

# INSTRUCTION MANUAL



For 1/10 SC or Monster, 1/8 SC or Buggy  
Support Both Sensor or Sensor-less Brushless Motor



## INTRODUCTION

Thank you for purchasing TORO SC120 Brushless Sensored ESC from SKYRC TECHNOLOGY CO.,LTD. Please read the Instruction Manual thoroughly before you use the product. These operating instructions are designed to ensure that you quickly become familiar with its features and functions and make full use of this product.

## FEATURES

- Well-performed throttle and brake control function could control the punch/brake rate by point and the point can be set by user. The precision of the punch/brake rate is 1%. And the user could also custom the throttle/brake curve.
- Punch control is reasonable and precise and it can meet different customers' request for line and power.
- Users could modify the setting, monitor the ESC and motor status at any time by smart phone via Bluetooth Module (Bluetooth Module adaptor can be purchased separately, which is not included in the package).
- Red copper connector is used internal of the ESC. It can decrease the internal resistance at high current situation.
- The circuit is managed by intelligent thermal management kernel algorithm. The dynamic loss can be reduced effectively when the motor is running at high speed or the user changes the motor speed frequently so that the motor can be more stable when running.
- Heat transfer: The internal resistance can be reduced by laminated copper stack control technology and cooling fan design so that the dynamic thermal equilibrium can be got. In this case, the aluminum heat sinks can work effectively.
- The users could set and store 10 sets of profiles in the ESC. These data could be called out at any time without any special program setting. All the setting can be exported or imported so that the user could compare and analyze.
- Safety features: low voltage protection, motor and ESC overheat protection and signal lost protection.
- It can be programmed by Program Box(SK-300046), PC via SKYLINK(SK-600013) or smart phone via Bluetooth Module(SK-600058).
- The firmware can be updated by connecting the ESC with PC or smart phone.

## SAFETY NOTE

- It is not a toy and suitable for users older than 14 years old.
- Never allow water, moisture, oil or other foreign materials to get inside ESC, motor, or on the PC Boards. It may damage the ESC completely.
- Never disassemble the ESC and modify the components on the PC Boards.
- Suggest using the original wires and connectors which are packed in the box.
- Never solder one part for more than 5 seconds as some components will get damaged by high temperature.
- Never run the ESC w/o load at full throttle and it may damage the bearings and other moving parts.
- Please make sure the location where to fix the ESC has good airflow ventilating so that the heat could dissipate quickly.
- To avoid short circuit, please keep the ESC connectors far away from other metal parts.
- Never connect the battery in polarity in reverse.
- Please remove the pinion gear before performing calibration and programming functions with this system. Please keep your hands, hair, cloth, clear from the gear train and wheels of an armed high performance
- Before you switch on the ESC, please make sure all the cables are well solder with the connectors (It is easy to get loose when running) . What's more, make sure the cables not touch the moving parts.
- Electronic motor timing will increase the temperatures of ESC and brushless motor. Use extreme caution when setting up and testing your application to avoid overloading and overheating.
- Incorrect Boost and Turbo timing setting may cause permanent damage to the ESC and motors. Please choose proper ratio and timing setting according to motor's instruction.
- To avoid signal interference, please always turn on the transmitter first THEN turn on the speed control. Do the opposite when powering it off.
- Never use faulty accessories, e.g. motor which may damage the ESC. Always insulate exposed wiring with heat shrink tubing or electrical tape to prevent short circuits, which can damage ESC too.
- Always disconnect the battery pack from the speed control when not in use to avoid short circuits and possible fire hazard. When the ESC is switched off, there is still small current and it may cause over discharge of the battery after some time.
- The ESC can support 6-12 cells NiMH or 2-4 cells LiPo battery.

Note: We will not be responsible for any damage caused by non-compliance with above instruction.

## PREPARATION

### 1) Plan Speed Control Placement

Choose a location for the speed control that is protected from debris. To prevent radio interference, place the speed control as far away from the radio receiver as possible and keep the power wires as short as possible. Select a location that has good airflow ventilating. If the ESC gets air flow, it will run cooler; and that means it will be more efficient.

### 2) Mount Speed Control in Vehicle

- Use double-sided tape to mount the speed control in vehicle (do not use CA glue). Use double-sided tape to mount the switch where it will be easy to access. Select a position where it will not get damaged or get switched OFF during a crash or roll-over.
- You may use the mounting plate(included) to fix the ESC to the chassis.

