Power 25 Brushless Outrunner Instructions

Thank you for purchasing the E-flite Power 25 Brushless Outrunner motor. The Power 25 is designed to deliver clean and quiet power for 25-size sport and scale airplanes weighing 3- to 5.5-pounds (1.4-2.5 Kg), 15-size 3D airplanes up to 3.5-pounds (1.6 Kg), or models requiring up to 600 watts of power. It's an especially good match for scale 25-size airplanes.

Power 25 Brushless Outrunner Features:
• Equivalent to a 25-size glow engine for 3- to 5.5-pound (1.4- 2.5-Kg) airplanes
• Ideal for 15-size 3D airplanes up to 3.5-pounds (1.6-Kg)
• Ideal for models requiring up to 600 watts of power
• High torque, direct drive alternative to inrunner brushless motors
• Includes mount, prop adapters, and mounting hardware
• Quiet, lightweight operation
• External rotor design, 5mm shaft can easily be reversed for alternative motor installations
• High quality construction with ball bearings and hardened steel shaft
• Slotted 12-pole outrunner design

Power 25 Specifications
Diameter: 35mm (1.4 in)
Case Length: 54mm (2.1 in)
Weight: 190g (6.7 oz)
Shaft Diameter: 5mm (.2 in)

EFLM4025A
Kv: 870 (rpms per volt)
Io: 2.4A @ 10V (no load current)
Ri: .03 ohms (resistance)
Continuous Current: 32A*
Max Burst Current: 44A*
Input Watts: up to 600
Cells: 10-14 Ni-MH/Ni-Cd or 3-4S Li-Po
Recommended Props: 11x8 to 14x7
Brushless ESC: 40-60 Amp

* Maximum Operating Temperature: 220 degrees Fahrenheit
* Adequate cooling is required for all motor operation at maximum current levels.
* Maximum Burst Current duration is 30 seconds. Adequate time between maximum burst intervals is required for proper cooling and to avoid overheating the motor.
* Maximum Burst Current rating is for 3D and limited motor run flights. Lack of proper throttle management may result in damage to the motor since excessive use of burst current may overheat the motor.

Determine a Model's Power Requirements:
1. Power can be measured in watts. For example: 1 horsepower = 746 watts
2. You determine watts by multiplying 'volts' times 'amps'. Example: 10 volts x 10 amps = 100 watts

Volts x Amps = Watts

3. You can determine the power requirements of a model based on the 'Input Watts Per Pound' guidelines found below, using the flying weight of the model (with battery):

- 50-70 watts per pound; Minimum level of power for decent performance, good for lightly loaded slow flyer and park flyer models
- 70-90 watts per pound; Trainer and slow flying scale models
- 90-110 watts per pound; Sport aerobatic and fast flying scale models
- 110-130 watts per pound; Advanced aerobatic and high-speed models
- 130-150 watts per pound; Lightly loaded 3D models and ducted fans
- 150-200+ watts per pound; Unlimited performance 3D models

NOTE: These guidelines were developed based upon the typical parameters of our E-flite motors. These guidelines may vary depending on other motors and factors such as efficiency and prop size.

4. Determine the Input Watts per Pound required to achieve the desired level of performance:

Model: E-flite J-3 Cub 25e ARF
Estimated Flying Weight w/Battery: 4 lbs
Desired Level of Performance: 70-90 watts per pound; Slow flying scale models

4.0 lbs x 70 watts per pound = 280 Input Watts of total power (minimum)
required to achieve the desired performance

5. Determine a suitable motor based on the model's power requirements. The tips below can help you determine the power capabilities of a particular motor and if it can provide the power your model requires for the desired level of performance:

- Most manufacturers will rate their motors for a range of cell counts, continuous current and maximum burst current.
- In most cases, the input power a motor is capable of handling can be determined by:

Average Voltage (depending on cell count) x Continuous Current = Continuous Input Watts

Average Voltage (depending on cell count) x Max Burst Current = Burst Input Watts

HINT: The typical average voltage under load of a Ni-Cd/Ni-MH cell is 1.0 volt. The typical average voltage under load of a Li-Po cell is 3.3 volts. This means the typical average voltage under load of a 10 cell Ni-MH pack is approximately 10 volts and a 3 cell Li-Po pack is approximately 9.9 volts. Due to variations in the performance of a given battery, the average voltage under load may be higher or lower. These however are good starting points for initial calculations.

