The eBike Rechargeable Battery Guide

Everything you need to know about Bosch PowerPacks
PowerPacks are the energy source for the Bosch Performance Line CX, Performance Line and Active Line eBike systems. Tips and useful pointers on how to determine their range, optimize their efficiency and maximize their service life are provided on the following pages.

Contents
Succinctly stated

PowerPacks
The energy carriers

03  PowerPacks
06  Range
13  DualBattery
17  Benefits
18  Charger
20  Charging time
21  Weight
23  Service life
24  Handling
26  For your safety
28  Care
30  Electricity costs
31  Recycling
Position Balanced

When installed as a frame battery, the PowerPack is very close to the center of gravity of the bicycle and thus has a very positive effect on the handling. The rack variant is frequently used on step-through bicycles to offer as much clearance as possible when getting on and off the bike.
Range
Optimized

PowerPacks are the fuel tanks of pedelecs. State-of-the-art lithium-ion technology makes them into efficient and longlasting suppliers of power. As an eBiker you can ride with them very economically and thus maximize the range of a rechargeable battery charge.

Tips and tricks for optimal range:

Cadence
Cadences above 50 revolutions per minute optimize the efficiency of the drive unit. In contrast, very slow pedaling is very costly in terms of energy.

Weight
The mass should be minimized by keeping the total weight of the bicycle and luggage from being unnecessarily high.

Starting & braking
As with a car, frequent starting and stopping is less economical than long distances at a nearly constant speed.

Gear shifting
Correct shifting also makes eBiking more efficient. It is best to start off and take inclines in a low gear. You then switch to a higher gear in accordance with the terrain and speed.

Tire pressure
Rolling resistance can be minimized by proper tire pressure. Tip: In order to maximize the range, inflate the tires to the maximum permissible tire pressure.

Motor performance indicator
Keep track of the motor performance indicator of the Nyon or Intuvia on-board computer and adapt your riding style accordingly. A long bar means greater power consumption.

Rechargeable battery & temperature
With decreasing temperature, the efficiency of a rechargeable battery goes down, since the electrical resistance increases. In winter you can thus expect a reduction in the normal range.

The range of the Bosch PowerPacks depends on numerous different factors: the Drive Unit with which your eBike is equipped, the terrain you are riding on and your average speed. You can calculate the range of your own eBike – epowered by Bosch – using our Range Assistant.

Calculate your range using the Range Assistant at bosch-ebike.com/range-assistant
Range of PowerPacks

Support modes, riding behavior, and external factors influence the range. For the PowerPacks, the following graphics provide an overview of the range as a function of a variety of conditions:

**Ideal conditions**
- Flat terrain, approx. 15 km/h, no headwind, approx. 20 °C outside temperature, low rolling resistance, optimal gear shifting, weight without eBike < 70 kg, no additional connected components, e.g. lights.

**Favorable conditions**
- Slightly hilly terrain, approx. 20 km/h, slight headwind, approx. 10 °C to 20 °C outside temperature, medium rolling resistance, generally optimal gear shifting, weight without eBike 70 to 80 kg, additional connected components, e.g. lights.

**Difficult conditions**
- Hilly terrain, approx. 25 km/h (Speed: 30 km/h), headwind, < 10 °C outside temperature, high rolling resistance, unfavorable gear shifting, weight without eBike > 85 kg, additional connected components, e.g. lights.

* The ranges are typical values for new batteries, which may decrease if one of the conditions listed deteriorates.
** Average of combined use of all four modes.
Active Line Cruise

**PowerPack 500**

- Turbo
- Sport
- Tour
- Eco
- Mix**

**PowerPack 400**

- Turbo
- Sport
- Tour
- Eco
- Mix**

**PowerPack 300**

- Turbo
- Sport
- Tour
- Eco
- Mix**

DualBattery

Range doubled

- Difficult conditions
- Favorable conditions
- Ideal conditions
DualBattery range

DualBattery is the ideal solution for trekking bikers and long-distance commuters: DualBattery combines two PowerPacks 500/400/300 installed on the bike. This makes capacities of up to 1,000 watt hours possibly for eBikers.

