DECLARATION
FEATURES
SPECIFICATIONS
BEGIN TO USE THE NEW ESC
PROGRAM THE ESC
ALERT TONES AND LED STATUS
BRUSHLESS SYSTEM CONFIGURATION SUGGESTION
TROUBLE SHOOTING
WARRANTY INFORMATION

CONTENTS

DECLARATION ................................................................. 2
FEATURES ................................................................. 2
SPECIFICATIONS ......................................................... 3
BEGIN TO USE THE NEW ESC ........................................... 3
PROGRAM THE ESC ....................................................... 6
ALERT TONES AND LED STATUS ..................................... 11
BRUSHLESS SYSTEM CONFIGURATION SUGGESTION ............... 11
TROUBLE SHOOTING ..................................................... 12
WARRANTY INFORMATION ............................................... 13
DECLARATION

Thanks for purchasing the Electronic Speed Controller (ESC). High power system for RC model can be very dangerous, so please read this manual carefully. In that we have no control over the correct use, installation, application, or maintenance of our products, no liability shall be assumed nor accepted for any damages, losses or costs resulting from the use of the product. Any claims arising from the operating, failure of malfunctioning etc. will be denied. We assume no liability for personal injury, consequential damages resulting from our product or our workmanship. As far as it is legally permitted, the obligation to compensation is limited to the invoice amount of the affected product.

FEATURES

- Compatible with all sensored brushless motors and most of sensored brushless motors such as LRP, SpeedPassion, Novak, etc.
- Excellent start-up, acceleration and linearity features.
- Built-in ESC has a powerful output to supply all the electronic equipments.
- Firmware can be updated through an USB adapter on the advanced LCD Program Box (Optional equipment).
- User programmable. Easily programmed with the “SET” button on the ESC and also compatible with the 3 digital LEDa Program Card and the advanced professional LCD Program Box.
- 3 running modes (Forward mode, Forward/Reverse mode, Rock Crawler mode)
- 4 steps of maximum reverse force adjustment
- Proportional A/B/C brake function with 4 steps of maximum brake force adjustment, 8 steps of drag-brake force adjustment and 4 steps of initial brake force adjustment.
- 9 start modes (Also called "Punch") from "very soft (Level 1)" to "very aggressive (Level 9)."
- 8 steps of timing adjustment to suitable for all brushless motors.
- Multiple protection features: Low voltage cut-off protection / Over-Heat protection / Throttle signal loss protection / Motor blocked protection.

SPECIFICATIONS

<table>
<thead>
<tr>
<th>MODEL</th>
<th>XERUN-120A-V2</th>
<th>XERUN-60A-V2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cont / Burst Current</td>
<td>120A / 700A</td>
<td>40A / 300A</td>
</tr>
<tr>
<td>Resistance</td>
<td>0.0033 ohm</td>
<td>0.0058 ohm</td>
</tr>
<tr>
<td>Suitable Car</td>
<td>1/10, 1/12 on-road &amp; off-road, 1/8, 1/10 scale rock crawler</td>
<td></td>
</tr>
</tbody>
</table>

Sensored and sensoredless Brushless Motors

<table>
<thead>
<tr>
<th>Suitable Motor</th>
<th>5-6 NIMH or 2 Lipo</th>
<th>8-9 NIMH or 3 Lipo</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>25.51(on-road), 25.51(off-road)</td>
<td>25.51(on-road), 28.51(off-road)</td>
</tr>
<tr>
<td>Battery</td>
<td>4-5 cells NIMH or 2-3 cells LiPo</td>
<td></td>
</tr>
<tr>
<td>BEC Output</td>
<td>5.7V@50% Built-In BEC</td>
<td></td>
</tr>
<tr>
<td>Dimension</td>
<td>43mm(W) * 36mm(H) * 33mm(H)</td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>15g</td>
<td>8g</td>
</tr>
</tbody>
</table>

Fan Working Voltage * 5V@0.15A, maximum 8V. (This fan gets the power supply directly from the battery)

* Please choose 12V cooling fan when using 3 cells Lipo.