Model: E-flite J-3 Cub 25e ARF
Estimated Flying Weight w/Battery: 4.0 lbs
Total Input Watts Required for Desired Performance: 280 (minimum)

Motor: Power 25
Max Continuous Current: 32A*
Max Burst Current: 44A*
Cells (Li-Po): 3

3 Cells, Continuous Power Capability: 9.9 Volts (3 x 3.3) x 32 Amps = 316 Watts
3 Cells, Max Burst Power Capability: 9.9 Volts (3 x 3.3) x 44 Amps = 435 Watts

Per this example, the Power 25 motor (when using a 3S Li-Po pack) can deliver up to 435 watts of input power, readily capable of powering a scale 25-size electric ARF with the desired level of performance (requiring 280 watts minimum). You must however be sure that the battery chosen for power can adequately supply the current requirements of the system for the required performance.

Battery Choices:
We recommend either E-flite or Thunder Power batteries and list some possible choices for the Power 25 Brushless Outrunner motor, all depending on the airplane application. Battery technology is constantly changing and manufacturers are improving and updating older packs with new ones so the list below may generally have new substitutions.

THP33003SP30	3300mAh 3-Cell/3S 11.1V Pro Power 30C Li-Po	EFLB32003S	3200mAh 3S 11.1V 20C Li-Po, 13 AWG
THP33004SP30	3300mAh 4-Cell/4S 14.8V Pro Power 30C Li-Po	EFLB32004S	3200mAh 4S 14.8V 20C Li-Po, 13 AWG
THP38503SP30	3850mAh 3-Cell/3S 11.1V Pro Power 30C Li-Po		
THP38504SP30	3850mAh 4-Cell/4S 14.8V Pro Power 30C Li-Po		

Examples of Airplane Setups:
Please see our web site for the most up-to-date information and airplane setup examples.

NOTE: All data measured at full throttle. Actual performance may vary depending on battery and flight conditions.

E-flite J-3 Cub 25e ARF

Option 1:
Motor: Power 25
ESC: E-flite 40A Brushless (V2) (EFLA312B)
Prop: APC 12x8E (APC12080E)
Battery: Thunder Power PRO LITE 4200mAh 3S2P (THP420003S2PPL)
Flying Weight w/Battery: 4.0 lbs

Amps	*Volts*	*Watts*	*Input Watts/Pound*	*RPM*
36.8	10.8	397	99	7410

Expect very strong performance providing plenty of power for full aerobatics. Average duration is approximately 12-15 minutes depending on throttle management.

Option 2:
Motor: Power 25
ESC: E-flite 40A Brushless (V2) (EFLA312B)
Prop: APC 12x8E (APC12080E)
Battery: KAN 1800mAh 4/5A 10-Cells
Flying Weight w/Battery: 4.15 lbs

Amps	*Volts*	*Watts*	*Input Watts/Pound*	*RPM*
29.6	9.8	290	70	6780

Expect good flight performance with ability to do rolls and loops. Scale flight at half throttle was smooth and responsive. Average duration is approximately 5-7 minutes depending on throttle management.

Accessories and Spare Parts:
See our web site at www.E-fliteRC.com or www.horizonhobby.com for our complete line of brushless motors. We have posted a specification comparison sheet on our web site so you can compare the different motors we offer.

EFLA110	Power Meter (measures power output in amps, volts, watts, and capacity)
EFLA241	Gold Bullet Connector Set, 3.5mm (3)
EFLM1925	Prop Adapter w/ Collet, 5mm
EFLM40102	X-Mount/Hardware: Power 10/15/25
EFLM40251	Shaft: Power 25 BL Outrunner
EFLA1040L	40A Lite Pro SB Brushless ESC
EFLA1040	40A Pro SB Brushless ESC
EFLA1060	60A Pro SB Brushless ESC

Operating Instructions:
1. This brushless motor requires the use of a sensorless brushless speed control. Failure to use the correct speed control may result in damage to the motor and/or speed control. **Please be sure the timing and PWM switching frequency is set properly on your controller.**
2. When mounting the motor, be sure the correct length of screws are used so damage to the inside of the motor will not occur. We suggest you use the mounting hardware included with your motor. **The use of long screws will damage the motor.**
3. You may connect the three motor wires directly to the controller with solder or use connectors such as gold plated brushless bullet connectors (EFLA241), which will also need to be soldered properly to your wires. The three motor wires can be connected in any order to the three output wires

or output port on a sensorless brushless speed control. Be sure to use heat shrink tubing to properly insulate the wires so the wires will not short. Shorting may damage the motor and speed control.

