

Invented for life



**BOSCH**

# Your eBike Battery Guide



**eBike Systems**



# Do you have questions about eBike batteries?

We will familiarize you with the basics and show you how a battery works. We also explain how to charge, store and care for it correctly. If you follow a few tips regarding your battery, you will be safer on the road and will be able to rely on it for many years.



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# 1

## How does a lithium-ion battery work?

The lithium-ion technology in Bosch batteries stores energy efficiently and durably. In this chapter you will find out how this works and why safety is particularly important with batteries.

# Lithium-ion technology

## Lithium-ion batteries from Bosch...

... are storage devices for electrical energy and supply your eBike with power.



... are rechargeable and can store a lot of electricity in an extremely compact space.



... last for many years and miles.



... are protected by an intelligent battery management system, certified to the UL 2271 safety standard, and are among the most modern on the market.



## How is the power for your eBike generated?

A lithium-ion battery generates the electromotive force by displacing **lithium ions**. While the eBike is in motion and the battery is outputting energy **electrodes** move from the negative anode, via the rider (e.g. drive unit), to the positive cathode. The lithium ions provide balance, thereby making the current flow. The reverse process takes place when the battery is charged.

### Properties of lithium-ion batteries\*

#### Benefits:

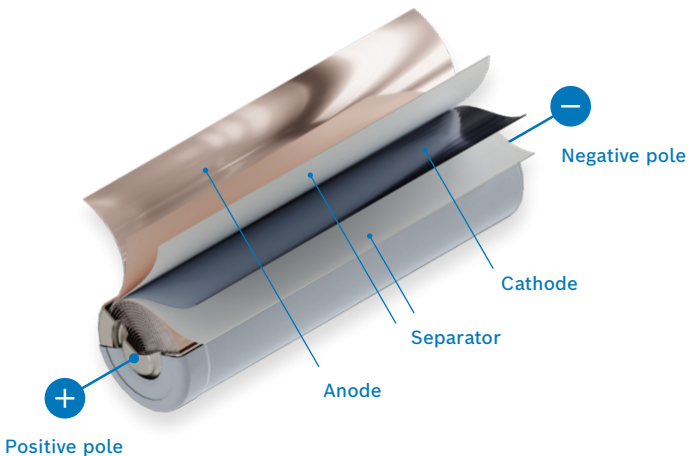
- Rechargeable
- Lots of energy in a compact space
- Lighter than other rechargeable batteries
- Quickly ready for use – even after long storage periods

#### Risks:

- Sensitive to overheating and short circuit
- Danger of gas leaks and risk of fire if damaged or incorrectly handled

\* Compared to other battery types





## How is a lithium-ion battery built?

The **cathode** typically consists of nickel, manganese, aluminium and cobalt-containing mixed oxides. The **anode** is made from graphite. The **separator** film prevents the two electrodes from directly contacting one another and therefore provides for protection against short circuits. Incidentally: The electrolyte is a conductive solution that transports the lithium ions between the cathode and the anode.

# Interesting facts



## Capacity (charge and energy)

- The capacity is given in ampere-hours (Ah). It tells you how much power can be drawn from the battery and for how long.
- The amount of energy that can be stored, stated in watt hours (Wh), is the actual working capacity of the battery and is relevant for the achievable range.



## Easy charging

- Whether full, half-full or empty, batteries with lithium-ion cells can be charged quickly, regardless of their state of charge, at any time. Interruptions of the charging process do not harm the battery.
- A “memory effect”, i.e. decreasing capacity due to frequent incomplete discharge, as familiar from earlier battery systems, does not occur with lithium-ion batteries.



### **Low self-discharge**

Even after long periods of storage, e.g. over winter, the battery can be used without recharging.



### **Service life**

- Batteries are wearing parts. Even when not in use, they age over time due to chemical reactions in the battery cells. This is referred to as calendar aging.
- The battery ages faster when exposed to high temperatures or when stored at low or high states of charge.
- The so-called cyclical aging of the battery is caused by charging and discharging processes. The more intensively a battery is used, the faster it ages cyclically.

# Bosch eBike batteries

## Battery positions



### Frame battery

Because it is a frame battery, the PowerPack is easy to access and remove. Thanks to its low center of gravity, it ensures balanced weight distribution.



### Rack battery

Thanks to their higher positioning on the eBike, rack batteries can be removed and charged conveniently while standing.