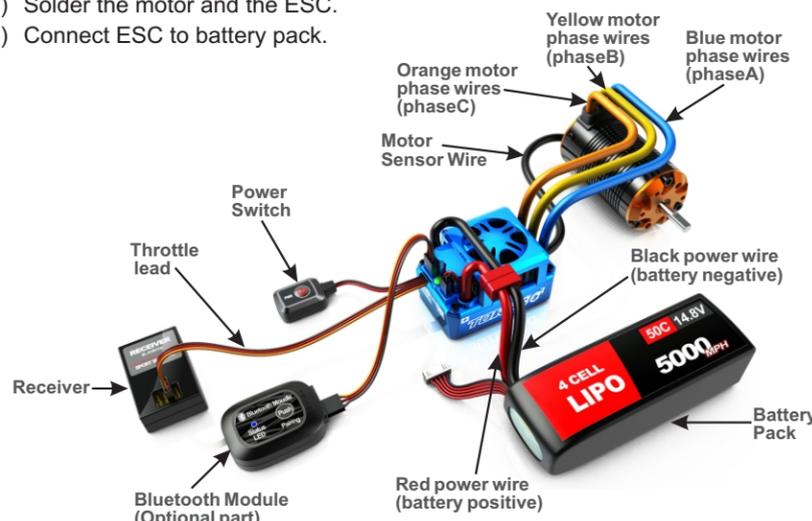


### 3) Soldering

Cut the ESC's BLUE, YELLOW & ORANGE silicone motor power wires to the desired length and strip about 3.2mm-6.35mm (1/8"-1/4") of insulation from the end of each wire. "Pre-tin"the wire by heating the end and applying solder until it is thoroughly covered. CAUTION: By very careful not to splash yourself with hot solder. Place the ESC's BLUE Phase 'A' motor wire onto motor's 'A' solder tab and solder. Use soldering iron to apply heat to exposed wire; begin adding solder to tip of soldering iron and wire. Add just enough solder to form a clean and continuous joint from the plated area of the solder tab up onto the wire. Solder the ESC's YELLOW Phase'B' motor wire to the motor's 'B' solder tab and Solder the ESC's ORANGE Phase 'C' motor wire to motor's 'C' solder tab.

## CONNECTION

- Connect the motor sensor harness to ESC. Insert the 6 pin connector on the end of the motor's sensor wires into ESC's sensor harness socket.
- Connect Throttle lead to ESC and other end to the Receiver (Throttle Channel, Ch2)
- Solder the motor and the ESC.
- Connect ESC to battery pack.



## ESC CALIBRATION

Calibration is necessary for the first use of the ESC, or whenever used with a new/different transmitter. Individual transmitter's signals for full throttle, full brake and neutral vary. You must calibrate your ESC so that it will operate more effectively with your transmitter.

### How to calibrate the ESC?

- ESC switch OFF.
- Connect the ESC to the battery and the motor.
- Turn on the transmitter.
- Press and hold the ESC switch for few seconds, the motor will ring long beep once. After that, the red LED will blink the motor will ring like beep-beep-beep... in a row which indicates it is time to set the neutral position, full throttle and full brake one by one. You could release the ESC switch now.
- Keep the throttle trigger in neutral position, press the ESC switch once, the green LED will blink once then extinguish and the motor will ring beep once which indicates the neutral position has been set.
- Hold full throttle and press the ESC switch once, the green LED will blink twice then extinguish and the motor will ring twice like beep-beep which indicates the full throttle has been set.
- Move the throttle trigger to full brake and hold full brake, press the ESC switch once, the green LED will blink three times then extinguish and the motor will ring three times like beep-beep-beep which indicates the full brake has been set.
- After the calibration is finished, keep the throttle in neutral position, the red LED will stay ON, the ESC and the motor is ready to work.



## ESC ON/OFF AND LED INDICATOR

- ESC ON/OFF: When the ESC is OFF, press the switch once, the motor will ring beep once and the red LED will blink, then the ESC is ready to work. When the ESC is on, press the switch once, the LED will extinguish and the ESC is OFF.

Note 1: After running at full load, the ESC will be very hot. In this case, please turn off the ESC after it cools down.  
Note 2: When the motor is running, the ESC can't be powered off by pressing the switch; when the motor stops working, the ESC can be powered off. In an emergency, please disconnect the battery to power off the ESC.