BEGIN TO USE NEW ESC

1) Connect the ESC, motor, receiver, battery and servo correctly.

A) Sensored brushless motor wiring

When using brushless motor with Hall Sensor, it is necessary to connect the sensor cable to the “SENSOR” socket on the ESC, and ESC can automatically identify the motor type (sensored or sensorenless) by detecting the signal coming from the SENSOR socket.

**WARN/NGP** For sensored brushless motor, the #A, #B, #C wires of the ESC MUST be connected with the motor wire #A, #B, #C respectively. Do not change the wires sequence optionally!
B) Sensorless brushless motor wiring
When using brushless motor without Hall Sensor, the #A, #B, #C wires of the ESC can be connected with the motor wires freely (without any sequence). If the motor runs in the opposite direction, please swap any two wire connections.

⚠️ Note: For SENSORLESS motor, you can also set the throttle channel of your transmitter to the "REVERSE" direction, and then the motor will run oppositely. And please calibrate the throttle range again after changing the direction of throttle channel. Please keep in mind that this method is ONLY available for SENSORLESS motor.

Throttle Range Setting (Throttle Range Calibration)
In order to make the ESC fit the throttle range, you must calibrate it when you begin to use a new ESC, or a new transmitter, or change the settings such as the neutral position of the throttle stick, ATV or EPA parameters, etc. Otherwise the ESC cannot work properly.
There are 3 points need to be set, they are the "Top point of forward", the "Top point of backward" and the "Neutral point". The following pictures show how to set the throttle range with a Futaba transmitter.

A) Switch off the ESC, turn on the transmitter, set the direction of throttle channel to "REV", set the throttle trim to "0", set the "CH6/ATV" value of throttle channel to "100%", and disable the ABS function of your transmitter.
B) Use a pen or screw driver to hold the "SET" key and then switch on the ESC, and release the "SET" key as soon as possible when the red LED begins to flash.

Note: If you don't release the "SET" key as soon as the red LED begins to flash, the ESC will enter the program mode, in such a case, please switch off the ESC and re-calibrate the throttle range again from step A to step D.
C) Set the 3 points according to the steps shown as the pictures on the right side.
   ▶️ The neutral point
   ▶️ The top point of forward direction
   ▶️ The top point of backward direction

D) When the process of calibration is finished, the motor can be started after 3 seconds.

- Neutral point
- Top point of forward direction
- Top point of backward direction
- The green LED flashes 1 time
- The green LED flashes 2 times
- The green LED flashes 3 times

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PROGRAM THE ESC

1 Programmable Items List (The blue color texts in the form are the default settings)

<table>
<thead>
<tr>
<th>Programmable Item</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Basic Items</strong></td>
<td></td>
</tr>
<tr>
<td>1. Running Mode</td>
<td></td>
</tr>
<tr>
<td>Forward with Brake</td>
<td>Forward/Reverse with Brake</td>
</tr>
<tr>
<td>2. Drag Brake Force</td>
<td>0%</td>
</tr>
<tr>
<td>3. Low Voltage Cut-Off Threshold</td>
<td>No-Protection</td>
</tr>
<tr>
<td>4. Start Mode (Punch)</td>
<td>Level1</td>
</tr>
<tr>
<td><strong>Advanced Items</strong></td>
<td></td>
</tr>
<tr>
<td>5. Max Brake Force</td>
<td>25%</td>
</tr>
<tr>
<td>6. Max Reverse Force</td>
<td>25%</td>
</tr>
<tr>
<td>7. Initial Brake Force</td>
<td>0%</td>
</tr>
<tr>
<td>8. Neutral Range</td>
<td>0% (Normal)</td>
</tr>
<tr>
<td>9. Timing</td>
<td>0.02 s</td>
</tr>
<tr>
<td>10. Overheat Protection</td>
<td>Enable</td>
</tr>
</tbody>
</table>

**Explanation For Each Programmable Item**

2.1. Running Modes: With “Forward with Brake” mode, the car can go forward and brake, but cannot go backward, this mode is suitable for competition. “Forward/Reverse with Brake” mode provides backward function, which is suitable for daily training.

