Service Training

Self-study Programme 318

The Golf 2004

The Golf 2004 continues the success story of the Golf, which so far has been almost 30 years in the making. It stands out by virtue of its aesthetics and comfort, and through the use of modern technologies. The loving attention to detail, the spacious interior, the powerful and safety-conscious "inner values" under the bonnet and within the member structure set the Golf 2004 apart as a trendsetter.

The product characteristics of the Golf 2004:

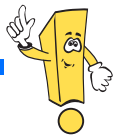
- Dynamic, elegant design
- Excellent quality
- Superior handling dynamics
- Comprehensive safety
- Innovative drivetrain technology
- Efficient economy
- Spacious interior
- Target-group-oriented product range

S318_032

There are special Self-study Programmes on the following topics:

- SSP 308: The Direct Shift Gearbox 02E
- SSP 317: The Electromechanical Power-Assisted Steering with Double Pinion
- SSP 319: The Golf 2004 - Electrical System
- SSP 321: The 2004 Golf Running Gear

NEW



Important Note

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

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

Contents

Brief overview

The Golf 2004

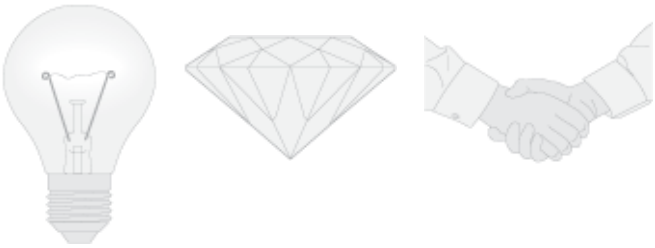
The Golf 2004 sets new standards for the A-class in many areas, e.g.:

- design,
- handling dynamics,
- drivetrain technology,
- spaciousness,
- safety,
- quality.

- High-end radio and sound system
- Various stowage options, e.g. in the overhead console
- Electromechanical power assisted steering
- 2.0 l/103 kW TDI engine with 4-valve technology
- Clear glass headlights

The Golf 2004 stands for the group values...

...innovation, value retention and a partnership approach.



- 2C-Climatronic (2-zone air conditioning)
- Rear lights with LED technology

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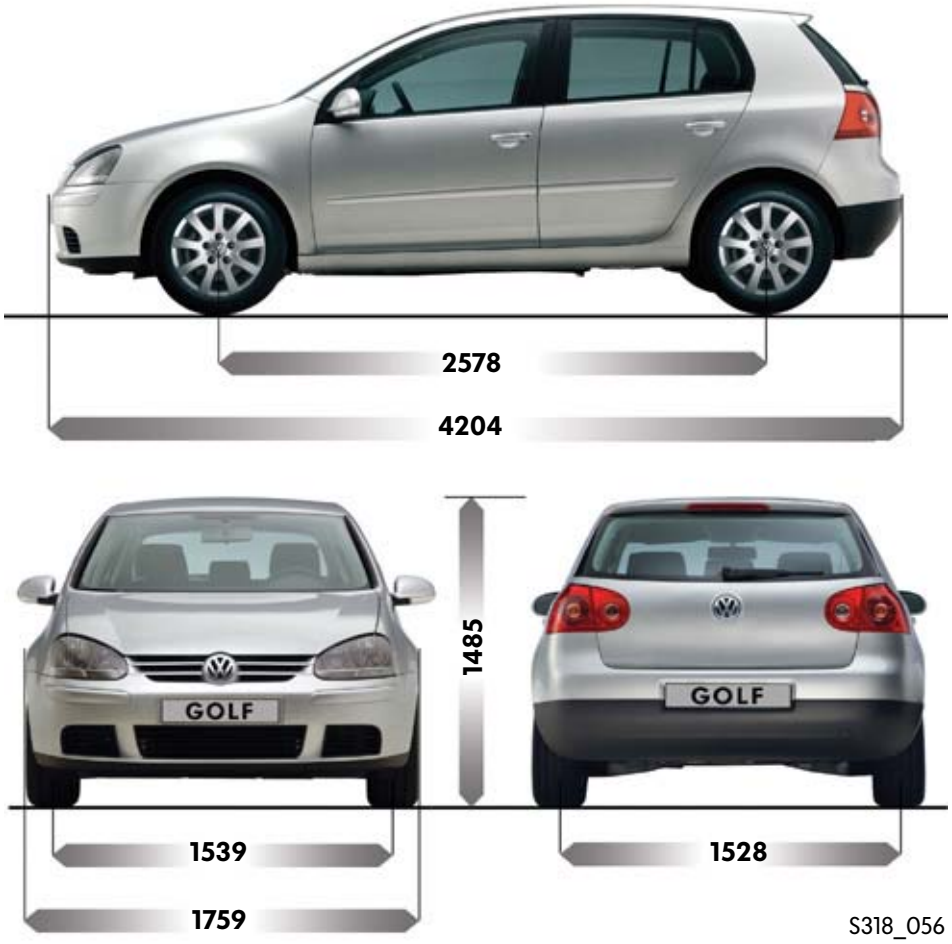
Further highlights:

- Intelligent wiper system with "droplet wipe function": a repeat wipe cycle is executed five seconds after the last wipe-wash cycle
- Optional Coming Home and Leaving Home function
- Optional ParkPilot (rear distance warning)

Brief overview

Technical data

The figure shows the dimensions of the Golf 2004 as a 4-door saloon with front-wheel drive.



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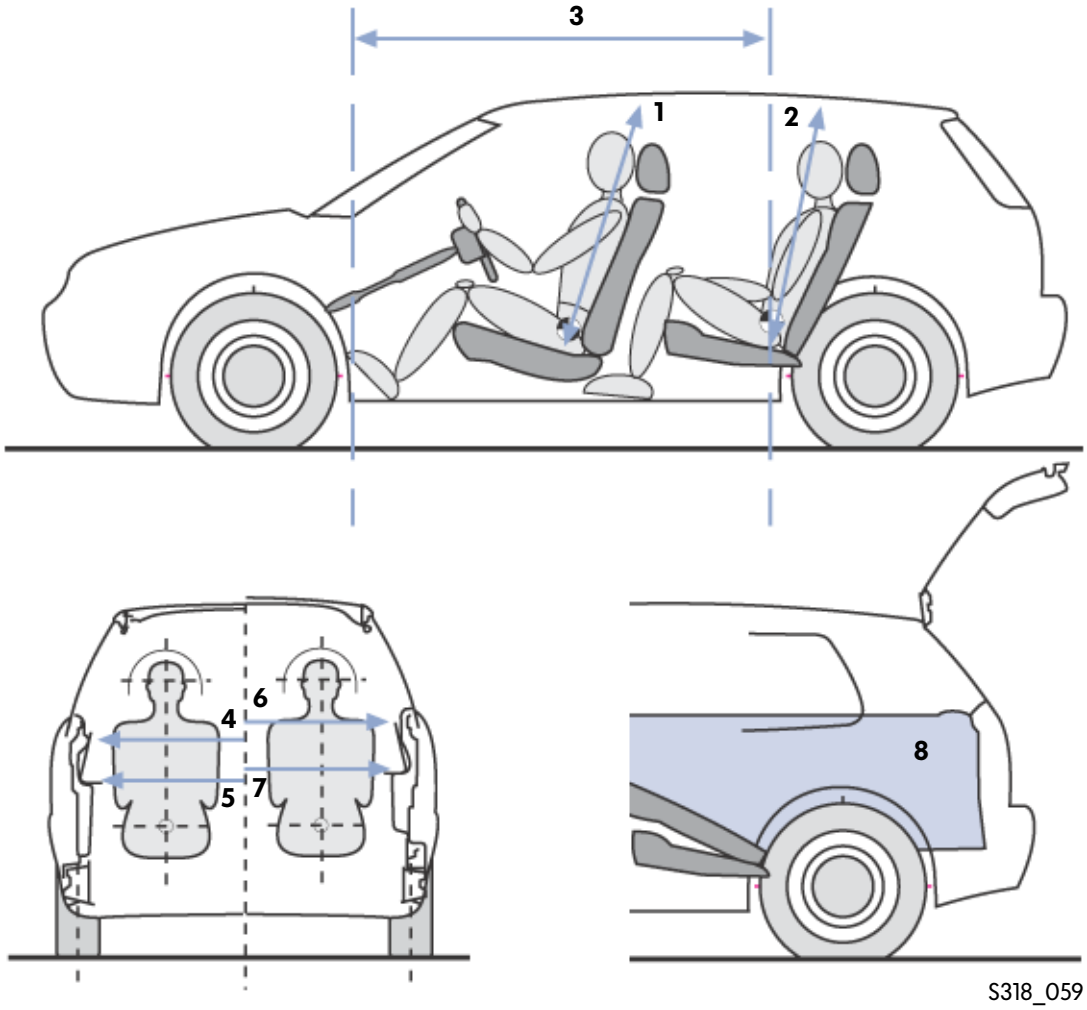
Dimensions and weights

Length	4204 mm
Width	1759 mm
Height	1485 mm
Wheelbase	2578 mm
Roof load	75 kg
Trailer load, braked	from 1200 to 1700 kg
Tank capacity	55 l

Front track width	1539 mm
Rear track width	1528 mm
Max. permissible weight	from 1740 to 2010 kg*
Unladen weight	from 1154 to 1431 kg*
Luggage capacity	350 l
Coefficient drag value	0.32 c_d

*varies depending on model

Interior dimensions



Dimensions

1	Front headroom	from 965 to 987 mm*
2	Headroom 2nd seat row	from 978 to 979 mm*
3	Cabin length	1736 mm
4	Shoulder room front	from 1390 to 1391 mm*
5	Elbow room front	from 1446 to 1448 mm*

6	Shoulder room rear	from 1348 to 1386 mm*
7	Elbow room rear	from 1437 to 1479 mm*
8	Luggage capacity with rear seat back folded forward	1305 l

*varies depending on model

The body structure

Static and dynamic rigidity

The Golf 2004 sets new standards for static and dynamic rigidity. However, this rigidity has not been achieved to the detriment of body weight, but by systematic application of lightweight design principles. This fact is reflected clearly in the vehicle's 'lightweight factor'.

The lightweight factor L

Formula:

$$L = \frac{M_{RK}}{C_T \cdot A}$$

M_{RK} = bodyshell mass
C_T = torsional rigidity
A = wheel contact surface

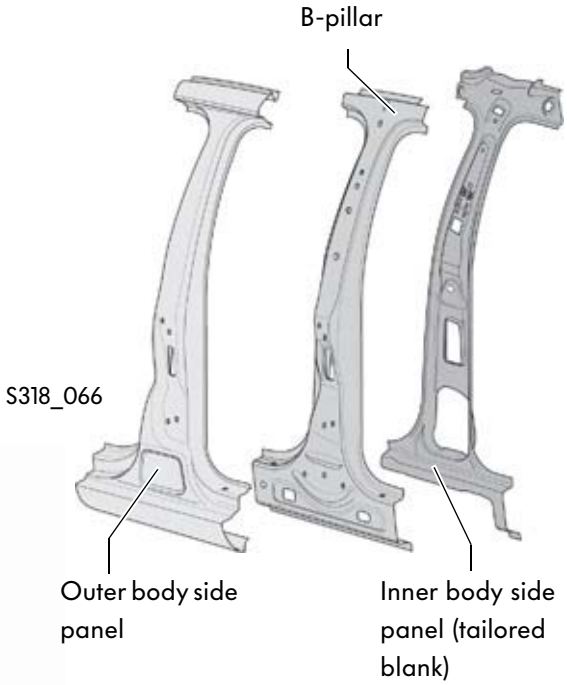
As the formula shows, the lightweight factor is the ratio of vehicle mass to the product of vehicle size and rigidity.
The lesser the vehicle's mass and the greater its size and rigidity in relation to this, the better.
Therefore, the lower the value, the higher the lightweight factor L. The lightweight factor of the Golf has been improved continuously over generations.
The 1974 Golf had a lightweight factor of L=6.2; in the 1998 Golf, it was L=4.0, and in the 2004 Golf it is now only L=2.5.

S318_010

Key:
red =side impact zone
yellow =occupant cell
blue =frame structure

The B-pillar

The B-pillar has a 3-layered structure. By using hot formed panels, it provides a high degree of safety for the vehicle's occupants in the event of a side-impact collision.



