Taycan: The Glossary

04/09/2019 The most important technical terms regarding the first fully electric Porsche sports car.

AC charging

Charging using Alternating Current. However, electric cars store direct current (DC) in the battery. 240 V/400 V alternating current must therefore be converted into 800 V direct current. This is done by the on-board charger in the vehicle. The Porsche Taycan charges with up to 11 kW.

800-volt technology

The Porsche Taycan is the first production vehicle with 800-volt technology. Its drive system components use this voltage. At the same power output, half the cross-section of conventional 400-volt technology is sufficient for cables. In the Taycan, this saves around four kilograms in weight, reduces transmission losses and requires less installation space. The new generation of charging stations developed by Porsche Engineering Services GmbH under the name “Porsche Charging” is designed for 800-volt technology. This significantly shortens charging times because higher power outputs can be achieved. However, the vehicle components and in particular the battery (cooling) must also be appropriately adapted.

Combined Charging System (CCS)

The CCS plug is a combined plug for AC and DC. Normal alternating current (AC) flows through the upper, round part, direct current (DC) is transmitted through the two contacts in the lower part and is also used for high-power charging. Porsche uses the Combined Charging System as standard in Europe and North America. For Japan and China, Porsche offers the local standards (IGBT, Chademo).

DC charging

Charging using direct current. Here, the current is charged directly into the battery without further conversion, the rectifier is installed in the charging station. A booster in the on-board charger makes 800-volt power possible. The charging capacity of the Taycan is then up to 270 kW.

Hairpin winding

The stator coils of the electric motor consist of wires that are rectangular in the Taycan rather than round. The wires are bent and their shape — before they are inserted into the stator's laminated core —

is reminiscent of that of hairpins, hence the name “hairpin”. The open ends are welded together using a laser beam. The manufacturing process of hairpin technology is complex, but it allows the wires to be packed more densely and thus increases the amount of copper in the stator. This increases power output and torque for the same volume. Another important advantage for a high-performance car like the Taycan is that a hairpin stator can be cooled considerably more efficiently.

Lithium-ion battery

The cells of this type of battery consist of an anode, cathode, separator and electrolyte. During discharge, the anode releases electrons. These move to the cathode via an external electrical load, e.g. electric drives, and current then flows. In return, positive lithium ions migrate from the anode into the electrolyte and flow through the separator to the cathode. When charging, a voltage is applied from the outside. The process is reversed: the lithium ions now migrate from the cathode to the anode and are deposited in the graphite lattice (intercalation). Lithium-ion batteries are thermally stable in a wide range. They have a low level of self-discharge and are not subject to any memory effect. Compared to lead and nickel metal hydride batteries, lithium-ion batteries offer a higher energy and power density (volumetric and gravimetric) and are therefore smaller and lighter for the same energy content.

Permanently excited synchronous motors

Design type electric motors. The rotor of the AC motor is equipped with permanent magnets. They provide a permanent magnetic field in the motor. The advantages include high power density, high efficiency and high power constancy over the entire speed range and in the long term.

Pulse-controlled inverter

This is the interface between the electric motor and the battery. The pulse-controlled inverter converts the direct current from the battery into alternating current for the electric motor when driving the electric motors. The pulse-controlled inverter determines the frequency of the rotating field in the electric motor's stator, which sets the speed of the rotor.

Energy recuperation

The recovery of energy (Latin: recuperare, to recover). When the Taycan's driver presses the brake pedal, the electric motors are used as generators and deceleration therefore initially takes place without the intervention of the mechanical wheel brakes. The kinetic energy of a car is thus converted back into electrical energy, which is routed into the battery. If a car has to be decelerated strongly, more braking power is required than the electric motors can generate. In this case, the conventional (friction) brakes also intervene. A distinction can be made between overrun recuperation and brake recuperation. With

overrun recuperation, the electric motors are used for deceleration when the accelerator pedal is released. In brake recuperation, the braking system is used to decide which part of deceleration is realised by recuperation and which part by conventional wheel braking.

Additional content

MEDIA ENQUIRIES



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Consumption data

Taycan Turbo (Predecessor model)

Taycan Turbo S (Predecessor model)

*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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