

# 4PHD 4-POLE MOTOR INSTRUCTIONS

# NOVAK



#55-3510M-1 Rev.1  
9-2014

## SPECIFICATIONS

Input Voltage .....	2S LiPo/LiFe cells (8.4 VDC)
Motor Kv .....	4,600 (#3510)
Design .....	Sensor-based
Compatibility .....	Sensored/Sensorless ESCs
Motor Size .....	1.41" D x 2.62" L x / 35.8 x 66.5mm
Weight .....	8.6 oz / 245 g with 6" 12AWG power wire
Output Shaft Dimensions .....	5mm Diameter; 0.59"/15mm Length
Rotor .....	4-pole, high-strength sintered Neodymium
Stator .....	12-slot
Max. RPM .....	50,000
Power Wire .....	12AWG factory installed
Power Connectors .....	4mm Low-Loss, High-Current Bullets included
Mounting .....	M3x0.5 and M4x0.7 spaced at 25mm

## PRECAUTIONS

### NEVER FREE-REV THE MOTOR!

**Free-running your brushless motor in a no-load condition can result in rotor failure and ESC transistor damage. This will void the product's warranty!**

- **WATER & ELECTRONICS DON'T MIX** Never allow water, moisture, or other foreign materials to get inside motor, or on the ESC's PC board.
- **NOVAK MOTORS & ESCs FOR BEST RESULTS** Use Novak sensed motors with Novak Brushless ESCs for best performance & protection. Only use motors with the proper Kv to match ESC's rating.
- **DO NOT OVERHEAT THE MOTOR** Temperatures above 160°F will weaken the magnet and may melt the coils. This voids the warranty and can damage the ESC.
- **INSULATE EXPOSED WIRES** Use heat shrink tubing to prevent shorts. Refer to ACCESSORIES for Novak heat shrink kits.
- **NO SOLVENTS** Do NOT expose the motor or electronics to any type of solvents.
- **SET GEAR MESH PROPERLY** Too tight of a gear mesh can result in motor pinion shaft breakage--be sure to adjust the gear mesh properly.
- **NO MOTOR CAPACITORS & SCHOTTKY DIODE** Novak brushless motors do not need motor capacitors or external Schottky diodes. Schottky diode usage will damage ESC.

# INSTALLATION INSTRUCTIONS

## STEP 1- INSTALL MOTOR

Included with the 4PHD motor are Novak's low-loss, high-current, gold-plated bullet connectors. Both connector sides are included if you wish to install on your motor and/or speed control.

1. Insert the motor mounting screws that came with your vehicle through the motor mounting plate. **Novak 4PHD motors need no more than 1/8" of screw extending past the vehicle's mounting plate (2-4mm).** Too little can strip the motor's threads. Too much will cause internal motor damage and will void warranty.
2. Attach the motor to the vehicle's motor mount using one of the sets of threaded mounting holes (M3x0.5 or M4x0.7). **Select a mounting position that keeps the solder tabs clear of conductive surfaces like aluminum or graphite.**

## STEP 2- INSTALL PINION GEAR

1. Install pinion gear on the motors output shaft and test fit in vehicle to align pinion and spur gears.

**Refer to GEAR SELECTION (on the back) for additional information on selecting the proper pinion gear.**

2. Tighten pinion's set screw on the flat of motor shaft.
3. Adjust the motor position for proper amount of free play.

**It is important to have a small amount of play between the pinion gear and the spur gear (about the thickness of piece of paper). Check the free play at several positions around the spur gear to ensure a proper mesh (just in case the gears are out of round).**

**MAKE SURE PINION/SPUR GEAR MESH IS NOT TOO TIGHT! IF GEAR MESH IS TOO TIGHT, MOTOR SHAFT BREAKAGE CAN OCCUR.**

4. Tighten motor mounting screws. **Avoid using excessive force, as the threaded holes in motor could become stripped.**

## STEP 3- CONNECT MOTOR SENSOR HARNESS

1. Determine the best routing in the vehicle for the motor's sensor harness. Securing the sensor harness to the motor power wires with a tie-wrap can provide a good location and also act as a strain relief. *Novak offers several sensor harness lengths for various installations (Novak #5351-5354)*

2. Connect one end of the harness to the ESC and the other end to the motor's sensor harness connector located on the back endbell (refer to figure).

Be sure the plug on the end of the harness inserts all the way into the sensor harness connector. The plug and connector are keyed and will only go together one direction.

**Note: If any of the teflon wires pull out of the motor sensor harness connector, refer to the SENSOR HARNESS WIRING section on back.**



Sensor harness connector (keyed)

## GEAR SELECTION (Important!)

**Motor operating temperature is the ONLY way to properly set the maximum vehicle gearing**

The motor should be **150-160°F MAX** at end of run!

**Temperatures above 160°F will weaken the magnet & may melt the coils! This voids warranty & can damage ESC!**

Change the gearing to avoid overheating.

Because of the potential danger of overheating, ESC/motor damage & failure, **you must start with VERY small pinion sizes** and check ESC & motor temperatures at multiple times throughout a run. **This is the only way to ensure that you are not causing excessive heating.**

If ESC & motor temperatures remain low and stable, you can slowly increase the pinion size while again monitoring the temperatures to determine the safe gearing for your vehicle, motor, and climate/track conditions. Because these variables can change or be modified, **you MUST continually monitor ESC & motor temperatures to protect your electronics from damage.**

## OVERHEATING -- WARNING!

The Novak 4PHD Motor when used properly should not have an issue of over-heating. However extended runtimes, gearing, vehicle performance, and track conditions, can lead to overheating.