Note: “Forward/Reverse with Brake” mode uses “Double-click” method to make the car go backward. When you move the throttle stick from forward zone to backward zone for the first time (The 1st “click”), the ESC begins to brake the motor, the motor speed down but it is still running, not completely stopped, so the backward action is NOT happened immediately. When the throttle stick is moved to the backward zone again (The 2nd “click”), if the motor speed is slowed down to zero (i.e. stopped), the backward action will happen. The “Double-Click” method can prevent mistaken reversing actions when the brake function is frequently used in steering.

In the process of brake or reverse, if the throttle stick is moved to forward zone, the motor will run forward at once.

“Forward/Reverse” mode uses “Single-click” method to make the car go backward. When you move the throttle stick from forward zone to backward zone, the car will go backward immediately. This mode is usually used for the Rock Crawler.

2.2. Drag Brake Force: Set the amount of drag brake applied at neutral throttle to simulate the slight braking effect of a neutral brushed motor while coasting.

2.3. Low Voltage Cut-Off: The function prevents the lithium battery pack from over discharging. The ESC detects the battery’s voltage at any time, if the voltage is lower than the threshold for 2 seconds, the output power will be reduced 70%, after 10 seconds the output power will be completely shut off and the red LED flashes (in such a way “e-e-e-e”). Please stop your car at the track side as soon as possible to avoid obstructing other racing cars. For stock motors, 3.4V/Cel cut off threshold is suggested. Please note that the cutoff threshold is calculated for each LITHIUM (Lipo) battery cell. For NiMH battery packs, if the voltage of the whol NiMH battery pack is higher than 8.0V. It will be considered as a 3 cells lithium battery pack, if it is lower than 8.0V. it will be considered as a 2 cells lithium battery pack. For example, a NiMH battery pack is 8.0V, and the threshold is set to 2.6V/Cel, so it will be considered as a 2 cells lithium battery pack, and the low-voltage cut-off threshold for this NiMH battery pack is 2.6V*2=5.2V.

There are 9 preset options for this programmable item. You can customize the cutoff threshold by using an advanced LCD Program Box (Optional equipment) to trim it with a step of 0.1V, so it will be more suitable for all kinds of batteries (NiMH, NiCd, Li-Ion, Lipo, LiPo, etc.).

Please always keep in mind that the customized value is not for each Lipo battery cell, it is for the WHOLE battery pack.

2.4. Start Mode (Also called “Punch”): Select from “Level1” to “Level9” as you like, Level1 has a very soft start effect, while Level9 has a very aggressive start effect. From Level1 to Level9, the start force is increasing. Please note that if you choose “Level7” to “Level9” mode, you must use good quality battery pack with powerful discharge ability, otherwise these modes cannot get the burst start effect you want. If the motor cannot run smoothly (the motor is trembling), it may caused by the weak discharge ability of the battery pack, please choose a better battery or increase the gear rate (Use a smaller pinion).

2.5. Maximum Brake Force: The ESC provides proportional brake function. The brake force is related to the position of the throttle stick. Maximum brake force refers to the force when the throttle stick is located at the top point of the backward zone. A very large brake force can shorten the brake time, but it may damage the gears.

2.6. Maximum Reverse Force: Sets how much power will be applied in the reverse direction. Different value makes different reverse speed.

2.7. Initial Brake Force: It is also called “minimum brake force”, and it refers to the force when the throttle stick is located at the initial position of the backward zone. The default value is equal to the drag brake force, so the brake effect can be very smoothly.

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2.8. Throttle Neutral Range: Please refer to the following picture to adjust the neutral range as your like.

2.9. Timing: The timing item is usable for both sensored and sensorless brushless motors. Please select the most suitable timing value according to the motor you are just using. Generally, higher timing value brings out higher power output, but the whole efficiency of the system will be slightly lower.

