

Tips & Technology

For Bosch business partners

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Electrics / Electronics



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Invented for life

Starter batteries – Information and tips

Tasks and requirements

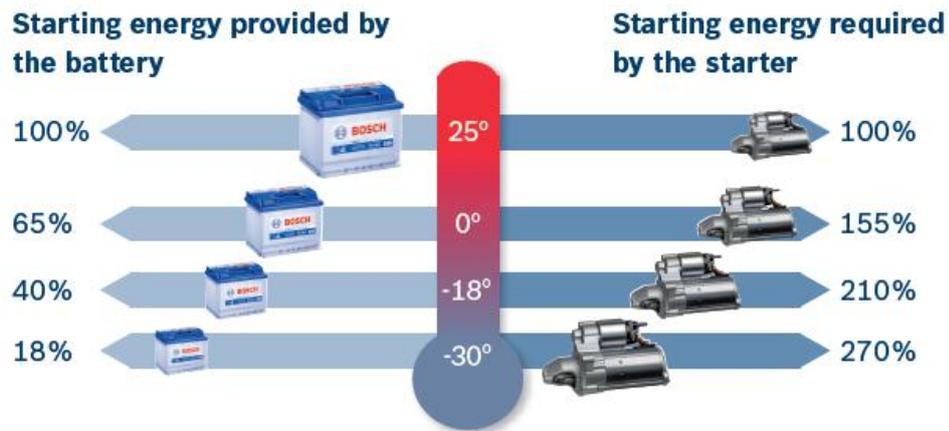
The starter battery acts as a store for electrical energy in the vehicle electrical system and has the following tasks:

- Provision of electrical energy for the starter
- Compensation for the difference between generation and consumption if the alternator is not supplying the vehicle electrical system with sufficient power (e.g. at idle or with engine stopped)
- Damping of vehicle electrical system voltage peaks to protect sensitive electronic and electrical components (e.g. bulbs, semi-conductors).

Although it is only switched on for a brief period, the starter has the greatest power input of all items of electrical equipment (car with gasoline engine: 0.7...2.0 kW; car with diesel engine: 1.4...2.6 kW; buses/commercial vehicles: 2.3...9.0 kW). The battery terminal voltage drops on starting on account of the high current. A certain level must however be maintained to ensure operation of the various control units – e.g. the engine management system. These can no longer function if the power supply is too low.

Numerous items of electrical equipment have to be supplied with power whilst driving (e.g. engine management system, lights, air conditioning system, electronic stability program). If the alternator is not generating sufficient power to supply all the electrical equipment running – e.g. at idle or low engine speed – the vehicle electrical system voltage drops to the voltage level of the battery and electrical energy is drawn from the battery. For a limited period, the battery thus has to be capable of partially or fully – in the case of engine and thus alternator stoppage – providing electrical system components with power. When sufficient current is being generated, the battery can be re-charged by way of the alternator regulator. The operations described are referred to as charging and discharge cycles.

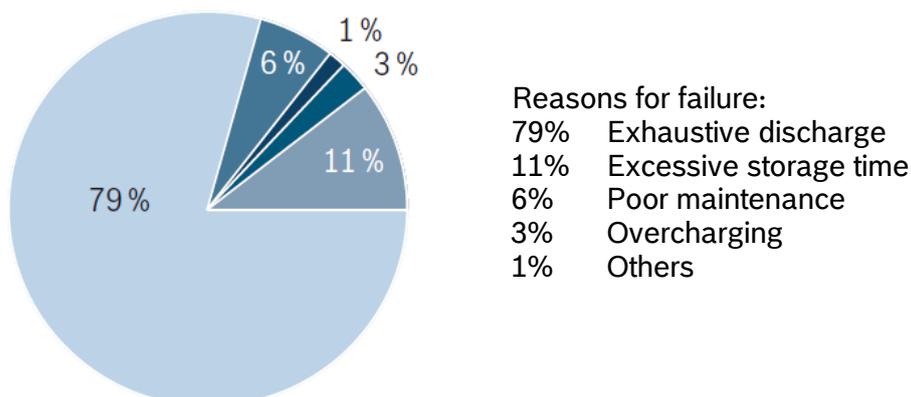
The amount of current drawn from a starter battery differs considerably. The vehicle electrical system current requirement with the engine and alternator not running is roughly 10 mA (e.g. for the clock, anti-theft alarm or remote controlled central locking system). At idle and when driving slowly, the battery has to provide 20...70 A at times. Starting the engine requires approximately 300 A for a period of 0.3...3 s. The peak current values may even be as high as 1000 A. The power requirement and duration of engine starting are much greater at low temperatures.



