

# CYCLEZEE LTD.

## eZee Mk2 KIT INSTALLATION GUIDE 2012



This guide will help you successfully install your eZee Electric Bicycle Conversion Kit. The kit contains a hub motor, front or rear wheel complete with tyre, battery, and all the electronics and parts necessary to bring electric power to your ride. Installation can be accomplished with basic bike maintenance tools and takes between 30 minutes and 2 hours.

# CONTENTS

1. How eZee powered electric bicycles work
2. Inventory
3. Tools required
4. Front hub motor installation
5. Rear hub motor installation
6. Battery rack / carrier, battery and motor controller
7. Throttle or EAF dial speed control, motion sensor for pedelec or power assist operation mode and LED Control Console or Cycle Analyst
8. Charging the Battery and LED Battery Life Indicator
9. Specifications of eZee Kit Components
10. Controller Self Diagnostic Indicator

## 1. HOW EZEE POWERED ELECTRIC BICYCLES WORK

The eZee powered bicycles have the motor built into the hub of the front or rear wheel. There is a throttle on the handlebars that when turned sends a signal to the controller, which is an electronic black box that distributes the power from the battery to the motor. Riding an electric bike without a controller would be like driving a car that the only way to control it was to have it running at full speed or nothing at all. All the electric components on the bike connect to the controller then from it to the motor. As well as a throttle, eZee powered bikes have Pedelec motion sensor which detects the rotation of the pedals.

## 2. INVENTORY

Hub Motor with wheel and tyre (front or rear)  
37 Volt 10Ah or 14Ah eZee Lithium Polymer battery  
4Ah battery smart charger  
City type battery rack / carrier. MTB type optional.  
Controller and mounting bracket  
Twist grip throttle  
Cabling  
Junction box  
Pedelec motion sensor  
Disc brake rotor  
LED Control Console  
Left and right brake levers with electronic cutouts  
Torque plates  
Cable ties

### 3. TOOLS REQUIRED

4 mm, 5 mm, 6mm Philips/crosshead screwdrivers

2.5 mm, 4 mm, 6 mm Allen/hexagon keys

19 mm 'C' spanner. If you don't have one an adjustable spanner can be used.

Craft knife or wire cutters

T-25 'star' screwdriver bit. This if is required if you are fitting a brake disc.

Fine hand file may be required.

Crank removal tool and bottom bracket extractor required if the Pedelec sensor is fitted

### 4. FRONT HUB MOTOR INSTALLATION

The easiest way to mount a hub motor and secure the front wheel if you don't have a bike stand available, is to turn your bicycle upside down resting on its handlebars and seat.

Some key guidelines:

- A. Remove the original front wheel
  - B. Position the hub motor so that, when facing forward, the disc brake, if fitted, is on the left-hand side of the bike and the electric cables are on the right.
  - C. If the bike has disk brakes, the disk rotor can be installed on the hub. A set of 6 stainless steel screws is included. Remove the screws already on the hub, and use the longer set of screws for attaching the disc rotor.
  - D. Check if the axle can be slid inside the slot in your fork. If there is difficulty for example with a 9 mm drop out, then a small amount of filing may be necessary.
  - E. The hub motor axles are ground flat to 9.95 mm on 2 edges. Ideally, your bicycle dropout slots will be 10mm wide and the motor will slide into place.
  - F. If your axle does not slide into the dropouts, some minor modification is required by using a file to a) enlarge the dropout slot and/or b) file down the axle flats so the axle slides snugly into the dropout
- N.B. When filing is required, only remove enough for a snug fit, take care to avoid over filing!



Front wheel with cable protection bracket



Junction box cover for motor cable connectors



Front wheel left side with disc brake rotor and universal torque plates

- G. After ensuring that the axle sits deeply and snugly into the dropout slots, the axle must be secured tightly to the fork using the torque plates, washers, lock washers and axle nuts. The inner washer is designed to fit inside the quick release recess. If the nut becomes loose, the torque of the electric hub motor is sufficient to cause the axle to spread the dropouts apart and spin out, possibly severing the power and Hall Effect wires and causing the wheel to detach from the bicycle.
- H. On one side of the axle, wires exiting through the axle prevent the washers and nut from being removed. The smaller diameter washer, larger diameter washer, lock washer, and axle nut must be secured so they all sit flat against each other.
- I. On the opposite side, there is an option to exactly mirror the first side. Next, follow the washer by the lock washer, and then the axle nut.
- J. The axle nuts must then be fastened tightly, as all the torque of the motor is transferred to the frame of the bicycle through the axle flats and axle nuts.
- K. Check and ensure that you have firmly tightened the nuts on your axle so all pieces sit flat against the forks.

