

830mm Super Scorpion Jet

Operating Manual



Specifications

Wingspan	830mm (32.7in)
Overall Length	960mm (37.8in)
Flying Weight	1020g (36.0oz)
Wing Area	15.6dm ² (241.8 in ²)
Wing Load	65.38g/dm ² (0.15oz/in ²)
Radio Controls	4 Channel



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WARNING

 **WARNING:** Read the ENTIRE instruction manual to become familiar with the features of the product before operating. Failure to operate the product correctly can result in damage to the product, personal property and cause serious injury.

This is a sophisticated hobby product and NOT a toy. It must be operated with caution and common sense and requires some basic mechanical ability. Failure to operate this product in a safe and responsible manner could result in injury or damage to the product or other property. This product is not intended for use by children without direct adult supervision.

This manual contains instructions for safety, operation and maintenance. It is essential to read and follow all the instructions and warnings in manual, prior to assembly, setup or use, in order to operate correctly and avoid damage or serious injury.

Safety Precautions and Warnings

As the user of this product, you are solely responsible for operating in a manner that does not endanger yourself and others or result in damage to the product or the property of others. This model is controlled by a radio signal subject to interference from many sources outside your control. This interference can cause momentary loss of control so it is advisable to always keep a safe distance in all directions around your model, as this margin will help avoid collisions or injury.

Age Recommendation: Not for children under 14 years. This is not a toy.

- Never operate your model with low transmitter batteries.
- Always operate your model in an open area away from cars, traffic or people.
- Avoid operating your model in the street where injury or damage can occur.
- Never operate the model in the street or in populated areas for any reason.
- Carefully follow the directions and warnings for this and any optional support equipment (chargers, rechargeable battery packs, etc.) you use.
- Keep all chemicals, small parts and anything electrical out of the reach of children.
- Moisture causes damage to electronics. Avoid water exposure to all equipment not specifically designed and protected for this purpose.
- Never lick or place any portion of your model in your mouth as it could cause serious injury or even death.



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Safety

Lithium Polymer (Li-Po) Battery Warning

CAUTION: Always follow the manufacturer's instructions for safe use and disposal of batteries. Fire, property damage, or serious injury can result from the mishandling of Li-Po Batteries.

- By handling, charging or using a Li-Po Battery you assume all risks associated with lithium batteries.
- If at any time the batteries begin to swell, or balloon, discontinue use immediately! Charging or discharging a swelling or ballooning battery can result in fire.
- Always store the batteries at room temperature in a dry area to extend the life of the battery. Always transport or temporarily store the battery in a temperature range of 40-120F. Do not store the battery or model in a car or in direct sunlight. If stored in a hot car, the battery can be damaged or even catch fire.
- Never use a Ni-Mh Charger to charge Li-Po Batteries. Failure to charge the battery with a Li-Po compatible charger may cause fire resulting in personal injury and property damage.
- Never discharge Li-Po Cells below 3V.
- Never leave charging batteries unattended.
- Never charge damaged batteries.

Charging the Flight Battery Warning

- Use a battery charger that is designed to safely charge the Li-Po Battery. Read the charger instructions carefully before use. When charging the battery, make certain the battery is on a heat resistant surface. It is also highly recommended to place the Li-Po Battery inside a fire resistant charging bag readily available at hobby shops or online.

FMS Super Scorpion introduction

Thanks for purchasing the FMS super scorpion EDF Jet. We would like to make a brief

introduction before you take it out to fly.

The FMS Super Scorpion has a larger 2845-2750KV motor, 70A Heavy duty ESC, digital metal gear servos, and runs on a 4S 2200mAh LiPo pack. Yes, this Super Scorpion is extremely fast and agile. It has fantastic speed and great flight characteristics right out of the box. The 70mm Super Scorpion EDF jets are some of the most entertaining jets out there and this one tops them all. Built from durable EPO foam and using nylon hinges which are superior to a foam hinge make it soar like a rocket. Hand launching and belly landing continues to be a breeze.

One year in the making, the FMS Super Scorpion features the following innovations:

- Pre-assembled fuselage, no glue required
- Speeds in excess of 120MPH
- High visibility paint scheme
- Ball-joint pushrods prevent any play in the control surfaces
- Highly efficient 12-bladed fan
- Large battery bay for extended flight times.

Contents of Kit

Before assembly, please inspect the contents of the kit. The photo below details the contents of the kit and labels the major components thru for your convenience. If any parts are missing or defective, please identify the name or part number (refer to the spare parts list near the end of the manual), then contact your local shop or email us.

FMS Team Product Support

3/F, Building B, 3rd Industry Zone, Matigang, Dalingshan Town,
Dongguan City, P.R.C.

Phone: 0086-769-86976655

Email: Support@fmsmodel.com



Screws bags details

A (PA 2.6x40mm)

B (PM 3.0x32mm)(PA3.0x15mm)

C (PM 3.0x32mm)(PA2.6x25mm)

Spare Parts List

Replacement parts for the FMS Scorpion are available using the order numbers in the spare parts list that follows. The fastest, most economical service can be provided by your hobby dealers or mail-order company.

