Porsche Active Ride High-end suspension for E-Hybrid models

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Porsche is offering a new premium suspension system as an option exclusively for the Panamera E-Hybrid models. Porsche Active Ride, which features active two-valve shock absorbers and single-chamber air springs, regulates the forces of each individual damper actively, individually and at lightning speed. In this way, it always achieves maximum driving comfort and performance for any given situation. The design is fundamentally different from regular adaptive systems and other active suspension concepts. Porsche Active Ride offers a unique driving experience that spans the entire spectrum of dynamic behaviour, from the gliding comfort of a luxury sedan to the directness of response that's typical of a sports car. It delivers top marks in the disciplines of pitch and roll support, body stability, slow-speed driving comfort and handling performance. It also provides extensive additional functions.

The Porsche Active Ride shock absorbers are each connected to an electrically driven hydraulic pump. They generate a volume flow in the damper as required, which is then regulated separately in both the

rebound and compression directions. The volume flow enables the piston in the damper to be moved up or down at lightning speed, allowing each wheel to actively extend or compress individually. The wheels therefore actively follow the contour of the road surface – they are pushed into potholes, for example, and lifted going over bumps. This is always done with the aim of correcting the unevenness of the road and keeping the surface as far away from the body as possible. The dampers operate at up to 13 Hz, which means they can adjust the setting up to 13 times per second and therefore react at lightning-fast speed to the driving situation and the road surface at any given moment.

Porsche Active Ride also does not require traditional anti-roll bars, as their effect is provided entirely by the active dampers. The dampers also perform the function of electronic anti-roll stabilisation (PDCC Sport). Moreover, the new shock absorbers make it possible to replace the complex three-chamber air suspension of the previous model with a system that features lightweight and efficient single-chamber air springs. The air suspension is used for speed-dependent control of the vehicle's ride height to improve driving stability and aerodynamics, as well as for automatic self-levelling depending on the occupancy or cargo load condition. A lower or higher ride height can be selected manually in the Porsche Communication Management system (PCM).

In summary, Porsche Active Ride offers the following functions:

Body control: Porsche Active Ride constantly monitors longitudinal and lateral acceleration. It actively reacts to acceleration and braking inputs as well as to the driver's steering movements. It also builds up forces that counter the natural pitching and rolling movements of the body and in this way keeps the body level in all driving situations.

Insulation against uneven surfaces – the new Panamera almost literally floats over the asphalt: the Porsche Active Ride suspension detects and balances out road bumps with exceptional responsiveness. Occupants feel very little body movement on uneven surfaces.

Dynamic wheel load distribution: The tuning of the suspension makes a fundamental contribution to the traction of the vehicle. Porsche Active Ride dynamically adjusts the setting of the springs and dampers to any given driving situation. With rolling moment distribution based on vertical, longitudinal and lateral forces, the new Panamera constantly makes optimum use of its grip potential, taking into account all-wheel distribution and differential lock torque.

Dynamic ground clearance: In high-performance driving situations, especially when braking or with significant lateral acceleration, Porsche Active Ride lowers the body of the Panamera. The lower centre of gravity reduces load transfer on the wheels. The active suspension geometry, meanwhile, increases the camber and therefore improves traction.

Active cornering dynamics: Porsche Active Ride can not only compensate for the pitch and roll of the vehicle's body, but it can also actually overcompensate for it when the function is activated. If the correct box is ticked in the PCM, the suspension builds up forces during cornering against the natural direction of body roll and actually tilts the body towards the inside of the bend. In this way, the new

Panamera reduces the effect of lateral acceleration acting on the occupants. The result is similar to that of a banked curve on motor racing circuits.

Acceleration and braking comfort: Based on the principle of active cornering, the suspension also counteracts pitching movements during acceleration and braking. This function is similar to the flight position of a helicopter when accelerating or decelerating. This must also be activated in the PCM.

Comfort entry and Smart Lift: If desired, Porsche Active Ride increases the vehicle's ride height to ease getting in and out for all passengers. The Smart Lift function also automatically lifts the ride height based on location data previously stored by the driver, and in this way prevents the Panamera from scraping its body in potholes or on steep driveways.

Standard two-chamber air suspension with two-valve dampers

A Porsche is always the most dynamic car in its class. Yet with its positioning as a luxury sedan, the requirements for an outstanding level of comfort are also particularly high in the Panamera. So Porsche has equipped the new Panamera with newly developed two-valve air suspension as standard. The two-valve technology enables the adaptive dampers to adjust the rebound and compression stages independently of each other. This considerably expands the breadth of chassis capabilities between that of a comfortable, gliding character and a decidedly high-performance setup. The technology makes it possible to switch from the tried-and-tested three-chamber air spring to a lighter two-chamber system with improved suspension performance. In addition, optimisations to the hydraulic mounts on the front axle, the rear axle beam bearings and the wishbone bearings on the rear suspension ensure noticeably increased comfort when driving over bumps.

