

The eBike Rechargeable Battery Guide

Everything you need to know about PowerPacks



Bosch eBike Systems 2016



BOSCH

Invented for life

Contents

Succinctly stated

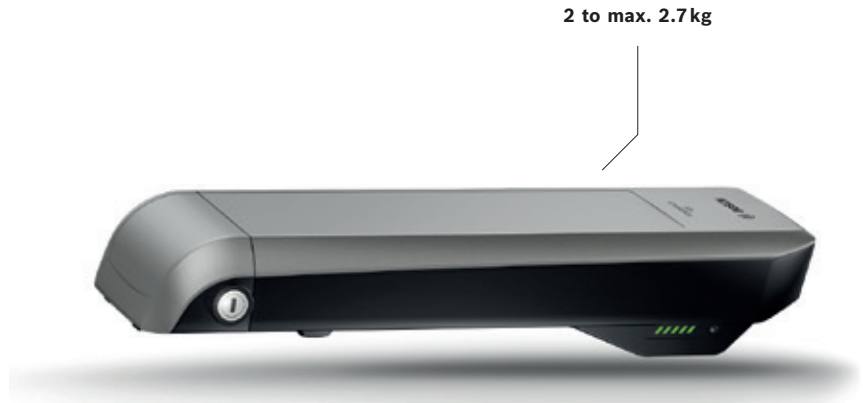
PowerPacks are the energy source of the Bosch eBike Active Line and Performance Line systems. On the following pages, you will find tips and tricks on how to determine their range, optimize their efficiency, and maximize their service life.

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Weight

Saved

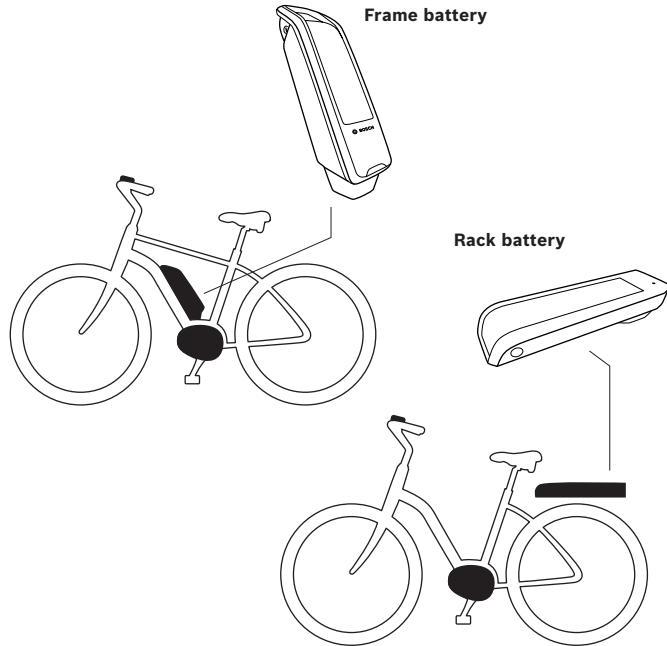
The PowerPacks are efficient and reliable energy suppliers for when you are on the go. At approx. 2 to 2.7 kg, they are real lightweights, with energy density (Wh/kg) that takes a leading position among eBike batteries.



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 long-lasting 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: Always ride with the maximum allowable tire pressure.

Motor performance indicator

Pay attention to the motor performance indicator of the on-board computer and adjust 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.

Range

Far-reaching technology

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, low rolling resistance, proper shifting, weight without eBike < 70 kg

Favorable conditions*

Slightly hilly terrain, approx. 20 km/h, light headwind, medium rolling resistance, correct shifting for the most part, weight without eBike 70 to 80 kg

Difficult conditions*

Mountainous terrain, approx. 25 km/h (speed: 30 km/h), headwind, high rolling resistance, unfavorable shifting, weight without eBike > 85 kg

The above conditions are assumptions that can be both exceeded and undershot.