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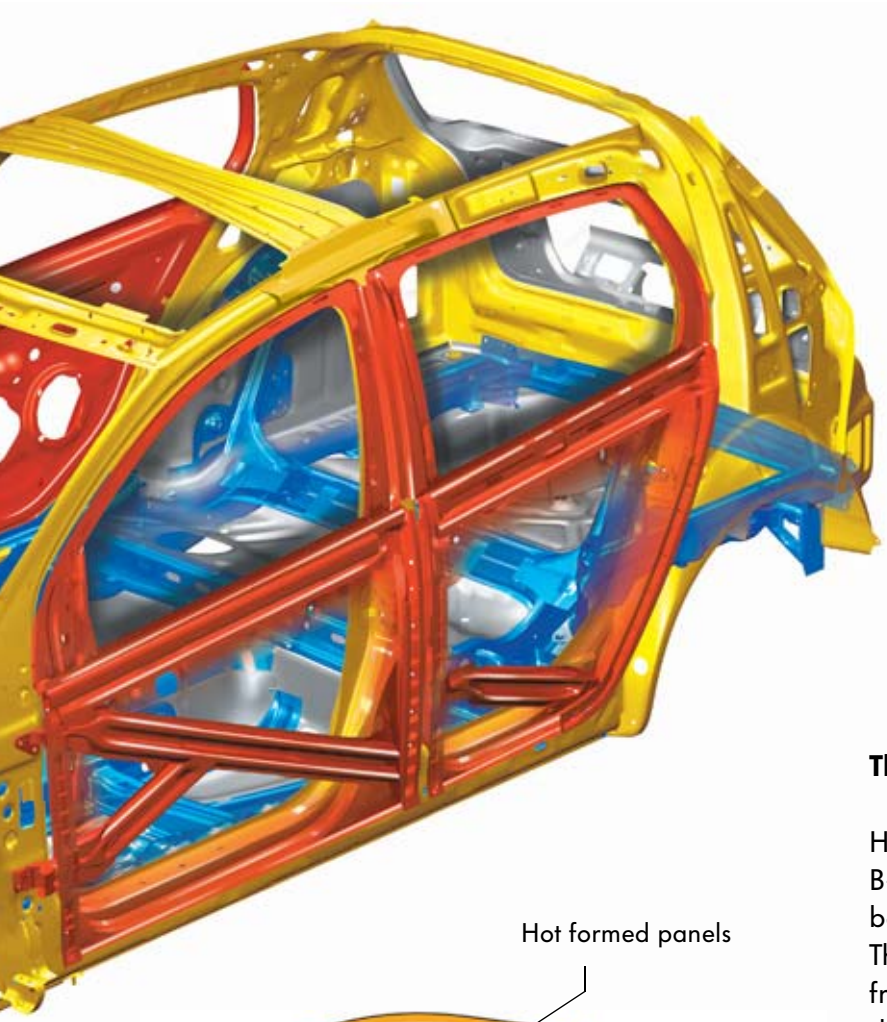

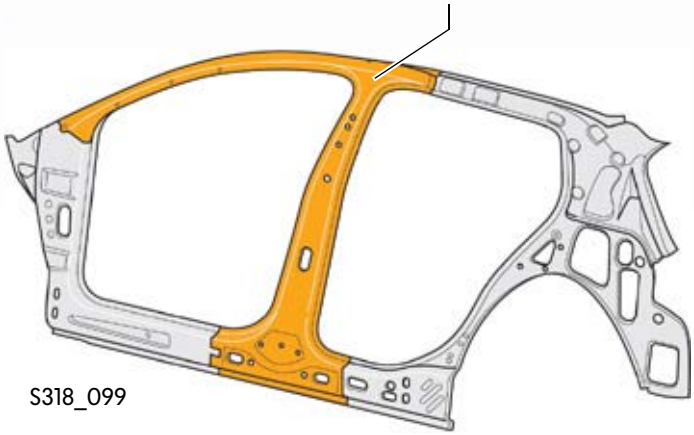

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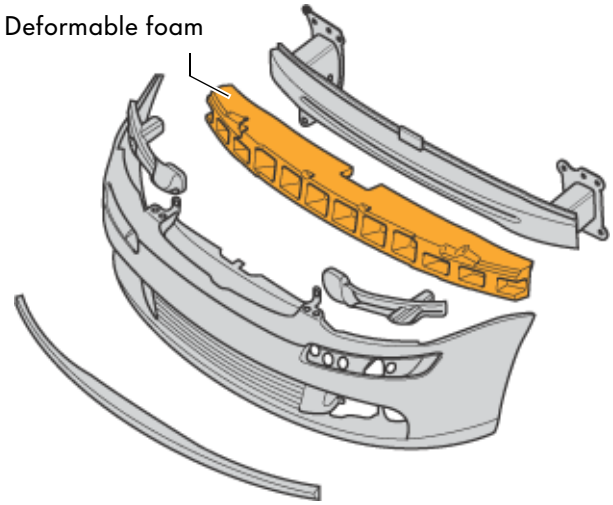
The hot formed panels

Hot formed panels are used for the B-pillar and in the adjacent portion of the body in the direction of the A-pillar. These components derive their strength from specific heat treatment before and during the in-tool shaping process. Hot formed panels have a higher strength and lower weight than regular panels.

The add-on parts



S318_289

The front bumper

The risk of injury for pedestrians was reduced by integrating an elastic impact-absorbing element into the front bumper behind the front spoiler. This deformable foam element allows a defined compression of the front end in the event of a collision.

S318_068

The headlights

The headlights on the Golf 2004 feature clear glass technology.
The lamps are connected to the reflector by a "one-touch" fastener system. The turn signals are located below the dipped and main beam headlights in order to improve visibility for other road users.

In the Medium and High versions, a combination of the BiXenon module and a main beam reflector with H7 lamps is possible as an optional extra.

S318_151

The exterior mirror

LED turn signals are integrated in the exterior mirrors.

S318_259

The rear lights

The 2004 Golf has two-part rear lights.

S318_062

The doors concept

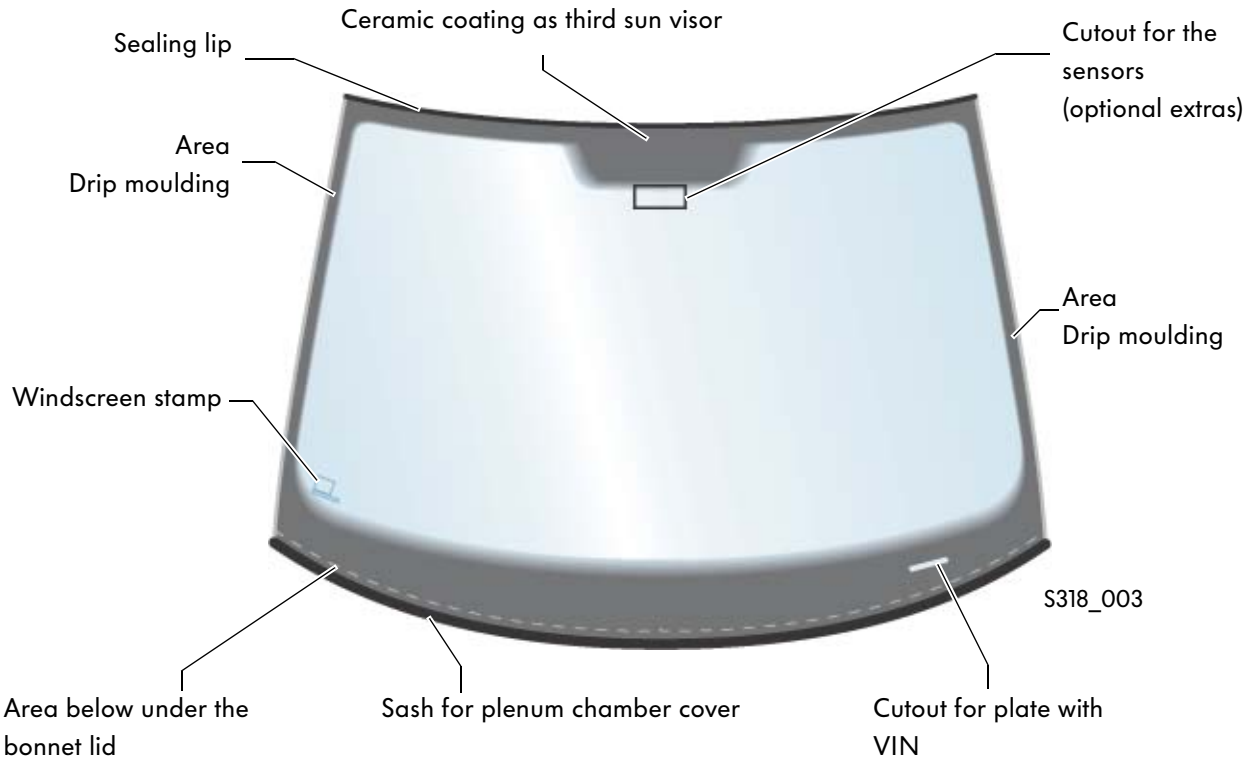
A completely new doors concept based on a door outer panel with mounting rails and a door inner section will be introduced to the Golf.

The glazing

The windows on the Golf are in green-tinted glass, and will also be available in blue-tinted glass at a later date. Deep tinted glass on the windows behind the B-pillar is optional. The thickness of the window glass corresponds to its function: the windscreen is 4.4 mm thick, the front side windows are 3.5 mm thick and the other windows are 3.15 mm thick.
All fixed windows are bonded directly.

The windscreen

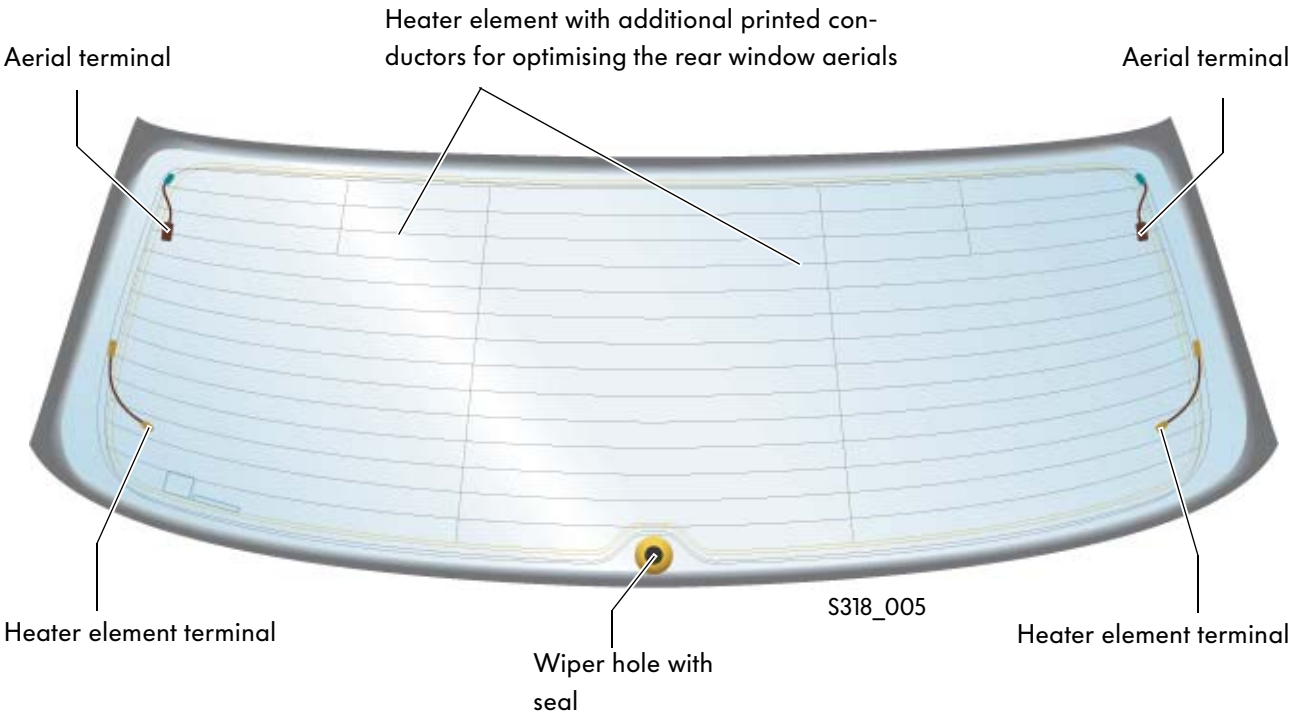
The windscreen is also available with an infrared-reflective metal vapour deposition coating.
This metal vapour deposition coating reflects to a large extent the infrared portion (heat radiation component) of the sunlight, whereas conventional heat reflective glass shields only a far smaller proportion of the solar radiation by absorption.



The windscreen may only be set down on its side. Otherwise, the sash at the bottom and/or the sealing lip at the top can become damaged.

The rear window

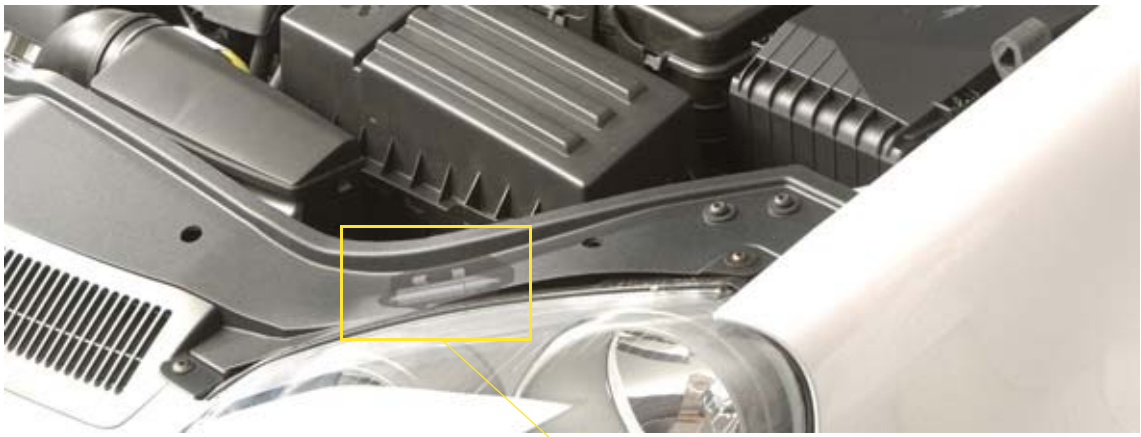
In the production process, windows are fitted with different types of aerial depending on model.
As a replacement part, the rear window is basically fitted with Diversity aerials. If no Diversity system is being used in the vehicle, the unnecessary aerial terminal must be removed, otherwise rattling noises can occur. In the case of the Diversity aerial, there are two aerial terminals on the window.
The signals are simultaneously relayed from these terminals to the radio and respectively to the Diversity switching box (with the radio navigation system MFD 2). Use of both aerial signals significantly reduces interference with reception.



The rear window may only be fitted if the rear lid has been installed and set.
For detailed instructions for fitting the rear window, please refer to the current workshop manuals.

The bonnet lid

The bowden cable for opening the bonnet lid is located in an access-protected position in the engine compartment. There is a disconnection point behind the left headlight. This means that the bowden cable need no longer be removed from the vehicle interior, but can easily be disconnected to carry out work on the front end.



