up the ESC, the motor does not run and the receiver and servos also do not work.	1. Dead Battery. 2. Bad solder joint on battery/ESC connectors. 3. Bad Battery or ESC connector. 4. ESC plugged into receiver backwards.	1. Charge or replace battery. 2. Inspect solder joints and repair. 3. Inspect and replace connector. 4. Unplug lead and plug in correctly.
After powering up the ESC, the motor will not run, and emits a continuous beeping sound once per second.	1. Transmitter not turned on. 2. Throttle stick not at full idle position. 3. ESC throttle endpoint calibration not done. 4. Throttle channel backwards in transmitter.	1. Turn on Transmitter. 2. Put throttle stick in idle position. 3. Perform Throttle Endpoint Calibration. 4. Reverse throttle channel in transmitter.
Motor runs fine, but it is spinning backwards to the desired direction.	1. Motor phasing is backwards.	1. Unplug any 2 wires between the motor and ESC, trade places with them and plug them back in. This will reverse the motor running direction.
Motor stops in the middle of a flight.	1. ESC overheating. 2. Loss of control signal to ESC. 3. Aircraft out of radio range.	1. Run smaller prop or provide more cooling air to the ESC. 2. Make sure that the ESC control lead is firmly plugged into receiver. 3. Fly aircraft closer to you.

BADASSPOWER SYSTEMS

REBEL V2 SERIES
ESC USER MANUAL

Thank you for purchasing a BadAss Rebel Electronic Speed Controller (ESC). Please read the information contained in this manual carefully before using the product. BadAss Power Systems has no control over the installation, use or maintenance of these products, and therefore assumes no responsibility or liability for any damages, losses, injury or associated costs resulting from the use of these products. It is the sole responsibility of the user to ensure that the products are used in a safe manner.

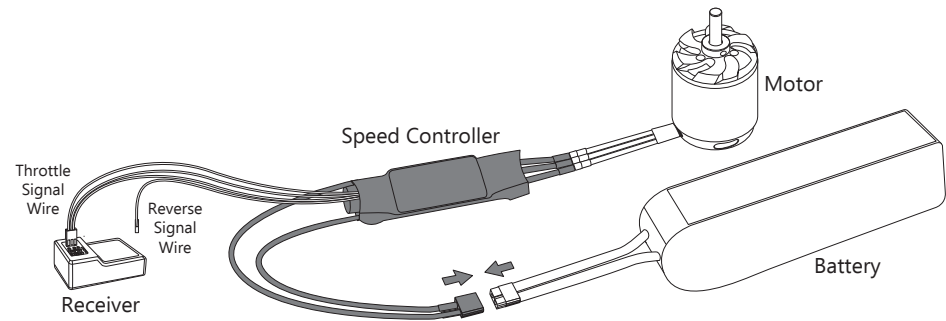
Key Speed Controller Features

1. High-Performance 32-bit Microprocessor for more computing power, faster operation, and more available features.
2. Latest generation, high-performance MOSFET's for low output resistance, high current handling and cooler operation.
3. Super smooth motor start-up and accurate linear throttle response.
4. Multiple ESC protection including Start-up, Over-heat, Low-Voltage cutoff, Loss of Signal and Loss of motor connection.
5. High-Power Switching BEC circuits on all ESC models, fixed 6-volt on Lite series and adjustable 5 or 6-volt all others.
6. Compatible with most brushless motors available today.
7. New Software Motor Reversal (SMR) feature allows for instant thrust reversing for shorter landing rollouts.
8. Ultra-Fast switching for High-speed motors. Max Speed 100,000 RPM for 6-pole, 42,857 RPM for 14-pole motors.
9. Programmable with throttle stick or with the optional LCD Programming Card

