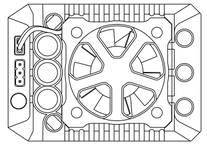
INSTRUCTION MANUAL

TORO TS150 PRO COMPETITION ADVANCED TIMING SYSTEM



For 1/8 Scale Car
Support Brushless Sensored and Sensorless Motor

INTRODUCTION

Thank you for purchasing SkyRC TORO TS150 PRO ESC. Please read the instruction manual thoroughly before use, as the operating instructions are designed to ensure you to quickly become familiar with its features and functions and make full use of the TS150 PRO ESC.

FEATURES

- Upgraded aluminum case design and support TURBO function.
- 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 Wi-Fi Module (Wi-Fi 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 and the thermal resistance.
- The circuit is managed by intelligent thermal management kernel algorithm which can improve driving skill and adjust the control time of the dead band. 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 works 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 or smart phone via Wi-Fi Module(SK-600075).

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.
- 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 6-18 cells NiMH or 2-6 cells LiPo battery.

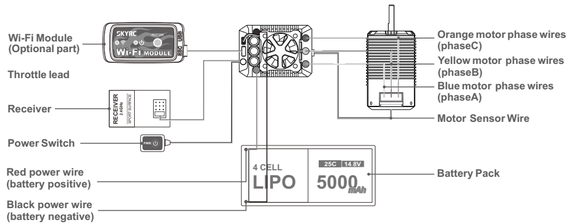
Note: We will not be responsible for any damage caused by non-compliance with above instruction.

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.
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

1) 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.
2) Connect Throttle lead to ESC and other end to the Receiver (Throttle Channel, Ch2).
3) Solder the motor and the ESC.
4) 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

1. 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.

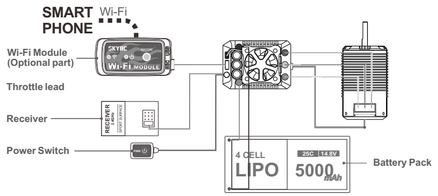
2. Explanation of LED Indicator

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

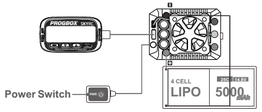
ESC PROGRAMMING

The ESC can be programmed by program box, PC or smart phone via Wi-Fi Module.

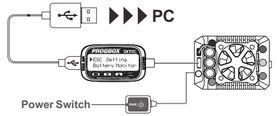
1. Smart Phone via Wi-Fi Module (optional part SK-600075)



2. Program Box (optional part SK-300046)



3. On PC.



Note: The program box can be used independently to program the ESC, but also can be regarded as a connector between ESC and PC when programming in PC.

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℃/185℉	105℃/221℉	125℃/257℉	Disable
	Motor Overheat Protection	85℃/185℉	105℃/221℉	125℃/257℉	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	Linear	Custom		
	Throttle Dead Band	0.002-0.150ms			
	Throttle Status				
Brake Control	Drag Brake	0-50%(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	Linear	Custom		

Section	Program Item	Description
Turbo Timing	0-10deg(with Progbox)	
	0-15deg(on PC)	

*If you set the cut-off voltage manually, please note the adjustable votage 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.

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 as per request.

Below are the recommended settings for SkyRC X8 PRO V2 motor with 2350KV, 4 Poles, 4S LiPO.

Recommended Setting for TS150 PRO with SkyRC X8 PRO V2 Motor

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℃/221℉
	Motor Overheat Protection	105℃/221℉
Throttle Control	Punch Rate Switch Point	50%
	1st Stage Punch Rate	5
	2nd Stage Punch Rate	5
	TH Input Curve	Linear
	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
	Brake Input Curve	Linear
Turbo	9deg	

Note: X8 PRO v2 motor timing is suggested to be 35 deg for better performance.

TURBO TIMING

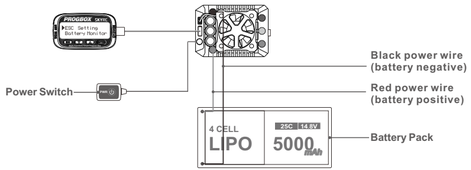
1. Turbo Setting with Program Box (Optional Part SK-300046)

Users could set the turbo timing directly by connecting TS150 PRO to SkyRC Progbox.

Refer to below procedures for setting:

1) Connect T150 PRO to SkyRC Progbox and power source (See picture1-1);
2) Click the power switch to initiate TS150 PRO, Progbox will automatically boot up;
3) Choose ESC setting, and go to TURBO timing on Progbox. Default Turbo timing is 0deg, click to choose suitable deg.

Note: Turbo timing degree makes no difference if the motor timing is zero. Only 10 degrees are available with SkyRC Progbox.



(1-1)

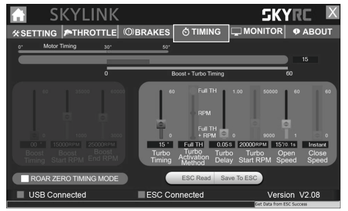
2. Turbo Timing with PC

To get full TURBO timing setting, it is highly recommended to connect TS150 PRO to your PC.

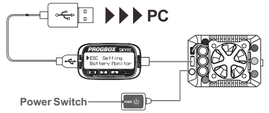
Refer to below procedures for setting:

1) Prepare TS150 PRO, ESC, sensor cable and micro USB cable①;
2) Download and install SkyRC USB link② onto your PC;
3) Finish the connection first, then connect the USB cable to your PC;
4) Launch the USB link software, successful connection displays:
5) Choose TIMING to change to preferred TURBO timing setting (See picture 2-1).

Note: ① Length of the micro USB cable should be approximately 30cm.
② Go to relative ESC website to download SkyRC USB link.



(2-1)



SPECIFICATION

Constant/Burst Current		150A/950A
Motor Compatible		Brushless Sensor or Sensorless ESC
Car Compatible		1/8 Buggy, Truck and Monster
Motor Limits	2-4S LiPo	KV≤3000, 2-6 Poles
	2-6S LiPo	KV≤2400, 2-4 Poles
Resistance		0.0002ohm
Battery Cell Count		6-18S NiMH or 2-6S LiPo
BEC Output		6V@5A
Size		58x41x38mm (LxWxH)
Net Weight		123g (with wire)
FAN		5V@0.3A

WARRANTY AND SERVICE

The TORO TS150 PRO Brushless 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
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7504-1094-01 Ver 1.0