S318_046

Disconnection point closed

S318_251

Disconnection point open

S318_253

Bowden cable disconnected

S318_255

The rear lid

The rear lid has a new locking mechanism. The VW badge swivels upward under gentle pressure - which is applied to the top third of the badge with the thumb - to become a neat handle for opening the rear lid. After that, the badge glides gently backs into its original position by means of a silicone brake.

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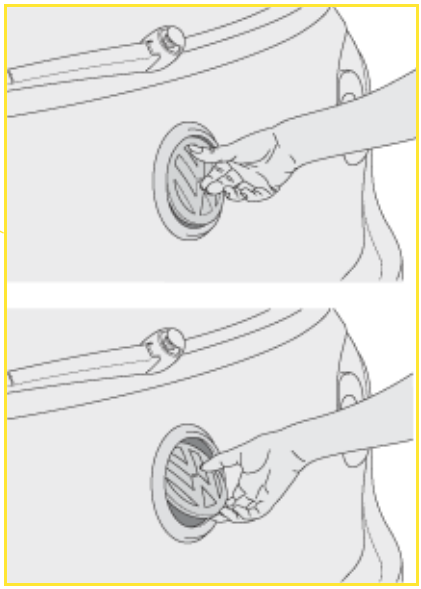


S318_283

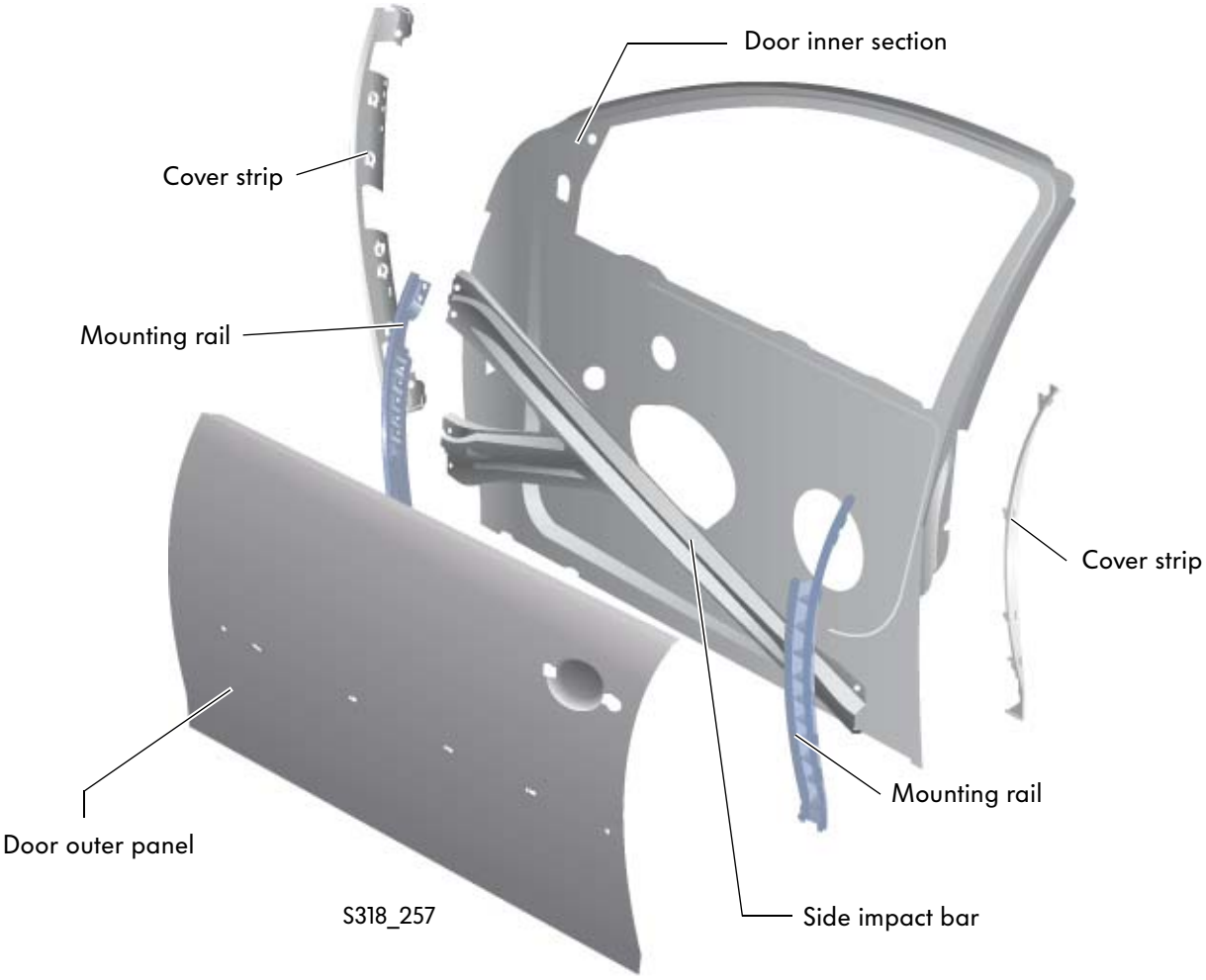
After the body has been painted, the lock unit can be installed. It is functional straight away - without the need for adjustment work. To make this possible, a diecast zinc ring was beaded into the body.

The emergency release mechanism

There is a removable cover in the rear lid trim. After this cover has been removed, the locking linkage can be accessed to allow emergency release of the rear lid.

The new doors concept

The doors in the Golf 2004 consist of a door outer panel with two mounting rails and a door inner section for mounting the fittings. The door outer panel is bonded onto the mounting rails.
The mounting rails are in turn bolted onto the door inner section.

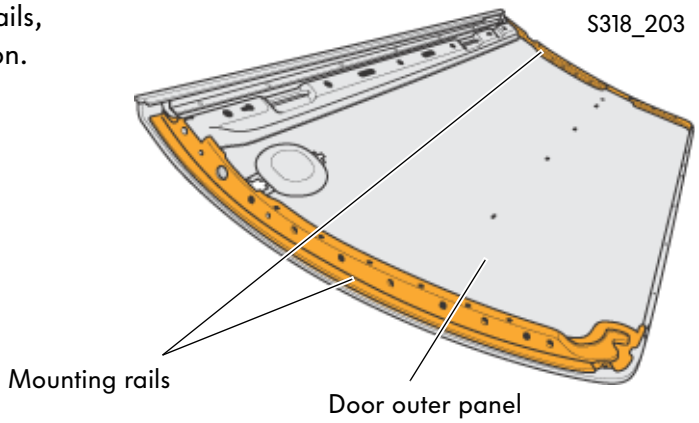


This provides the following advantages:

- The technology in the doors is easily accessed and checked after the door outer panel has been removed.
- In the event of damage, the door outer panel can be separately detached for removing dents or for replacement purposes.

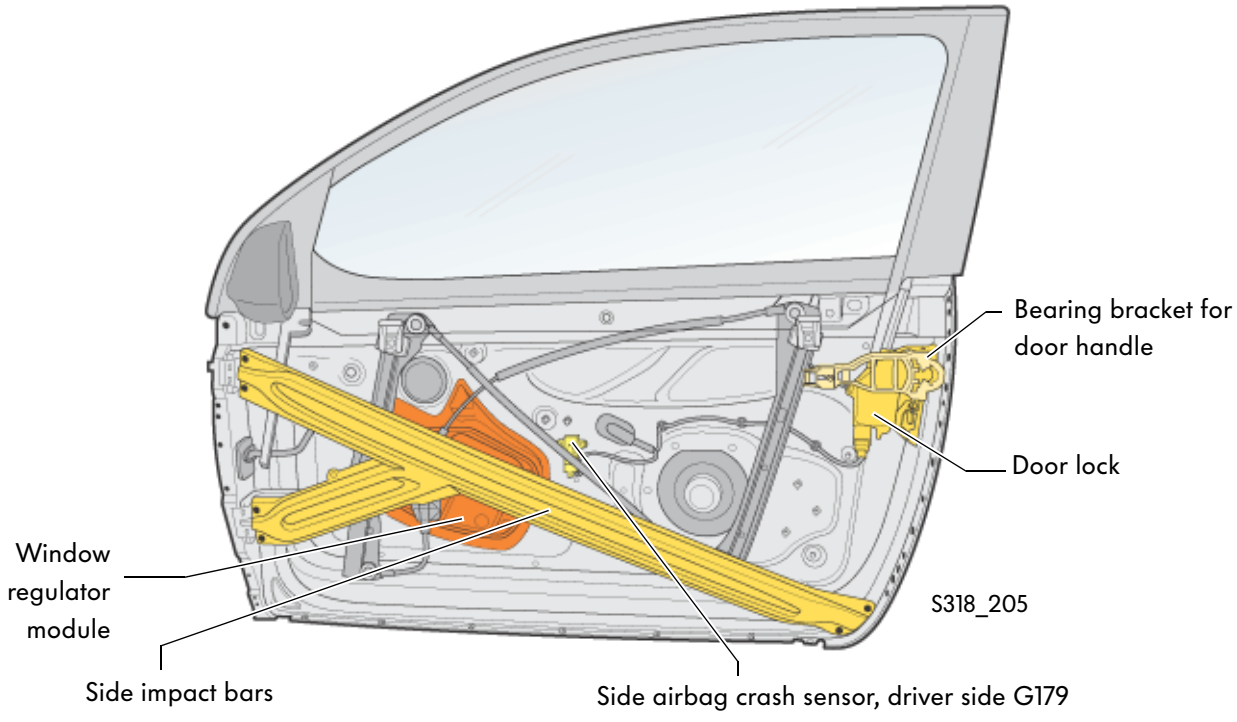
The mounting rails

The door outer panel is made for accurate fit and is bonded once only onto mounting rails, which are bolted into the door inner section.



The door fittings

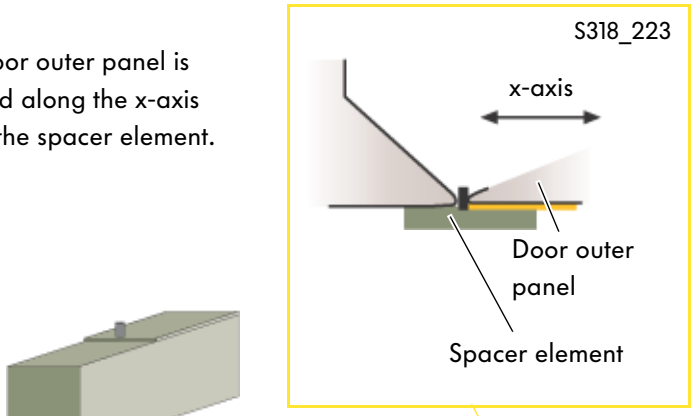
Detaching the door outer panel provides easy access to the side impact bars, the door handle bearing bracket, the door lock and the side airbag crash sensor, as well as the window regulator module on the door inner section.



The door assembly

The door inner section serves as the supporting structure. The mounting rails are bolted onto the door inner section along the two vertical edges beneath the top shoulder. The door outer panel is bonded onto the mounting rails. For this purpose, the door outer panel must firstly be adapted "dry" to the mounting rails installed in the door inner section using spacer elements and wedges. The door outer panel is aligned along the x-axis using the spacer elements and along the z-axis using the spacer wedges. Fixing stops are used to fit the panels along the y-axis. The shut line is set using pins attached to the spacer elements.

The door outer panel is aligned along the x-axis using the spacer element.



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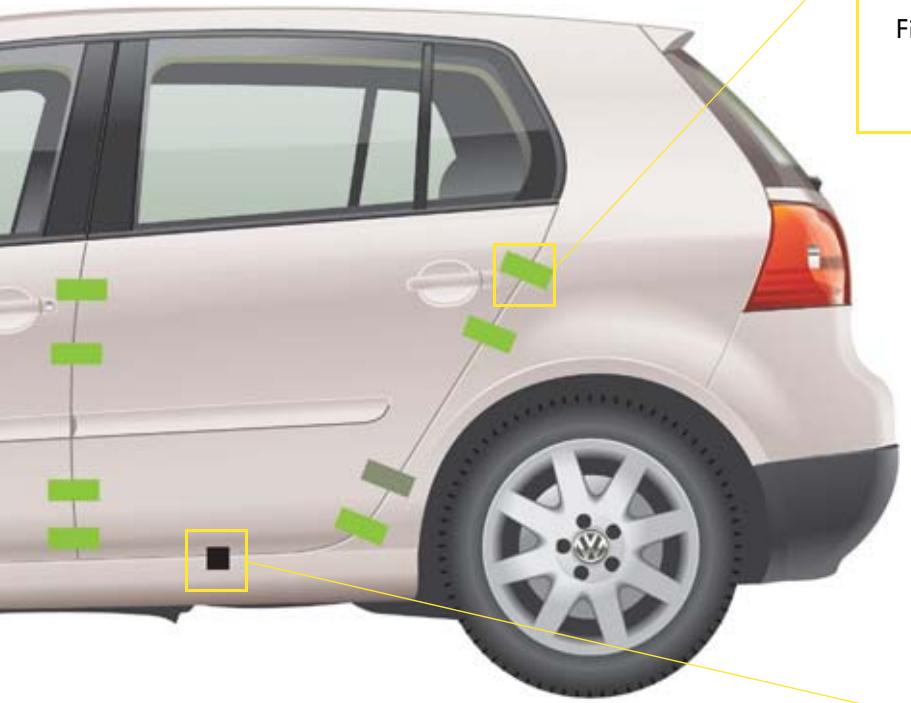
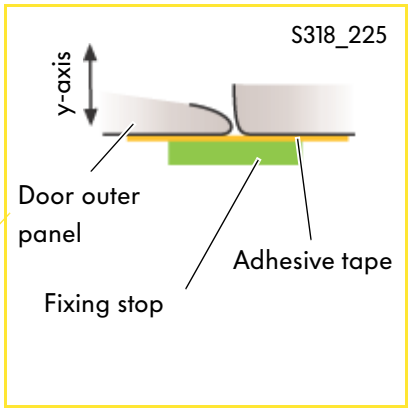
For detailed instructions for assembling the door,
please refer to the current workshop manuals.
The spacer elements, fixing stops and spacer wedges are supplied with tool no. T10237.

