



The MQB technologies of the all-new Passat Variant

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Notes

1. Near-production concept vehicle. The vehicle is not yet available for sale.
2. Line-dependent or optional equipment.
3. "Mobility in Germany" study.
4. ID.7 - Power consumption in kWh/100 km: combined 16.3-14.1; CO₂ emissions in g/km: combined 0; only consumption and emission values in accordance with WLTP and not in accordance with NEDC are available for the vehicle. Where ranges are stated, the values for consumption and CO₂ emissions depend on the selected vehicle equipment.



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The MQB evo – the new Passat technologies in detail

Evolution of a bestseller: the MQB evo delivers the building blocks of progress

- MQB stands for innovative technologies, flexible drive concepts and synergies across product lines
- The latest evolutionary stage of the modular transverse matrix platform brings progressive high-tech features such as DCC Pro on board the Passat Variant.
- Two new plug-in hybrid drives build a new bridge to electric mobility with an electric range of approx. 100 km and fast DC charging (50 kW)
- New mild hybrid drives with an economical 48-volt system convert kinetic energy into electric energy and make it possible to temporarily switch off the engine
- New digital instruments and a new infotainment system generation merge to create an intuitively operated cockpit landscape

Matrix of advanced MQB technologies. The MQB evo – the latest evolutionary stage of the modular transverse matrix platform – is a matrix made up of ultra-modern technology modules that are perfectly integrated with each other. Volkswagen has now used these modules to develop the new Passat Variant and Tiguan as well as an update for the Golf. The high quality of its interiors, a new and intuitively operated infotainment architecture, a new generation of plug-in hybrid drives with long electric ranges of around 100 km and new DC fast-charging function as well as highly comfortable running gear meet the expectations of Volkswagen drivers.

MQB evo makes high tech more affordable. Customers who choose the new Passat Variant (ninth generation), new Tiguan (third generation) or the new Golf (eighth generation update) will benefit from the significant economies of scale offered by the modular transverse matrix. That is because a host of new systems are used on board these Volkswagen models and their development costs are shared across all MQB product lines. In this way, Volkswagen makes innovations available and more affordable for hundreds of thousands of car drivers worldwide.

TDI, TSI, eTSI and eHybrid. A general special feature of the MQB is the fact that all common drive types can be realised in one product line: diesel engines, petrol engines, mild and plug-in hybrid systems and even all-electric versions, as proven by the e-Golf (seventh generation). All MQB models have front-wheel drive or, depending on version and power output, all-wheel drive. The new Passat Variant and new Tiguan as well as the update of the current Golf will be available with turbodiesel engines (TDI), turbocharged petrol engines (TSI), mild hybrid turbocharged petrol engines (eTSI) and plug-in hybrid systems (eHybrid).

New MQB and MEB infotainment system. During the development process, Volkswagen did not just make use of the potential offered by the MQB, but also

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exploited the overall synergies of the brand and Group. This reduces costs and allows access to the technologies of other product lines. The MQB evo is therefore intentionally equipped with interfaces to the other matrix platforms of the brand and Group in order to benefit from economies of scale. This compatibility is made clear, for example, by the new fourth-generation modular infotainment matrix: the MIB4 graphic design, menu structure and operating philosophy are the same as in the new ID.4, ID.5 and ID.7⁴ (MEB models).

MQB – from compact car to the large US SUV. The MQB shapes the brand and the Group like no other platform. The first two MQB models were the Volkswagen Golf (seventh generation) and the Audi A3 (third generation) in 2012. They were followed at the end of 2014 by the first Passat (eighth generation) on this platform, the Touran (second generation) in mid-2015, and then the Tiguan (second generation) at the start of 2016. All Volkswagen MQB models share common engine and gearbox series with a standard installation position, an identical running gear architecture, and common components such as the all-wheel drive system, air conditioning systems, steering wheels, infotainment system and assist systems. There are also synergies in production, because different MQB product lines can be produced in parallel in one factory. At the same time, the modular platform also offers a great deal of freedom – the wheelbases, tracks or power range of the drive systems can be varied, for example. This makes it possible to develop such different Volkswagen models as the compact Polo and the large US SUV Atlas on the basis of the MQB.

