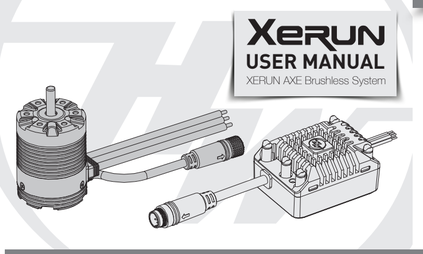
HOBBYWING®



01 Disclaimer

Thank you for purchasing the HOBBYWING's XERUN AXE Brushless System! 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. 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.
- Do not hold the vehicle in the air and free rev it to full throttle, as rubber tires can "expand" to extreme size or even crack to cause serious injury, or damage to your system can occur.
- Never allow the ESC & motor temperatures (external temp.) 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 is use. The ESC will cont 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.
- The ESC must be Calibrated or setup to your radio system before normal operation.

03 Features

- The first FOC (Field-oriented Control) brushless power system for rock crawlers will provide the very powerful low rpm torque compared to standard sensored brushless power systems and brushed power systems. This also translates to higher efficiency and longer runtimes.
- 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).
- The motor with 4 poles & 12 magnets, featuring Hobbywing's "staggered pole" patent has zero cogging effect & torque ripple. It can work smoothly at low speeds. This greatly improves the maneuverability of rock crawlers at low speeds.
- The new sensor harness, which features the plug-and-screw design, has a silicon O ring inside. The new design & O ring not only provide firm connection between motor and ESC but solve "waterproof" challenge for sensor ports.
- Advanced and secure electronic switch features a waterproof, dust-proof and shock-resistant design.
- Multiple protections: low-voltage cutoff, thermal, fail safe (throttle signal loss), motor lock-up, and over current.

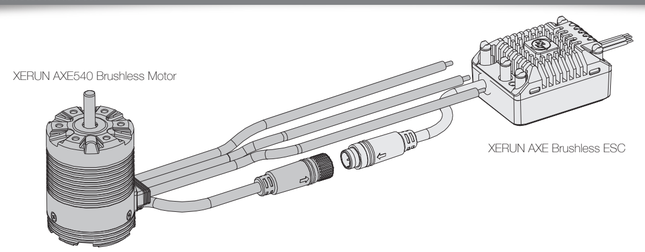
04 Specifications

Model	XERUN AXE Brushless ESC
PN	30112100
Cont./Peak Current	60A/360A
Motor Type	Only the XERUN AXE Series
Applications	1/10th Rock Crawler
LiPo/NiMH Cells	2-3S LiPo, 6-9S NiMH
BEC Output	6V/7.4V Switchable, Continuous Current of 3A (Switch-mode)
Connectors	Input/Output Ends: No Connectors
Size/Weight	47.4 x36.2x24.6mm/ 82g
ESC Programming	Via an iOS or Android smart phone (installed with the HW LINK app)

PN	COMBO
38020248	XERUN AXE540-1200KV-FOC XERUN AXE Brushless ESC
38020249	XERUN AXE540-1800KV-FOC XERUN AXE Brushless ESC
38020250	XERUN AXE540-2300KV-FOC XERUN AXE Brushless ESC

PN	Motor Model	KV Rating (No-load)	LiPos	Resistance	No-load Current	Motor Diameter Length	Shaft Diameter Length	Poles	Weight
30401250	XERUN AXE540-1200KV-FOC	1200KV	2-3S	0.133Ω	0.9A	36.0/48.8mm 1.42"/1.92"mm	3.175/15.5 mm 0.125"/0.61"mm	4	175g
30401251	XERUN AXE540-1800KV-FOC	1800KV	2-3S	0.055Ω	1.2A				173g
30401252	XERUN AXE540-2300KV-FOC	2300KV	2-3S	0.037Ω	1.5A				173g

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.Motor Wiring

The XERUN AXE brushless ESC only supports the XERUN AXE series of FOC brushless motors. The Axe ESC it cannot be paired with any other type of motor. The Axe Motor, cannot be used with any other type of ESC.

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 ESC sensor wire to the motor sensor wire. Never change the order of your motor wires or damage will occur.

Please ensure that the ESC sensor wire has been plugged into the motor sensor wire and screwed up, otherwise the water may get inside and damage the ESC or motor.

2.Receiver Wiring

The throttle control cable on the ESC has to be plugged into the throttle (TH) channel on the receiver. The throttle control cable (the Red wire) provides an output voltage of 6V/7.4V to the receiver and steering servo, hence, no separate battery can be connected to the receiver. Improper wiring of any external BEC, or battery pack will result in damage to your ESC.

3. 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 damage the ESC. This WILL NOT be covered under warranty!

06 ESC Setup

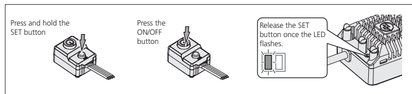
1 Set the Throttle Range - ESC Calibration - Radio Setup

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.

