

How does an electric bike work?

You will find here all the answers concerning our kits, batteries and their use. For more clarity, here are 3 main categories:

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- 1.2 - **Is the motor compatible with my bike?**
- 1.3 - **Do I need a front motor or a rear motor?**
- 1.4 - **What difference is there between a geared motor and a gearless motor?**
- 1.5 - **What is a brushless motor?**
- 1.6 - **What is a Hall sensed motor?**
- 1.7 - **What does 26-inch or 28-inch wheel mean on a bike?**
- 1.8 - **Which freewheel for my rear motor?**
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1.1 - Which kit to choose : Balade, Magic Pie or Xtrême kit?

The **choice of the motor** depends on the use of your bike : once **you have determined the main use of your bike**, it will be easy to **choose**.

We provide [concrete examples](#) to help you choose.

The **Balade Kit** is **very light** (less than 3kilos), less powerful than his cousins but **energy-saving**, it will be adapted to **city bikes** and even on Mountain Bikes on the **Front** wheel.

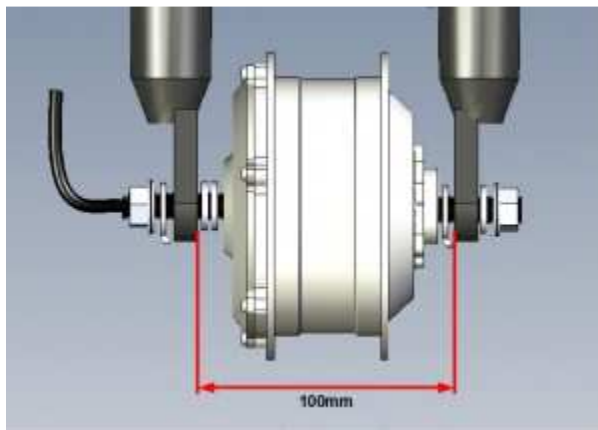
The **Xtreme kit** is the **fastest** of our kits (more than 31mph with assistance), it is adapted for long straight roads, **ideal on a Front wheel on a hybrid bike**.

The **Magic Pie kit** is the kit with **most torque**, it is **compatible with disc brakes**, ideal to go **mountain biking**, on a **Rear** wheel.

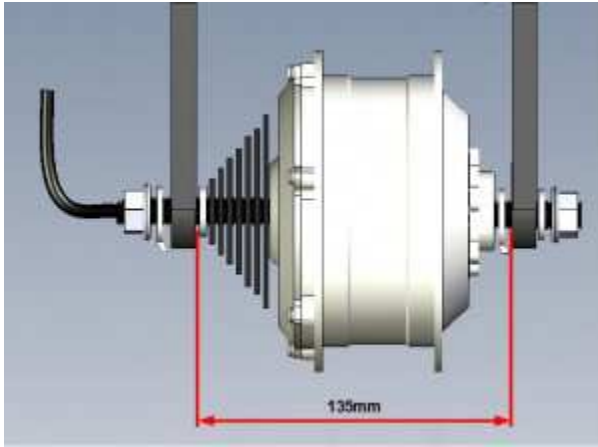
1.2 - Is the motor compatible with my bike?

Our [electric bike kits](#) are compatible with most of the bikes because our motors have **standard widths**.

- **Distance between the fork ends of 100mm for a FRONT motor**

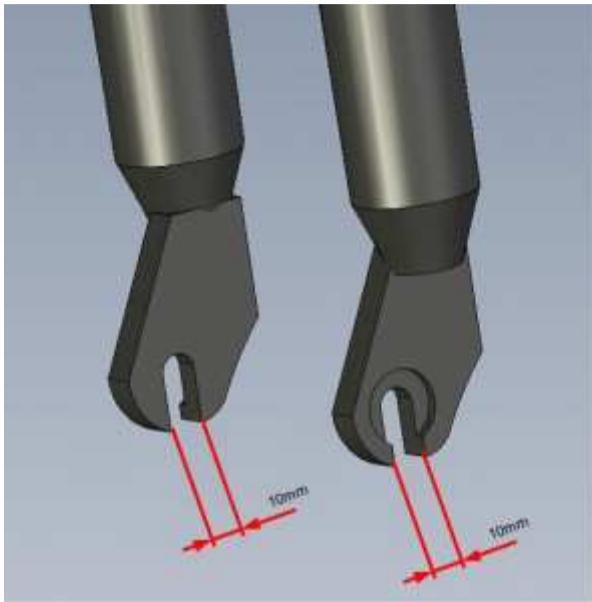


- **Distance between the fork ends of 135mm for a REAR motor**



The other thing to check is located at the point of the **notches of the frame ends**. The motor axes, **thickness 10mm**, must be able to fit in the **frame ends** of the bike.