ELECTRIC DRIVING – eHYBRID WITH LARGE BATTERY

eHybrid with 150 kW¹ and 200 kW¹. Volkswagen has extensively redesigned the eHybrid – with a more efficient and larger battery, a higher charging capacity and, for the first time in a plug-in hybrid model, the 1.5 TSI evo2 engine. In the base version, this high-tech turbocharged petrol engine for the eHybrid drive delivers 110 kW (150 PS)¹ and, together with the electric drive motor's peak output of 85 kW (115 PS), enables a system power of 150 kW (204 PS)¹. Optionally, the flagship version of the engine is available with 130 kW (177 PS)¹, which together with the electric drive motor generates a system power of 200 kW (272 PS)¹. The 150-kW version¹ will develop a system torque of 350 Nm; in the case of the 200-kW version¹, this is 400 Nm. The highest system power and the maximum system torque are not additions of the values of the 1.5 TSI evo2 and the electric drive motor, but are maximum values controlled electronically for maximum efficiency. A detailed look at the plug-in hybrid drive components:

1.5 TSI evo2 with 110 kW¹ and 130 kW¹. The plug-in hybrid drive consists of two drive modules: the electric drive motor and the turbocharged petrol engine. The previous 1.4 TSI is replaced by the 1.5 TSI evo2. The evo2 is characterised by a number of high-tech features. These include the TSI-evo combustion process and a variable turbine geometry (VTG) turbocharger. The combination of the TSI Miller combustion process and the VTG turbocharger are unique technical selling point in the area of high-volume petrol engines. In addition to use of the 1.5 TSI evo2 in a plug-in hybrid drive for the first time, the engine variant with the highest output of 130 kW¹ is also making its



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debut. It was previously only available in the version with 110 kW¹ as well as in a version with 96 kW (130 PS)¹; the latter is used in the Golf and will also be used from now on in the new Tiguan.

Miller cycle increases efficiency. The TSI evo combustion process already familiar from the first 1.5 TSI evo is also used in the TSI evo2 generation. Alongside optimisation of combustion chamber cooling, the decisive factor here is the symbiosis of the Miller cycle (early closing of the inlet valves with high compression) and VTG turbocharging. The petrol-air mixture is run with lambda 1 efficiency throughout the entire operating range of the engine; the TSI thus does not run either too rich (excess petrol) or too lean (excess oxygen), as the fuel is burnt completely and cleanly. Thanks to this combustion process, the 1.5 TSI evo2 operates with a very high efficiency. This minimises consumption and emissions. Other technical parameters include high-pressure injection with up to 350 bar pressure, plasma-coated cylinder liners (lower internal friction) and pistons with cast-in cooling channels (optimisation of combustion). Both plug-in hybrid versions of the 1.5 TSI develop their maximum output between 5,500 and 6,000 rpm and their maximum torque of 250 Nm between 1,500 rpm and 4,000 rpm.

Electric drive motor with 85 kW and six-speed DSG. In its MQB models, Volkswagen uses a further developed hybrid gearbox: the DQ400e evo. The electric drive motor is integrated in this special six-speed direct shift gearbox. The electric drive motor with the designation HEM80evo delivers 85 kW (115 PS) and a peak torque of 330 Nm, as described above. The electric drive motor forms a compact unit together with the new DQ400e evo.

19.7 kWh high-voltage battery. According to forecasts, the new MQB plug-in hybrid models will have electric ranges of around 100 km. The ranges were between 50 and 80 km previously. This significant increase in range is achieved thanks to a new high-voltage battery. Its net energy content increases from 10.6 to 19.7 kWh compared to previous versions. The battery has a new cell technology for the 96 modules and external liquid cooling. Since the lithium-ion battery is also positioned in front of the rear axle, the interaction with the front-mounted drive (electric motor, DSG, TSI) results in balanced weight distribution.