Performance Line CX

**DualBattery 1000** (2 x PowerPack 500)

**DualBattery 800** (2 x PowerPack 400)

Performance Line Cruise

**DualBattery 1000** (2 x PowerPack 500)

**DualBattery 800** (2 x PowerPack 400)

- Turbo
- Sport
- Tour
- Eco
- Mix**

- Difficult conditions
- Favorable conditions
- Ideal conditions
Benefits
The advantage of the PowerPacks

No memory effect
The PowerPack with lithium-ion cells can be briefly charged at any time regardless of its charging state. Interruptions of the charging process do not harm the battery. Complete discharge is not required.

No self-discharge
Even after prolonged storage, such as during the winter, it is possible to use the rechargeable battery without recharging it. This means PowerPacks do not need to be recharged after a long break in use. For longer storage, a charge status of approx. 30 to 60% is recommended.

Long service life
PowerPacks are designed for many tours, miles, and years of service. The intelligent, electronic Bosch battery management system (BMS) protects lithium-ion batteries from excessive temperatures, over-charging, and deep discharge. The BMS checks every cell, extending the life of the battery. This makes the time from initial use to the need to replace a PowerPack very long.
Faster charging made easy

Bosch Chargers are compact, lightweight, and rugged. And above all, really fast. The Bosch Standard Charger is only about the size of a drinks bottle and is extremely lightweight at under 800 grams. The Travel Charger weighs even less, at barely 500 grams. In this way you can charge your pedelec on the go without a 230-volt connection – all you need is the cigarette lighter of a car or motorhome.

**Standard Charger**
Thanks to the short charging times of the 4A Standard Charger, the battery can quickly be used again and your pedelec is always ready. Like all the Bosch eBike System chargers, the Standard Charger is low-noise.

**Compact Charger**
The Compact Charger is the ideal charger for all those who undertake long trips with their eBike. Small and compact, the 2A Charger weighs less than 600 grams. With 40% less volume than the Standard Charger, it fits into any saddlebag. The Compact Charger is compatible with supply voltages of 110 to 230 volts and can be used in Europe, the US and Canada as well as Australia.

**Travel Charger**
Weighing just under 500 grams, the small Travel Charger is operated via the cigarette lighter in a car or the 12V vehicle socket in a motorhome and also enables convenient recharging when on the road. An integrated discharge protection protects the car battery.
**Charging time**

Quickly at full charge

The charging time depends on the capacity of the battery and of the charger: with the Standard Charger, the PowerPack 300 requires approx. one hour for half a charge, while the PowerPack 400 requires around 1.5 hours and the PowerPack 500 about two hours. An empty PowerPack 300 is fully charged in just 2.5 hours. A PowerPack 400 needs 3.5 hours for this, and the PowerPack 500 4.5 hours.

A charge cycle refers to full charge in a single charging session or several partial charging sessions.

---

**Weight Saved**

The PowerPacks are efficient and reliable energy suppliers for when you are on the go. At approx. 2 to 2.7 kg, they are really lightweight, with energy density (Wh/kg) that takes a leading position among eBike batteries.
Factors that shorten the service life:
▶ Heavy-duty use
▶ Storage at over 30 °C ambient temperature
▶ Prolonged storage in a completely charged or completely discharged state
▶ Parking of the eBike in the blazing sun

Factors that have a positive impact on the service life of the battery:
▶ Low load
▶ Storage at a temperature between 0 and 20 °C
▶ Storage at approx. 30 to 60% charge status

The service life of a PowerPack is influenced mainly by the type and duration of use. Like every lithium-ion battery, a PowerPack also ages over time, even if you do not use it.

The figure shows typical curves for energy content over usage duration and frequency.
Handling
One flick of the wrist, everything under control

High-tech can be this simple. The Bosch PowerPacks rest securely in their mounts even when you are riding on uneven terrain, but they are very easy to remove for storage or charging. Simply open the lock, which serves as attachment and theft protection, and remove the battery from the mount at an angle.