- The notch of the **frame ends** must be **10mm**.



You just need to **measure** and **check** these 2 points to know if your bike can be **motorized**.

1.3 - Do I need a FRONT or REAR motor?

The **position of the motor** will depend on your use of the bike. We provide **concrete examples** to help you choose.

FRONT motor

- easier to assemble
- **better weight distribution** (motor at the front, battery at the rear)
- greater stability with the **gyroscopic** effect of the motorized wheel
- adapted to roads and easy tracks
- enables you to keep the **original rear transmission** (= greater development)
- **2 motorized wheels** (electric motor at the front and 'human' motor at the back)

REAR motor

- **adapted to all kinds of roads and mountain biking** (better adhesion in the sand, the mud...)
- you will have to adjust the transmission (the cassette will be 5 to 6 speeds maximum depending on the motor. Efficient pedalling until about 22mph)
- the gear lever will have to be changed
- better driving

CONCLUSION :

- the **REAR motor** is recommended for a use on **difficult tracks (sand, pebbles, mud ...)** : **mountain biking** and **challenging outings**
- the **FRONT motor** is recommended for a use on **hard tracks (road, concrete, asphalt ...)** and for those who want to **drive fast**.

By keeping the **original rear transmission** of your bike (11 sprocket), you will have a **greater development** than with a 14 sprocket of a **5 or 6 speeds freewheel** : this will enable you **to not pedal loosely** and to assist the bike **after 22mph**.

1.4 - What difference is there between a geared motor and a gearless motor?

The **geared motor** has a 'gearbox and internal freewheel' : with the same power, a geared motor has more torque (more power) at the start and uphill : imagine a car starting in second gear = gearless motor and a car starting in first gear = geared motor.

Geared motor (Balade kit)

- **lighter** (about. 20%) than the gearless motor
- planetary gear : **more torque** at low speed (with equal power)
- internal freewheel : **no resistance when you are cycling freely** without electrical assistance
- **no regeneration when braking**
- no energy production downhill

Gearless motor (Xtrême kit and Magic Pie kit)

- **regeneration when braking** (2s)
- **reverse**
- energy production downhill from 24mph
 - without electrical assistance : **do not exceed 24mph**
 - in order to preserve your battery when cycling downhill, you just need to speed up in order to **force the use** of the energy of the battery (low consumption in that case <100W)
- slight electromagnetic resistance

- enables you to cycle freely without power below 12mph

1.5 - What is a Brushless motor?

This is an **electromagnetic motor** with **permanent magnets** : there is no coal so there is **no wear and tear** as we can notice on a classical electric motor, like a drill.

It is the **polarity change** of the coil winding (handled by the controller), which enables the rotor to turn.



1.6 - What is a Hall sensed motor?

The **Hall sensed** motors have magnetic field sensors which inform the controller on the position of the rotor : this device **synchronizes the controller** in order to **improve the torque** and the **power** at the start.

This will make the start of the motor smoother (no vibrations or stammering) and it enables to cycle with a very low rotation speed.



On the contrary, a **sensorless motor** ([foldable bike kit](#)) needs to be launched when the pedal is at the right place (quarter of a 'tour') to start perfectly. If it is not, the motor can give the impression of juddering while the controller is detecting the phases of the motor.

1.7 - What does 26 or 28-inch wheel mean on a bike?

It is very simple : **26"** (26 inches) or **28"** (28 inches) correspond to the diameter of the wheel. In the bicycle field, the wheel diameter is measured **WITH** the tire.

