

Invented for life



BOSCH

Your eBike Battery Guide



eBike Systems



Do you have questions about eBike batteries?

We will familiarise you with the basics and show you how a battery works. We will 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 to come.



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1

How does a lithium-ion battery work?

The lithium-ion technology in Bosch batteries stores energy efficiently and durably. This chapter will teach you precisely how this works.

1 How does a lithium-ion battery work?

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.



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 consumer (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*

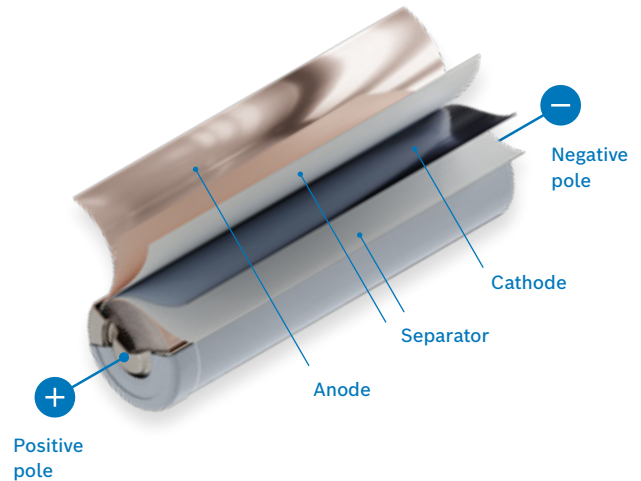
Benefits:

- 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 circuiting
- 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 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

- Batteries with lithium-ion cells can be charged quickly, irrespective of your charge level, 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.

Extremely 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 ageing.
- The battery ages faster when exposed to high temperatures or when stored at low or high states of charge.
- The so-called cyclical ageing 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 Frame is easy to access and remove. Thanks to its low centre of gravity, it ensures balanced weight distribution.



Rack battery

As a rack battery, the PowerPack Rack can be removed and charged conveniently while standing, thanks to its higher positioning on the eBike.



Integrated battery

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

Greater range

DualBattery

Combining two Bosch batteries provides considerably more energy and therefore more range. Meaning maximum power can be utilised over a longer period of time.



Range Extender

The additional bottle-sized battery PowerMore 250 provides even more range as a portable energy reserve.



You would like to find out more about the various batteries from Bosch?

Find the suitable lithium-ion battery for any requirement and for every eBike type:
[bosch-ebike.com/batteries/products](https://www.bosch-ebike.com/batteries/products)

2

Battery safety

Safety is our top priority – including our rechargeable batteries. On the following pages, we show you how we are constantly making our batteries safer.

2 Battery safety

Our contribution to safer eBike batteries



Innovative battery technology*

From the battery management system to cell isolation: with our rechargeable batteries, potential sources of hazard are counteracted where they could arise.



Automated battery production*

Our highly automated battery production reduces the risk of assembly errors.



How we test batteries**

eBike batteries must pass legally prescribed tests before they can be placed on the market. With some tests, we even go beyond the legal requirements.

* Safety measures depending on design and generation.

** In the prescribed short-circuit test, for example, we exceed the legal requirements and also test the battery cells in further short-circuit scenarios. A crush test, shaker test, drop test and watertightness test are examples of legally required tests.

Innovative battery technology*



Battery Management System (BMS)

The intelligent BMS monitors the battery. It detects fault sources and protects against excessive temperatures, overload and deep discharge.



Electrical isolation of battery cells**

The cell connectors provide electrical interruption, in case of increased current flow from a cell.



Mechanical isolation of battery cells**

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



Thermal isolation of battery cells**

Encased cells and separators reduce the risk of overheating in the battery and a potential chain reaction between the cells.



Protection against water ingress

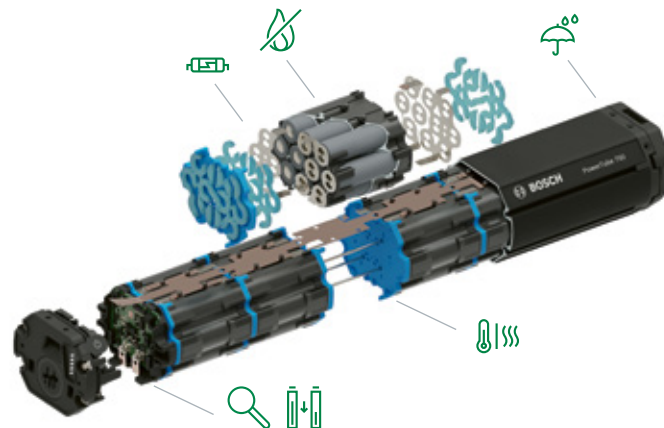
The sealing concept of a Bosch eBike battery protects it against water ingress and therefore against consequential damage.