Charging with up to 50 kW. The power flow between the battery and the electric motor is managed by new power electronics. This converts the direct current (DC) of the battery into alternating current (AC) for the electric drive motor. In addition, an integrated DC/DC converter supplies the 12 V electrical system. A new charger means it is now possible to charge with up to 11 kW instead of 3.6 kW at AC charging points such as a home wall box. With this, a discharged battery is charged to 100 per cent again in around two hours. For the first time, it is now also possible with the new Volkswagen plug-in hybrid drives to charge with up to 50 kW at DC fast-charging stations. In this case, a battery can be charged from 10 to 80 per cent again in around 25 minutes. Drivers who start off with a full battery will be able to cover typical commuting distances of less than 100 km using only electric power.



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EFFICIENT DRIVING – eTSI WITH 48 V SYSTEM

eTSI with 110 kW¹. Electricity can also be generated through the conversion of kinetic energy – the braking or recuperation power of a vehicle. The eTSI mild hybrid drives in the Passat, Tiguan and Golf make this possible. As in the new plug-in hybrid models (eHybrid), the 1.5 TSI evo2 forms the technical centre of the powertrain. The eTSI is coupled to a 48 V lithium-ion battery and a 48 V belt starter generator that provides 15 kW power and 25 Nm torque. The 48 V system acts like a type of electric booster and thus offers excellent moving-off performance. At the same time, the technology makes it possible for the 1.5 TSI evo2 to be completely switched off, thereby enabling coasting and temporary electric driving. The eTSI is always linked to a seven-speed DSG.

The eTSI in detail. In addition to technical features such as the TSI evo combustion process and VTG turbocharger, the 1.5 TSI evo2 with a torque of 250 Nm as eTSI is additionally equipped with enhanced Active Cylinder Management (ACTplus) compared to the version used in the eHybrid models. With ACTplus, two of the engine's four cylinders are switched off as often as possible, depending on the operating situation. The second and third cylinders are designed to be taken out of the fuel supply at low and medium loads and speeds. Efficiency thus increases in the active cylinders, while the passive cylinders run almost loss-free. When the throttle is opened again, they immediately become active again. Compared to the first 1.5 TSI evo generation, this switching on and off of the cylinders has been improved once more to guarantee smooth engine running. The switching operation itself is virtually imperceptible.

The 48 V system in detail. The 48 V system was designed to save fuel. Depending on driving style and ambient conditions, the saving can be around half a litre per 100 km. The technical principle of 48 V technology permits transmission of higher electric power levels with smaller conductor cross-sections and a compact battery – thus also resulting in low additional weight. Compared to vehicles with pure 12 V technology, this leads to recuperation of a significantly larger amount of energy during braking or deceleration. The energy stored in the 48 V lithium-ion battery is used to drive a 48 V belt starter generator and to supply the 12 V on-board electrical system via a DC/DC converter. The water-cooled belt starter generator has the role of alternator and starter. At the same time, it acts as a compact electric motor, which increases the drive torque without any delay when moving off. The output of the generator is transferred by the belt drive. The generator also restarts the combustion engine – which is switched off as much as possible while the vehicle is moving. The bottom line is that the 48 V mild hybrid drive combines low consumption and emission values with excellent moving-off performance in daily operation.



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POWERFUL DRIVING – TSI, TDI AND 4MOTION

4MOTION now even more comfortable. In the Passat Variant, the 2.0-litre turbocharged petrol engines of the EA888 evo4 series deliver an output of 150 kW (204 PS)¹ and 195 kW (265 PS)¹. The 150 kW version transfers a torque of up to 320 Nm to the front axle via the DSG, while the 195 kW version with maximum 400 Nm transfers the power via the DSG to the all-wheel drive system. Volkswagen will offer the current 2.0-litre turbocharged diesel engine of the EA288 evo series in three output versions in the Passat Variant: with 90 kW (122 PS)¹ and 320 Nm maximum torque, 110 kW (150 PS)¹ and 360 Nm as well as 142 kW (193 PS)¹ and 400 Nm. The two 2.0 TDI engines with 90 kW¹ and 110 kW¹ power the front axle; the 142 kW¹ version is coupled to the 4MOTION all-wheel drive as standard. Volkswagen has developed a new centrifugal pendulum for the 4MOTION system that neutralises vibrations and perfects the acoustic comfort. In addition, the latest 4MOTION clutch, which features an intelligent energy management system, is used in the MQB evo models on the rear axle. When towing a trailer, for example, the Trailer driving profile is automatically activated to optimally control the distribution of power between the front and rear axles for trailer operation. The new Passat with all-wheel drive system is designed for trailer weights of up to 2,200 kg.

