



Product Manual

80A & 120A & 150A

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Sensored/Sensorless Brushless Speed Controller for Car or Truck

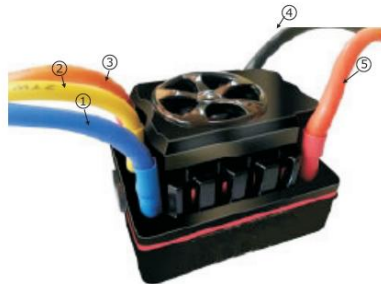
Thank you for your purchasing this Brushless Electronic Speed Controller (ESC). This electronic speed controller is specifically designed for operating Sensored/Sensorless brushless motors. High power systems for RC models can be very dangerous and we strongly suggest that you read this manual carefully. We have no control over the correct use, installation, application or maintenance of these products, thus no liability shall be assumed nor accepted for any damages, losses or costs resulting from the use of this item. Any claims arising from the operating, failure or malfunction, 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 for compensation is limited to the invoice amount or product in question.

Features:

- Enhanced throttle response, excellent acceleration, strong brakes and throttle linearity
- Advanced software interface for setting up and firmware updates.
- Uses LCD or LED program card for adjustments.
- Multiple protection features: Low voltage cut-off protection, over-heat protection and throttle signal loss protection
- Compatible with brushless sensed/sensorless motors.

Setup

Please check all connections carefully and make sure they are connected properly.



- ① Blue motor wire A
- ② Yellow motor wire B
- ③ Orange motor wire C
- ④ Power wire(-)
- ⑤ Power wire(+)

Sensored Mode:

When using a Sensored Brushless motor, the Blue motor wire A, the Yellow motor wire B and the Orange motor wire C of the ESC must be connected with the Sensored motor wire A,B,C respectively. It is necessary to connect the Sensor wire to the "Sensor" socket on the ESC. It is important to not alter the order of motor wires when using with a sensed motor.

Sensorless Mode:

When using a Sensorless Brushless motor, the Blue motor wire A, the Yellow motor wire B and the Orange motor wire C of the ESC can be connected with the motor wires in any order. If the motor runs in the opposite direction, please swap any two wire connections.

Connection to the Receiver

Black wire RX-
Red wire RX+6.0V
White wire RX-Signal

LEDs:

Sensored/sensorless function

When the Power wires on the ESC are connected with the battery pack, the ESC can automatically identify the motor type (Sensored/Sensorless) via indicated LEDs. Sensored cable must be removed for ESC to operate in sensorless mode.

| Function | LED | LED Status |
|--------------------------------------|------------------|------------|
| Low voltage of the battery | Red LED | Blinking |
| Over-heat of the ESC and motor(95°C) | Blue LED | Blinking |
| Sensored motor | Blue and Red LED | ON |
| Sensorless motor | Blue LED | ON |

Throttle Range Calibration

The ESC must be calibrated when used for the first time, and any time a new radio/receiver is used.

For the first time using transmitter or changing the transmitter you must set up Throttle Range Calibration.

- Switch off the ESC, then connect ESC to battery and turn on the transmitter; set the EPA/ATV (travel) value of the throttle channel to the maximum setting in both directions (can be 100%, 125%, 150% etc. depending on radio).

NOTE: Some radios must have throttle channel set to REV (e.g. Futaba, Flysky).

NOTE: If your radio is equipped with ABS braking it must be disabled for calibration.

- Hold the "set" button down and turn on ESC while still holding the "set" button. After about 4 seconds the LED will turn SOLID BLUE. Release the "set" button, and immediately apply full throttle and hold it. The LED will FLASH RED and then turn SOLID RED. Motor will beep.

- Immediately apply full brake (do not stop at neutral). The LED will FLASH BLUE and then turn SOLID BLUE. Motor will beep.

- Return throttle to neutral position. RED and BLUE LEDs will flash, and then turn solid and then off. Motor will beep. Throttle has been calibrated.

- Turn the ESC back ON. The ESC is now ready to use.

Programmable Items and default settings:

Default settings are shown in the grey boxes.

| Programmable Items | Programmable Value | | | | | | | | |
|--------------------------|---------------------|---------------------------------|-----------------|-----------|-----------|------------|-----|-----|------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| Cut-off Voltage | 2.6V/cell | 2.8V/cell | 3.0V/cell | 3.2v/cell | 3.4V/cell | NO-Cut Off | | | |
| Running Mode | Forward w/o Reverse | Forward with pause then Reverse | Forward Reverse | | | | | | |
| Motor timing | Very Low | Low | Normal | High | Very High | | | | |
| Initial Acceleration | Low | Medium | High | Very High | | | | | |
| Throttle percent Reverse | 20% | 30% | 40% | 50% | 60% | 70% | 80% | 90% | 100% |
| Throttle Limit | 0% | 20% | 30% | 40% | 50% | 60% | 70% | 80% | 90% |
| Percentage Braking | 10% | 20% | 30% | 40% | 50% | 60% | 70% | 80% | 100% |
| Percentage Drag Brake | 0% | 4% | 8% | 12% | 15% | 20% | 25% | 30% | |
| Motor Rotation | Normal | Reverse | | | | | | | |
| Neutral Range | 2% | 3% | 4% | 5% | 6% | 10% | | | |

Sensored/Sensorless brushless ESC general information

1. Cutoff Voltage

Automatically detects number of cells

ESC automatically detects number of cells in battery pack. You can program the cut-off voltage as an individual cell voltage. For example, if you set cut-off to a 3.2v. cell, a 2S LiPo pack will cut-off at a total pack voltage of 6.4v. Cut-off can be programmed via program card or PC software.