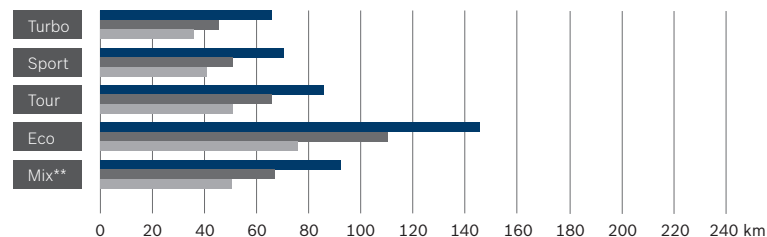
The range of the Classic+ Line is comparable to the range of the Active Line.

* The calculated ranges are typical values which can be reduced if any of the conditions listed above worsen. The actual range of the eBikes is the responsibility of the eBike manufacturer.

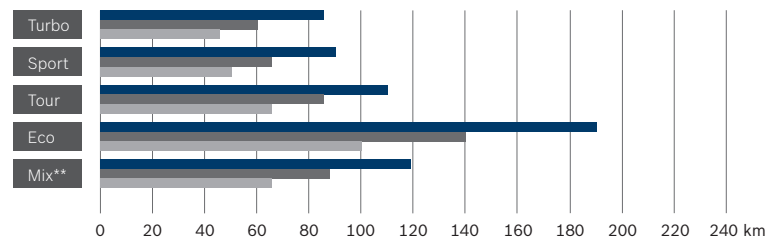
** Average of combined use of all four modes.

Range Active Line

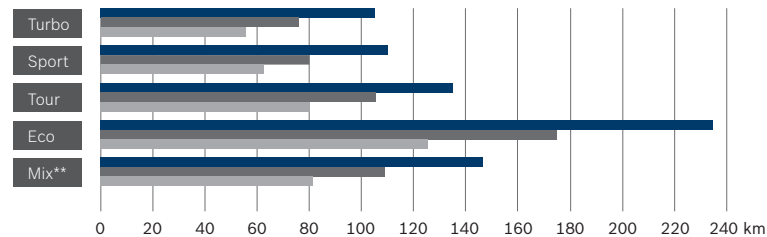
Cruise with PowerPack 300



Cruise with PowerPack 400



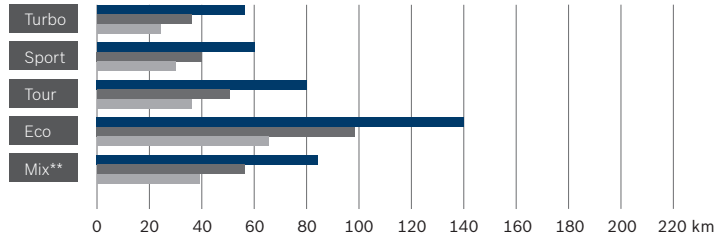
Cruise with PowerPack 500



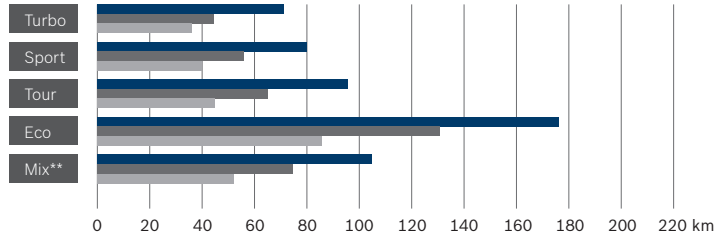
■ Ideal conditions ■ Favorable conditions ■ Difficult conditions