The energy requirement resulting from the ratings of the electrical equipment in a vehicle and calculated on the basis of the operating conditions, is definitive for the dimensioning of both the battery and the alternator. If a vehicle is fitted with additional equipment such as convenience systems with control motors for window and roof drive units, seat and steering wheel adjustment, seat heating, air conditioning or a refrigeration unit, a good deal of extra energy may be required. The manufacturer takes these equipment ratings into account when dimensioning the electrical components in a vehicle. Consequently such vehicles are supplied with a more powerful battery and possibly also a larger alternator. Further mechanical, cyclical or climatic factors are also taken into consideration depending on the type of application concerned. For example, commercial vehicles suitable for off-road use are often fitted with special batteries designed to withstand vibration and accordingly provided with features such as a tightly packed mat between the plates. AGM batteries are highly suitable for use where particular cyclical loads are involved for instance. A corrosion-resistant lead alloy is required in hot climates. As caravans and mobile homes are frequently equipped with a variety of electrical equipment such as lights, refrigerator, heating, radio and television sets, additional batteries with a separate circuit are often installed in such vehicles. The Bosch range includes L-series batteries for this purpose or the Optima series to satisfy higher power requirements or for installation in confined spaces.

Battery failure due to exhaustive discharge

In addition to excessive storage times, one of the main reasons for battery failure is so-called exhaustive discharge. In this process the entire capacity is drawn off at once. The damage to the battery in this condition may be considerable depending on the length of time for which the vehicle is not driven. Consequences: Loss of power, re-charging not possible, substantial curtailment of service life.



Reasons for battery exhaustive discharge:

- Short circuit in the electrical system
In the event of a short circuit, a considerable amount of current is drawn from the battery in a short time and converted into heat. In a worst case situation this can even lead to the vehicle catching fire.
- Leaving the vehicle lights switched on
The vehicle lights consume a lot of power. The dipped beam should therefore be switched off when parking – it is always best to check after getting out.
- Auxiliary heating
The blower has to run to distribute warm air throughout the vehicle. If it is not switched off in the event of undervoltage, the battery will suffer exhaustive discharge. This will also be the case if the battery used is too large or too small.
- Defective alternator
The battery is not charged by the alternator whilst driving. The control units and other items of electrical equipment are supplied solely by the battery – until it is flat.
- Control unit fault
Control units are networked and communicate with one another whilst driving. If they are not switched off on switching off the ignition (e.g. on account of a defective sensor), they continue to use power which will result in exhaustive discharge over the course of time.
- Retrofitting of electrical equipment
Seat heating, connected to continuous current (by way of the cigarette lighter) for example, will drain the battery in a very short time.
- Fitting of incorrect battery
A defective AGM-battery for example must be replaced with another AGM-battery, as fitting the wrong type of battery would impair operation of the start/stop-system and detract from the positive effects of this. The service life of the battery is shortened.
- Short journeys
On short journeys, the amount of power consumed is often more than the alternator can supply. Wherever possible use should then not be made of the heated rear window function or seat heating, particularly in winter.
- Radio, TV, DVD, refrigerator units
Radios, navigation units and other electronic entertainment devices such as televisions and DVD players require a lot of battery power. If it is not simultaneously re-charged, the battery may suffer exhaustive discharge.
- Defective alternator regulator
The alternator regulator ensures optimum charging of the battery. If it is defective, exhaustive discharge may occur as a result of inadequate charging or the battery may be overcharged.

Advice to workshops on replacing starter batteries

Short circuits (caused for example by tools) can produce sparks and lead to burns. After switching off all electrical equipment, the ground cable should therefore be disconnected before starting work on the electrical system or in the vicinity of the battery. Particular caution is required when connecting and disconnecting a charging cable or jump lead to avoid short circuits. The following safety principles should be heeded when working with batteries:

- Wear safety goggles and rubber gloves as a precaution when handling electrolyte or topping up water in non-maintenance-free batteries.
- Take care never to exceed the max mark when adding electrolyte.
- Avoid tilting the battery too far and for too long.
- Take care to avoid naked flames and spark formation and do not smoke when charging due to the risk of electrolytic gas explosion (connect and disconnect in the specified sequence with the charger switched off).
- Make sure the battery charging area is well ventilated.