Take the example of a mountain bike : they are equipped with 26 inches wheel (**1 inch = 2.54cm**), a diameter of $26 \times 2.54 = 66\text{cm}$ WITH the tyre.



This implies that the **total diameter of the wheel** of a bike **can vary** a few centimeters **depending of the tire width** : a tire **26x2.4** will be larger than a tire **26x1.75**.

This is why it is recommended to adjust your bike meter according to the **precise diameter** of your wheel.

When you choose your **electric bike kit**, have a look on the **tire** side of your bike, you will find all **useful information** ::

- Example for a mountain bike : **26 x 2.0**
 - diameter of the tire : **26 inches**
 - width of the tire : **2 inches**
- Example for a city bike or hybrid bike : **28 x 1.40** ou **700 x 35C**
 - diameter of the tire: **28 inches**
 - width of the tire: **1,4 inches or 35mm**

More information : the **ETRTO** norm (*European Tire and Rim Technical Organization*) looks like this : **ETRTO 55 - 555**

The first number with **2 figures** refers to the **tire width when inflated**, the second with **3 figures** refers to the **diameter of the rim**.

- **16"** : ETRTO norm **47 - 305**
- **20"** : ETRTO norm **40 - 406**
- **26"** : ETRTO norm **40 - 559**
- **28" (700C)** : ETRTO norm **37 - 622**

It is perfectly possible to set up a larger tire **37-622** instead of the thinner tire **35-622**: the diameter stays the same.

1.8 - Which freewheel do I need for my rear motor?

Little reminder : the freewheel is composed of sprockets : it is a mechanism which enables to stop momentarily the traction of the rotation of the wheel, while the latter can go on rolling freely.

When I pedal, I pull the rear wheel along. If I stop pedalling, the rear wheel goes on turning freely.

- The **Magic Pie motor** v2 or v3 is compatible with [freewheels to be screwed](#) from 6 to 9 speeds.
- The **Xtrême motor** is compatible with [freewheels to be screwed](#) 5 speeds (14/28).
- The **Balade motor** is compatible with [freewheels to be screwed](#) 6 speeds (14/28).

1.9 - Changing the freewheel means adjusting the derailer?

Yes and even sometimes changing the lever so the speeds number of the lever corresponds to the one from the freewheel.

We always change the lever on the bikes on which we change the freewheel..

If you want to keep the original lever, you will have to adjust [the derailer's limit stops](#) in order to keep only the speeds from the kit's freewheel.

1.10 - Is it easy to remove and put back the motor ?

Front and Back motors equipped with disk brakes : it is possible to change the wheel but this means that you will have to adjust the brake calipers according to the disk so it won't rub together.

Back motors only : this also means that you will have to adjust the transmission if the number of sprockets of the rear wheel is different between the motorized wheel and the original wheel.

For the **other cases**, you will just need to change the wheel without having any adjustment to make.

1.11 - I have a Nexus at the rear with back-pedal brake and drum brakes at the front. Can I put one of your motors?

Setting up the hub of an electric motor like our Balade, Xtreme or Magic Pie kit, implies you will have to remove the original front wheel if you put the motor at the front or the original back wheel if your put a rear motor.

If the wheel you remove is equipped with a hub like Nexus, **dynamo** hub, **drum** hub or any other system **fit** in the wheel , you will lose this equipment : you need to see what you want to favour according to your needs. If you can not do otherwise (because of the design of the bike), you will still get a powerful **electromagnetic brake (Magic Pie or Xtreme kit)** that you can adjust according to the weight of the vehicle.

We still **recommend** to have **2 real brakes** on the bike, in case of emergency, it is **the only reliable solution**.

1.12 - Motor on the front or rear wheel to pull a trailer?

If the main use of the bike will be to pull along a trailer, it is much more safer to put the kit on the rear wheel.

If the front wheel of the bike lifts up because of the traction of the trailer, the vehicle will stay in line and the motorized wheel will still be in contact with the road.

For this type of use, the best is still **to motorize the trailer** : you will have a better **weight** distribution, a better motricity, and more **torque**.

1.13 - Which motor do I need to motorize a trailer for a long trip? (Above) (Motors table of contents)

It is better to use a geared motor : this type of motor is equipped with an **internal freewheel** and will have **no electromagnetic resistance** while cycling, even without electric assistance.

