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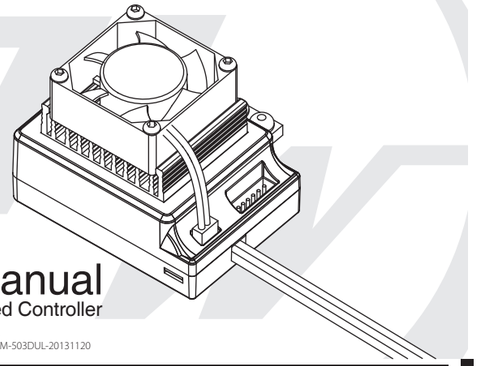


User Manual

Brushless Speed Controller

XERUN 90A/120A

Updated at November 2013 SM-503DUL-20131120

DECLARATION

Thanks for purchasing our 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 is legally permitted, the obligation to compensation is limited to the invoice amount of the affected product.

FEATURES

- Compatible with all sensorless brushless motors and most of sensored brushless motors such as LRP, SpeedPassion, Novak, etc.
- Seamlessly change to sensorless working mode when the sensor cable is broken.
- Excellent start-up, acceleration and linearity features.
- Built-in BEC has a powerful output to supply all the electronic equipments.
- Firmware can be updated through an USB adapter on the Multifunction LCD Program Box (Optional equipment).
- User programmable. Easily programmed with the "SET" button on the ESC and also compatible with the 3 digital LEDs Program Card and the Multifunction LCD Program Box.
  - 3 running modes (Forward mode, Forward/Reverse mode, Rock Crawler mode)
  - 4 steps of maximum reverse force adjustment.
  - Proportional ABS 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

Model		XERUN-120A-V2	XERUN-90A-V2
Cont./ Burst Current		120A / 760A	90A/520A
Resistance		0.0003 ohm	0.0005 ohm
Suitable Car		1/10, 1/12 on-road & off-road, 1/8, 1/10 scale rock crawler	
Suitable Motor	5-6 NIMH or 2 Lipo	Sensored and sensorless Brushless Motors	
		≥3.5T(on-road), ≥5.5T(off-road)	≥5.5T(on-road), ≥8.5T(off-road)
	8-9 NIMH or 3 Lipo	≥5.5T(on-road), ≥8.5T(off-road)	≥10.5T(on-road), ≥17.5T(off-road)
Battery		4-9 cells NiMH or 2-3 cells Li-Po	
BEC Output		5.75V@3A Built-in BEC	
Dimension		43mm(L) * 36mm(W) * 33mm(H)	
Weight		105g	85g
Fan Working Voltage*		5V@0.16A, maximum 8V. (The fan gets the power supply directly from the battery)	

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

BEGIN TO USE THE NEW ESC

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

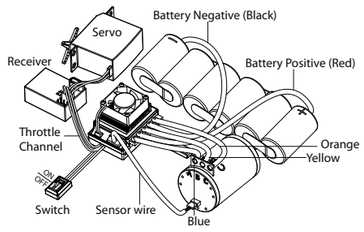
A. Sensored brushless motor wiring

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 sensorless) by detecting the signal coming from the SENSOR socket.

WARNING! 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 order). 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.

2. Throttle Range Setting (Throttle Range Calibration).

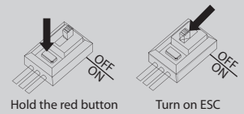
In order to make the ESC fit the throttle range, you must calibrate it when you begin to use a new ESC, or a new transmitter, or change the settings such as the neutral position of the throttle stick, ATV or EPA parameters, etc. Otherwise the ESC can not work properly. There are 3 points need to be set, 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 "EPA/ATV" value of throttle channel to "100%", and disable the ABS function of your transmitter.

B. Switch on the ESC when holding the running button, 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.

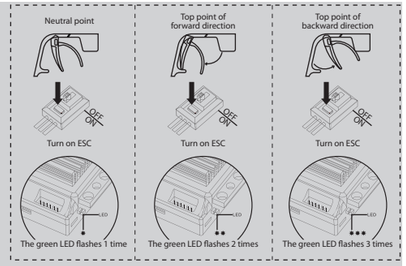


Hold the red button Turn on ESC

Release the red button as soon as the red LED begins to flash

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.



