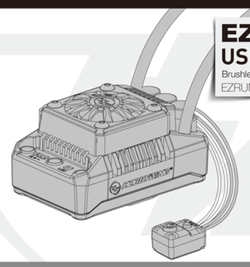
HOBBYWING®



EZRUN USER MANUAL

Brushless Electronic Speed Controller

EZRUN MAX5 • EZRUN MAX6

01 Introduction

Thank you for purchasing the EZRUN-MAX5/MAX6, HOBBYWING's high performance sensorless brushless motor electronic speed controller! Brushless power systems can be very dangerous. Any improper use may cause personal injury and damage to the product and related devices. We strongly recommend reading through this user manual before use. Because we have no control over the use, installation, or maintenance of this product, no liability may be assumed for any damage or losses resulting from the use of the product. We do not assume responsibility for any losses caused by unauthorized modifications to our product.

02 Warnings

- Ensure all wires and connections are well insulated before connecting the ESC to related devices, as short circuit will damage your ESC.
- Ensure all devices are well connected, in order to prevent poor connections that may cause your vehicle to lose control or other unpredictable issues like damage to the device.
- Read through the manuals of all power devices and chassis and ensure the power configuration is rational before using this unit.
- Please use a soldering iron with the power of at least 60W to solder all input/output wires and connectors.
- Do not hold the vehicle in the air and rev it up to full throttle, as rubber tires can "expand" to extreme size or even crack to cause serious injury.
- Stop using the ESC when its casing temperature exceeds 90℃/194℉; otherwise your ESC will get destroyed and may also get your motor damaged. We recommend setting the "ESC Thermal Protection" to 105℃/221℉ (this refers to the internal temperature of the ESC).
- We recommend removing the cooling fan from ESC before exposing vehicle to liquids, and fully dry it right after the use.
- Always disconnect and remove batteries after use, as the ESC will continue to consume current if it's still connected to batteries (even if the ESC is turned off). Long-time contact will cause batteries to completely discharge and result in damage to batteries or ESC. This **will not** be covered under warranty.

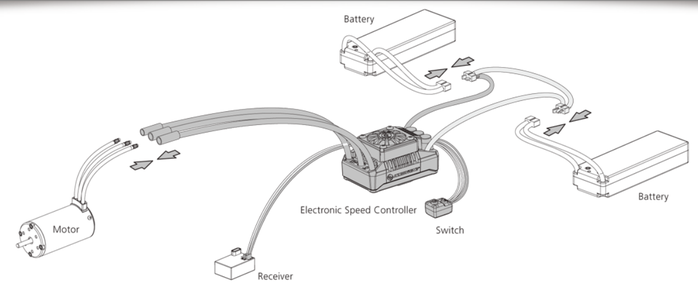
03 Features

- Compatible with sensorless brushless motors and sensored brushless motors (only in sensorless mode).
- Fully waterproof design for all weather conditions.
- Super internal switch-mode BEC with switchable voltage of 6V/7.2V and a cont. /peak current of 6A/25A for easily driving big torque servos and high voltage servos.
- Highly reliable electronic switch avoids troubles which may happen to traditional mechanical switch due to dirt, water, dash and etc.
- The built-in spark-proof circuit effectively protects not only battery and ESC connectors from damage but also users from physical injury (to hands) caused by strong electrical sparks produced at the battery and ESC connecting moment.
- Separate programming port to easily connect the LED program card or the LCD program box to the ESC.
- Proportional brake with 9 levels of brake amount/maximum brake force and 9 levels of drag brake force.
- 5 levels of acceleration /punch from soft to aggressive for different vehicles, tires and tracks.
- Multiple protections: motor lock-up protection, low-voltage cutoff protection, thermal protection, overload protection, and fail safe (throttle signal loss protection).
- Single-button ESC programming and factory reset.
- Advanced programming via portable LED program card or multifunction LCD program box.
- Firmware upgrade via HOBBYWING multifunction LCD program box (item sold separately).