Rebel ESC Specifications

ESC Model	Max Current Cont./Burst*	LiPo Cells	SBEC Output	Weight in grams	Size (mm) L x W x H	Battery Connector	Motor Connectors
Rebel Lite 20A V2	20A/30A	2-4	6V/3A	13.0	39x16x10	None	None
Rebel Lite 30A V2	30A/40A	2-4	6V/3A	18.4	55x18x10	None	None
Rebel 20A V2	20A/30A	2-4	5-6V/4A	33.8	53x26x10	XT60	3.5mm Bullet
Rebel 30A V2	30A/40A	2-4	5-6V/4A	38.8	61x26x10	XT60	3.5mm Bullet
Rebel 40A V2	40A/55A	2-4	5-6V/4A	47.2	70x27x10	XT60	3.5mm Bullet
Rebel 50A V2	50A/65A	2-4	5-6V/4A	47.2	70x27x10	XT60	3.5mm Bullet
Rebel 60A V2	60A/80A	2-6	5-6V/8A	71.4	72x35x12	XT60	3.5mm Bullet
Rebel 80A V2	80A/100A	2-6	5-6V/8A	93.4	90x39x13	XT90	4.0mm Bullet
Rebel 100A V2	100A/120A	2-6	5-6V/8A	99.4	90x39x13	XT90	4.0mm Bullet

*Note: Burst Current Rating is for a maximum of 15 seconds



Speed Controller Connection Diagram

Throttle Endpoint Calibration Procedure

It is important to perform a throttle endpoint calibration whenever an ESC is put into a model for the first time. This ensures that the ESC learns the High and Low throttle signals that come from your Transmitter and Receiver, and that you get full linear throttle travel over the entire range of operation. Before performing the throttle endpoint calibration, you should always remove the propeller from the model to make sure that no one is injured if the motor suddenly powers up unexpectedly.

The following steps outline the procedure for performing the Throttle Endpoint Calibration on BadAss Rebel ESC’s.

- Step 1: Turn on your transmitter and open the throttle stick to the full throttle position.
- Step 2: Connect your flight battery to the power input of the Speed Controller.
- Step 3: After the motor makes 2 short beeps, immediatly move the throttle stick to the idle position.
- Step 4: The motor will beep once for each cell in your battery followed by a longer “Beep---Beep” tone.
- Step 5: Unplug the flight battery and wait a few seconds.
- Step 6: Make sure that the transmitter is still on and the throttle is in the idle position.
- Step 7: Plug the flight battery in and verify the motor beeps once for each cell in the pack followed by a “Beep---Beep” tone.
- Step 8: Run the throttle up and down slowly to verify that the motor runs smoothly over the entire throttle range.
- Step 9. Unplug the flight battery and install the propeller onto the motor. Your model is now ready for flight.

Normal ESC Startup Procedure

- Step 1: Turn on your transmitter and move the throttle stick to the lowest idle position.
- Step 2: Connect the flight battery to the input side of the ESC.
- Step 3: You will hear 1 beep for each cell of the battery pack followed by a longer “Beep--Beep” tone.
- Step 4: While holding the aircraft, verify that the motor is spinning the proper direction and the throttle works correctly.

Programmable Features (Note: The option in **Bold** type is the Factory Default setting.)

- 1. SMR Function (Software Motor Reversal): **OFF** / ON
This feature allows the user to instantly reverse the motor rotation direction in flight at any throttle setting below 50% throttle. To use this feature, SMR must be turned on, and the single yellow control lead wire needs to be plugged into a 2-position switch channel (such as the retract channel) on the receiver. This feature allow you to greatly shorten the landing roll for a STOL type model or heavy pattern aircraft by instantly reversing the motor direction when the switch is flipped. To activate thrust reversing you must be below 50% throttle, but once activated you have full 100% thrust available if needed by moving the throttle stick up.
- 2. Brake Level: **OFF** / SOFT / MEDIUM / HARD
- 3. Motor Timing: **AUTO** / Low (5°) / Medium (15°) / High (25°)
- 4. Motor Rotation Direction: **CW** / CCW
- 5. Synchronous Rectification (SR Function): ON / **OFF**
- 6. Number of Battery Cells: **Auto Detect** / 2S / 3S / 4S / 5S / 6S
- 7. Low Voltage Cutoff Level: OFF / NiXX 50% / NiXX 60% / **3.0V** / 3.2V / 3.4V / 3.6V
- 8. Low Voltage Cutoff Type: **Reduce Power to 70%** / Cut Off Power
- 9. BEC Output Voltage: **5V** / 6V (The 20A and 30A Lite Series ESC’s are fixed at 6.0 Volts)
- 10. Motor Acceleration Level: **Normal** / Soft