The green LED flashes 1 time | The green LED flashes 2 times | The green LED flashes 3 times

PROGRAM THE ESC

1. Programmable Items List (The Options on the grey background are the default sttings)

Programmable Items	Options								
	1	2	3	4	5	6	7	8	9
Basic Items									
1. Running Mode	Forward with Brake	Forward/Reverse with Brake	Foward/Reverse (For Rock Crawler)						
2. Drag Brake Force	0%	5%	10%	20%	40%	60%	70%	100%	
3. Low Voltage Cut-Off Threshold	Non-Protection	2.6V/Cell	2.8V/Cell	3.0V /Cell	3.2V /Cell	3.4V /Cell			
4. Start Mode(Punch)	Level1	Level2	Level3	Level4	Level5	Level6	Level7	Level8	Level9
Advanced Items									
5. Max Brake Force	25%	50%	75%	100%					
6. Max Reverse Force	25%	50%	75%	100%					
7. Initial Brake Force	= Drag Brake Force	0%	20%	40%					
8. Neutral Range	6% (Narrow)	9% (Normal)	12% (Wide)						
9. Timing	0.00 °	3.75 °	7.50 °	11.25 °	15.00 °	18.75 °	22.50°	26.25°	
10. Over-heat Protection	Enable	Disable							

2. Explanation For Each Programmable Item

2.1. Running Mode: 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 running function, which is suitable for daily training.

Note: "Forward/Reverse with Brake" mode and "Foward 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 speeds 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 mistakenly reversing action when the brake function is frequently used in steering. By the way, in the process of braking or reversing, 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 mainly prevents the lithium battery 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: "☆-☆-, ☆-☆-, ☆-☆-".

Please stop your car at the track side as soon as possible to avoid obstructing other racing cars. Please note that the cutoff threshold value in the programmable item list is calculated for Lipo battery cell, so for NiMH battery packs, if the voltage of the whole NiMH battery pack is higher than 9.0V, it will be considered as a 3 cells lithium battery pack; If it is lower than 9.0V, 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/Cell, 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 2.6*2=5.2V. There are 6 preset options for this programmable item. You can customize the cutoff threshold by using the Multifunction 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, LFP, 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 your 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 as you want. If the motor can not 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.

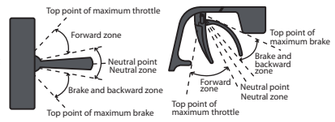
2.5. Maximum Brake Force: The ESC provides proportional brake function. The brake force is related to the position of the throttle stick. Maximum brake force refers to the force when the throttle stick is located at the top point of the backward zone. A very large brake force can shorten the brake time,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

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.

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



Note: For ESC firmware later than 091218A, if the ESC works with a MODIFY moter, please don't choose timing values larger than 18.75°, otherwise the motor maybe 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 sensored brushless motor is up to a factory-preset 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 sensored brushless motor made by the same manufacturer of the ESC. 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.

3. Reset All Items To Default Values

At any time when the throttle is located in neutral zone (except in the throttle calibration or parameters program process), hold the "SET" key for over 3 seconds, the red LED and green LED will flash at the same time , which means each programmable item has be reset to its default value.

