

Phoenix II Hub Power System Home Assembly Guide

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Overview

This guide will take you from the boxes to your first ride. We assume your dealer has not performed any pre-assembly, but some dealers do much of the work for you. They may have packaged your system differently, might have performed part of the assembly, and might have included accessories such as a third-party speedometer or light set. Those items should have their own documentation. This guide covers installation and assembly of the equipment supplied by EV Depot with your hub motor system.

Your safety

If you are not confident of your ability to assemble a safe, properly adjusted bike, please take it to a bike shop now along with these instructions. The charge is generally minimal and you can be sure it is installed safely and correctly. Some dealers may pay a small fee to have your batteries pre-wired, while others do not specify. If you want your batteries pre-wired, be sure to tell your dealer when making your purchase. There may be an additional fee associated with pre-wiring, depending on the dealer. Battery wiring instructions are available on request.

We have prepared these instructions to make the installation of your Phoenix II hub motor conversion kit as fast and worry-free as possible.

Required tools

- Scissors or wire snips
- Crescent or 17mm wrench
- 11/32" wrench
- Phillips-head screwdriver
- 3mm hex wrench

Unpack

Open the boxes and identify all the parts with the Kit Contents list below.



Complete Kit Contents	Power System Only Kit Contents
Phoenix II Motor Laced to Rim	Phoenix II Motor Laced to Rim
Throttle	Throttle
Controller w/50A Anderson Connector	Controller w/50A Anderson Connector
APM-Display	APM-Display
Spoke Wrench	Spoke Wrench
Batteries	Zip Ties
Wiring Harness	
Charger	
Bag or Battery Brackets	
Rack or Basket	
Brake inhibits	
7-Speed or 8-Speed Freewheel (Rear Only)	

Install the Tire

1. Remove the original front wheel from your bike.
2. From this wheel remove the tire and tube for use on your new Phoenix II Wheel.
3. Push the tire and tube, starting with the valve, onto the rim, one side at a time, being careful not to pinch the tube.
4. Inflate to about 5psi and check to see that the tire is evenly seated all the way around the rim on both sides. Inflate to 30psi. If you have a valve stem remover, quickly unscrew the valve stem to deflate the tube as quickly as possible. This step is important, as it will usually fix any wrinkles, folds, or pinches. If you don't have a valve stem remover, simple let the air out of the tube as fast as you can by pushing in on the valve stem. NOTE: If you have a slime tube, position the valve stem on the top as shown in the picture above in order for the slime to fall away from the valve stem before deflating. Make sure to allow enough time for gravity to do its work or it can be a very messy task.
5. Inflate to the full pressure specified on the sidewall of your tire in increments of 10psi, making sure the sidewall is seated in the rim properly between each increment.



About tires

The higher the pressure, the less rolling resistance. Tires capable of higher pressure will give you better range and speed. The smoother the tire, the less rolling resistance. Slicks give you better range and speed than knobbies.

Install the Wheel

6. If you don't have a bike stand, turn the bike upside down and rest it on the seat and handlebars. Use wood blocks or other material to protect the seat and any accessories on the handlebars.
7. Make sure the brake arms are out of the way so the tire on your new wheel will mount bypass them easily. Some brakes require that you loosen the cable. Others have a quick-release for the cable.
8. When correctly mounted, the wires coming from a Phoenix II motor will exit on the LEFT side of the bike, which is also where your rotor will mount when using disc brakes.
9. Before mounting the wheel on the frame, observe these two dimensions:
 - a. Fork width
 - b. Dropout Diameter

About Fork Width

We have successfully installed hub motors on many bike frames. If you do not have front suspension, you can use a tool as simple as a threaded stud and bolts to spread the forks. Turn the bolts on each side evenly, switching from left to right, spreading the fork to the necessary width. Do NOT try to bend a front suspension fork, and do NOT try to bend aluminum!