04 Specifications

Model	EZRUN-MAX6	EZRUN-MAX5
Cont./Peak Current	160A/1050A	200A/1300A
Motor Type	Sensored / Sensorless Brushless Motor (only in sensorless mode)	
Applications	1/6th Touring Car, Buggy, Truggy and Truck	1/5th Touring Car, Buggy, Truggy and Truck
Motor Limit	With 6S LiPo/18S NiMH: KV≤1500 (5892 size motor) With 8S LiPo/24S NiMH: KV≤1200 (5892 size motor)	With 8S LiPo/24S NiMH: KV ≤ 1000 (58110 size motor)
LiPo /NiMH Cells	9-24S NiMH, 3-8S LiPo	
BEC Output	6V/7.2V Switchable, Continuous Current of 6A (Switch-mode BEC)	
Cooling Fan	Powered by the stable BEC voltage of 6V/7.2V	
Connectors	Input End: No, Output End: Female 6.5mm Gold Connectors (pre-soldered onto the PCB of the speed controller).	
Size/Weight	70(L)x56(W)x46.5(H)/240g	93.35 (L)x 58.12 (W)x 47.81 (H)/342g
Programming Port	FAN /PRG Port	

05 Connections



This is an extremely powerful brushless motor system. For your safety and the safety of those around you, we strongly recommend removing the pinion gear before performing calibration and programming functions with this system, and keeping wheels in the air when you turn on the ESC.

1. Motor Wiring

There is no polarity on the A/B/C wires between ESC and motor, so do not worry about how you connect them initially. You may find it necessary to swap two wires if the motor runs in reverse.

2. Receiver Wiring

Plug the throttle control cable (also called Rx cable) on the ESC into the throttle (TH) channel on receiver. The red wire in the throttle control cable will output the BEC voltage of 6V/7.2V to the receiver and servo, so please do not connect any additional battery to the receiver. Otherwise, your ESC may be damaged.

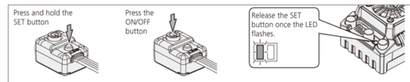
3. Battery Wiring

Proper polarity is essential here! Make absolutely sure positive (+) of ESC connects to positive (+) of battery, and negative (-) of ESC connects to negative (-) of battery when you plug in your battery! If reverse polarity is applied to your ESC from the battery, it will damage your ESC. This **will not** be covered under warranty!

06 ESC Setup

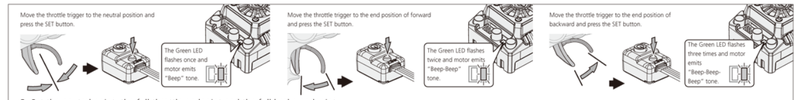
1 Set the Throttle Range

In order to make the ESC match the throttle range, you must calibrate it when you begin to use a new ESC, or a new transmitter, or after you change the settings such as the TRIM, D/R, EPA and other parameters of throttle channel on your transmitter, otherwise the ESC cannot work properly. We strongly recommend activating the "Fail Save" function of the radio system and set it (F/S) to "Output OFF" or set its value to the "Neutral Position" to ensure the motor can be stopped when there is no signal received from the transmitter. About setting the throttle range, let's take Futaba™ transmitter as an example.



1. Turn on the transmitter, set parameters on the throttle channel like "D/R", "EPA" and "ATL" to 100% (for transmitter without LCD, please turn the knob to the maximum) and the throttle "TRIM" to 0 (for transmitter without LCD, please turn the corresponding knob to the neutral position). For Futaba™ radio transmitter, the direction of throttle channel shall be set to "REV", while other radio systems shall be set to "NOR". Please ensure the "ABS braking function" of your transmitter must be DISABLED.
2. Start with transmitter on and the ESC turned off but connected to a battery. Holding the SET button and press the ON/OFF button to turn on the ESC, the RED LED on the ESC starts to flash (Note 1 the motor beeps at the same time), and then release the SET button immediately. (The ESC will enter the programming mode if the SET button is not released in 3 seconds, then you need to restart from step 1.)

Note 1: Beeps from the motor may be low sometimes, and you can check the LED status instead.



