Service Training

Self-Study Programme 445

The Sharan 2011

As a family car, the new Sharan continues to set standards in its third generation.

In addition to the new body structure, the Sharan features an electrically operated tailgate, a large panoramic sunroof as well as sliding doors that allow easy access to the rear seats for the whole family.

Thanks to the greater track width, extended wheelbase and greater vehicle length and width, the interior has become more spacious. This increases comfort and practicality and also extends the range of available equipment.

Curtain airbags for occupants in both the front and the rear, a driver and a front passenger airbag, a knee airbag on the driver's side and belt tensioners for all seats meet the highest standards of vehicle safety.
For the first time, side airbags in combination with belt tensioners are now optionally available for the second row of seats.

The latest generation of highly efficient, eco-friendly and lightweight TSI and TDI-CR engines provide substantial reductions in fuel consumption. The engines employ BlueMotion Technology, which includes a start/stop system, brake energy recuperation and, for the diesel engines, the Selective Catalytic Reduction (SCR) exhaust gas aftertreatment system.

The second-generation ParkAssist has been thoroughly enhanced and now facilitates semi-automatic parking.

The new Sharan combines maximum variability with the simplest handling while providing outstanding comfort and attractive design. It sets standards with its low fuel consumption, top quality and the highest degree of safety.

S445_002

The self-study programme portrays the design and function of new developments. The contents will not be updated.

For current testing, adjustment and repair instructions, refer to the relevant service literature.

Attention Note

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The Sharan 2011

The overview introduces you to important standard and optional equipment for the new Sharan. Features are divided between the equipment lines Trendline, Comfortline and Highline.
Country-specific deviations are possible.

- Panoramic sunroof, optional
- 2nd-generation ParkAssist, optional
- 3-zone Climatronic, optional
- Windscreen with sound-deadening insulation glass
- Bi-xenon headlights with AFS and LED daylight driving lights, optional
- Heated windscreen, optional
- KESSY, optional
- Knee airbag on driver's side
- Electromechanical parking brake
- Rear seats, "one-hand folding" allows folding them down to create a continuous surface
- 6-speed dual clutch gearbox, optional
- DCC Dynamic Chassis Control, optional

- "Premium" mobile phone preparation, optional

- Side airbags and belt tensioners for outer seats in second row, optional (standard for 6-seater)

- Swivelling tow coupling with electric release, optional

- Electrically opening and closing tailgate, optional

- Six or seven seats, optional

- Run-flat tyres

S445_003

- Cargo management system, optional

- Manually operated sliding doors rear left and rear right (optionally electrically operated)

- BlueMotion Technology, depending on engine
  -Start/stop system
  -Recuperation
  -Flow-formed steel wheels
  -Low-rolling resistance tyres
  -Low-friction drive shafts
  -SCR exhaust gas aftertreatment
  -Electrically controlled fuel pump

Further details on BlueMotion Technology topics can be found in Self-Study Programme no. 424 "Selective Catalytic Reduction Exhaust Gas Aftertreatment" and no. 426 "Start/Stop System 2009".

Technical data

Exterior dimensions and weights

These data apply to a vehicle with five seats excluding driver; standard equipment; 1.4 l / 110 kW TSI engine; 6-speed manual gearbox and 205/60 R16 tyres.

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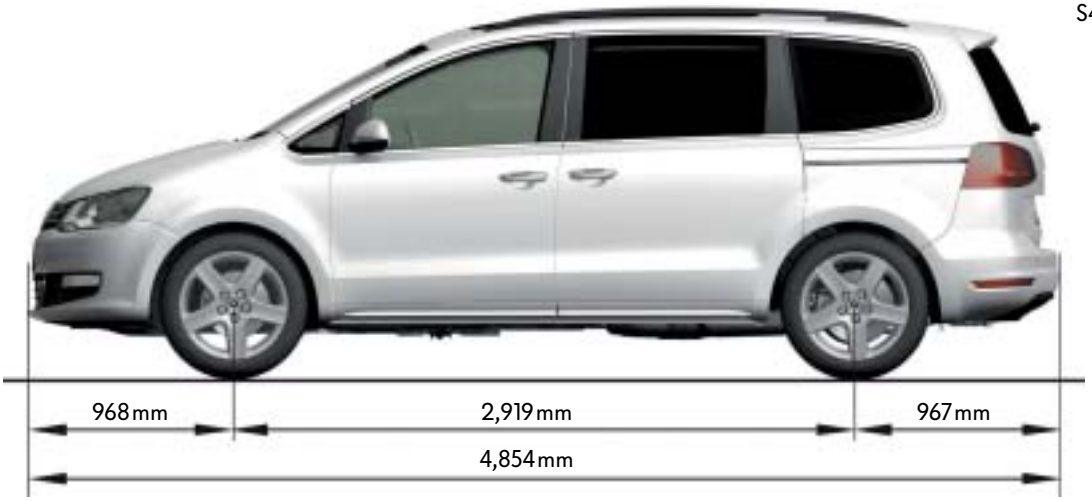

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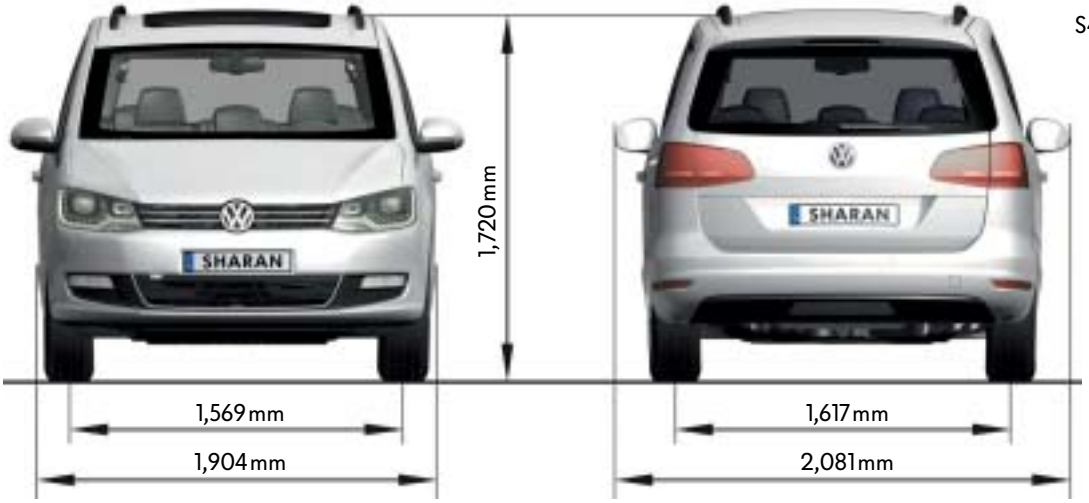


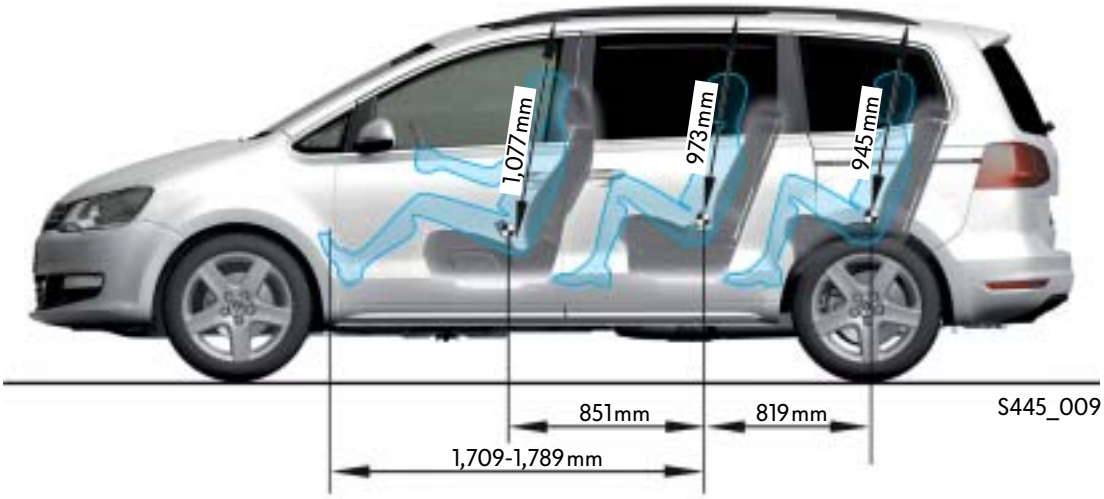
Exterior dimensions

	Sharan 2011	Sharan 2004
Length	4,854 mm	4,634 mm
Width	1,904 mm	1,810 mm
Height	1,720 mm	1,732 mm
Wheelbase	2,919 mm	2,844 mm
Track width at front	1,569 mm	1,530 mm
Track width at rear	1,617 mm	1,524 mm
Turning circle	11.9 m	10.9 m

Weights/further data

	Sharan 2011	Sharan 2004
Permissible gross vehicle weight	2,290 kg	2,430 kg
Kerb weight	1,648 kg	1,638 kg
Max. trailer load	1,800 kg	1,800 kg
Max. roof load	100 kg	75 kg
Tank capacity	70 l	70 l
SCR AdBlue® tank capacity	17 l	-
Drag coefficient	0.29 c_d	0.31 c_d

Interior dimensions



Interior dimensions and volumes

	Sharan 2011	Sharan 2004
Interior length 2nd row of seats	1,709–1,789mm	1,770–1,840mm
Space between 2nd and 3rd row of seats	819mm	725mm
Luggage compartment capacity 7-seater	300/711/2297l	256/852*/2610*l
Luggage compartment volume 5-seater	885/2430l	852/2610*l

* with seats removed

	Sharan 2011	Sharan 2004
Front headroom	1,077mm	1,061mm
Headroom 2nd row of seats	973mm	959mm
Headroom 3rd row of seats	945mm	945mm
Knee space 2nd row of seats	45mm	65mm
Knee space 3rd row of seats	24mm	**

** Knee space results only from a reduction of knee space in the 2nd row

The seat concept

To suit varying requirements, the Sharan is available as a 5-seater, 6-seater or 7-seater. In each case, the seats are highly variable and user-friendly. The 2nd and 3rd row of seats can be folded down to create a continuous cargo surface, offering a large volume of luggage space.

The 5-seater

The longitudinally adjustable rear seat system features the following:

- Folding seats for creating a continuous cargo surface
- One-hand operation
- Backrests adjustable by up to 20°

S445_043

The 6-seater

In the 6-seat equipment variant, the two seats in the middle row are moved further inwards.
The side armrests are attached to the backrest.

The 6-seater features the easy-entry system for easy access to the 3rd row of seats.

S445_045

The 7-seater

The optionally available 3rd row of seats consists of two individual seats. Both seats can be individually folded down.
The 7-seater features the easy-entry system for easy access to the 3rd row of seats.

S445_047

Luggage compartment capacity

Luggage compartment capacity 5-seater

Normal

S445_013

Rear seats folded down

S445_017

Luggage compartment capacity 6/7-seater

Normal

S445_015

3rd row of seats folded down

S445_095

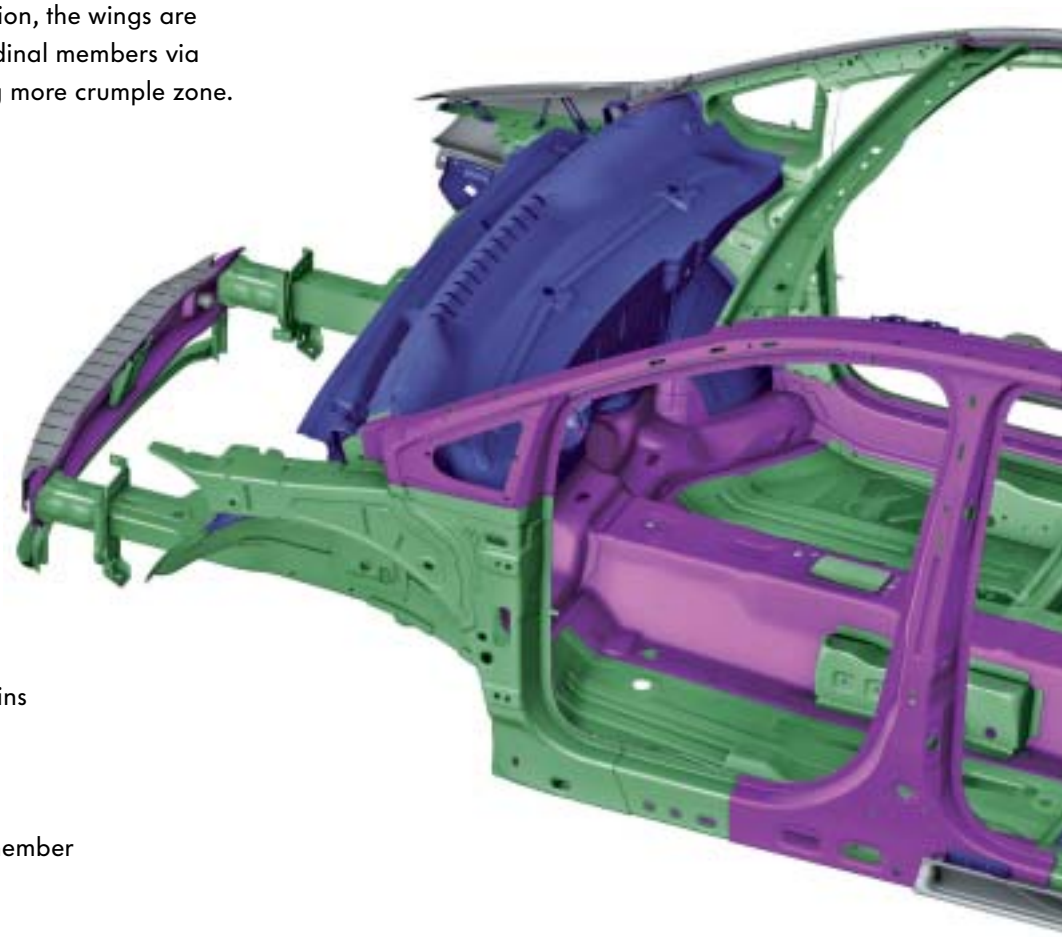
2nd and 3rd row of seats folded down

S445_093

Body structure

The primary objective in designing the body was to increase the body's rigidity while simultaneously reducing its weight.

To improve pedestrian protection, the wings are attached to the upper longitudinal members via deformation elements, adding more crumple zone.

