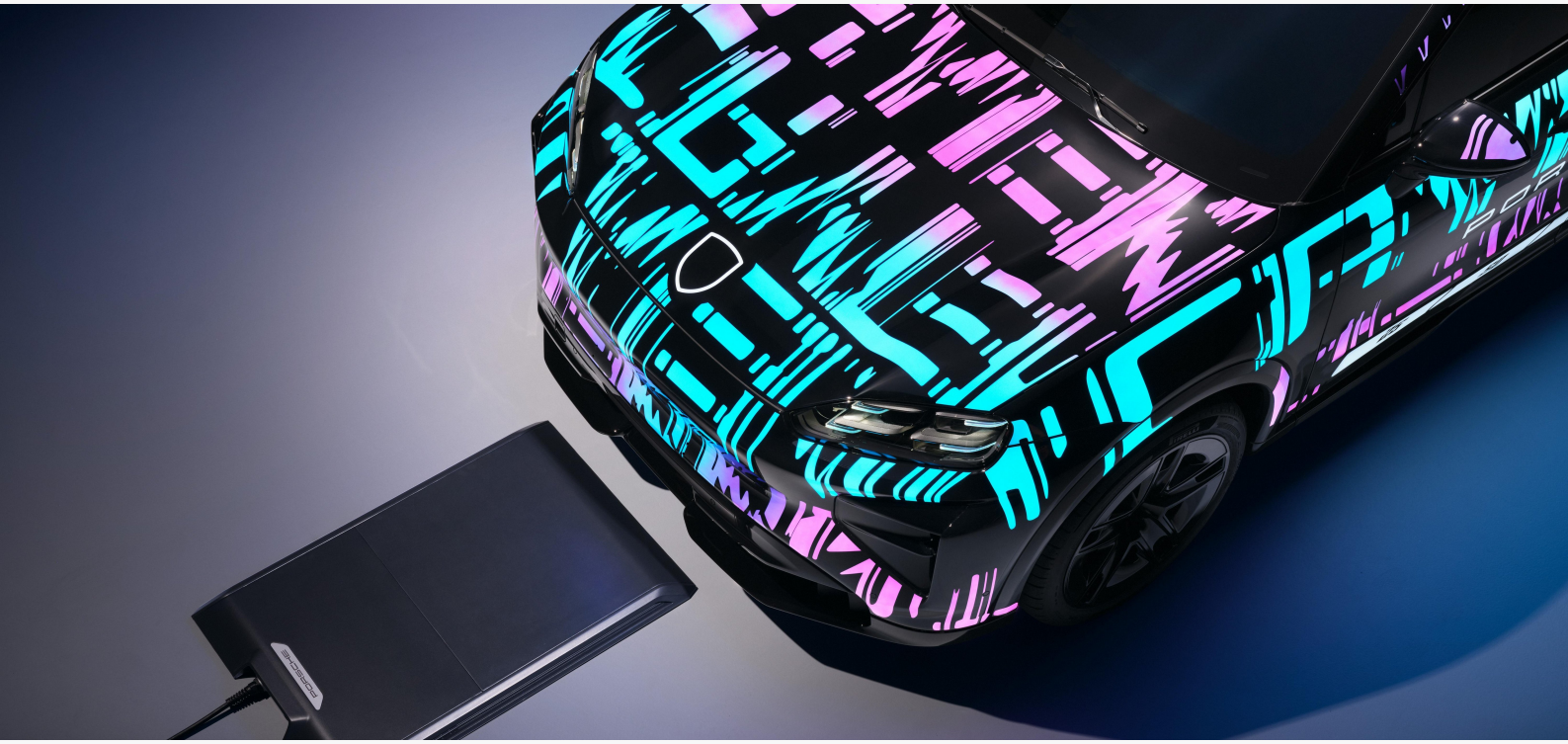

How does inductive charging work in the new Cayenne Electric?

12/11/2025 Park your vehicle and charge it – contactlessly. What we are already used to with smartphones and other devices now also works with sports cars. A first for Porsche.

Charging can be so simple. The Cayenne Electric, which will soon be offered alongside the combustion engine and hybrid vehicles of the SUV model series, will open the door to the future: Porsche has introduced "wireless charging" to the market as an optional extra for the new SUV. This means: Soon there will be no need for charging cables, wallboxes, or manual involvement – simply park the car in the garage and charging will begin. How does this work?

The charging system consists of just two components: a floor plate for the garage or parking space and a receiver unit located behind the front axle of the Cayenne. "Porsche is currently the only car manufacturer in the world that is going to offer contactless charging, with an innovative 11 kW one-box system," says Christian Holler, head of charging systems at Porsche. This form of energy transfer is already part and parcel of people's everyday lives – with induction stoves, smartphones, and electric toothbrushes. But supplying energy to an electric car contactlessly? That's the next level.