Range Performance Line

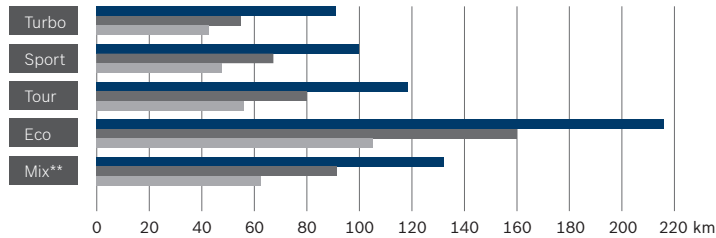
Cruise with PowerPack 300



Cruise with PowerPack 400

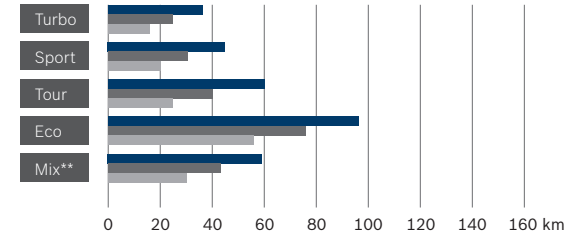


Cruise with PowerPack 500

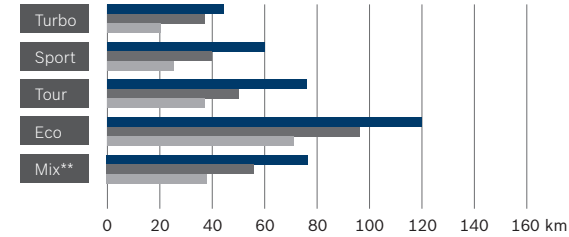


** Average of combined use of all four modes.

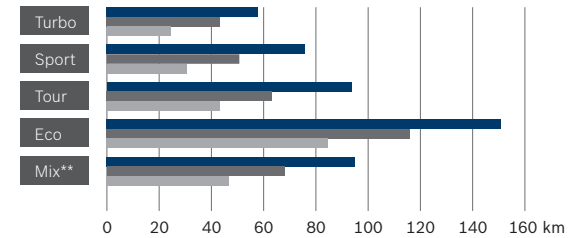
Speed with PowerPack 300



Speed with PowerPack 400



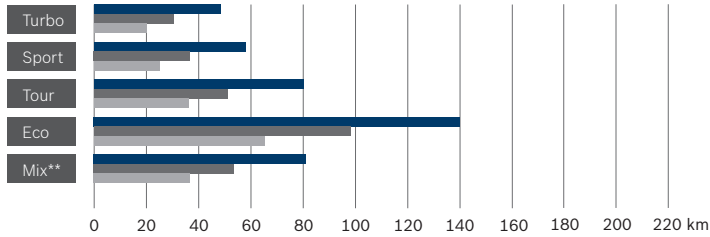
Speed with PowerPack 500



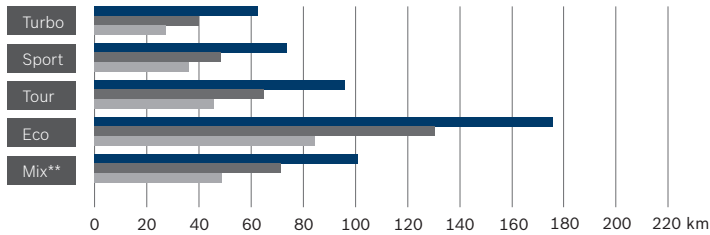
■ Ideal conditions ■ Favorable conditions ■ Difficult conditions

Range Performance Line CX

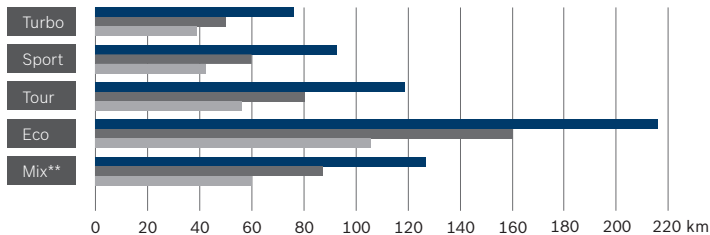
Cruise with PowerPack 300



Cruise with PowerPack 400



Cruise with PowerPack 500



** Average of combined use of all four modes.

■ Ideal conditions ■ Favorable conditions ■ Difficult conditions

eBike Range Cockpit

The range of your eBike system depends on various factors including the conditions of the terrain, headwind, and start-up behavior.