When using NiMH or NiCd batteries you do not need to set a cutoff voltage to protect the batteries. If you are using more than 6-cell NiMH or NiCd batteries, you must adjust the cutoff voltage. For example if you are using an 8-cell pack of NiMH batteries, you would use a cutoff of 5.6V volts (8 x

0.7V = 5.6V). When the voltage of the batteries packs is within 8.4-12.6V, the ESC will automatically identify 3S LiPos. When the voltage of the batteries packs is less than 8.4V, the ESC will automatically identify 2S LiPos. When the voltage of the batteries packs is within 8.4-14.8V, the ESC will automatically identify 2-4S LiPos. When the voltage of the batteries packs is within 21-25.2V, the ESC will automatically identify 5-6S LiPos.

Customized voltage Cutoff

For NiMH or NiCd Batteries, you can select a starting cutoff voltage of 4, 5, 6, 9 or 12 volts. Using the up/down to the right of the voltage you can increase the voltage stepping up 0.1V between the selectable settings.

When using any Lithium or MI (A123) batteries, they must not be discharged to less than 3.0V per cell.

Running Mode
Forward w/o Reverse

This is a Race setting - Reverse is disabled.

Note: Most tracks will not allow racing with reverse enabled.

Forward with pause then Reverse: (DEFAULT)

General bashing around (FUN) or racing if reverse is allowed for the event. The Electronic Speed Controller requires 2 seconds of continuous neutral from the transmitter prior to allowing reverse to operate.

Note: There is automatic protection within the ESC. If while traveling in reverse, you pull the trigger to go forward, only after you have stopped and returned the trigger to neutral will reverse become available. This is to help prevent serious damage to the drive train.

Forward/Reverse

If this option is selected, the car will be able to go forward and backwards but will not have brakes.

ESC reverse operation

If you need to engage reverse, apply brakes and return throttle to neutral after car has come to a complete stop. Wait at least 2 seconds and then push trigger to full brake position to activate reverse.

Motor Timing - This option affects the power band and efficiency (run time) of an electric motor. The default is Normal and is a good starting point to deliver power and provide good run time.

Very Low - Provides maximum efficiency with less power. Higher timing produces significantly more power but at the expense of efficiency (less run time) and typically the motor will generate more heat. Each brushless motor will respond to timing differently. Good for running around on paved or harder surfaces, and racing with high KV rated or low-turn motors.

Low - Provides power for running through soft surfaces, having fun and longer run time.

Normal (Default) - Good mix of power and efficiency using any motor.

High - More power than efficiency, so run time will be reduced, and you should be monitoring motor heat. The higher KV or lower turn motors will generate heat quickly using this setting. A safe high temperature range is 165F to 180F (74° - 82° Celsius); going higher may damage your motor.

Very high - This is maximum power and must be used with caution.

Note: Any motor has the potential to overheat in this setting. Frequently check the motor temperature and make sure you're not operating higher than 165° and 180° Fahrenheit (74° - 82° Celsius), which may damage your motor or your Electronic Speed Controller (ESC).

Initial Acceleration - Use this to limit the initial power that is sent to the motor when starting from a complete stop. Using the Low option, the vehicle will launch very slowly and provide the longest run times. When using the High choice, you will have wheel-spinning acceleration at the cost of run time. This is

also very tough on the batteries as the amperage draw can be very high. If your vehicle cuts out, hesitates or loses radio control, you should consider setting this at a lower value.

Low - Using this option will provide longer run times and is easiest on the batteries. It is a good choice for beginners.

Medium - Requires more from your batteries, and is good for low traction surfaces.

High - This option will provide full acceleration and requires stout batteries to supply the load required in this setting.

Very high - This option will provide full acceleration and requires stout batteries to supply the load required in this setting.

Throttle Percent Reverse - Use this to limit the power available using reverse throttle. The lower the percent or level the less speed will be available in reverse.
20%, 30%, 40%, 50%, 60%(Default), 70%, 80%, 90%, 100%

Throttle Limit - Use this to limit the power available using forward throttle.The lower the percent the less forward throttle speed will be available.
0%(Default), 20%, 30%, 40%, 50%, 60%, 70%, 80%, 90%

Percentage Braking - Gives you the ability to have full control over the amount of brake your vehicle will have.
10%, 20%, 30%, 40%, 50%(Default), 60%, 70%, 80%, 100%