We advise to motorize the trailer rather than the bike : the little diameter of the wheel of the trailer will offer **more torque** and the **output will be better**, you will 'waste' less energy.

It is not necessary to motorize bike + trailer, except if the total weight exceeds 250kg or if you need to go up steep hills. In that case, we need to make a more thorough study of your project to find the best setup : contact@cycloboost.com

1.14 - Can I put 2 motors on my vehicle (MTB, Hybrid bike, cargo bike, tricycle...)?

It is possible and it works perfectly. Instead of putting a very powerful motor, with a high consumption, we recommend to put **2 little motors** : you will have **more torque** at the start and uphill for **almost the same consumption**. The reason is simple : **the output is twice better**, you waste much less energy.

One battery is enough for 2 little kits (ex : 1 battery 36v/15ah for 2 Balade Kits), for more powerful kits (Xtreme or Magic Pie kits), we recommend to use 1 battery per kit.

The **2 motors** are controlled by **one throttle** (we give the connexion details by e-mail on request). **The use is identical** to a classical use with **one kit**.

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Use and functioning of the Cycloboost electric bike kits

2.1.1 - Regulations : what is an electric assisted bike?

To be considered as an E-bike in France and some countries in Europe, an electric bike has to follow these rules :

- nominal power of the motor: **250 W**
- maximum speed before power cut : 15.50mph
- the motor only functions if you pedal
- the motor automatically cuts if you use the brakes

All this information is available here [Directive Européenne 2002/24/EC](#).

2.1.2 - Can we use an electric bike without power?

Yes, of course, this is what may happen if you are **short on energy**, you may **end up pedalling**. Without assistance, you keep a classical bike, even if it is a little heavy because of the weight of the motor and the battery. Even without electric assistance, you always need to let the battery connected so the energy produced by the motor can disperse (except 250W motor).

2.1.3 - When do we use a torque arm?

It is **not essential** to set up a torque arm on **rear motors**. We recommend it in the case of a **front motor** set up on a fork.

The **Torque arms** are **important safety elements** especially with **very powerful motors** (>500W). With **250W**, we advise it especially if **the fork is not very tough**.

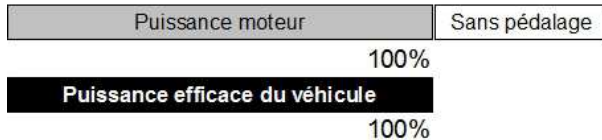
2.1.4 - Why do I need to pedal?

It is **essential** to pedal on a electric bike for the following reasons :

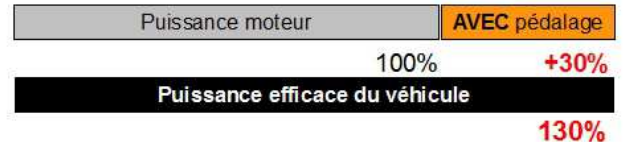
- **to avoid damaging the frame** or the **fork** of the bike
- **to reduce the electric consumption** and thus increase the autonomy (*see picture below*)
- **to avoid heating the electronics** of the kit and the battery, otherwise it **reduces the lifetime of the electronic components**
- **improve the performances** of the bike (*see picture below*)

Pedalling improves the performances

Performance d'un vélo électrique
SANS assistance au pédalage



Performance d'un vélo électrique
AVEC assistance au pédalage

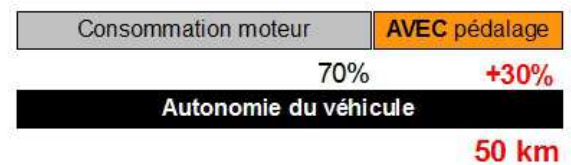


Pedalling improves the autonomy

Autonomie d'un vélo électrique
SANS assistance au pédalage



Autonomie d'un vélo électrique
AVEC assistance au pédalage



The throttle

2.2.1 - What is a throttle for bike?

It is an accessory which enables to progressively and precisely control the speed of your bike. It has 2 shapes : at the thumb (on the left) or at the twist (on the right) :



This accessory is composed of a **warning light** for the battery (3 color LEDs : **GREEN** - charged battery, **ORANGE** - half empty battery and **RED** - empty battery) and a **red button** for the lights control.

