XC500TF, XC550TF, XC550TF-MJ

Brushless Electronic Speed Controller

DUALSKY
ADVANCED POWER SYSTEMS ,

Track & Field ,

Instructions

Please read this manual carefully before you use the product, and retain the manual for future use.

1. Introduction

Now the brushless motor wave is rapidly sweeping through the field of R/C cars. We can hardly find any brushed motors in higher level competition. After the successful launch of the industry-leading Track & Field XC800TF competition ESC, Dualsky has developed XC500TF, XC550TF and XC550TF-MJ Electronic Speed Controls for 1/10 and 1/12 racing cars. The ESCs offer upgraded power output and control at a whole new level.

Thank you for choosing Track&Field ESC; please read these Instructions thoroughly and carefully before using the product, in order to avoid incorrect operation which may cause danger or damage to the product. These Instructions will help you learn more about the brushless system. The operation of this product differs a lot from the use of a brushed ESC, and it also differs remarkably from other brushless ESC's.

Please keep these Instructions for future use and carry them with you when racing to help with adjustments. Please do not use the product when the instructions are unavailable. Warranty information is at the rear of these Instructions, please read it carefully.

2. Usage Warning

- This ESC is not a toy, it should only be used by RC modelers above 14 years of age, or with adult supervision
- DO NOT apply voltage and/or current that may exceed the limits in specification of the ESC.

- Do NOT contact the ESC with water, oil or conductive liquids, as it may cause permanent damage to, and/or burn out the ESC. If it happens, stop using it immediately and try to make it dry.
- Do NOT cut off or change the original lead and connectors.
- Do NOT disassemble the product, especially Do NOT modify the components soldered on the PCB.
- Do NOT use any defective products (e.g. faulty motor), that may lead to more serious consequences, including a short-circuit in the ESC.
- Do NOT wrap the ESC with any material which will leads to poor heat dissipation, nor any metal material which could easily cause a short circuit.
- Do NOT connect the battery polarity in reverse, that will burn out the ESC.
- Do NOT solder one part over 5 seconds, or the component will be damaged due to overheating. A Soldering iron with 60W minimum power output is suggested.
- Do NOT contact the power connectors with any metal object; this may directly lead to a short circuit of the ESC or battery.
- Make sure the leads are fixed securely, vibration during operation will loosen the plugs, and also make sure there is no chance of contact with any rotating parts like gears or drive shafts.
- This product and its connected motor are a high power system. For safety reasons, we strongly suggest NOT installing the motor gear while adjusting the system. Keep hair, clothes and parts away from the power system and the rotating parts.
- Do NOT drive the unloaded system with full power, to avoid any damage to the bearings and any other rolling parts.
- Make sure the tyres are well bonded to the rims. Tyre trouble whilst running the car can also be very dangerous.
- Always disconnect the battery and ESC after operation. Even if the switch is off, there is still a small current in the system if the battery is connected, and after a longer time, it will lead to the battery being deeply discharged and may result in irreparable damage.
- Always turn on the remote control transmitter first, then switch on the ESC, to avoid signal interference which may cause mistakes to the system. Do the opposite when turning off the system (disconnect ESC, then power down the transmitter)

  Note: The Manufacturer will not be responsible for any damage caused by non-compliance with the above instructions.

3. Quick Start Guide

- First, place the ESC in the remote control car to determine the proper installation location. Mark the wires at the appropriate length. Under the premise of not touching any moving parts, make the wires as short as possible.
- Remove the ESC, solder the red and black input wires to the battery plug with

60W iron. Make sure there are no mistakes on polarity matching.

- Solder the ABC output wires to the corresponding phase of motor. The phase of ABC and the motor should be matched properly. (Note: The motor here is assumed to be a Track&Field series motor; different manufacturers may make the ABC in a different sequence.)
- Firmly fix the ESC on the model car's chassis with double-sided adhesive. Fix the switch to a convenient place, insert the throttle signal cable into the throttle channel of RX. Reaffirm the wire does not touch the moving parts.
- Remove the motor gear. Ensure the ESC switch is OFF, connect the ESC with the battery.
- Turn on the power for the transmitter and check the servo direction setting for the throttle channel. JR systems, NOR for throttle. Futaba systems, REV for throttle.
- Switch on the ESC power, test acceleration and deceleration of the motor and check the running direction. If all is correct, you can shut down the system and install the motor gear. If the motor direction is reverse, please change one of the phases wiring.
- If the testing as above was OK you can now drive your racing car. For the throttle calibration and advanced settings, please refer to the following chapters.

