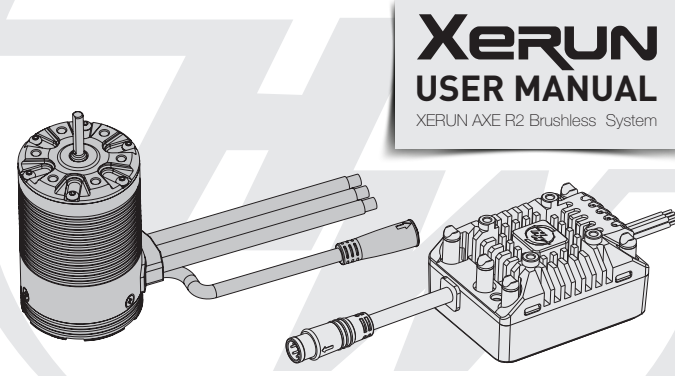


## 01 Disclaimer



Thank you for purchasing the HOBBYWING's XERUN AXE R2 Brushless System! 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. We, HOBBYWING, are only responsible for our product cost and nothing else as result of using 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 to prevent poor connection that may cause your vehicle to lose control or other unpredictable issues such as damage to the device.
- Read through the manuals of all power devices and chassis and ensure the power configuration is correct before using this unit.
- Please use a soldering iron with the power of at least 60W to solder all input/output wires and connectors.
- Never allow the ESC & motor temperatures (external temp.) to go above 90°C/194°F, as high temperature may cause damage to both the ESC and motor.
- Always disconnect the batteries when your vehicle is not in use. The ESC will continue to drain current if it is connected to batteries (even if the ESC is turned off). Extended battery connection (Even when off) will cause batteries to completely discharge and result in damage to batteries or ESC. This WILL NOT be covered under warranty.

## 03 Features

- Apply FOC(Field Oriented Control) driving mode to the power system of rock crawler. The low speed torque is very strong, it is better than ordinary sensored brushless power system or even better than the brushed power system.
- The chip-type magnetic encoder inside the motor guarantees consistency between three phases' signals and always outputs the pure and precise signals indicating the rotor position.
- The waterproof and dust-proof design (\*IP67 standards) allows the AXE brushless power system to be used in all weather & track conditions without any issue of damage caused to the system from water or dust. Damage to the vehicle caused by water, mud, or conditions should be monitored closely when running in muddy, wet, or adverse conditions.
- Intelligent torque output & speed closed-loop control for easy control, and consistent motor RPM under all loads.
- The adjustable drag brake & drag brake rate control with the maximum drag brake of up to 200% (that's nearly twice the drag brake of standard brushless power systems) can provide unprecedented parking capacity on slopes, with no jerky stops.
- The innovative built-in Bluetooth connectivity allows users to read ESC data or update ESC firmware via a smart phone (installed with the HW LINK app).
- Multiple protections: low-voltage cutoff, thermal, fail safe (throttle signal loss), motor lock-up, and battery reversal.
- It supports dual operation mode, not only classic "Forward and Reverse (rock crawler)" mode, but also "Forward/Reversewith brake (normal)" mode.