3. Set the neutral point, the full throttle endpoint and the full brake endpoint.
   - Leave the throttle trigger at the neutral position, press the SET button, the RED LED dies out and the GREEN LED flashes 1 time and the motor beeps 1 time to accept the neutral position.
   - Pull the throttle trigger to the full throttle position, press the SET button, the GREEN LED blinks 2 times and the motor beeps 2 times to accept the full throttle endpoint.
   - Push the throttle trigger to the full brake position, press the SET button, the GREEN LED blinks 3 times and the motor beeps 3 times to accept the full brake endpoint.
4. The motor can be started 3 seconds after the ESC/Radio calibration is complete.

2 Power ON-OFF Warnings

1) Power ON/OFF:

(Start with the ESC turned off), press the ON/OFF button to turn on the ESC.

(Start with the ESC turned on), press and hold the ON/OFF button to turn off the ESC.

2) Warning Tones:

Turn on the ESC in the normal way (that is to turn it on without holding the SET button); the motor will beep the number of LiPo cells you have plugged in. For example, 3 beeps indicate a 3S LiPo, 4 beeps indicate a 4S LiPo, 6 beeps indicate a 6S LiPo, and 8 beeps indicate a 8S LiPo.

3 Programmable Items

(Those "black backgroud and white text" options are the factory default settings)

Programmable Items	Parameter Values								
Basic Setting	Option 1	Option 2	Option 3	Option 4	Option 5	Option 6	Option 7	Option 8	Option 9
1.Running Mode	Fwd/Br	*Fwd/Rev/Br*							
2. LiPo Cells	*Auto Calculation*	2S	3S	4S	6S	8S			
3. Low Voltage Cutoff	Disabled	Auto (Low)	*Auto (Intermediate)*	Auto (High)					
4. ESC Thermal Protection	*105℃/221℉*	125℃/257℉							
5. Motor Thermal Protection	*Disabled*								
6. Motor Rotation	*CCW*	CW							
7. BEC Voltage	*6.0V*	7.2V							
8. Max Brake Force	12.5%	25%	37.5%	*50.0%*	62.5%	75.0%	87.5%	100.0%	Disabled
9. Max Reverse Force	*25%*	50%							
10. Start Mode (Punch)	Level 1	Level 2	*Level 3*	Level 4	Level 5				
Advanced Setting									
11. Drag Brake	*0%*	2%	4%	6%	8%	10%	12%	14%	16%

1. Running Mode

Option 1: Forward with Brake

The vehicle can go forward and brake but cannot reverse in this mode. This mode is usually for racing.

Option 2: Forward / Reverse with Brake

This mode provides the braking function, so it's usually for training. "Forward/ Reverse with Brake" mode adopted the "DOUBLE-CLICK" method, that is your vehicle only brakes (won't reverse) when the 1st time you push the throttle trigger forward (away from you) (1st push). If the motor stops when you quickly release the throttle trigger and then re-push the trigger quickly (2nd push), the vehicle will reverse. If the motor does not stop, then your vehicle won't reverse but brake, and you need to push the throttle trigger one more time. The vehicle only reverses after the motor stops. This method is for preventing vehicle from being accidentally reversed.

2. LiPo Cells

We strongly recommend setting this item manually instead of using the default setting "Auto Calc. (which means calculating the LiPo cells automatically)". The ESC can only identify 3S, 4S, 6S and 8S LiPo packs when setting this item to "Auto Calc.". After you power on the ESC, if the battery voltage is below 13.6V, it will be identified as a 3S, if the voltage is from 13.6V to 17.6V, it will be identified as a 4S, if the voltage is from 17.6V to 26.5V, it will be identified as a 6S, if the voltage is above 26.5V, it will be identified as a 8S.

Note 2:

1) This ESC is not intended for 2S operation. Even if you can set the "LiPo Cells" to 2S, it still does not work.

2) You need to set "LiPo Cells" to "Auto Calc." and "Cutoff Voltage" to "Disabled" if you use a NiMH pack or a 5S/7S LiPo.