5. Features

Hardware

- ***ICE Core Technology***: Adoption of Low-resistance power panel and fulfilled pure copper heat sink to reduce its internal resistance and improve the heat transfer.

- ***New low-resistance power transistor:*** it can withstand a higher impact current, and uses kernel adopted patch technology, that enables the heat to dissipate quickly.

- ***Control Module Overhead:*** With the ICE Core technology and new MosFETs, XC500TF, XC550TF, XC550TF-MJ runs at a lower temperature and offers better heat dissipation. This allows the control module to be placed on the top of MosFETs, and take advantage of the precious space above ESC, providing a better option to arrange the LED lights and sensor-wire connector.

- ***Super mini design:*** extremely minimized volume, because of the patent technology of the overhead control module.

- ***Full Metal Jacket for XC550TF-MJ:*** good heat dissipation, more area for heat dissipation than common heat sinks. The use of fan cooling is often not required.

- ***Thermal overload protection:*** Provides the protection to the system if it becomes temperature overloaded, to ensure no damage to the system.

- ***Built-in programmable key switches***. With the top LED display, and motors 'tweet', setting is a simple operation.

- ***Support fan.*** The included external fan power connector means you can choose from the Dualsky improved fan products to further enhance the level of system power.

Software

- **Support Sportman rules.** The procedure was developed for the series of ESC which support 0 Timing default setting, and can be distinguished by the flashing LED. This allows players can focus attention on setting and operation of racing car.

- ***Intelligent Dual-mode driver.(Applicable for XC550TF and XC550TF-MJ)*** It is provided with both sensor and sensorless drivers and also can switch between each other automatically. There is no dragging in sensor launch, the power take up follows your fingers! If the sensor wire falls off during crucial competition, the sensorless ESC driver will ensure your race finishes smoothly and reliably.

- ***D^2RP Tech - Dualsky Digital Racing Profiles.*** After many tests, the Start Mode，Timing，Throttle Curve and even the frequency have all been optimized. We worked out several configurations for different applications that allows users to get optimal performance without the need to do time-consuming tests.

- ***AutoCell Tech:*** There is no need to set the battery type and voltage. The ESC optimizes the voltage protection based on the latest Lipo battery level.

- ***Dynamic Digital Timing Tech:*** According to the speed of the car, the ESC will adjust the electronic timing automatically to meet the requirements for torque under different speeds.

- ***Quick Restart Technology.*** In the 4-5cells NiMH race environment under some extreme cases, the heavy load will lower the battery voltage and can make it lower than the MCU working voltage, which results in the entire system restarting. If this happens, the Dualsky ESC is able to recover quickly, and enable the racer to be able to complete the competition successfully.

- ***Most simplified settings.*** Dualsky ESC presents basic default settings to users from our own experience and high level testing. The choice of four profile settings, makes operation very simple.

- ***Support Dualsky LINK.*** With the Dualsky LINK USB cable (sold separately), we will present more technical options for experienced users, so they can configure their own power system perfectly.

4. Specifications:

Parameters	XC550TF	XC550TF-MJ	XC500TF
P/N	**45618**	**45619**	**45617**
Dimensions(LxWxH)	34.5 x 33 x 15.5mm	34.5 x 33 x 15.5mm	34.5 x 33 x 15.5mm
utxruWeight [1]	38g	42g	38g
Rated current [2]	60A	65A	45A
Instantaneous current	400A	400A	300A
Resistance	0.0006 Ohm	0.0006 Ohm	0.0008 Ohm
Battery [3]	2S LiPo, 4-6 NiMH	2S LiPo, 4-6 NiMH	Up to 3S LiPo, 4-10 NiMH
B.E.C.	6V, 2A Linear	6V, 2A Linear	6V, 2A Linear
Sensored	Y	Y	N
Sensorless	Y	Y	Y
Power capacitor	Large capacity, low voltage(10V)	Large capacity, low voltage(10V)	Solid capacity, high voltage(16V)
Fan interface [4]	Y	Y	Y
Full metal jacket	**N**	**Y**	**N**
Programming	Key & USB LINK	Key & USB LINK	Key & USB LINK
Status LEDs	2	2	2
D^2RP	4	4	4
Sportman [5]	Y	Y	Y
Reverse function	Y [6]	Y [6]	Y [6]
Upgradable	Y	Y	Y
Thermal protection	Y	Y	Y
Wire size	14AWG	14AWG	16AWG
Wire Tabs	Y	Y	N
Batt/Motor Plug	DC3A/DB3F [7]	DC3A/DB3F	DC3A/DB3F
Motor limit	8.5T and higher	6.5T and higher	10.5T and higher, brushless motor only
Applicable models	1:10 & 1:12 on-road & off-road	1:10 & 1:12 on-road & off-road	STOCK Race, sportman
Motors for combo	8.5T, 10.5T, 13.5T, 17.5T, 21.5T	6.5T, 7.5T, 8.5T, 10.5T, 13.5T, 17.5T, 21.5T	Sensorless only, 10.5T, 13.5T, 17.5T, 21.5T

*1 The weight exclude the wires and capacitor.