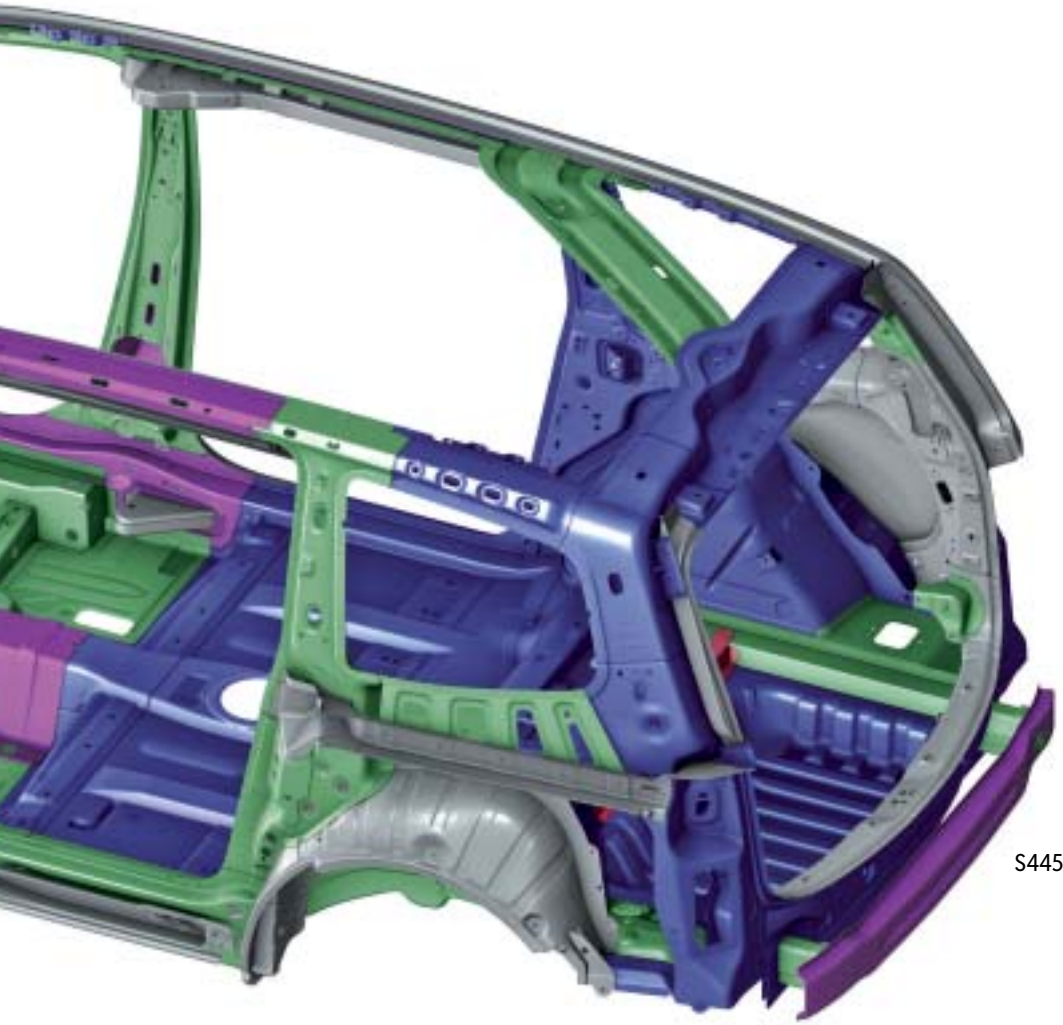


The body of the Sharan contains hot-formed steel elements:

- upper A-pillar
- parts of the roof side member
- B-pillar
- footwell cross member
- interior sill panel
- centre tunnel

Legend

- Steel panels up to 160 MPa
- High-strength steel panels up to 220 MPa
- Higher-strength steel panels up to 420 MPa
- Ultra-high-strength steel panels up to 1,000 MPa
- Ultra-high-strength, hot-formed steel panels over 1,000 MPa

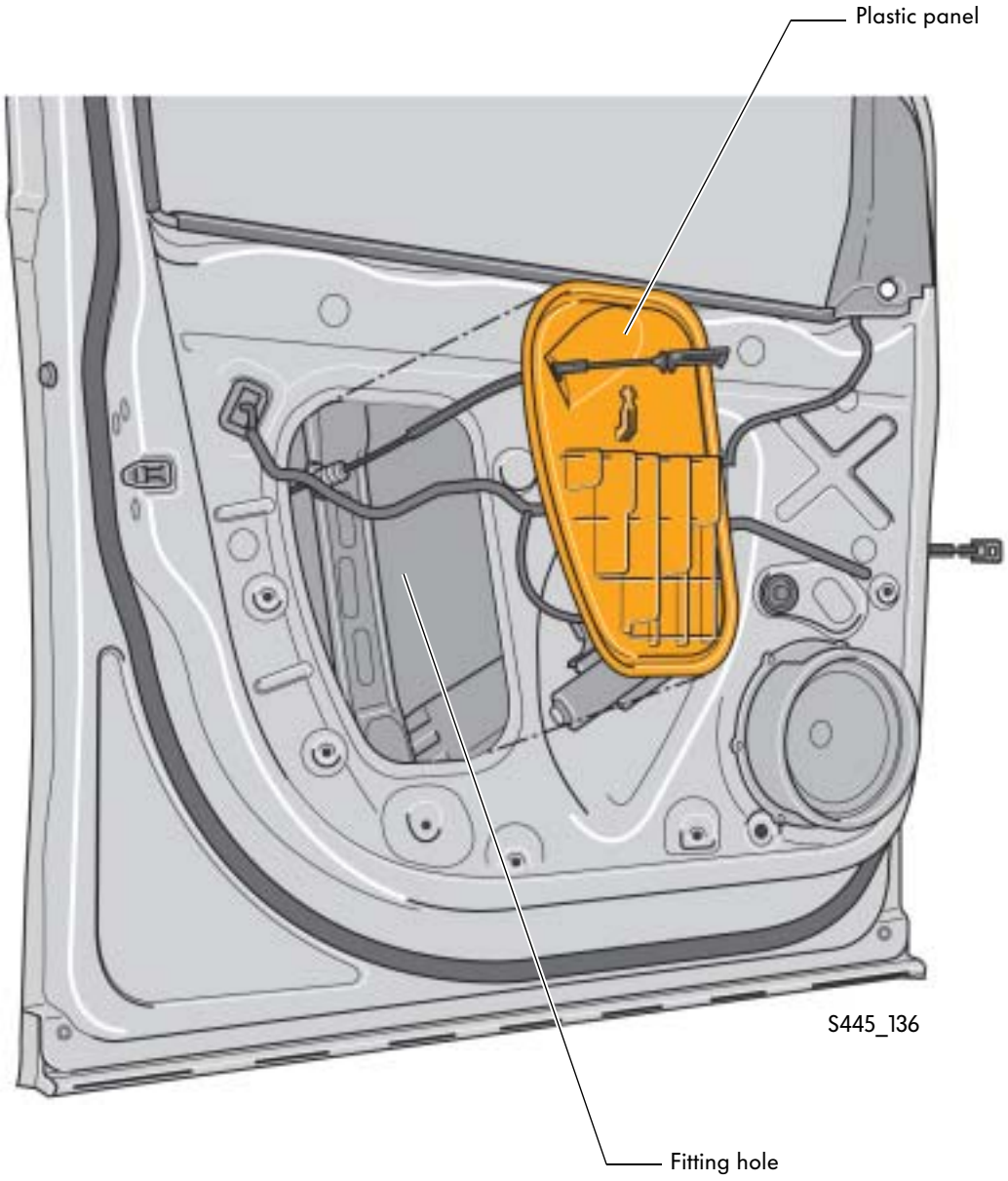


S445_027

Both the front and the rear transverse impact member feature crash boxes.
These deform easily in low-energy collisions, thus protecting the longitudinal members from damage.

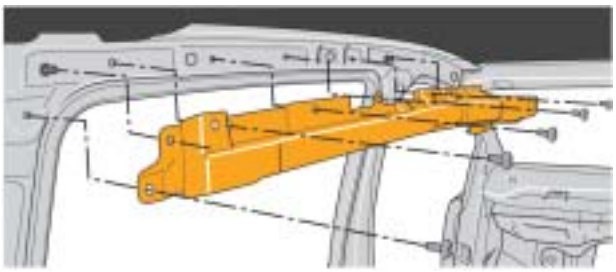
Doors

The insert parts in the doors are installed through fitting holes. The fitting holes are covered by plastic panels.



Electric sliding doors

The Sharan can optionally be equipped with electric sliding doors. The doors are then operated either by using the door handles, by two buttons in the vehicle interior or by radio remote control. The sliding door runs in three rails. The rails are located in the roof frame, the side panel and the sill panel respectively.



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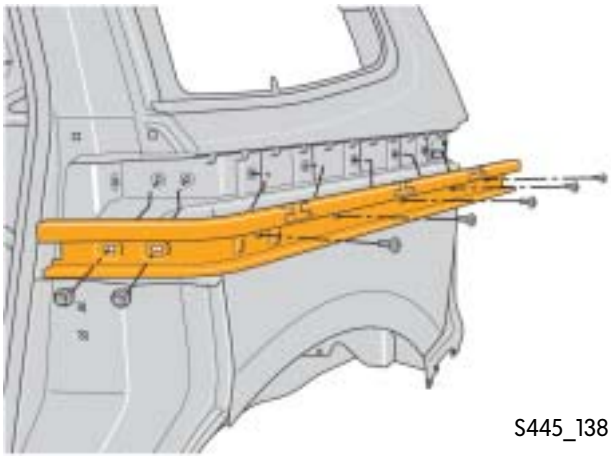
The rail on the roof frame is inside a separate housing in the vehicle interior.



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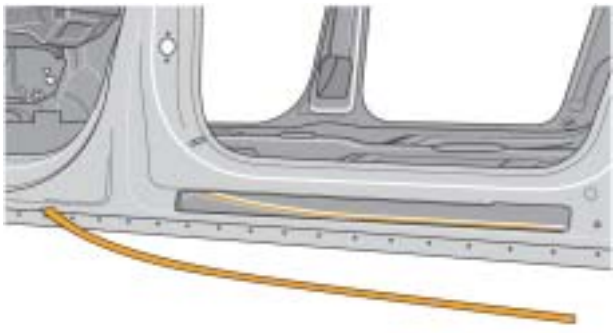
The rail in the side panel is bolted on from the outside.



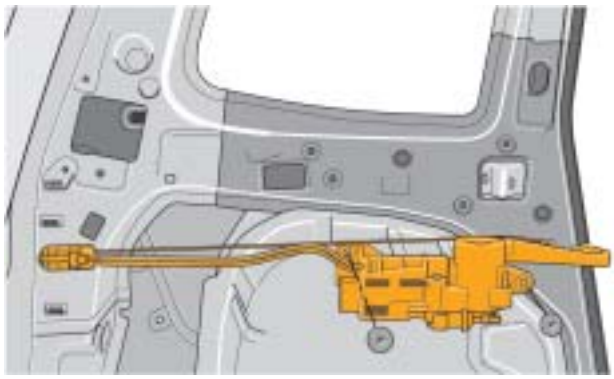
S445_140

The lower rail is part of the body.

To protect the sliding door from overheating, it can no longer be operated electrically once it has been opened and closed nine times. Electric operation becomes possible again after five minutes.

Cable drive

The sliding door is opened and closed by an electric cable drive. The drive is installed in the rear interior side panel.



S445_144

Manual opening and closing

Should the electric drive malfunction, the sliding door can be manually opened and closed. This requires a greater degree of force.

In the event of a crash, the sliding door's mechanism is disconnected from the drive. The sliding door can then be opened without increased effort.

The disconnection of the drive is performed by an integrated electric coupling. This coupling is disengaged by the crash signal of the airbag control unit and engaged by manually closing the door.

Cable routing

Cable routing when sliding door is closed

S445_029

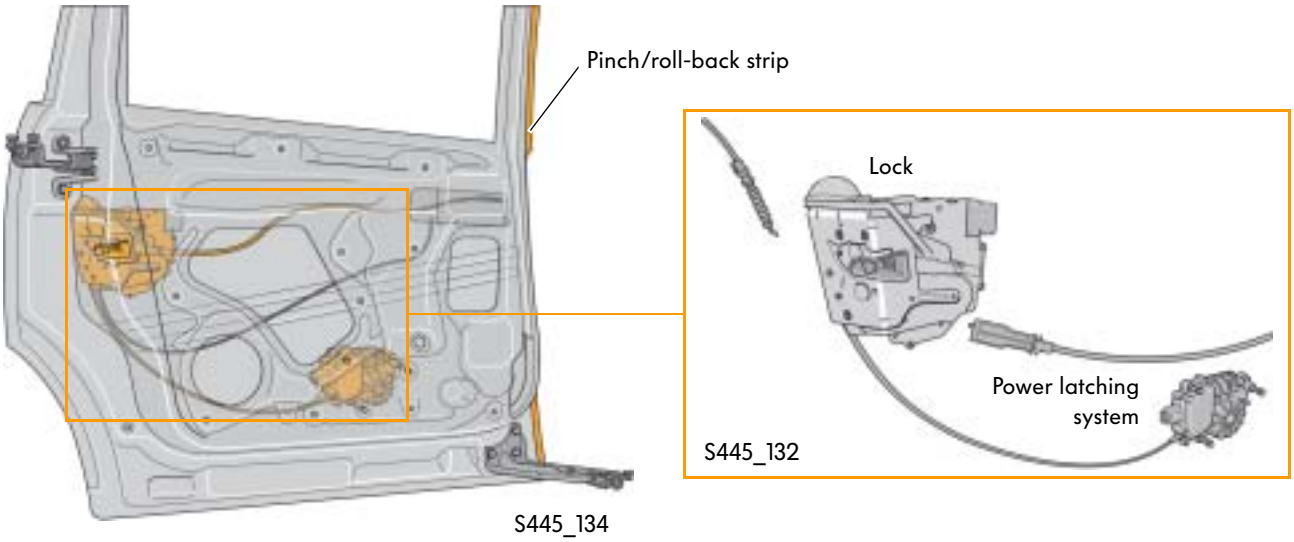
Cable routing when sliding door is open

S445_033

The electric lines of the sliding door are located in the lower part of the door. They are protected from kinking by a flexible plastic tube. The lines' disconnection point is inside the vehicle interior underneath the lateral wheel housing trim.

Power latching system

The electric sliding doors both feature a power latching system which pulls the doors into the latches with minimum noise.



Pinch/roll-back system

For safety reasons, the pinch/roll-back protection consists of two systems. One operates based on the so-called overcurrent protection, the other based on the pinch/roll-back strip in the front contact area of the sliding door. The pinch/roll-back strip's resistance changes when the strip is subjected to pressure. This resistance is constantly monitored by the sliding door control unit. If it registers that the door is trapping something, the door is immediately opened fully.

The Sharan features electric windows in the sliding doors. To achieve the greatest possible opening travel of the door, the window's front edge passes beyond the C-pillar. To counter the resulting risk of trapping, the control restricts the opening travel of the electric sliding door once the window has been opened to a certain level.

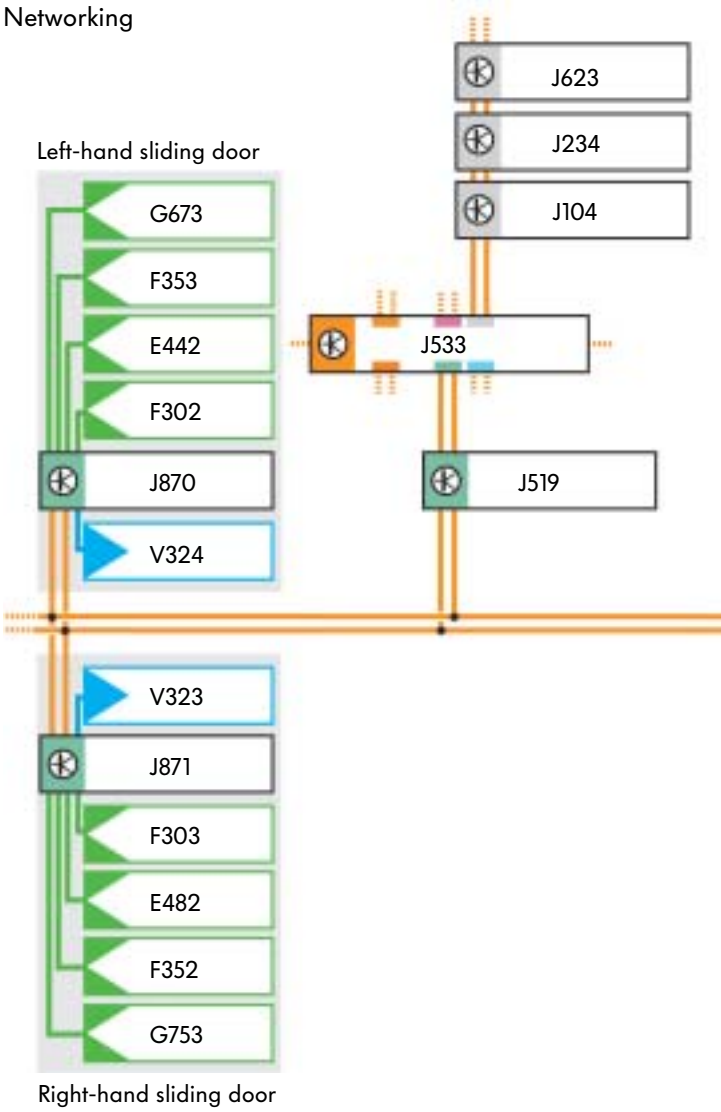
When opened, the tank flap intrudes into the path of the sliding door on the right-hand side. To prevent the sliding door from colliding with the opened tank flap, the microswitch in the sash lock actuator transmits a signal to the onboard supply control unit. This ensures that the right-hand sliding door cannot be opened, for example by a passenger who wishes to exit the vehicle while it is being refuelled. In the event of an emergency, the right-hand sliding door can still be opened from the outside.

System overview

The rear door control units J388 and J389 control the motors of the drive element for the central locking as well as the motors for the electric windows. They are connected to the front door control units via LIN bus.