Calculate the range for your next eBike tour at www.bosch-ebike.com in the Service area.

Charger

Faster charging made easy

Bosch Chargers are compact, lightweight, and rugged. And above all, really fast. The Bosch eBike Charger is only about as big as a water bottle and very lightweight, at just 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.

Charger and Adapter



Travel Charger



Charging time

Quickly at full charge

The charging time depends on the capacity of the rechargeable battery: To charge up to 50%, the PowerPack 300 requires approx. one hour, the PowerPack 400 approx. 1.5 hours, and the new PowerPack 500 approx. 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.

PowerPack 300

PowerPack 400

PowerPack 500



2.5 h
Charging time

3.5 h
Charging time

4.5 h
Charging time

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 extended storage, a charge of approx. 60% is recommended.

Long service life

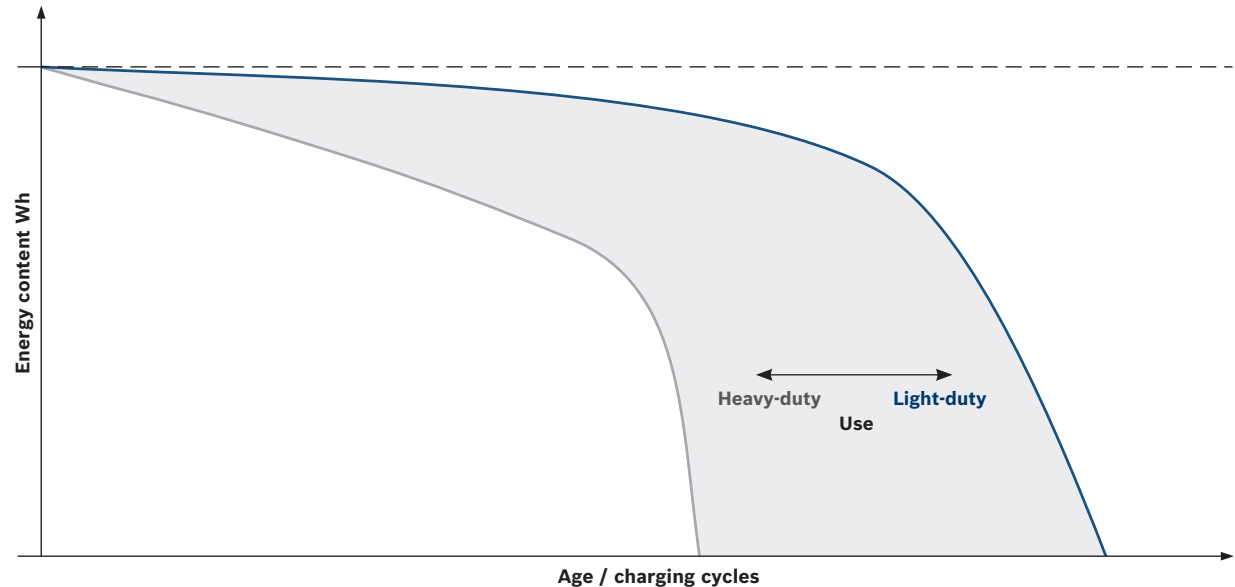
PowerPacks are designed for many tours, miles, and years of service. The intelligent, electronic Bosch battery management system (BMS) protects lithium-ion batteries from excessive temperatures, overcharging, and deep discharge. The BMS checks every cell, extending the life of the battery. This makes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

Service life

Lifelines

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.