The **thumb throttle** is **much more practical** to set up than the **twist throttle**. It **enables to keep access** to the gear levers. It can be set up on the right or the left of your handlebar.

2.2.2 - How do we adjust the speed?

It is the **same principle** as a car or scooter throttle : depending on the throttle you **just need to push slightly the thumb** or **turn slightly the twist** to get the bike going.

It is possible to **adjust your speed** on that of a walker, a jogger or a less speedy vehicle : **you can graduate from 0mph to 28mph depending on the kit**. This works **like a scooter or car throttle**.

2.2.3 - Which throttle should I choose, thumb or twist? Which is the more practical?

The **most practical to set up** and use is definitely **the thumb throttle** : you can set it up on the **left** or the **right** of the handlebar. The **twist throttle** can only be set up on the right at the end of the handlebar.

The **twist throttle** being put **at the end of the handlebar only**, there is **no possible choice** for the setting up of the controls panel. The access to the various original controls is reduced.

The **twist throttle** is reserved for vehicles that do not have **gear levers on the handlebar** (scooter, beach bike ...)

- Example of set up with a twist throttle with gear lever on revolving grip :



- Example of set up with a twist throttle with gear lever on trigger :



- Example of ergonomic set up with thumb throttle (on the left of the handlebar) :



With this type of set-up, it is possible to **speed up** with the left hand and **change gears** with the right hand : you will have a better output and **efficient starts**.

2.2.4 - Do I need to put a throttle on my bike?

No, you can set up a **Pedelec** but you won't have the same precision in the adjustment of your speed. The **Pedelec** will switch on when you **pedal** and order to the controller to **progressively deliver the power** until it reaches the **maximum**.

It is not possible, with a Pedelec, **to maintain a constant speed** of 6mph for example, **only the throttle enables it**.

The throttle is reserved for a use on **tracks not opened to public traffic**.

Cruise control and horn

2.3.1 - What is a cruise control?

This accessory enables to maintain the bike at constant speed. The adjustment is made with the help of the throttle : you adjust your speed and then you set off the cruise control by pushing once the **red** button. You stop it by using the power brake handles or pushing again the **red** button.

To beep the horn? Just push the **GREEN** button.



2.3.2 - How does the cruise control work ? (

Activation :

- **Adjust your speed with the throttle** and at the same time, **push once the red button**. You can remove your finger from the throttle, you will keep the same speed.

Deactivation :

- by **pressing again the red button**
by **using the power brake handles** if you have set them up

2.3.3 -If I pedal and exceed the speed defined by cruise control or throttle, what happens?

You will have to **reduce the electric** consumption, it is even **highly** recommended.

For example, you **stabilise your speed at 12mph**, you pedal and you will reach **15.5mph with no effort**. To go faster, you will then have to **program another speed** or **go manually with the throttle**.

Over 15.50mph in this example, if you **go on** producing **an effort while pedalling** or if you arrive on a steep hill, 2 things might happen **depending on the type of motor :**

- **geared** motor (Balade kit type) : you will go over the speed of the motor and your consumption will be very little, under 50W. In that case there is no need to speed up ([more information...](#)).
- **gearless** motor (Magic Pie or Xtreme kit) : you will go over the speed of the motor and the latter will slow you down ([more information...](#)).

2.3.4 - Do I need to put the cruise control on my bike?

No, this accessory is optional. You just need the **Pedelec** or the **throttle**.

The cruise control is reserved for a use on private tracks not opened to public traffic.

The light

2.4.1 - Is it possible to connect a light on an internal controller (Magic pie)?

Yes there is a **red connector** (battery tension) on which you directly connect your lights.

If you want to switch on or off this light from your handlebar, you also have to connect, in series, the wires for the throttle switch.

2.4.2 - Is the original light system of my bike compatible with my battery?

No, the **dynamo** light system generally produces **6v**. If you connect **your light on the battery (24v to 48v)**, you will directly **burn out** your **bulb**.

Our Led lights are **compatible** with all **batteries from 24v to 48v**.