The sliding door control units J870 and J871 are connected to the convenience CAN bus.
These control units control the motor for opening and closing. They also receive the signals from the door control buttons in the B-pillar as well as from those in the centre console.

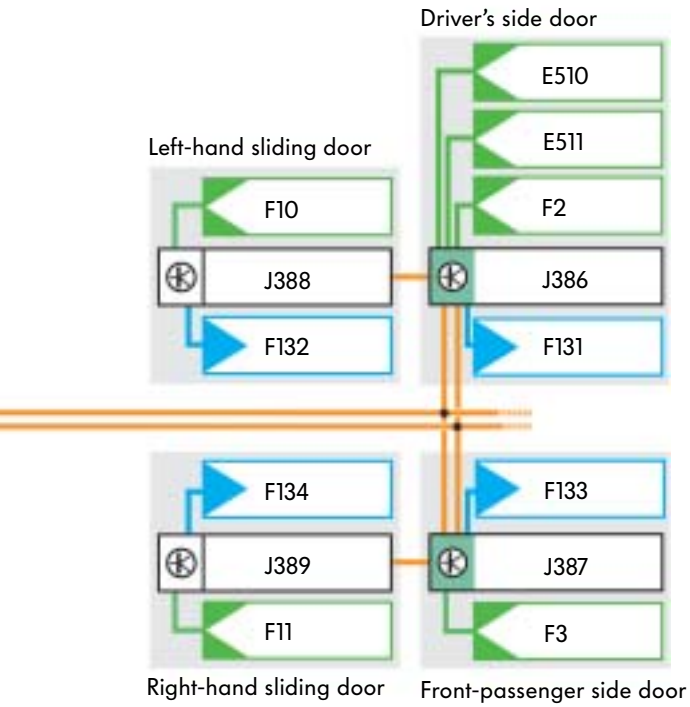
Networking



Legend

- Powertrain CAN data bus
- Convenience CAN data bus
- Display and operation CAN data bus
- Extended CAN data bus
- LIN data bus
- Sensors
- Actuators

CAN - data bus line
LIN - data bus line



S445_056

Legend

E442 Sliding door button
E482 Button for right-hand sliding door
E510 Button for left-hand child-proof lock
E511 Button for right-hand child-proof lock

F2 Driver door contact switch
F3 Front passenger door contact switch
F10 Rear left door contact switch
F11 Rear right door contact switch
F131 Drive element for central locking front left
F132 Drive element for central locking rear left
F133 Drive element for central locking front right
F134 Drive element for central locking rear right
F302 Door contact switch for central locking in left-hand sliding door
F303 Door contact switch for central locking in right-hand sliding door
F352 Switch for right-hand sliding door in centre console
F353 Switch for left-hand sliding door in centre console

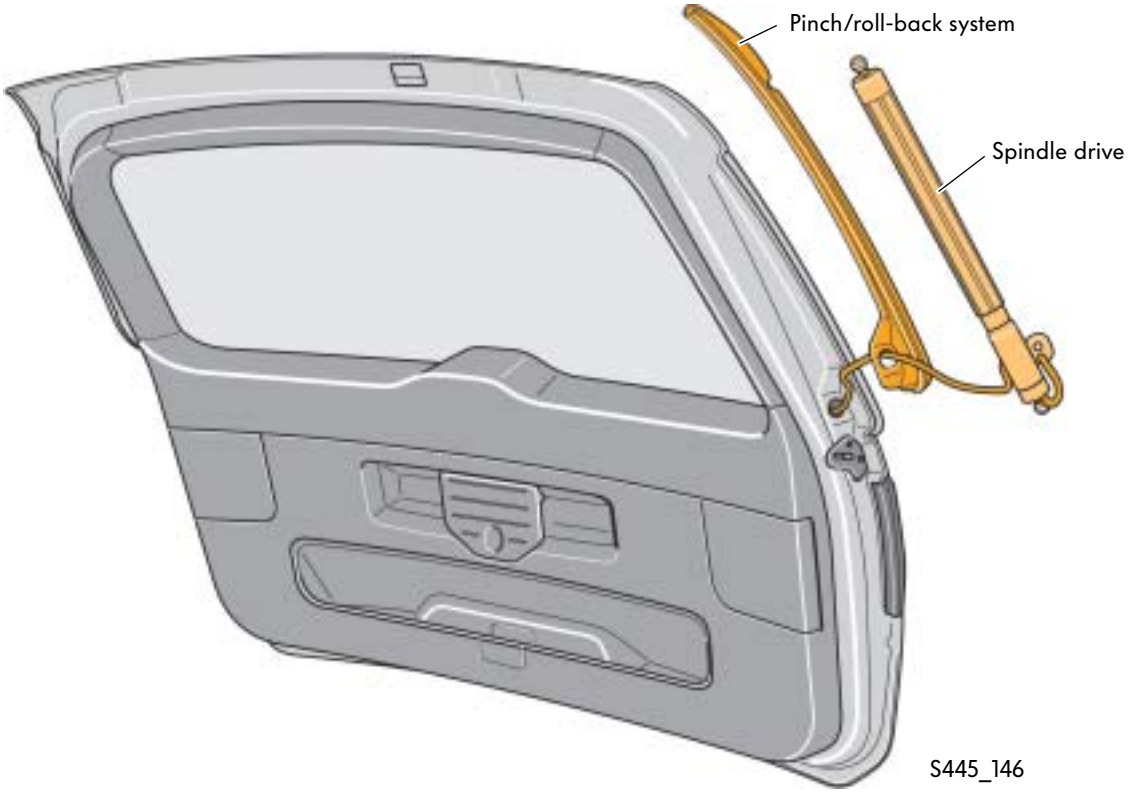
G673 Position sender 1 for pinch/roll-back system
G753 Position sender 2 for pinch/roll-back system

J104 ABS control unit
J234 Airbag control unit
J386 Driver door control unit
J387 Front passenger door control unit
J388 Rear left door control unit
J389 Rear right door control unit
J519 Onboard supply control unit
J533 Gateway
J623 Engine control unit
J870 Control unit for rear left-hand sliding door
J870 Control unit for rear right-hand sliding door

V323 Motor for opening right-hand sliding door
V324 Power latching motor for sliding door

Electrically opening and closing tailgate

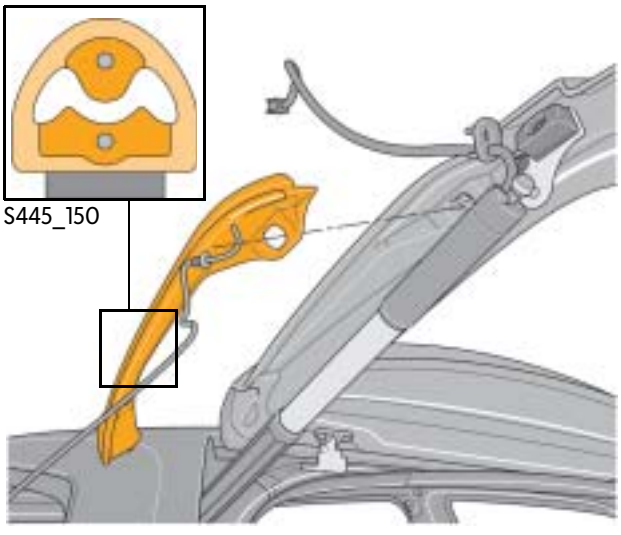
The optionally available electric tailgate has already been used in the Touareg 2011.



S445_146

Pinch/roll-back system

The sides of the tailgate incorporate a pinch/roll-back strip. The strip's resistance changes when the strip is subjected to pressure. This resistance is constantly monitored by the tailgate control unit J605.
If it registers that the tailgate is trapping something, the tailgate is immediately opened slightly.



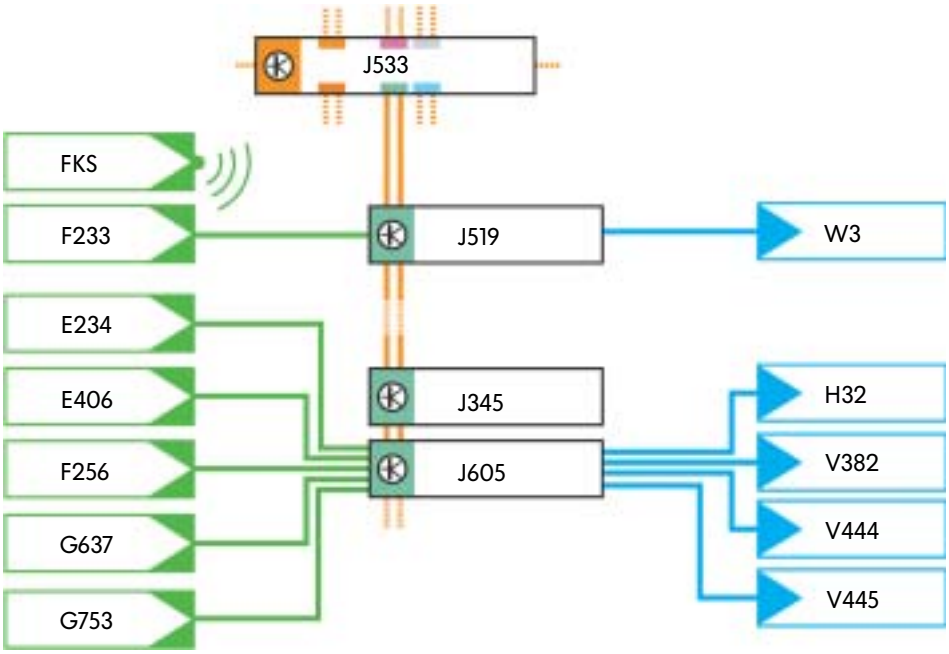
S445_150

S445_148

Further information on the electric tailgate can be found in Self-Study Programme no. 449 "Touareg 2011".

System overview

Networking



S445_054

Legend

E234 Tailgate handle release button
E406 Button to close tailgate in luggage compartment

FKS Remote folding key
E233 Tailgate remote release button
F256 Tailgate lock unit

G673 Position sender 1 for pinch/roll-back system
G753 Position sender 2 for pinch/roll-back system

H32 Warning buzzer for tailgate

J345 Trailer detector control unit
J519 Onboard supply control unit
J533 Gateway
J605 Tailgate control unit

V382 Power latching motor for tailgate
V444 Tailgate motor 1
V445 Tailgate motor 2

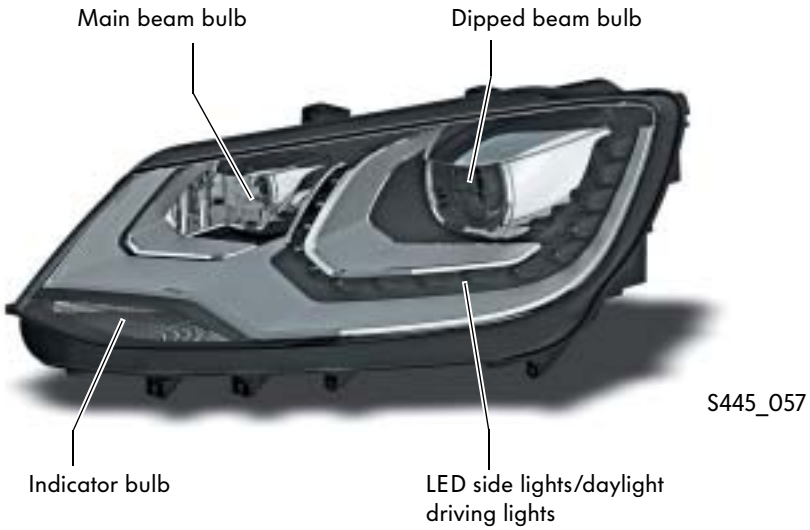
W3 Luggage compartment light

Powertrain CAN data bus
Convenience CAN data bus
Display and operation CAN data bus
Extended CAN data bus
LIN data bus
Sensors
Actuators

CAN - data bus line
LIN - data bus line

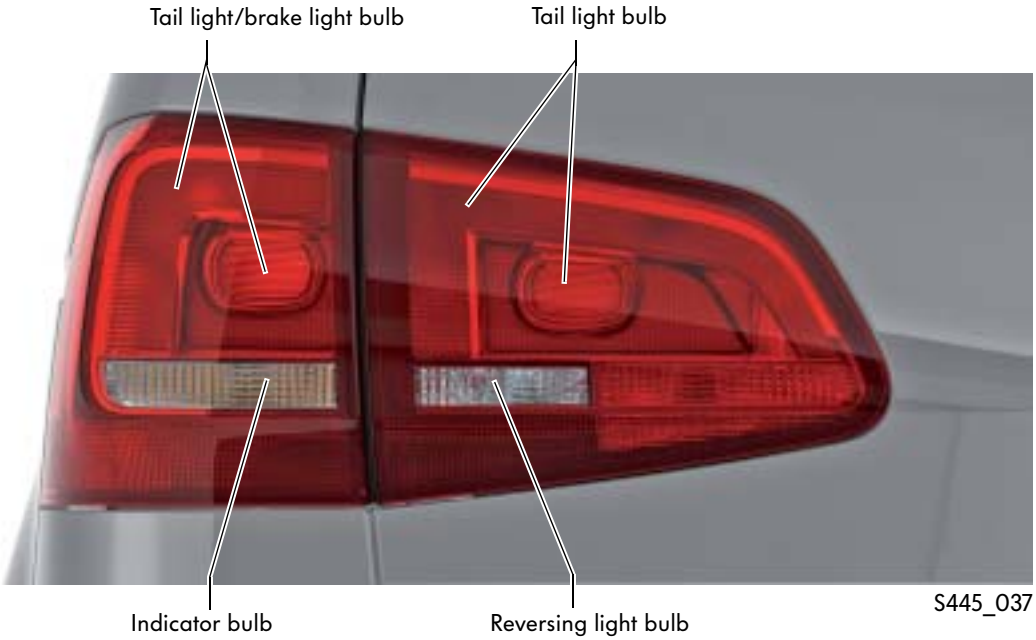
Halogen headlight

Xenon headlight



Rear lights

The rear lights of the Sharan 2011 consist of two parts. The outer part is fastened by a central bolt.



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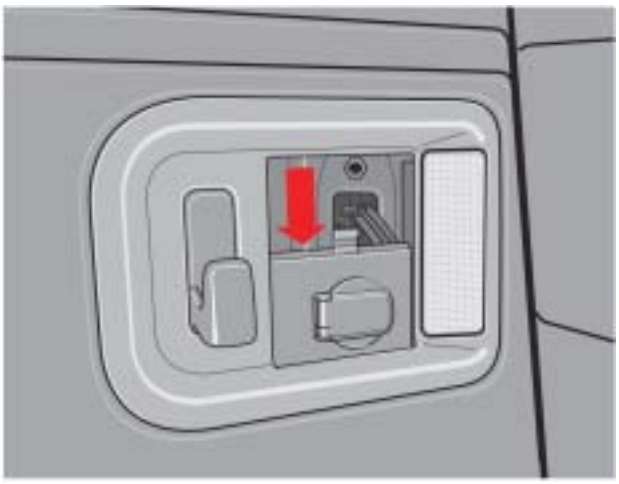


S445_016

The left-hand bolt is covered by the luggage compartment trim. To access the right-hand bolt, the power socket trim can be pushed downwards.

Interior equipment

Rear seat system (2nd row of seats)

The Sharan 2011 is available as a 5-seater, 6-seater or 7-seater. The following section details the various functions of the seats in the 2nd row.

2nd row of seats in the 6-seater

S445_072

In the 6-seater variant, the two seats in the middle row are moved further inwards and feature folding armrests attached to the backrests.

"EasyPackage" position

S445_074

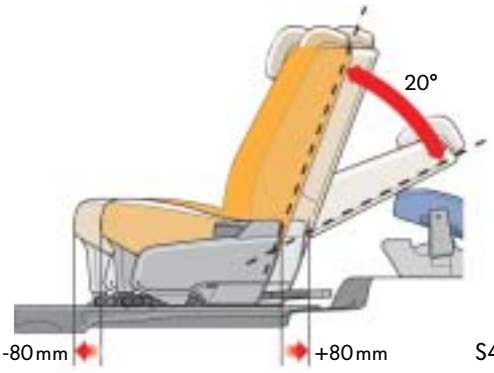
Using a release handle on the top edge of the backrest, the customer can fold the seat into the so-called "EasyPackage" position and also move the entire seat as far forward as possible.
This position allows comfortably entering and exiting the 3rd row of seats.