BRUSHLESS SYSTEM CONFIGURATION SUGGESTION

Motor	KV	FDR 1/10 On Road	FDR 1/10 Off Road	ESC	Application
3.5T	9100KV	9.0-11.0		120A	1/10, 1/12 On-road competitive racing (Modified group)
4.5T	7650KV	8.4-10.0		120A	
5.5T	6450KV	8.0-9.4	9.5-11.0	120A	1/10 On-Road sportful racing
6.5T	5340KV	7.4-8.4	9.0-11.0	120A	1/10 Off-road competitive racing (Modified group)
8.5T	4165KV	6.0-7.0	8.0-9.6	120A/90A	1/10 Drift, 1/10 2WD Off-road
10.5T	3450KV	5.0-6.0	7.0-8.5	120A/90A	1/10, 1/12 Stock race and Sport race
13.5T	2760KV	4.0-5.0	6.5-7.5	120A/90A	
17.5T	2210KV	3.8-4.5	5.5-7.0	120A/90A	

PROGRAM METHODS

1. **Program the ESC with LED program box (Optional equipment)**
   Please refer to the user manual of LED program box.
2. **Program the ESC with Multifunction LCD program box (Optional equipment)**
   Please refer to the user manual of LCD program box.
3. **Program the ESC with the SET button on the ESC**
   Please refer to the instructions at the right side.

Note:
- In the program process, the motor will emit "Beep" tone at the same time when the LED is flashing.
- If the "N" is bigger than the number "5", we use a long time flash and long "Beep----" tone to represent "5", so it is easy to identify the items of the big number.

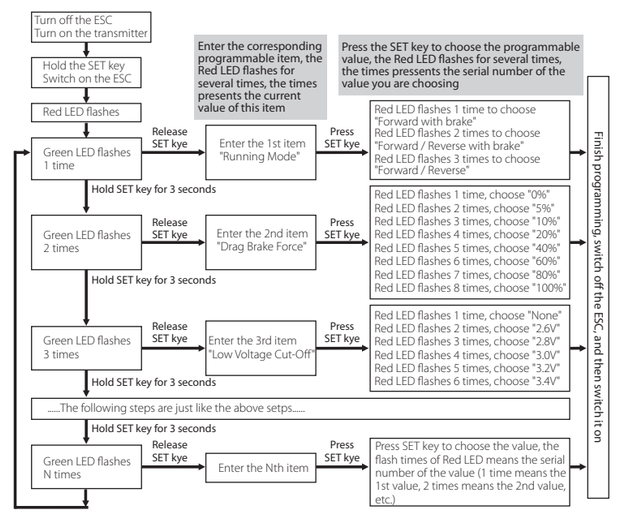
For example, if the LED flashes as the following:

"A long time flash + a short time flash" (Motor sounds "Beep----Beep") = the No. 6 item

"A long time flash + 2 short time flash" (Motor sounds "Beep----BeepBeep") = the No. 7 item

"A long time flash + 3 short time flash" (Motor sounds "Beep----BeepBeepBeep") = the No. 8 item

And so on.



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 "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-" (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 (end point) of the forward zone or backward zone.

TROUBLE SHOOTING

Trouble	Possible Reason	Solution
After power on, motor doesn't work, no sound is emitted	The connections of battery pack are not correct The switch is damaged	Check the power connections, replace the connectors or switch
After power on, motor can't work, but emits "beep-beep-, beep-beep-" alert tone. (Every "beep-beep-" has a time interval of 1 second)	Input voltage is abnormal, too high or too low.	Check the voltage of the battery pack
After power on, the red LED lights, but motor cannot run	Throttle signal is abnormal	Check the transmitter and the receiver,and check the signal wire connection of your ESC
The motor runs in the opposite direction	1) The wire connections between the ESC and the motor need to be changed 2) The chassis is not suitable for this ESC	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.
The motor stops running while in working state	The ESC has entered the "Low voltage protection mode" or the "Over-heat protection mode"	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
When accelerating quickly, the motor stops or trembles	1) The battery has a bad discharge performance 2) The gear rate is too small so the motor load is too heavy	1) Use a better battery 2) Use lower KV motor or change the gear rate or set the "Start Mode" more softly
When the throttle stick is in the neutral range, the red LED and the green LED flashes synchronously	The motor is a sensored motor, but the ESCdetects abnormal signal from the sensor,so it changes to sensorless mode automatically	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 the motor
The motor trembles but cannot start smoothly	1) The connctions are not A-A, B-B and C-C 2) The ESC is damaged	1) Check the connections 2)Contact the dealer for after-sales service