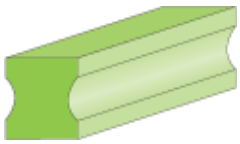
The adapted door outer panel is fixed in place using double-sided adhesive tape and the fixing stops. It can now be detached complete with the supports and stops. Adhesive can now be applied to the mounting rails, and the outer body panel can be securely bonded in place. In addition, the door outer panel and door inner section are bolted directly in the sill and top shoulder areas.

If so required, the door outer panel can now be detached by unscrewing the mounting rails and undoing the direct bolted connection.

The door outer panel is aligned along the y-axis by means of fixing stops.



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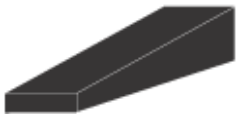
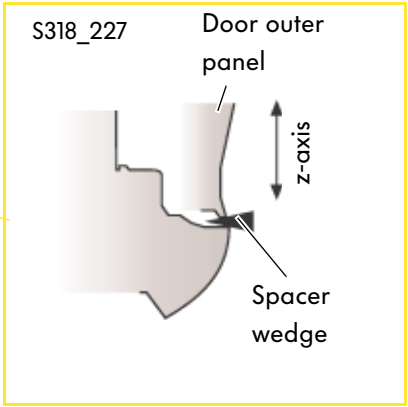

S318_249



The door outer panel is aligned along the z-axis using spacer wedges.

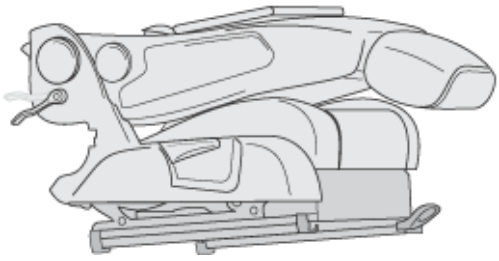
The seat concept

The front seats

The front seats have as standard equipment an active head restraint system.
A mechanical 2-way lumbar support or an electrical 4-way lumbar support and an under-seat drawer are available as optional equipment. The figure shows a seat with electrical 4-way lumbar support.

S318_060

The front passenger seat has an optional through-loading facility. This allows long items of cargo to be transported easily using the full length of the vehicle interior. An Isofix anchoring is optionally available for the front passenger seat.

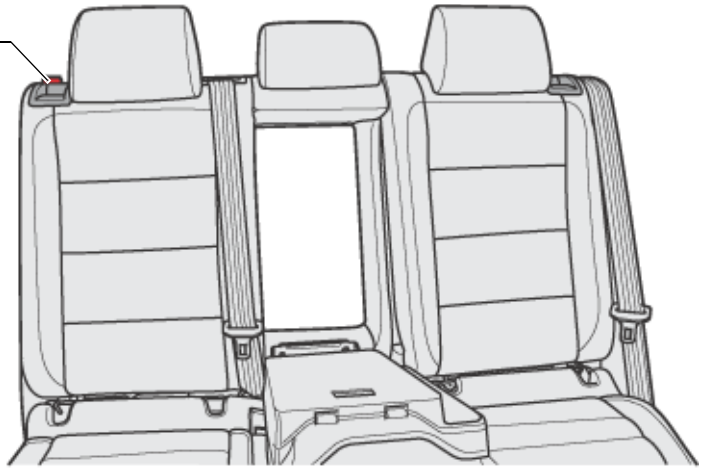

S318_101

The front seats in the 2-door version are equipped with the "Easy-Entry" system with manual memory function.


S318_057

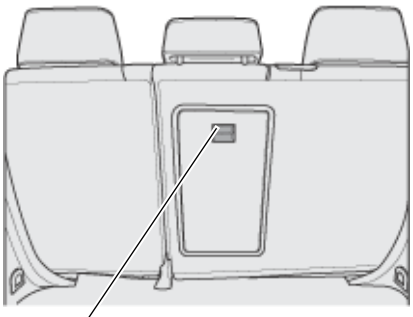
The rear bench seat

The seat cushion is continuous across the width of the car. The backrest is split 60/40 and can be folded down. The backrests can be locked using a rotary latch lock. There is attached to the backrest a red indicator which signals the status of the backrests so it can be determined at first glance whether the backrests are locked or not.



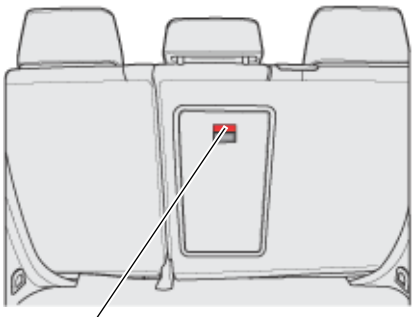
S318_207

A through-loading facility is optionally available for the rear bench seat. The armrest and a flap located behind it can be folded forward to allow long items (e.g. skis, golf bag) to protrude from the luggage compartment.



S318_209

The load-through flap is locked.



S318_211

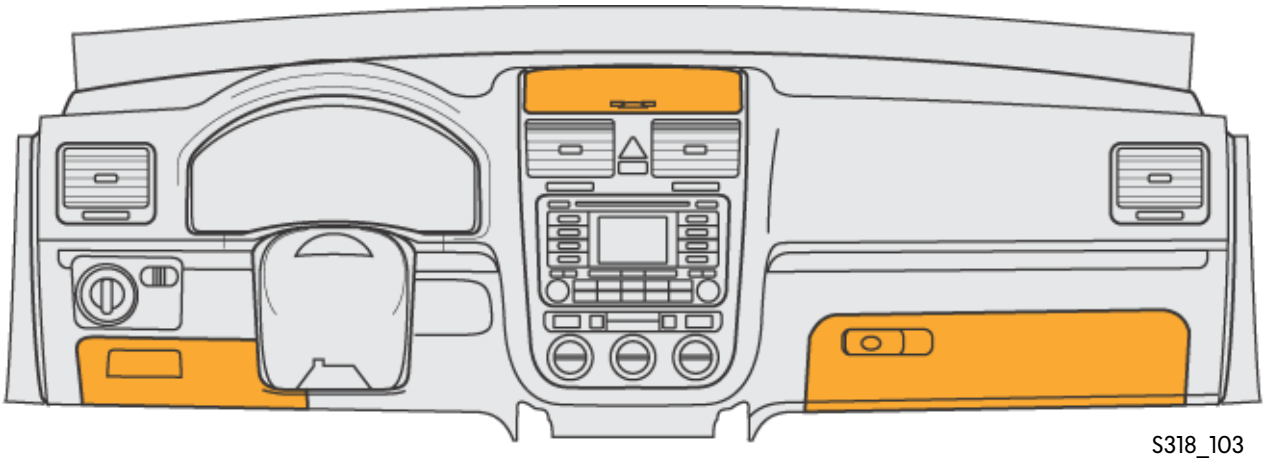
Red indicator:
the load-through flap is not locked.

The stowage space concept

There is a multiplicity of storage compartments and spaces in the interior of the Golf 2004.

The front storage compartments/spaces

Three compartments are provided as standard in the dash panel. If the vehicle is equipped with an air conditioning system, the storage compartment on the front passenger side is cooled.



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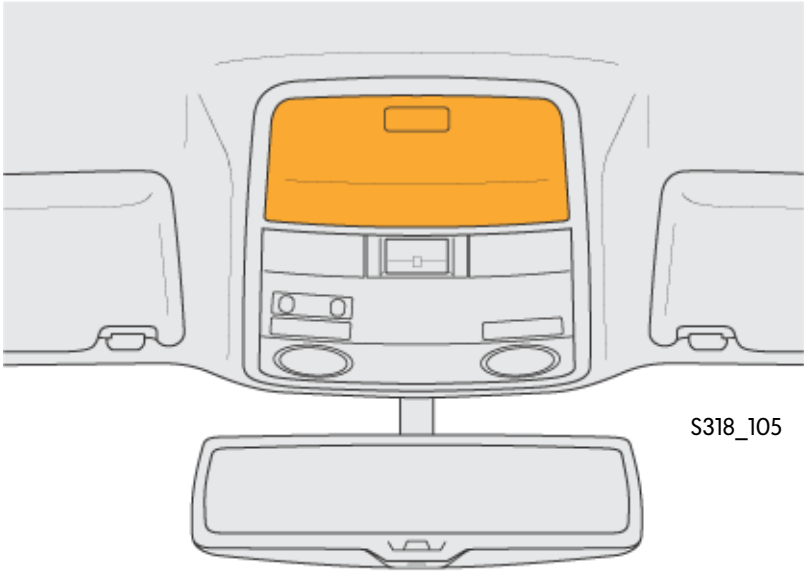
The storage compartments/spaces in the overhead console

There is an open compartment in the overhead console of the Golf 2004. A spectacles compartment, as shown in the figure, is optionally available.



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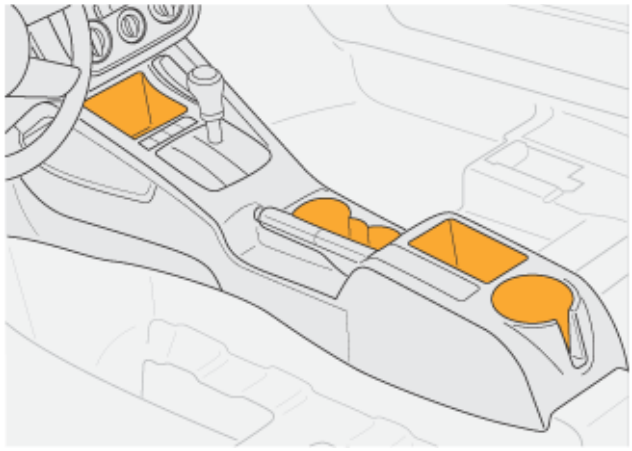
The storage compartments/spaces in the centre console



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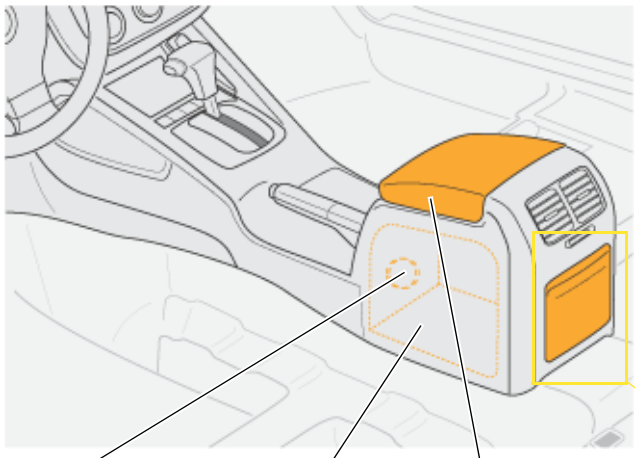
In the basic trim, there are two open compartments as well as a cup holder for the driver, front passenger and one rear passenger in the centre console.



S318_081

The Golf is optionally available with an air-conditioned combi-box in the centre armrest, as well as foldaway cup holders for the rear seats.