The following link is to a PDF is courtesy of ebike.ca which has some detailed diagrams you may find useful [http://www.ebike.ca/store/diagrams/eZee\\_installguide\\_V23.pdf](http://www.ebike.ca/store/diagrams/eZee_installguide_V23.pdf)

## 5. REAR HUB MOTOR INSTALLATION



Rear wheel fitted with optional  
9 speed Freewheel

This is a similar procedure to installing a front motor with the exception of the chain and derailleur gears.

- A. Remove the original rear wheel
  - B. Position the hub motor so that, when facing forward, the disc brake, if fitted, is on the left-hand side of the bike and the electric cables are on the right.
  - C. If the bike has disk brakes, the disk rotor can be installed on the hub. A set of 6 stainless steel screws are included. Remove the screws already on the hub, and use the longer set of screws for attaching the disc rotor.
  - D. Install a suitable Freewheel of your choice, available as an optional extra, on the threaded section on the right-hand side of the hub motor and screw it on until it is finger tight.
  - E. Check if the axle can be slid inside the slot in your fork. If there is difficulty for example with a 9 mm drop out, then a small amount of filing may be necessary.
  - F. The hub motor axles are ground flat to 9.95 mm on 2 edges. Ideally, your bicycle dropout slots will be 10mm wide and the motor will slide into place.
  - G. If your axle does not slide into the dropouts, some minor modification is required by using a file to a) enlarge the dropout slot and/or b) file down the axle flats so the axle slides snugly into the dropout
- N.B. When filing is required, only remove enough for a snug fit, take care to avoid over filing!

- H. After ensuring that the axle sits deeply and snugly into the dropout slots, the axle must be secured tightly to the forks using the torque plates, washers, lock washers and axle nuts. The inner washer is designed to fit inside the quick release recess. If the nut becomes loose, the torque of the electric hub motor is sufficient to cause the axle to spread the dropouts apart and spin out, possibly severing the power and Hall Effect wires and causing the wheel to detach from the bicycle.
- I. On one side of the axle, wires exiting through the axle prevent the washers and nut from being removed. The smaller diameter washer, larger diameter washer, lock washer, and axle nut must be secured so they all sit flat against each other.
- J. On the opposite side, there is an option to exactly mirror the first side. Alternatively, depending on your bike geometry and if you have a quick release lip, you can eliminate one of the smallest diameter washers or larger washers.
- K. Next, follow the washer by the lock washer, and then the axle nut.
- L. The axle nuts must then be fastened tightly, as all the torque of the motor is transferred to the frame of the bicycle through the torque plates, axle flats and axle nuts.
- M. Check and ensure you have firmly tightened the nuts on your axle so all pieces sit flat against the forks.

## 6. BATTERY RACK / CARRIER, BATTERY AND MOTOR CONTROLLER

The controller should first be attached to carrier or the stainless steel mounting bracket with the set of screws provided, do not use other screws that are not of the correct length ! The assembly can now then be attached to a suitable part of the frame with the nylon ties provided. Here is one example below attached to the seat post or the down tube close to the saddle.



The specially designed carriers provide other options for attaching the battery, offer the facility of securely locking the battery in place. There is a City carrier and a MTB carrier, both also have a bracket for mounting the controller.



## 7. Throttle or EAF dial speed control, motion sensor for pedelec or power assist operation mode and LED Control Console or Cycle Analyst. Brake levers.

### Throttle

- A. Install an eZee Kit Throttle in place of your original left-hand grip on standard 7/8" / 22 mm handlebars. Right hand throttles are available if preferred.
- B. Whilst the grips are removed, fit the left and right brake levers.
- C. Remove the existing handlebar grip from the bicycle and slide the throttle in place. Tighten the grub screw with a 2.5 mm Allen wrench, just enough to prevent rotation.
- D. Removing handgrips can sometimes be tricky. Bike shops usually use compressed air; other tricks involve squirting hairspray or lubricant under the rubber. The eZee Kit throttle is complete with a grip, so it is always an option to cut off stubborn grips with a craft knife.

## LED Control Console

The console shows the remaining battery power level and has 5 power assist level settings. Install the console on the handlebars.

There are 2 cables coming from the console, one connects to the throttle and the other to the moulded junction box.



## Console Operation

### Power On

During power on, the battery gauge will perform an initialization with all the LEDs lit up for 2 seconds before entering normal operation.

If all the LEDs fail to light up, there is a fault in the battery gauge. Try to switch the ignition key On/Off again to initialize.

Battery level shows the state of charge of the battery. As you continue to cycle and the battery power drops, the level gauge will correspond to the state of charge remaining. If the battery level shows 'red', it is best to recharge.

Power level shows the level of electric assistance in pedelec mode. There are 5 levels of assistance and zero assistance. Use Up▲ or Down▼ button to increase or decrease the level of electric assistance needed.