Cargo floor position

S445_078

By pulling the handle on the side of the backrest, the backrest is folded down onto the seat cushion. At the same time, the seat cushion retracts into the footwell floor. This provides a large load space without necessitating the removal of the seat.

Seat adjustment



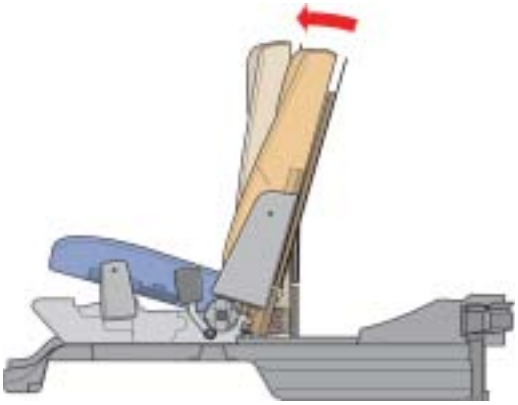
S445_076

The rear seat backrest can be adjusted incrementally by up to 20°C. The seat itself can be moved forwards and back through 160 mm.

Rear seat system (3rd row of seats)

The 3rd row of seats in the new Sharan is flexible and easy to fold down. By fully folding down all the seats, the load space can be extended in the shortest possible time. The seats are just as easy to fold back up.

Folding down



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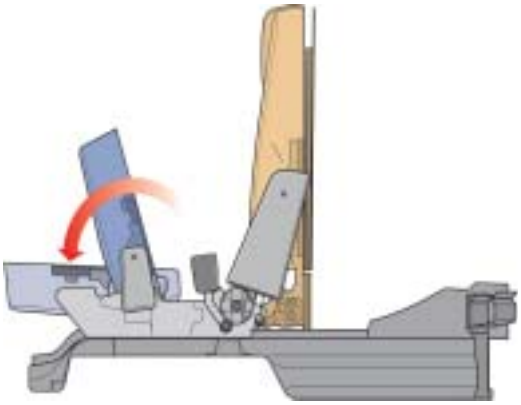

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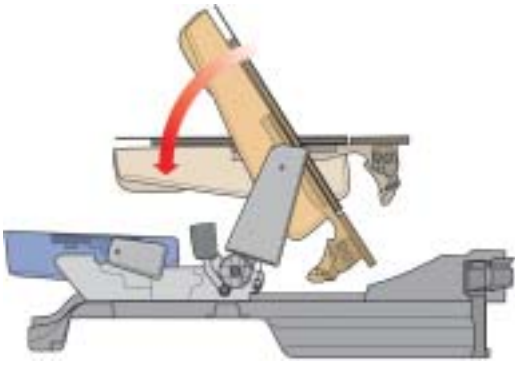

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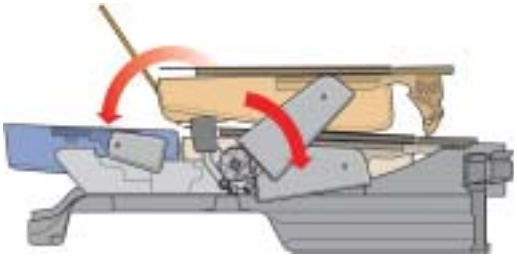


S445_044

Please observe the corresponding notes in the vehicle operating manual.

The seats in the 2nd and 3rd rows feature Isofix child seat anchors.

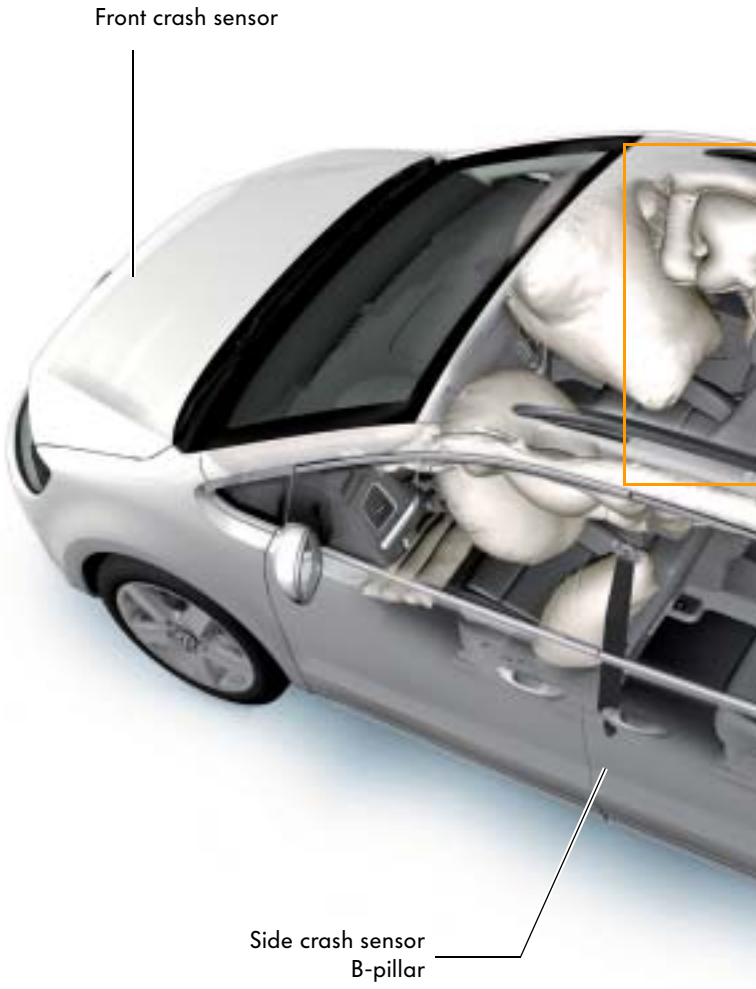
Occupant Protection

Safety equipment

The new Sharan features two front, two side and two curtain airbags as standard. To protect the legs, it also features a knee airbag on the driver's side as standard.
Belt tensioners for the driver and the front passenger are also standard.

Crash sensor

The centre of the front module incorporates a crash sensor for early detection of a frontal collision.



Side crash sensor

The lower area of the B and C-pillar house lateral acceleration sensors for side impact detection.

Side airbags and belt tensioners are optionally available for the 2nd row of seats.

The 6-seater model features these as standard.

S445_041

Curtain airbag

The curtain airbag in the Sharan 2011 provides protection for all three rows of seats.

S445_039

Engine/gearbox combinations

Engines / Gearbox	1.4l/110kW TSI engine  Petrol engine	2.0l/147kW TSI engine  Petrol engine	2.0l/103kW CR TDI engine  Diesel engine	2.0l/125kW CR TDI engine  Diesel engine
6-speed manual gearbox MQ350-6F 02Q				
6-speed manual gearbox MQ500-6F 0A6				
6-speed manual gearbox for four-wheel drive MQ500-6A 0A6				
6-speed dual clutch gearbox DQ250-6F DSG 02E				

1.4l/110kW TSI engine with dual-charging

This engine is familiar from various Volkswagen vehicles. This 110-kW version is already used in the Tiguan.

S445_101

Technical features

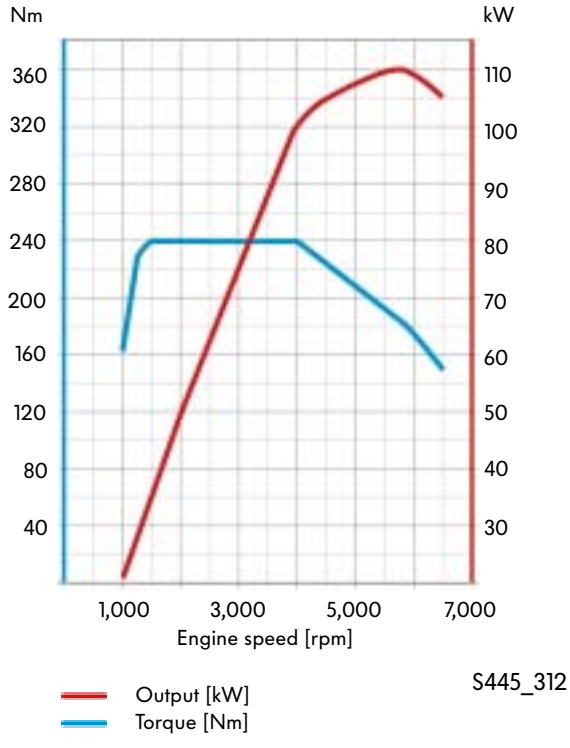
- Homogeneous mode (Lambda 1)
- Double injection (catalytic converter heating)
- Turbocharger with waste gate
- Additional mechanical supercharger
- Intercooler
- Grey cast iron cylinder block
- Dual-circuit cooling system
- Demand regulated fuel system
- High-pressure fuel pump with delivery pressure of up to 120 bar

Further information on this engine can be found in Self-Study Programme no. 359 “1.4l TSI engine with dual charging”.

Technical data

Engine code	CAVA
Type	4-cylinder in-line engine
Displacement	1,390cm^3
Bore	76.5mm
Stroke	75.6mm
Valves per cylinder	4
Compression ratio	10:1
Maximum output	110kW at 5800 rpm
Maximum torque	240Nm at 1500 rpm to 4000 rpm
Engine management	Bosch Motronic MED 17.5.1
Fuel	Super unleaded RON 95
Exhaust gas aftertreatment	Main catalytic converter close to engine, one broadband lambda probe upstream and one transient lambda probe downstream of main catalytic converter
Emissions standard	EU5

Output and torque curves



S445_312

The 2.0l/147kW TSI engine

The 2.0 l TSI engine is part of the EA888 series of 4-cylinder in-line engines. It is almost identical to the 1.8 l TSI engine. The engine is available only with a dual-clutch gearbox.

Technical features

- The greater displacement is achieved by modifying the pistons, connecting rods and crankshaft.
- The turbocharger's vacuum unit can be replaced.
- Volumetric flow-controlled external gear oil pump
- Two balancer shafts
- Optimised-friction piston rings and cylinder honing

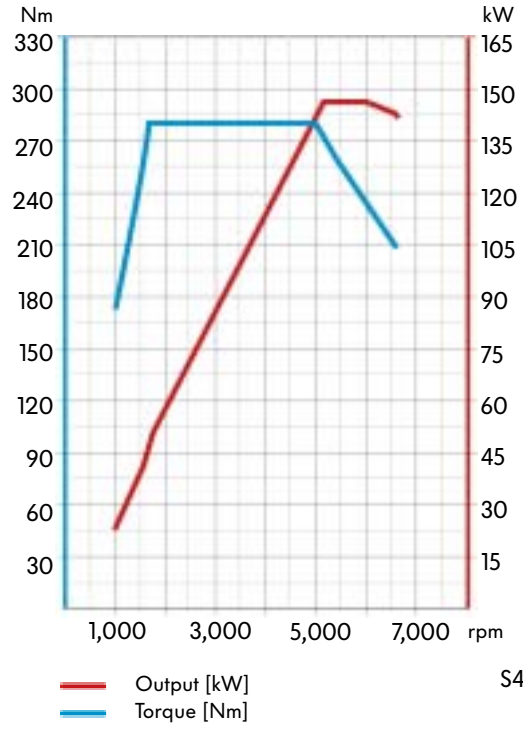
S445_051

Further information on this engine can be found in Self-Study Programme no. 401 "1.8l/118kW TFSI engine with timing chain".

Technical data

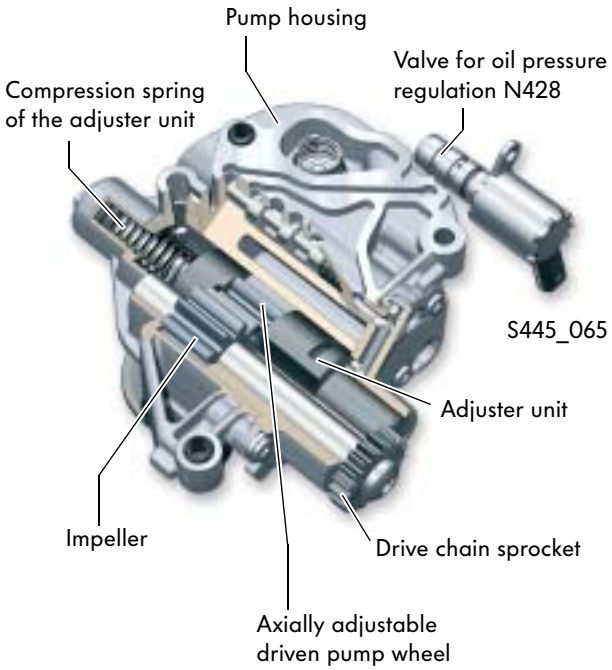
Engine code	CCZA
Type	4-cylinder in-line engine
Displacement	1,984cm^3
Bore	82.5mm
Stroke	92.8mm
Valves per cylinder	4
Compression ratio	9.6:1
Maximum output	147kW at 5,100 to 6,000 rpm
Maximum torque	280Nm at 1,700 to 5,000 rpm
Engine management	Bosch Motronic MED 17.5.2
Fuel	Super unleaded RON 95
Exhaust gas aftertreatment	Broadband lambda probe upstream of precatalytic converter close to engine, transient lambda probe downstream of main catalytic converter
Emissions standard	EU5

Output and torque curves



S445_032

Volumetric flow-controlled oil pump



The 2.0 l TSI engine features a volumetric flow-controlled external gear oil pump. Volumetric flow-controlled oil pumps are familiar from other engines in the form of a pendulum slide pump or vane cell pump.

The axially adjustable driven pump wheel allows targeted adjustment of the delivery volume and delivery pressure within the oil circuit.

Switching points:

	Oil pressure	Rotational speed
Low delivery volume	1.8bar (relative)	< 3500 rpm
High delivery volume	3.3bar (relative)	> 3500 rpm

The vane cell oil pump is described in Self-Study Programme no. 452 "3.0l V6/245kW TSI engine with supercharger in the Touareg Hybrid".

All oil pumps follow the same operating principle. The aim is to reduce

- the friction inside the engine
- the power consumption of the oil pump
- the oil throughput in the oil system

The result is a corresponding reduction in fuel consumption and CO_2 emissions.

Adjuster unit positions


S445_109

No axial adjustment: maximum oil delivery volume


S445_107

Maximum axial adjustment: low oil delivery volume

During the first 1,000km, the high oil pressure level is maintained while driving. This is intended to account for the higher temperature strain of the components in the engine intake system.

The 2.0l-103/125kW TDI-CR engine

The new Sharan employs generation II 2.0 l TDI-CR engines. These new engines are enhanced versions of the generation I 2.0 l TDI-CR engines used to great effect since 2007 in many Volkswagen models.
The engine is available in two performance variants. To reduce nitrogen oxide emissions, all engines are equipped with the Selective Catalytic Reduction (SCR) exhaust gas aftertreatment system.