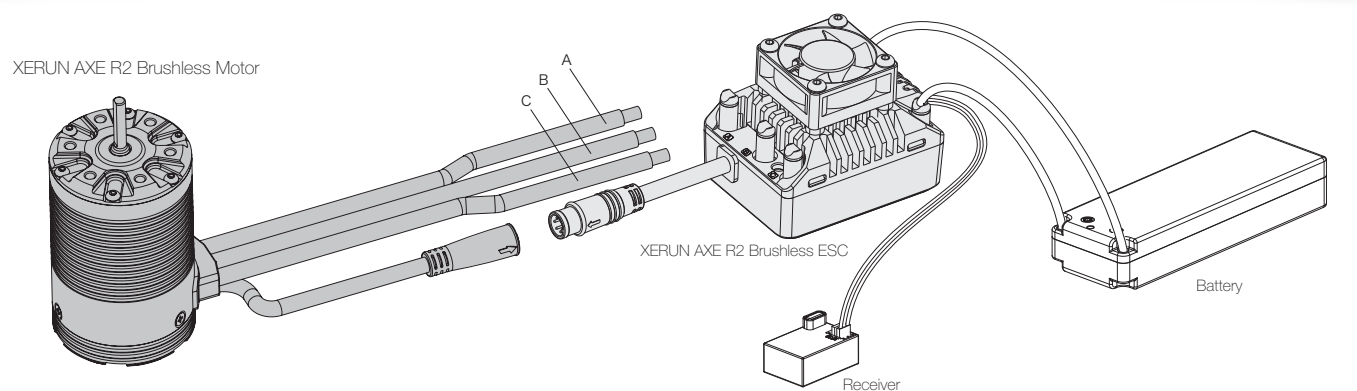
## 04 Specifications

| Model              | XERUN AXE R2 Brushless ESC                                  |
|--------------------|---|
| PN                 | 30112102  |
| Cont./Peak Current | 80A/480A  |
| Motor Type         | Only the XERUN AXE R2 Series                                |
| Applications       | 1/10th Rock Crawler   |
| LiPo/NiMH Cells    | 2-3S Lipo, 6-9 Cells NiMH                                   |
| BEC Output         | 6V/7.4V Switchable, Continuous Current of 6A                |
| Connectors         | Input/Output Ends: No Connectors                            |
| Size/Weight        | 47.4(L)x36.2(W)x26.5(H)mm/ 108g (Included input wires)      |
| ESC Programming    | iOS or Android smart phone (installed with the HW LINK app) |

| PN       | COMBO                                    |
|----------|--|
| 38020318 | COMBO-XERUN AXE540 R2-2300KV-FOC System  |
| 38020311 | COMBO-XERUN AXE540L R2-1400KV-FOC System |
| 38020312 | COMBO-XERUN AXE540L R2-2100KV-FOC System |
| 38020313 | COMBO-XERUN AXE540L R2-2800KV-FOC System |
| 38020314 | COMBO-XERUN AXE550 R2-3300KV-FOC System  |

| PN       | Motor Model                 | KV (No-load) | LiPos | No-load Current | Motor Diameter Length        | Shaft Diameter Length          | Poles | Weight |
|----------|-----------------------------|--------------|-------|-----------------|------------------------------|--------------------------------|-------|--------|
| 30401257 | XERUN AXE540 R2-2300KV-FOC  | 2300KV       | 2-3S  | 2.5A            | 36.0/49.8 mm<br>1.42/1.96 in |                                |       | 185g   |
| 30401253 | XERUN AXE540L R2-1400KV-FOC | 1400KV       | 2-3S  | 1.7A            |                              | 3.175/16.0 mm<br>0.125/0.63 in | 4     | 232g   |
| 30401254 | XERUN AXE540L R2-2100KV-FOC | 2100KV       | 2-3S  | 2.7A            | 36.0/57.8 mm<br>1.42/2.28 in |                                |       | 233g   |
| 30401255 | XERUN AXE540L R2-2800KV-FOC | 2800KV       | 2-3S  | 3.6A            |                              |                                |       | 234g   |
| 30401256 | XERUN AXE550 R2-3300KV-FOC  | 3300KV       | 2-3S  | 4.7A            | 36.0/63.8 mm<br>1.42/2.51 in | 5/16.0 mm<br>0.197/0.63 in     |       | 268g   |

## 05 Connections



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

### 1. Cooling Fan Installation (Optional)

When pairing the ESC with a 550 motor, we recommend installing the matching cooling fan. The cooling fan can be powered by the receiver.

### 2. Motor Wiring

There is strict wiring order from the ESC to the motor, the three A/B/C ESC wires must connect to the three A/B/C motor wires correspondingly. Next, connect the sensor cable of the esc and motor according to the arrow mark on the sensor connector.

**Note:** AXE R2 esc only supports AXE R2 series motors and does not support the use with other types of motors.

Please make sure that the sensor connector of esc and motor is connected according to the arrow direction and tightened. Improper use may damage the internal structure of the sensor connector or cause water ingress, which may lead to abnormal operation.

If the motor direction is reversed, change the parameter on item 5 "Motor rotation" to achieve the correct setting.

### 3. Receiver Wiring

Insert the throttle cable of the ESC into the throttle channel of receiver. Because the red wire of throttle cable output 6V/7.4V voltage to receiver and steering servo, do not supply any other power source to the receiver, otherwise the ESC may be damaged. If an external power supply is needed, unpin the red wire from the receiver plug, insulate and secure the plug pin out side of the receiver plug.

