Audi A5 e-hybrid quattro - Plug-in hybrid powertrain

Intelligent drive management for greater efficiency

The hybrid management of the new models is designed for efficiency, flexibility, and maximum customer comfort and automatically selects the optimal operating strategy. The electric drive is provided by a permanently excited synchronous motor with a peak output of 105 kW. The electric motor is integrated into the housing of the seven-speed S tronic. The full system torque is available even at idle speed – 500 Nm in the 270 kW variant (fuel consumption (weighted, combined): 2.7-2.1 l/100 km (87.1-112.0 US mpg); power consumption (weighted, combined): 15.9-15.1 kWh/100 km; CO_2 emissions (weighted, combined): 61-47 g/km (98.2-75.6 g/mi); CO_2 class (weighted, combined): B; fuel consumption on discharged battery (combined): 7.4-6.5 l/100 km (31.8-36.2 US mpg); CO_2 class on discharged battery: F-E) and 450 Nm for the 220 kW variant (fuel consumption (weighted, combined): 2.6-2.0 l/100 km (90.5-117.6 US mpg); power consumption (weighted, combined): 15.8-14.9 kWh/100 km; CO_2 emissions (weighted, combined): 60-45 g/km (96.6-72.4 g/mi); CO_2 class (weighted, combined): B; fuel consumption on discharged battery (combined): 7.4-6.3 l/100 km (31.8-37.3 US mpg); CO_2 class on discharged battery: F-E). The power electronics (pulse inverter) used in the plug-in hybrid models of the A5 are a new development. The pulse inverter is smaller, lighter, and more efficient, thus reducing electrical consumption. Consumption in hybrid mode is therefore also lower.

Battery capacity and energy density significantly increased

The heart of the new A5 plug-in hybrids is the new high-voltage battery (HV battery) at the rear of the vehicle. At 25.9 kWh (20.7 kWh net), Audi has increased its capacity by roughly 45 percent as compared to its plug-in-hybrid predecessor, the A6 TFSI e. In contrast, the required installation space has only increased slightly in view of the significantly increased capacity. The HV battery measures 992 × 996 × 177 millimeters (39.1 x 39.2 x 7.0 in). The further developed and significantly optimized interaction between the mechanical friction brake and energy recovery via the electric motor has also increased regenerative braking performance.

Intelligent operating strategy for maximum efficiency

Two operating modes are available in the new A5 PHEV models: “EV” and “hybrid.” In EV mode, the PHEV models run on electric power. The combustion engine is only turned on in

the following situations: deliberately deselecting EV in the switch bar below the panoramic display or via the MMI; in driving program S; via the selected mode of the Audi drive select dynamic handling system; or when starting route guidance with hybrid assist activated. If navigation route guidance is activated, the hybrid assistant takes the route data into account when selecting the drive mode. The combustion engine also engages during kickdown, and EV mode is deactivated until the kickdown action is over. If none of these situations occur, the new PHEV models use the HV battery in EV mode until it is completely discharged. The digital slider used to control the desired state of charge via the MMI in hybrid mode cannot be operated in EV mode; that is because the battery charge will be fully utilized in electric mode. In EV mode, vehicle speed is limited to 140 km/h (87 mph). The PHEV models can be started either in EV or hybrid mode, and the mode used last will be set as the default for when the vehicle is started next.

When driving in hybrid mode, the hybrid management system maintains the battery's state of charge at the necessary level to save enough electrical energy for later use, for example for electric driving in the city. The A5 Sedan e-hybrid quattro* can drive up to 116 km (72.1 mi) on electric power alone according to the WLTP EAER City value.

When it comes to efficiency-optimized consumption, hybrid mode is most efficient for both short and long distances. Depending on the driving situation and the driver's power needs, the operating strategy decides whether to drive in electric or hybrid mode in order to be as efficient as possible. The PHEV model prefers to drive on electric power in urban areas. At higher speeds, the proportion of hybrid driving increases. With active route guidance, the operating strategy takes the planned route into consideration; the best possible energy configuration for the desired route is automatically selected. To achieve the highest efficiency, the vehicle calculates which parts of the route are suitable for electric driving. For example, electric driving is preferable where speeds are likely to be low, such as in urban areas and traffic jams. When the hybrid assistant is activated and route guidance is on, settings such as the desired charge level will be overwritten to ensure an efficient operating strategy.

On top of the automatic hybrid mode, the desired charge level can now be individually set for the first time using a digital slider. Drivers can use it to precisely define how high the charge level of the HV battery should be. The charge level can also be set before your trip, so that there will be enough energy available for electric driving at the destination if so desired or if there is no charging option there.

The desired charge level can be set in defined steps using a digital slider on a percentage scale. If the target state of charge (SoC) value is below the actual SoC value, the battery will be discharged down to that value. If the target and actual values match, power will

mainly come from the combustion engine to maintain the SoC. If the target SoC is above the actual SoC, the vehicle will be powered by the combustion engine to recharge the battery.

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