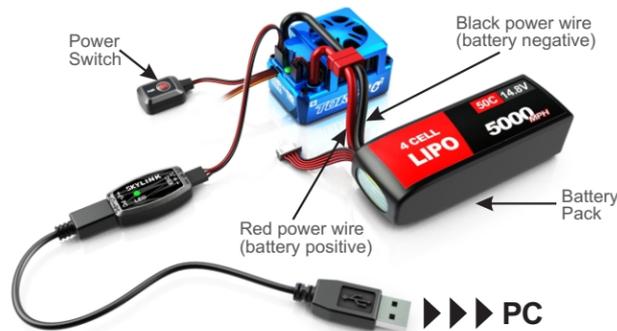
### 2. Explanation of LED Indicator

The throttle trigger is in neutral position	Red LED is blinking (zero timing)
The throttle trigger is in neutral position	Red LED stays on (Motor turbo timing is on)
The motor is running while the throttle trigger doesn't reach to the highest throttle/brake position	Green LED is blinking.
The throttle trigger is at the highest throttle/brake position.	Green LED stays ON

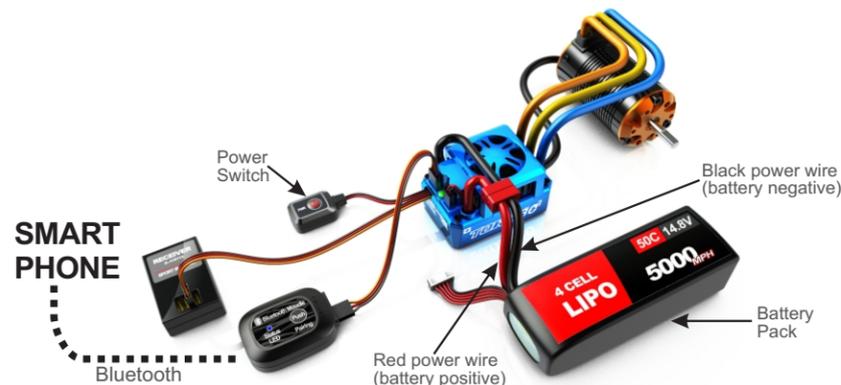
## ESC PROGRAMMING

The ESC can be programmed by program box, PC (connected with SKYLINK) or smart phone via bluetooth module.

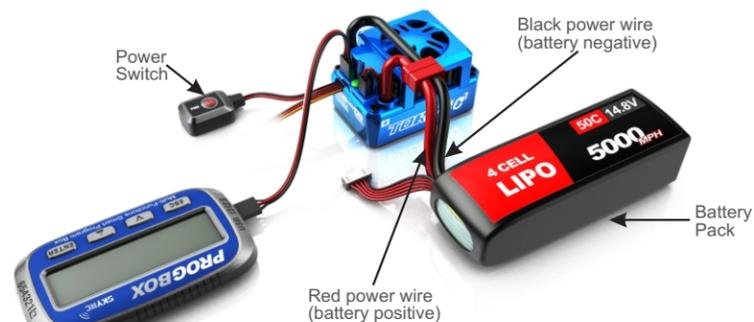
1. PC via SKYLINK (optional part SK-600013)



2. Smart Phone via Bluetooth Module (optional part SK-600058)



3. Program Box (optional part SK-300046)



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## Programmable Items and Description

Section	Program Item	Description			
General Setting	Running Mode	Forward/Brake	Forward/Brake/Reverse	Forward/Reverse	
	Motor Direction	Normal	Reverse		
	Reverse Speed	25-100% (in 1% increment)			
	Voltage Cutoff*	3.0-25V (in 0.1V increment)	Auto (3.2V)		
	ESC Overheat Protection	85°C/185°F	105°C/221°F	125°C/257°F	Disable
	Motor Overheat Protection	85°C/185°F	105°C/221°F	125°C/257°F	Disable
Throttle Control	Punch Rate Switch Point	1-99%(in 1% increment)			
	1st Stage Punch Rate	1-30			
	2nd Stage Punch Rate	1-30			
	TH Input Curve	Line	Custom		
	Throttle Dead Band	0.002-0.150ms			
	Throttle Status				
	Brake Control	Drag Brake	0-100%(in 1% increment)		
Brake Strength		0-100%			
Initial Brake		=Drag Brake	0-50%		
Brake Rate Switch Point		1-99%(in 1% increment)			
1st Stage Brake Rate		1-20			
2nd Stage Brake Rate		1-20			
Brake Input Curve		Line	Custom		
Turbo	Turbo Timing	0-10 deg			
	Turbo Full TH Delay	Instant	0.01-1.00S		
	Turbo Engage Slope	1 deg/0.1S - 64 deg/0.1S			