*2 Current rating for full throttle operation with 10KM/h airflow over the ESC in 5 minutes.

*3 Up to 3S LiPo if upgrade a HV capacitor.

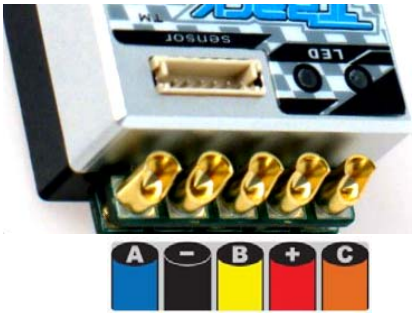
*4 The optional fan can be controlled by switch, voltage is not regulated.

*5 This will eliminate any timing advance speed controls you might have.

*6 Reverse function could be enabled/disabled via USB LINK.

*7 Battery Plug: Dualsky DC3 heavy duty Plug. Motor Plug: DB3 Female x 3 Pcs.

7. ESC installation



- the order of input and output wires: ESC has been soldered with different colors of input and output wires in the factory. If you need to replace input / output wires, please be sure to follow the picture carefully.

- Battery: the input wire of ESC can be soldered to the terminals of battery directly. The preferred method is to add a plug which matches the output wire of battery. In order to ensure optimal system performance, the plug's continuous rated current capacity should be greater than 40A. We recommend the Dualsky DC3 Heavy Duty plug. In the current market for competition, it is popular to use a battery with female sockets 4MM x 2 on the output wires. For this battery system, you have to solder 2pcs male plugs of same kind (4mm) on the input wires of the ESC. They possess a higher conductivity (lower resistance), but it is also very easy to mistake the positive and negative terminals when connecting the battery to the ESC, which will burn out the ESC. So please check the polarity carefully.

- Brushless Sensorless motor: through the ABC three power wires, the ESC delivers power to the sensorless motor. The combination is very simple. ABC power wires can be soldered directly to the motor terminals with a 60W electric soldering iron. The ABC power wires can also be soldered to plugs which match the motor outlet plugs, and the rated current capacity of the plugs should be greater than 40A. We recommend the use of a Track & Field original motor, and make it A-A, B-B, C-C. The phase of other brands motors may be different, which will result in the motor rotating in reverse. If reverse rotation happens, you can exchange any two poles to change the direction of rotation.

- Brushless Sensed motor: There is one more sensor wire between the sensed motor and ESC, this is the only difference from the connection of a sensorless motor. It makes the ESC drive the sensed motor through the Hall signal, and greatly enhances low-speed driving torque and acceleration. The XC550TF and XC550TF-MJ have the ability to work in two modes, and can automatically identify the mode of sensed or sensorless. Please use Track & Field original motors or motors that are IFMAR approved. Otherwise, in the sensed mode, it may lead to the motor or ESC working incorrectly or burning out. Sensor wires are consumables; they may be broken or have intermittent connections due to a poor working environment and possible vibration. We recommend to use

high-quality original Dualsky sensor wires, and replace them after every 20 runs.

- Brushed motor: the hardware of XC500TF,XC550TF,XC550TF-MJ has the ability to drive a brushed motor, but the software does not support it. This allows a better optimization of the brushless function which gives you better performance.

- Remote Controller - XC500TF,XC550TF,XC550TF-MJ supports the main remote controllers currently in the market. It works perfectly with 2.4GHZ systems. Insert the ESC signal cable into the Throttle channel of RX. For JR, the throttle channel is set to NOR; for Futaba, throttle channel set to REV. Meantime, the ESC has the capacity of continuous power supply at 6V 2A, that can supply the power to a current high-torque digital servo for steering function.

8. Applicable motors

The motor must comply with the standard of IFMAR. The warranty will be void for the ESC damaged due to using a motor which does not meet the standard of IFMAR. (sensor wiring)

Different motor gear ratios, the choice of different modes of operation and even different tires, venues, etc. all will lead to different heat of the ESC. Therefore, please follow the suggestions for the motor gear ratio in Instructions and set the mode of ESC to be lower. ESC's temperature protection mode is turned on originally. If you have turned it off through USB LINK, please turn it on again when you use it for new motor.

