# CONVERSION KIT

## User Manual

## Dillenger Premium Off Road Kit


English

Please read through carefully before beginning your conversion

# THANK YOU

Thank you for purchasing your new Dillenger conversion kit!  We know you'll love it, and with some care it should last for a very long time.  Please read through this manual carefully before operating the kit.

# SAFETY

### Mechanical Safety Check:

Routinely check the condition of your bike. Make sure no fasteners have come loose. Perform a visual inspection of the whole bicycle before every ride. Make sure tyres are correctly inflated within the range given on the tyre sidewall. Check your brakes for proper operation.

### Your First Ride:

Be sure to pick an area away from cars, other cyclists, obstacles or other hazards to become familiar with the controls, features and performance of your new electric bike.

## PLEASE NOTE

We highly recommend the purchase of the Dillenger hub motor conversion kit. It will make your installation and ongoing maintenance much easier. This can be purchased online.

# Contents

# ITEM CHECK LIST

Each conversion kit is tested for quality control before shipping to a customer. Before converting your bike, it's a good idea to lay each of the components out to visiualise how they will come together on your bicycle.

In the box you'll find:
- Motor wheel
- Battery with keys and cradle
- PAS, throttle, and e-brake sensors
- LCD display
- Wiring
- Fasteners

- Before you begin your conversion, it can be helpful to lay everything out first and make sure all the parts are there.
- Something missing? Double check the box, even under the flaps. Those small parts can be sneaky. If you still can't find it let us know and we'll assist you ASAP.

# INSTALL OVERVIEW


## 1. Remove Contents

Take your components out of the box. Remove the protective packaging. Keep track of all the parts that you remove from the box. Remove the battery and put it on charge.

## 2. Prepare you bike

Make sure you have measured your dropout slot widths (approx. 10mm) and the clearance between your dropouts (approx. 135-140mm for the rear of the frame). Remove your current wheel, remove the tyre, tube, rim tape and also your handlebar grips, shifters and brakes.

## 3. Installation

Once you have your bike ready for installation, the first step (after transferring your rim tape, tube and tyre) is to install the wheel and secure the axle nuts. Take note of the order or the washers so that you can replicate this when installing into the frame. Then move on to the battery cradle/ controller and handlebar controls.


## 4. Tidy Up

After you have installed all of the components needed to control each part of the kit, it's now time to tidy up the wiring harness and make your conversion look nice and neat.


## 5. Ride!

Once the battery is fully charged, you've checked your tyre pressures and fasteners you're now ready to go!

# INSTALLATION PROCESS

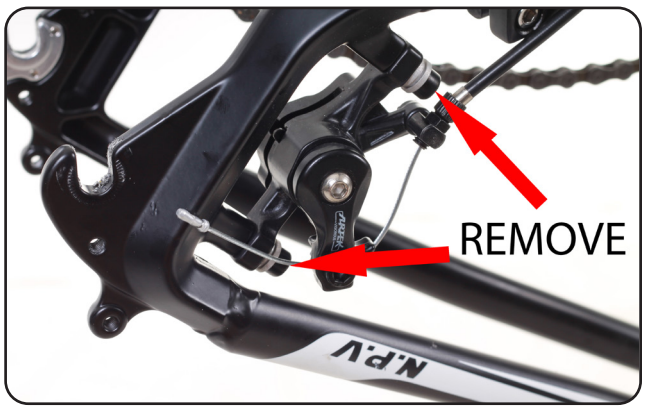
## Pre Installation Tips

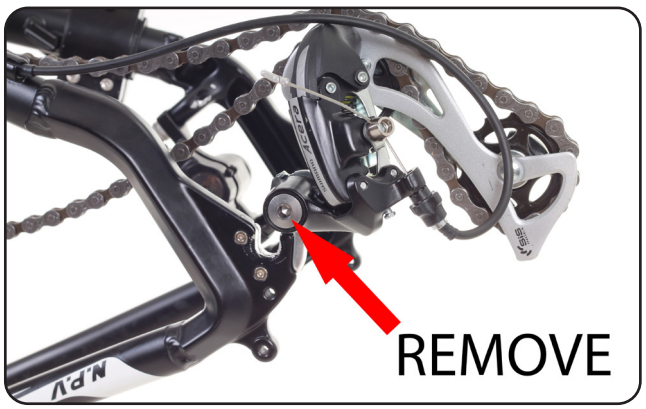
Before beginning your conversion, there are a couple things you can do that will make the installation more efficient. Remove your handlebar controls such as your brakes, shifters and grips. Remove your rear wheel and install your existing tube, tyre and rim tape (recommended) onto the new electric wheel.