4. If you add connectors and you no longer wish to use them, never cut the motor wires. Remove them by properly desoldering them. Shortening the motor wires is considered an improper modification of the motor and may cause the motor to fail.
5. When you connect the motor to the esc, check the rotation direction of the motor. If you find the rotation is reversed, **switching any two motor wires will reverse the direction so the motor rotates properly**.
6. Proper cooling of the motor is very important during operation. New technology has brought much higher capacity batteries with higher discharge rates, which can cause extreme motor temperatures during operation. It is the responsibility of the user to monitor the temperature and prevent overheating. Overheating of the motor is not covered under any warranty.
7. You can install the propeller on the motor shaft after you have confirmed proper rotation direction. Also consult the instruction included with your sensorless electronic speed control for proper adjustments and timing.
8. Once the battery is connected to the motor, please use extreme caution. Stay clear of the rotating propeller since spinning propellers are very dangerous as the motors produce high amounts of torque.
9. Never disassemble the motor. This will void any warranty.

Reversing the Shaft:
This Outrunner motor has a shaft, which exits through the rotating part of the motor. If you want to reverse the shaft to exit through the fixed part of the motor, follow these instructions carefully for changing the shaft installation. Be sure to use the correct sized wrench or you may strip the set screw. **NOTE:** The user assumes all liability for damage that may occur.

1. Loosen the set screw on the shaft collar and remove the collar from its location against the bearing.
2. Remove the small black donut washer that rests against the bearing.
3. Loosen the two set screws in the rotating part of the motor.
4. Slide the shaft through the motor. It may be necessary to use a small hammer to lightly tap the shaft. It is very important that you do not bend the shaft in this process so use extreme caution to assure this does not happen.
5. Re-install the donut washer against the bearing. Do not skip this step.
6. Re-install the shaft collar back against the washer and bearing.
7. Retighten all setscrews making sure you line up with the flat spot on the shaft.

Replacement shafts are available separately. Order EFLM40251 for a Power 25 BL Outrunner shaft.

Safety Precautions:
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. The Outrunner motor case is a rotating part so use extreme caution.** Please read the warning information included with your propellers for safety information related to the operation of motors with propellers. Failure to comply with these warnings and/or improper use of propellers may result in serious injury.

Installation:

NOTE: Photo shows typical installation of motor and x-mount directly to the outside of the firewall. There are other options available including mounting the motor inside the fuselage (requires reversing the shaft direction) or extending the motor further forward using aftermarket mount extensions when using cowls.

1. You can first trial fit the aluminum x-mount against the front of the firewall and use a Sharpie® to mark the locations of four holes and drill appropriate size hole to fit the blind nuts provided. Always be sure to maintain the proper thrust line and account for adequate prop/spinner clearance.
2. Attach aluminum x-mount to the outrunner motor using the four flat head (countersunk) screws provided with the motor.
3. Install four blind nuts on the inside of the firewall.
4. Attached the aluminum x-mount and motor to the outside of the firewall using the four socket head cap screws and washers.

Limited Warranty Period
Horizon Hobby, Inc. guarantees this product to be free from defects in both material and workmanship for a period of 1 year from the date of purchase.

Limited Warranty
(a) This warranty is limited to the original Purchaser ("Purchaser") and is not transferable. REPAIR OR REPLACEMENT AS PROVIDED UNDER THIS WARRANTY IS THE EXCLUSIVE REMEDY OF THE PURCHASER. This warranty covers only those Products purchased from an authorized Horizon dealer. Third party transactions are not covered by this warranty. Proof of purchase is required for warranty claims. Further, Horizon reserves the right to change or modify this warranty without notice and disclaims all other warranties, express or implied.

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(c) Purchaser Remedy- Horizon's sole obligation hereunder shall be that Horizon will, at its option, (i) repair or (ii) replace, any Product determined by Horizon to be defective. In the event of a defect, these are the Purchaser's exclusive remedies. Horizon reserves the right to inspect any and all equipment involved in a warranty claim. Repair or replacement decisions are at the sole discretion of Horizon. This warranty does not cover cosmetic damage or damage due to acts of God, accident, misuse, abuse, negligence, commercial use, or modification of or to any part of the Product. This warranty does not cover damage due to

improper installation, operation, maintenance, or attempted repair by anyone other than Horizon. Return of any goods by Purchaser must be approved in writing by Horizon before shipment.