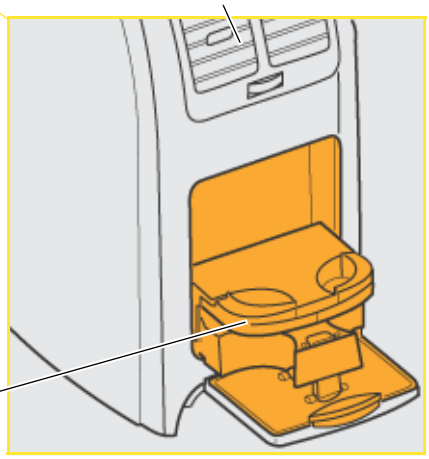
Manually adjustable outlet

Fold-up cover

Temperature-controllable compartment in the centre armrest

Rear centre vent

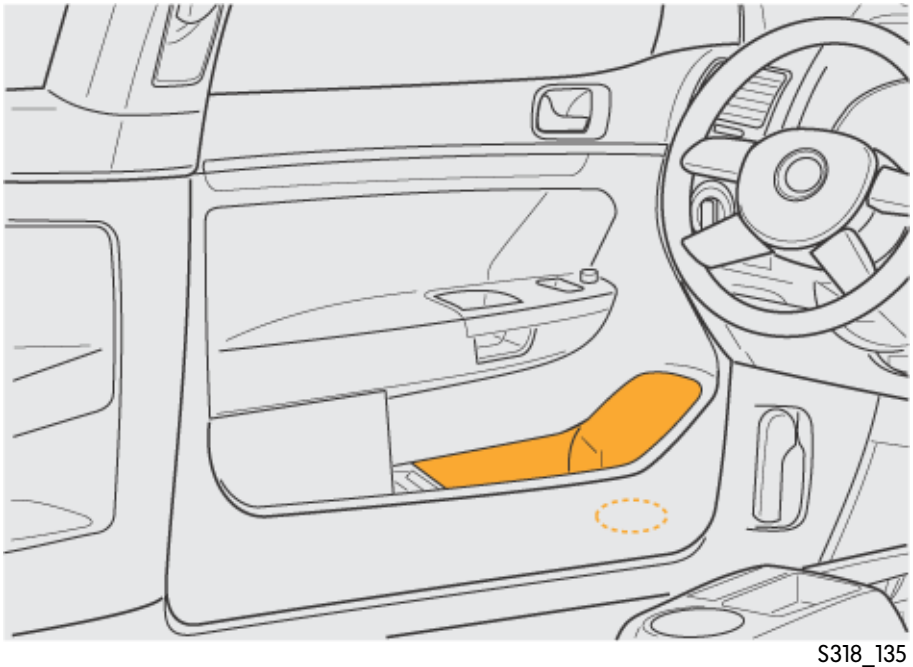
Folded-out cup holder



S318_155

The storage compartments/spaces in the doors

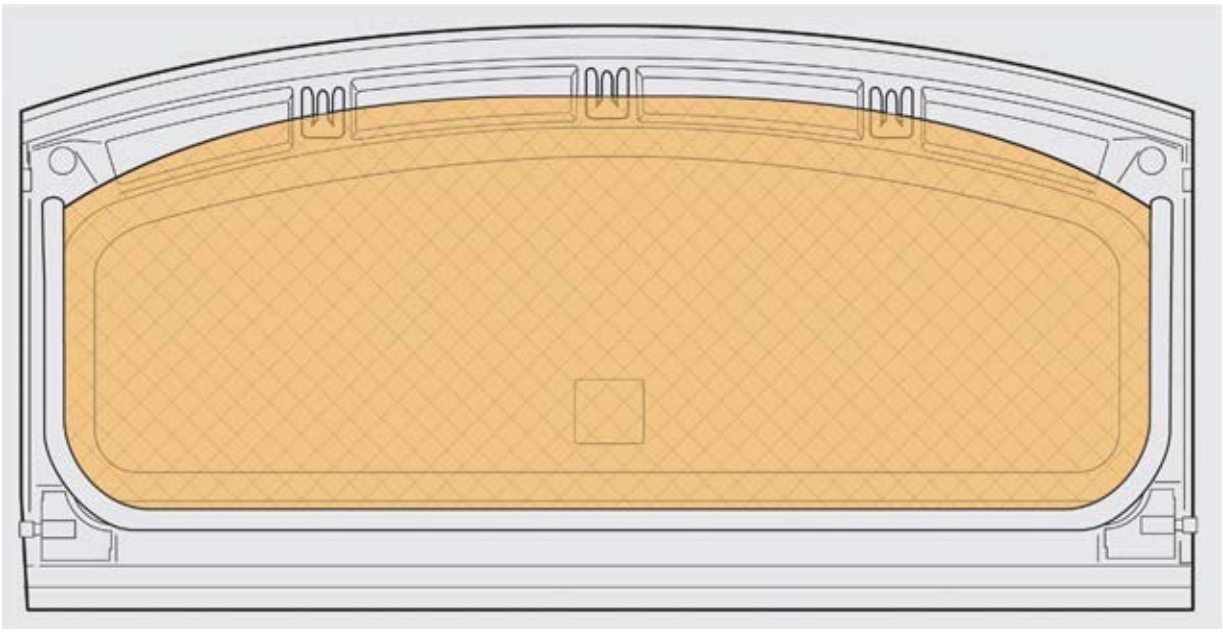
Located in the door panel trims are storage compartments, as well as a cup holder for 1.5 litre bottles.



S318_135

The stowage net on the rear shelf

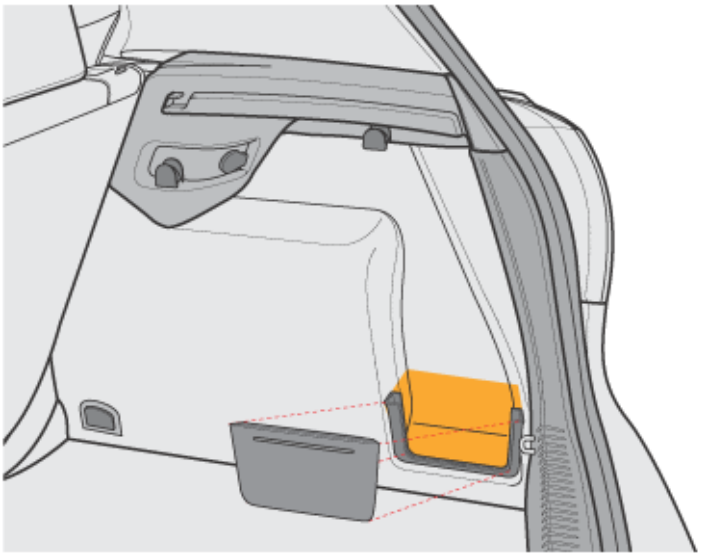
An optional extra is a stowage net which attaches to the underside of the rear shelf and in which small objects can be safely stowed away.



S318_133

The storage compartments/spaces in the luggage compartment

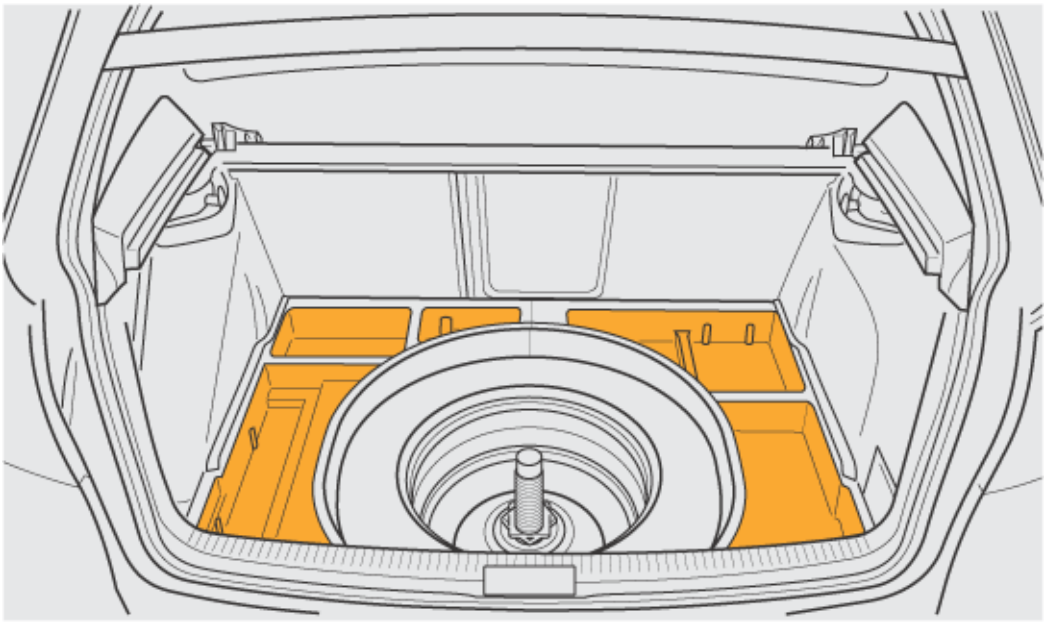
A sliding cover integrated in the side luggage compartment trim accommodates small objects. When the sliding cover is removed, items such as a golf bag can be easily stowed parallel to the rear bench seat.



S318_239

The storage compartments/spaces in the spare wheel well

The Golf 2004 is optionally available with an emergency wheel or a full-size spare wheel.
In those vehicles which are equipped with a full-size spare wheel, the cavities below the hub cap serve as additional stowage spaces.



S318_107

Occupant safety

Introduction

For protection of the occupants in the Golf 2004, the following components have been fitted.

Standard equipment:

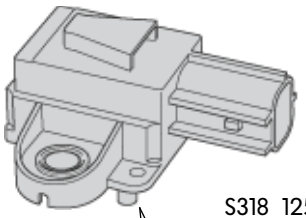
- driver and front passenger airbags,
- side airbags in the front seats,
- head airbags for cockpit and rear occupants,
- 3-point seat belts on all seats,
- belt tensioners and belt force limiters for the front seats,
- active head restraint system on the front seats.

Optional equipment:

- side airbags for rear passengers in combination with belt tensioners and belt force limiters on the outer and rear seats (in the 4-door version).

The figure shows a Golf 2004 with airbag and belt systems in full specification.

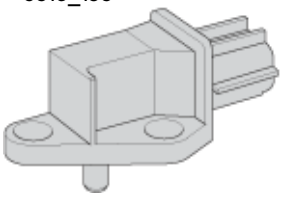
The new pressure sensors in the front doors register sudden changes in pressure caused by deformation during a side-impact collision.



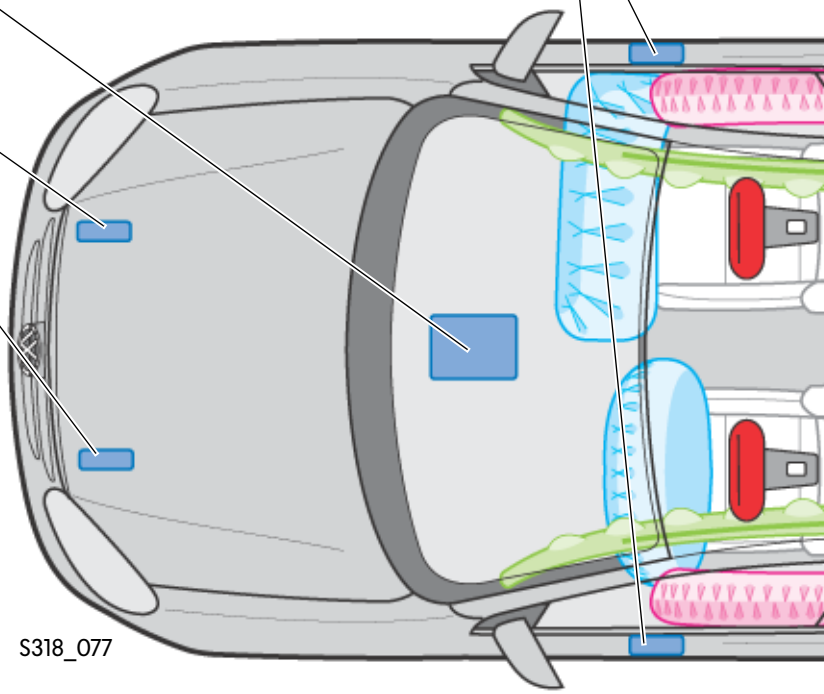
S318_125

Airbag control unit J234

S318_153



In the front end of the vehicle there are two longitudinal acceleration sensors in the form of Early Crash Sensors which recognise an impact and its severity and transmit the data to the airbag control unit.



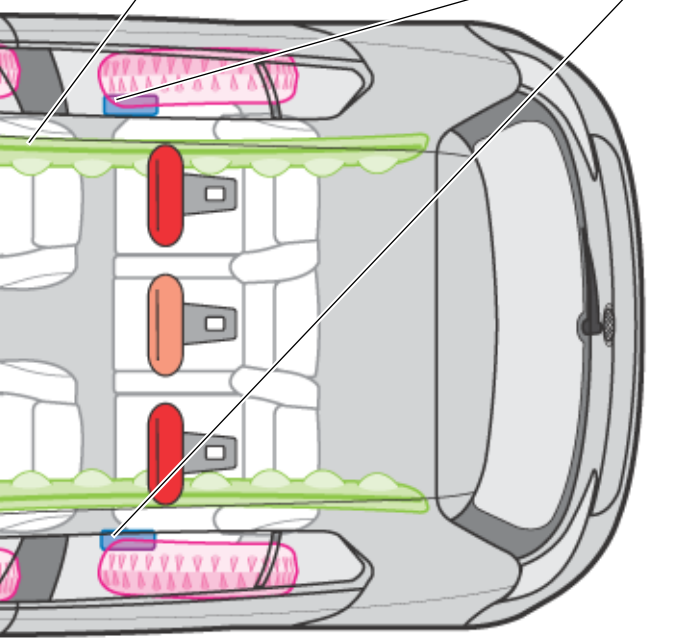
S318_077

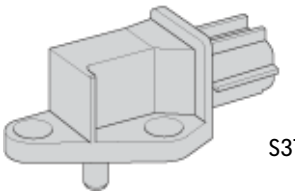
At market launch, the Early Crash Sensors will only be available for the North American market.

The front airbags are designed for single-stage deployment.
The front passenger airbag can be deactivated by means of a key switch in the storage compartment on the front passenger side.

In the curtain airbags, which cover a window area extending from the A-pillar to the C-pillar, a gas distributor tube ensures uniform inflation of the airbags in the event of a crash.

Isofix anchorages are located on the rear outer seats. An Isofix anchorage can be ordered for the front passenger seat as an optional extra.





S318_153

In the rear wheel housing trims there are lateral acceleration sensors which recognise a side-impact collision.

Three-point seat belt with belt tensioner and belt force limiter

Three-point seat belt with retractor in the backrest

Occupant safety

The rear side airbags

In the 4-door version, side airbags are optionally available for the outer rear seats.
They are installed in the side bolsters.

Rear side airbags will be introduced to this class for the first time in the 2004 Golf.

S318_016

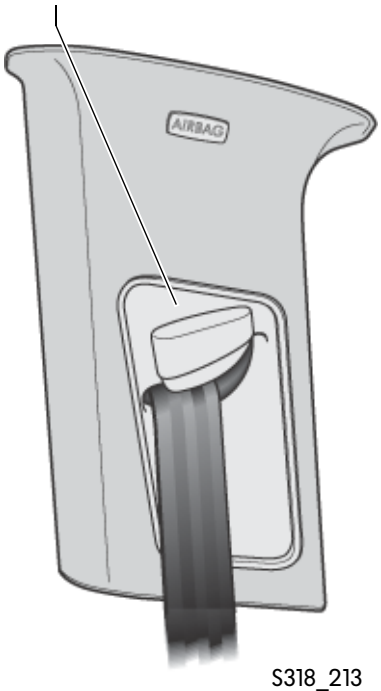
The belts

The driver and front passenger belts are equipped with electrically igniting pyrotechnical ball-type tensioners and belt force limiters.
The belts for the front seats have belt guides for added comfort.