The first step in any conversion is installing the wheel. The easiest way to take off your wheel is to turn your bike upside down so that your bike rests on the handlebars, and the seat. Your seat height may need to be adjusted to ensure the bike will be stable, when upside down.

Take off your disk brake caliper from the frame, or release your V-brakes if you have not done so already. For disk brake users, it's much easier to fit the motor wheel with the caliper removed.

If your bike has gears, it can also be helpful to remove the derailleur before installation of the rear wheel.



# INSTALLATION INSTRUCTIONS

The installation instructions for this kit are show in this video:

https://www.youtube.com/watch?v=Arg5zSV3Cl8

In this manual we will describe the main steps in the installation process, but we strongly recommend use the video as well. Seeing the steps in the video will help you to understand each step and make the process a lot easier.

The video shows an older version of the kit which uses a cassette, while the newer kits use a freewheel. All other installation instructions are the same for the new kit.

# Freewheel and Disk Brake Install

Once you've taken your old wheel out of your bike and put the tube and tyre on the new motor wheel, you can install the gear cluster on the motor.

This rear wheel motor uses a threaded freewheel, not a splined cassette, and can take up to a 10 speed.

For those with disk brakes, the disk brake rotor installs onto the side of the motor hub just like a regular hub.

Tighten the bolts to maximum 5Nm (40 lbs) tightening torque. If you overtightened these bolts, you may risk stripping the hub which is not covered by warranty. Make sure that the bolts aren't too long, otherwise they'll interfere with the internal parts of the motor.

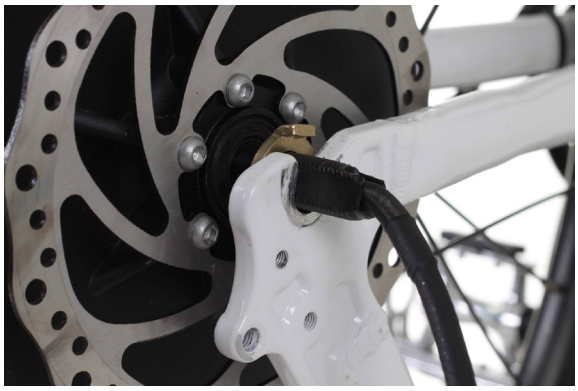
If you don't have disk brakes, leave this side of the hub untouched.

# Wheel Install

Once you have installed the disk brake, loosen the axle nuts on the electric wheel. This will allow the axle to slot into your dropouts. We are showing the most common way that the fasteners/ washers can be arranged, but it is possible you will discover a more suitable way to arrange them, depending on your bike and gear set layout. If you need to space the rear dropouts further, you can use the washers and spacers provided. If the you need more room on the gear set side, space the hub over with the washers provided, or if you need to space the hub evenly over to the disk brake side, you can rearrange the fasteners to achieve this.

The distance between your dropouts should be around approx. 135-140mm. Your rear dropouts/chain stays will flex in and out a certain amount without causing any structural issues. The dropout axle slots should be approx. 10mm however you may need to file off a thin layer of paint for the axle to slot in all the way. The axles are designed to be a very tight fit, so don't stress if you need to remove a small amount of material, this is normal.

So long as the hub is orientated so that the freewheel thread side is on the chainwheel side of the bike, it will rotate in the correct direction.



# Wheel Install Continued

With your bike upside down, your wheel should be pushed all the way down into the dropouts to make sure it's a nice and tight fit. This is very important. If the dropouts are not embedded firmly in the bottom of the drop out slots this could cause failure of the dropouts or cause the electric hub axle to become unsecured.

Tighten to approx. 30-40Nm (250 - 350 in lbs). If you would like to install the torque arm on the rear wheel, please see the manual for the Arc torque arm on the website.

Your rear derailleur and disk brake callipers can now by reinstalled if they were removed prior to the installation of the rear wheel.

# Battery Cradle Install

The battery installation starts with mounting the battery cradle. This is what your battery will attach to and it's also where the controller is housed.

The most common way to install the battery is by using the drink bottle holder mounts on your frame. Simply remove your drink bottle holder, (if you have one) and you're ready to install the battery cradle.