Charge equalisation for battery cells

This ensures that all the cells in the battery have the same state of charge and the same voltage, which in turn improves efficiency and extends the service life of the battery.

Structure of a Bosch lithium-ion battery*



* Based on the example of a PowerTube 750

** Safety measures depending on design and generation

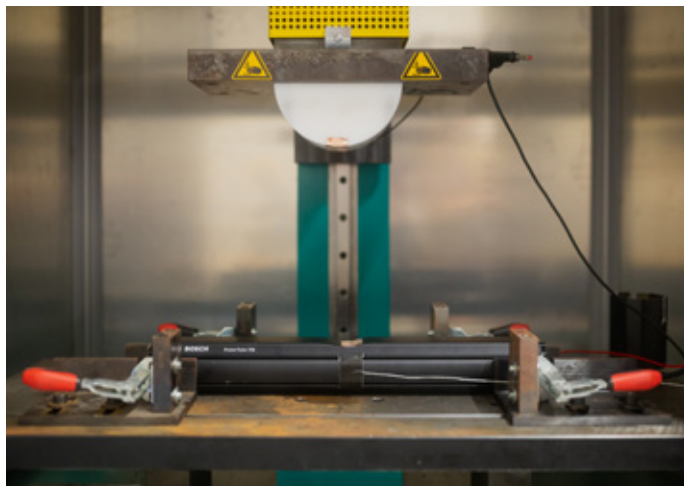
Automated battery production

We develop the batteries for our eBike systems at our headquarters in Reutlingen and produce them mainly at our Bosch plant in Miskolc, Hungary. Highly automated battery production reduces the risk of assembly errors. Robots take over central work steps such as fitting the cell holders and assembling the cell blocks.



Get an insight into our eBike battery production here:
bosch-ebike.com/batteries/production

How we test batteries



Crush test*

A battery is loaded with 1,000 times its own weight. This allows us to test its safety under strong mechanical pressure.



Drop test*

A battery is dropped from a height of one metre onto a concrete block. This allows us to test its robustness against falls or dropping.



Shaker test

The battery is subjected to vibrations of varying intensity, simulating the load of an entire life cycle. This allows us to test its durability.



Watertightness test*

A battery is subjected to high water pressure of up to 100 bar from various angles. This allows us to test its resistance to water.

* This test simulates improper use of a battery and must not be replicated.



All you need to know about the technology, safety and use of our batteries can also be found in our explanatory videos:

bosch-ebike.com/batteries/battery-safety



Good to know: The CE mark indicates that the battery meets all the relevant EU-wide requirements.



Basic rules for greater safety

1 Do not open the battery. This is reserved exclusively for competent persons after qualification and training.

2 Protect the battery from heat, direct sunlight and fire.

3 Do not immerse the battery in water or clean it with a direct jet of water or high pressure cleaners.

4 When transporting the eBike on the rear bike rack, remove the battery from the eBike and stow it in the car.

5 Keep the battery 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.

6 Do not damage the battery, e.g. due to hard shocks, sharp objects or screws.

3

How do I handle the battery correctly?

If you follow a few simple rules for handling, care and transport, this will have a positive effect on the safety and durability of your battery. We also show you how to recycle your battery properly and plan your eBike tours even better.

3 How do I handle the battery correctly?

Charging



Chargers

The charger must also be compatible with the battery: Please only use chargers that are compatible with 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.

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. Otherwise: A charge level of up to 80% and therefore 4 illuminated LEDs on the charge level indicator is ideal for extending the service life of your battery.
- After charging: Disconnect the battery and charger from the power supply.



- Avoid complete discharge 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 0 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.
- Remove the battery from the eBike if you are not going to use your eBike for a longer period of time or are storing it away.