### 4. Battery Wiring

Proper polarity is essential. Please ensure positive (+) connects to positive (+), and negative (-) connects to negative (-) when plugging in the battery! When reverse polarity is applied to the ESC from the battery, it will not function.

## 06 ESC Setup

### 1 Set the Throttle Range - ESC Calibration - Radio Setup

In order to make the ESC match the throttle range, you must calibrate it when you begin to use a new ESC. If you install a new radio system, or make changes to your throttle/brake values in your transmitter, you must redo the ESC Calibration Process. Failure to calibrate the ESC to your radio system will result in the ESC not working correctly. We strongly recommend activating the "Fail Safe" 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, please follow the following steps:

### 2 Power On/Off & Warning Tones

#### 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.

### 3 Programmable Items

| Item # | Programmable Item     | Option 1            | Option 2                   | Option 3     | Option 4                | Option 5 | Option 6 | Option 7 | Option 8 | Option 9 |
|--------|-----------------------|---------------------|----------------------------|--------------|-------------------------|----------|----------|----------|----------|----------|
| 1      | Running Mode          | Forward and Reverse | Forward/Reverse with Brake |              |                         |          |          |          |          |          |
| 2      | RPM/Throttle Matching | Disabled            | Low                        | Intermediate | High                    |          |          |          |          |          |
| 3      | Cutoff Voltage        | Disabled            | Low                        | Intermediate | High                    |          |          |          |          |          |
| 4      | BEC Voltage           | 6.0V                | 7.4V                       |              |                         |          |          |          |          |          |
| 5      | Motor Rotation        | CCW                 | CW                         |              |                         |          |          |          |          |          |
| 6      | Max. Forward Force    | 25%                 | 37.5%                      | 50%          | 62.5%                   | 75%      | 87.5%    | 100%     |          |          |
| 7      | Punch                 |                     |                            |              | 1-15 (default: 8)       |          |          |          |          |          |
| 8      | Neutral Range         |                     |                            |              | 3%-15% (default: 8%)    |          |          |          |          |          |
| 9      | RPM Decrease Rate     | Level 1             | Level 2                    | Level 3      | Level 4                 | Level 5  | Level 6  | Level 7  | Level 8  | Level 9  |
| 10     | Max. Reverse Force    | 25%                 | 37.5%                      | 50%          | 62.5%                   | 75%      | 87.5%    | 100%     |          |          |
| 11     | Max. Brake Force      |                     |                            |              | 10-200% (default: 100%) |          |          |          |          |          |
| 12     | Drag Brake Force      |                     |                            |              | 0-200% (default: 80%)   |          |          |          |          |          |
| 13     | Smart Drag Brake Rate | Disabled            | Enabled                    |              |                         |          |          |          |          |          |
| 14     | Drag Brake Rate       |                     |                            |              | 1-15 (default: 8)       |          |          |          |          |          |
| 15     | Turbo Timing          |                     |                            |              | 0-10" (default: 0")     |          |          |          |          |          |
| 16     | Turbo Delay           | Instant             | 0.05s                      | 0.10s        | 0.15s                   | 0.20s    | 0.3s     | 0.5s     | 0.7s     | 1.0s     |

**Note:** those black-and-white options are default values.

#### 1. Running Mode

##### Option 1: Forward and Reverse

This mode is often used by special vehicles (rock crawler). It adopts the "SINGLE-CLICK" method. The vehicle will reverse immediately when you push the throttle trigger forward.

##### Option 2: Forward/Reverse with Brake

This mode provides the braking function, 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 release the throttle trigger and then re-push the trigger (2nd push), the vehicle will reverse. If the motor does not stop, then your vehicle won't reverse but still brake, you need to push the throttle trigger one more time. This method is for preventing vehicle from being accidentally reversed.

#### 2. RPM/Throttle Matching

About this function, the ESC will automatically adjust the motor torque when the load of the vehicle changes. You can adjust the ability of the vehicle to maintain speed when encountering resistance through the options, the higher this value is set, the stronger the ability to maintain speed(the greater the torque increased), which means that the vehicle speed changes less with resistance. If this value is set to "Disabled", it is similar to normal brushed or brushless power system, the ESC will not automatically adjust the motor torque when the load of the vehicle changes.