9. ESC setting

a) Enter into operation mode

The ESC will enter into operation mode under three circumstances: I) ESC is turned on without touching the buttons of the switch. II) at the end of throttle calibration. III) quit from the running programming mode.

The ESC will sound a longer tweet, meaning the ESC has entered operation mode. The ESC has two operation modes of sensed and sensorless, at any time the system will automatically select the operating mode, with the priority of sensed mode being higher than sensorless mode. Note: XC500TF is sensorless ESC only.

b) Indicator LED meaning

There are two LED indicator lights on the ESC, one red and one green. The red light indicates an error and failure during working time; for details please refer to “Trouble shooting". Without abnormality, the red light is in the off state. Green light indicates throttle state: When the throttle is at Neutral, the green light is off (except Neutral Brake @100% when the green light will be on) ; when the throttle is in forward, the green light flashes; when braking, the green light will be half bright; when in full throttle

forward or maximum braking, the green light stays on.

In the programming mode, the red light indicates the setting item/function, while the green light indicates the content of the setting item/function.

- **ESC/Radio Throttle Calibration**

Why should you do the throttle calibration? It is good to use the ESC and radio control more efficiently. If you do not calibrate them and use them blindly, it may lead to the system not performing properly, and may cause erratic performance or a dangerous situation.

When should you do the throttle calibrating?

- with the first use of ESC
- if you replace/change the radio control or change the model data needed to calibrate the radio control and ESC
- If you use the Dualsky LINK to update the ESC software

First step:

First, turn on the transmitter, and do not connect ESC and batteries at this moment. The neutral point (Sub Trim) and fine-tuning (Trim) set to 0, throttle travel (ATV / End Point) set to plus or minus 100%, throttle sensitivity set to 0%, close the ABS function. If it is a simple radio control transmitter you only need to set fine-tuning (trim) to 0, and the throttle travel to 100%. Be sure to remove the pinion gear from the motor.

Note: With Futaba systems, throttle channel should be set to REV.

Second step: Keep the transmitter ON, connect the battery to the ESC, press and hold on the SET button, switch ON at this moment. The red light will flash immediately–and the motor will tweet synchronously, it means the ESC has entered into throttle calibration mode; release the SET button.

Third step:

Now the ESC needs to record the three data points of neutral point, the highest point and lowest point:

- with the throttle at the neutral point, press the SET button one time, green light will flash one time indicating that it has recorded the neutral point data;
- with the throttle at full-throttle point, press SET button one time, green light flashes 2 times indicating that it has recorded the highest point data;
- with the throttle on the max braking point, press SET button one time, green light flashes 3 times indicating that the lowest point data has been recorded;

The red light stays off during this process, green light flashes and the motor tweet synchronously.

Fourth step: the ESC will quit from the calibration mode automatically after 3

seconds, and it goes into working state (operation mode)

- **Running Programming**

Differing from throttle calibration, running programming operates entirely through the ESC itself, and does not need the involvement of the transmitter. In order to ensure security, the transmitter is suggested to be ON (but not used/controls not moved).

How to enter the mode of Running Programming? Turn on the ESC, allow it enter the operation mode, then press the SET button and hold it more than 3 seconds. The red light starts flashing, indicating that the ESC has entered into the running programming mode.

How to choose the setting item? Under programming mode, red light flashing means the setting item, flash one time, on behalf of Item1; flash two times, on behalf of Item2, and so on. Red light will flash in turn automatically to indicate different setting items. When you see the setting item you want to enter, press the SET button, the red light is off, the green light starts flashing, indicating you have entered into the setting item, then you can change the value. If you have not chosen any item by the last flashing, the ESC will quit the programming mode automatically.

How to check the current value of the setting items? → after entering into the setting item, the times of green light flashes first time represents the current setting value, then the green light will flash circularly to indicate different setting values.

How to change the value of setting items? When you see the times of green light flashes for your desired settings, press the SET button, and the value is automatically saved. Meantime return to setting options, the green light will be off, and the red light starts flashing.

How to quit from the running programming mode? Wait for the red light to flash the last setting item and the ESC will automatically quit from programming mode. Or, you can simply switch off and then switch on to return to operation mode.

Note: when the red and green light flashes, the motor will tweet synchronously.