You will be able to tell where your cradle will fit best by simply holding the cradle up against your frame. You will have a few different height options however keep in mind you need room above the cradle to manoeuvre the battery in and out. You can secure the cradle by using your existing bolts/screws and tightening them up.

Be careful not to over tighten your bolts/screws as drink bottle mounts and threads are only 'nutserts'. If installed correctly the battery and cradle should feel very secure and not bounce over bumps.


If drink bottle mounts aren't an option, there are plenty of battery attachment options other than the method above, such as:

1. Install the battery on a rear rack (contact Dillenger for this option).

2. Use large hose clamps or heavy-duty fasteners to secure the battery cradle on the downtube (not recommended).

3. Drill through holes in your frame and use high tensile steel bolts and lock nuts to attach the cradle. If done correctly, this is a very solid option and you will only need to spend $2 on fasteners.

The cradle should always be secure and rigid to avoid any vibrations or movement of the battery.

# Battery Install

Once you have installed the cradle you slot the battery in its cradle.

The battery is automatically in a “locked” position, so in order to remove the battery from the cradle you need to turn the key and gently slide the battery out of the cradle.


# Handlebar Controls Install

With the motor, battery, and cradle/controller mounted, it’s time to move on to the easy part.

Firstly remove the packaging from the Display, Thumb Throttle and E-Brake Sensor kit.

Your handlebars should be just about bare, ready to accept your new controls.

# Display Install

Mounting the display is easy. The display should be mounted to the clamp first, using two screws.

Next, remove the nuts and bolts from the clamp and put the clamp on the handlebars.

There are rubber spacers included in the kit that go inside the clamp depending on the thickness of your handlebars. Now put the nuts and bolts back into the clamp and tighten them securely.

Position the display so that it will be hassle free to glance at during your ride.

The angle of the display can depend on the rider style or the shape of the handle bars.

Attached to the Display is also a Pedal Assist Controller. This Controller also has the On/Off button on it.

The way this controller works is that it has a number rating that will appear on screen. The higher the number, the more that the motor will assist with your riding, or pedaling.

This pedal assist controller should be slid on to the handlebars on the side most preffered by the rider and then tightened in a comfortable position. This is shown in photo 2.

Tighten your brake lever in place, and do a final check of all the controls that they are all comfortable and tightened.

The grips can now be reinstalled to your handlebars.

# Thumb Throttle Install

Start by putting the brake lever back on and tightening it in place. Next, slide the thumb throttle onto your handlebars, usually the right side, however it is up to personal preference which side the throttle goes. Move the throttle to the inside of the handlebars and tighten it in place so it butts up against the throttle.

Once you have the throttle secured, make sure the cable is not fouling the brake lever, otherwise readjust.

Before sliding the grip handle onto the handlebars, make sure you insert the small plastic bush (you can see this in the third photo on this page). This prevents the grip from rubbing against the throttle.

At this point your handlebar installation is completed and you should have everything in a comfortable position.



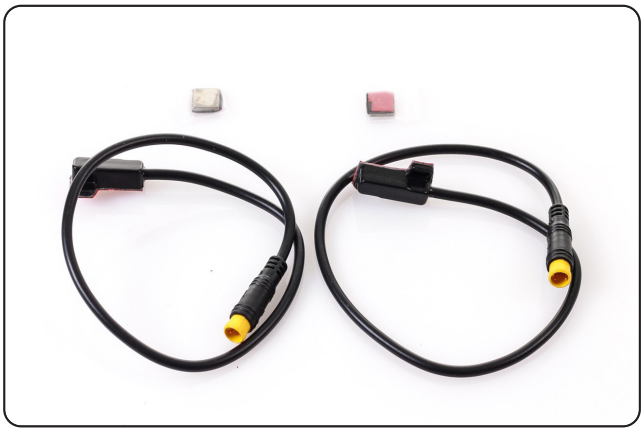


## PLEASE NOTE

For users in states or territories that require no hand throttle to be used, (pedal assist only), you can pass this step and leave the throttle absent. Please move onto the RPAS installation process.

# E-Brake Sensors Install

This kit comes standard with E-Brake Sensors which are a nifty little invention that enables you to use your existing brake levers. This solves a common issue from previous systems that required the replacement of the brake levers which is more time consuming and also problematic if you have hydraulic brakes or integrated gear shifters.



In this series of photos, we have shown the installation of the magnetic square and the sensor on the top surface of the brake lever. This is purely for visualisation purposes. The sensors/magnets can also be installed underneath the brake levers so they are hidden, making for a sleeker look.