It can of course be inserted again just as easily. With the low weight, handy dimensions, and precise fit of the rechargeable battery, the PowerPack can be easily and intuitively inserted. The rechargeable battery locks into its mount in a manner that is noticeable and audible, so that it rests securely on the eBike.

Charging directly on the pedelec is also very easy. You just need to insert the plugs of the charger into the charge socket in the mount and into the wall outlet. Done. The PowerPack is charged directly on the eBike.

All PowerPacks are equipped with an ergonomic carrying handle, which makes them very easy to carry and manipulate. It allows the PowerPacks to be conveniently inserted, removed, carried, and charged.

PowerPack frame and rack batteries are maintenance free. Occasional cleaning and light greasing of the plug is still recommended, however. Cleaning with a direct water jet or immersion in water, however, are impermissible.
For your safety
Conscientious use of the battery

PowerPacks are lithium-ion cells, which are developed and manufactured to the highest standard. The applicable safety standards are met or even exceeded. In the charged state, these lithium-ion batteries have a high energy content. The constituents of lithium-ion cells are flammable under certain conditions. For this reason, please familiarize yourself with the warnings contained in the owner’s manual.

Doubly protected
Each individual cell in the PowerPack is protected by a rugged steel cup and kept in a plastic housing. Do not open the case, and avoid mechanical stress and excessive heat. These could damage the battery cells and lead to leakage of flammable ingredients.

Careful storage
Avoid excessive heating and do not store your PowerPack in the vicinity of heat sources of inflammmable materials. We recommend storage in uninhabited rooms with smoke detectors. Cool and dry locations are the most suitable. Disconnect the PowerPack and Charger from the power supply after charging.

Cleaning
Cleaning with a direct water jet is impermissible, in particular to protect the electronic components. A damp cloth is more suitable for this task. Always remove the battery before cleaning.

Properly dispose of damaged batteries
You should not touch heavily damaged batteries with your bare hands, since electrolyte may leak and cause skin irritation. Keep the battery in a safe place outdoors. If necessary, tape over the poles and inform your dealer. He will support you in proper disposal.

Safe storage with Bosch Chargers
The integrated battery management system in the PowerPack in conjunction with a Bosch Charger protects the battery against overload during charging.

Bosch Chargers protect against damage from extreme overload or short circuit. Use these exclusively for eBikes with Bosch drive, since the components ensure a perfectly coordinated charging and discharging process.
Care

Proper treatment

The more conscientiously you treat the PowerPack, the further it will take you.

We have a few tips and tricks to help:

Charging
The battery should be charged under dry conditions and at room temperature.

Storage during winter
Store the batteries in a dry location at temperatures between 0 and 20 °C. Storage at room temperature is ideal. Being completely charged or completely discharged for storage is not advised for the batteries. The ideal charge status for lengthy periods of storage is approx. 30 to 60% or two to three LEDs on the battery indicator.

Cleaning & care
Cleaning with a direct water jet is impermissible, in particular to protect the electronic components. Before cleaning, remove the battery. Occasionally clean and lightly grease the plug terminals.

Winter use
During winter use (particularly below 0 °C) we recommend charging and storing the battery at room temperature before inserting the battery in the eBike immediately before riding it. For frequent travel in the cold, it is advisable to use thermal protective covers.

Storage
Temperatures below -10 °C and above 60 °C should be avoided.

Transport
For transport, the battery should always be taken off the eBike and safely transported in your car, for example.

Inspection
Using a diagnostic unit, the dealer can check the health status of the eBike, especially the battery, and tell you the number of charging cycles.
Electricity costs
Ride & save

If only everyone would use as little electrical energy as an eBiker! Even a refrigerator with 250 kWh per year consumes significantly more than an active eBike commuter with only about 40 kWh per year. But riding an eBike is good not only for the environment but also for your wallet.

A full charge of a PowerPack 300 costs less than 10 cents (Assumption: green electricity rate of 25 cents per kWh).

Recycling
After cycling: Recycling

The dealer takes care of environmentally sound and free disposal of Bosch PowerPacks. In this way, valuable raw materials reenter the cycle and resources are conserved. Simply take the rechargeable battery to your dealer – perhaps on your eBike.