FTZ-001	Fuselage
FTZ-002	Main wing set
FTZ-003	Vertical Stabilizer
FTZ-004	Horizontal Stabilizer
FTZ-005	Canopy
FTZ-006	Cowl
FTZ-007	Linkage Rod
FTZ-008	Decal
FTZ-009	Friction Disc

FZ-010
Ducted fan
Motor
ESC
SER9MGD

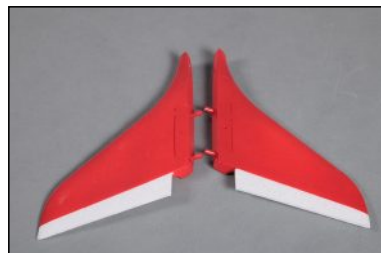
Screw Set
70mm Ducted fan
2845-KV2750 motor
70A ESC
9g digital metal gear servo positive



FZ-001



FZ-002



FZ-003



FZ-004



FZ-005



FZ-006



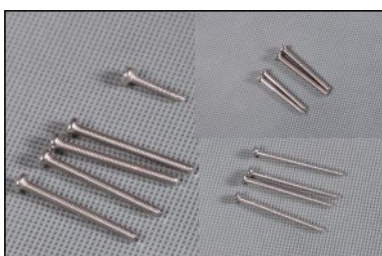
FZ-007



FZ-008



FZ-009



FZ-010



70mm Ducted fan



2845-KV2750



ESC



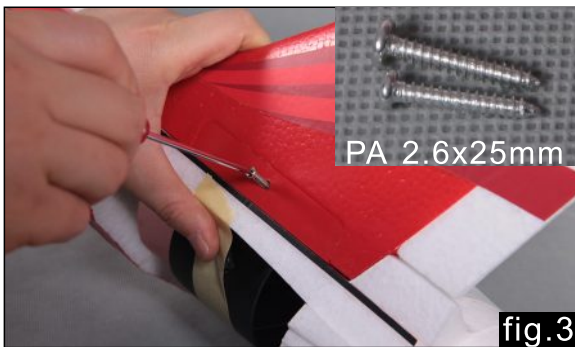
FMSSER9MGD

Install the horizontal stabilizer and vertical stabilizer

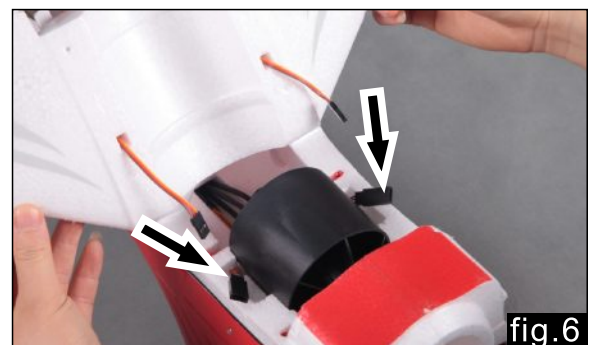
- 1) Insert the vertical stabilizer into its slot. (fig.1)
- 2) Find the screws as indicated in (fig. 2), secure the vertical stabilizer onto the fuselage as shown above. (PM 3.0x32mm for front)(PA2.6x25mm for rear)



- 3) Repeat for the other half of the vertical stabilizer.



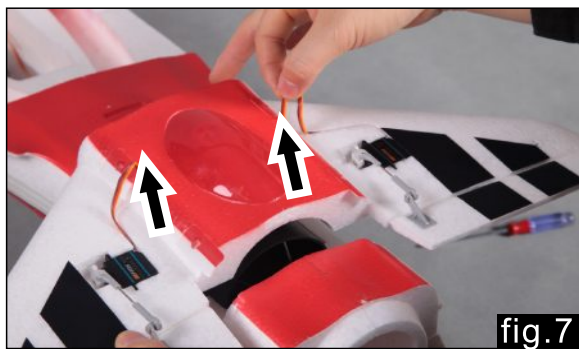
- 4) Remove the tape which temporarily secures the EDF unit for shipping. (fig.5)
- 5) Connect the elevator servos to the servo harnesses within the aircraft fuselage. (fig.6)



- 6) The servo harnesses should be wired through the fuselage as shown. (fig.6.1)



- 7) Raise the servo leads for the horizontal stabilizer. (fig.7)
- 8) Wire the harnesses through their respective slots prior to mating the horizontal stabilizer to the fuselage. (fig.8)

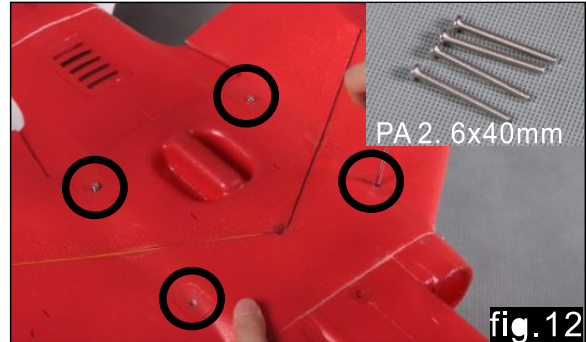
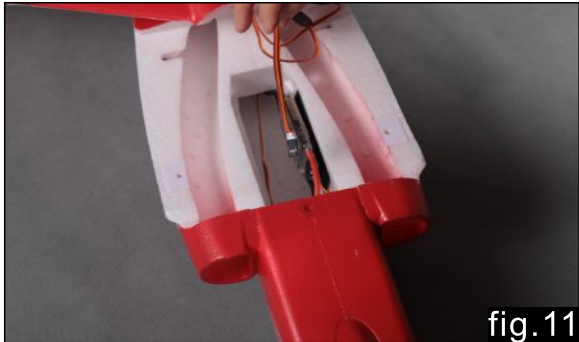