The magnetic square and the sensor should be installed so that when the brake lever is realeased, they contact each other.

When you pull on the lever to brake, the sensor will register the proximity change and activate the e-brake cut off. This means that when you use your brakes, the pedal assistance will stop.

Cable ties can be added to the sensor for added rigidity.

If you prefer not to add the e-brake sensors, the system will still function without them. For throttle installations, e-brake cut off is not necessary. For installations with pedal assist, it is highly recommended (and mandatory in some states).

# Removable Pedal Assist Sensor (RPAS) Install

Normally this step would involve the removal of the crank which can be quite complicated. Thanks to Dillenger's innovative RPAS, this step is now a breeze!

To begin, have a look at the black plastic magnet wheel and the way the two halves join together. When you snap them together on the crank axle, (on your bike) you will then need to fit the steel circlip around the outside groove.

The purpose of the pedal assist sensor is to generate a signal from the rotation of the crank that the controller processes to know that you're pedaling and want some power!

How does this work? Magnets on the disk generate a changing magnetic field or a 'hall effect' and this is picked up by the hall effect sensor which transmits a signal to the controller. The pedal assist is the primary function of an electric bike and the level of assistance is adjustable on the handlebar LCD.

1. The sensor will need to line up very closely (under 5mm) to the RPAS disk.

2. Be sure to have the "working side" text facing the sensor. The RPAS is directional, so when you pedal backwards, the motor won't engage (that would be dangerous and annoying!). If the PAS doesn't have writing on it, face the flat side to the sensor.

3. With the two halves of the disk mated together you can mount the silver circlip onto the disk, without jamming your fingers in the process (ideal, but not always possible).

4. When fitting the hall effect cadence sensor, the adhesive section is only there to hold it in place while you secure the sensor with cable ties provided.

# RPAS Install Continued...

The RPAS disk installs easily by placing each half of the disk around the crank axle, and then securing the steel circlip around the outside groove.

Next the sensor must be installed. This is done by peeling off the strip of paper to expose the adhesive bottom surface of the sensor. The sensor can then be stuck down in place and then zip tied to ensure the senor is secure.

Depending on the style of crank axle you have, you may need to modify the black plastic wheel and remove some of the internal 'vanes' of plastic.

You may be required to carefully remove a portion of the vanes if a larger diameter hole is required. This would be done with a sharp pair of scissors or side-cutters.

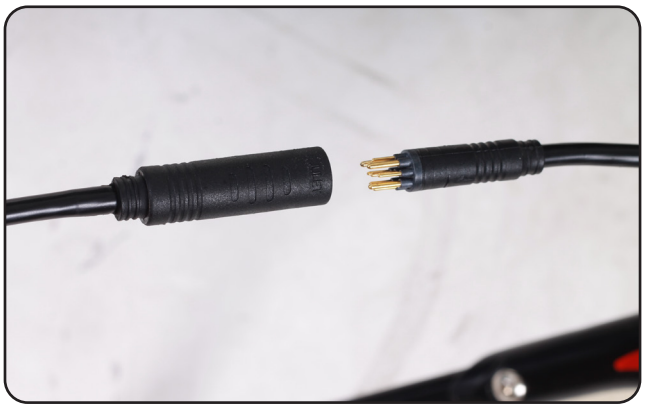
The level of assistance you receive is controlled by your handle bar display buttons, which we already fitted with the display, (up and down buttons).

# Wiring Install

The wiring now has to be connected up so that everyhting has power and can function correctly.

All the wires are colour coded so it is simply a matter of connecting the same coloured wire ends together.

1. The first wire to connect is the main wire connecting from the rear wheel to the controller. This wire has 9 pins at the end of it. At the end of the wires are arrows, align the arrows and then insert the pins.



# Wiring Install Continued

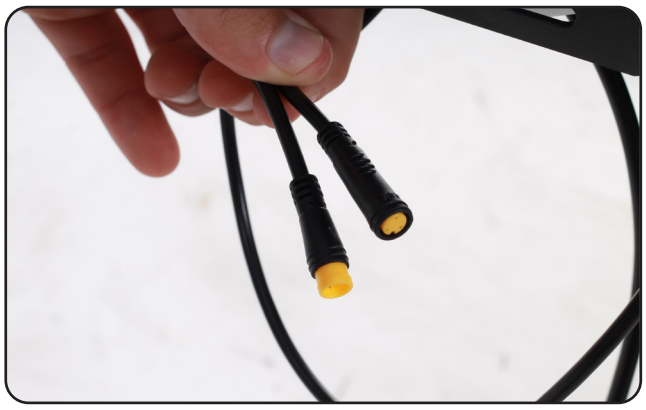
2. The next wire to join is the RPAS sensor to the controller. These wires are colour coded yellow.