Note: For ESC firmware later than 091219A, if the ESC works with a MODIFY motor, please don’t choose timing values larger than 18.75°, otherwise the motor may over heat and damaged.

2.10. Over-Heat Protection: If the function is activated, the output power will be cut-off when the temperature of the ESC or the internal temperature of the sensor less brushless motor is higher than a factory-set value for 5 seconds. When the protection happens, the Green LED will flash.

► When the ESC is over-heat: The Green LED flashes as “■■”, “■■■”, “■■■■” (Single flash).
► When the motor is over-heat: The Green LED flashes as “■■■■■ ■■■■■” (Double flash).

Note: The motor over-heat protection function is only available for the sensorless brushless motor made by HOBBYWING. For motors made by other manufacturers, this function maybe not available or the protection point doesn’t match the design of the ESC, please disable the over-heat protection function in such a case.

Program Methods
A) Program the ESC with LED program card (Optional equipment)
   Please refer to the user manual of LED program card.
B) Program the ESC with advanced LCD program box (Optional equipment)
   Please refer to the user manual of LCD program box.
C) Program the ESC with the SET button on the ESC
   Please refer to the flow chart at page 10.

Note:
► In the program process, when the LED is flashing, the motor will emit “Beep” tone at the same time.
► If the number “N” is bigger than the “5”, we use a long time flash and long “Beep—” tone to represent “5”, so it is easy to identify the items with bigger series number.

For example, if the LED flashes as the following:

“A long time flash + 1 short time flash” (Motor sounds “Beep—Beep”) = the No. 6 item
“A long time flash + 2 short time flashes” (Motor sounds “Beep—BeepBeep”) = the No. 7 item
“A long time flash + 3 short time flashes” (Motor sounds “Beep—BeepBeepBeep”) = the No. 8 item
And so on.

Reset All Items To Default Values
At any time when the throttle is located in neutral zone (except in the throttle calibration process or program mode), hold the “SET” key more than 3 seconds, the red LED and green LED will flash at the same time, which means each programmable item has been reset to its default value.
**Running Mode**

1. Turn off the ESC.
2. Switch on the ESC.
3. Hold the SET key.
4. Release the SET key for 3 seconds.
5. The ESC will beep once, choose "0%".
6. Release the SET key for 3 seconds.
7. Hold the SET key for 3 seconds.
8. Release the SET key for 3 seconds.
9. The following steps are just like the above steps.

**Alert Tones and LED Status**

1. Input voltage abnormal alert tone: The ESC begins to check the input voltage when power on, if the voltage is out of the normal range, such an alert tone will be heard: "beep-beep-beep-beep-beep-beep" (There is 1 second interval between every group of "beep-beep" tone).

2. Throttle signal abnormal alert tone: When the ESC can’t detect the normal throttle signal, such an alert tone will be heard: "beep-beep-beep-beep". (There is 2 seconds interval between every "beep" tone).

3. The LED Status in Normal Running
   - Normally, if the throttle stick is in the neutral range, neither the red LED nor the green LED lights.
   - The red LED lights when the car is running forward or backward and it will flash quickly when the car is braking.
   - The green LED lights when the throttle stick is moved to the top point of the forward zone.