- 9) Use four screws to lock the horizontal stabilizer to the fuselage. (fig.9)
(PA 2.6x40mm)
- 10) Connect the Y-harness to the two aileron servo leads on the wing. (fig.10)

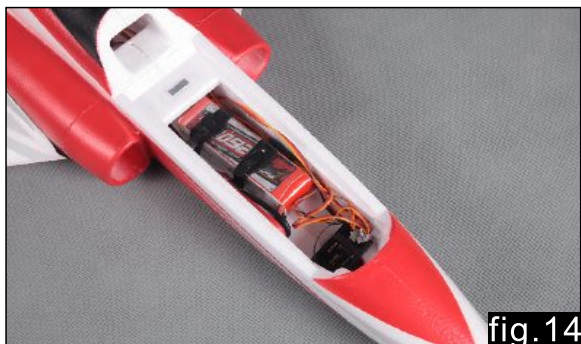


Install the main wing set

- 11) Wire the Y-harness through the fuselage towards the nose of the aircraft. (fig.11)
- 12) Secure the wing to the fuselage with five screws as shown above. (fig.12) (fig.13) (PA 2. 6x40mm)(PA3.0x15mm)



- 13) Insert the battery into the battery compartment as shown (fig.14). Secure the battery in place with the hook and loop strap.
- 14) Assembly complete. (fig.15)



Control Surfaces

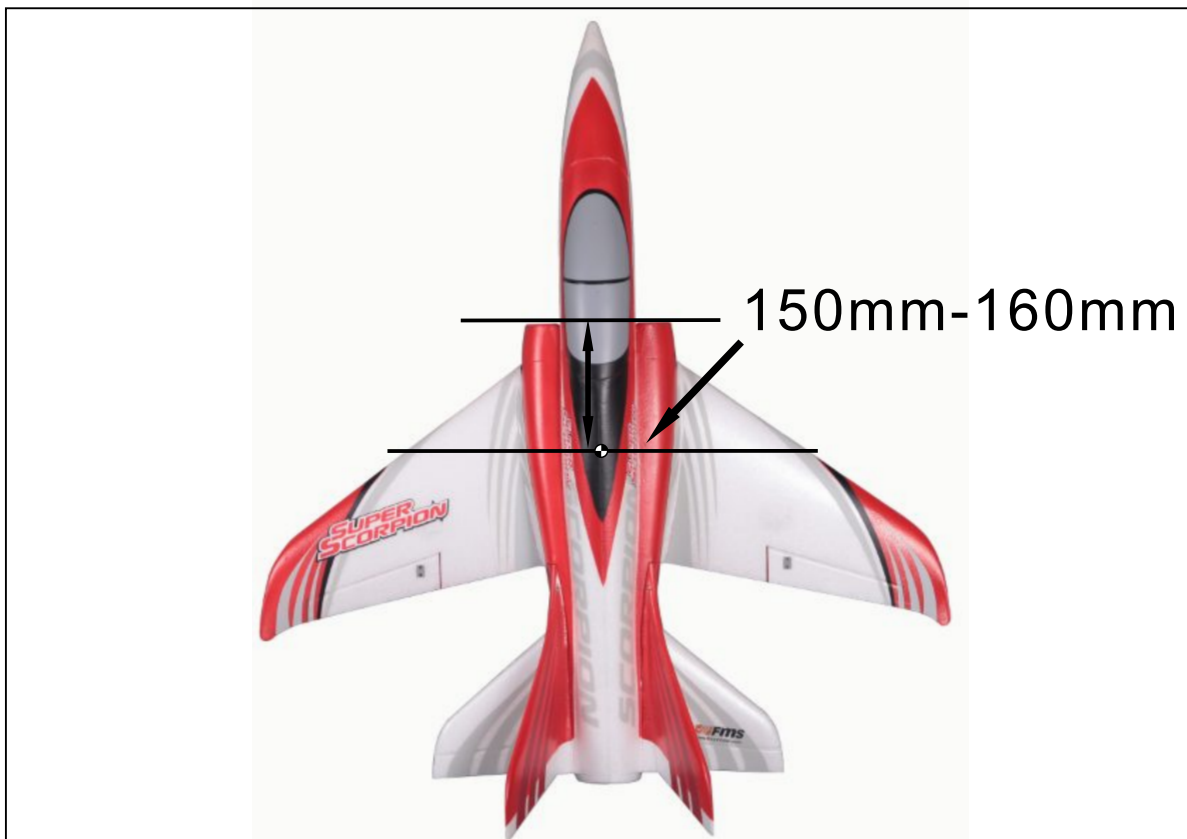
Center Adjustment (trim)

1. Follow all safety precautions as outlined in this manual and your transmitter manufacturer's manual, including setting the throttle to the off position.
2. Turn on the transmitter and plug in the ESC battery.
3. Center all the trim controls on the transmitter.
4. Look at all the control surfaces to determine which ones need adjustment.
5. Unplug the ESC battery and turn off the transmitter before attempting any adjustments.
6. Adjust clevises as necessary to center control surfaces to their neutral position.
7. Repeat steps 1 thru 4 to verify adjustments.
8. If more adjustment is required, repeat steps 5 and 6 until process is completed.

Center of Gravity

Before balancing your model, make sure that it is completely assembled, the battery is installed. The recommended center of gravity (CG) for your model is 150-160mm from the wings leading edge (measured at point of contact with fuselage). Lightly mark the ideal center of gravity position on the top surface of the wing on each side of the fuselage. Support the plan inverted at the marks made on the top of the wing with your fingers or a commercially available balancing stand. It should be level or just slightly nose down. Adjust the position of the battery as necessary to achieve it.