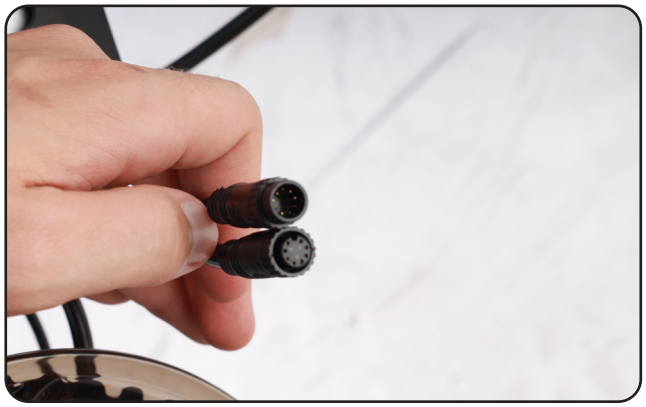
3. Now connect the Wiring Loom to the controller. These wires are colour coded with a black plug.

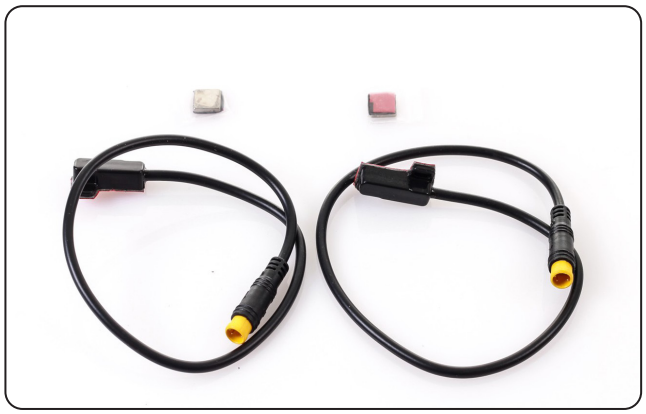
4. The male yellow plug from the wiring loom goes to the throttle.

5. The two female yellow plugs from the wiring loom go to the E-Brake sensors.

6. Lastly the green plug from the wiring loom joins with the wire coming from the LCD display.







# Tidy Up

In the final stage of the installation, it's time to tidy up the wires and make everything look nice and neat.

In the adjacent images, you can see the provided zip/cable ties being used to bundle and secure the cables coming from the base of the battery/controller, RPAS and anything else leading up to the handlebars.

Also included in this kit is a protection pipe which can be used to group multiple brake/gear cables together to make for a neater appearance.

# Battery Operation

As previously mentioned in this manual, the battery is automatically in a “locked” state. Turn the key to unlock the battery from its cradle. When the battery is unlocked, it can be removed from the cradle for charging.

The battery charging plug is on one side of the battery and the On button and key hole are on the other side of the battery.

Take one of the keys off the key chain before you’re finished and store it in a safe place. The keys are coded so if you loose both you will have to ship your battery back to Dillenger to have the barrel replaced (not ideal!).

The battery should never be ridden or turned On without being locked into the rack. It should also never be dropped or treated roughly.

If you’re battery is returned to us and has signs of being dropped, this will void the warranty.


## Turning Your Bike On/Off

Once your bike and conversion kit have been properly assembled and wired you will obviously want to turn it on and ride! Ensure the battery is sufficiently charged and locked in, then press the Power button (it will stay in and glow blue). Next, hold down the Power button on the control on your handle bars until the display turns on. Now you are free to ride!

To turn off hold down the Power button on the control on your handle bars until the display turns off, then press the Power button on the battery. It will release and the blue light will turn off.

### PLEASE NOTE

Even with the battery locked in and turned off, the bike should be locked using a high quality bike lock.

# Charging

Charging the battery:

1. Plug the charger into the wall socket/outlet, just like a laptop of mobile phone charger.

2. Check that the LED on top of the charger glows green.

3. Plug the charger, (battery end) into the battery carefully, making sure it is all the way in. Do not force it if there is an obstruction.