3. Low Voltage Cutoff

Sets the voltage at which the ESC lowers or removes power to the motor in order to keep the LiPo battery at a safe minimum voltage. The ESC will monitor the battery voltage all the time, it will immediately reduce the power to 50% and cut off the output 10 seconds later when the voltage goes below the cutoff threshold. The RED LED will flash a short, single flash that repeats (☆, ☆, ☆) to indicate the low-voltage cutoff protection is activated. If you use a NiMH pack, then please set the "Cutoff Voltage" to "Disabled".

Option 1: Disabled

The ESC won't cut off the power due to low voltage after you select this option. We do not recommend using this option when you use any LiPo pack (5S &7S LiPo batteries are exceptions), otherwise you will irreversibly damage it. However, for avoiding losing power in racing due to low voltage, we recommend using this option (this still may cause damage to your battery). You need to select this option when you use a NiMH pack.

Option 2: Auto (Low)

Low cutoff voltage, not very easy to get the LVC Protection activated, is applicable to batteries with poor discharge capability.

Option 3: Auto (Intermediate)

Medium cutoff voltage, prone to getting the LVC Protection activated, is applicable to batteries with ordinary discharge capability.

Option 4: Auto (High)

High cutoff voltage, very prone to getting the LVC Protection activated, is applicable to packs with great discharge capability.

Warning: If you set the Cutoff Voltage to DISABLED when you use a LiPo pack, then please pay attention to the power change of your vehicle. In general, the battery voltage gets pretty low when your vehicle is severely losing power, then you should stop using that pack.

4. ESC Thermal/Overheat Protection

The ESC will automatically cut off the output and the GREEN LED will flash a short, single flash that repeats (☆, ☆, ☆) when the temperature gets up to the value you preset and activates the ESC thermal protection. The output won't resume until the temperature gets down.

5. Motor Thermal/Overheat Protection

This item has been permanently set to "Disabled" by manufacturer.

6. Motor Rotation

Pull the throttle trigger with the motor shaft faces you, the motor spins counter clockwise if this item is set to CCW; the motor spins clockwise if set to CW. The (A/B/C) wiring order of motors from different manufacturers may vary, so the direction of the motor rotation may be opposite to what you expect. You can adjust the "Motor Rotation" or swap any two (ESC-to-motor) wires if the motor runs in reverse.

7. BEC Voltage

Option 1: 6.0V

It's applicable to ordinary servos. Do not use this option with high voltage servos; otherwise your servos may not function normally due to insufficient voltage.

Option 2: 7.2V

It's applicable to high voltage servos. Do not use this option with ordinary servos; otherwise your servos may be burnt due to high voltage.

8. Brake Amount/ Max. Brake Force

This ESC provides the proportional braking function; the braking effect is decided by the position of the throttle trigger. It sets what percentage of available braking power is applied with full brake. Large amount will shorten the braking time but it will damage your pinion and spur. Please select the most suitable brake amount as per your car condition and your preference.

9. Reverse Amount/ Max. Reverse Force

Different reverse amount will bring different reversing speed. For the safety of your vehicle, we recommend using a low amount.

10. Start Mode / Punch

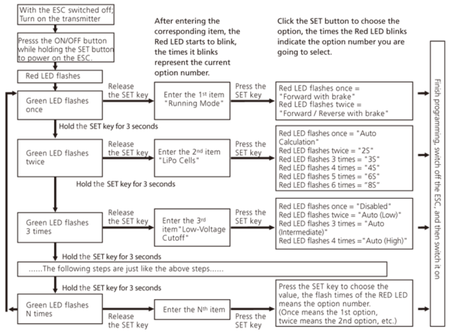
You can choose the punch from level 1 (very soft) to level 5 (very aggressive) as per the track, tires, grip, your preference and etc. This feature is very useful for preventing tires from slipping during the starting-up process. In addition, "level 4" and "level 5" have strict requirement on battery's discharge capability. It may affect the starting-up if the battery discharges poorly and cannot provide large current in a short time. The car stutters or suddenly loses power in the starting-up process indicating the battery's discharge capability is not good; you need to reduce the punch or increase the FDR (Final Drive Ratio).