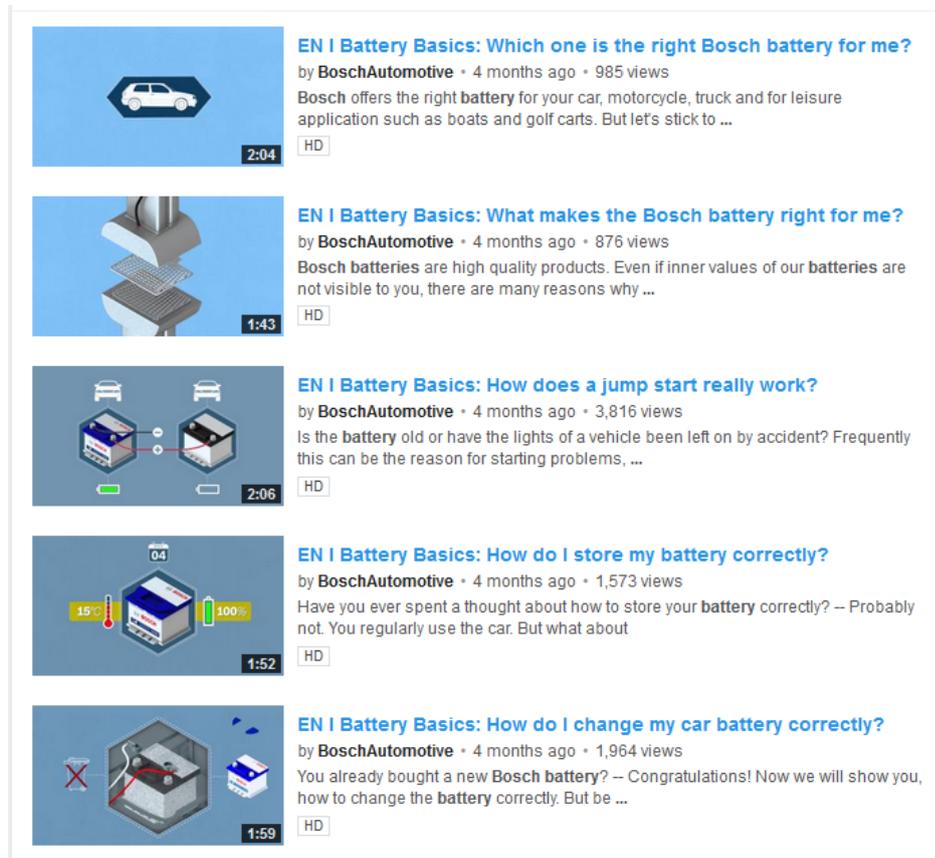
Advice for customers

Motorists can help to extend the service life of the battery by:

- Having the voltage, charge and starting power of the battery as well as power losses in the vehicle checked at regular intervals
- Inspecting the battery at least twice a year - once a month in winter (frosty conditions) in the case of older batteries
- Keeping batteries clean and dry and thus avoiding short circuits or self-discharge
- Securing the battery firmly in position in the battery compartment, greasing the metal parts of the battery and tightening the terminals firmly
- Not leaving vehicle lights switched on for example and thus causing exhaustive discharge
- Pressing the clutch on starting and thus reducing starter resistance and current consumption
- Switching off all unnecessary loads such as radio, air conditioner or heater before starting
- Removing the battery after a lengthy period of non-use and connecting it to an electronically controlled charger

Have you seen "Battery basics" on YouTube?

In YouTube, go onto "Bosch Automotive" and then "Auto Parts" or use this direct [link](#).



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Bosch offers the right **battery** for your car, motorcycle, truck and for leisure application such as boats and golf carts. But let's stick to ...
2:04 HD

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Is the **battery** old or have the lights of a vehicle been left on by accident? Frequently this can be the reason for starting problems, ...
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Have you ever spent a thought about how to store your **battery** correctly? -- Probably not. You regularly use the car. But what about
1:52 HD

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1:59 HD

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