Percentage Drag Brake - The drag brake function provides the driver a set percentage of brake when you have the transmitter resting in neutral. This will create the feeling of a Brushed Motor. Drag brake are used in racing to slow a vehicle as you let off approaching a corner versus the driver having to push the brake at every corner. Try working with this to get a sense of how you might use this for your track. If you are running on a high traction track with tight corners, a stronger setting should work best. If you are running in an open area, you will find a smaller percentage will result in better control. If you are running on slippery or dusty surfaces, you will more than likely want to use the lowest option.
0%(Default), 4%, 8%, 12%, 15%, 20%, 25%, 30%

Motor Rotation Normal (default). Reverse

Neutral Range - This setting adjusts the amount of "Deadband" off neutral on the throttle trigger. This is in milliseconds (MS) and is the amount of neutral when you pull the trigger. The smaller the value, the less "Deadband" or movement is required off-center for the ESC to begin throttle function. Using a higher value for this setting will provide a wider "Deadband."
2%, 3%, 4% (Default), 5%, 6%, 10%

BEC – BEC is adjustable via “11th” (hidden) option on LCD card or via Starlink US Link. 6V/8.4V
*****VERIFY SERVO AND RX ARE RATED FOR HIGH-VOLTAGE, OTHERWISE DAMAGE TO ESC, SERVO OR RX MAY OCCUR.*****

How to use a PC to set up or update the firmware:

1. An LCD program card or a StarLink USB link is required to link the ESC to a PC via the supplied USB cable. The desktop application can be downloaded from www.HobbyStarLabs.com.

2. Connect the LCD card or the StarLink to the PC via the USB cable, and connect the ESC signal lead to the port marked "ESC" on the LCD card or the StarLink. Note: Make sure the black wire from the ESC signal lead is aligned with the "-" on the ESC port on the LCD card or the black mark on the StarLink.

3. Switch on the ESC, and launch the desktop application. You will now be able to read and change the ESC settings and update firmware.

Note: If working with Windows 2000, you will be required to restart the PC before the USB Adaptor gets connected and the small LED on the adapter turns from Red to Blue.

4. The ESC settings will be read when application is launched. If settings do not appear, press the "Data" button to read the ESC.

5. When you are done making adjustments, click the "Apply" button, and settings will be saved to the ESC. You do not need to hit "Apply" after every change. Note: When using an LCD card as a stand-alone programmer, you must hit "OK" after every change for it to be saved to the ESC.

6. The "Firmware" option can be used to upgrade the ESC firmware if a new version is available. Note: Firmware needs to be downloaded separately, and loaded via the "Firmware" option. The application is not connected to the internet and does not search for or automatically download updates.

7. The software is installed and ready for use now.

Please refer to the section above for a general overview and field-specific help. Take a moment to review the selectable functions, and read the specific help text to become familiar with each of them. To make configuration changes to a function, select the setting you want, and from the drop-down menu select your new choice or option. When you are satisfied and finished with this configuration, click the "SEND Settings" button located on the bottom of each tabbed page. **Connection:** This section is displayed on every Tab. There are two icons; one for the USB connection, the other indicates the Electronic Speed Control connection. They are Orange in color when disconnected and Blue on connection.

Note: It is not recommended that you make changes to the "default" configuration without a full understanding of a specific function and the reasons for the changes. The defaults were selected as a direct result of the testing used to establish these settings. Changing of the configuration will be at your own risk.

Read Settings: Use of this button will read the current Electronic Speed Control (ESC) configuration and present it on the current tabbed page only.

Send Setting: Use of this button will send (write) the current selected configuration to the ESC for the current tabbed page only.

Upgrade Firmware: Use of this button will begin the firmware upgrade process. A pop-up will be displayed, and you need to select the location of the firmware update file. You may cancel this process here without any effect to the ESC firmware.

After finding and selecting the file, the confirmation screen will then display. You may still cancel the process at this time without any effect to the ESC firmware. If you select OK, the progress status percentage of the upgrade will be displayed. Please do not unplug your computer or the ESC while the upgrade is in progress, or damage to the ESC may result. If no problems were encountered, OK will be displayed and the configuration redisplayed.

You are finished with the upgrade and you can re-configure the ESC or end the program. If a problem is encountered and the upgrade fails, simply restart the upgrade process. If there should be another failed upgrade, then close all other programs on your computer and possibly re-download the file from the website.

Using the LED Program card

The Program card with LED display is easy to use and convenient to carry. All of the programmable functions are shown on the program card.

1. Turn on the ESC, and plug the signal wire into the port on top of the card marked "┐└": After 2 seconds the card will turn on, and the first setting will be displayed. If the card does not turn on, check the connections and try again.

2. If ESC is not connected to battery power, a separate power source will need to be connected to the program card. Connect a 5.0-6.3V power supply (battery) to port marked " ⊕ ⊖ " with the negative (black) wire aligned with the " ⊖ " symbol.

3. The number on the left is the programmable item which is being displayed, and the number on the right is the current setting. You can scroll through all the settings using the "Menu" button. To make changes to a given setting, use the "Value" button to change the "number on the right" setting. Press "OK" to apply the new setting to the ESC. NOTE: You must press "OK" after every individual change or they will not be saved to the ESC.

4. Pressing the "Reset" button will restore all settings to default.