S445_049

Characteristics of the generation II 2.0 l TDI-CR engine

Common rail fuel injection system with solenoid valve-controlled injectors

S445_058

Cylinder head as for 1.6 l TDI-CR engine with exhaust gas recirculation partially running through the cylinder head

S445_077

Exhaust gas recirculation module as for 1.6 l TDI-CR engine with exhaust gas recirculation and cooler for exhaust gas recirculation

S445_067

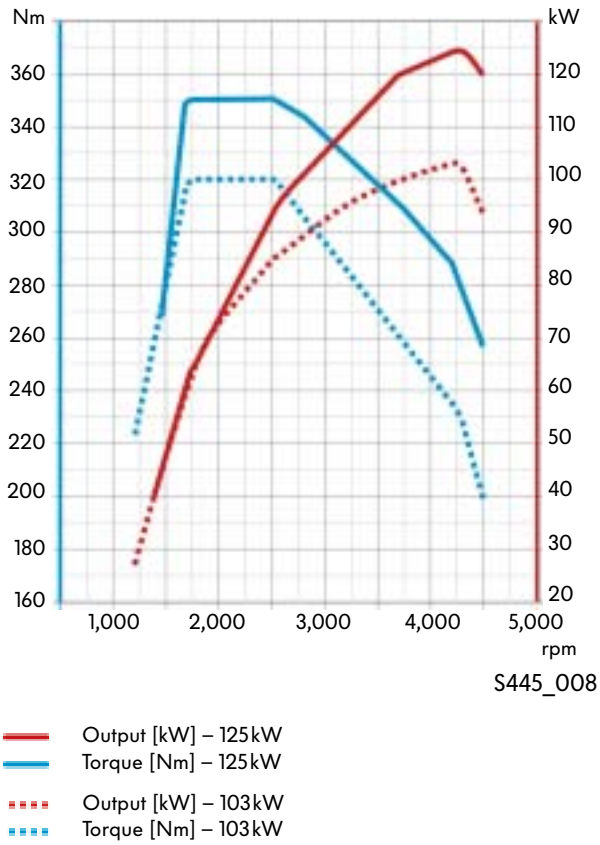
Plastic intake manifold without swirl valve adjustment

S445_079

Technical data

Output	103kW	125kW
Engine codes	CFFB	CFGB
Type	4-cylinder in-line engine	
Displacement	1,968cm^3	
Bore	81mm	
Stroke	95.5mm	
Valves per cylinder	4	
Compression ratio	16.5:1	
Maximum output	103kW at 4,200 rpm	125kW at 4,200rpm
Maximum torque	320Nm at 1,750 to 2,500rpm	350Nm at 1,750 to 2,500rpm
Engine management	Bosch EDC 17 (common-rail injection system)	
Fuel	Diesel, in accordance with DIN EN 590	
Exhaust gas aftertreatment	Exhaust gas recirculation Oxidising catalytic converter Diesel particulate filter SCR system	
Emissions standard	EU5	

Output and torque curves



- More details on the 2.0 l TDI-CR engine can be found in Self-Study Programme no. 403 “2.0 l TDI Engine with Common Rail Injection System”.
- Design and function of the 1.6 l TDI-CR engine is described in Self-Study Programme no. 442 “1.6 l TDI Engine with Common Rail Injection System”.

Fuel system of the 2.0 l TDI-CR engine

1 – Fuel pump control unit J538

The fuel pump control unit regulates the pressure in the fuel supply system in accordance with demand and monitors the function of the fuel pump.

2 – Fuel system pressurisation pump G6

The pressurisation pump generates the pressure in the fuel supply system.

3 – Fuel filter

The fuel filter keeps impurities in the diesel fuel away from the components of the injection system. The high-precision components, for example the high-pressure pump and the injectors, can be damaged or their function impaired by even the most minute particles of dirt.

4 – Fuel temperature sender G81

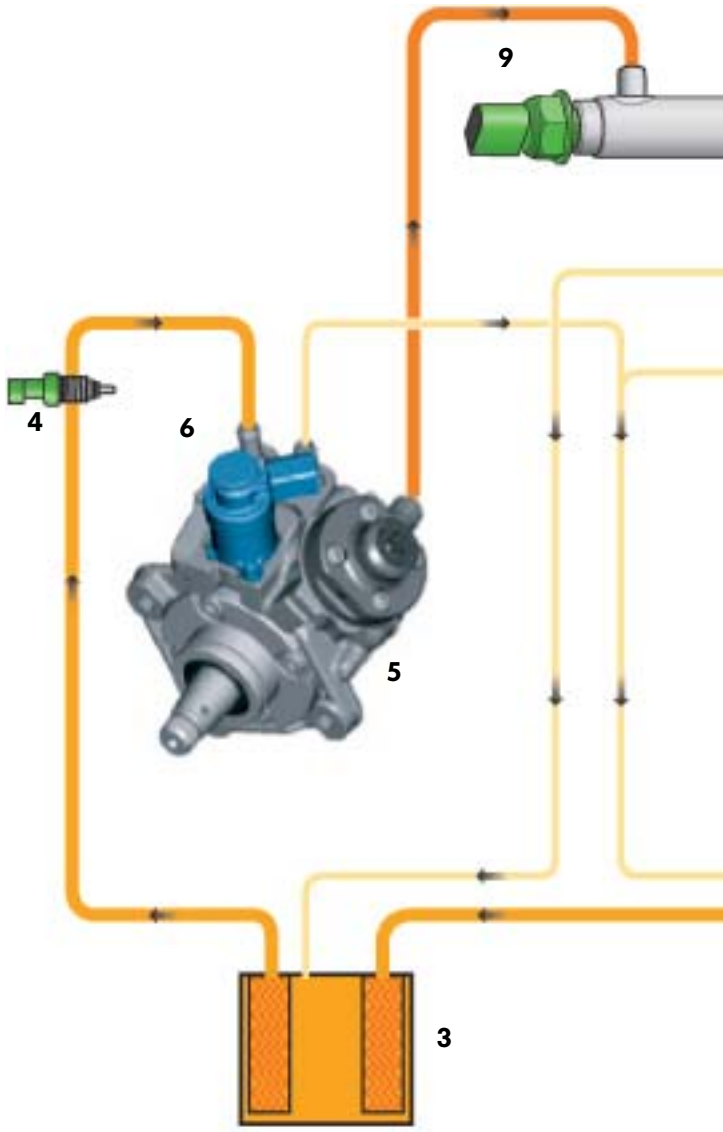
The fuel temperature sender measures the current fuel temperature.

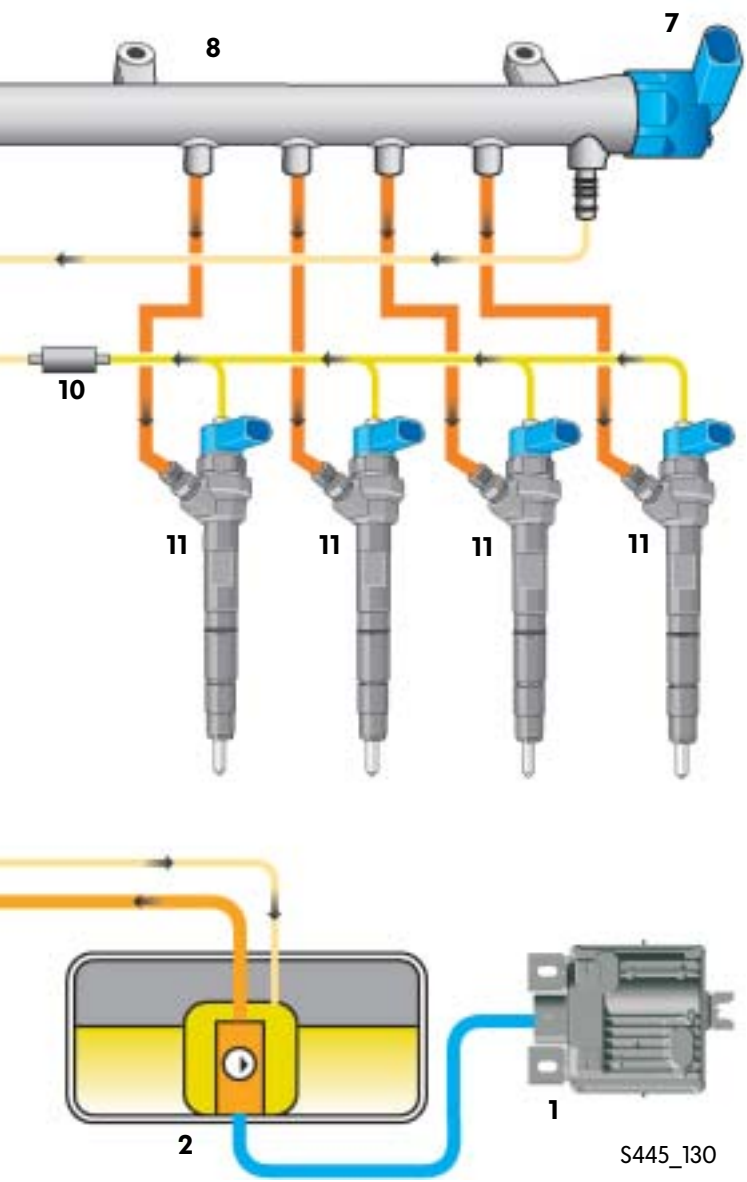
5 – High-pressure pump

The high-pressure pump generates the high fuel pressure required for injection.

6 – Fuel metering valve N290

The fuel metering valve regulates the quantity of fuel needed to generate the high pressure as required.





Colour code/legend

- High pressure 230 – 1,800 bar
- Supply pressure approx. 5 bar
- Return pressure from the injectors approx. 2 bar
- Return line pressure 0.1 – 1 bar

7 – Fuel pressure regulating valve N276

The regulating valve sets the fuel pressure in the high-pressure system.

8 – High-pressure accumulator (rail)

The high-pressure accumulator stores the fuel required for injection into all cylinders under high pressure.

9 – Fuel pressure sender G247

The fuel pressure sender measures the current fuel pressure in the high-pressure system.

10 – Pressure retention valve

The pressure retention valve provides a constant pressure of approx. 2 bar in the injectors' return lines. This prevents pressure fluctuations and thus facilitates precise control of the injectors.

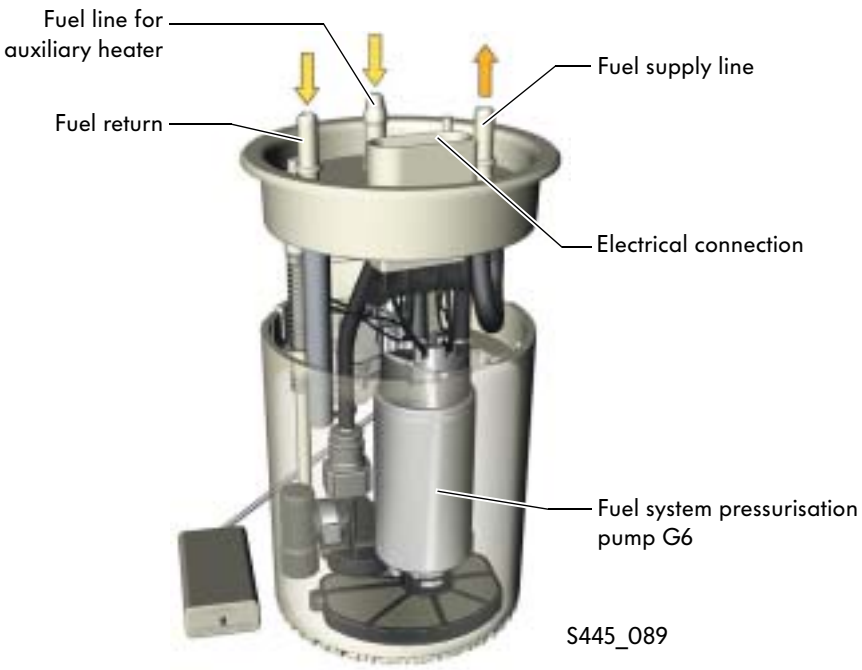
11 - Injectors N30, N31, N32, N33

The injectors inject the fuel into the combustion chambers.

Fuel system pressurisation pump G6

The fuel system pressurisation pump is an electrically driven crescent pump. It is located in fuel pump unit GX1. Depending on the engine's operating status, the pump provides a pressure in the fuel supply system of between 3.5 to 6bar at a maximum delivery rate of 220l/h.
The benefit of the pump's demand-controlled delivery is that the pressure generated in the fuel supply system never exceeds the pressure actually required by the operating situation.

Design of fuel pump unit GX1



Function

The engine control unit determines the current fuel demand from a range of different signals, for example accelerator pedal position, engine torque and coolant temperature.
It then sends a PWM signal to the fuel pump control unit J538. The fuel pump control unit regulates the required fuel delivery volume by increasing or reducing the speed of the pump.

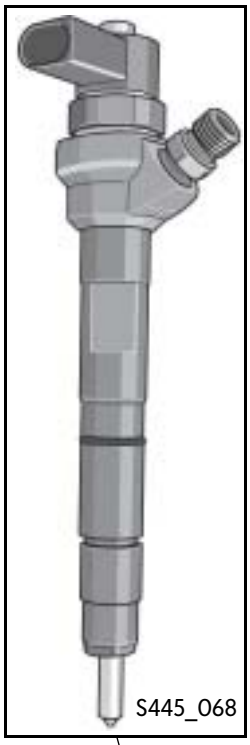
The electric motor for the fuel pump is an AC motor. The alternating current required is generated by the fuel pump control unit J538 through commutation (reversing the polarity) of the onboard supply's 12-volt direct current.

Effects upon failure

If the fuel pump unit fails, the engine shuts off.

Injectors

The injectors in the generation II 2.0 l TDI engine are controlled by a solenoid actuator.
They replace the injectors with piezo actuator installed in the generation I 2.0 l TDI engine.

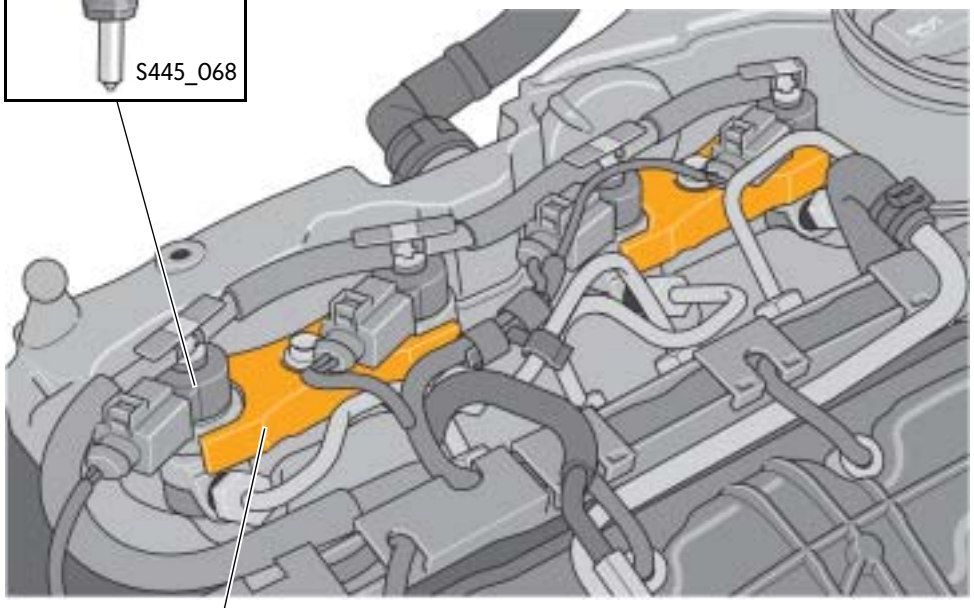


S445_068

The company Bosch has developed a solenoid-controlled injector that meets the requirements for high-pressure injection and that is capable of multiple injections per working cycle.

Solenoid-controlled injectors have the advantage of being easier to manufacture than injectors with piezo actuators.

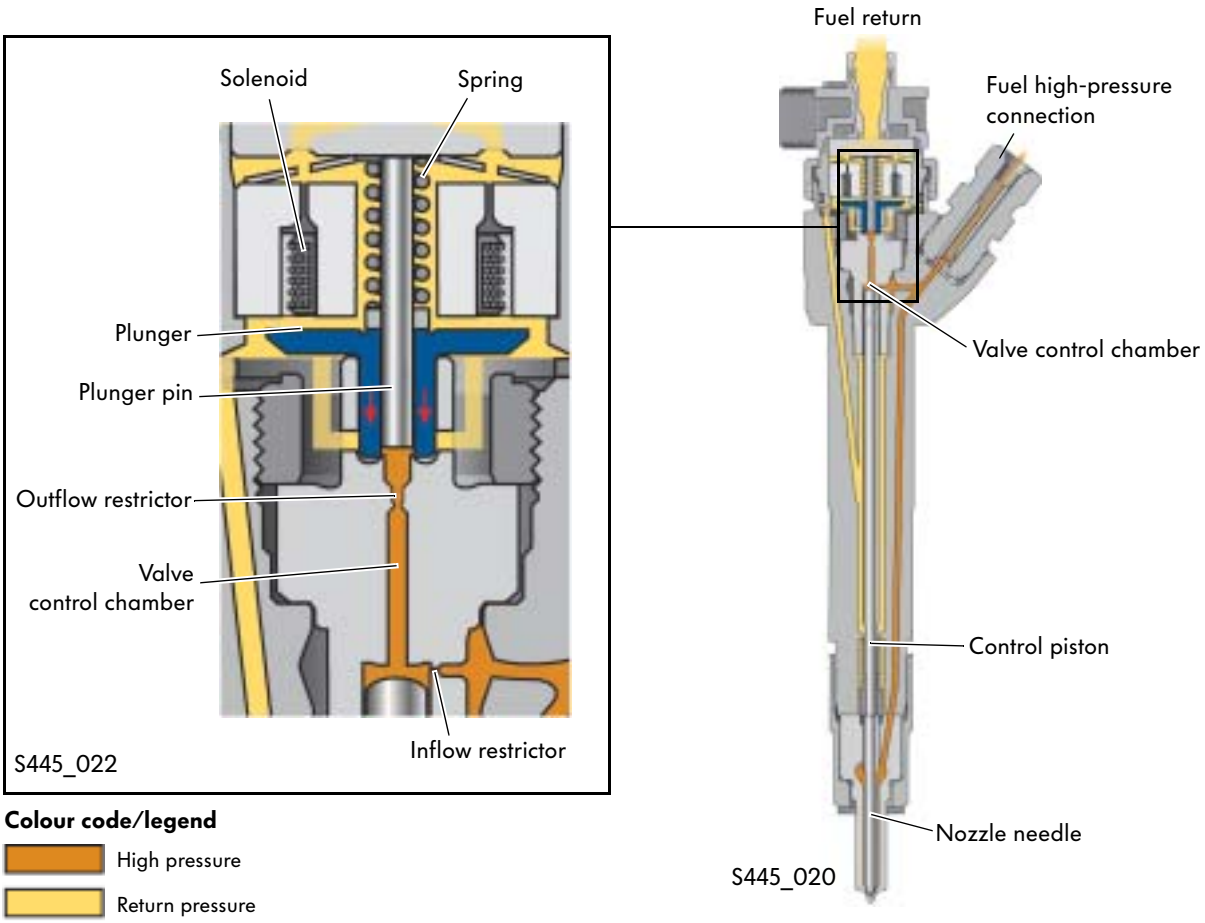
Two external clamping pieces each affix two injectors on the cylinder head cover.