About Dropout Diameter

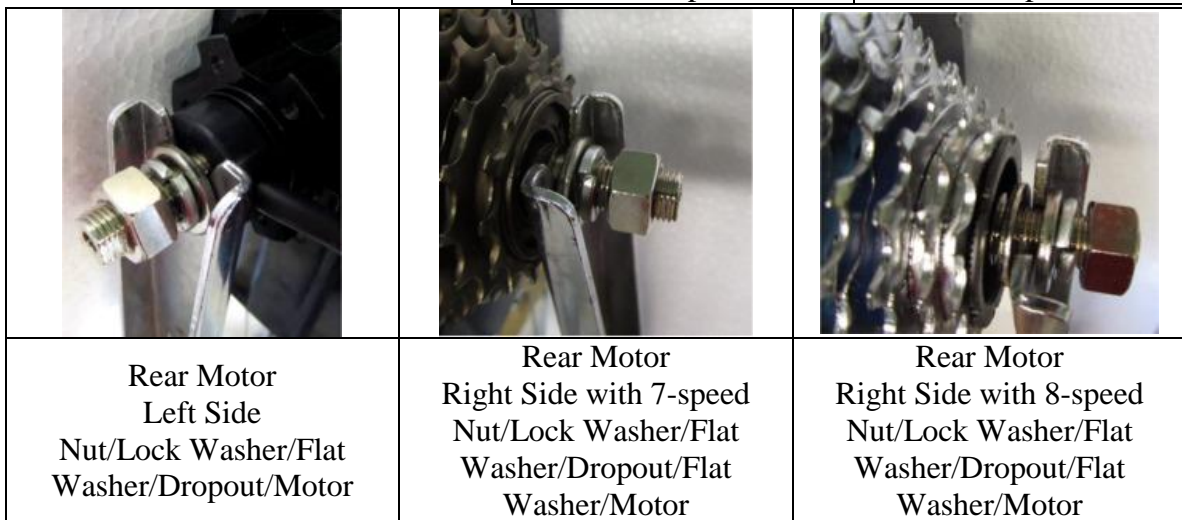
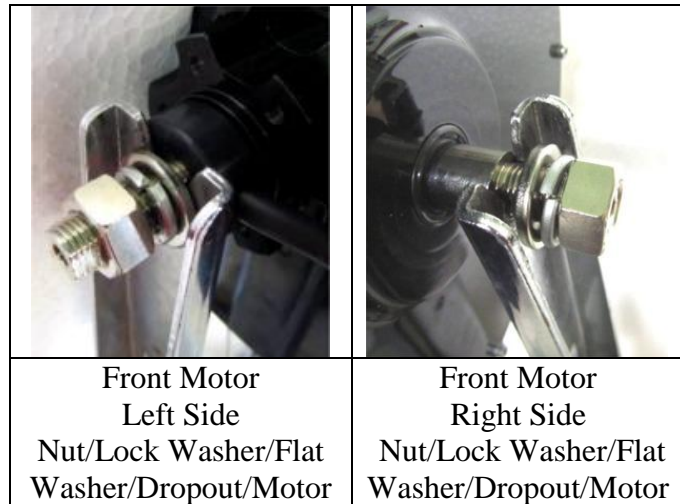
If necessary, use a die grinder to enlarge dropouts to the 10mm diameter of the axle. Any means of filing can be employed. The fit should be snug. For Phoenix II systems, we recommend steel forks with sturdy dropouts, usually found on less expensive frames. **DO NOT USE ALUMINUM FRONT FORKS!** Most who have dared install a Phoenix II motor on aluminum front forks have regretted it. Not only are the dropouts likely to break, but the motor wires are also likely to be damaged.

10. Put the wheel onto the frame, making sure that the channel through which the wires run faces downward (when the bike is upright.) This will help protect it from rain.



The channel of the axle should face downward to help keep water out. Make a loop of wire that extends below the axle so water will drop off the wire rather than into the channel.

11. If you have a rear motor with a 7 speed, you may need an extra washer. If you have an 8speed, you will definitely need an extra washer. The extra washer must be used as a spacer between the dropout and freewheel (gears) if the frame rubs the gears.
12. Observe the positions of the washers and nut on each side of the motor.



13. Tighten the axle bolts with the crescent or 17mm wrench. They need to be tight enough to prevent the motor from spinning the axle with it. Please note that damage caused by the bolts not being tight enough is not a manufacturing defect and is not covered by your warranty. Please tighten the bolts! If you have a torque wrench, tighten the nuts to 50 ft lbs for Phoenix II motors.
14. DO NOT over-tighten the axle nuts! While you want to be sure they are tight, over-tightening the axle nuts can strip the axle threads, rendering that motor useless. Please use judgement, as stripped threads caused by over-tightening is not a manufacturing defect, and is not covered under warranty.

