



Power 60 Brushless Outrunner Instructions

Thank you for purchasing the E-flite Power 60 Brushless Outrunner motor. The Power 60 is designed to deliver clean and quiet power for 60-size sport and scale airplanes, 46-size 3D airplanes, or models requiring up to 1200 watts of power. It's an especially good match for Hangar 9® .60-size warbirds like the Corsair 60 (HAN2575), P-47D Thunderbolt 60 (HAN2975), P-40 Warhawk 60 (HAN2850), P-51 Mustang 60 (HAN2375), P-51 Miss America 60 (HAN2775) and .46-size 3D planes such as the Hangar 9 Funtana 40 (HAN1975) or Seagull Harrier 46 (SEA3025).

Power 60 Brushless Outrunner Features:

- Equivalent to a 60-size glow engine for 6- to 10-pound (2.7 - 4.5Kg) airplanes
- Ideal for 46-size 3D airplanes up to 7-pounds (3.2 Kg)
- Ideal for models requiring up to 1200 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, 6mm shaft can easily be reversed for alternative motor installations
- High quality construction with ball bearings and hardened steel shaft
- Slotted 14-pole outrunner design

Power 60 Specifications

Diameter: 50mm (2 in)
Case Length: 62mm (2.4 in)
Weight: 380g (13 oz)
Shaft Diameter: 6mm (.24 in)

EFLM4060A

Kv: 400 (rpms per volt)
I_o: 2.7A @ 10V (no load current)
R_i: .06 ohms (resistance)
Continuous Current: 55A*
Max Burst Current: 65A*
Watts: up to 1700
Cells: 16-24 Ni-MH/Ni-Cd or 5-7S Li-Po
Recommended Props: 14x8 to 16x10
Brushless ESC: 80-Amp (EFLA1080B)

* 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.

Note: The 3.5mm Gold Bullet Connectors included on this motor are rated for current up to 60A. Please see our accessory parts listed below for 4mm connector option if you are running more current than we recommend.

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: Hangar 9 P-51 Miss America

Estimated Flying Weight w/Battery: 9.0 lbs

Desired Level of Performance: 90-110 (100 average) watts per pound; Fast flying scale model

**9.0 lbs x 100 watts per pound = 900 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: Hangar 9 Miss America
Estimated Flying Weight w/Battery: 9.0 lbs
Total Input Watts Required for Desired Performance: 900 (minimum)

Motor: Power 60
Max Continuous Current: 40A*
Max Burst Current: 60A*
Cells (Li-Po): 6

6 Cells, Continuous Power Capability: 19.8 Volts (6 x 3.3) x 40 Amps = 792 Watts
6 Cells, Max Burst Power Capability: 19.8 Volts (6 x 3.3) x 60 Amps = 1188 Watts

Per this example, the Power 60 motor (when using a 6S Li-Po pack) can deliver up to 1188 watts of input power, readily capable of powering the P-51 Miss America with the desired level of performance (requiring 900 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. You must also use proper throttle management and provide adequate cooling for the motor, ESC and battery.

Battery Choices:

We recommend E-flite® or Thunder Power RC batteries for the Power 60 Brushless Outrunner Motor, depending on the airplane application. Battery technology is constantly changing and manufacturers are improving and updating older packs with new ones. Please refer to your model's manual or our website for recommended batteries.

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.

Hangar 9 P-51 Miss America (HAN2775)

Motor: Power 60
ESC: Castle Creations Phoenix 80 (Standard settings with 18V Soft Li-Po cut off and no brake)
Prop: APC 15x10E
Battery: Thunder Power PRO LITE 6000mAh 6S3P (THP60003S3PPL x2 in series)
Flying Weight w/Battery: 8.8 lbs

Amps	Volts	Watts	Input Watts/Pound	RPM
56.0	21.3	1195	136	7375

Expect very strong performance with a great balance of thrust and top speed. Average duration is approximately 8-15 minutes depending on throttle management.

Seagull Harrier 3D 46 (SEA3025)

Motor: Power 60
ESC: Castle Creations Phoenix 80 (Standard settings with 18V Soft Li-Po cut off and no brake)
Prop: APC 16x8E
Battery: Thunder Power PRO LITE 4200mAh 6S2P (THP42003S2PPL x2 in series)
Flying Weight w/Battery: 6.4 lbs

Amps	Volts	Watts	Input Watts/Pound	RPM
50.5	21.0	1060	165	6975

Expect very strong performance with unlimited vertical and plentiful power for hovering and 3D aerobatics. Average duration is approximately 8-15 minutes depending on throttle management.

Accessories:

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)
EFLA249	Gold Bullet Connector Set, 4mm (3)
EFLM1926	Prop Adapter w/ Collet, 6mm

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.

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.
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 EFLM40601 for a Power 60 BL Outrunner shaft.

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.
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.

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 3mm 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 & Limits of Liability

Pursuant to this Limited Warranty, Horizon Hobby, Inc. will, at its option, (i) repair or (ii) replace, any product determined by Horizon Hobby, Inc. to be defective. **In the event of a defect, these are your exclusive remedies.**

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 an authorized Horizon Hobby, Inc. service center. This warranty is limited to the original purchaser and is not transferable. In no case shall Horizon Hobby's liability exceed the original cost of the purchased product and will not cover consequential, incidental or collateral damage. Horizon Hobby, Inc. 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 Hobby, Inc. Further, Horizon Hobby reserves the right to change or modify this warranty without notice.

REPAIR OR REPLACEMENT AS PROVIDED UNDER THIS WARRANTY IS THE EXCLUSIVE REMEDY OF THE CONSUMER. HORIZON HOBBY, INC. SHALL NOT BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES.

As Horizon Hobby, Inc. 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.

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 Hobby, Inc. directly. This will enable Horizon to better answer your questions and service you in the event that you may need any assistance.

Questions or 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 your 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 Hobby, Inc. is not responsible for merchandise until it arrives and is accepted at our facility. Include your complete name, address, phone number where you can be reached during business days, RMA number, and a brief summary of the problem. Be sure your name, address, and RMA number are clearly written on the shipping carton.

Warranty Inspection and Repairs

To receive warranty service, you must include your original sales receipt verifying the proof-of-purchase date. Providing 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 and the expense exceeds 50% of the retail purchase cost, you will be provided with an estimate advising you of your options. You will be billed for any return freight for non-warranty repairs. Please advise us of your preferred method of payment. Horizon Hobby 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.

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

**Horizon Service Center
4105 Fieldstone Road
Champaign, Illinois 61822**

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