Note: The BadAss Rebel ESC’s can be programmed with either Throttle Stick Programming, or by using the optional BadAss V2 LCD Programming Box. The Programming Box makes this process much easier and quicker, with less chance of error.

Entering the Stick Programming Mode

- Step 1: Turn on your transmitter and move the stick to the full throttle position.
- Step 2: Connect your flight battery to the ESC.
- Step 3: After 1 second the motor will emit 2 beeps.
- Step 4: After 5 more seconds the motor will emit a musical tone like “Doodilly-Doot”
- Step 5: The motor will then count through a series of tones every 4 seconds as described by the table at the top of the next page. After going through the entire list, the cycle will repeat over and over until you select a value, or unplug the battery.

Programmable Item Tones

After entering the Programming Mode, you will hear the following 11 tone sequences in a loop. In the chart below, “beep” will signify a short beep and “BEEP” will signify a long beep.

Tones	Programable Item	Tone Descripton
1: beep	SMR Function	1 short tone
2: beep-beep	Brake Type	2 short tones
3: beep-beep-beep	Motor Timing	3 short tones
4: beep-beep-beep-beep	Motor Rotation Direction	4 short tones
5: BEEP	SR Function	1 long tone
6: BEEP-beep	Number of LiPo Cells	1 long & 1 short tone
7: BEEP-beep-beep	Low Voltage Cutoff Level	1 long & 2 short tones
8: BEEP-beep-beep-beep	Low Voltage Cutoff Type	1 long & 3 short tones
9: BEEP-beep-beep-beep-beep	BEC Output Voltage	1 long & 4 short tones
10: BEEP-BEEP	Motor Acceleration Level	2 long tones
11: BEEP-BEEP-beep	Restore All Factory Defaults	2 long tones & 1 short tone

Setting Item Values With Stick Programming

To select the Programmable Item you wish to change, right after you hear the series of tones for that item, close the throttle stick to the idle position. Once that is done, the beep sequence will start again with one short beep, followed by 2 short beeps and so on. Using the chart below, follow along with the available options for the parameter you wish to change, and after you hear the beep sequence for the value you want, open the throttle back up to the full throttle position and that value will be set into memory. After that, you will get a musical confirmation tone to let you know that the value was saved. After that, the beep process will start all over again and you if you want to change another parameter, repeat the above procedure for that parameter after you hear the correct beep sequence. When you are finished programming, simply unplug the battery.

Programming Tone Reference Table

Beep Tones Parameters	beep	beep-beep	beep-beep-beep	beep-beep-beep-beep	BEEP	BEEP-beep	BEEP-beep-beep
	1 short tone	2 short tones	3 short tones	4 short tones	1 long tone	1 long 1 short	1 long 2 short
SMR Function	OFF*	ON					
Brake Type	OFF*	Soft Brake	Mid Brake	Hard Brake			
Motor Timing	AUTO*	Low (5°)	Mid (15°)	High (25°)			
Motor Rotation Direction	CW*	CCW					
SR Function	ON	OFF*					
Battery Cell Count	AUTO*	2-Cells	3-Cells	4-Cells	5-Cells	6-Cells	
Low Voltage Cutoff Level	OFF	NIXX 50%V	NI-XX 60%V	LiPo 3.0V*	LiPo 3.2V	LiPo 3.4V	LiPo 3.6V
Low Voltage Cutoff Type	70% Power*	Cut Power					
BEC Output Voltage	5 Volts*	6 Volts					
Motor Acceleration	Normal*	Soft					
Restore Factory Defaults	Restore						