CENTER OF GRAVITY(C.G.)



Flight Safety

1. Do not fly in strong winds or bad weather.
2. Never fly in crowded areas near people, cars, buildings, power lines, airports, etc. The plane can travel at high speed so choose a wide open space and give yourself plenty of room to operate. Remember you are responsible for the safety of others.
3. Not recommended for children under 14 years of age. Children under 12 must have adult supervision.
4. Never use or leave the battery charger in a wet environment.
5. Keep the model away from heat which can easily destroy the foam structure of the plane, the electronics, or the battery.
6. Do not attempt to catch the model while flying.
7. Stay clear of the propeller at all times, even when it is not moving because the transmitter could easily be bumped and cause the propeller to move without warning.
8. Never leave the model unattended with a battery installed. Injury could be caused by children or unaware adults turning on the transmitter.
9. When preparing for flight, turn the transmitter on and ensure the throttle is off before connecting the battery.

Daily Flight Checks

Prior to first flight:

1. Check condition of major components. Ensure wing, tail, motor, are secure.
2. Check condition of ducted fan
3. Check all control surface actuating hardware (linkages, screws, nuts, bolts, etc.)
4. Check the voltage on the transmitter and ESC batteries.
5. Perform a range test on the radio equipment.
6. Check control surfaces for proper direction and throw.
7. Check center adjustment of each control surface.

Post flight:

1. Disconnect ESC battery
2. Turn off transmitter
3. Remove ESC battery from model.
4. Recharge ESC battery.
5. Store ESC battery away from model in fire proof container.
6. Repair or replace any damaged parts on the model airplane.

Maiden Flight Tips

If this is your first RC Model Airplane, you may want to seek the help of an experienced pilot to assist you on the first flight. You can usually find people that are happy to assist at a local RC Club. You can also inquire at your local hobby shop. Often hobby shop employees will know where to go locally for flight assistance.

Whether you are a new or experienced pilot, the maiden flight for any new RC model can often be challenging. Even if you have followed all the instructions exactly and adjusted all the control surfaces to their neutral positions, the model will likely need to be “trimmed out”. Once you have the plane in the air, immediately climb to a safe altitude. Many RC Pilots will tell you that a safe altitude is “three mistakes high”. Reduce throttle to half. Put the plane on a straight and level trajectory. While trimming, hold your transmitter up high near eye level; this will make it easier to see your plane and your trim settings at the same time. The goal of trimming the plane is to adjust it so it will maintain straight and level flight with no control inputs. For example, if the plane climbs, add down elevator trim. If it dives, add up trim. You may also need to adjust rudder trim (and aileron trim if applicable). Make as many passes as necessary, putting the plane on a straight and level trajectory and making required trim corrections until the plane flies straight and level.

Monitor and limit your flight time using a timer (in your transmitter if available, or a wrist watch). To avoid a dead-stick landing on your first flight, conservatively set the timer to four minutes. When you hear the alarm, land your plane as soon as possible.

Routine Maintenance

Store Li-Po batteries at room temperature in a dry environment in a fire proof container. Periodically check the cell voltage. Do not let the voltage drop below the manufacturer's recommended minimum storage voltage (typically around 3.3V per cell).

Repairs to foam should be made with foam safe adhesives such as hot glue, foam safe CA, and 5 min epoxy.

Troubleshooting Guide

Troubleshooting Guide		
Problem	Possible Causes	Solution
Receiver will not bind to transmitter	Transmitter is too close to the receiver Transmitter or receiver is too close to a large metal object ESC battery or Transmitter battery is not charged Bind plug installed incorrectly in receiver	Move transmitter a few feet away from receiver and then unplug and reconnect the ESC battery Move transmitter a few feet away from receiver and then unplug and reconnect the ESC battery Charge ESC battery or Transmitter battery Follow manufacturer's instructions for binding and re-bind receiver
Control Surface(s) will not move	Transmitter/receiver not bound correctly Incorrect model selected on transmitter Loose connection Control linkage, clevis, horn not connected, binding or damaged Servo damaged ESC battery or Transmitter battery is not charged	Re-bind receiver to transmitter per manufacturer's instructions Select correct model on transmitter Check battery, ESC, and receiver connections Check all control linkage connections Replace servo Recharge/replace batteries
Control Directions reversed	Transmitter servo direction settings are reversed	Perform Control Surfaces Direction Test and reverse transmitter settings as necessary
Model responds to all controls except throttle	Throttle channel is reversed Throttle is not at idle or trim is too high on transmitter	Reverse throttle channel setting on transmitter Move throttle stick and trim to lowest setting
Motor pulses then loses power	Low ESC battery charge or damaged battery Battery "C" rating too small	Re-charge/replace ESC battery Use proper battery
Excessive noise or vibration at high throttle	Damaged propeller or motor Propeller is not balanced	Replace damaged part Replace defective propeller
Model underpowered or has a reduced flight time	Propeller installed backwards Propeller rotation direction incorrect ESC battery charge is too low or battery damaged	Install propeller with numbers facing towards you Perform Control Surfaces Direction Test and reverse transmitter settings as necessary Recharge/replace battery
Model will not climb	Elevator trim not adjusted correctly	Adjust elevator trim
Model keeps turning in same direction	Rudder trim not adjusted correctly Aileron trim not adjusted correctly	Adjust rudder trim Adjust aileron trim
Model is difficult to control	Wing or tail damaged Center of Gravity incorrect Inadequate or excessive control throw settings	Repair/replace as necessary Check center of gravity and correct as necessary. Make sure battery is secure (not moving in flight) Verify control throws are at recommended settings

Direction Check

Turn on your transmitter and receiver. Viewing the model from the rear, move the controls on the transmitter per the instructions that follow and verify the control surfaces are responding in the appropriate direction. You may have to reverse the direction of one or more channels on your transmitter to correct any issues.

