

Thanks for purchasing TEAM WAVE racing speed controller RB-50. RB-50 is a high performance brushless/brushed electronic speed controller (ESC) designed for racing / professional use. Please read through this instruction manual before setting up your RB-50 and consult our engineering supporting team if you have any question.

WARNING !

RB-50 is designed for professional use only and requires electronic knowledge for operation. Please seek help if you have any question in operation and always keep it out of reach of children. High frequency noises may be emitted during operation and may cause interferences to other electronic devices. Do not operate if such effect become unacceptable.

CAUTION !

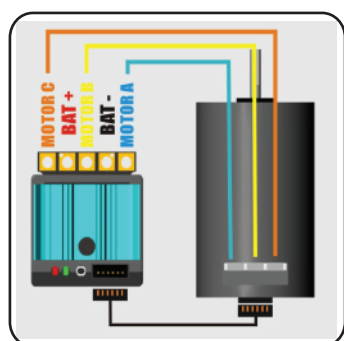
Always remove battery connection when not in use. Always switch on transmitter before RB-50. Always switch off RB-50 before the transmitter. Do not operate on wet surface. Do not touch the heatsink after run which may be hot and cause injury. Always check all connection/wiring and motor type before operation. Visual check any short circuit after soldering. Do not run without the power capacitor. Do not run when the fan is not in operation. Do not connect the fan directly to the battery. Do not run without the schottky diode when running brushed motor. Check proper gearing of your vehicle. Over gearing or under gearing may damage the RB-50 as well as the motor. Do not adjust the motor timing on the motor. Always turn on LiPo cut-off function when using Lithium-Polymer battery. Never solder RB-50 directly to the battery and high current connectors are suggested instead. Sensor wire must be connected when operate in brushless mode. Always remove the motor prior to switching between brushless/brushed mode. Do not short circuit battery and/or motor connections. Do not reverse battery connection. Only operate the vehicle in RC specified area such as RC circuit. Examine the ESC immediately after heavy impact from car crashes. Heatsink may be loosen or casing may be cracked after heavy impact. Do not operate in such cases until fixed. Never operate above 12V DC or any AC power sources.

Technical specification

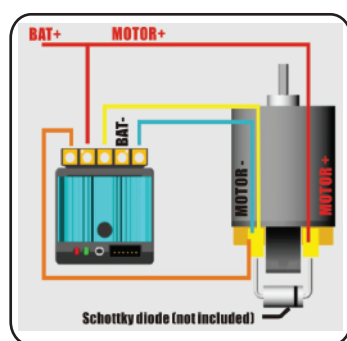
- *Brushless motor: over 3.5T
- *Brushed motor: no limit
- *Rated current: 400A/Phase continuous, brushless (FET SPEC)
- *BEC: 6V, 3A continuous
- *Input: 4-8 cells NiMH, 3Cells LiPo
- *Size: 34mm x 31mm x 33mm (W x D x H)
- *Weight: 45g without wires
- *Brushless drive mode: Forward/Brake/Reverse
- *Brushed drive mode: Forward/Brake

Installation

RB-50 comes with TEAM WAVE ultra 12AWG wire in black color only, use the supplied color shrink wrap for identification if needed. Solder the wire to the 3.5mm bullet connector. Avoid long soldering time and short circuit between solder joints.

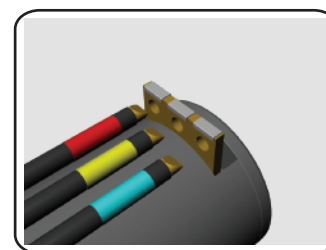
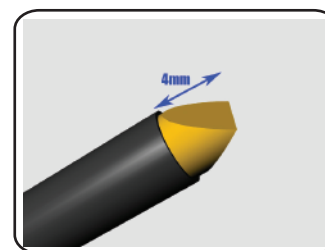
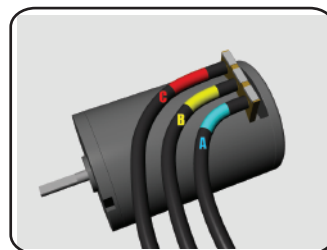


