

Why is a 12 V battery needed in an electric car?

The role of the 12V batteries in an EV

Despite being propelled by a high voltage battery, electric vehicles still need the 12 Volt battery we are familiar with, from cars with internal combustion engines. The 12 Volt battery plays a key role for the functioning of nearly all electrical components within the electric vehicle and is especially needed to ensure the availability of critical safety systems.

During normal operation, the 12 Volt battery is charged via a DC / DC converter from the HV battery but the power demand from various components is highly fluctuating. Thus, the 12 Volt battery is needed to buffer the electrical system, enabling to supply components like:

- ▶ Electronic power steering actuators
- ▶ Electronic stability control brake pressure pumps
- ▶ Engine and cabin fans
- ▶ Heated windshields and seats
- ▶ Diverse electronic vehicle control units

When the electric vehicle is neither in operation nor being charged, the high voltage system is switched off. But there are still many functions that are dependent on a reliable energy supply like:

- ▶ Central locking and keyless entry system for unlocking the vehicle
- ▶ Indoor and outdoor lighting and signaling
- ▶ Powering of radio, sound system, navigation, multimedia
- ▶ Connectivity to provide remote control (e.g. cabin preheating)

European regulations for electric vehicles

In addition to all these functionalities the most demanding job of the 12 Volt battery comes into play if something goes wrong. According to regulations ECE-R-100 and FMVSS-305 it is mandated, that the high voltage battery of any type, must be separated from the rest of the electrical installation in the event of any failure of the HV circuit, whether it is a fault in the HV lines or individual components. Furthermore, this is also the case in the event of an accident. When the Airbag ECU detects via its acceleration sensors that a collision has occurred, this information is forwarded via the CAN Bus to the ECU of the HV system which immediately disconnects the HV battery. On the HV battery there are



relays on both plus and minus sides which as soon as they receive this signal, they separate the HV battery from other parts of the HV system.

In both situations, all components are solely being powered by the 12 V battery. The vehicle has to allow the driver to stop the vehicle safely or has to be able to actively control safety systems, the most important functions being:

- ▶ Powering of driver assistance functions
- ▶ Continuation of operation of steering system
- ▶ Power to the airbag passenger protection system
- ▶ Backup power to the braking system
- ▶ Hazard lighting and emergency call

Breakdown causes of electric vehicles

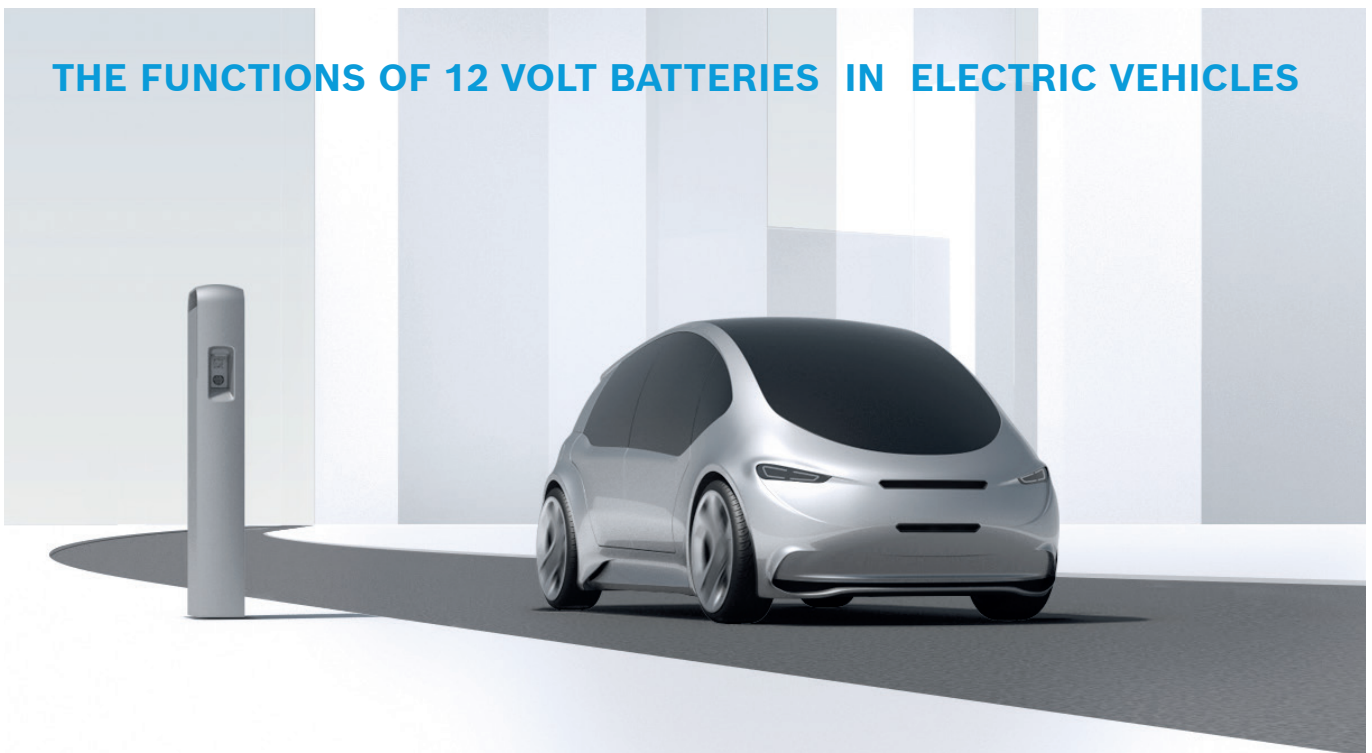
According to a study conducted in Germany by ADAC* in 2021 that investigates the causes of breakdowns in electric cars, illustrates that the most frequent problem, that accounts for 54% of the breakdowns, is the discharged or defective 12V battery. Therefore, when replacing the battery in their electric cars, customers must orientate themselves for a high quality 12V battery brand.

Bosch batteries – a solution for electric vehicles

With its wide range of powerful batteries Bosch is a reliable partner for the customers. The powerful Bosch batteries S5 A with AGM technology and S4 E with EFB technology are particularly well-suited for modern vehicles. The premium Bosch battery with AGM

technology is a reliable source of power for electrical consumers having a longer service life and a higher deep-cycle resistance than conventional batteries. Bosch current battery portfolio is covering most of the European electric and hybrid vehicles.

THE FUNCTIONS OF 12 VOLT BATTERIES IN ELECTRIC VEHICLES



ELECTRICAL COMPONENTS



Indoor and outdoor lighting and signaling



Engine and cabin fans



Heated windshields and seats



Radio and sound system



Navigation system



Central locking



Electronic power steering actuators



Multimedia

CRITICAL SAFETY SYSTEMS



Operation of steering system



Backup power to the braking system



Powering of driver assistance functions



Power to the airbag