Installation is intuitive and convenient. The floor plate is lined up centrally before the front axle of the parked SUV. The housing, which measures six centimeters in height, 78 in width, and 117 centimeters in length, contains everything you need. “Previous solutions needed additional components like a wallbox,” explains product manager Simon Schulze. The new floor plate simply needs to be connected to the electricity supply – and then it’s ready to use. Before the first energy transfer, both sides need to get to know one another. Similar to the communication between a driver’s smartphone and Porsche Communication Management (PCM), the vehicle and floor plate exchange data, including password, for initialization. This only needs to be done once and is primarily to protect the customer from abuse, such as electricity theft. The floor plate contains an integrated Wi-Fi module, with which the vehicle makes contact whenever it approaches.

The driver is literally given the green light in the form of a greeting: The Cayenne appears on the PCM display in the Surround View parking function. A green dot on the display marks the location of the receiver around the front axle. A green circle symbolizes the coil of the charging system.

The message of this intuitive guide is unmistakable: Once the dot is inside the circle, the SUV is in the correct position. “For positioning, we use technology from the Keyless Go system, which is used for keyless vehicle unlocking,” explains development engineer Simon Klein. Two sensors in the vehicle correspond to four units in the floor plate.

The basic principle of charging is simple and has been well established for more than 100 years. The technical term is “inductive coupling.” Two coils of copper wire are positioned appropriately opposite one another. When an electric current flows through one of the coils, a magnetic field is created, which generates a voltage in the second coil. While existing inductive charging systems, such as those used with smartphones, work at low power levels, Porsche engineers were faced with a challenge with the new technology: Simply scaling up would not be sufficient to make inductive charging for electric vehicles efficient, safe, and economical. Porsche selected a concept that takes as few steps as possible.

The AC voltage from the electricity grid is first converted into DC voltage in the floor plate. The reason: Rather than the standard grid frequency of 60 Hz in the USA or 50 Hz in Europe, the charging system works with an 85 kHz AC voltage. This corresponds to 85,000 Hz. This requires an intermediate step involving DC voltage. This is then converted into AC voltage with 85 kHz and 2,000 V in the oscillating circuit.

“This approach ensures that enough energy is transmitted even if the transmitter and receiver coils are not positioned perfectly in line with one another,” explains Dominik Scherer, development engineer. The software checks the misalignment and continuously adjusts the charging parameters. A misalignment of up to 10 centimeters between the floor plate and the receiver module in the vehicle presents no problem. “We have purposefully allowed some tolerance here,” adds Simon Schulze.

Once the driver activates the parking brake, charging begins. The system can transfer up to 11 kilowatts of power wirelessly. Despite the gap of 12 to 18 centimeters between the floor plate and the receiver unit at the bottom of the vehicle, charging efficiency is over 90 percent. The gap is due to the

standard ground clearance of the Cayenne Electric. The installation of the receiver plate ensures it is not visible and is protected in the underbody paneling. Charging power and time are similar to when using a wallbox connected with a cable and plug. So everything is the same as before – just without any need for manual involvement.

A number of precautions have been taken to ensure that no damage occurs due to the high flow of current. The receiver plate is embedded in a shielding plate that prevents the magnetic field from spreading upwards and protects the components in the vehicle. Beneath the coil in the floor plate and above the receiver coil, ferrites ensure that the magnetic flux is guided in a targeted manner. The foreign-object detection system integrated into the floor plate detects metallic objects like keys. The live-object detection system uses motion detectors to protect pets or people who are reaching under the vehicle.

Both systems warn the driver as soon as they approach the floor plate or stop the charging process immediately. "A metal part would heat up, just like on an induction stove," says Simon Schulze. "Our security precautions make sure that doesn't happen." The same applies to interference with other systems: The contactless charging system falls well below all electromagnetic compatibility (EMC) limits.

In the future, this new charging convenience may be enhanced even further: Porsche is working on a combination of automatic parking and contactless charging. The scenario: Park your car in front of the garage, press a button, and that's it. The car then parks itself, starts the charging process, and gets ready for its next outing – fully charged, of course.

Info

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MEDIA ENQUIRIES

Ben Weinberger

Spokesperson Cayenne und Macan
+49 (0) 170 / 911 2097
ben.weinberger@porsche.de

Consumption data

Cayenne Turbo Electric (WLTP)*: Electrical consumption combined: 22.4 – 20.4 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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