In vehicles equipped with rear side airbags, the rear outer seats also have belt tensioners and belt force limiters. The retractors are attached to the bodyshell for enhanced comfort in the shoulder area.

The rear centre seat has a three-point seat belt whose retractor is integrated in the bench seat backrest.

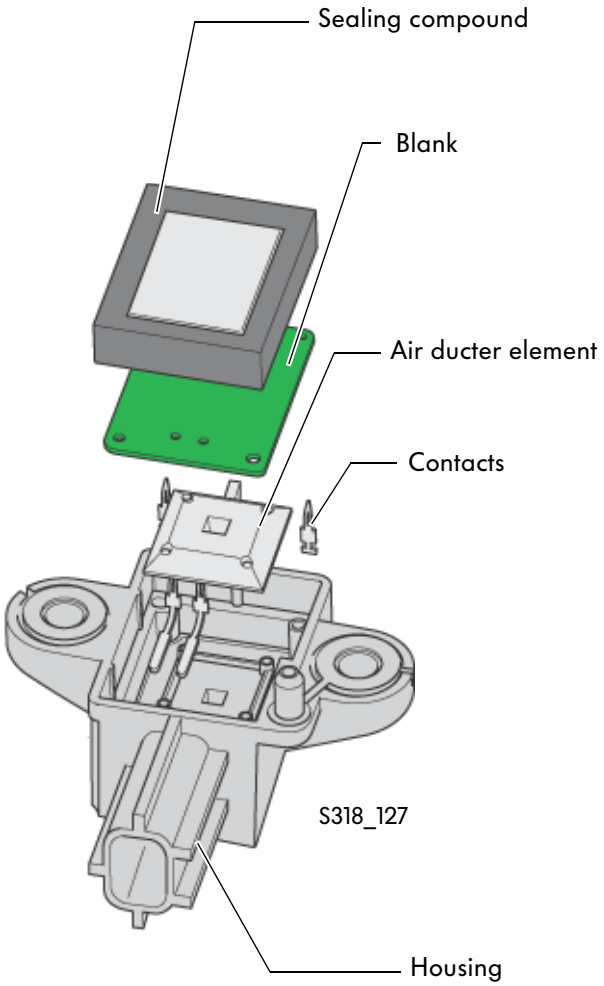
Driver seat belt in the B-pillar with belt guide



S318_213

The side airbag crash sensor, driver side G179, The side airbag crash sensor, front passenger side G180

For side impact detection, new pressure sensors are fitted in the place of the conventional acceleration sensors.
These new sensors allow more rapid detection of side impacts in the door area.



Function

The side airbag crash sensors for the driver and front passenger sides are located in the front doors between the inner and outer body panels. They react to changes in pressure in the door cavity. The air is directed via an inflow duct to a plate. The components on the plate react to rapid changes in pressure of the kind which arise during a crash.

Signal application

The sensor continuously measures the air pressure.
If the sensor detects a rise in air pressure above a predetermined threshold value, it sends a signal to the airbag control unit.

Effects of failure

If the sensor fails, the airbag warning lamp in the dash panel insert will come on.

Engine-gearbox combinations

The petrol engines

Engine	0AF  5-speed manual gearbox	0AG  6-speed manual gearbox	0A4  5-speed manual gearbox
1.4 l/55 kW engine 	✓		
1.4 l/66 kW FSI engine 	✓		
1.6 l/75 kW engine 	✓		
1.6 l/85 kW FSI engine 		✓	
2.0 l/110 kW FSI engine 			

02S	02Q	09G	DSG 02E
			
6-speed manual gearbox	**6-speed manual gearbox**	**6-speed automatic gearbox**	**6-speed direct shift gearbox**
		✓	
		✓	
✓		✓	

Engine-gearbox combinations

The diesel engines

Engine	0AF  5-speed manual gearbox	0AG  6-speed manual gearbox	0A4  5-speed manual gearbox
1.9 l/77 kW TDI engine 			✓
2.0 l/103 kW TDI engine 			

The 0AF, 0AG, 0A4, 02S and 02Q manual gearboxes are identical to the gearboxes from the Touran. They have been improved for the 2004 Golf in respect of their shift quality and adapted to the installation requirements.

02S	02Q	09G	DSG 02E
			
6-speed manual gearbox	6-speed manual gearbox	6-speed automatic gearbox	6-speed direct shift gearbox
✓	✓		✓
	✓		✓

Power units

The 1.4 l/55 kW engine with 4-valve technology

The 1.4 l/55 kW engine is the entry-level engine for the 2004 Golf. It has been adopted from the predecessor model and adapted to the space needs of the 2004 Golf.

S318_159

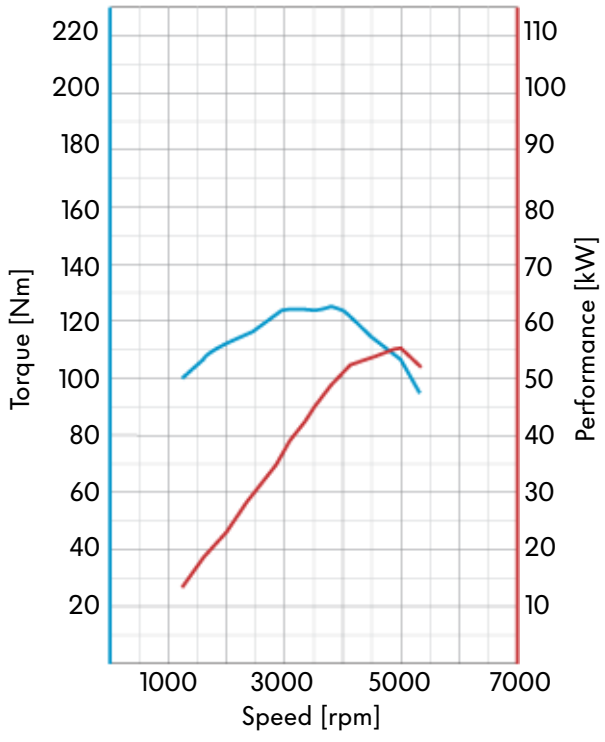
Special features

- Air filter integrated in the engine cover
- Returnless fuel system
- Crankshaft sealing flange with new engine speed sender wheel
- Electrical exhaust gas recirculation valve
- Electronic throttle with contactless accelerator pedal position sender
- Contactless clutch position sender

Technical data

Engine code	BCA
Type	4-cylinder in-line engine
Displacement [cm³]	1390
Bore [mm]	76.5
Stroke [mm]	75.6
Valves per cylinder	4
Compression ratio	10.5:1
Max. output	55 kW at 5000 rpm
Max. torque	126 Nm at 3800 rpm
Engine management	Bosch Motronic ME 7.5.10
Fuel	95 RON unleaded fuel (91 RON unleaded fuel can be used alternatively with a slight reduction in performance)
Exhaust gas treatment	Pre-catalytic converter, main catalytic converter, lambda control
Emissions standard	EU 4

Torque and power development diagram



S318_201

The 1.4 l/66 kW FSI engine with 4-valve technology

This 1.4 l/66 kW FSI engine is based on the 1.4 l/63 kW FSI engine in the Polo. It is a petrol direct injection engine with timing chain.
Its power output has been increased from 63 kW to 66 kW.

S318_027

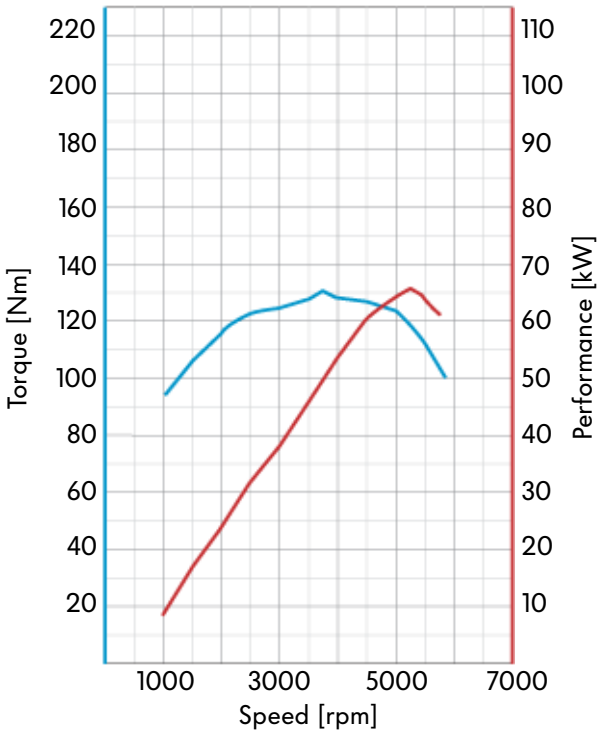
Special features

- Timing chain driven camshaft
- Dual circuit cooling system
- Self-regulating oil pump
- Crankshaft sealing flange with integrated engine speed sender wheel
- Petrol direct injection engine MED 9.5.10 with twin injection
- Supply on demand fuel system
- Accelerator pedal module with contactless accelerator pedal position senders
- Contactless clutch position sender

Technical data

Engine code	BKG
Type	4-cylinder in-line engine
Displacement [cm³]	1390
Bore [mm]	76.5
Stroke [mm]	75.6
Valves per cylinder	4
Compression ratio	12:1
Max. output	66 kW at 5250 rpm
Max. torque	130 Nm at 3750 rpm
Engine management	Bosch Motronic MED 9.5.10
Fuel	95 RON unleaded fuel (91 RON unleaded fuel can be used alternatively with a slight reduction in performance)
Exhaust gas treatment	Pre-catalytic converter, NO_x storage-type catalytic converter, lambda control
Emissions standard	EU 4

Torque and power development diagram

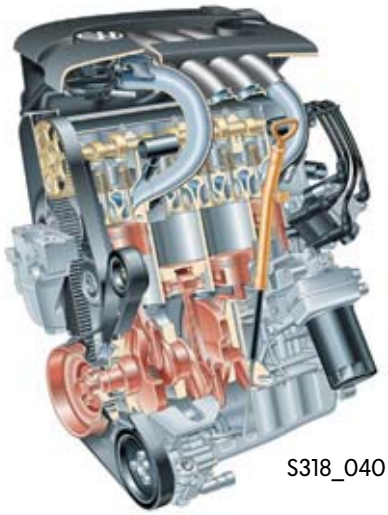


S318_229

Power units

The 1.6 l/75 kW engine with 2-valve technology

The 1.6 l/75 kW engine is based on the conventional 1.6 l/75 kW engine from the predecessor Golf with engine code BFQ.
In the predecessor Golf, however, the engine was available only in combination with automatic transmission.



S318_040

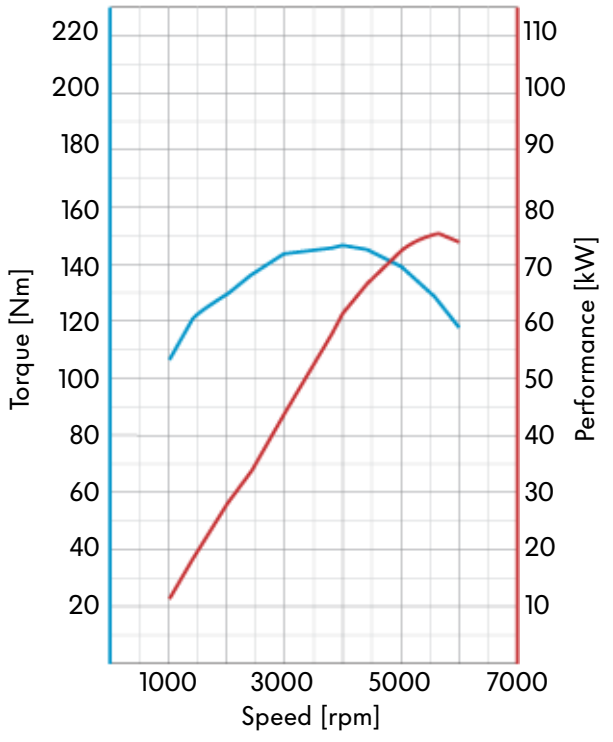
Special features

- 2-valve roller rocker finger
- Aluminium engine block
- Secondary air system
- Plastic active intake manifold
- Pressure sensor guided system (previously HFM, hot-film air mass meter)

Technical data

Engine code	BGU
Type	4-cylinder in-line engine
Displacement	1595 cm^3
Bore	81 mm
Stroke	77.4 mm
Valves per cylinder	2
Compression ratio	10.5:1
Max. output	75 kW at 5600 rpm
Max. torque	148 Nm at 3800 rpm
Engine management	Simos 7.1
Fuel	95 RON unleaded fuel (91 RON unleaded fuel can be used alternatively with a slight reduction in performance)
Exhaust gas treatment	Pre-catalytic converter probe: linear lambda probe, probe after catalytic converter: nonlinear probe
Emissions standard	EU 4

Torque and power development diagram



S318_235

The 2.0 l/110 kW FSI engine with 4-valve technology

The 2.0 l/110 kW FSI engine was introduced to the Audi A3 in February 2003. Volkswagen will deploy the engine in the Touran for the first time in October, and thereafter in the Golf in early 2004.