ACTIVE DRIVING – DCC PRO² AND VEHICLE DYNAMICS MANAGER AS NETWORK

Electronically controlled running gear. The MQB evo provides the basis for a new running gear generation. Alongside numerous individual measures, Volkswagen has developed a new generation of the adaptive chassis control DCC for its best-selling models, the optional DCC Pro². In addition, the new Passat Variant and Tiguan – as was already the case previously in the Golf – are now equipped with a Vehicle Dynamics Manager. The system controls the functions of the electronic differential locks (XDS) and the lateral dynamics components of the controlled shock absorbers in the DCC Pro system. Thanks to the Vehicle Dynamics Manager, which performs wheel-specific braking interventions and wheel-selective adjustments of the shock absorber hardness, the handling characteristics are more neutral, stable, agile and precise. The basic architecture of the running gear comprises a MacPherson front axle and an enhanced four-link rear axle.

The fundamental operating principle of DCC. The same applies to both the new and previous DCC systems: the electronic active damping control reacts continuously to the road conditions and driving situation and takes into account parameters such as steering, braking and acceleration. The ideal damping is calculated for each wheel and is adjusted via the shock absorbers within fractions of a second. The driver has the option of individually adjusting the DCC system to settings ranging from very comfortable to very sporty. The lateral dynamics components of the adaptive chassis control are coordinated and optimised via the Vehicle Dynamics Manager. In combination with the Vehicle Dynamics Manager, the adaptive chassis control therefore always offers both optimum driving comfort and outstanding driving dynamics.



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The DCC Pro in detail. The new DCC Pro further improves the alliance of the adaptive chassis control and Vehicle Dynamics Manager. Compared with the familiar DCC with conventional single-valve shock absorbers, the shock absorbers of the new DCC Pro are now equipped with two valves. This change is accompanied by an adapted control algorithm for separate rebound and compression stage control. The faster two-valve shock absorbers permit better and quieter connection between the body and running gear at the same time as optimised driving dynamics – thanks to the even more precise control of the rebound and compression stages. Two-valve shock absorbers were used previously only in combination with multi-link suspension in the premium and luxury class; integration in MacPherson struts is new. The new adaptive chassis control system DCC Pro once more significantly increases the spread between the dynamic and comfort characteristics. Thanks to the interaction of these characteristics, the driver will enjoy an extremely pleasant driving experience and a sense of security even on poor road surfaces. Extremely comfortable body levelling is achieved through the reduction in body vibrations.

ASSISTED DRIVING – PARK ASSIST PROVIDES SUPPORT

Park Assist Plus and Park Assist Pro. The new Passat Variant, Tiguan and Golf will launch with a further developed range of state-of-the-art assist systems. The spectrum of park assist systems is new. Depending on the product line and equipment version, they include optional or standard Park Assist Plus², Park Assist Pro² and the memory function for Park Assist Pro². Park Assist Plus is a system that is already familiar from other Volkswagen models. This allows assisted driving into or out of parallel or bay parking spaces. The Volkswagen models take over control of acceleration, braking and steering for this purpose. If the vehicle is equipped with Park Assist Pro, the driver can also drive the vehicle into and out of parking spaces from outside the vehicle in the same situations. The driver controls the procedure using an app on their smartphone in this case. If the Volkswagen has the memory function for Park Assist Pro on board, the system records the last 50 metres driven and thereby also the parking situation at the driver's request. The parking manoeuvre can be stored when the vehicle has come to a stop. When the vehicle reaches the same position again – for example, the entrance to the carport at home – it automatically offers to take over parking independently. Independent driving out of a parking space is also possible. The driver can store up to five parking manoeuvres.

