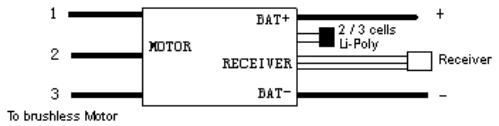
Welgard 70A ESC 5Amp BEC
Brushless ESC Manual
Advanced Edition
(For more models visit www.graysonhobby.com/manuals/)

The ESC is programmable for battery type and number, throttle settings, brake settings, direction of motor rotation, timing mode and PWM. Please make sure you fully understand these settings before adjusting. Failure to properly program ESC will result in poor motor performance.

CAUTION: Secure the aircraft and keep fingers and body away from of the propeller.

Connecting the Motor

.Note the wiring diagram below:



1. Solder an appropriate connector on the battery +(red) and battery -(black) leads. We recommend Deans. If using a polarized connector, make sure the polarity matches your batteries.
2. Connect the three motor wires to your brushless motor (ignore the wire colors). If the motor spins in the wrong direction, swap any two of the motor wires to reverse the direction. We recommend using gold plated spring connectors (also known as bullet connectors) between the motor and the speed control to facilitate swapping the wires. Make sure to cover the bullet connectors with heat shrink tubing.
3. Plug the servo connector into the appropriate channel on your receiver. Most receivers use channel 3 for the throttle, but some use channel 1. Consult the manual for your receiver for details. The red wire on the servo connector is positive (+), the brown or black wire is negative (-), and the orange or white wire is the signal.
4. Make sure your transmitter throttle channel is not reversed. Most Futaba transmitters have the throttle channel reversed by default.
5. Before flight, you can program the battery type, number of cells, and cut-off voltage. See the next page for programming instructions.
   Install your ESC in a location in your airplane that receives good cooling airflow. Keep the motor and battery wires away from your receiver and antenna

Cutoff Voltage:

- Cutoff voltages are auto-set
- Lipo 75% of initial startup voltage
- 0.8V per unit for NiMh selection

If the proper cell type and cell number is selected, the ESC will cut off at **75**% of the initial voltage. For example, when using a 2s lipo when fully charged, the initial voltage is 4.2V [4.2V x 2 (2S pack) = 8.4V.] ESC cut off at 8.4 * 0.**75** = 6.3per pack or 3.15V each cell. If the cells are not fully charged or if there is any other reason causing the voltage to be lower than 4.2V a cell in some circumstance the LVC will be lower than 3.0V a cell.

PACKS MUST BE FULLY CHARGED BEFORE USE

Phase 1 Enter programming Mode

1. Connect your motor and receiver to the speed controller, but do not connect the battery yet.

2. Turn on your transmitter and move the throttle stick to the full throttle position (full up). Please Note: Many Futaba transmitters have the throttle channel reversed by default.

3. Connect your battery and the controller will initialize with a musical tone.

Phase 2 Programming

After 3 seconds, the controller will start beeping a sequence of tones – a musical tone followed by one or more beeps. Each sequence represents a parameter that you can program and is repeated 3 times.

The parameters are:

♪—	Music Tone + 1 Beep	Options 1. Cell Type and No. of Cells
♪— —	Music Tone + 2 Beeps	Options 2. Throttle Setting
♪— — —	Music Tone + 4 Beeps	Options 3. Brake Setting /Throttle type (for Heli)
♪— — — —	Music Tone + 5 Beeps	Options 4. Direction and Cutoff Type
♪— — — — —	Music Tone + 6 Beeps	Options 5. Timing Mode

Step 1. Starting, Enter Sub-options. When you hear the sequence for the parameter you wish to program, move the throttle stick to the Center Position to Enter Sub-options. The controller will then start beeping a Morse code sequence of short and long beeps representing the possible options you may choose for the selected parameter. See table 2 for a list of all programmable options. Each option sequence is repeated 3 times.

Step 2. Select and save, the select the option, move the throttle stick back to the Full-up-position., when you hear the sequence for the option you wish to select. The controller will then save the selected option, and sound a long beep as a confirmation. It then goes back to the beginning of the programming sequence (phrases 2).

Step 3. Complete programming and save options. Setup all the parameters you need to change. When complete, move the throttle stick to the Lowest (Down) Position. The controller will save all options and re-initialize in normal running mode so you can start your motor.

1.1 ♪— For (2S-7S)-ESC Cell Type and Number of Cells	70A,
• — 1 Short + 1 Long	NiMh/NiCD Auto Cell Count - 0.8V/Cell Cutoff Voltage
• — — 1 Short + 2 Long	7S Li-Po (25.9V) – 21V Cutoff Voltage
• — — — 1 Short + 3 Long	6S Li-Po (22.2V) –18V Cutoff Voltage
• — — — — 1 Short + 4 Long	5S Li-Po (18.5V) – 15V Cutoff Voltage
• — — — — — 1 Short + 5 Long	4S Li-Po (14.8V) – 12V Cutoff Voltage
• — — — — — — 1 Short + 6 Long	3S Li-Po (11.1V) – 9V Cutoff Voltage
• — — — — — — — 1 Short + 7 Long	2S Li-Po (7.4V) – 8V Cutoff Voltage

2.Throttle Setting ♪— —	
•• — 2 Short + 1 Long	Auto Throttle Range *
•• — — 2 Short + 2 Long	1.1ms to 1.8ms
•• — — — 2 Short + 3 Long	Hard start*
•• — — — — 2 Short + 4	Long Soft start

3.Brake Setting (For normal Aircraft) ♪— — —	
••• — 3 Short + 1 Long	No Brake
••• — — 3 Short + 2 Long	Soft Brake*
••• — — — 3 Short + 3 Long	Medium Brake
••• — — — — 3 Short + 4 Long	Hard Brake

4.Direction and Cutoff Type ♪— — — —	
•••• — 4 Short + 1 Long	Clockwise Rotation
•••• — — 4 Short + 2 Long	Counterclockwise
•••• — — — 4 Short + 3 Long	Soft Cutoff
•••• — — — — 4 Short + 4 Long	Hard Cutoff *

5.Timing Mode Setting ♪— — — — —	
••••• — 5 Short + 1 Long	1º - For 2-Inrunner Motors *
••••• — — 5 Short + 2 Long	7º - For 6- Pole Motors
••••• — — — 5 Short + 3	15º- For 10-14 Pole
••••• — — — — 5 Short + 4 Long	30º - For 10-14 Pole High-RPM Outrunner

6. Pulse Width Modulation (PWM) Setting ♪— — — — — —	
•••••• — 6 Short + 1 Long 8KHz	For low RPM and low pole count motors *
•••••• — — 6 Short + 2 Long 16KHz	For most out runner motors

The table above summarizes the various programming options for each parameter:

*** is Default Setting**