Welgard 45A
Brushless ESC
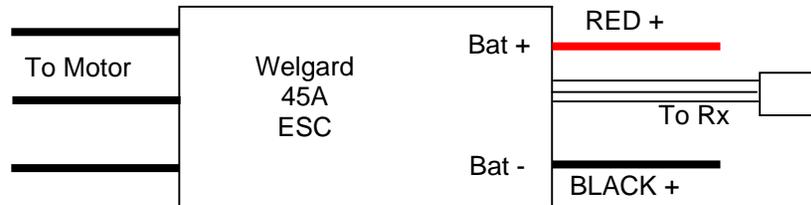
Max Continuous Current:	45A on 2-4 Cells
	30A on 7 Cells
BEC:	No
Input Voltage:	6V-30V (2-7 Lithium Polymer, 6-20 NiCD/NiMH)
Resistance:	0.0025 ohms (12 FETs)
Thermal Cutoff:	100° C / 212° F
Maximum RPM:	40,000 RPM on a 14 Pole Motor

Hookup Instructions:

1. Solder an appropriate connector on the battery + (red) and battery – (black) leads. We recommend Deans Ultra or Anderson Power Pole connectors. If using a polarized connector, make sure the polarity matches your batteries, and make sure your connector can handle 80 amps of current.
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 must program the battery type, number of cells, and cut-off voltage. See the next page for programming instructions.
6. 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.

Notes on the BEC:

This speed control does not have a built-in battery-eliminator circuit (BEC). You must either use a 4.8V receiver pack, or use a separate switching BEC to provide power to your receiver.

Programming Instructions:

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).
3. Connect your battery and the controller will initialize with a musical tone.
4. After 3 seconds, the controller will start beeping a sequence of tones – one to six short beeps.   Each sequence represents a parameter that you can program and is repeated 3 times. The parameters are:

—	Tone + 1 Beep	Cell Type and Number of Cells
— —	Tone + 2 Beeps	Throttle Setting
— — —	Tone + 3 Beeps	Brake Setting
— — — —	Tone + 4 Beeps	Direction and Cutoff Type
— — — — —	Tone + 5 Beeps	Timing Mode
— — — — — —	Tone + 6 Beeps	Pulse Width Modulation (PWM)

Table 1 – Programming Parameters

5. When you hear the sequence for the parameter you wish to program, move the throttle stick to the center position.
6. 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. When you hear the sequence for the option you wish to select, move the throttle stick back to the full up position.
7. 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 (step 4)
8. 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.

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

1. Cell Type and Number of Cells

• —	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) – 6V Cutoff Voltage

2. Throttle Setting

•• —	2 Short + 1 Long	Auto Throttle Range (Default)
•• — —	2 Short + 2 Long	1.1ms to 1.8ms
•• — — —	2 Short + 3 Long	Hard start (Default)
•• — — — —	2 Short + 4 Long	Soft start

3. Brake Setting

••• —	3 Short + 1 Long	No Brake
••• — —	3 Short + 2 Long	Soft Brake (Default)
••• — — —	3 Short + 3 Long	Medium Brake
••• — — — —	3 Short + 4 Long	Hard Brake

4. Direction and Cutoff Type

•••• —	4 Short + 1 Long	Clockwise Rotation (Default)
•••• — —	4 Short + 2 Long	Counterclockwise Rotation
•••• — — —	4 Short + 3 Long	Soft Cutoff
•••• — — — —	4 Short + 4 Long	Hard Cutoff (Default)

5. Timing Mode Setting

••••• —	5 Short + 1 Long	1º - For 2-4 Pole Inrunner Motors (Default)
••••• — —	5 Short + 2 Long	7º - For 6-8 Pole Motors
••••• — — —	5 Short + 3 Long	15º - For 10-14 Pole Outrunner Motors
••••• — — — —	5 Short + 4 Long	30º - For 10-14 Pole High-RPM Outrunner Motors

6. Pulse Width Modulation (PWM) Setting

•••••• —	6 Short + 1 Long	8KHz – For low RPM and low pole count motors (Default)
•••••• — —	6 Short + 2 Long	16KHz – For most outrunner motors

Table 2 – Programming Values