**Brushless System Configuration Suggestion**

<table>
<thead>
<tr>
<th>Motor</th>
<th>KV Power</th>
<th>Gear Rate 1</th>
<th>Gear Rate 2</th>
<th>Suitable ESC</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.5T</td>
<td>9100KV/80W</td>
<td>9.6-11.0</td>
<td>11.0-13.0</td>
<td>120A</td>
<td>1/10, 1/12 On-road racing (Modified group)</td>
</tr>
<tr>
<td>4.5T</td>
<td>7300KV/90W</td>
<td>8.4-10.0</td>
<td>10.0-12.0</td>
<td>120A</td>
<td>1/10 On-road racing (Mod)</td>
</tr>
<tr>
<td>5.5T</td>
<td>6000KV/140W</td>
<td>8.0-9.4</td>
<td>10.0-12.0</td>
<td>120A</td>
<td>1/10 Off-road racing (Mod)</td>
</tr>
<tr>
<td>6.5T</td>
<td>5200KV/130W</td>
<td>7.4-8.4</td>
<td>9.0-11.0</td>
<td>120A</td>
<td>1/10 Off-road racing (Mod)</td>
</tr>
<tr>
<td>8.5T</td>
<td>4200KV/150W</td>
<td>6.0-7.0</td>
<td>8.0-9.0</td>
<td>120A/150A</td>
<td>1/10 On-road racing (Mod)</td>
</tr>
<tr>
<td>10.5T</td>
<td>3300KV/250W</td>
<td>5.0-6.0</td>
<td>7.5-8.5</td>
<td>120A/150A</td>
<td>1/10 Off-road racing (Mod)</td>
</tr>
<tr>
<td>13.5T</td>
<td>2700KV/210W</td>
<td>4.5-5.5</td>
<td>7.0-8.0</td>
<td>120A/150A</td>
<td>1/10 Off-road racing (Mod)</td>
</tr>
<tr>
<td>17.5T</td>
<td>1900KV/150W</td>
<td>4.0-5.0</td>
<td>6.0-7.0</td>
<td>120A/150A</td>
<td>1/10 Off-road racing (Mod)</td>
</tr>
</tbody>
</table>

Note:
- The “Power of motor” means the maximum output power under 7.2V.
- The “Gear rate” is just the recommended value for 1/10 scale car truck under 6 cells NiMh battery input.
<table>
<thead>
<tr>
<th>Trouble</th>
<th>Possible Reason</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>After power on, motor doesn’t work, no sound is emitted</td>
<td>The connections of battery pack are not correct. The switch is damaged.</td>
<td>Check the power connections, replace the connections or switch.</td>
</tr>
<tr>
<td>After power on, motor can’t work, emits “beep-beep, beep-beep” alert</td>
<td>Input voltage is abnormal, too high or too low.</td>
<td>Check the voltage of the battery pack.</td>
</tr>
<tr>
<td>After power on, the red LED lights, but motor cannot run</td>
<td>Throttle signal is abnormal</td>
<td>Check the transmitter and the receiver, and check the agreed wire connection of your ESC.</td>
</tr>
<tr>
<td>The motor runs in the opposite direction</td>
<td>1) The wire connections between the ESC and the motor need to be changed</td>
<td>1) Swap any two wire connections between the ESC and the motor. (Note: This method is only available for SENSORLESS motor.) 2) Please don’t use the ESC for this special chassis.</td>
</tr>
<tr>
<td>The motor stops running while in working state</td>
<td>The ESC has entered the “Low voltage protection mode” or the “Over-heat protection mode”</td>
<td>The red LED flashes means Low voltage protection, please replace the battery pack. The green LED flashes means Over-heat protection, please wait for some minutes to cool the ESC.</td>
</tr>
<tr>
<td>When accelerating quickly, the motor stops or trembles</td>
<td>1) The battery hasn’t a good discharge performance</td>
<td>1) Use a better battery 2) Use lower KV motor or change the gear ratio or set the “Start Mode” more softly.</td>
</tr>
<tr>
<td>When the throttle stick is in the neutral range, the red LED and the green LED flashes synchronously</td>
<td>The motor is a sensorless motor, but the ESC detects abnormal signal from the sensor so it changes to sensorless mode automatically</td>
<td>1) Check the connection of hall sensor cable to make it firmly connecting the motor with the ESC. 2) The Hall sensors in the motor are damaged, please change this motor.</td>
</tr>
<tr>
<td>The motor trembles but cannot start smoothly</td>
<td>1) The connections are not A, A, B, B and C-C</td>
<td>1) Check the connections 2) Contact the dealer for after-sales service</td>
</tr>
</tbody>
</table>