4. The charger indicator light should glow red whilst charging.

5. Once the charger indicator light changes green, the battery is fully charged.

There is no way to over-charge the battery. When it is full, the charger will stop charging the battery automatically.

Charging time can vary from 1 to 7 hours if completely empty.

The battery should be used and charged at least once every month as a minimum to maintain healthy cells.

The best way to charge your battery is to plug it in after every use, and leave it on charge until the indicator light shows the battery is fully charged. It is not good practice to only half or partially charge the battery.




## PLEASE NOTE

Only charge the batteries with the specified charger. Using a different charger could damage your battery.

# Maintenance and Care

A little extra maintenance is required over and above a normal bicycle.

One of the main things you may come across is that your spokes need to be tightened more often than a non-electric wheel. Our wheels use 12G and 13G stainless steel spokes which handle the load and torque of these motors very well, but are more susceptible  to coming loose.

A spoke-tightening tool such as the one including in the Dillenger hub motor conversion toolkit, is ideal.

Check the tightness of each spoke ideally after the first 100km and then every 500km.

As well as caring for your spoke tension it's important to do a check on all of your fasteners every few months. It never hurts to go over your bike with tools, tightening and checking everything that can be checked. This will ensure you have a safe and well-serviced bike.


Keep your bike clean! There's nothing worse than having to work on a dirty bike...

Also keep in mind the usual bike maintenance like tyre pressures, brake pads, etc...

The motor in this kit is a sealed unit and requires no maintenance during its design life.

Lastly (just to reiterate) it's important that you charge the battery at least once every month to ensure the battery maintains a safe storage level.

## PLEASE NOTE

Any modifications to your conversion kit that aren't approved by Dillenger staff, will void your warranty.

# Trouble Shooting

Dillenger's troubleshooting advice will take you through a logical way to diagnose any issues that may arise during installation and use.

Before commencing troubleshooting, disconnect all components. Do not short cut this process. There are countless times a loose plug has caused grief. By disconnecting all the plugs and then reconnecting just the crucial components, this will solve any loose plug issue.

Go through one by one plugging in the other components (such as the PAS or the e-brake handles) to see if any of these are the cause of the problem. In this basic state you may discover the culprit quickly.

| Fault | Solution |
|---|---|
| Display turns on, but motor does not Activate | Check the motor plug from the controller. This is a very stiff connection and will not work unless the plug is all the way in to the indicator line. The twisting of the handlebars can sometimes cause the plug to pull out slightly if there is not enough slack in the motor cable. |
| Motor runs backwards | Remove the motor from the frame and switch the direction. |
| Motor feels like it has something caught inside or some kind of brake on inside | Remove the disk brake bolts completely and see if this remedies the issue. If the disk brake bolts are too long, they will go too far into the housing and fowl against the internals. |
| A high pitched rattling noise can be heard when accelerating | The vibration of the motor is very small, but at this frequency it can do some odd things to the other components on the bike if they are loose. For example a loose spoke or even a bolt on your rear rack. If something is just a little bit loose, sometimes this can reverberate and make a harsh high pitch rattling sound. Nothing is broken or wrong, you just have to identify the loose part! |
| Rim has a buckle or spokes coming loose all the time | We would recommend a competent wheel builder to fix any major spoke tension issues, however there are some really good youtube tutorials on how to adjust spoke tension. |
| Spokes have snapped or missing | Dillenger stocks spare spokes for very reasonable prices, just check out our spares section online and you can find the right type and length for your kit. |