#### 3. Cutoff Voltage

Low Voltage Cutoff for LiPo Protection. This item is mainly for preventing the LiPo pack from over-discharge. If the low-voltage cutoff protection is enabled, the ESC will monitor the battery voltage all the time and gradually reduce the output to 50% (in 3 seconds) and cut it off about 30 seconds later when the voltage goes below the cutoff threshold. The Red LED will flash a single flash that repeats (☆, ☆, ☆, ☆, ☆, ☆, ☆, ☆, ☆, ☆) when the ESC enters the low-voltage cutoff protection. The ESC will not cut off the power when the voltage is low if the low-voltage cutoff protection is disabled. We don't recommend setting the "Cutoff Voltage" to "Disabled" when using a LiPo pack, otherwise, the battery will be damaged due to over-discharge.

- NiMH - For a NiMH pack, we recommend setting this item to "Disabled".
- Voltage - The specific voltage values correspond to "Low/Intermediate/high" are 3.0V/3.2V/3.4V per cell. Please note, due to a number of variables you may not see exactly these same voltage values.

#### 4. BEC Voltage

BEC voltage supports 6.0V/7.4V adjustable, generally 6.0V is applicable to common steering servo, if high voltage steering servo is used, it can be set to 7.4V. Please refer to the steering gear voltage identification for specific setting voltage.

**Note:** 1. Do not set the BEC voltage above the maximum operating voltage of the servo, as this may damage the servo or even the ESC.

2. Due to the characteristics of the BEC circuit, there is a voltage difference between the BEC output voltage and the input voltage,when the BEC voltage is set to 7.4V and 2S Lipo is used,the BEC cannot stably output 7.4V (will decrease as the battery voltage decreases) .Therefore,it is recommended to use 7.4V BEC when matching with 3S Lipo.

#### 5.Motor Rotation

This feature allows the changing of the motor's forward direction. To check, look at the motor with the shaft facing you. If the motor spins counter clockwise if this item is set to CCW; the motor spins clockwise if set to CW. The drive train of your chassis will determine what direction motor you should use. Some vehicles use normal or CCW rotation, other vehicles use CW or backwards rotation motors.

#### 6. Max. Forward Force

It's the force when throttle trigger is at the full throttle position. It's adjustable among 25%, 37.5%, 50%, 62.5%, 75%, 87.5% and 100% (by default). You can lower down the value for better driving feel/control when you drive a crawler (simulation model) over difficult terrains (and don't have any requirement against the maximum speed).

#### 7. Punch

You can choose the punch from level 1 (very soft) to level 15 (very aggressive). This feature is very useful for preventing tires from slipping during the starting-up process. In addition, very high levels and "level 9" 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, and you need to reduce the punch or reduce the pinion gear size.

#### 8. Neutral Range

As not all transmitters have the same stability at "neutral position", please adjust this parameter as per your preference. You can adjust to a bigger value when this happens. The neutral range is the "dead zone" or "dead band" of the throttle/brakes. If you notice inconsistent drag brakes, you would increase your neutral range value.

#### 9. RPM Decrease Rate

This refers to the speed of rpm change when reducing the throttle (from high to low throttle), the higher the value, the faster the change. If you want to achieve the experience of natural sliding when reducing the throttle like normal brushless power, this value needs to be set to a low level.

**Note:** This parameter is only valid when "RPM/Throttle Matching" is set to Disabled.

#### 10. Max. Reverse Force

The reverse force of the value will determine its speed. For the safety of your vehicle, we recommend using a low amount.

#### 11. Max. Brake Force

This ESC provides proportional braking function,the braking effect is decided by the position of the throttle trigger. It sets the maximum brake force when the throttle trigger is at the full brake position. Large amount will shorten the braking time but it may damage your pinion and spur gear.Please set the appropriate value according to the vehicle's condition.

#### 12. Drag Brake Force

It is the braking power produced when the throttle is at the neutral position. (Attention! Drag brake will consume more power and heat will be increased, apply it cautiously.). Higher drag brake means stronger hold or hill brakes.