S318_028

Special features

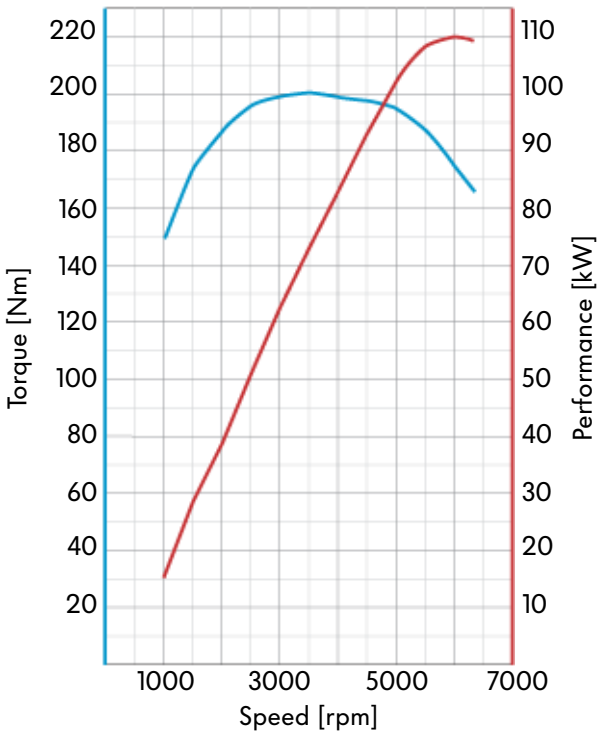
- Single-piston high-pressure pump
- Plastic active intake manifold with change-over barrel for homogeneous and heterogeneous charge operation
- Water-cooled exhaust gas recirculation valve
- Roller rocker finger with hydraulic support element
- Two overhead camshafts with continuous inlet camshaft timing adjustment
- Balancer shaft gear assembly in the oil sump
- Air-guided combustion process

For further information on the engine, please refer to SSP 322 "The 2.0 l/110 kW Petrol Direct Injection Engine".

Technical data

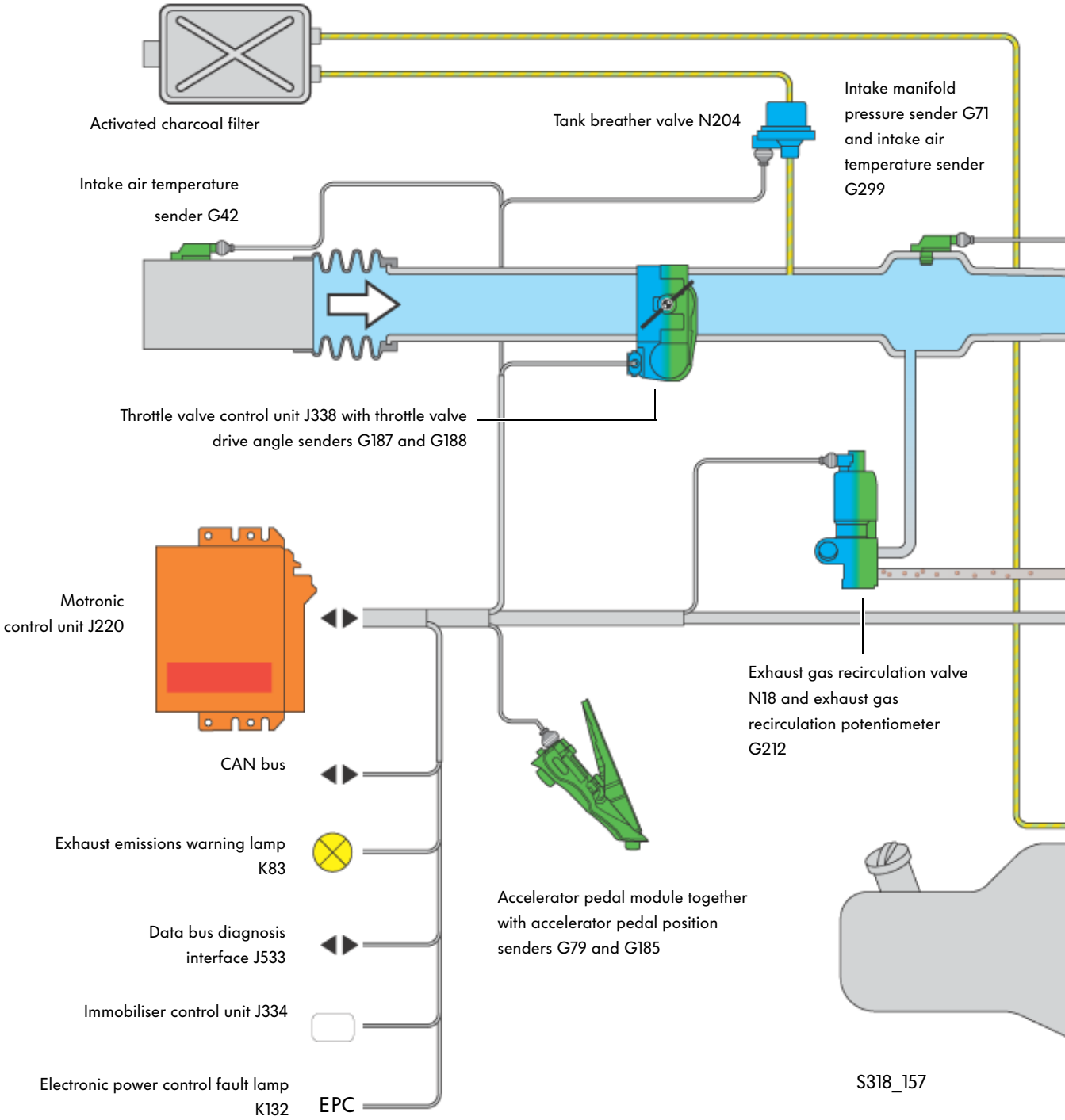
Engine code	AXW
Type	4-cylinder in-line engine
Displacement [mm³]	1984
Bore [mm]	82.5
Stroke [mm]	92.8
Valves per cylinder	4
Compression ratio	11.5:1
Max. output	110 kW at 6000 rpm
Max. torque	200 Nm at 3500 rpm
Engine management	Bosch Motronic MED 9.5.10
Fuel	98 RON unleaded fuel (95 RON unleaded fuel can be used alternatively with a slight reduction in performance)
Exhaust gas treatment	NO_x storage-type catalytic converter and two pre-catalytic converters
Emissions standard	EU 4

Torque and power development diagram



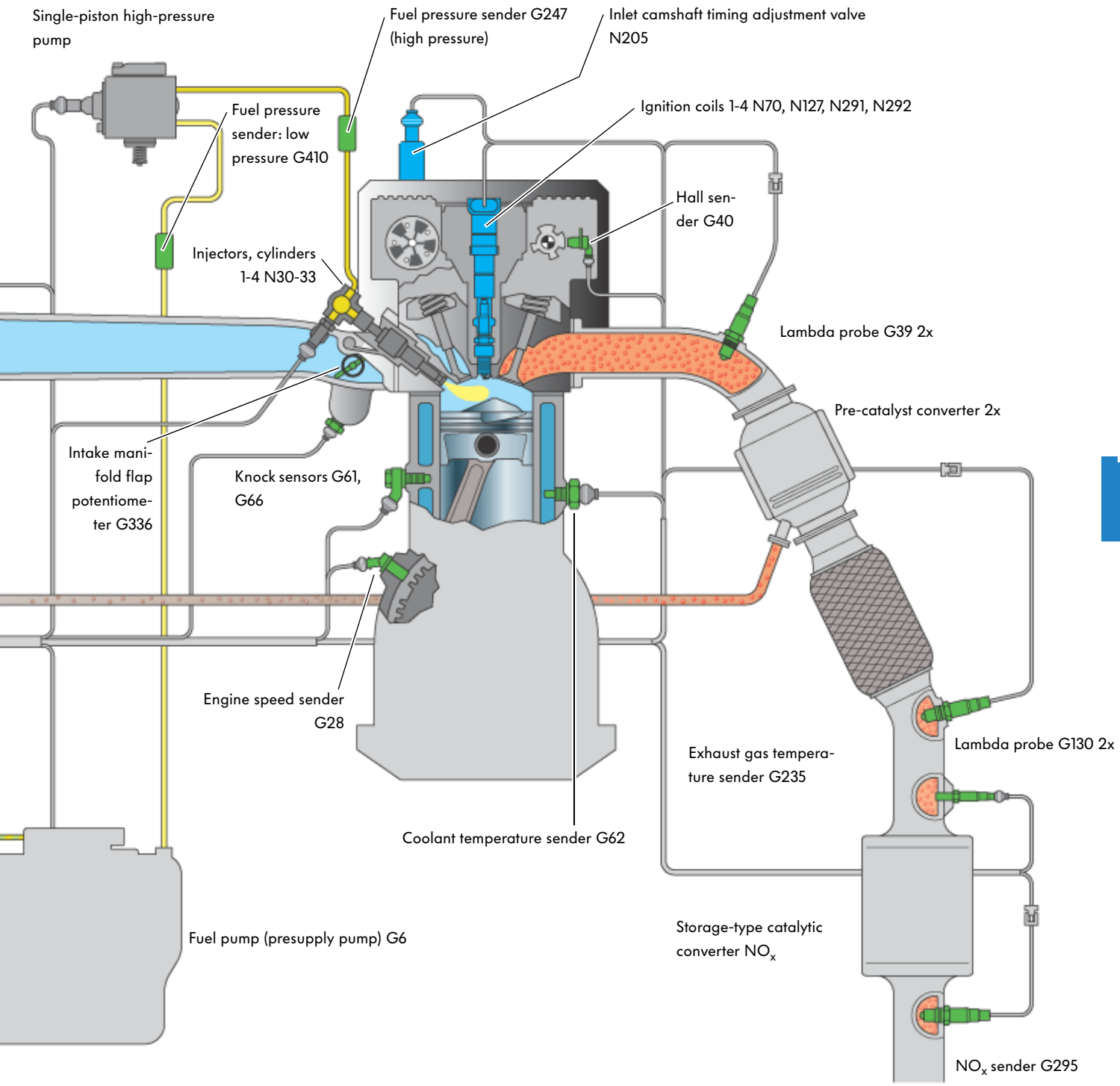
S318_233

The FSI functional diagram of the 2.0 l/110 kW engine



The load sensing device utilises the following sensor signals:

- ambient pressure (determined by an altitude sender installed in the engine control unit),
- intake air temperature (determined by the intake air temperature sender G42 installed upstream of the throttle valve),
- throttle valve position,



- pressure and temperature in the intake manifold (determined by the Duo sensor together with intake manifold pressure sender G71 and intake manifold temperature sensor G299),
- flap position of exhaust gas recirculation valve N18,
- position of the tumble flaps,
- inlet camshaft position.

Power units

The 1.6 l/85 kW FSI engine with 4-valve technology

This 1.6 l/85 kW FSI engine has already been introduced to the Touran. It is a petrol direct injection engine with camshaft timing chain.

S318_023

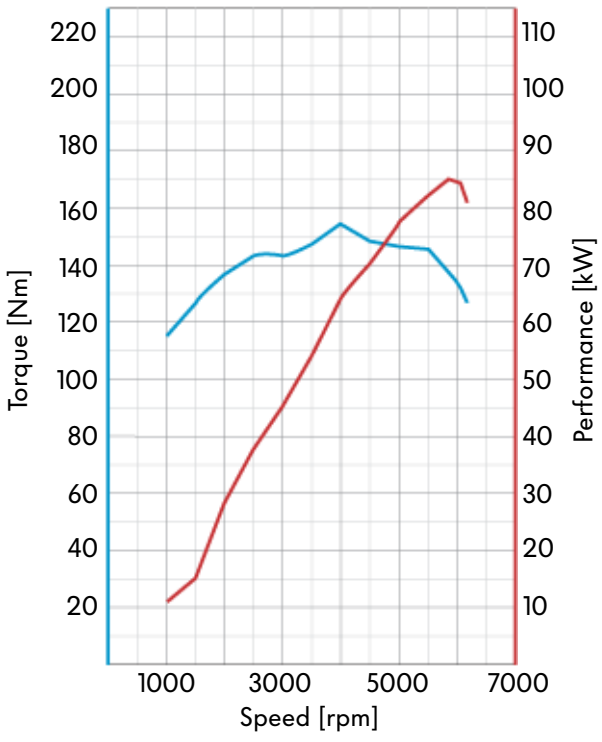
Special features

- Timing chain driven camshaft
- Continuous variable valve timing
- Dual circuit cooling system
- Self-regulating oil pump
- Crankshaft sealing flange with new engine speed sender wheel
- Petrol direct injection MED 9.5.10 with twin injection
- Supply on demand fuel system
- Accelerator pedal module with contactless accelerator pedal position senders
- Contactless clutch position sender

Technical data

Engine code	BAG
Type	4-cylinder in-line engine
Displacement [cm³]	1598
Bore [mm]	76.5
Stroke [mm]	86.9
Valves per cylinder	4
Compression ratio	12:1
Max. output	85 kW at 5800 rpm
Max. torque	155 Nm at 4000 rpm
Engine management	Bosch Motronic MED 9.5.10
Fuel	98 RON unleaded fuel (95 RON unleaded fuel can be used alternatively with a slight reduction in performance)
Exhaust gas treatment	Pre-catalytic converter, NO_x storage-type catalytic converter, lambda control
Emissions standard	EU 4

Torque and power development diagram



S318_231

The 1.9 l/77 kW TDI engine with 2-valve technology

This TDI engine is a further development of the 1.9 l/74 kW TDI engine from the Polo.

Special features:

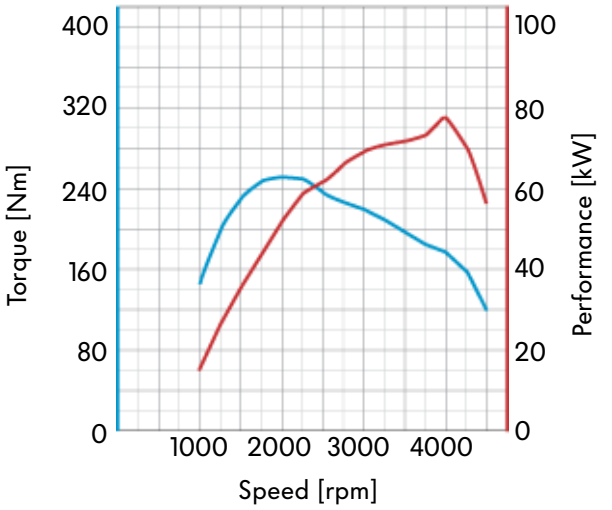
- Switchable EGR cooler
- Crankshaft sealing flange with integrated engine speed sender wheel
- Accelerator pedal module with contactless accelerator pedal position senders
- Contactless clutch pedal switch.