About Torque

Torque is twisting motion. If you apply throttle without first securely tightening the axle bolts, the motor will try to turn inside the dropouts, permanently damaging the wires coming out of the motor. Be sure the axle is very tightly secured to the dropouts. Phoenix front wheel motors also have a torque arm.

Torque Arm

The Phoenix II motor torque arm is attached to the axle and goes “outside” the front fork. Torque arms are designed to transfer much of the torque from the dropouts to the forks themselves. There are several ways to install the torque arm depending on your specific setup. Notice the torque arm has a separate piece with a wire channel that allows the wires to run through it. This is only possible if your setup will NOT use disc brakes. Since disc brakes are on the left, and the wires also exit on the left, the torque arm must be installed on the right-hand side when disc brakes are being used. If rim brakes will be used, torque arm installation can be done on either side. Also note that when installed on the side opposite the wires, the outer plate that normally would channel the wires can be removed by removing the 3 screws.

15. Re-install and adjust the brakes. Chances are good that the new rim and the old one aren't exactly the same, so adjust the shoes so that they engage the rim with full contact. Adjust the cable for just enough free-play to keep the shoes off the wheel during rotation. Remember, you will be asking more from your brakes when riding at electric bike speeds.
 - **Center Pull Brakes** are the oldest and least effective style of brakes around today. Bulldog brakes we sell are a good replacement for this style of brake, however, the center pull brake design just isn't very effective for E-bikes. We recommend using a different style. Center Pull Brakes have a bolt that runs through the center of the brake assembly, and through the top-center of your fork.
 - **Linear Pull Brakes** are a much more advanced version of center pull brakes. Linear Pull Brakes offer much more leverage for braking than center pull brakes, and are usually sufficient for stopping heavy E-bikes. Linear Pull Brakes have one arm attached to each fork, and the cable is what connects them in the center. Many Linear Pull Brakes are just as effective as disc brakes.
 - **Disc Brakes** are the most advanced style of braking for bicycles, although some are better than others. In order to use disc brakes, your frame must already be equipped with a caliper mount to attach the caliper.

Install the Rack

16. Install the rack. It's a little different for each bike, but generally you will use one of the pre-threaded accessory holes for the lower support and the seat clamp for the upper support. It may be necessary to bend or grind a little off the upper supports of the rack to fit some bikes. For the rack you will need a Phillips-head screwdriver and an 11/32" or crescent wrench.



Mount the Controller

17. Most controllers will operate just fine if stored in the cargo bag with the batteries. However, it is best to allow air to keep the controller cool. If your controller shuts down from thermal overload, let it cool for a few minutes. For external mounting you can secure the controller to your bike frame using zip-ties, or secure it on top of your cargo bag using the attached bungee.

TIP: If you want to remove your battery pack for charging, it is best to mount the controller on the bike frame. Doing this will allow you to leave throttle, motor, and optional cruise control with inhibits connected to the controller as a part of the bike. To remove the battery pack, you only have to disconnect one connector from controller to batteries.

