

**MAHLE power electronics move electric vehicles**

- With its power electronics, traction motors, and charging infrastructure solutions, MAHLE offers a broad range of products for e-mobility
- Power electronics from MAHLE stand out thanks to their robust design and high power density

Stuttgart/Germany, June 06, 2019 – MAHLE is unrivaled when it comes to components for power electronics in electric cars. During AC charging, the power flows through a MAHLE noise filter and a MAHLE onboard charger toward the battery. A MAHLE DC/DC converter supplies the 12-volt unit with power, and a MAHLE inverter ensures precise control of the traction motor and processes the energy obtained during the recuperation process.

“Part of our dual strategy is the continuous expansion of our already broad product portfolio in the area of power electronics. Robustness and a high power density are central to our development activities,” says Dr. Jörg Stratmann, Chairman of the Management Board and CEO of MAHLE.

Power electronics are at the heart of modern electric vehicles. Noise filters are crucial for compliance with the strict rules on minimizing electrical interference. With minimal power loss, MAHLE noise filters cover a frequency band of 150 kilohertz to 300 megahertz with a voltage of 400 volts and are extremely robust and compact. They also identify the type of charging current and verify the quality of the ground connection.

Onboard chargers adjust the charging parameters during AC charging to match the requirements of the battery management system, speeding up the charging process while also saving power. However, the direct current required to charge the traction battery can usually only be found at DC charging stations on

freeways. In contrast, urban charging stations or local household connections supply alternating current, which the onboard charger generates by means of rectifying and conversion. MAHLE's onboard chargers have a particularly high power density and are protected against under- and overvoltage, overcurrent, and overheating from both a software and a hardware perspective.

Batteries in electric cars deliver a voltage level of well over 12 volts. Like the alternator in a vehicle with a combustion engine, the DC/DC converter provides a constant voltage and supplies power to consumers such as the air conditioning system, power steering, lighting, or the infotainment system. DC/DC converters from MAHLE separate the high- and low-voltage electrical systems safely and reliably. They are flexible in terms of installation space and design, and are also protected against under- and overvoltage, overcurrent, and overheating.

In modern electric cars, brushless electric motors are used. The rotating field needed to operate these motors has to be generated electronically. The inverter generates this rotating field and controls the electric motor depending on the position of the accelerator. If the motor acts as an alternator during the recuperation process, the inverter will rectify the generated AC voltage, which is then stored in the traction battery and can be made available again. MAHLE inverters are modular and scalable, cover a voltage range from 400 to 800 volts, and are compatible with all common types of traction motor.

#### **About MAHLE**

MAHLE is a leading international development partner and supplier to the automotive industry as well as a pioneer for the mobility of the future. The MAHLE Group is committed to making transportation more efficient, more environmentally friendly, and more comfortable by continuously optimizing the combustion

engine, driving forward the use of alternative fuels, and laying the foundation for the worldwide introduction of e-mobility. The group's product portfolio addresses all the crucial issues relating to the powertrain and air conditioning technology—both for drives with combustion engines and for e-mobility. MAHLE products are fitted in at least every second vehicle worldwide. Components and systems from MAHLE are also used off the road—in stationary applications, for mobile machinery, rail transport, as well as marine applications.

In 2018, the group generated sales of approximately EUR 12.6 billion with more than 79,000 employees and is represented in more than 30 countries with 160 production locations. At 16 major research and development centers in Germany, Great Britain, Luxembourg, Spain, Slovenia, the USA, Brazil, Japan, China, and India, more than 6,100 development engineers and technicians are working on innovative solutions for the mobility of the future.

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