\*If you set the cut-off voltage manually, please note the adjustable voltage is TOTAL cut-off voltage of the battery pack. In AUTO mode, the default cut-off voltage is 3.2V/S, for example, the cut-off voltage of a 4S battery pack is 3.2V\*4=12.8V in AUTO mode.

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## Profiles Preset

The users could preset and store 10 sets of profiles in the ESC. These data could be called out for application at any time without any special program setting. The user could also reset the profile according to his request. There is one factory default setting called Profile One which is used for 1/10 Short Course or Monster.

Setting Details of Profile One

### Profile One Setting Value (Default Value)

For 1/10 Short Course and Monster, 1/10 sensor brushless motor for Short Course, KV4600 4Poles, 2S LiPo

Section	Program Item	Description
General Setting	Running Mode	Forward/Brake
	Motor Direction	Normal
	Reverse Speed	25%
	Voltage Cutoff	Auto(3.2V/1S)
	ESC Overheat Protection	105°C/221°F
	Motor Overheat Protection	105°C/221°F
	Throttle Status	
Throttle Control	Punch Rate Switch Point	50%
	1st Stage Punch Rate	5
	2nd Stage Punch Rate	5
	TH Input Curve	Line
	Throttle Dead Band	0.080ms
	Throttle Status	
Brake Control	Drag Brake	10%
	Brake Strength	75%
	Initial Brake	=Drag-Brabe
	Brake Rate Switch Point	50%
	1st Stage Brake Rate	10
	2nd Stage Brake Rate	16
Turbo	Turbo Timing	0 deg
	Turbo Full TH Delay	0.10S
	Turbo Engage Slope	48 deg/0.1S

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## SPECIFICATION

Constant/Burst Current	120A/760A
Motor Compatible	Brushless Sensor or Sensorless ESC
Car Compatible	1/10 SC or Monster, 1/8 SC or Buggy
Motor Limits	6S NiMH or 2S LiPo KV≤6000
	7-9S NiMH or 3S LiPo KV≤4000
	10-12S NiMH or 4S LiPo KV≤3000
Resistance	0.0003ohm
Battery Cell Count	6-12S NiMH or 2-4S LiPo
BEC Output	6V@3A, Linear
Size	57x38x35mm (LxWxH)
Weight	76g (w/o wire)
FAN	6V@0.2A

## WARRANTY AND SERVICE

The TORO SC120 Brushless Sensored 120A ESC is guaranteed to be free from defects in materials or workmanship for a period of 90 DAYS from the original date of purchase (verified by dated, itemized sales receipt). Warranty does not cover incorrect installation, components worn by use, damage to case or exposed circuit boards, cross-connection of battery/motor power wires, overheating solder tabs, reverse voltage application, improper use or installation of external BEC, damage resulting from thermal overload or short-circuiting motor, damage from incorrect installation of FET servo or receiver battery pack, tampering with internal electronics, allowing water, moisture, or any other foreign material to enter ESC or get onto the PC board, incorrect installation/wiring of input plug plastic, allowing exposed wiring or solder tabs to short-circuit, or any damage caused by a crash, flooding or natural disaster. Because SKYRC has no control over the connection & use of the speed control or other related electronics, no liability may be assumed nor will be accepted for any damage resulting from the use of this product. Every SKYRC speed control & motor is thoroughly tested & cycled before leaving our facility and is, therefore, considered operational. By the act of connecting/operating speed control, user accepts all resulting liability. In no case shall our liability exceed the product's original cost. We reserve the right to modify warranty provisions without notice. This product is not intended for use by children under 14 years of age without the strict supervision of an adult. Use of this product in an uncontrolled manner may result in physical damage or injuries take extra care when operating any remote control.

For any repair or replace service, please contact your dealer in the first instance, who is responsible for processing guarantee claims.



Manufactured by  
SKYRC TECHNOLOGY CO., LTD.  
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