Mount the Throttle

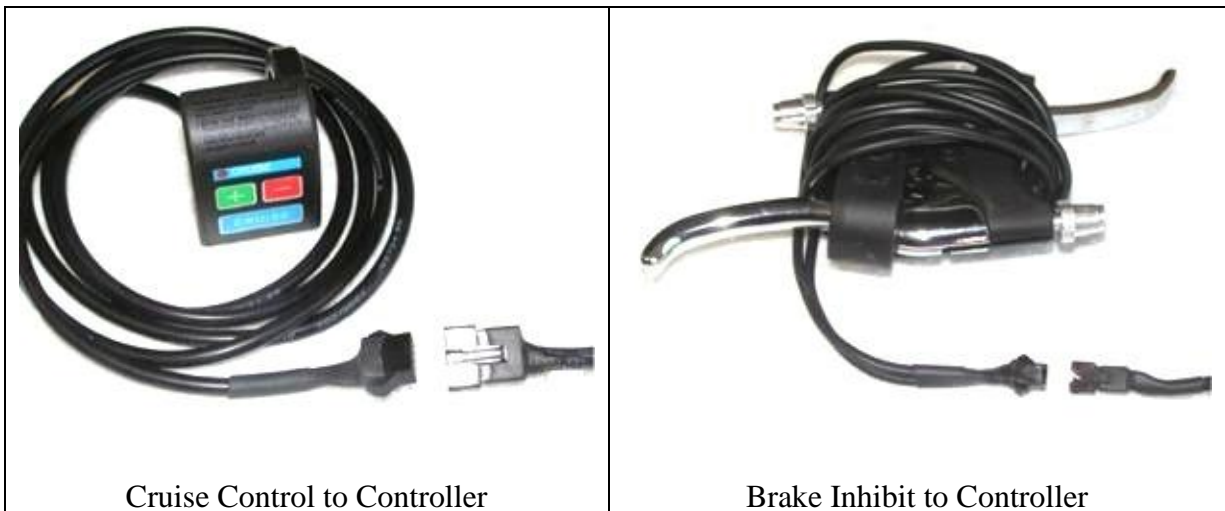
18. **Removing handgrips** can sometimes be a challenge, but there are tricks to making it a little easier. If you have an air compressor, forcing air through the hole in the end of the grip may force it or the opposite grip to slide off. If that doesn't work, try prying under an edge of the grip with the air tool and forcing air through from that direction. You should notice the grips come off fairly easy this way. If you do not have an air compressor, it can take a little more patience. The idea is to force air (or lubricant) between the wall of your hand grip and the handlebar, creating a thin layer of air (or lube) between your grip and handlebar. This will reduce or eliminate the friction between the two, and the grip should slide right off.
19. The order in which you install the handlebar components is up to you. Some throttle types may fit more comfortably in a different order. The thumb throttle may require the following: Remove the right handlebar grip and shifter if there is one present. Leave the brake handle, as your throttle will be installed against it.

Push the throttle onto the handlebar and against the brake, along with the black spacer following the throttle (see pic). Leave it loose while you replace the shifter and other components onto the handlebar. Once you have your handlebar components placed where you want them, you can begin to tighten them. The throttle can be tightened using a 3mm hex wrench. Handgrips of the proper size (or close) are supplied with all throttles. Depending on your shifters and brakes, you may need to cut a little off the grip. There is a way on every bike; some just take a bit more creativity than others. NOTE: Always make sure you install the thin, black washer between your throttle and hand-grip in order to eliminate friction between the two. If the black washer is not installed, the friction of the hand-grip against the throttle will prevent the throttle from springing back to its OFF position. Thumb throttles and twist throttles have a different type of spacer as seen in the pictures.



Run the Wire

20. Connect the 3 Pin plug on the motor to the corresponding plug on the controller.
Connectors will only fit with the correct mate, so do not try to force or alter any connections to make them fit! NOTE: We have spent much time testing components, connectors, etc. Our final product is extremely reliable the way it is sold, and when used as intended. **DO NOT CUT OR CHANGE CONNECTORS!** Most customers who do so create problems they were not expecting, and shipping components back for repair can get frustrating. We have done our best to provide a high quality, high power, and highly reliable system. Even the smallest change to our design could result in problems, so it is best to leave things in their original condition.
21. Connect the throttle wire to the controller. There is only one plug on the controller that fits the throttle connector. All of our throttles fit all of our controllers. The throttle connector is a 4-pin connector, although only 3 of the 4 pins are used with non-lighted throttles.
22. Connect Cruise Control and Brake Inhibits (If applicable). Cruise control has a 5-pin connector. Brake inhibits have a 3-pin connector.



23. Run all of these wires neatly along the frame where the movement of open brake and shifter cables will not rub through the insulation. Zip-ties make for a tidy installation. It is best to first install the zip-ties very loose. Once you make sure you have adequate slack for full left-and-right movement of your handlebars and bike suspension components, tighten the zips-ties until they are just snug. Over-tightening the zip-ties can cause your wiring to overheat, insulation to melt, and permanent damage to components.

Battery Pack

24. If you purchased a complete kit, the wiring may already be done for you. You may need this information when it is time to replace your batteries, so hang on to it. Please note that while a soldered connection is the best connection, it is also the most difficult connection to separate. For easier battery replacement, EV Depot does NOT solder the wires to the batteries anymore. Your battery wires will be secured tightly to each battery using a filament tape that will not come loose or tear. This allows the use of the same wire harness for your replacement pack when the time comes.
25. Phoenix II systems are sold in 3 different voltages, 36V, 48V, and 72V. Standard SLA batteries sold with Phoenix II systems are 12V 12AH. Wiring instructions are available on request.