BRUSHLESS MODE

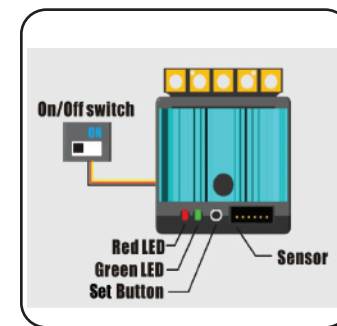
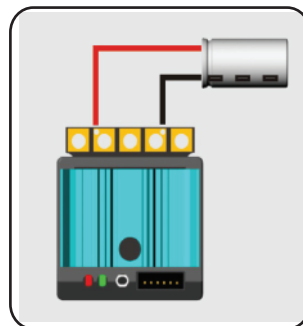


BRUSH MODE

Connect the wires for the desired profile (brushless/brushed) as the picture shown above. Don't forget the sensor cable (comes with the brushless motor) in brushless mode and schottky diode (NOT included) in brushed mode.



Use the supplied color shrink wrap to identify the wires. For easy and secure motor connection, peel off 4mm of the insulation, apply solder and then cut the tip into V-shape (refer diagram above). Insert the V-shaped tip all the way into the motor mounting hole and carefully apply solder on the other side.



The power capacitor is needed for both brushless and brushed application. Solder the positive of the capacitor to BAT+ of the ESC and negative of the capacitor to BAT- (polarity is indicated on the capacitor which comes with black wire). Place the capacitor in area far away from radio signal sources such as the antenna. Capacitor can be soldered to either of the upper and lower deck PCB, or both if using two capacitors.

Radio setup

Caution: Please check the following before radio setup

- *Make sure transmitter battery and car battery are charged.
- *Make sure RB-50 is in "OFF" position.
- *Check all proper wiring.
- *Ensure crystal of transmitter/receiver module are matching.
- *Set transmitter "Throttle travel" and "Brake travel" to maximum
- *Turn ON "Reverse" on transmitter
- *Turn OFF "ABS" on transmitter, if available
- *Set all other throttle related settings to neutral on transmitter (e.g. SUB Trim, EXP...)

- 1/ Switch on the transmitter
- 2/ Press and hold the Set button when switching on the RB-50
- 3/ Once the Green LED start flashing, release the Set button
- 4/ Wait until Red LED comes on solid
- 5/ Leave transmitter in neutral position and press the Set button once
- 6/ Green LED flashes and neutral position is stored
- 7/ Hold full throttle on transmitter and press the Set button once
- 8/ Green LED flashes and throttle position is stored
- 9/ Hold full brake on transmitter and press the Set button once
- 10/ Green LED flashes and brake position is stored
- 11/ Release throttle and switch off the RB-50. Radio setup completes.

Profile setup continue

PAGE		Value								
1	Neutral brake	1	2	3	4	5	6	7	8	9
		0%	12%	18%	22%	24%	27%	29%	34%	39%
2	Brake force	1	2	3	4					
		25%	50%	75%	100%					
3	Turbo	1	2							
		ON	OFF							
4	Time shift	1	2	3	4					
		Efficient		Power						
5	Drive profile	1	2	3	4	5	6	7	8	9
		Less aggressive					Aggressive			
6	Brake profile	1	2	3	4	5	6	7	8	9
		Less aggressive					Aggressive			
7	Temp cut	1	2	3	4	5				
		90°C	100°C	110°C	120°C	OFF				
8	Lipo cut	1	2	3	4	5	6	7		
		6.4V	6.2V	6.0V	9.6V	9.3V	9.0V	OFF		
9	Motor type	1	2	3						
		Brushless forward only	Brushless with reverse	Brush forward only						

Profile setup

RB-50 provides a set of 9 parameters for you to adjust to your specific needs. The parameters are organized into pages as in the table above. Please follow the instruction below to adjust the values of each parameter. Usage of the parameters are explained in the glossary.

How to enter the Profile Setup mode?