How should the battery be stored?

- Ideally, you should store your battery at temperatures between 10 and 20°C in a dry environment.
- Avoid excessive heating and direct sunlight.

What points should you remember in winter?

- If you store your battery in a garage: On particularly cold days, move it to a heated room and wait for it to warm up to room temperature before riding.
- Storage at cold temperatures between 0 and 10 °C is harmless. However, a cold battery will deliver less power.



If you store your battery for longer periods, such as in winter for example, a **charge level of between 30 and 60 %** is ideal. This corresponds to 2 to 3 illuminated LEDs on the charge level indicator.

Care



Cleaning & care

- If possible, remove the battery before cleaning your eBike.
- Use a damp cloth to clean the surface of the battery.
- You should clean the plug poles occasionally and lightly grease them with technical Vaseline.
- To protect the electronics, you must not clean the battery with direct water jets or even high pressure cleaners.

Inspection

Regular inspection of your eBike by a specialist dealer is important! Here, the condition of your battery is checked professionally using various tools from Bosch eBike Systems.



Transporting



Ideally, you should transport the battery with a **charge level of 30 %** and only charge it again once at your destination.

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 on a rack, remove the battery if possible and stow it in the car.



On flights

The transport of batteries in passenger aircraft is prohibited. We recommend renting an eBike battery or an eBike at your destination.



Commuter transport*

It is often permitted to take an eBike on local transport outside of regional off-peak times. Before your trip, find out more details from the relevant transport authority.



By train*

The battery must remain permanently installed on the eBike while travelling by train and must not be charged during the journey. Ideally, you should contact the respective service provider for precise information on the transport conditions before starting your journey.

* S-Pedelecs that provide support up to 45 km/h are regarded as light motorcycles and may not be transported on public transport.

Digression: Hazardous goods

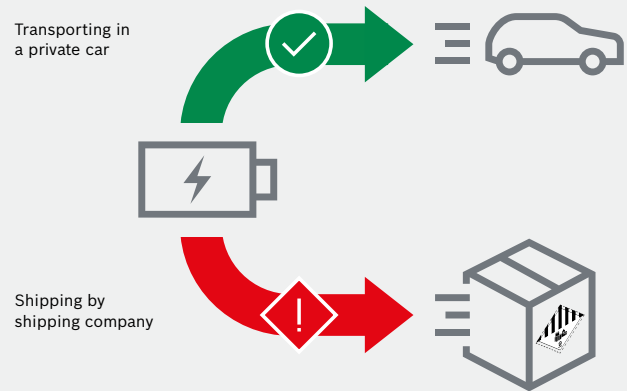
Lithium-ion batteries are flammable under certain conditions and are therefore classified as hazardous goods. The risks will be minimised if you follow the tips provided on care, charging and storage. Further precautionary measures and rules apply to shipping.

Regulations for the transport of hazardous goods

Special hazardous goods regulations apply worldwide when transporting hazardous goods by road. In Europe these are summarised, for example, in the so-called ADR (the agreement on the international transport of hazardous goods by road). The regulations must be applied to all commercial transport of hazardous goods. These do not apply to private individuals if they transport the battery themselves. However, as soon as the battery is given to a third party – e.g. for shipping – the hazardous goods legislation applies in full.

Note: Due to these laws, parcel services do not accept eBike batteries from private individuals for shipping. Simplified conditions only apply to batteries under 100 Wh.

Transporting an eBike battery



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 authorised 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 waste bin!

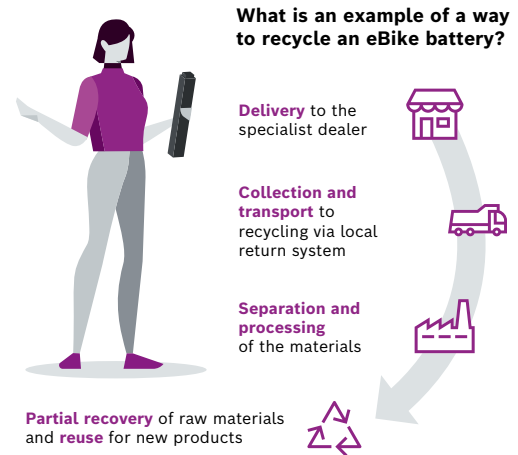
If it is disposed of with household waste, it ends up in waste collection vehicles or sorting plants. The battery can be damaged in the waste compactors, which can lead to dangerous short circuits or the release of harmful substances.