1. Move the right joystick down towards the bottom of the transmitter. The elevator should move up. Move the joystick towards the top of the transmitter. The elevator should move down.
2. Move the right joystick to the right. The right aileron should go up. The left aileron should go down. Move the joystick to the left. The right aileron should go down. The left aileron should go up.

Travel Settings (throw)

Adjust the throw by moving the clevis position on the control surface horns. A commercially available gauge is helpful in this task though not required. If you have a single rate transmitter, adjust throws to low rate settings. If you have a dual rate transmitter, adjust the throws to achieve high rate settings.

Aileron Control Throw Setting (low rate)

7 mm up/down (fig. 18). Pictures are for reference only on how to use the gauge.

Elevator Control Throw Setting (low rate)

6 mm up/down (fig.19)



Note: Measure the throw (deflection) at the widest point (chord) of each control surface.

Dual Rates and Exponential Recommendations

On many transmitters, dual rates can be setup for aileron, elevator, and rudder channels. If your transmitter is capable, designate a switch on the transmitter to change between a low and high rate of servo travel for each channel. Low rates are for normal flying. High rates are for extreme aerobatics.

To use dual rates, the control surface throw settings should be set to equal the high rate settings. When the transmitter switch is in the high rate position, the control surface will travel 100%. When the transmitter switch is in the low rate position, the servo will travel less than 100% (a percentage that you determine) to make the control surface throw equal to the low rate deflection.

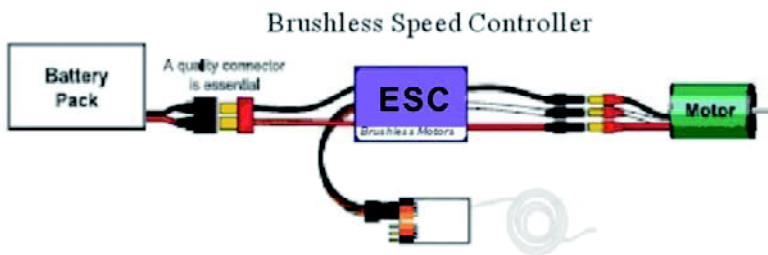
Aileron high rate 10 mm up/down
Elevator high rate 9 mm up/down

ESC instruction

Wires Connection:

The electronic speed controller can be connected to the motor by soldering directly or with high quality connectors. Always use new connectors, which should be soldered carefully to the cables and insulated with heat shrink tube. The maximum length of the battery pack wires shall be within 6 inches.

- Solder controller to the motor wires.
- Solder appropriate connectors to the battery wires.
- Insulate all solder connectors with heat shrink tubes.
- Plug the "JR" connector into the receiver throttle channel.
- Speed Controller Red and Black wires connects to battery pack Red and Black wires respectively.



Specification:

Model #	Cont. Current(A)	Burst Current (A) 10s.	Battery cell NiXX/Lipo	Weight (g)	BEC Output	Size (mm) W*L*H	User Program
6A	6A	8A	5-10 NC \ 2-3 Lipo	5	5volts / 2amps	13 x 21 x 4	yes
12A	12A	16A	5-12 NC \ 2-4 Lipo	8	5volts / 1amps	21 x 22 x 4	yes
20A	20A	30A	5-12 NC \ 2-4 Lipo	18	5volts / 3amps	13 x 21 x 4	yes
30A	30A	40A	5-12 NC \ 2-4 Lipo	30	5volts / 3amps	23 x 43 x 6	yes
35A	35A	45A	5-12NC \ 2-4 Lipo	47	5volts / 4amps	28 x 38 x 8	yes
40A	40A	50A	5-12 NC \ 2-4 Lipo	44	5volts / 3amps	28 x 38 x 8	yes
45A	45A	55A	5-12 NC \ 2-4 Lipo	42	5volts / 3amps	31 x 58 x 11	yes
50A	50A	70A	5-18NC \ 2-6 Lipo	45	5.5volts / 5amps	31 x 58 x 11	yes
60A	60A	70A	5-12NC \ 2-4Lipo	50	5.5volts / 3amps	36 x 50 x 8	yes
65A	65A	85A	5-18NC \ 2-6Lipo	58	5.5volts / 5amps	30 x 56 x 11	yes
70A	70A	75A	5-12NC \ 2-6 Lipo	56	5.5volts / 5amps	34 x 52 x 14	yes
85A	85A	100A	5-18NC \ 2-6Lipo	63	5.5volts / 5amps	34 x 52 x 14	yes

Features:

- ◆ Extremely low internal resistance
- ◆ Super smooth and accurate throttle linearity
- ◆ Safety thermal over-load protection
- ◆ Auto throttle shut down in signal loss situation
- ◆ Supports high RPM motors
- ◆ Power arming protection (prevents the motor from accidentally running when switched ON)
- ◆ New advanced programming software

Our ESC allows you to program parameters to fit your specific needs:

Our ESC allows you to program parameters to fit your specific needs:

1. User programmable brake setting (we recommend using brake for only folding props applications)
2. User programmable battery type (LiPo or NiCd/NiMh)
3. User programmable low voltage cutoff setting
4. User programmable factory default setting restore
5. User programmable timing settings (to enhance ESC efficiency and smoothness)
6. User programmable soft acceleration start ups (for delicate gearbox and helicopter applications)
7. User programmable governor mode (for helicopter applications)
8. User programmable motor rotation (clockwise\counterclockwise)
9. User programmable switching frequency
10. User programmable low voltage cutoff type (power reduction or immediate shutdown)

Settings:

1. Brake: ON/OFF

* ON-Sets the propeller to the brake position when the throttle stick is at the minimum position (Recommended for folding props).