Note: We use a 50A Anderson connector (gray color) for all battery-to-controller connections. They are very sturdy connectors that will never overheat.

Batteries contain a lot of energy! You can vaporize light metal with a single battery!

About Batteries

The oldest, most reliable battery chemistry is sealed lead acid (SLA). The acid is fully absorbed into a glass mat and the batteries are completely sealed. There is no maintenance to be done. You can, however, form habits that will greatly extend the life of your batteries. Always plug in the charger after use. SLA batteries do not develop a memory, so you can charge them anytime, charge them fully, or charge them partially. If they sit for weeks in a discharged state, they may never take a charge again.

Connect the Battery Pack to the Controller

26. Connect the battery pack to the controller. If your keyswitch is ON when you make the connection, you will hear a “pop” and may see a spark. This is normal behavior. It will not hurt you or the system.



APM-Display

The Active Power Management Display (APM-Display) is an amazing device! Equipped with a bright blue back-light, the large display screen is easy to read from any riding position. Not only does it display measurements like trip, watts being used, RPM, volts, speed, and current, but it has programmable parameters for things like low voltage cutoff, max.current draw, and has 3



preset speeds. All Phoenix II Complete kits and Power System Only kits include an APM-Display that has been pre-set to the correct wheel size, voltage, low voltage cutoff, and max current based on the system you purchased. While EV Depot has many processes in place to minimize the risk of human error, we recommend you verify the settings of the APM-Display are correct before your first ride. **Incorrect display parameters can cause permanent damage to your battery pack and other major components!** See *APM-Display Owner's Manual* for more details and information.

Disclaimers

This publication is **not** a substitute for a bicycle mechanic. **If you have any doubt about the safety of your bike, or if you doubt your ability to assemble it safely, take it to a bicycle shop now.** Charges are usually minimal to assemble and adjust a new bike, and your safety is well worth the money.

Truing wheels (keeping wobble out of wheels) is usually the most difficult maintenance challenge for bicyclists. There are a number of good online “How To” resources for every type of bicycle maintenance, but many prefer to have their bike tuned up periodically by a professional. The electrical system and motor require no maintenance.

We have tried to be 100% accurate in the development of this guide, but we are human, subject to making mistakes, and cannot guarantee the absolute correctness or completeness of this guide. If you have any questions or concerns not covered by this guide, you should contact your Authorized Dealer.

Warranty

We have engineered our systems for maintenance and trouble-free operation. We also realize manufacturing defects still occur. Electronic component defects usually show up within the first two weeks of use. We stand behind our systems and will cover all manufacturing defects by replacing failed parts. We will not cover abuse. That is, we expect our customers to realize their light electric vehicles have limits. Most of the same kinds of rules apply to electric vehicles as gas-powered vehicles. You can't hold the throttle and brake at the same time for very long or something is going to break.

In the case of a car, it will probably be the transmission. In the case of an electric vehicle, it will probably be the controller. Driven responsibly, you can expect years of use from your system.

For 90 days from date of purchase, we will repair or replace any defective part of your power system purchased from an EV Depot authorized dealer. The warranty extends to 180 days for the motor. Here's how it works: Contact the dealer from whom you purchased your system. Your dealer will listen to the symptoms you describe and contact EV Depot for a replacement part. Only if your dealer cannot be reached, call EV Depot at 325-227-6903.

Upgrades, Parts, and Accessories

Your Phoenix II Authorized Dealer stocks a number of parts and accessories for electric and pedal bikes. They also offer upgrades and accessories to make your bike go faster and/or farther. From faster chargers to batteries to beefed-up motors, they will try to satisfy your electric transportation needs.

Phoenix II systems are made by Crystalyte for EV Depot. Please note that Phoenix II is more powerful than Crystalyte's main line HS/HT24 and HS/HT35. Therefore, what you receive from EV Depot and your dealer may be different than what you would receive elsewhere. EV Depot uses 12g spokes, better paint, etc. Motors that are made for EV Depot can be identified easily by their black color.