### Integrated battery

The PowerTube integrates perfectly in the frame, creating an elegant, sleek eBike look.

## Powerful in every design

Greater range

### DualBattery

Combining two Bosch batteries provides considerably more energy and therefore more range.



### Range extender

The additional water bottle-sized battery provides even more range as a portable energy reserve.

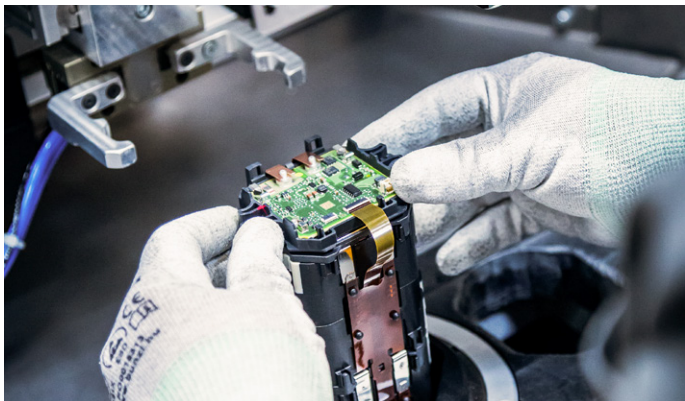


#### Learn more about Bosch batteries

Find the suitable lithium-ion battery for any requirement and for every eBike type:

**[bosch-ebike.com/batteries](https://bosch-ebike.com/batteries)**

# Battery safety



Lithium-ion batteries are complex, finely tuned systems with a high energy content. Their contents can, in principle, be flammable in certain conditions. This is why all eBike batteries undergo extensive testing and may only be launched on the market once they've passed these tests.

## Bosch eBike Systems sets new standards in battery safety

While many brands certify only their batteries, Bosch certifies its entire electrical system to the rigorous UL 2849 safety standard. Additionally, all batteries are certified to UL 2271. The benefit of system-level testing and certification is to provide protection and the peace of mind that goes with it.

### Examples of Bosch Battery safety features<sup>\*</sup>:

- Battery Management System (BMS)
- Mechanical isolation of battery cells
- Electrical isolation of battery cells
- Thermal isolation of battery cells
- Protection against water ingress
- Automation in production

### **Battery housing must not be opened.**

This is exclusively reserved for competent persons after qualification and training. Opening the battery always means interfering with their certified condition and entails safety risks.



<sup>\*</sup> Safety features depending on design and generation

## How Bosch technology makes batteries safer\*



### **Battery Management System (BMS)**

The intelligent BMS continuously monitors the condition of the battery. It detects and protects against excessive operating temperatures, overload and deep discharge. It checks every cell, extending the life of the battery.



### **Mechanical isolation of battery cells\*\***

The individual cells of a Bosch eBike battery are encased in flame-retardant plastic.



### **Electrical isolation of battery cells\*\***

An integrated fuse provides electrical interruption, in case of increased current flow from a cell.



### **Thermal isolation of battery cells\*\***

The encased cells and additional separators reduce the risk of overheating in the battery and a potential thermal chain reaction between the individual cells. This enables a controlled process in the event of gas evolution in the battery: the gas is able to escape in a controlled manner via a predetermined breaking point, preventing it from spreading to further cells.





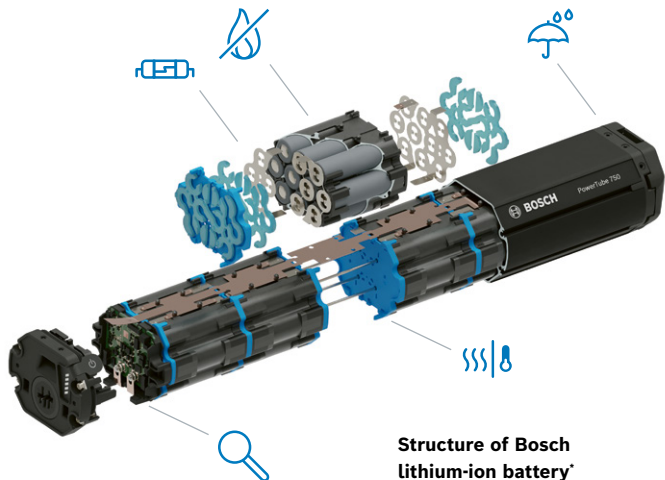
### Protection against water ingress

The sealing concept of a Bosch eBike battery protects it against water ingress and therefore against consequential damage.