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



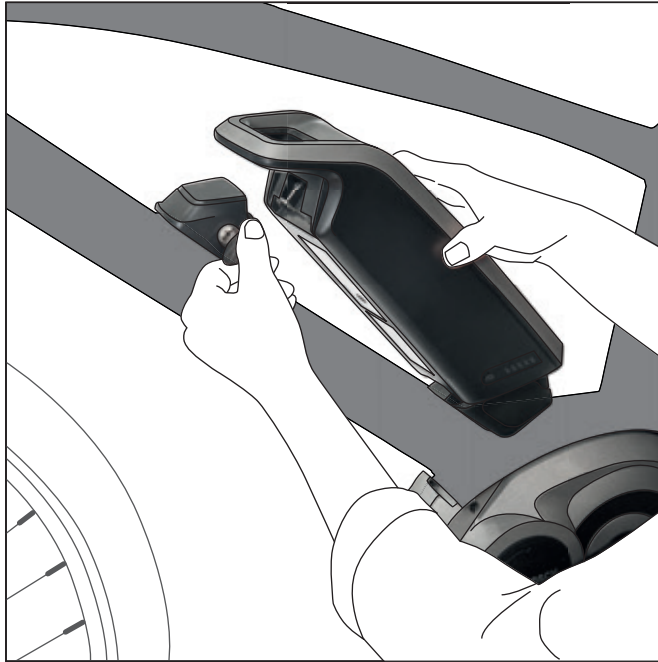
Factors that have a positive impact on the service life of the battery:

- Light-duty use
- Storage at a temperature between 15 and 20 °C
- Storage with a state of charge of approx. 60 %

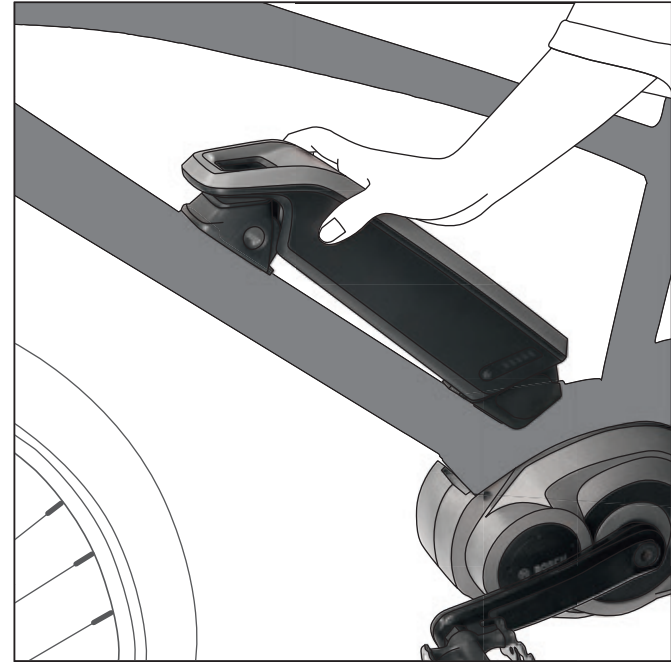
Handling

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. The batteries are also water resistant, but they should not be cleaned with high-pressure washers or immersed in water.



Care

Proper treatment

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

We have a few tips and tricks in this regard:

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 state of charge for extended periods of storage is about 50 to 60 %, or three diodes lit up on the battery indicator.

Cleaning & care

To protect the electronic components, the rechargeable battery should not be cleaned with a high-pressure cleaner. Before cleaning, remove the battery. Occasionally clean and lightly grease the plug terminals.

Winter use

When using the battery during the winter (especially below 0 °C), we recommend waiting until briefly before departure to insert the battery, which has been charged and stored at room temperature. 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.

For your safety

Conscientious use of the battery

The contents of lithium-ion battery cells are flammable under certain conditions. You should thus familiarize yourself with the rules of conduct in the user 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 heat. In this way you contribute to the longevity and safety of the battery. In particular, you should avoid storage in direct sunlight, such as behind the windshield of your car. Cool and dry places are suitable.

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.



Electricity costs

Ride & save

If only everyone would use as little electrical energy as an eBiker! But 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 the dealer for drop-off – on your eBike, for example.

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