



Power 46 Brushless Outrunner Instructions

Thank you for purchasing the E-flite Power 46 Brushless Outrunner motor. The Power 46 is designed to deliver clean and quiet power for .40 to 46-size sport and scale airplanes, 25- to 40-size 3D airplanes, or models requiring up to 800 watts of power. It's an especially good match for Hangar 9® .40-size trainers like the Alpha .40 (HAN2450), Arrow .40 (HAN2625) and warbirds like the T-34 Mentor 40 (HAN2425). Also a great match for sport planes like the Ultra Stick 40 (HAN1675 or HAN1690), Seagull Spacewalker 40 (SEA2050), and smaller sport 3D planes like the Twist 40 (HAN2650).

Power 46 Brushless Outrunner Features:

- Equivalent to a 40- to 46-size glow engine for 4- to 7-pound (1.8 - 3.2-Kg) airplanes
- Ideal for 25- to 40-size 3D airplanes up to 5-pounds (2.2 Kg)
- Ideal for models requiring up to 800 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 12-pole outrunner design

Power 46 Specifications

Diameter: 50mm (2 in)
Case Length: 55mm (2.15 in)
Weight: 290g (10 oz)
Shaft Diameter: 6mm (.24 in)

EFLM4046A

Kv: 670 (rpms per volt)
I_o: 3.88A @ 10V (no load current)
R_i: .04 ohms (resistance)
Continuous Current: 40A*
Max Burst Current: 55A*
Watts: up to 800
Cells: 12-16 Ni-MH/Ni-Cd or 4-5S Li-Po
Recommended Props: 12x8 to 14x10
Brushless ESC: 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.

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 Ultra Stick 40 ARF

Estimated Flying Weight w/Battery: 6.0 lbs

Desired Level of Performance: 90-110 (100 average) watts per pound; Sport aerobatic

**6.0 lbs x 100 watts per pound = 600 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 Ultra Stick 40 ARF

Estimated Flying Weight w/Battery: 6.0 lbs

Input Watts Per Pound Required for Desired Performance: 600 (minimum)

Motor: Power 46

Max Continuous Current: 40A*

Max Burst Current: 55A*

Max Cells (Li-Po): 4-5

4 Cells, Continuous Power Capability: 13.2 Volts (4 x 3.3) x 40 Amps = 528 Watts

4 Cells, Max Burst Power Capability: 13.2 Volts (4 x 3.3) x 55 Amps = 726 Watts

Per this example, the Power 46 motor (when using a 4S Li-Po pack) can handle up to 726 watts of input power, readily capable of powering the Ultra Stick 40 with the desired level of performance (requiring 600 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 Thunder Power Li-Po batteries for the best performance and lowest weight (in some cases Ni-MH 1950-3700mAh high-discharge packs also make good alternatives at the expense of weight and lower capacity). Some examples of the packs we recommend for use with the Power 46 motor can be found below:

THP42002S2PPL 4200mAh 2S2P 7.4V Li-Po,13GA

THP42003S2PPL 4200mAh 3S2P 11.1V Li-Po,13GA

THP53005S4PPL 5300mAh 5S4P 18.5V Li-Po,13GA

THP60004S3PPL 6000mAh 4S3P 14.8V Li-Po,13GA

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 Ultra Stick 40 ARF (HAN1675 / HAN1690)

Option 1:

Motor: Power 46

ESC: Castle Creations Phoenix 60 (Standard settings with 12V Soft Li-Po cut off and no brake)

Prop: APC 13x8E

Battery: Thunder Power PRO LITE 6000mAh 4S3P (THP60004S3PPL)

Flying Weight w/Battery: 5.8 lbs

Amps	Volts	Watts	Input Watts/Pound	RPM
51.5	14.4	745	128	8250

Expect very strong performance with very short take off rolls and a great balance of thrust and top speed. Average duration is approximately 12-20 minutes depending on throttle management.

