Optimal balance between performance and range

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The lithium-ion battery of the new Macan models is fitted low within the chassis and has a gross energy content of 100 kWh, of which roughly 95 kWh can be actively used. A lightweight but tough glass fibre composite underbody guard protects the high-voltage battery against physical damage from below. A cooling plate is integrated into the battery housing. Twelve modules, each with 15 prismatic cells connected in series, are mounted to it. Prismatic cells have their own aluminium shell, which makes them exceptionally stable.

The chemical composition of the anode, which accepts electrons and is therefore responsible for charging the battery, is 100 per cent graphite. Graphite anodes offer a high level of mechanical stability and great cycle stability. They also exhibit a slight change in volume during the charging and discharging cycles. These properties make them very durable and contribute to the service life of the batteries. The chemical composition of the cathode consists of nickel, cobalt and manganese in a ratio of 8:1:1. It is thanks to this cell chemistry that the battery achieves a particularly high energy density.

During development of the high-voltage battery for the new Porsche Macan, there was also a focus on repairability. The 12 modules and other important components can be replaced individually if necessary, allowing the battery to be efficiently repaired.

The electrical control centre of the vehicle, the battery management system (BMCe), is located on the battery cover. It distributes the electrical power between the electric motors and the high-voltage auxiliary consumers and enables DC charging at both 800 and 400 volts. Other tasks include monitoring the individual cell voltages and the entire current flow of the high-voltage system. This contributes to a long battery life. Safety components such as fuses and a pyrotechnic isolation unit are also integrated into the BMCe. If an overvoltage or short-circuit should occur, the high-voltage system is automatically switched off and can no longer be started. This also applies if a crash is detected and a restraint system (e.g. an airbag) is triggered.

Space-saving and efficient: the Integrated Power Box

Porsche has developed an innovation for the packaging of the electronic components, for which the company has applied for a patent. The Integrated Power Box (IPB) combines three components: the onboard AC charger, which converts alternating current (AC) into direct current (DC) during charging; the high-voltage heater, which controls the temperature of the high-voltage battery and the passenger compartment; and the DC/DC converter, which supplies the 12-volt vehicle electrical system. With a total weight of 19 kg, the IPB is about 3 kg lighter than conventional components. It is also very compact, which makes it possible to position it under the rear bench seat above the battery in order to save space. This packaging optimises the weight distribution of the vehicle and allows for a large front luggage compartment.

The high-voltage heater can be used to heat high-voltage components, such as the battery, in colder months. This keeps the battery within an optimal temperature range. This applies to both when driving and while charging. Thermal preconditioning is also carried out by the Porsche Charging Planner using the route planning function.

Consistent and fast: charging at up to 270 kW

The powerful battery and the high charging capacity are the key to covering long distances quickly. The Premium Platform Electric (PPE) comprises an 800-volt architecture that enables the new Macan models to achieve a DC charging power of up to 270 kW. The battery can be charged from 10 to 80 per cent (SoC) within approximately 21 minutes at a suitable fast-charging station.

The new all-electric Macan can charge rapidly over a very wide state-of-charge range (SoC range) – with the battery temperature and weather conditions having relatively little impact on the charging time. Up to about 55 per cent SoC, the Macan is capable of achieving more than 200 kW of charging capacity. This enables it to recharge for a range of up to 250 km in 10 minutes. The battery is

preconditioned for an optimal charging experience.

At 400-volt charging stations, a high-voltage switch divides the battery. Before charging, the 800-volt electric circuit is switched to create two separate 400-volt electric circuits. This effectively splits the 800-volt battery into two batteries, each with a nominal voltage of 400 volts. This enables highly efficient charging with a capacity of up to 135 kW – without an additional HV booster. If necessary, the states of charge of the two battery halves are first aligned before they are charged concurrently. The SoC can be increased from 10 to 80 per cent within about 33 minutes.

AC charging at up to 11 kW is possible at standard household wall boxes. Which means, for example, that the battery can be charged from zero to 100 per cent overnight at home in about 10 hours. The Porsche Mobile Charger or the Porsche Wallbox are available for convenient charging at home. The Macan comes with two charging ports at the rear as standard. The AC/DC connection is on the left of the car, with the AC connection on the right. The charge port doors are manually operated as standard. The optionally available electric charge port doors are illuminated and can be opened via a touch gesture using a sensor in the tailgate or, alternatively, via the PCM.

The Plug & Charge function – availability dependant on market – makes charging even more convenient: anyone with a corresponding charging contract will receive a digital certificate. Once this has been installed in the car, the corresponding vehicle function is activated automatically. With the help of the software key, the charging station and car communicate independently as soon as the charging cable is connected. Further authentication via an app, RFID or credit card is not necessary.

MEDIA ENQUIRIES

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Consumption data

Macan Turbo (WLTP)*: Electrical consumption combined: 20.7 – 18.4 kWh/100 km; CO_2 emissions combined: 0 g/km; CO_2 class: A

Macan 4S (WLTP)*: Electrical consumption combined: 20.5 – 17.7 kWh/100 km; CO_2 emissions combined: 0 g/km; CO_2 class: A

Macan 4 (WLTP)*: Electrical consumption combined: 20.5 – 17.8 kWh/100 km; CO_2 emissions combined: 0 g/km; CO_2 class: A

*Further information on the official fuel consumption and the official specific CO_2 emissions of new passenger cars can be found in the "Leitfaden über den Kraftstoffverbrauch, die CO_2-Emissionen und den Stromverbrauch neuer Personenkraftwagen" (Fuel Consumption, CO_2Emissions and Electricity Consumption Guide for New Passenger Cars), which is available free of charge at all sales outlets and from DAT (Deutsche Automobil Treuhand GmbH, Helmuth-Hirth-Str. 1, 73760 Ostfildern-Scharnhausen, www.dat.de).

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