10. Meaning of setting items

D^2RP – Dualsky Digital Racing Profiles

Operating parameters are composed of the throttle curve, start mode and timing advance. We need to consider the applied situation and power system features to

arrange them accordingly. It is sometimes difficult and time-consuming for users to determine these settings. Dualsky joined with top drivers and have done extensive testing in many different conditions, and these settings are shown as ***D²RP***, and are very easy to use and understand (see the table below). Of course, advanced racers can make their own settings that may be more suitable using the optional Dualsky USB LINK.

B004 - Sports for XC500TF, XC550TF, XC550TF-MJ

D²RP Dualsky Digital Racing Profiles	**Profile 1 Sportsman**	Profile 2	Profile 3 Modified	Profile 4 STOCK
Throttle Profiles	**"+ EXP"**	Linear	"- EXP"	Linear
Start Mode 启动模式	**9**	7	8	9
Timing Advance 进角	**1**	3	4	6

- Throttle Profiles: -EXP means at the beginning throttle is gentle, Linear means original linear output, + EXP means at the beginning throttle is rapid and fierce.
- Start Mode is divided into a total of 9 grades, the higher grade, the greater burst of power at the start. It is not always correct for burst power that greater is better. It also depends on the tire grip and battery characteristics.
- Timing advance is divided into 8 grades. The higher timing advance will help improve the output power, but also makes the motor run hotter. Applied with the latest dynamic variable timing technology, it can enhance the system efficiency significantly under high and low speed dynamic conditions. The first grade timing advance is 0 degree. The ESC's green LED light is flashing when the throttle at the neutral point to remind user the timing advance is 0 degree at the moment.(Comply with Sportman competition rules)
- These profiles were preset for D²RP, users can set them individually by Dualsky LINK.
- ***D²RP*** programming settings and default values may be changed without notice.

Auto Cell

This ESC supports the popular LiPos (default), NiMH or even LiFe batteries that are currently in the market, and it is able to judge the number of battery cells automatically, protecting the battery from over-discharging.

Neutral Brake

Neutral Brake can adjust the brake force when the throttle is in neutral. Usually, for off-road cars, we set the brake to be of a lower force. While for the Modified cars, we will set it higher due to the weakness of motor braking force. (lower wind motor typically)

Brake Amount

Brake amount shows the braking force when the throttle is in the maximum braking position. Braking force is linear, before it reaches the maximum braking, the brake force

will increase in linear increments. Too small or too large a braking force will affect performance in turning and the speed of car. Please adjust according to your driving style.

11. Table of programming items and values.

Programming Items	1	2	3	4
D^2RP Dualsky Digital Racing Profiles	***Profile 1**	Profile 2	Profile 3	Profile 4
AutoCell	None	*** LiPo**	NiMH	LiFe
Neutral Brake	0%	*** 10%**	15%	20%
Brake	25%	*** 50%**	75%	100%

- The bold text is the ESC default value.
- Custom settings are for the user to define, this value can be set from Track & Field Firmware on a PC connected through the optional Dualsky USB LINK.

12. Troubleshooting Guide

Trouble: The system does not work, the red light flashes regularly every 5S, motor tweet synchronously
Solution: This is because ESC is connected to power, but no radio signal is present. Check that the transmitter is turned on and the servo lead from the ESC is correctly plugged in to the receiver.

Trouble: The system does not work or runs but stop working, the red light continues flashing
Solution: battery pack voltage is too low. The battery voltage is lower than the current set minimum battery voltage. Check if the battery pack is normal, if it has been charged enough.

Trouble: Stop in running, red light repeat 2 times continuous flashing
Solution: ESC thermal overload protection, reduce load appropriately (gear ratio) wait for cooling and then run the ESC again.

Trouble: The system can run, but the red light stays on.
Solution: The system switches from sensed mode to sensorless mode automatically. First, check whether the sensor wire is off or damaged. Second, check whether the motor sensor is damaged.

13. Environment information

The crossed-out wheeled bin means that within the European Union the product must be taken to separate collection at the product end-of-life. Do not dispose of these products as unsorted municipal waste

14. Repair procedures/ Limited Warranty

English： Dualsky Track&Field speed controllers are warranted to the original purchaser for six months from the date of purchase against defects in material and workmanship. During this period Dualsky will repair or replace, at our discretion, the defective component.

This warranty does not apply to improperly installed, handled, abused, damaged in crash, nor to any unit which has been repaired or altered by unauthorized agencies. Under no circumstances will the buyer be entitled to consequential or incidental damages. This limited warranty gives you specific legal rights; you may have other rights which vary from country to country.

This warranty applies only to Dualsky products purchased from authorized dealers/distributors.

15. Copyrights and Company Inforrmation

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