* OFF-Sets the propeller to freewheel when the throttle stick is at the minimum position.

2. Battery type: LiPo or NiCad/NiMh

* NiCad/NiMh – Sets Low Voltage protection threshold for NiCad/NiMh cells.

* LiPo – Sets Low voltage protection threshold for LiPo cells and automatically detects the number of cells within the pack.

Note: Selecting the NiCad/NiMh option for the battery type, triggers the ESC to automatically set the cutoff threshold to the factory default of 65%. The cutoff threshold can then be subsequently altered through the Low Voltage protection function, if required. The ESC will read the initial voltage of the NiCad/NiMh pack once it is plugged in and the voltage read will then be used as a reference for the cutoff voltage threshold.

3. Low Voltage Protection Threshold (Cutoff Threshold):

Low / Medium / High

1) For Li-xx packs- number of cells are automatically calculated and requires no user input apart from defining the battery type. This ESC provides 3 setting options for the low voltage protection threshold; Low (2.8V)/ Medium (3.0V)/ High (3.2V). For example: the voltage cutoff option for an 11.1V/ 3 cell Li-Po pack would be 8.4V (Low)/ 9.0V (Med)/ 9.6V (High)

2) For Ni-xx packs-low / medium / high cutoff voltages are 50%/65%/65% of the initial voltage of the battery pack. For example: A fully charged 6 cell NiMh pack's voltage is $1.44V \times 6 = 8.64V$, when "LOW" cutoff voltage is set, the cutoff voltage is: $8.64V \times 50\% = 4.3V$ and when "Medium" or "High" is set, the cutoff voltage is now $8.64V \times 65\% = 5.61V$.

4. Restore factory setup defaults:

Restore - Sets the ESC back to factory default settings;

Brake :	Off
Battery type Detect :	LiPo with Automatic Cell
Low voltage cutoff threshold:	Medium (3.0V/65%)
Timing setup :	Automatic
Soft Acceleration Start Up :	Medium
Governor mode :	OFF
Frequency :	16kHz
Low voltage cutoff type :	Reduce power

5. Timing setup: Automatic / Low / High.

- * Automatic – ESC automatically determines the optimum motor timing
- * Low (7-22 deg) – Setting for most 2 pole motors.
- * High (22-30 deg)-setting for motors with 6 or more poles.

In most cases, automatic timing works well for all types of motors. However for high efficiency we recommend the Low timing setting for 2 pole motors (general in-runners) and high timing for 6 poles and above (general outrunners). For higher speed, High timing can be set. Some motors require different timing setups therefore we suggest you follow the manufacturer recommended setup or use the automatic timing setting if you are unsure.

Note: Run your motor on the ground first after making any changes to your motor timing!

6. Soft Acceleration Start ups: Very Soft / Soft Acceleration/ Start Acceleration

- * Very Soft – Provides initial slow 1.5 sec ramp-up from start to full rpm intended to protect delicate gears from stripping under instant load. This setting is recommended for either fixed wing models equipped with gearboxes and / or helicopters.
- * Soft Acceleration- Provides initial slow 1 sec ramp-up from start to full rpm. This setting is recommended for either fixed wing models equipped with gearboxes and or helicopters.
- * Start Acceleration – Provides quick acceleration start ups with a linear throttle response. This is recommended for fixed wing models fitted with direct drive setups.

7. Active RPM Control (Heli Governor Mode)

- * RPM control off

* **First range:** There will be a 5-second delay from start to full rpm, but if the throttle is cutoff after starting, then the next start will be as normal start.

* **Second range:** There will be a 15-second delay from start to full rpm, but if the throttle is cutoff after starting, then the next start will be as normal start.

Note: Once the Governor Mode is enabled, the ESC's Brake and Low Voltage Cutoff Type settings will automatically be reset to No Brake and Reduce Power respectively regardless of what settings they were previously set.

8. Motor Rotation: Reverse

In most cases motor rotation is usually reversed by swapping two motor wires. However, in cases where the motor cables have been directly soldered to the ESC cables, motor rotation can be reversed by changing the value of setting on the ESC.

9. Switching Frequency: 8 kHz/16kHz

- * 8 kHz – Sets ESC switching frequency for 2 pole motors, e.g. in-runners.
- * 16 kHz – Sets ESC switching frequency for motors with more than 2 poles, e.g. out-runners.

Although 16 kHz is more efficient without Thrust motors, the setup default is 8 kHz due to the higher RF noises caused at 16 kHz.

10. Low Voltage Cutoff Type: Reduce Power / Hard cutoff

- * Reduce Power – ESC reduces motor power when the pre-set (recommended).
- * Hard Cutoff – ESC instantly cuts motor power when the pre-set Low Voltage Protection Threshold value is reached.