**You must use extreme caution when setting up these electronics and carefully test your application to avoid overloading and overheating either the ESC or the motor.**

Refer to GEAR SELECTION (above) regarding monitoring the temperature of your motor to prevent overheating and damage.

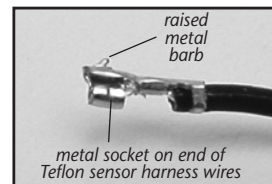
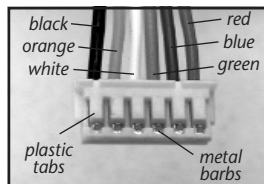
**Damage caused by excessive overheating WILL NOT be covered under the product's factory warranty.**

## MOTOR MAINTENANCE

- **CHECK ALL MOTOR SCREWS** for loosening at regular intervals, just like other hardware on your vehicle. *Note: The 3 main socket head screws that hold the motor together may require tightening after a few runs of the motor.* Also check the 3 flat head screws securing the end cap on the back of the motor.
- **CHECK MOTOR BEARING WEAR** after extensive use. The motor's closed design will keep most dirt and debris out, but some will get in and eventually cause wear. If the shaft does not spin freely, you may need bearing replacement. A small drop of Novak Speed Lube (#5860) on the bearings periodically can help extend bearing life. However, too much oil will attract dirt and will cause problems, so apply sparingly.
- **CLEAN INSIDE MOTOR** periodically by removing front end bell, removing the rotor, and blowing out the inside of the motor with compressed air. Be sure not to lose any small shim washers that may be on the ends of the rotor shaft, and keep them in the correct location.

## SENSOR HARNESS WIRING

Should any of the 28G Teflon wires pull out of the motor's sensor harness connector, re-insert them in the connector's appropriate slot as shown below. There is a small plastic tab that grabs a small raised barb on the back of the metal socket crimped onto the Teflon wire's end. Check the plastic tab to make sure it has not deformed excessively before inserting the socket into the plastic connector housing with the barb toward the plastic tabs.



## ACCESSORIES

- 5351-4 Shielded Sensor Harness--Double-ended. Available in 4", 6", 9", and 12"
- 5512 12GA Power Wire Set--3 feet each black, red, and blue
- 5647 Black Cooling Fan--25x25x10mm--With 2-pin JST connector.
- 5654 High RPM Cooling Fan--30x30x10mm--With 2-pin JST connector.
- 5731 3.5mm Power Connectors/5 pair--Gold plated low-loss connectors
- 5741 4mm Power Connectors/5 pair--Gold plated low-loss high-amp connectors.
- 5832 Lead-Free 3% Silver Solder--15g Tube--Low-resistance, high-conductivity
- 5836 Heavy Duty Lead-Free 3% Silver Solder--25g Tube--Thicker 1.5mm
- 5851 Heat Shrink Tubing--24pcs Black--6" pieces in 6 sizes from 1/16-3/8"
- 5852 Heat Shrink Tubing--40pcs Blk/Red--1" pieces in 1/4" size--20 each
- 5853 Heat Shrink Tubing Box--160pcs Blk--4" pieces in 6 sizes from 1/16-3/8"
- 5860 Speed Lube--10ml--Premium American-made bearing oil with penetrative additives

## SERVICE PROCEDURES

After reviewing instructions, tech section and how-to video section of website, if you feel your motor requires service (*motor may appear to have failed when other problems exist*), obtain the most current product service options and pricing by one of the following methods:

**WEBSITE:** Print a copy of the product **SERVICE FORM** from the SERVICE section of the Novak website. Complete form & return with the product.

**PHONE/E-MAIL:** Contact our customer service department by phone or e-mail, and we will supply you with current service options.

**WARRANTY SERVICE:** You **MUST CLAIM WARRANTY** on product **SERVICE FORM** and include a valid, itemized receipt with the purchase date on it, or an invoice from previous service work. If warranty provisions have been voided, there will be a service fee.

**e-mail: cs@teammovak.com • (949) 916-6044 • Mon-Thu**

## PRODUCT WARRANTY

Novak Brushless motors are guaranteed to be free from defects in materials or workmanship for a period of 120 days from the original date of purchase (*verified by dated, itemized sales receipt*). Warranty does not cover incorrect installation, components worn by use, cross-connection of battery/motor power wires, overheating solder tabs, damage resulting from thermal overload or operation above 160°F, use of excessive timing or overheating, splices or damage to the sensor harness, damage from disassembling motor, tampering with internal electronics, allowing water, moisture, or any other foreign material to enter motor or get onto the PC board, short-circuiting of motor by allowing exposed wiring or solder tabs to cross-connect or ESC applying simultaneous power to more than one phase at a time from switching to Brush Mode, free-revving motor, or any damage caused by a crash, flooding, or natural disaster. In no case shall our liability exceed the product's original cost. We reserve the right to modify warranty provisions without notice.

Because Novak R/C, Inc. has no control over the connection & use of motor or other related electronics, no liability may be assumed nor will be accepted for damage resulting from the use of this product. Every motor is thoroughly tested and cycled before leaving our facility and is, therefore, considered operational. This product is not a toy, and is not intended for use by children under 14 years of age without the strict supervision of an adult. Use of this product in an uncontrolled manner may result in physical damage or injuries. Take extra care when operating any remote control vehicle. *By the act of connecting/operating speed control, the user accepts all resulting liability.*

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