## Setup Menu

Hold the 'Down▼' button for about 5 seconds to enter setup menu.

Use the Up▲ or Down▼ button to select the appropriate settings.

In menu setup, hold the 'Down▼' button for about 3 seconds to save and switch to the next menu.



## Mode Selection

Mode 1 (Default): Pedelec / EBike (US): Power Led Bar shows the assist power level. When throttling, it switches to EBike mode.

Mode 2: Pedelec (EU): Power Led Bar shows the assist power level. Throttling will be in 6km EBike mode.

Mode 3: Not in used. For future development.

Mode 4: Pedelec (EAF): Responds to throttle/EAF. Power Led Bar Bar shows the current (amps) level.

Mode 5: EBike (Cruise): Responds to throttle (from gauge). Power Led Bar shows the current (amps) level. 'Up▲' button set cruise. 'Down▼' button turn off cruise. EBrake will also disengage cruise.

## Pedelec Motion Sensor

- A. To install the pedelec sensor the chainset and bottom bracket need to be removed so that the sensor ring can be fitted.\*
- B. To perform this task you will need a crank extractor tool although some types crank only require an Allen key for removal.
- C. Once the chainset is removed, you will then need to remove the bottom bracket. For this task, you will require an extractor that is compatible with your particular bottom bracket.
- D. When you have removed the bottom bracket, slide the the ring over it making sure the sensor is facing towards the chainset and refit the bottom bracket.
- E. The pedelec sensor will now be sandwiched between the frame and the collar of the bottom bracket.
- F. Next slide the plastic disc with magnets on to the axle ensuring that the arrow is pointing in the direction that you pedal. Position the disc so that the magnets come within 1 to 2mm of the sensor when the pedals are rotated.
- G. Now refit the chainset and connect the cable connector from the sensor to the corresponding connector cable from the controller and the task is completed.

Please note that it is not essential to fit the pedelec sensor, the kit will still operate using the throttle.

\*There are several good articles and videos on the internet which explain in detail how to remove chainsets and bottom brackets.

If you find the chainset and bottom bracket removal too daunting or difficult, most local bike shops will be happy to perform this task and it only takes a few minutes to complete.

### Wiring

The next step is wiring the components together, running the cables together along the frame and neatly securing them to the bicycle tubing.

- A. Run the motor controller cable from the controller to the hub motor following the bicycle frame.
- B. Connect the cable from the junction box to the controller.
- C. Connect the electronic cut out cables from the brake levers to the junction box.

### Secure the Wires

To make your setup look professional, route the wires along the bicycle tube in a tidy fashion, using cable ties.

The motor wires can be run from the motor up along the front fork to meet at the crossbar with the battery indicator wire. Together, they can follow the crossbar back to the controller.

Ensure enough cable slack at the front forks so the wheel can turn freely without inadvertently tugging connectors.

When securing with cable ties, feed the tie underneath exposed brake and derailleur cables to avoid interfering with these mechanisms.

A Velcro wire covering sleeve can be used to hide the connector to the hub motor

For setups that will see frequent wet weather use, it is a good idea to cover every exposed electrical connection with self-adhesive silicone tape. Not only does this effectively prevent water

from getting into and corroding the contacts, it also holds the mating halves of the connector together so they are unlikely to be inadvertently pulled apart.



Attach motor cable junction box cover to the front fork, push connectors together and close the junction box with the self tapping screws provided. Be careful to place wires carefully so that they do get pinched by the cover.

## 8. Charging the Battery and LED Battery Life Indicator

First, a word on conditioning. Before you start using a new battery, charge it fully, then just go out and ride until it is flat. This only needs to be done twice, doesn't need to be done in one ride and won't take up a massive amount of time.

After conditioning, the battery can be charged at anytime, regardless of whether the battery is run down completely or not. When the battery is fully rundown, it will automatically shutoff and the LED display will not light up.

To charge the battery, first ensure the battery key switch is in the off position, connect the charger and then turn the charger on. If the battery is taking charge, the orange LED will turn on and the internal fan will spin only if the temperature in the charger rises. Once charge is complete the LED light will turn green and the fan will shut off. It will take in the order of 3 hours to fully charge a flat 10Ah battery and 5 hrs for a 14 Ah.

Insert the charging plug into the socket on battery and connect the charger power cord to a A/C socket. Turn on the A/C socket. Turn the switch on "I", on the charger.

It is important to follow this sequence of actions every time you charge the battery.

Do not remove the plug by pulling the cord, always grip the charging port by its metal body. Check the indicator lights on the front of the charger.