### Automation in production\*

A high degree of automation in battery production reduces the risk of assembly errors.



**Structure of Bosch  
lithium-ion battery\***

\* Based on the example of a PowerTube 750

\*\* Safety features depending on design and generation

## Basic rules for greater safety

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**1** Do not open. This is reserved for competent persons after qualification and training.

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**2** Protect from heat, sunlight and fire.

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**3** Do not immerse the battery in water, transport it on the rear bike rack of the car in the rain or clean it with a steam jet or high-pressure cleaner.

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**4** Keep batteries away from small metal objects such as keys, nails or screws. There is a risk that contacts will be bridged, resulting in a short circuit.

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**5** Do not damage, e.g. due to hard shocks, sharp objects or screws.

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# 2

## How do I handle the battery correctly?

Batteries are highly complex components. If you follow simple rules for handling, care and transport, this will have a positive effect on the durability and safety of your battery – so you can enjoy your eBike for many years.

# Charging



## Chargers

The charger must match the battery: please only use compatible chargers for Bosch eBike batteries. This helps protect the battery from damage and prevents dangers such as overheating or short circuits. Original Bosch chargers are of course always compatible with Bosch eBike batteries.

## 2 How do I handle the battery correctly?

### Charging facilities

- **Charging on the eBike:** As soon as you have plugged in the charging cable, the drive unit is automatically locked and the charging process begins. You don't need to do anything else.
- **Charge separately:** If the battery can be removed for charging, it is important that you feel and hear it click into the mount when you reinsert it.
- **Charging on the go:** If there is no charging station on your route, our chargers are so compact and light that you can easily take them with you.





## Tips for optimal charging



- Before charging: Check the battery for visible damage and allow it to cool down.
- Only charge fully if necessary.
- After charging: Disconnect the battery and charger from the power supply.



- Avoid emptying completely while riding.
- Do not charge in escape routes or on flammable surfaces.
- Do not charge near combustible materials.
- Do not leave the battery unattended when charging.

## More information:



Only use compatible chargers for Bosch eBike batteries. With original Bosch chargers, you are always on the safe side.



Make sure the environment is dry and smoke detectors are present.



Charge the battery at an ambient temperature between 32°F and 104°F (0°C and 40°C).



Avoid direct sunlight.

# Storing

## Where should the battery be stored?

- Store the battery in a dry place protected from the weather. Ideally in a well-ventilated room with a smoke detector, away from heat sources or highly flammable materials.
- Due to the cool temperatures, storing the battery in a basement or garage is better than storing it in living spaces.
- Remove the battery from the eBike if you are not going to use or store your eBike for a lengthy period of time.







**For storage, a charge level between 30 and 60% is ideal.** This corresponds to 2 to 3 lit indicators on the battery charge indicator.

## How should the battery be stored?

- Store the battery at an ambient temperature between 50°F and 104°F (10°C and 40°C). To ensure an optimum service life, store the eBike batteries at room temperature. Never store it at temperatures below 14°F or above 140°F (-10°C or above 60°C).
- Avoid excessive heating and direct sunlight.
- Cold temperatures, such as those that can occur in a garage in winter, are harmless. However, a cold battery delivers less power.
- A charge level between 30 and 60% is ideal. This corresponds to 2 to 3 lit diodes on the battery display.

# Care

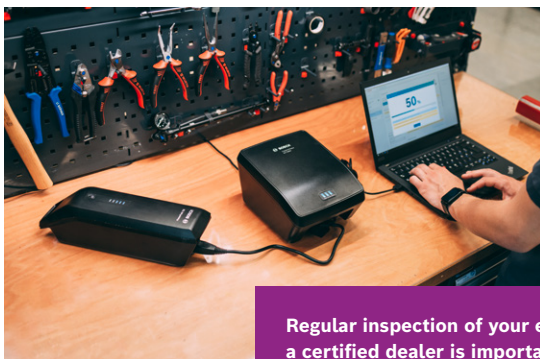
## Cleaning & care

- If possible, remove the battery before cleaning your eBike.
- Use a damp cloth to clean the surface of the battery.
- Clean the plug poles occasionally and lightly grease them with technical Vaseline.
- To protect the electronics, you must not clean the battery with steam jet or high-pressure cleaner.