# Trouble Shooting Continued...

| Fault | Solution |
|---|---|
| Motor does not fit in dropout axle slots | If you are not comfortable in removing a small amount of material from your dropout axle slots, then the only alternative may be to bring your bike in to Dillenger and have one of our team fit the wheel for you. Depending on the work needed this may incur extra cost. |
| Motor does not fit within the 100mm dropout width | Unfortunately there are always going to be rare cases when a manufacturer of a bike has decided to be different. If this is the case and there is not enough reasonable 'flex' in the dropouts to spread them wide enough to accept the motor wheel, you may have to seek assistance from a bicycle mechanic or preferably, us here at Dillenger. Before this try removing some of the axle washers to create less width. |
| Disk brake bolts foul against the inside of the frame | If you're not running disk brakes, you don't need the bolts so just remove them. If you are running disk brakes, you will have to use some additional washers to 'space' the motor over to the non-disk brake side to achieve clearance. |
| Wiring to a part of the kit is not long enough | For this problem we stock a wiring extension kit which can be purchased online. This is usually recommended for rear rack versions of this kit. |
| Disk brake bolts won't tighten | You may require some longer bolts, but be careful they are not too long and foul against the internals of the motor. |
| Handlebar too crowded | If for instance you have integrated shifters, you might find that with the throttle and shifter on the right side, you have run out of room. If you can't manage to shuffle everything around to make room, you may prefer to opt for a thumb throttle, which is available for purchase from Dillenger online. |
| I have hydraulic brakes, or integrated shifters and brakes | If the e-brakes provided are not ideal, either you can elect not to use e-brake handles (the kit will still function) or you purchase from Dillenger e-brake cut-off sensors which can mount to your existing brake handles, no matter what kind. |
| I don't want to use RPAS, or don't want to use throttle | The controller is configured so you can run both the pedal assist sensor, and the throttle, or one or the other. If installed, the throttle will always act as an override. |

# Trouble Shooting Continued...

| Fault | Solution |
|---|---|
| Kit won't turn on at all | Get a hold of a multimeter ($15 on ebay) and test the voltage (DC) output from the base of the battery. If this isn't over 41V on a 36V kit, then the battery may have to be returned to Dillenger for testing and potential replacement. If this is not the issue, then please double check the connections. With reasonable voltage, the kit should turn on if there is no fault with the display. |
| Error message on the display | Please refer to display manual for error code definition and if needed, report the error code to Dillenger in a service ticket. |
| My kit looses power over bumps | Check all connections to make sure all the plugs are all the way connected. Check that the battery is locked to the cradle and not loose. A momentary discontinuity in power will turn the kit off. |
| My battery cuts out intermittently | If the battery is low on power, or you are going up a very steep hill with a load on the motor, you will likely experience a voltage cut-off if you have overloaded the controller, or dropped the voltage below the low voltage cut-off, which is more prevalent at low power. This isn't a fault with the kit, it's just physics. |
| I would like my battery capacity tested | Please contact Dillenger by submitting a support ticket to arrange the return of your battery for testing. If the battery tests above 85% capacity within the first year (from purchase date) you will be liable for return freight. If it is tested and is under capacity within the warranty period, your battery will be replaced. |
| Display won't turn on, unless the battery charger is plugged in | Check all the connections, make sure the battery is charged. If the display turns on only when the battery charger is plugged in, you will have to submit a service ticked with this information. |
| My range has degraded | See next page. |

# Trouble Shooting Continued...

Range extension:

If you're not getting the approximate quoted range out of your e-bike system, take the following steps:

1. Pedal Assist Sensor

If you haven't installed the pedal assist sensor, you might not get the required range out of your kit. The pedal assist modes only work for pedal assist input, not throttle. If you use the throttle on low levels of pedal assist, this will not make any difference. Pedal assist levels are only for pedal assist. The throttle is great fun to use, but even moderate use of the throttle, with pedaling, is still going to burn through the juice a lot faster than on a low-medium pedal assist setting.

2. Battery Indicator Lights – Full Charge. The LED and LCD battery level displays are a basic indication of battery charge, but they are based on voltage which is variable and not a true indication of battery capacity. The only accurate indication of a full charge, is having charged the battery and the battery charger lights glowing green to indicate that the battery is fully charged.

3. LED/LCD Indicator Light – Running Low

Some customers find that the LED/LCD charge indicator can lead them astray in terms of how far the bike will go on low power. You don't risk damaging the system by riding all the way to the controller low voltage cutoff. Keep riding on pedal assist even after the last battery indicator bar starts blinking.

4. Hills/ Riding Style/ Other Factors

The ranges quoted are from real world testing, with some hills and some flat areas. If your commute involves a lot of hills, that's going to impact on the range of the kit. 1,000W kits are especially susceptible to being drained a lot more on hills (more than 250W kits anyway). If you need to purchase a second charger to charge the battery at half way, or if you need an additional battery, they will be available for purchase online.

5. General Tips

- Make sure the wheels are running free (rubbing brakes can halve your range quite easily)
- Keep the battery topped up between uses
- Make sure the tyre pressures are at optimum
- Pedal harder when taking off and select the right gear for assisting up hills

If you would like to submit a Dillenger service ticket, please go to this URL:

https://dillenger.zendesk.com/hc/en-us/requests/new