#### 13. Smart Drag Brake Rate

When this parameter is set to Enabled, the esc will detect the speed of the motor during running, if the speed is higher, the longer it takes to reach the set value of the drag brake rate (item 14), that is, the slower the drag brake is applied. This helps to prevent overturning or damage to the transmission system due to excessive braking when the vehicle speed is too high. When this parameter is set to Disabled, there is no additional auxiliary processing for the drag brake rate.

#### 14. Drag Brake Rate

It's the rate at which the drag brake increases to the preset value. This feature slows down how rapidly the ESC applies brakes. Lower values are slower and prevent sudden stops or jerky stopping movements. You can choose the drag brake rate from level 1 (very soft) to level 15 (very aggressive).

#### 15. Turbo Timing

This item is adjustable from 0 degree to 10 degrees, the corresponding turbo timing (you set) will initiate at full throttle. It's usually activated on long straightaway and makes the motor unleash its maximum potential. Turbo timing adds "RPM" to the full throttle.

#### 16. Turbo Delay

When "TURBO DELAY" is set to "INSTANT", the Turbo Timing will be activated when throttle trigger is moved to the full throttle position. When other value is applied, you will need to hold the throttle trigger at the full throttle position (as you set) till the Turbo Timing initiates.

## 4 ESC Programming & Firmware Upgrade - The Axe ESC is Only Adjustable using the HW Link App and a Bluetooth enabled Smart Phone

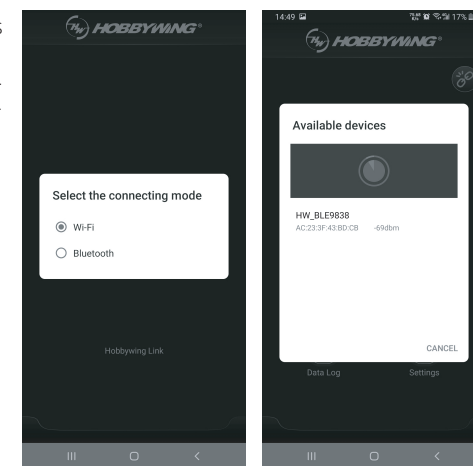
### 1) Program your ESC with a smart phone (installed with the HW LINK V2 app)

- Download and install the Hobbywing's official app "HW LINK V2" on your smart phone. For smart phones with the iOS operating system, please search "Hobbywing" in the App Store; for smart phones with the Android operating system, search "Hobbywing" in the Google Play or download it from our website or scan the following QR code to download it.
- Connect a battery to the ESC and turn it on, then open the Hobbywing official app"HW LINK V2" on your smart phone. It will ask if you want to connect "Bluetooth" or "WiFi" the first time when you open the app; at this point, please select "Bluetooth". You need to change the connection to "Bluetooth" after using the "WiFi" connection, you can click "Settings" (on the home page) and then "Select the connecting mode" to change the connection.
- A list of Bluetooth devices will pop out when you click the ESC icon on the upper right corner, then select the ESC you want to program to establish the Bluetooth connection between the ESC and smart phone. (Note: the default name & password of the Bluetooth device are HW\_BLE\*\*\*\* & 888888 respectively.)

**ESC Setup:** Click [Parameters] on the home page to adjust the ESC parameters, click the ESC icon on the upper right corner to disconnect the Bluetooth connection between the ESC and smart phone after completing and saving the settings.

**Firmware Updating:** Click [Firmware Update] and then select the [Available Version] to select the firmware version you need, and then click "Update" to upgrade your ESC.

**Note:** If the firmware is updated from the new version to the old version, after the update is completed, it is necessary to reset the parameters in the [Parameters] interface and re-calibrate the throttle range to operate the system normally.



## 5 Factory Reset

- Restore the default values (ESC parameters & Info about the Bluetooth module) with the SET button

Turn on the ESC, press and hold the Set button for over 3 seconds. Pressing and holding the SET button for over 3 seconds at any time when the throttle stick is at the neutral position (except during the ESC calibration or programming), can factory reset your ESC. The Red & Green LEDs flash at the same time indicating the factory reset is successful. The default values only take effect after you turn the ESC off and then on again.

**Attention!** This method will also factory reset the Bluetooth device.

- Restore the default values (only the ESC parameters) with a smart phone (installed with the HW LINK app)

After entering the app and establishing the Bluetooth connection between the ESC and smart phone, click "Factory Reset" in "Parameters" to factory reset your ESC. After that, please re-calibrate the throttle range.