S445_070

Clamping piece

Design



Colour code/legend

High pressure

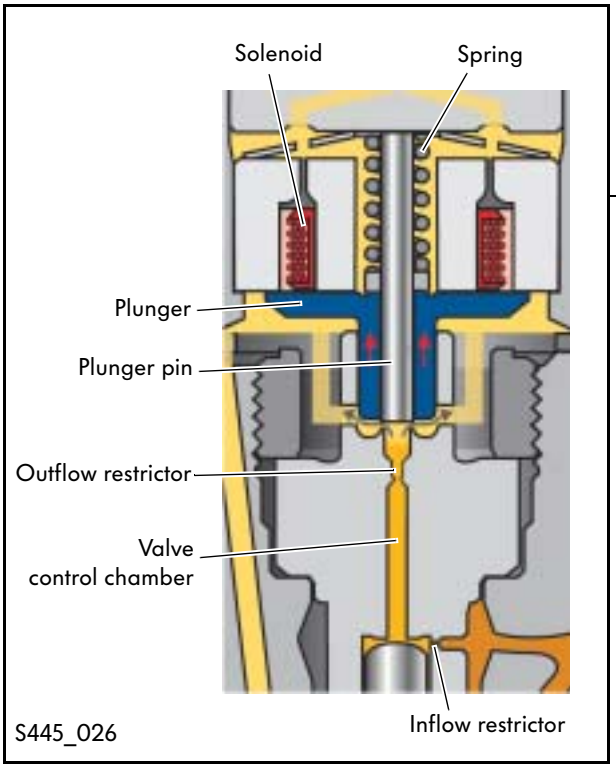
Return pressure

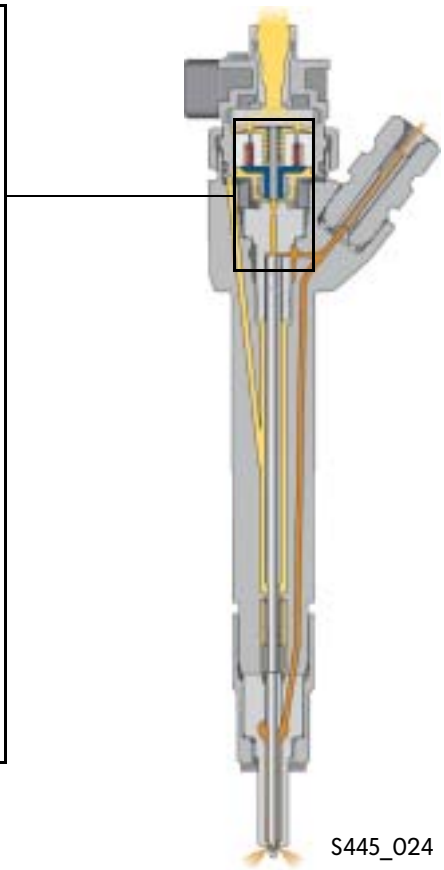
Injector closed/resting position

The injector is closed in its resting position. The solenoid valve is not actuated. The solenoid plunger is pressed into its base by the solenoid spring, closing off the valve control chamber's opening to the fuel return.

The fuel in the valve control chamber is under high pressure. Due to the surface pressure ratio between the control piston's surface and the nozzle needle, the needle is pressed into its base, closing off the nozzle.

Start of injection





Colour code/legend

High pressure

Return pressure

Fuel injection is initiated when the solenoid is energised by the engine control unit. Once the magnetic force exceeds the closing force of the solenoid spring, the solenoid plunger moves upwards and opens the outflow restrictor.

The fuel in the valve control chamber flows into the fuel return via the open outflow restrictor.
The fuel pressure in the valve control chamber drops. The inflow restrictor prevents a rapid equalisation of pressure between the fuel high-pressure system and the valve control chamber. The fuel pressure raises the nozzle needle and injection begins.

Pressure retention valve

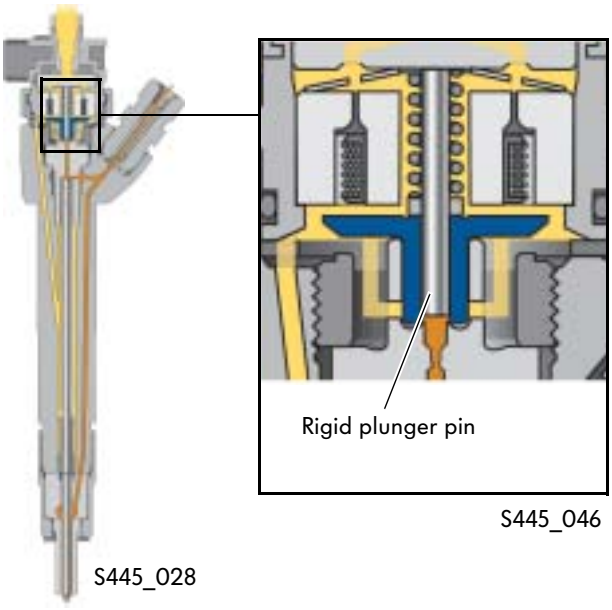
The injectors'return features a pressure retention valve. This valve maintains a pressure of approximately 2 bar in the injectors' return. This reduces pressure fluctuation and contributes to precise control of the injection volume.

Comparison of solenoids

The following comparison of two solenoids of different design demonstrates that a solenoid facilitates valve switching times that are almost as fast as those of a piezo actuator.

The injector in the 2.0 l TDI-CR engine is compared with the injector in the 2.8 l TDI engine with common-rail injection used in the Volkswagen LT2 (see also Self-Study Programme no. 266).

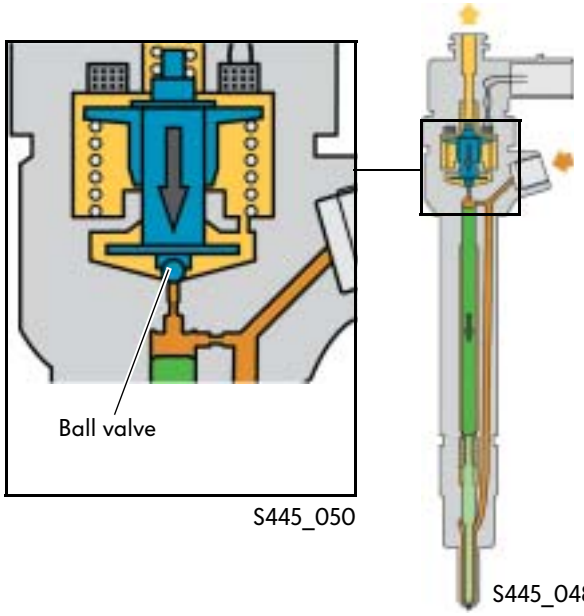
Injector in 2.0 l TDI-CR engine
Valve with plunger pin



S445_028

S445_046

Injector in 2.8 l TDI-CR engine
Valve seat with ball valve



S445_050

S445_048

In the 2.0 l TDI-CR engine, the hydraulic forces acting on the valve seat are compensated by the plunger pin. Compared to the ball valve in the 2.8 l TDI-CR engine's injector, the valve with plunger pin is not required to counter the rail pressure, thus requiring less closing force.

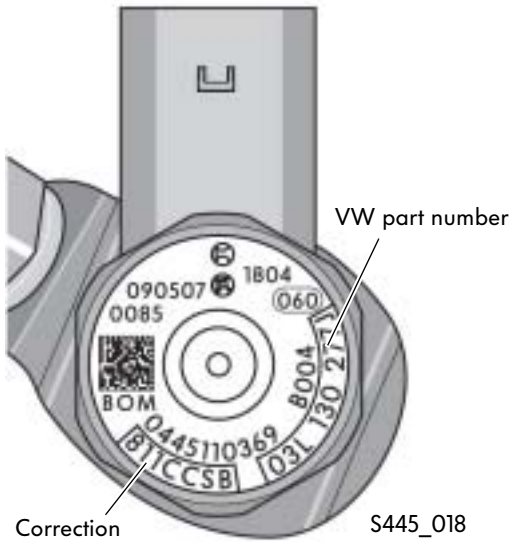
The lower closing force of the valve with plunger pin allows for a larger cross-section of the valve seat.
At identical stroke, the valve opening of the valve with plunger pin is three times larger than that of the ball valve. The valve with plunger pin thus requires less valve stroke for the same volume of fuel to flow from the valve control chamber. The smaller stroke facilitates very short valve switching times, in turn allowing multiple injections per working cycle.

Injector correction value

There is a data plate on the top of the injectors. In addition to manufacturer data, the VW part number and a 7-digit correction value for the injectors are stamped onto the data plate.

The correction values compensate differing injection properties of the individual injectors, which result from production tolerances.

The individual correction value for each injector is determined on a test rig during production. It indicates deviations from the specifications and thus describes the injection performance of the respective injector.

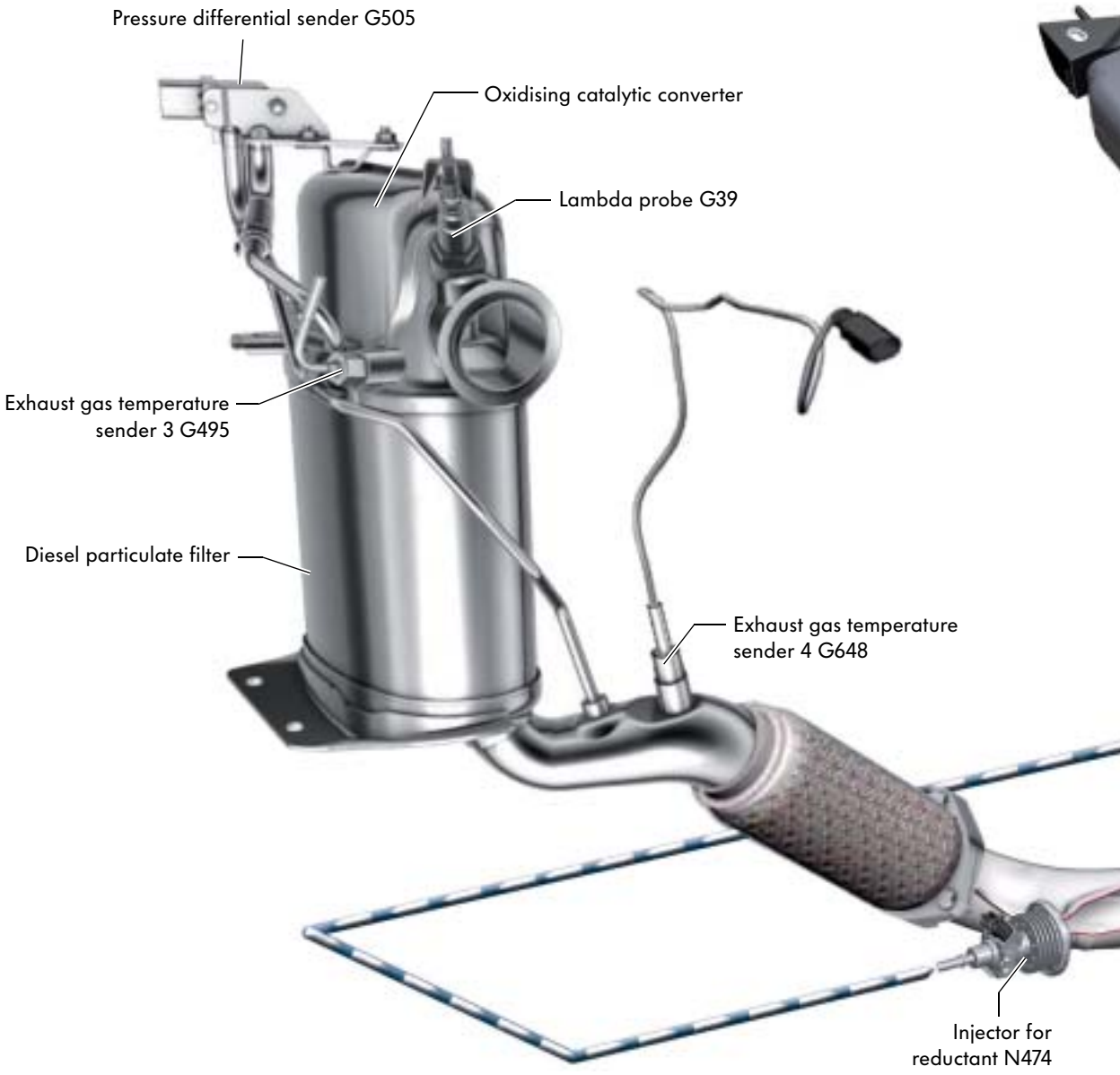


The engine control unit can use the correction value to control and correct the actuation of single injectors across the whole mapped range. This allows precise control of the injection quantities, which contributes to the reduction of fuel consumption and exhaust gas emissions as well as to smooth engine running.

When injectors are replaced, the correction value must be entered in “guided functions” under the “Read/adapt injector correction values” menu option.