RED	light indicates that the charger is connected and running from an A/C socket.
YELLOW	light indicates that the battery is charging
GREEN	light indicates that the battery is fully charged

Please use only the Li ion charger as provided.

A new battery might take 2 - 3 charges before it performs at its stated capacity.

Kept in good condition, eZee Li Ion batteries will perform at least 800 full charge cycles and retain 60% of their original capacity.

- |                       |                        |                           |
|-----------------------|------------------------|---------------------------|
| a. Male charging plug | b. Charging cord       | c. Charger specifications |
| d. Charger serial no. | e. Cooling fan         | f. Fuse 10 Amps           |
| g. Charger 'ON' LED   | h. Charging status LED | i. Warning label          |
| j. Power switch       | k. A/C voltage switch  | l. Power cord socket      |



Sometimes after temporary disconnection, the charging status light maybe green, to

check if you have a full charge, switch off and then on again.

If it is full you will have a green light in less than a minute.

When the battery is placed on the bike and turned on, the LED display will light up. The LED display lights are based on the battery voltage. The display is a very basic indication of your battery voltage.

Green indicates full voltage, yellow indicates low charge, and red indicates a warning before the battery automatically turns off. It takes a little while to get a feel for how long the battery will last for your unique riding route. If you are interested in a much more detailed display to monitor your battery charge, the Cycle Analyst is the ideal instrumentation. Full details of the Cycle Analyst are covered in a separate manual.

## Ride On

That's all for the installation. eZee hopes your electrified bicycle will help you to push new boundaries, climb bigger hills, and ride longer distances. Remember to charge your battery and that it can be recharged anytime. Regular bicycle maintenance will keep your bike in tiptop shape.

## 9. Specifications of eZee Kit Components

Battery: battery packs Amps-hrs (Ah) are rated in the trade as simple multiplication of the single cells in the pack, and the cells are rated with a discharge rate of 0.1C meaning a 1Ah is discharged at 0.1 amps, and 10Ah is discharged at 1 Amps. However higher discharge rate will yield less Ah.

Putting 1Ah cells in parallel you get 10Ah, but in reality the total is somewhat less. Ambient temperatures also make a difference, in cold you get less. Safety is of course the most important consideration of all, the cells and packs conform to all regulations, and have been without incident after millions of packs over the past 5 years in electric bike application. In the list below, you can see the capacity that you will get from each battery pack.

Li+ polymer pack (AEEnergy cells)  
Nominal voltage rating: 37 V  
Capacity: 9.6 Ah, 355 Wh  
Structure: Li+ polymer pouch cells / 10S1P  
Weight: 3.2 Kgs entire pack including lock  
Dimension: 142 x 349 x 57 mm  
Max. discharge rate: 20 amps  
Storage self discharge < 5 % per month

Li+ 18650 cells pack (Samsung cells)  
Nominal voltage rating: 37 V  
Capacity: 13.5 Ah, 500 Wh  
Structure: Li+ 18650 cells / 10S7P  
Weight: 3.8 Kg entire pack including lock  
Dimension: 142 x 349 x 57 mm  
Max. discharge rate: 30 amps  
Storage self discharge < 5 % per month

Controller  
Max Voltage 54 V  
Min Voltage 30 V  
Current limit 20 Amps  
Weight: 0.350 kg  
Dimension:

Motor  
RPM/V 0.75 Cruising Speed:  
Gear Ratio 5:1  
26 inch wheel restricted 25 Kph / de-restricted 32 Kph  
700c wheel restricted 26.5kmph / de-restricted 35 Kph  
Nominal Power: 250 watts / de-restricted 350 watt  
Weight: 3.6 Kg  
Assisted Range: 30-50 km 10Ah battery, 50-80 km with 14Ah battery Motor Only: 25 km

## 10. Controller Self Diagnostic Indicator

The controller is programmed with a self-diagnostic system that monitors the type of failure. Count the number of continuous blinks on the red LED at the left of the controller box; then refer to the corresponding signal code below.

This however does not necessarily encompass every possible failure. If you are unsure, please refer back to us.

LED No. of blinks	Description	Corrective measures
ON	Bicycle functioning normally	None
2	Brake lever cut-off in contact	Check brake lever
3	Brake lever cut-off in contact	Check brake lever, water in electric cut-off
4	Throttle not returned original position	Check throttle for faulty spring
5	Throttle faulty	Check throttle connections or replace
6	Low voltage	Charge battery
7	Excessively high voltage	Measure voltage with a multimeter
8	Hall sensor in motor faulty	Replace motor core, check hall wires
9	Incompatible motor	Replace motor
10	Temperature too high, thermostat activated	Wait for controller to cool down
11	Thermostat faulty	Replace controller
12	Amperes control faulty, controller faulty	Replace controller
Off	Power dead	Replace controller, check wiring