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

Please ask your local specialist dealer for advice on what to do with a battery that has reached the end of its lifetime.

Recycling of an eBike battery

By recycling properly, you can help to ensure that valuable raw materials can be returned to the material cycle.

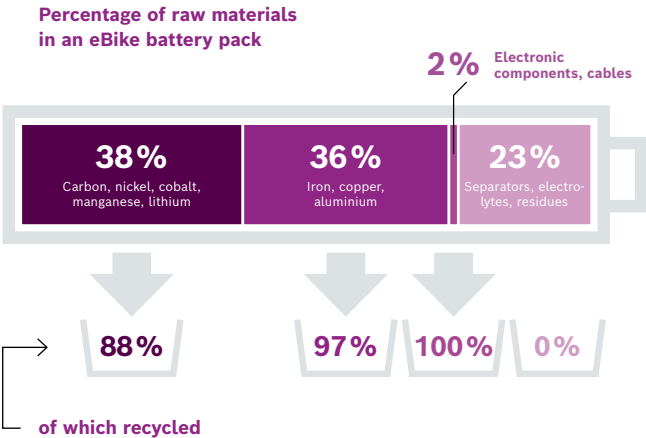


Note: The recycling systems are regulated differently depending on the country. Please contact your specialist dealer for support.

Graphic: Simplified illustration based on Regulation (EU) 2023/1542 on batteries and waste batteries.

3 How do I handle the battery correctly?

Efficiency of recycling an eBike battery
Example: GRS Germany take-back system, 2024



Graphic: Own illustration based on the “GRS Annual Review eMobility 2024”, from Gemeinsames Rücknahmesystem Batterien (GRS), Germany.

Around 79% of the raw materials of a used eBike battery were recovered in the GRS take-back system in Germany in 2024 and reused for new products. Exactly how much can be recycled depends on the battery type, the cell chemistry, the recycling process and the respective country.

Incorrect use (second use)

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



Planning

How far can I ride with my eBike battery?

This is a common question for many eBikers. We cannot answer this question in blanket terms, however, since the range depends on a number of different factors, including the terrain type, tyre tread and riding mode.

Your Range Assistant

Find out how far you can go with your eBike battery under different conditions – and which battery will best suit your needs.



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

Plan things out with Range Control.

With the eBike Flow app, you can plan out your routes without having to worry about range. With Range Control, you'll see how far you can travel for each riding mode – and will be able to specify the charge level you want to arrive at your destination with.



Download the
eBike Flow app
here

Protecting

How can I protect my eBike battery?

With **Battery Lock**, you can lock your eBike battery digitally, for even less stress when parking your eBike: this function ensures that your battery can no longer be used if it is stolen.



Battery Lock is a paid
**premium service from
Flow+** and is available for
eBikes with the smart
system.

Further information is
available here:



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

4

Frequently asked questions and answers

4 FAQ

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

The battery mount should be completely dry before the battery is used again. The battery should also be removed occasionally and the plug area cleaned. 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 or damaged battery?

Heavily damaged batteries should only be touched while wearing gloves, as electrolyte may leak out, causing skin irritation. Damaged batteries may no longer be charged. They 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 specialist dealer/retailer. For safety reasons, damaged batteries may under no circumstances be sent in a parcel.

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 system. We generally recommend original spare parts from Bosch. These are always compatible with the Bosch eBike system. Bosch eBike components are precisely matched and certified as a complete system. They stand for reliability and efficiency.

I have found a used battery for the Bosch eBike system online. Can I use it?

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

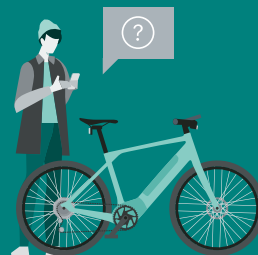


Bosch eBike battery check

If you buy a used battery, you can use the serial number to check whether a service case has already been registered for that battery.

bosch-ebike.com/batteries/battery-check

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/
batteries/help-center](https://bosch-ebike.com/batteries/help-center)



How-to videos

Our videos provide helpful tips about our products and features:



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

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