The Pedelec

2.5.1 - What is a Pedelec (pedalling sensor)?

The Pedelec is a **pedalling sensor**. This accessory is set up at the chainset and reports to the controller when the user pedals. This **triggers** the electric assistance when the user pedals.



2.5.2 - Do I need to put the pedelec on my bike?

Yes, if you want to be conform to the **European regulations** :

- **15.50mph**, then the motor cuts
- **Pedalling sensor** (not throttle) to activate the assistance
- **Continuous nominal power** of the motor : **250w**

2.5.3 - Can the Pedelec and throttle work together?

No, it is either the one or the other. You can **set up both accessories** on the bike and connect **both of them** to the controller but **only one will function** at a time, here are the functioning rules :

- if you only **pedal**, the **Pedelec** takes control
- if you only speed up, the **throttle** takes control
- if you **pedal** and **speed** up, the **throttle** takes over

The controller

2.6.1 - What is a controller ?

It is an electronic device which delivers the power necessary for the motor. This device is generally associated to a throttle or Pedelec.



2.6.2 - Where do I put the controller?

You have **plenty of** solutions, you just need to choose the one which **corresponds better to your** needs. It will mostly depends on the location on your battery, of your bike but also of your design choice.

The most common solutions are the following :

- In a **seat bag** (under the seat) for an MTB use
- In a **frame bag** (in the frame) for hybrid bikes
- In a **handlebar bag** for city bikes

Click on [this link to see all our bags](#). You can also get ideas from [bikes prepared in our workshops](#) and adapt it to your needs.

Finally, it is possible to **fix the controller directly in the frame** for a **better cooling**, you need to **protect it** as well as the wires from the **rain**.

2.6.3 - Magic Pie v2 : difference between INTERNAL and EXTERNAL controller? ([above](#)) ([Controller table of contents](#))

They are the same controllers with the same power and same characteristics : one is inside the motor, the other is generally put **under the seat** or in the frame in a bag. In both cases, you need to put the accessories' wires in a bag to protect them from rain.

The INTERNAL controller can not receive a horn.

We prefer **EXTERNAL controllers** because they are more easy to access, if we need to make changes or to program it.

2.6.4 - Do I need to programme the controller?

No there is no need. The **controller is already programmed** and you already get all the power it is able to give. You can define a parameter if you want to reduce

the power to improve your autonomy, change the braking regeneration force, reduce speed ...

Example : on a child bike, we are going to limit the throttle course at 20% to get a speed of 15.50mph max (to be adjusted according to the diameter of the wheel).

Please consult the [Guide for defining the controller's parameters](#) for more technical information.

Power cut brakes

2.7.1 - Power cut brakes)

This accessory is delivered with all our kits. It is a safety element which cuts the power of the motor when the user activates it.

This accessory is **compatible** only with **cable brakes (V_brakes or disks)**.



They do not replace the original braking system : **brakes are necessary to stop the bike.**

[Power cut brakes presensation video](#)

2.7.2 - Can I put power cut brakes on my MTB with hydraulic brakes? (above) ([Brakes table of contents](#))

Yes, if you have **hydraulic brakes** on your bike, it is possible to activate the power cut by using a **pressure switch** connected in series in the hydraulic circuit.

You connect 2 electrical wires from the **pressure switch** directly on the controller in the space of the classical power brake handles.

2.7.3 - Do I need to put power cut brakes on my bike?

No, this is not necessary. It is an **extra security** that you can set up or not on your bike.

The user of mountain bikes who have hydraulic brakes on their bikes do not set up this accessory for 2 reasons :

- **power brake handles** are **not compatible** with **hydraulic brakes**
- It is often useful on a MTB to **pedal AND brake at the same time** to get over technical obstacles.