- 1/ Press and hold the Set button when switching on the RB-50
- 2/ The Green LED will flash first, followed by the Red LED. Release the button once the Red LED flashes.
- 3/ Both LED will then turn off and you are now in Profile Setup mode

Once you are in Profile Setup mode, follow the steps below to adjust the values of each parameter:

- 1/ Press the Set button to choose the required page with reference to the table above. For example, to adjust the Drive Profile, press the Set button 5 times. (Green LED will flash for every press)
- 2/ Wait 2 seconds and the Red LED will flash the same number of times as the Profile selected. In the example above, it flashes 5 times
- 3/ The Green LED will then flash the same number of times as the current value set under that parameter
- 4/ Press the Set button to increase the value. Each press increases the value by one step and it will loop back after reaching maximum
- 5/ Wait 2 seconds without pressing any button. The Green LED will then flash to reflect the new value selected. Count the number of flashes to confirm
- 6/ Both Red and Green LED will then flash together quickly to indicate the value is stored
- 7/ Repeat steps 1 - 6 to adjust another parameter
- 8/ Turn off your RB-50 and the changes will be effective on your next run

Glossary

Neutral brake - This is the amount of brake power automatically applied to the motor (brushless/brushed) when the throttle is in neutral position. Neutral brake is critical and will affect drive feeling, especially for brushless motor of which magnetic drag force is relatively weak. The 9 preset levels are tuned through extensive testing and is non-linear. Start with the default setting (Level 3) and adjust it according to your driving style.

Brake force- Brake force is the maximum amount of brake power applied to the motor (brushless/brushed) when full brake is applied.

Turbo (for brushless only) - This is an exclusive feature introduced by TEAM WAVE. It will be triggered at full throttle position and will give an instant extra boost to the motor, resulting in higher RPM output.

Time shift (for brushless only) - This is another exclusive feature introduced by TEAM WAVE. Unlike other sensed brushless system in which motor timing is fixed, the RB-50 offers another kind of motor timing technology. User can choose from power efficient mode through to high output mode. For example, the car will be more drivable and smooth in cornering in lower output level. Combined with Turbo and other parameter settings, you can achieve the best compromise between runtime, top speed and drivability, resulting in better lap times.

Drive profile- 9 drive profiles are tuned through extensive testing to provide gentle to very aggressive drive feeling. User can adjust according to personal driving style.

Brake profile- Similar to the Drive Profile, 9 Brake Profiles are available for different motors and driving styles. The precise adjustability gives you an edge in fine-tuning your car.

Temp Cut- Although RB-50 can withstand 100°C or higher, extreme heat may still shorten its life span and reduce its performance. If temperature cut occurs, the Red LED will turn on solid and users are suggested to inspect the gear ratio, motor, sensor cable, all connections and hearing the motor for any abnormal sound. Experienced driver may turn it off which is useful for race event. If triggered, RB-50 will limit the throttle to allow user to drive the car to a safe area.

LiPo cut- Unlike NiMH/NiCd battery, Lithium Polymer (LiPo) battery is very sensitive to voltage drop and may even be damaged if allowed to drop below certain level. Safety voltage level varies among brands but 3.0V / cell is generally accepted. 6 cut-off voltage levels are available in RB-50 (Please refer to the table on the left side) and it should be switched off if using NiMH/NiCd battery. If triggered, RB-50 will limit the throttle to allow user to drive the car to a safe area and Red LED will flash.

Motor type- RB-50 supports both brushless and brushed motors (Note: Reverse function is only available for brushless motor). When switching from brushless to brushed motor, an extra power wire is needed between BAT+ and MOTOR+. This connection bypasses some MOSFETs in the ESC and gives maximum power and efficiency. When switching from brushed to brushless motor, REMEMBER to plug in the sensor cable and REMOVE the extra power wire needed in brushed mode.

Reverse- RB-50 features a smart reverse system which will only be activated when car is not moving. Reverse power is limited to 50% for safety reason.

Software update- RB-50 firmware can be updated using optional USB programmer/setup box

Warranty

Wave Electronics Limited guarantees the RB-50 to be free from defects in materials and workmanship for a period of 30 days from original date of purchase (verified by dated, itemized sales receipt). Warranty does not cover incorrect installation, components worn by use or excessive force, exceeding the recommended input voltage, physical damages, or from improper transportation/storage, disassembling the case, tampering with the internal electronics, allowing water, moisture, or any other foreign materials entering the unit. Any damage to the casing and the cooling fan is not covered. We reserve the right to modify the provisions stated in this warranty without notice. Since we cannot supervise the proper use of our product, no liability is accepted for direct or indirect damage of any type arising from their use or occurring to the property of the user and/or third party. We have tight quality control and each RB-50 is thoroughly tested before leaving our factory, and is therefore considered operational. By the act of connecting/operating this product, the user accepts all resulting liability.