## Winter use

- If you store your battery in a garage: On particularly cold days, move it to a heated area and wait for it to warm up to room temperature before riding.
- For longer journeys in cold conditions, it is advisable to use thermal protective covers.



**Regular inspection of your eBike by a certified dealer is important!**

Here, the condition of your battery is checked professionally using various tools from Bosch eBike Systems.

# Transporting

Lithium-ion batteries store large amounts of energy. That's why you should take some precautions during transport.



## By car

If you are transporting your eBike outside of the car, e.g. on a bike rack, remove the computer and battery if possible and store both safely in the car to avoid damage. Always use an approved and compatible bicycle rack when transporting your eBike. The Bosch drive system adds weight to the bicycle. Refer to your bicycle rack manual to be sure your eBike is compatible. Overloading a bike rack can result in death or serious injury.



## By train

Before starting your journey, you should contact the respective service provider for precise information on the transport conditions. Please note that it may not be possible to take them on all routes.



### On commuter services and long-distance buses

Before your trip, find out more details from the relevant transport authority. If you want to take your eBike with you on a coach, contact the relevant provider in advance.



### Flights

Air transportation organisation IATA has forbidden the transportation of batteries on passenger planes. Depending on the airline, you may be able to take your eBike with you without a battery. We recommend renting a Bosch eBike battery at your destination.



**Safety on the go:** It is best to transport the battery with a charge level of 30% and only charge it fully again at your destination.

## **Attention: Hazardous goods**

Lithium-ion batteries are flammable under certain conditions and are therefore classified as hazardous goods. The risks will be minimized if you follow the tips provided on care, charging and storage. Further precautionary measures and rules apply to shipping.

### **Regulations for the transport of hazardous goods**

When batteries are transported by commercial users or third parties (e.g. air transport or forwarding agency), special requirements on packaging and labeling must be met. All persons that transport batteries must be trained to meet all requirements to safely ship the batteries and have a training certificate that indicates appropriate training has been provided. Training requirements are based on the mode of transport (air, ocean, highway, rail) used.

## Transporting an eBike battery

Transporting in  
a private car



Transport by  
shipping company



### Interesting fact

In many cases, the certifications required for transport expire in the event of repairs or further interventions that are not carried out by the manufacturer or an authorized company.

## Exchange instead of repair



All batteries lose capacity over time. eBike batteries are also wearing parts. For safety reasons, you should not repair or refresh faulty, old or worn out batteries, but have them recycled appropriately.





## **Risks attached to repairing or refreshing Bosch eBike batteries**

To protect the battery cells, batteries are sealed against the ingress of water and dirt. Opening the battery and reassembling it improperly or incorrectly can lead to a loss of tightness and increased friction on wires, weakening of insulation, displacement of the battery cells, weakening of electrical or mechanical connections and countless further potential risks.

Correct function and optimum interaction with the Battery Management System may no longer be fully guaranteed if a battery is improperly repaired. There is then, among other things, a risk that the improperly repaired eBike battery will catch fire due to a short circuit.

Improper opening and repair can also have an impact on guarantee and warranty claims as well as on compliance with legal requirements (such as transport regulations).

# Recycling



## **Your eBike battery does not belong in the household garbage!**

If disposed of improperly, the batteries may become mixed with other flammable materials. This can damage the battery and lead to fire.

## **So where should I bring the battery at the end of its lifetime?**

Find your nearest drop-off location at:

**US:** [hungryforbatteries.org](https://hungryforbatteries.org)

**CA:** [recycleyourbatteries.ca](https://recycleyourbatteries.ca)

## Recycling of an eBike battery

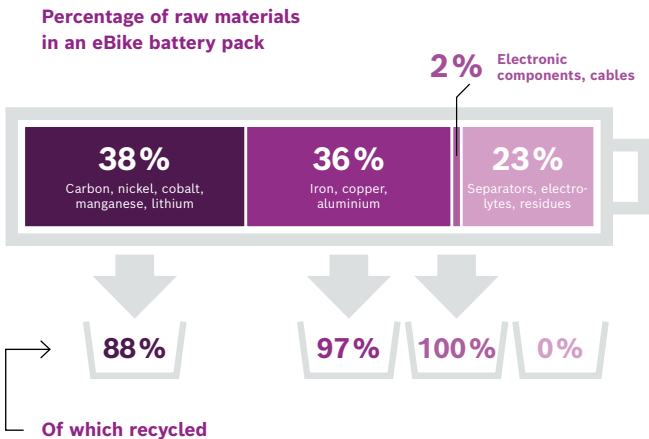
By having batteries recycled properly, you can contribute toward saving resources so that valuable raw materials are returned to the materials cycle.