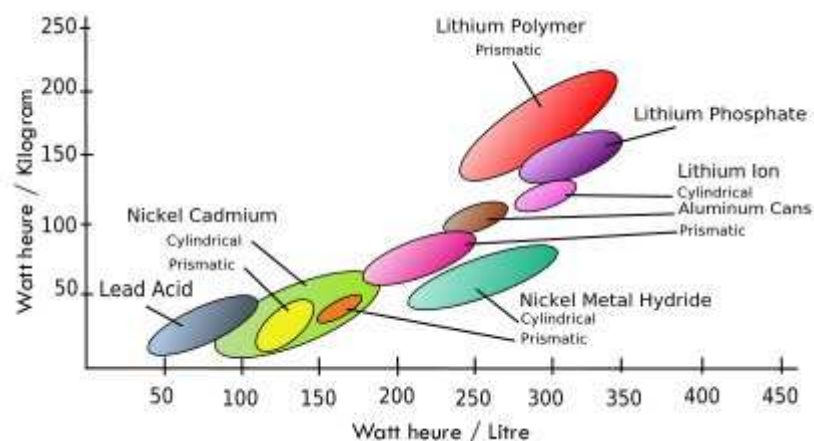
3 -BATTERIES

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3.1 - What is a battery?

It is the **energy stock** essential for the functioning of the electric bike. There are different sorts of batteries : **lead, li-ion, Nimh...**

Here is a graph showing the **excellent performances of Lithium batteries** (in the top right-hand corner) in comparison with Lead batteries (in the bottom left-hand corner).



3.2 - Our batteries' autonomy

The autonomy of an electric bike depends on the size (Ah capacity) of the battery but also :

- from the **assistance when pedalling** : I pedal = I use less Watts
- from the difference in level of the road : **steep hill = high energy consumption**
- from the headwind : **high wind = high energy consumption**
- total weight of the vehicle : **heavy burden = high energy consumption**

To increase your autonomy, **you always need to pedal** and **not force the motor** uselessly especially going uphill (see this [chapter](#)).

Trick : a bike well looked after with well inflated tires will help you gain a few kilometers.

3.3 - Characteristics of Li-ion batteries Lipo (Lithium Polymer)

- No maintenance, recyclable
- **Electronic regulation (BMS)** - avoid all risks of discharge or over charge
- Reliable technology - the battery can not catch fire or explode in case of over charge
- Lifespan of **800 cycles** of charge/discharge, 5 times more than lead
- **30% lighter** than Lifepo4 batteries

3.4 - Characteristics of Lifepo4 batteries (Lithium-ion Lead Phosphate)

- No maintenance, recyclable, no damage on the environment
- **Electronic regulation (BMS)** - avoid all risks of discharge or over charge
- Reliable technology - the battery can not catch fire or explode in case of over charge
- Lifespan of **1500 cycles** of charge/discharge

3.5 - What is a BMS (Batterie Management System)

It is the electronic part of the battery which enables to **control the charge and discharge** of the battery. During the charge, the BMS checks that all cells of the battery are all at the same level of charge (tension max 3.7v). During the discharge, the BMS checks that the cells do not discharge too much (tension min, about 2,8v).



3.6 - How can I know my autonomy?

You have 2 main methods :

- **Theoretical method** : you put in the [power calculator](#) all parameters linked to the ride (difference in level, distance, total weight of the vehicle, wind, pedalling assistance). The tool is pre-adjusted, it will give you theoretical values for the consumption of your bike.

To refine the calculation, you can **decompose the ride in several parts**.

- **Practical method** : charge your battery, initialize the distance travelled on your bike computer and cycle. **At the power cut, you will have a precise idea :-)**

3.7 - Do I need to check the charge and discharge of my battery?

No, this is the role of the **BMS** (Battery Management System). It is an electronic card fit in all Lithium batteries which mission is to **check the charging phase** as well as the **discharge phase** (when you use the bike).

Thanks to the BMS, the battery is safe. You just need to think about **disconnecting the charger from the mains** at the end of the charge.

3.8 - When do I need to recharge the battery?

The best way is to recharge the battery **after 90% of use of its autonomy**. For example, if **you have 24miles** of autonomy with a complete charge, **recharge after 22miles**.

3.9 - Can we charge a half-empty battery?

Yes, this will count as a **half-charge**. You just need to let it charge until the end, and not interrupt it along the way. **There is no memory effect on Lithium batteries** but it has been noticed that **batteries give a better output** if we do **complete cycles of charge and discharge**.

3.10 - How do I store a battery for a long time without using it?