11. Drag Brake

Drag brake is the slight braking power produced when releasing the throttle trigger to neutral zone. This gently slows the vehicle down when you let off the trigger; it can provide a better cornering approach. (Attention! Drag brake will consume much power, so apply it cautiously.)

4 ESC Programming

1. Programming your ESC with the SET button



- For easy recognition, the motor beeps at the same time when the GREEN LED flashes.
- When "N" (the number) is equal to or bigger than 5, we use a long flash to represent "5". For example, the GREEN LED flashes a long flash (and the motor beeps a long beep at the same time) indicating you are in the 5th programmable item; if the GREEN LED flashes a long flash and a short flash (and the motor beeps a long beep and a short beep at the same time) indicating you are in the 6th programmable item; a long flash and two short flashes (a long beep and two short beeps at the same time) indicating you're in the 7th programmable item and so on.

2. Program your ESC with the EZRUN MAX series of LED program card

The portable program card is an optional accessory applicable for field use. Its friendly interface makes the ESC programming easy and quick.

Before the programming, you need to connect your ESC and the program card via a cable with two JR male connectors, and then turn on the ESC; all programmable items will show up a few seconds later. You can select the item you want to program and the setting you want to choose via "ITEM" & "VALUE" buttons on the program card and then press the "OK" button to save all new settings to your ESC.

3. Program your ESC with a multifunction LCD program box

You can program this EZRUN MAX5/6 ESC through a 3-in-1 LCD program box or through a 3-in-1 LCD program box and a PC (HOBBYWING USB LINK software needs to be installed on the PC). Before the programming, you need to connect your ESC and the LCD program box through a cable with two JR male connectors and turn on the ESC, then the boot screen will show up on the LCD, press any button on the program box to initiate the communication between your ESC and the program box. The "CONNECTING ESC" will be displayed, a few seconds later, the program box will display the current mode like profile 1 and then the 1st programmable item like running mode. You can adjust the setting through "ITEM" & "VALUE" buttons, and then press the "OK" button to save new settings to your ESC.

The programming port of this ESC is also the fan port, so you need to unplug the fan first and then plug (one end of) the programming cable in the PRG/FAN port and the other end (of the programming cable) in the ESC port on the LCD program box. Please don't use the throttle control cable (also called Rx cable) on the ESC to connect the program card/box,otherwise the program card/box won't function.



5 Factory Reset

- **Restore the default values with the SET button**

  Press and hold the SET button for over 3 seconds anytime when the throttle trigger is at the neutral position (except during the ESC calibration and programming) can factory reset your ESC. RED & GREEN LEDs flash simultaneously indicating you have successfully restored all the default values within your ESC. Once you power the ESC off, and then back on, your settings will be back in the default mode.
- **Restore the default values with the EZRUN MAX series of LED program card**

  After connecting the program card to the ESC, press the "RESET" button and the "OK" button to factory reset your ESC.
- **Restore the default values with a multifunction LCD program box**

  After connecting the program box to the ESC, continuously press the "ITEM" button on the program box until you see the "RESTORE DEFAULT" item, and then press "OK" to factory reset your ESC.

07 Explanation for LED Status

1. During the Starting-up Process
   - The RED LED keeps flashing rapidly indicating the ESC doesn't detect any throttle signal or the neutral throttle value stored on your ESC may be different from the current value stored on the transmitter.
   - The GREEN LED flashes "N/ (number of)" times indicating the number of LiPo cells you have connected to the ESC.
2. In Operation
   - RED & GREEN LEDs die out when the throttle trigger is in throttle neutral zone.
   - The RED LED turns on solid when your vehicle runs forward. The GREEN LED will also come on when pulling the throttle trigger to the full (100%) throttle endpoint.
   - The RED LED turns on solid when you brake the vehicle, the GREEN LED will also come on when pushing the throttle trigger to the full brake endpoint and setting the "brake amount/maximum brake force" to 100%.
   - The RED LED turns on solid when you reverse your vehicle.
3. When Some Protection is Activated
   - The RED LED flashes a short, single flash that repeats (☆, ☆, ☆) indicating the low voltage cutoff protection is activated.
   - The GREEN LED flashes a short, single flash that repeats (☆, ☆, ☆) indicating the ESC thermal/overheat protection is activated.