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HORIZON SHALL NOT BE LIABLE FOR SPECIAL, INDIRECT OR CONSEQUENTIAL DAMAGES, LOSS OF PROFITS OR PRODUCTION OR COMMERCIAL LOSS IN ANY WAY CONNECTED WITH THE PRODUCT, WHETHER SUCH CLAIM IS BASED IN CONTRACT, WARRANTY, NEGLIGENCE, OR STRICT LIABILITY. Further, in no event shall the liability of Horizon exceed the individual price of the Product on which liability is asserted. As Horizon has no control over use, setup, final assembly, modification or misuse, no liability shall be assumed nor accepted for any resulting damage or injury. By the act of use, setup or assembly, the user accepts all resulting liability.

If you as the Purchaser or user are not prepared to accept the liability associated with the use of this Product, you are advised to return this Product immediately in new and unused condition to the place of purchase.

Law: These Terms are governed by Illinois law (without regard to conflict of law principals).

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

Questions, Assistance, and Repairs:
Your local hobby store and/or place of purchase cannot provide warranty support or repair. Once assembly, setup or use of the Product has been started, you must contact Horizon directly. This will enable Horizon to better answer your questions and service you in the event that you may need any assistance. For questions or assistance, please direct your email to productsupport@horizonhobby.com, or call 877.504.0233 toll free to speak to a service technician.

Inspection or Repairs
If this Product needs to be inspected or repaired, please call for a Return Merchandise Authorization (RMA). Pack the Product securely using a shipping carton. Please note that original boxes may be included, but are not designed to withstand the rigors of shipping without additional protection. Ship via a carrier that provides tracking and insurance for lost or damaged parcels, as **Horizon is not responsible for merchandise until it arrives and is accepted at our facility**. A Service Repair Request is available at www.horizonhobby.com on the "Support" tab. If you do not have internet access, please include a letter with your complete name, street address, email address and phone number where you can be reached during business days, your RMA number, a list of the included items, method of payment for any non-warranty expenses and a brief summary of the problem. Your original sales receipt must also be included for warranty consideration. Be sure your name, address, and RMA number are clearly written on the outside of the shipping carton.

Warranty Inspection and Repairs
To receive warranty service, you must include your original sales receipt verifying the proof-of-purchase date. Provided warranty conditions have been met, your Product will be repaired or replaced free of charge. Repair or replacement decisions are at the sole discretion of Horizon Hobby.

Non-Warranty Repairs
Should your repair not be covered by warranty the repair will be completed and payment will be required without notification or estimate of the expense unless the expense exceeds 50% of the retail purchase cost. By submitting the item for repair you are agreeing to payment of the repair without notification. Repair estimates are available upon request. You must include this request with your repair. Non-warranty repair estimates will be billed a minimum of ½ hour of labor. In addition you will be billed for return freight. Please advise us of your preferred method of payment. Horizon accepts money orders and cashiers checks, as well as Visa, MasterCard, American Express, and Discover cards. If you choose to pay by credit card, please include your credit card number and expiration date. Any repair left unpaid or unclaimed after 90 days will be considered abandoned and will be disposed of accordingly. **Please note: non-warranty repair is only available on electronics and model engines.**

Items requiring inspection or repair should be shipped to the following address (freight prepaid):

Horizon Service Center
4105 Fieldstone Road
Champaign, Illinois 61822

Please call 877-504-0233, or e-mail us at productsupport@horizonhobby.com with any questions or concerns regarding this product or warranty.

United Kingdom:
Horizon Hobby UK
Units 1-4 Ployters Rd
Staple Tye
Harlow, Essex CM18 7NS
United Kingdom

Please call +44 (0) 1279 641 097 or email us at sales@horizonhobby.co.uk with any questions or concerns regarding this product or warranty.

Germany:
Horizon Technischer Service
Hamburger Strasse 10
25335 Elmshorn
GERMANY

Please call +49 4121 46199 66 or email us at service@horizonhobby.de with any questions or concerns regarding this product or warranty.

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