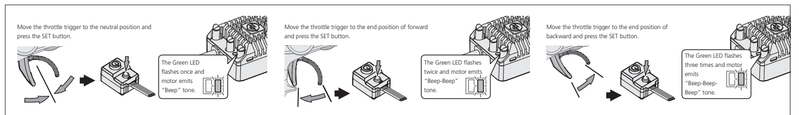
We strongly recommend activating the "Fail Safe" function of the radio system and set it (F/S) to "Output OFF" or set its value to the "Neutral Position" to ensure the motor can be stopped when there is no signal received from the transmitter.

About setting the throttle range, let's take Futaba™ transmitter as an example, however basic walk through applies to any and all radios.



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 FutabaTM 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 & 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	Option 10
1	Cutoff Voltage	Disabled	Low	Intermediate	High						
2	Max. Forward Force	25%	37.5%	50%	62.5%	75%	87.5%	100%			
3	Max. Reverse Force	25%	37.5	50%	62.5%	75%	87.5%	100%			
4	Turbo Timing	0-10° Adjustable (Step: 1°, default: 0°)									
5	Turbo Delay	Instant	0.1s	0.2s	0.3s	0.4s	0.5s				
6	Drag Brake Force	50-200% Adjustable (default: 80%)									
7	Drag Brake Rate	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7	Level 8	Level 9	Auto
8	Neutral Range	6%-17% Adjustable (default: 10%)									
9	Start Mode (/ Punch)	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7	Level 8	Level 9	
10	BEC Voltage	6.0V	7.4V								
11	Motor Rotation	CW	CCW								

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

1. 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 10 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.

2. 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).

3. 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.

4. 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" at full throttle.

5. 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.

6. 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.

7. 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 9 (very aggressive).

In Auto mode, the ESC adjusts the brag brake rate automatically as per the current speed. The higher the current speed, the lower the drag brake rate (when releasing the throttle trigger to the neutral position); the lower the current speed, the higher the drag brake rate. It can not only help prevent vehicle from flipping over or the drivetrain from damage due to the rapid intervention of drag brake when driving at a high speed but also guarantee the sensitive control feel when driving at a low speed.

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. Start Mode/(Punch)

You can choose the punch from level 1 (very soft) to level 9 (very aggressive). This feature is very useful for preventing tires from slipping during the starting-up process. In addition, "level 7" 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.

10. 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: 7.4V

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.

11.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.

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 app)

- Download and install the Hobbywing's official app "HW LINK" 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" 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-BLE01 & 888888 respectively.)
- 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 adjustments.

2) Firmware Upgrade with a smart phone (installed with the HW LINK app)

- Download and install the Hobbywing's official app "HW LINK" on your smart phone.
- As you enter the app, click Settings→About→Check for updates to ensure that the database and software version of your ESC are the latest.
- Connect a battery to the ESC and then turn it on, open the "HW LINK" app on your smart phone, a list of Bluetooth devices will pop out when you click the ESC icon on the upper right corner, then select the ESC (Bluetooth device) 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-BLE01 & 888888 respectively.)
- Click "Firmware upgrade" and then "Select the target version" to select the firmware version you need, and then click "Update" to upgrade your ESC. After the upgrade, you can adjust the parameters via "Parameters" and click the ESC icon on the upper right corner to disconnect the Bluetooth connection between the ESC and smart phone after saving the adjustments.

- During the upgrade process, please ensure that the network connection is stable and do not upgrade your ESC at any place with strong interference. In addition, please ensure that the smart phone is fully charged and the battery connected to the ESC still has sufficient power and it's firmly connected to the ESC. Do not disconnect the battery during the upgrade process, as that may cause the ESC to get damaged or be unable to function.
- When connecting the Bluetooth device (your ESC), please ensure the connection between the ESC sensor wire and the motor sensor wire is normal, otherwise the Bluetooth device cannot be connected and programmed.

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.

07 Explanations for Different Status LEDs

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. - 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 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. 2. The ESC switch was damaged.	1. Check if all ESC & battery joints or connections have been well soldered or firmly connected. 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. 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. 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. 2. The ESC entered the LVC protection. 3. The ESC entered the ESC thermal protection.	1. Check all devices and try to find out the possible causes, and check the transmitter's battery voltage. 2. The Red LED keeps flashing indicating the LVC protection is activated, please replace the battery. 3. The Green LED keeps flashing indicating the ESC thermal protection is activated. Please let it cool again before using the ESC again.
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. 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. 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. 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.
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. 3. The throttle range stored on your ESC is different from the one stored on the transmitter.	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. 3. If you're using a Futaba transmitter, set the throttle to "REV"; if other transmitters, please try to keep the ratio between "Forward" and "Reverse" on the throttle channel at 5:5.