The assist systems of the new Passat Variant at a glance:

- Oncoming vehicle braking when turning and swerve support
- Trailer manoeuvring system Trailer Assist²
- Adaptive Cruise Control (ACC)
- Hill Start Assist
- Park Distance Control (warning signals for obstacles at the front and rear)
- Electronic Stability Control with counter steering assistance, ABS, TCS, EDL, engine drag torque control and trailer stabilisation
- Semi-automated driving assistance Travel Assist²
- Speed limiter



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- Driver Alert System
- Autonomous Emergency Braking Front Assist with Pedestrian and Cyclist Monitoring
- Park Assist Pro²
- Park Assist Pro with memory function²
- Park Assist Plus²
- Proactive occupant protection system
- Rear view camera system
- Lane keeping system Lane Assist
- Lane change system Side Assist with Rear Traffic Alert and exit warning system
- Area View including Rear View²
- Dynamic Road Sign Display

INFORMED DRIVING – MIB4 OFFERS INTUITIVE OPERATION

The new infotainment system in detail. The new digital centre of the MIB4 (fourth-generation modular infotainment matrix) is the touch display of the infotainment system. The graphic interface, structure and menu navigation have been redesigned. The aim was to make operation simple, self-explanatory and customisable. To achieve this, the display has been divided into two touch bars at the top and bottom of the screen, as well as the home screen. The driver can assign favourite direct access functions to large areas of the top bar and home screen. The individually configured top bar and static bottom bar remain continuously displayed when the driver opens various functions in the form of apps on the home screen. This considerably simplifies operation. Additionally, the now backlit touch sliders are located under the infotainment system display and are used to adjust functions such as temperatures and volume.

Top bar. The top bar has a new direct access button on the left that lets the driver open the main menu with an overview of all apps with just one click. Next to this is a button for the new Car Control Centre, which offers direct access to the most important vehicle functions and can be configured individually by the driver. The main menu and Car Control Centre can be accessed at any time without having to close the active app, making operation much easier. There are additional direct buttons to which the available apps can be freely assigned on the right of the Car Control Centre.

Home screen. The large home screen in the middle combines the content of the most important apps on differently sized graphic tiles. Alongside classic content such as navigation, telephone or media, the tiles offer new functions such as suggestions from the new voice assistant. If one of the menu options from the top or bottom bar is activated, this app is also displayed in the individually configurable home screen.

Bottom bar. The bottom bar on the display provides access to the air conditioning and seat functions and has a home button in the middle of the bar that lets the driver return to the central home screen at any time. This means the air conditioning menu,



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temperature settings for the driver and front passenger and configurable air conditioning functions can always be accessed directly.

The digital instruments in detail. The latest MQB models have digital instruments on board as standard. With a display diagonal of 260 mm, they are larger than the Digital Cockpit of the predecessors. The graphic interface was also newly developed and the range of functions extended. Using the corresponding buttons on the multifunction steering wheel, the driver can select different basic graphic configurations (views) that can in turn be individually assigned functions. There will be a choice of four views: Classic, Progressive, Navigation and R-Line. Instead of R-Line, the Golf will get GTI, GTE and R as individual views.

Classic. In this classic view, the display has round instruments (rev counter and speedometer) on the left and right. In the middle is an area that shows information from the assist systems as well as the vehicle speed in digital form. The driver can also display information such as consumption and range or media information in the middle of the two round instruments.

Progressive. The round instruments are hidden in this view; content such as consumption, range and media information remains visible and is embedded in square fields. The information displayed in the middle area of the cockpit does not change compared with the Classic view.

Navigation. The navigation map and route guidance are shown on the display if the driver changes to this view. Turn instructions and information on the remaining journey time and distance are also displayed. In this case, the assist system information and digital speed display move to the bottom area of the display.

R-Line. The sportiest view, R-Line, uses the same basic layout as Navigation. In this case, the navigation map is replaced by a dark-coloured area and the R logo, a gear-change indicator and a horizontal rev counter in the upper area.