Programming Mode Audible Tones

Programming Mode Audible Tones	ESC Functions
0 Throttle Calibration (within the first 4 Sec) ● ● ● ●	

1	Brake * * * *	Brake On /Off
2	Battery type ~ ~ ~ ~ ~ ~ ~ ~	NiCad LiPo
3	Low Voltage Cutoff Threshold *	Low 2.8V/50% Medium 3.0V/60% High 3.2V/65%
4	Restore Factory Setup Defaults _ _ _ _ _	Restore
5	Timing Setup _ _ _ _ _ _ _ _ _ _ _ _ _ _ _	Automatic (7-30°) Low (7-22°) High (22-30°)
6	Soft Acceleration Start Ups V	Very Soft Soft Acceleration Start Acceleration
7	Governor Mode * * * * ** ** ** ** *** *** *** ***	Rpm off Heli first range Heli second range
8	Motor Rotation W W W W	Positive/ Reverse
9	Switching Frequency // // // // // // // //	8kHz 16kHz
10	Low Voltage Cutoff Type X X X X X X X X X X	Reduce Power Hard Cut Off

Using Your New ESC

Improper polarity or short circuit will damage the ESC therefore it is your responsibility to double check all plugs for proper polarity and firm fit BEFORE connecting the battery pack.

Alert Tones

The ESC is equipped with audible alert tones to indicate abnormal conditions at power up.

If the ESC can't enter into working mode after powering up, indicates that you have not setup throttle calibration.

1. Continuous beeping tone (****) – Indicates that the throttle stick is not in the minimum position.
2. Single beeping tone followed by a one second pause (* * * *) – Indicates that the battery pack voltage is not within the acceptable range. (The ESC automatically checks and verifies the battery voltage once the battery is connected).
3. A single beeping tone followed by a short pause (* * * *) – Indicates that the ESC is unable to detect the normal throttle signal from the receiver.

Built-in Intelligent ESC Safety Functions

1. Over-heat protection: When the temperature of ESC exceeds 110 deg C, the ESC will reduce the output power to allow it to cool.
2. Lost Throttle signal protection: The ESC will automatically reduce output power to the motor when it detects a lost

of throttle signal for 2 second, a subsequent loss of throttle signal beyond 2 seconds, will cause the ESC automatically to cut power to the motor.

Powering up the ESC for the first time and setting the Automatic Throttle Calibration

The ZTW ESC features Automatic Throttle Calibration to attain the smoothest throttle response and resolution throughout the entire throttle range of your transmitter. This step is done once to allow the ESC to “learn and memorize” your Transmitter’s throttle output signals and only repeated if you change your transmitter.

1. Switch your Transmitter ON and set the throttle stick to its maximum position.
2. Connect the battery pack to the ESC. **Wait for about 2 seconds, the motor will beep for twice, then put the throttle in the minimum position, the motor will also beep, which indicates that your ESC has got the signal range of the throttle from your transmitter.**

The throttle is now calibrated and your ESC is ready for operation.

Normal ESC start up procedure:

1. Switch your Transmitter ON and set the throttle to its minimum position.
2. Connect the battery pack to the ESC.
3. When the ESC is first powered up, it emits two sets of audible tones in succession indicating the status of its programming state.
 - * The first set of tones denotes the number of cells in the LiPo pack connected to the ESC. (Three beeps (***) indicates a 3 cell LiPo pack while 4 beeps (****) indicates a 4 cell LiPo pack).
 - * The second set denoting Brake status. One beep (*) for Brake “ON” and two beeps (**) for Brake “OFF” .
 - * The ESC is now ready for use.

Entering the Programming Mode:

1. Switch your Transmitter ON and set the throttle to its maximum position.
2. Connect the battery pack to the ESC.
3. Wait until you hear two short beeps (_ _ **) confirming that the ESC has now entered the programming mode.
4. If within 5 seconds, the throttle stick is lowered to its minimum position, an audible tone is emitted confirming that the **throttle calibration** setting has changed. If the throttle stick is left in the maximum position beyond 5 seconds, the ESC will begin the sequence from one function and its associated setting options to another. (Please refer to the table below to cross reference the functions with the audible tones).
5. When the desired tone for the function and setting option is reached, move the throttle stick down to its minimum position. ESC will emit two beeps (**) confirming the new setting has been stored.
6. The ESC only allows the setting of one function at a time. Therefore should you require making changes to other function disconnect the battery pack and wait 5 seconds to reconnect the battery and repeat the above steps.

General Safety Precautions

Do not install the propeller (fixed wing) or drive pinion (helicopter) on the motor when you test the ESC and motor for the first time to verify the correct settings on your radio. Only install your propeller or pinion after you have confirmed that the settings on your radio is correct.

- Never use ruptured or punctured battery cells.
- Never use battery packs that are known to overheat.
- Never short circuit battery or motor terminals.
- Always use proper insulation material for cable insulation.
- Always use proper cable connectors.
- Do not exceed the number of cells or servos specified by the ESC.

Wrong battery polarity will damage the ESC and void the warranty.