08 Trouble Shooting

Trouble(s)	Possible Causes	Solution(s)
The ESC was unable to start the status LED, the motor, and the cooling fan after it was powered on.	1. No power was supplied to the ESC. 2. The ESC switch was damaged.	1. Check if all ESC & battery connectors have been well soldered or firmly connected. 2. Replace the broken switch.
The ESC was unable to start the motor after it was powered on, but the motor emitted a short, double beep (BB, BB, BB...) that repeats with GREEN LED on the ESC blinked. (The interval between two beeps was 1 second.)	The battery voltage was beyond the normal operating voltage range of the ESC.	Check the battery voltage.
After the ESC was powered on and finished LiPo cells detection (the GREEN LED flashed N times), and then the RED LED flashed rapidly.	1. The ESC didn't detect any throttle signal. 2. The neutral throttle value stored on your ESC is different from the value stored on the transmitter.	1. Check if the throttle wire is reversely plugged in or in the wrong channel and if the transmitter is turned on. 2. Re-calibrate the throttle range after you release the throttle trigger to the neutral position.
The vehicle ran backward when you pulled the throttle trigger towards you.	1. The (ESC-to-motor) wiring order was incorrect. 2. Your chassis is different from popular chassis.	Swap any two (ESC-to-motor) wires.
The motor suddenly stopped or significantly reduced the output in operation.	1. The receiver was influenced by some foreign interference. 2. The ESC entered the battery LVC (Low Voltage Cutoff) protection. 3. The ESC entered the thermal (over-heat) protection.	1. Check all devices and try to find out all possible causes, and check the transmitter's battery voltage. 2. The RED LED keeps flashing indicating the LVC protection is activated, please replace your pack. 3. The GREEN LED keeps flashing indicating the thermal protection is activated, please let your ESC cool down before using it again.
The motor stuttered but couldn't start.	1. Some soldering between the motor and the ESC was not good. 2. The ESC was damaged (some MOSFETs were burnt).	1. Check all soldering points, please re-solder if necessary. 2. Contact the distributor for repair or other customer services.
The vehicle could run forward (and brake), but could not reverse.	1. The throttle neutral position on your transmitter was actually in the braking zone. 2. Set the "Running Mode" improperly. 3. The ESC was damaged.	1. Re-calibrate the throttle neutral position. No LED on the ESC will come on when the throttle trigger is at the neutral position. 2. Set the "running mode" to "Forward/Reverse with Brake". 3. Contact the distributor for repair or other customer services.
The car ran forward/backward slowly when the throttle trigger was at the neutral position.	1. The neutral position on the transmitter was not stable, so signals were not stable either. 2. The ESC calibration was not proper.	1. Replace your transmitter 2. Re-calibrate the throttle range or fine tune the neutral position on the transmitter.
1. The LCD program box kept displaying "CONNECTING ESC" after you connected it to your ESC. 2. The LED program card kept display 3 short lines (- - -) after you connected it to your ESC.	The programming card/box was connected to the ESC via the throttle control cable (Rx cable).	It is wrong to use the Rx cable to connect programming card/box. The programming port of this ESC is also the fan port, so please connect the ESC and programming card/box by plugging the programming cable into the fan port.
When pressing the SET button to set the throttle neutral position, the GREEN LED didn't flash and no beep was emitted, or you were unable to set the full throttle endpoint and the full brake endpoint after the neutral position was accepted.	1. The ESC throttle cable wasn't plugged in the correct channel on the receiver. 2. The ESC throttle cable was reversely plugged in.	1. Plug the throttle cable into the throttle (TH) channel on your receiver. 2. Plug in the throttle cable properly by referring to relevant mark shown on your receiver.