With the new suspension, Porsche simultaneously achieves reduced body movements and improved body insulation. The four-door sports car pitches and rolls less when braking and when driving through dips or over undulations and crests. The result is a faster, more sensitive chassis response and noticeably smoother suspension behaviour. At the same time, the suspension has the potential to significantly increase the damping force in the rebound and compression directions depending on the situation, thereby optimising the car's performance. This is particularly evident in fast cornering. In addition, the new air spring with optimal valve control reduces the energy consumption of the suspension.

New electric brake booster

Porsche has deployed an electric brake booster in the new Panamera. All variants benefit from newly adapted brake pedal characteristics, which significantly improve pedal feel and brake precision. In the E-Hybrid models, engineers have also succeeded in smoothing out the transition between the energy regeneration braking effect (which is achieved via the electric motor) and the effect of friction braking (which is achieved via the wheel brakes). Although two braking systems complement each other in

these variants, this gives the driver optimal control of the braking force. And no energy is wasted in the process: the electric motor generates current when decelerating to a standstill.

In the Panamera and Panamera 4, Porsche uses a brake system with six-piston fixed callipers and grey cast iron discs measuring 360 millimetres x 36 millimetres at the front. At the rear, there are four-piston fixed callipers and 330 mm x 28 mm grey cast iron discs. The standard-fit brakes on the Panamera Turbo E-Hybrid are 10-piston fixed callipers at the front and grey cast iron brake discs measuring 420 mm x 40 mm, with four-piston fixed callipers and 380 mm x 30 mm grey cast iron brake discs at the rear.

For the Panamera Turbo E-Hybrid, Porsche is offering a new 21-inch performance tyre as an option: the Pirelli P Zero Corsa improves track-driving suitability through increased grip levels, improved precision and higher temperature resistance. Its wet-weather properties have also been further optimised.

Consumption data

Panamera 4S E-Hybrid (WLTP)*: Fuel consumption weighted combined: 4.0 – 3.2 l/100 km; Fuel consumption with depleted battery combined: 9,8 – 8,8 l/100 km; Electrical consumption weighted combined: 18.5 – 17.6 kWh/100 km; CO_2 emissions weighted combined: 91 – 74 g/km; CO_2 class weighted combined: B; CO_2 class with depleted battery: G

Panamera Turbo S E-Hybrid (WLTP)*: Fuel consumption weighted combined: 4.4 – 4.1 l/100 km; Fuel consumption with depleted battery combined: 10,8 – 10,4 l/100 km; Electrical consumption weighted combined: 18.8 – 18.4 kWh/100 km; CO_2 emissions weighted combined: 100 – 93 g/km; CO_2 class weighted combined: C – B; CO_2 class with depleted battery: G

Panamera 4 E-Hybrid (WLTP)*: Fuel consumption weighted combined: 3.8 – 3.0 l/100 km; Fuel consumption with depleted battery combined: 9,6 – 8,7 l/100 km; Electrical consumption weighted combined: 18.4 – 17.9 kWh/100 km; CO_2 emissions weighted combined: 86 – 69 g/km; CO_2 class weighted combined: B; CO_2 class with depleted battery: G

Panamera 4 E-Hybrid Executive (WLTP)*: Fuel consumption weighted combined: 3.8 – 3.2 l/100 km; Fuel consumption with depleted battery combined: 9,7 – 8,9 l/100 km; Electrical consumption weighted combined: 18.5 – 18.0 kWh/100 km; CO_2 emissions weighted combined: 87 – 72 g/km; CO_2 class weighted combined: B; CO_2 class with depleted battery: G

Panamera 4 (WLTP, preliminary values)*: Fuel consumption combined: 11.0 – 10.1 l/100 km; CO_2 emissions combined: 250 – 230 g/km; CO_2 class: G

Panamera Turbo E-Hybrid (WLTP)*: Fuel consumption weighted combined: 4.3 – 3.5 l/100 km; Fuel consumption with depleted battery combined: 11,0 – 10,0 l/100 km; Electrical consumption weighted combined: 19.8 – 18.8 kWh/100 km; CO_2 emissions weighted combined: 99 – 81 g/km; CO_2 class weighted combined: C – B; CO_2 class with depleted battery: G

Panamera (WLTP, preliminary values)*: Fuel consumption combined: 10.4 – 9.6 l/100 km; CO_2 emissions combined: 236 – 219 g/km; CO_2 class: G

*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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