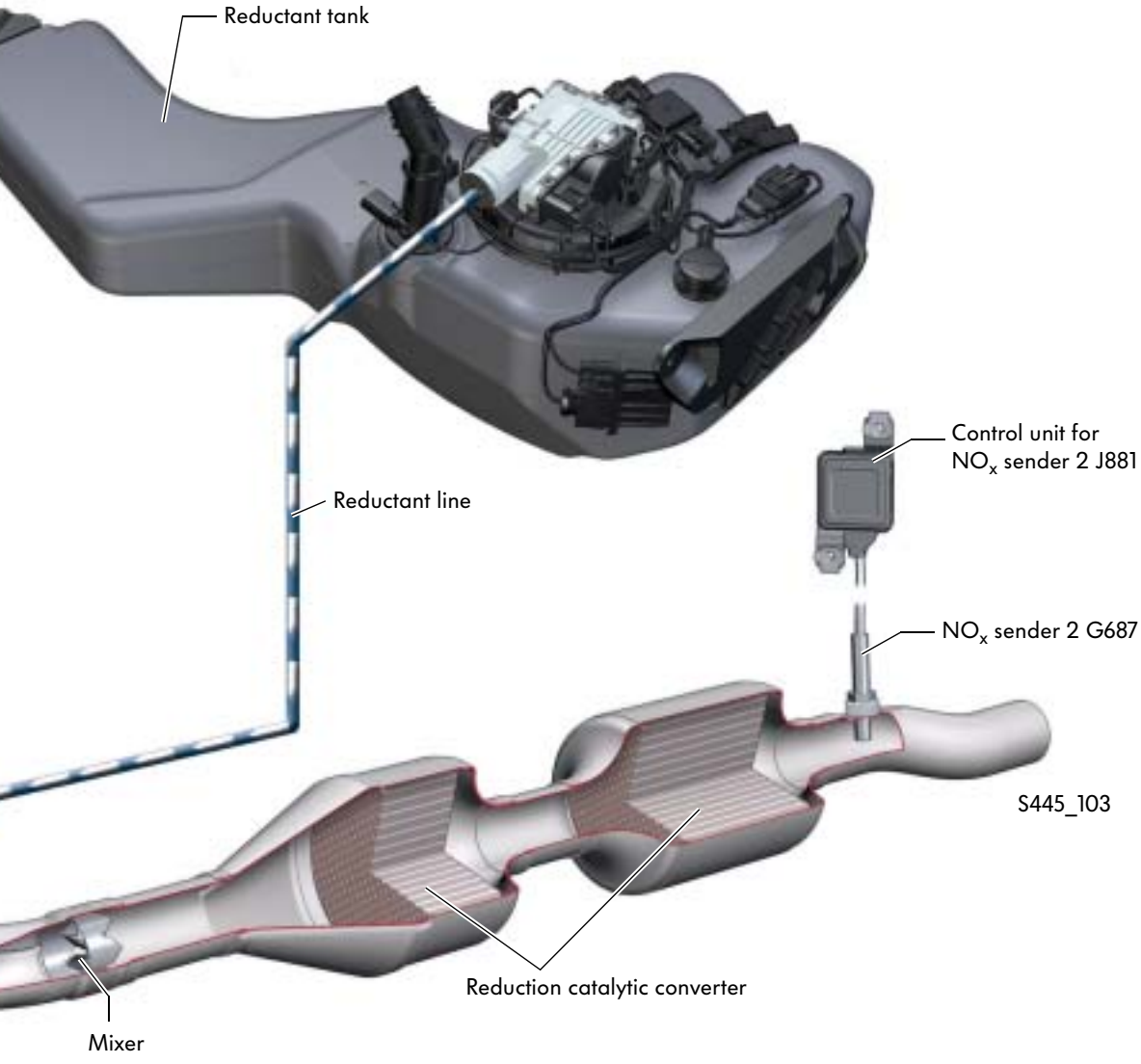
SCR system of the 2.0 l TDI-CR engine

The diesel engines in the new Sharan feature the Selective Catalytic Reduction (SCR) exhaust gas aftertreatment system as standard. The SCR system further reduces the nitrogen oxide content of the exhaust gas. Volkswagen first used the system in 2009 in the Passat Blue TDI.



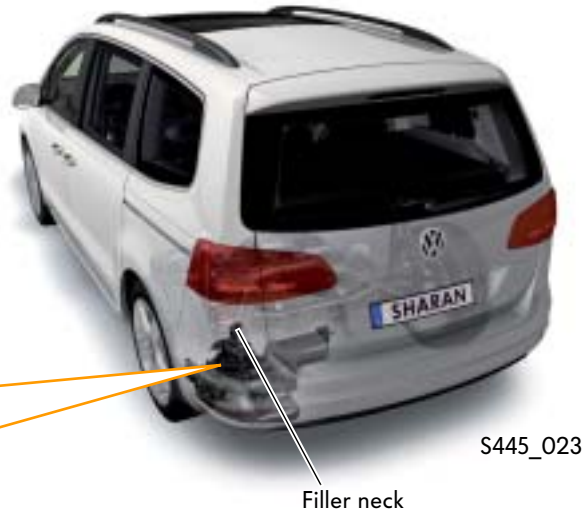
The SCR converts the nitrogen oxides contained in the exhaust gas to nitrogen and water in the reduction catalytic converter. To achieve this, the reductant AdBlue® is continuously injected into the exhaust gas flow upstream of the reduction catalytic converter. AdBlue® reductant is a 32.5% aqueous urea solution. It is contained in a separate, additional tank.

The SCR system is described in detail in Self-Study Programme no. 424 “Selective Catalytic Reduction Exhaust Gas Aftertreatment”.



Reductant tank

In the Sharan, the reductant tank is located in the rear left wheel housing. The tank has a capacity of approximately 17 litres. The filler neck is located behind a cover on the rear left of the luggage compartment.



S445_023

S445_025

AdBlue® display in the dash panel insert

Where an additional reductant is used for exhaust gas aftertreatment, the legislation governing the Euro 5 emissions standard requires a restart inhibitor if the reductant tank level is insufficient.
To avoid the engine restart prevention from taking effect due to a lack of reductant, the driver is notified of the remaining range in good time by a warning in the dash panel insert and instructed to refill the tank.

at 2,400 km remaining range

S445_087

at 1,000 km remaining range

S445_085

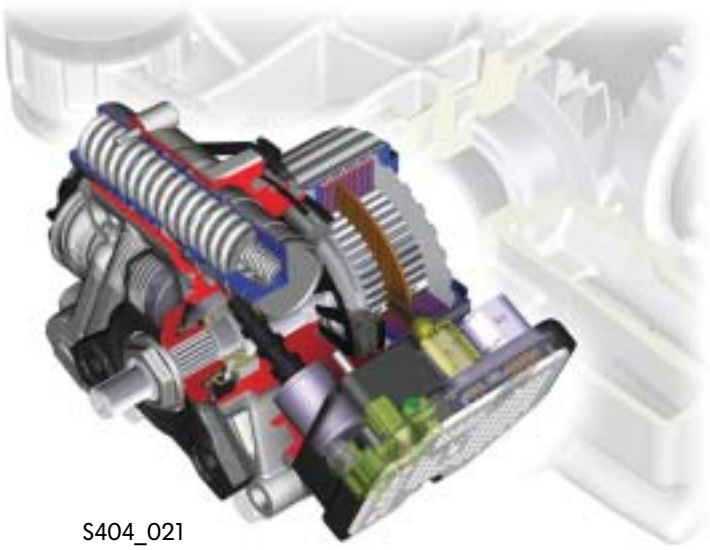
0 km remaining range

S445_083

- To refill the reductant tank, use only Volkswagen approved AdBlue® and containers and filling systems specifically designed for this purpose.
- When the minimum AdBlue® fluid level has been reached, at least 10 litres have to be poured in. This corresponds to approximately six of the commercially available refill bottles. Only this refill quantity guarantees that replenishing is recognised and that starting the engine is therefore possible again.

Four-wheel drive coupling generation IV

In principle, power is transmitted via the clutch plate set of the generation IV four-wheel drive coupling in the same way as with the previous Haldex models. Pressure generation using an electric pump is a new feature.
The four-wheel drive control unit J492 determines the torque to be transferred by controlling the valve governing the opening of coupling N373. Differences in speed between the front and rear axle no longer affect the activation of the four-wheel drive coupling.



S404_021

Technical features

- Electrohydraulically controlled plate clutch
- Integrated in the rear axle drive
- Simplified hydraulic system
- Optimised, demand-regulated pump control

Advantages

- Coupling control not dependent on driving situation
- Fast torque build-up by means of pre-control
- Permanent rear-axle drive capacity
- Fully compatible with the anti-slip systems (e.g. ESP, ABS)

Further information on this topic can be found in Self-Study Programme 414 “4MOTION with Generation IV Four-Wheel Drive Coupling”.

Gearbox overview

Manual gearbox

Gearbox type	Technical features	Further information
6-speed manual gearbox MQ350-6F 02Q 	• Developed from 02M gearbox • 3-shaft gearbox • Compact design • CO_2-optimised transmission ratio • 6^{th} gear transmission ratio extended, top speed reached in 5^{th} gear • Without speed signal for speed sensor • Designed for use with start/stop system • Torque capacity up to 350 Nm	SSP 205
6-speed manual gearbox MQ500-6F 0A6 	• Further developed from the 0A5 gearbox • 4-shaft gearbox • Compact design • CO_2-optimised transmission ratio • Without speed signal for speed sensor • Designed for use with start/stop system • Torque capacity up to 500 Nm	SSP 320
6-speed manual gearbox for four-wheel drive MQ500-6A 0A6 	• Further developed from the 0A5 gearbox • Difference to MQ 500-6F: specially tuned transmission ratios for the individual gears allow reaching top speed in 6^{th} gear • Designed for use with start/stop system	SSP 320

Dual clutch gearbox

Gearbox type	Technical features	Further information
6-speed dual clutch gearbox DQ250-6F DSG 02E 	• Currently only planned for front-axle drive vehicles • Mechatronics software specifically adapted for the Sharan • Specially tuned transmission ratios for the individual gears, including adaptation to the greater vehicle weight • CO_2-optimised transmission ratios • Designed for use with start/stop system	SSP 308

Overview

Thanks to its running gear tuning, the Sharan 2011 offers maximum ride comfort. The running gear is essentially based on the running gear used for the Passat 2006 and the Tiguan 2008. The new Sharan is available with sports suspension, normal running gear or DCC Dynamic Chassis Control.

- Manual height and fore/aft adjustment of the steering column
- Lightweight McPherson strut front suspension
- State-of-the-art electromechanical power steering
- AUTO HOLD function

- Further information on the parking brake can be found in Self-Study Programme no. 346 “Electromechanical Parking Brake”.
- Further information on AUTO HOLD and roll-over prevention can be found in Self-Study Programme no. 374 “Traction Control and Assist Systems”.
- Further information on power steering can be found in Self-Study Programme no. 399 “Electromechanical steering with Parallel-Axis Drive (APA)”.

- Electromechanical parking brake

- Tyre pressure monitor
- Run-flat tyres

S445_053

- Four-link rear suspension
- Ride-height control for the rear axle (Nivomat), optional
- Brake system: ABS/ESP by TRW, EBC 450M with roll-over prevention (ROP)
- DCC Dynamic Chassis Control, optional

- Further information on run-flat tyres can be found in Self-Study Programme no. 417 “Passat CC 2009”.
- Further information on ride-height control can be found in Self-Study Programme no. 357 “The Nivomat”.
- Further information on the chassis control system can be found in Self-Study Programme no. 406 “DCC Dynamic Chassis Control”.

Electrical System

Overview

The Sharan 2011 is the first to feature the second generation driver assistance system PLA ParkAssist and the new radio navigation system RNS 315. In addition, the access and start authorisation system KESSY will be used in a Sharan for the first time.

The improved second-generation ParkAssist allows multi-point manoeuvring into, and now also out of, even shorter parking spaces. It now also supports parking in parking spaces perpendicular to the road.

KESSY facilitates convenient locking and unlocking of the vehicle as well as starting the engine without active use of a key. The access and start authorisation system KESSY comprises the electric steering column lock ELV, which replaces the mechanical steering lock, and the start button, which replaces the ignition lock.

- "Premium" mobile phone preparation, optional
- RNS 315 radio navigation system, optional

S445_061

- Dynaudio sound system, optional
- 2nd-generation ParkAssist, optional
- Access and start authorisation system KESSY, optional

- Further information on the electrical system can be found in Self-Study Programme no. 493 "Sharan 2011 Electrical System/Electronics".
- Further information on ParkAssist can be found in Self-Study Programme no. 494 "ParkAssist 2010".

Air conditioning

The new Sharan offers two different air-conditioning systems, depending on the vehicle equipment:

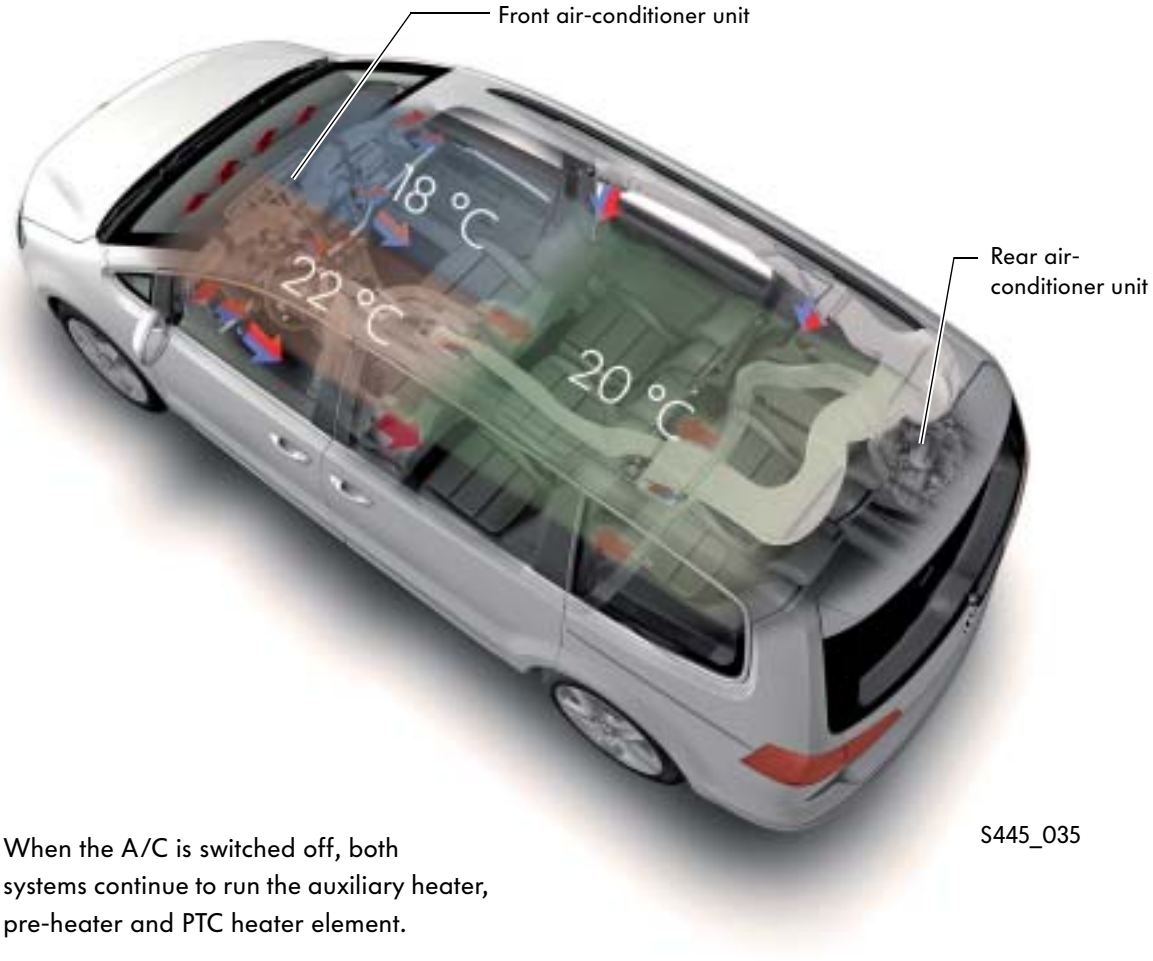
- Air conditioning
- 3-zone Climatronic

Standard equipment includes a non-automatic single-zone air-conditioning system with manual temperature control and electric temperature-flap adjustment.

3-zone Climatronic is a fully automatic combination of heating, ventilation and cooling system. It features one air-conditioner unit for the front compartment and an additional air-conditioner unit for the rear compartment. New for the system is its automatic humidity control, which prevents the windows from misting up.

The installed system can be identified at first glance by the air conditioning control panel.

3-zone Climatronic

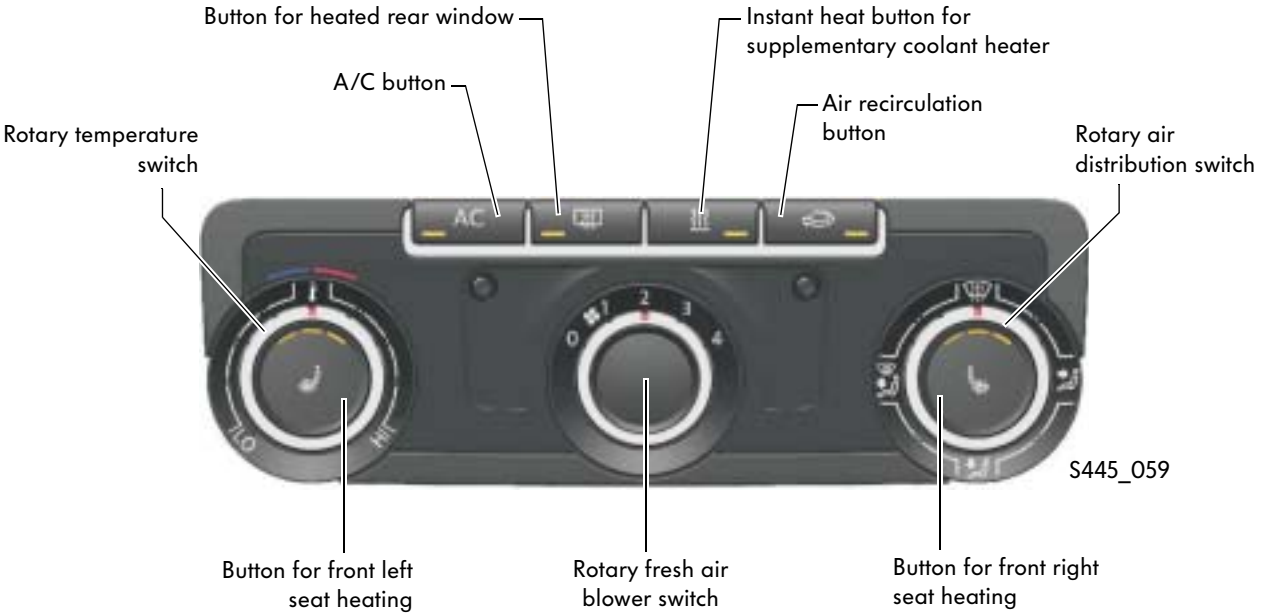


S445_035

When the A/C is switched off, both systems continue to run the auxiliary heater, pre-heater and PTC heater element.