Source: Own simplified representation, based on GRS Batterien Service GmbH,  
[www.grs-batterien.de/batterien-und-recycling/#c2022](http://www.grs-batterien.de/batterien-und-recycling/#c2022)

## 2 How do I handle the battery correctly?

**Recover resources through recycling –  
this is how high the actual recycled content is**



Nearly 71% of the raw materials in a used eBike battery can be recovered and used for new products.

Source: Own representation based on GRS Batterien Service GmbH, Recycling-effizienzen 2022, Germany

## **Incorrect use (second use)**

Our batteries are specially designed and certified for use with eBikes. We cannot guarantee reliable operation in other application areas.



# Range



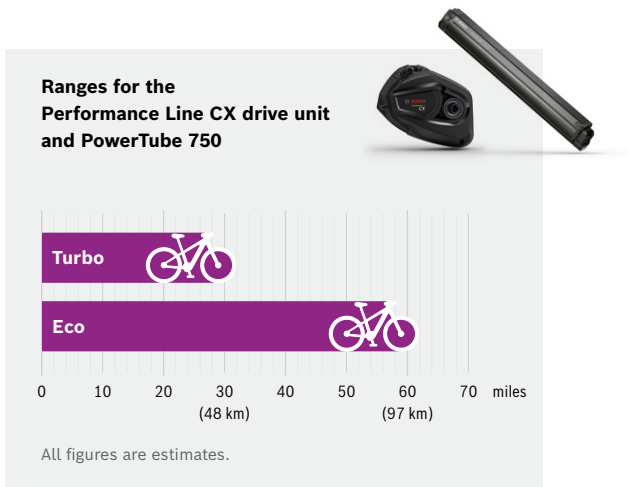
## **Range calculator for more reliable planning**

Calculate how many miles of support your eBike battery is likely to deliver on your next ride:  
**[bosch-ebike.com/range](https://bosch-ebike.com/range)**

## How far can I ride with my eBike battery?

This is a common question for many riders. There is a vast number of factors that have an effect on the range. Our range calculator tool makes it possible to estimate a typical range under various parameters.

In addition, the following graphic shows how the range changes, for example, if Turbo mode is selected rather than Eco mode:



# 3

## Frequently asked questions and answers



## **What should I do if water gets into the battery mount?**

The mount is designed in such a way that water can drain off and the contacts can dry. To ensure that this happens, the mount and plug area should be kept clean. The contacts are supplied with a coating which protects the surface against corrosion and wear. Technical Vaseline may also be used occasionally to maintain the contacts if required.

## **How do I deal with a defective battery?**

Heavily damaged batteries should not be touched with bare hands as electrolyte may leak out, causing skin irritation. Damaged batteries are best stored in a safe place outdoors, protected from rain and direct sunlight and with the contacts taped, before being disposed of by a dealer.

## **Are chargers from other manufacturers safe to use?**

Only if it is ensured that these are compatible with the Bosch eBike batteries. Bosch cannot make any statement about the safety of third-party devices. We generally recommend original spare parts from Bosch.

## **Can I use replacement batteries from other manufacturers?**

Only if it is ensured that these are compatible with the Bosch eBike batteries. We generally recommend original spare parts from Bosch. These are always compatible with Bosch eBike batteries. Bosch eBike components are precisely matched and certified as a complete system. They stand for reliability and efficiency.

## **Can I use a Bosch eBike system battery I found online?**

When purchasing used batteries, you must always make sure they have not been damaged by their previous owner. Damaged or unprofessionally repaired batteries are offered online from time-to-time; these pose a possible high safety risk and can lead to dangerous malfunctions. Sometimes illegal or stolen goods are available online as well.

**Do you have any further questions?  
We have the answers!**



## Help Center

Here you will find answers to the most frequently asked questions:  
**[bosch-ebike.com/help-center](https://bosch-ebike.com/help-center)**



## How-to videos

Our videos provide helpful tips about our products and features:  
**[bosch-ebike.com/help-center/video](https://bosch-ebike.com/help-center/video)**



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