- Install the ESC in a suitable location with adequate ventilation for cooling. This ESC has a built-in over heat cutoff protection feature that will immediately cut power to the motor once the ESC temperature exceeds the 230 Deg F/ 110 Deg C high temperature limit.
- Use only batteries that are supported by the ESC and ensure the correct polarity before connecting. Switch your Transmitter ON and ensure the throttle stick is in the minimum position before connecting the battery

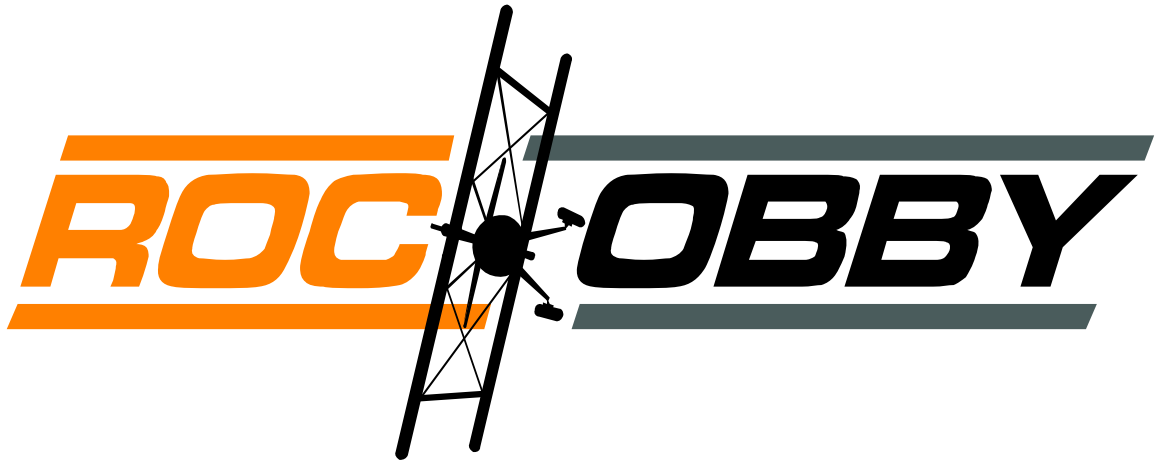
pack.

- Never switch your transmitter **OFF** while the battery is connected to your ESC.
- Only connect your battery pack just before flying and do not leave your battery pack connected after flying.
- Handle your model with extreme care once the battery pack is connected and keep away from the propeller at all times. Never stand in-line or directly in front of any rotating parts.
- Do not immerse the ESC underwater while powered up.
- Do fly at a designated flying site and abide by the rules and guidelines set by your flying club.

Troubleshooting:

Issue	Possible Reason	Action
Motor doesn't work, but there are audible tones of automatic detection of the number of cells after powering up ESC.	The ESC throttle calibration has not set up.	Set up the ESC throttle calibration.
Motor doesn't work and no audible tone emitted after connecting the battery. Servos are not working either.	Poor/loose Connection between battery Pack and ESC.	Clean connector terminals or replace connector.
	No power	Replace with a freshly charged battery pack
	Poor soldered connections (dry joints)	Re-solder the cable connections
	Wrong battery cable polarity	Check and verify cable polarity
	ESC throttle cable connected to receiver in the reverse polarity	Check the ESC cable connected to the ESC to ensure the connectors are in the correct polarity.
	Faulty ESC	Replace ESC
Motor doesn't work and no audible tone emitted after connecting the battery BUT servos are working.	Poor / loose connection between ESC and motor	Clean connector terminals or replace connectors
	Burnt motor coils	Replace motor
Motor doesn't work after powering up the ESC. An alert tone with two beeping tones followed by a short pause (** ** ** *) is emitted.	Poor soldered connections (dry joints)	Re-solder the cable connections
	The battery pack voltage is not within the acceptable range.	Replace with a freshly charged battery pack Check battery pack voltage
Motor doesn't work after powering up the ESC. An alert tone with a single beeping tone followed by a short pause (* * *) is emitted.	The ESC is unable to detect the normal throttle signal from the receiver	Check and verify that the ESC cable is connected to the <u>Throttle</u> channel on the receiver. Check the transmitter and receiver to verify that there is throttle signal output. (Connect a spare servo to verify throttle channel operation)
Motor doesn't work after powering up the ESC. An alert tone with continuous beeping tones (****) is emitted.	The throttle stick is not in the <u>minimum</u> position at power up.	Move the throttle stick to the minimum position.
Motor doesn't work after powering up the ESC. ESC emits two long audible tones followed by two short beeps(__ **)	Reversed throttle channel caused the ESC to enter the programming mode.	Enter the servo reverse menu on your transmitter and reverse the throttle channel. Note: For Futaba radios set the throttle channel to Reverse.

Issue	Possible Reason	Action
Motor runs in reverse rotation Motor stops running in flight.	Wrong cables polarity between the ESC and the motor.	Swap any two of the three cable connections between the ESC and the Motor or __ access the Motor Rotation function via the ESC programming mode and change the pre-set parameters.
	Lost throttle signal	Check proper operation of the radio equipment. Check the placement of the ESC and the Receiver and check the route of the receiver' s aerial and ESC cables to ensure there is adequate separation to prevent RF interference. Install a ferrite ring on the ESC' s throttle cable.
	Battery Pack voltage has reached the Low Voltage Protection threshold.	Land the model immediately and replace the battery pack.
	Possible bad cable connection	Check and verify the integrity of the cable connections
Motor restarts abnormally ESC Overheats	Possible RF Interference at the flying field.	The normal operation of the ESC may be susceptible to surrounding RF interference. Restart the ESC to resume normal operation on the ground to verify recurrence. If the problem persists, test the operation of the ESC at a different flying field.
	Inadequate Ventilation	Relocate the ESC to allow better ventilation
	Servos drawing too much current and over loading the ESC.	Use servos that are adequately sized for the ESC. The maximum BEC current drawn should be within the BEC limits.
	Over sized motor or prop	Prop down or resize the motor



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