Option 2:

Motor: Power 46

ESC: Castle Creations Phoenix 60 (Standard settings with 12V Soft Li-Po cut off and no brake)

Prop: APC 13x8E

Battery: Thunder Power PRO LITE 4200mAh 4S2P (THP42002S2PPL x2 in series)

Flying Weight w/Battery: 5.4 lbs

<i>Amps</i>	<i>Volts</i>	<i>Watts</i>	<i>Input Watts/Pound</i>	<i>RPM</i>
47.4	14.1	670	124	8220

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

Option 3:

Motor: Power 46

ESC: Castle Creations Phoenix 60 (Standard settings with 12V Soft cut off and no brake)

Prop: APC 13x8E

Battery: Sanyo RC-3000HV 14-Cells (7-Cell packs x2 in series)

Flying Weight w/Battery: 6.7 lbs

<i>Amps</i>	<i>Volts</i>	<i>Watts</i>	<i>Input Watts/Pound</i>	<i>RPM</i>
44.0	13.4	590	89	7950

Expect good performance with a good balance of thrust and top speed. Average duration is approximately 5-7 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.

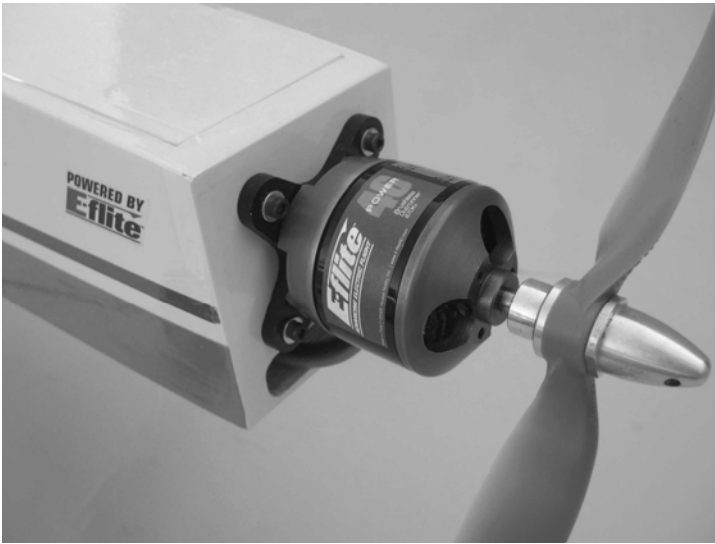
1. Loosen the set screw on the shaft collar and remove the collar from its location against the bearing.
2. Remove the small black donut washer that rests against the bearing.
3. Loosen the two set screws in the rotating part of the motor.
4. Slide the shaft through the motor. It may be necessary to 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 EFLM40461 for a Power 46 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.

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.

Warranty and Repair Policy:

The Power 46 Brushless Outrunner Motor is guaranteed to be free from original manufacturing defects in material and workmanship at the date of purchase. No term warranty applies to this product. This warranty does not cover any component parts damaged by use, misuse, unauthorized service or any form of modification. Horizon Hobby assumes no liability for damages caused during the installation of this motor. At no time will Horizon Hobby be responsible for collateral or incidental damages caused during the operation of this motor. We reserve the right to change or modify this warranty at any time.

To speak to a service technician, call (877) 504-0233.

Warranty Repairs:

To receive warranty service, you must include your original sales receipt verifying the proof-of-purchase date. Providing that warranty conditions have been met, your motor will be repaired free of charge.

Non-Warranty Repairs:

Should your repair cost exceed 50% of the retail purchase cost, you will be provided with an estimate advising you of your options. Any return freight for non-warranty repairs will be billed to the customer. For non-warranty repairs, please advise us of the credit card that you prefer to use. Horizon Service Center accepts Visa or MasterCard. Include your card number and the expiration date. Horizon Service Center also accepts money orders.

If your motor needs to be repaired, ship the motor in its original box (freight prepaid) to:

Horizon Service Center
Attn: E-flite™ Service Center
4105 Fieldstone Rd.
Champaign, IL 61822

Include your complete name and address information inside the carton, as well as clearly writing it on the outer label/return address area. Include a brief summary of the difficulty. Date your correspondence and be sure that your name and address appear on this enclosure. Also, please include a phone number where you can be reached during the business day.

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