A battery always has to be stored protected from dampness and cold, at 80/90% of its charge.

Important : A battery must never be stored discharged because it has a risk of completely discharging. The internal resistor of the cells and the electronic circuit of control of the battery, the BMS, consume energy and can damage the battery for good if it reaches a too low level of charge. So you need to control and recharge the battery regularly.

3.11 - When do I need to recharge the battery?

The battery must be **disconnected from the controller**. The battery needs to be in an airy space and put on the floor.

First connect the charger to the battery then **connect the charger to the mains**. Let the charge go until the end (green light on) to make sure **all cells are perfectly balanced**.

3.12 - The light from the charger goes from red to red/orange, is it normal?

Yes, this means the battery is in the cells' **balancing phase**. You need to let it finish in order to get a better functioning. This can take an hour depending on the battery.

3.13 - Do I need to do the running in of the battery?

Yes and it is very important : you have to do **5 cycles of complete charge/discharge while cycling** to improve the **balancing of the cells** and **increase the autonomy**.

There is no need to hang up the bike and leave the motor to turn for nothing. We recommend to use the bike during the run-in, it will also enable you to **know the autonomy**..

During the **5 run-in cycles**, **there is no need to force the motor** : it can damage or reduce the future performances of the battery. **Have a supple riding at moderate speed with pedalling assistance** at the **start** and **uphill** : **maximum** consumption of **10A** during the run-in, that is **360W** with a **36V** battery and **480W** with a **48V** battery. With a Magic Pie or Extrême kit, you need to limit your speed at **18.5mph** with a **36V** battery and **22mph** with a **48V** battery on flat roads with pedalling assistance.

When the **battery is empty**, you need to charge it (**from 4 to 8 hours of charge according to the capacity of the battery**) and **not interrupt before the end of the balancing of the cells of the battery** : green light permanently on.

3.14- Can I charge the battery when going downhill?

Yes, only with **brushless gearless motors** (like the **Magic Pie** or **Extreme** kit). These **motors function as generators producing energy**. At **low speed, the regeneration is insignificant** but at high speed (>25mph) going downhill for a long time can **damage the battery** especially if it is **already full** (overcharge risk, cells unbalanced).

If **you want to ride fast downhill**, you just need to speed up **to force the use of the electrical assistance** : you will reach the **maximum speed** of the motor with a **very low consumption** (less than 50W).

3.15 - Do I charge the battery when braking?

Yes, **if you have set up the power brake handles**. When you are braking, the energy produced by the motor is **used for 2s** to slow down the bike and **also to recharge a little the battery** : less than 3% for an urban ride of 25miles.

Note : with **Xtreme** and **Magic Pie** kits, it is recommended to leave the **original programming of regeneration at 25%** to **protect the battery**. At high speed (>25mph), braking with the power brake handles recharges **too violently the battery** : **this can** have irreversible consequences on the **battery cells (overcharge)**.

3.16 - Can I drive without the battery?

Yes, **under 19mph, this is no problem**

No, in the other cases : if **you ride fast and for a long time at more than 19mph**, your motor (except Balade motor 250W) **will produce electricity** and **you can damage the electronics of your kit (motor and controller)**.

We recommend to let the battery connected in that case.

3.17 - Which type of battery can I use with my kit?

You can use **any type of battery** : **Lithium** (Li-ion, Lifepo4, A123), **Nimh**, **Lead**, **Nicd** ... You just need to respect the tension of the controller : a **36V** battery with a **36V controller**, a **48V** battery with a **48V controller**...

We will offer you **different shapes** of batteries, you have the choice between the following models :

- **Aluminium cased batteries** to set up on a back **rack**, easy for the city, with a lock for more security
- **Cylindrical batteries**, good design, very light **to fix inside the frame**, with a lock for more security
- **Heat shrink batteries** to set up in a **bag**, a backpack (MTB), a top case or inside a cargo bike.

3.18 - Are the batteries resistant to shocks?

Our batteries can support normal vibrations linked to a use on roads. They can be fixed horizontally or vertically on the bike and have to be as one with the bike.

But they are not designer to resist important shocks. For a mountain use, it is essential to carry the battery in a backpack.