## 6 Automatic Motor Pairing (Optional)

You must do the "automatic motor pairing" (as explained below) when any of the following situations occurs:

- Updated the ESC firmware,
- Issues like loose rear endplate, severe impact, or abnormal heat (during the operation) abnormal power output occurs to the motor,

#### Steps of "Automatic Motor Pairing"

- Unplug the throttle wire from the receiver, and then remove the pinion gear (or you can hold the vehicle in the air and remove the wheels, but the effect won't be that good);
- Connect the battery, turn on the esc, and then press and hold the SET button for 3 seconds, the green light will flash and you can release it. The motor will automatically run and wait for the motor to stop running.
- Connect the throttle cable to the receiver and restart the esc to operate normally.

## 07 Explanations for Different Status LEDs

### 1. During the Starting-up Process

- The Red LED keeps flashing 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. - Redo the ESC calibration Process if your ESC is flashing and not working.
- The Green LED flashes "N (number of)" times indicating the number of LiPo cells you have plugged in.

### 2. In Operation - What lights you should see.

- The Red & Green LEDs go out when the throttle trigger is in the throttle neutral zone.
- The Red LED turns on solid when your vehicle runs forward. The Green LED will also come on solid when pulling the throttle trigger to the full (100%) throttle endpoint and setting the "Max. Forward Force" to 100%.
- The Red LED turns on solid when you brake the vehicle, the Green LED will also come on solid when pushing the throttle trigger to the full brake endpoint and setting the "Max. Reverse Force" to 100%.

### 3. Error or Warning LED Codes

- 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 protection is activated.
- The Green LED flashes a short, double flash that repeats (☆☆, ☆☆, ☆☆) indicating the motor thermal protection is activated.
- The Green and Red LEDs flash a short, double flash that repeats (☆☆, ☆☆, ☆☆) indicating the power system stops functioning due to "sensor issue". In that case, please check if the ESC sensor wire has been firmly connected to the motor sensor wire before resuming the operation.

## 08 Trouble Shooting

| Trouble(s)   | Possible Causes  | Solution(s)  |
|--|--|--|
| The ESC was unable to start the status LED, the motor after it was powered on.   | 1. No power was supplied to the ESC.<br>2. The ESC switch was damaged.   | 1. Check if all ESC & battery joints or connections have been well soldered or firmly connected.<br>2. Replace the switch.   |
| The ESC was unable to start the motor but beeped "B-B-, B-B, B-B" (the time interval was 1s) and the Green LED on the ESC flashed. | The battery voltage was beyond the normal range.   | Check if the battery voltage is within the regulated range.  |
| After the ESC was powered on and finished LiPo detection, the GREEN LED flashed N times, and then the RED LED flashed.             | 1. The ESC didn't detect any throttle signals.<br>2. The neutral throttle value stored on your ESC is different from the one 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.<br>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.   | The default motor direction didn't match the chassis.  | Set the motor direction/rotation to the other option via the HW LINK app.  |
| The motor suddenly stopped or significantly reduced the output in operation.   | 1. The receiver was influenced by some foreign interference.<br>2. The ESC entered the LVC protection.<br>3. The ESC entered the ESC thermal protection.<br>4. The motor entered the ESC thermal protection. | 1. Check all devices and try to find out the possible causes, and check the transmitter's battery voltage.<br>2. The Red LED keeps flashing indicating the LVC protection is activated, please replace the battery.<br>3. The Green LED keeps flashing indicating the ESC thermal protection is activated. Please let it cool again before using the ESC again.<br>4. It is over temperature protection of motor if green light flashes continuously (double flash). Please continue to use it after the temperature of motor reduces. |
| The vehicle couldn't be started or stopped halfway, and the Red & Green LEDs flashed a short, double flash that repeated.          | 1. "Sensor wire connection" issue.<br>2. ESC problem.  | 1. Check if the ESC & motor sensor wires are damaged and re-connect them and re-start the ESC after confirming that there is no sensor issue.<br>2. Contact the dealer for customer service.   |
| 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.<br>2. The ESC calibration was not proper.  | 1. Replace your transmitter.<br>2. Re-calibrate the throttle range or fine tune the neutral position on the transmitter.   |