Air conditioning

Operating and display unit



Operation

The air conditioning features manual controls.
All functions are controlled using the operating and display unit.
The operating and display units vary according to the equipment level. The illustration above shows the maximum equipment level.
Instead of the instant heat button for the supplementary coolant heater, the unit may feature a windscreen heater button.

To provide visual feedback, the controls feature LEDs. These indicate whether a function is active and at which level it is currently operating.

Cold and warm air supply to the entire interior is handled by the air-conditioner unit located underneath the dash panel.
Unlike the familiar Climatic system, the air conditioning has no interior temperature sensor and no temperature sensors in the air outlets.
The air conditioning therefore does not provide the option of preselecting a fixed temperature in °C. Instead, the temperature is regulated by manually adjusting the supply of cold or warm air. When doing so, the rotary temperature switch actuates the temperature flap motor. The rotary switch is continuously adjustable from HI to LO.

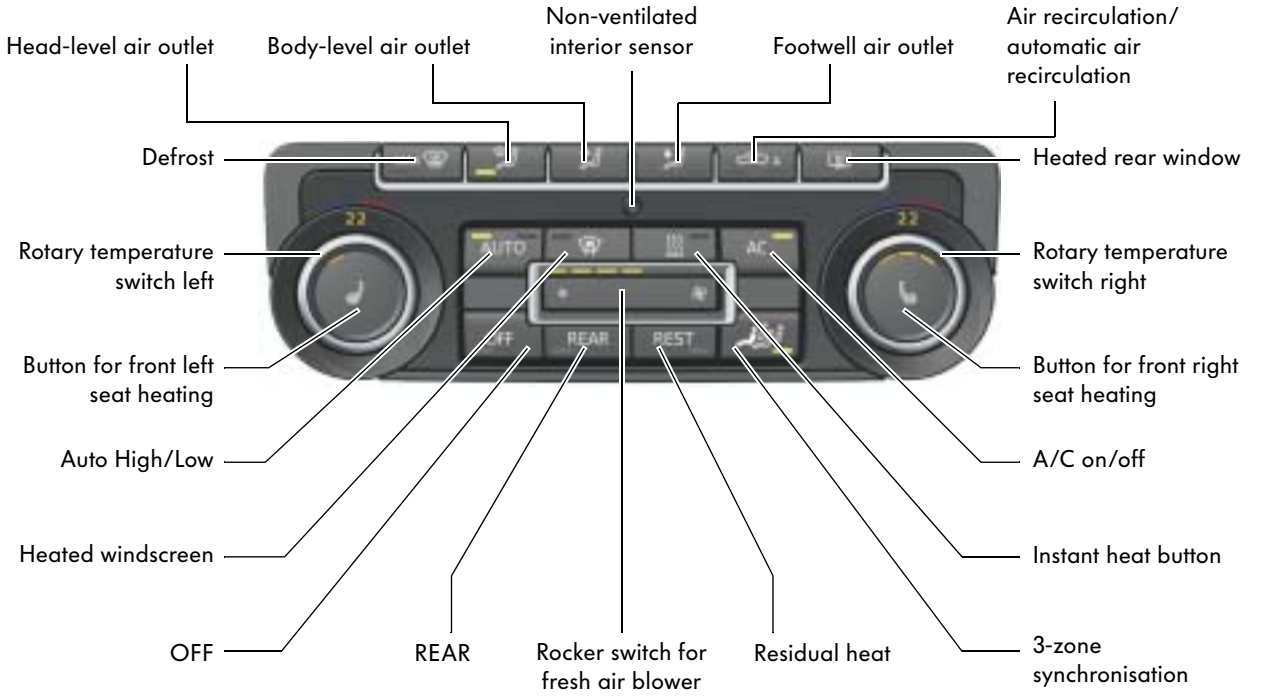
3-zone Climatronic

Front operating and display unit

Climatronic features two air-conditioner units.
These supply three climatic zones:

- driver, front passenger (front air-conditioner unit) and
- 2nd + 3rd row of seats (rear air-conditioner unit).

All Climatronic functions can be selected in the front operating and display unit.



S445_006

Operation

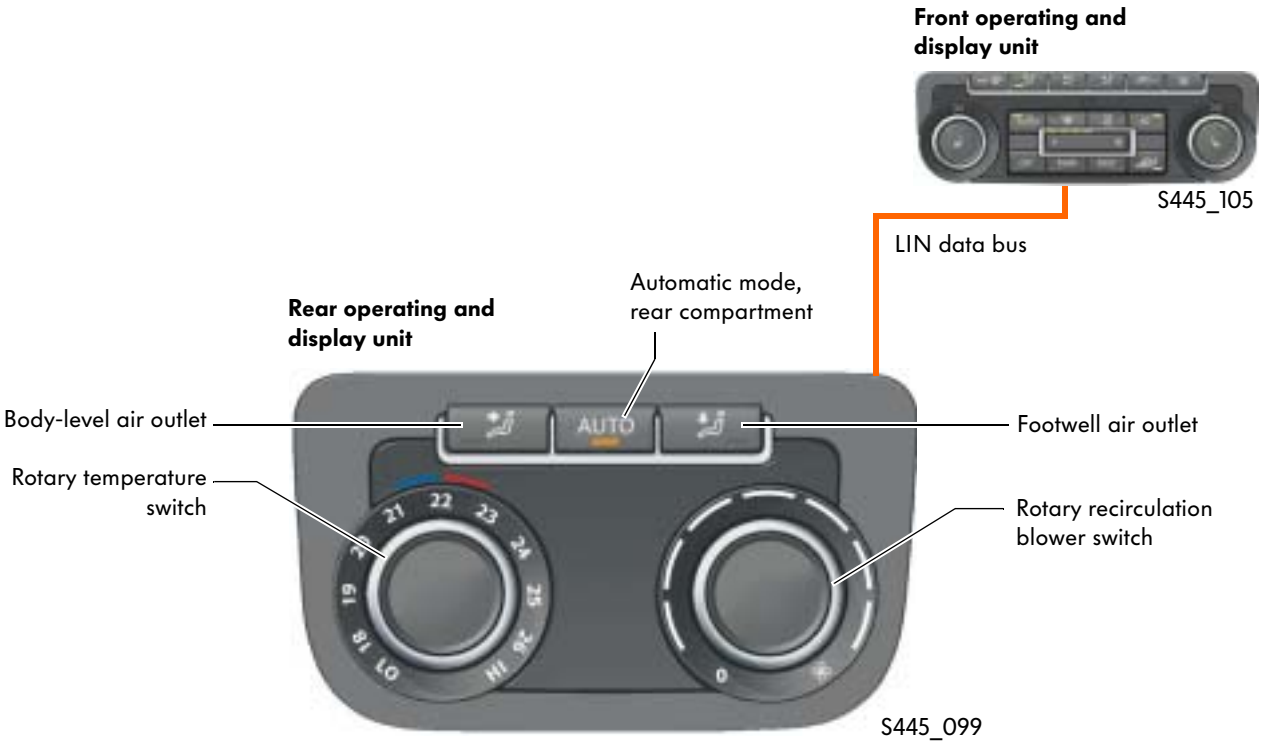
3-zone Climatronic is designed as a dual-evaporator system with an additional air-conditioner unit in the rear compartment.
The system is operated entirely using the front display and operating unit.
LEDs in the operating and display unit provide feedback on Climatronic's current settings.
This information can also be displayed in the radio or radio navigation system unit.

When the defrost function is activated, the fresh air blower speed of the front air-conditioner unit is increased and the entire intake air is directed onto the windscreen and side windows. The fresh air blower of the rear air-conditioner unit is switched off and the water valve of the rear-compartment air conditioning's heater is closed.

Pressing the REAR button on the front operating and display unit allows the functions for the rear climate zone to be set from the rear compartment for about 30 seconds.

Heating and Air Conditioning

Rear operating and display unit (optional)



Operation

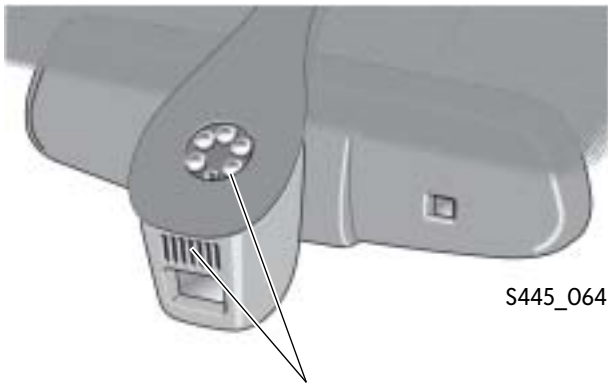
The rear operating and display unit is optional. It allows all the functions for the third climatic zone to be set conveniently from the rear compartment. The unit is connected to the front operating and display unit via the LIN bus.

When the REAR button on the front operating and display unit is pressed, the LED in the AUTO button in the optional rear operating and display unit lights up.

When the defrost function is activated, all LEDs in the rear operating and display unit are switched off. Operation of the air conditioning is then only possible using the front operating and display unit. Switching the rear-compartment air conditioning back on using the rear operating and display unit is also impossible.

Misting detection and humidity control

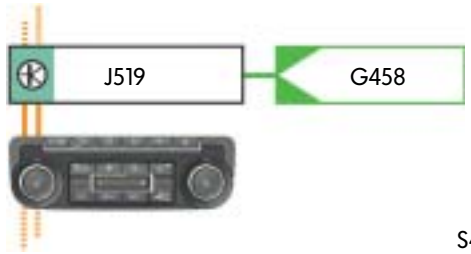
Safe driving requires unrestricted visibility, i.e. clear windows. To prevent the windows from misting up, humidity in the vehicle interior needs to be low. Besides controlling the temperature in the passenger compartment, air conditioning provides the additional benefit of dehumidifying the air in the vehicle interior.
A new feature in the Sharan is a humidity control system with intelligent misting detection. The system uses the windscreen's humidity and temperature sensor, which is installed in the interior mirror's base.



S445_064

Humidity and temperature sensor in windscreen G458

Networking



S445_036

G458 Humidity and temperature sensor in windscreen
J519 Onboard supply control unit

How it works:

When air cools down, the volume of water it can contain drops as part of the humidity condenses. The temperature at which condensation occurs is referred to as the dew point.

The dew point is determined in dependence of the humidity and temperature. The sensors in the interior mirror's base measure the air's actual dew point and the temperature of the windscreen. The signal from the humidity and temperature sensor G458 in the windscreen is transmitted to the onboard supply control unit via LIN bus. The onboard supply control unit forwards the signal to the Climatronic control unit via the convenience CAN data bus.

If the sensor detects that the dew point has been reached, the Climatronic control unit first redirects the airflow to the windscreen.
If the windscreen continues to mist up, the air-conditioning compressor is activated. The air, dehumidified by the air conditioning, then ensures a clear windscreen.

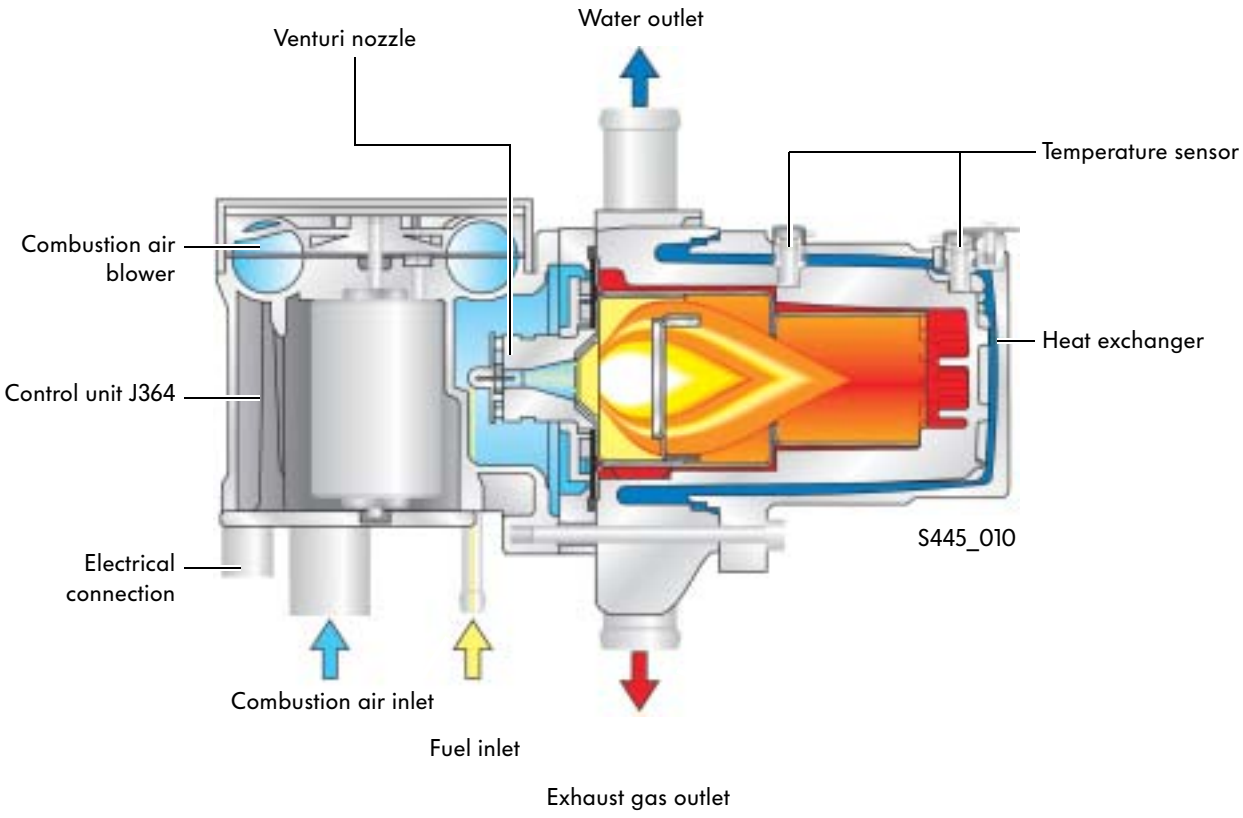
Once the data indicates that the windscreen will no longer mist up, the Climatronic control unit deactivates the air-conditioning compressor again. The demand-dependent control of the air-conditioning compressor reduces fuel consumption and CO_2 emissions.

Thermo Top V supplementary coolant heating

The new Sharan can optionally be equipped with the Thermo Top V supplementary coolant heating. It is installed at the front right ahead of the wheel housing as in the Golf 2004.

The supplementary coolant heating by Webasto is used for the following:

- auxiliary heater for heating the vehicle interior and defrosting the vehicle's windows.
- stationary ventilation to lower the interior temperature when the vehicle is parked in the sun.
- pre-heater for petrol and diesel engines. If the vehicle is equipped with supplementary coolant heating, the PTC heater element is omitted. At ambient temperatures of less than 5°C, the supplementary coolant heating provides the pre-heater function.



The intake air is directed through the ceramic Venturi nozzle. The fuel is "sucked" from the fuel line into the nozzle by the airflow's drag.

Further information on "Thermo Top V" can be found in Self-Study Programme no. 318 "Golf 2004".

Notes

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