S318_033

Technical data

Engine code	BEZ
Type	4-cylinder in-line engine
Displacement	1896 cm^3
Bore	79.5 mm
Stroke	95.5 mm
Valves per cylinder	2
Compression ratio	19:1
Max. output	77 kW at 4000 rpm
Max. torque	250 Nm at 1900 rpm
Engine management	Bosch EDC 16
Fuel	Diesel, min. 49 CN or biodiesel
Exhaust gas treatment	Exhaust gas recirculation and oxidising catalytic converter
Emissions standard	EU4

Torque and power development diagram



S318_197

The 2.0 l/103 kW TDI engine with 4-valve technology

This TDI engine is a further development of the 1.9 l/96 kW TDI engine.

Special features:

- 4-valve technology
- Two camshafts, driven by toothed timing belts
- Increased engine displacement by means of greater cylinder bore
- New unit injectors adapted to the 4-valve technology
- Switchable EGR cooler
- Crankshaft sealing flange with integrated engine speed sender wheel
- Accelerator pedal module with contactless accelerator pedal position senders
- Contactless clutch pedal switch.

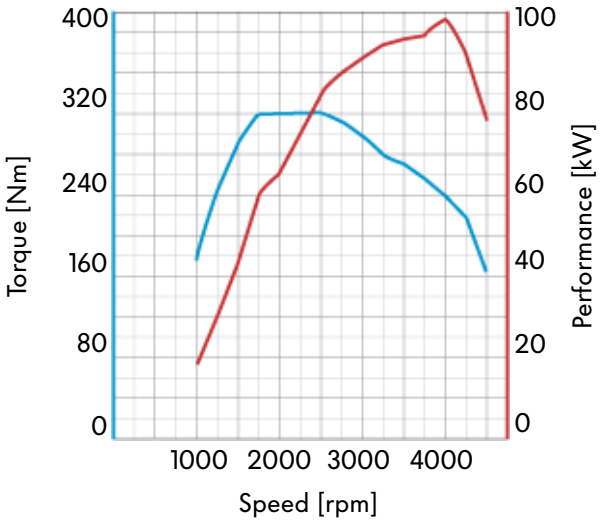
S318_035

For detailed information on 2.0 l/ 103 kW TDI engine please refer to SSP 316, "The 2.0 l TDI Engine".

Technical data

Engine code	BKD
Type	4-cylinder in-line engine
Displacement	1968 cm^3
Bore	81 mm
Stroke	95.5 mm
Valves per cylinder	4
Compression ratio	18:1
Max. output	103 kW at 4000 rpm
Max. torque	320 Nm at 1750 rpm to 2500 rpm
Engine management	EDC 16 with pump injection system
Fuel	Diesel, at least 49 CN
Exhaust gas treatment	Exhaust gas recirculation and oxidising catalytic converter
Emissions standard	EU4

Torque and power development diagram

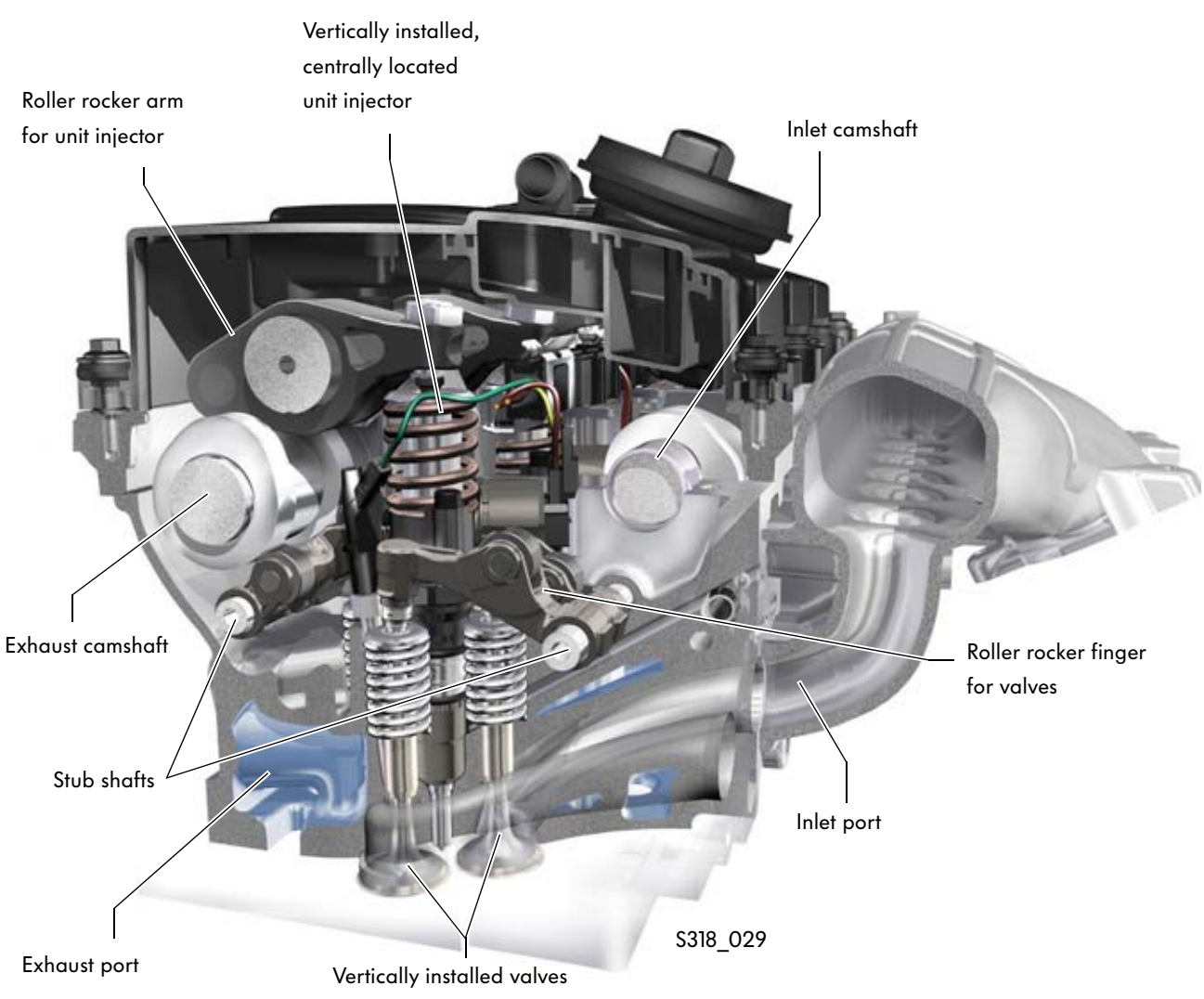


S318_199

The advantages of the 4-valve technology

Larger inlet and exhaust cross-sections of the valves provide improved volumetric efficiency, as well as higher power output and torque. Wastage on load change is also reduced.

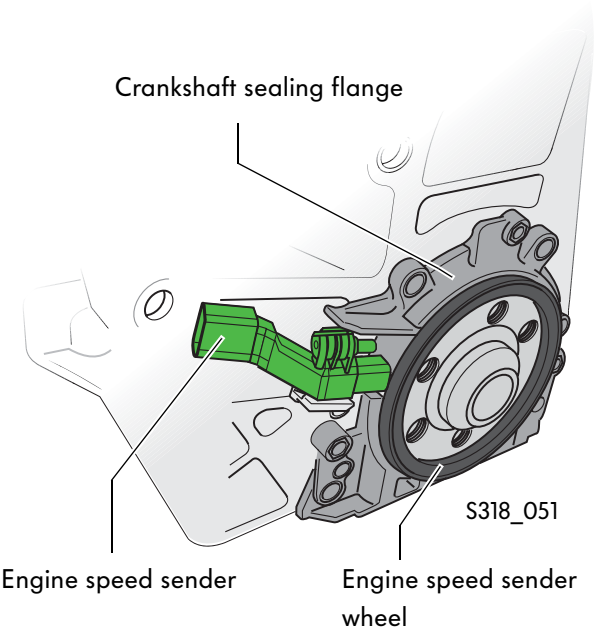
The symmetrical layout of the valves and the vertical, centrally located unit injectors allow for good mixture formation. This leads to lower fuel consumption and exhaust gas emissions are reduced as a result.



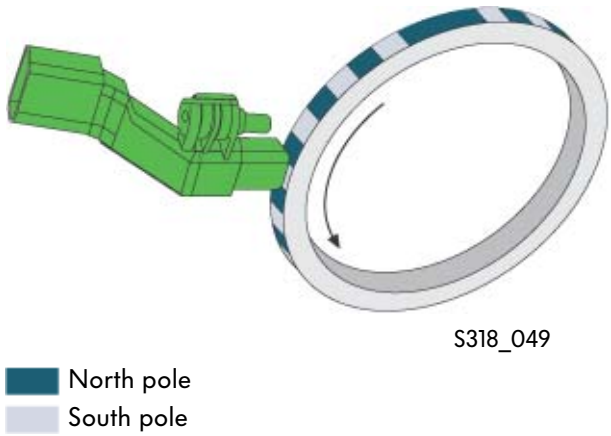
The crankshaft sealing flange with integrated engine speed sender wheel

A crankshaft sealing flange with an integrated engine speed sender wheel will be used in the diesel engines. This system has already been tried and tested in several petrol engines.
The engine speed sender wheel is the only new feature. The crankshaft sealing flange seals off the cylinder block on the flywheel end. The oil seal is made of heat-resistant and nonwearing polytetrafluoroethylene (PTFE) plastic.

The engine speed sender is actually a Hall sender. It is mounted in the crankshaft sealing flange housing.



The engine speed sender wheel consists of a steel ring coated with a rubber compound.
This rubber compound contains a large number of metal chips which are alternately magnetised to become north and south pole regions.
The diesel engines have two large north poles (60-2-2) and the petrol engines have one large north pole (60-2) on the sender wheel; they serve as reference marks for the engine speed sender. The sender wheel is press-fitted onto the crankshaft flange and exactly positioned.

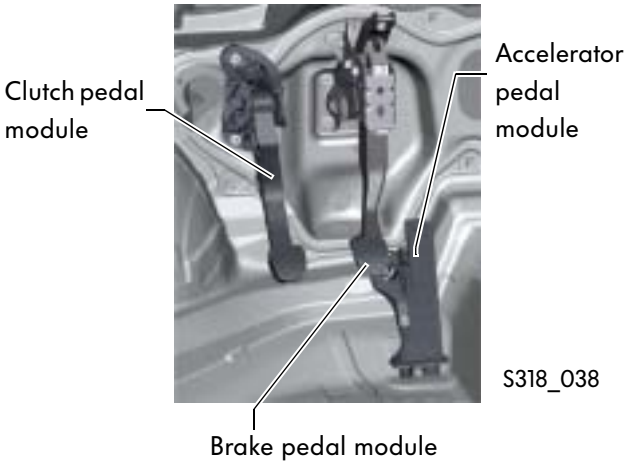


The pedal cluster

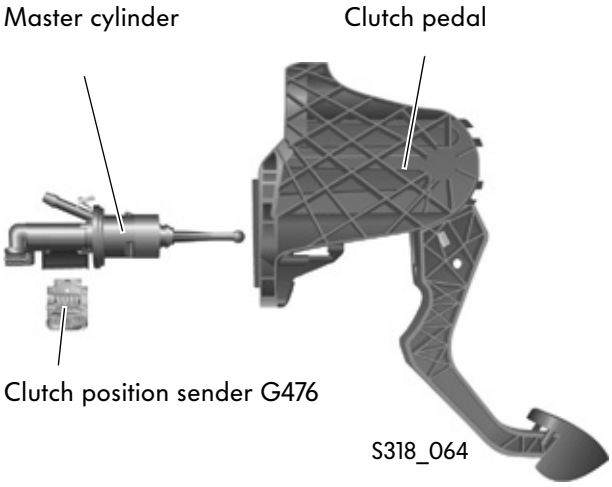
The pedal assembly in the 2004 Golf comprises separately pre-assembled accelerator, brake and clutch control modules.

The brake pedal module is made of aluminium and sheet steel.

The accelerator pedal and the clutch pedal module are made of plastic.
Pedal position recognition is by contactless senders.

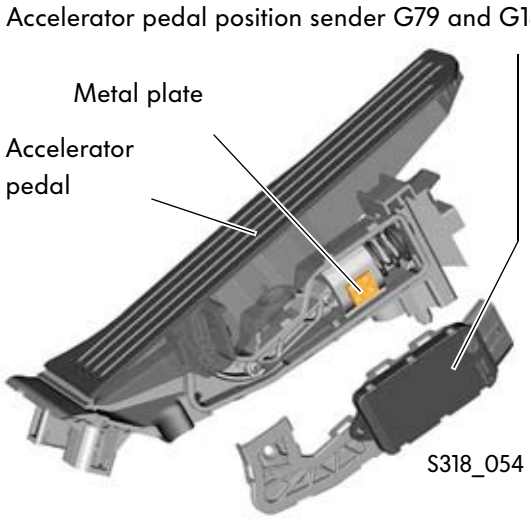


Clutch position sender G476



The clutch position sender is a Hall sensor, which signals to the engine control unit that the clutch pedal has been operated. The cruise control system will then be deactivated and the injection quantity in the engines will briefly be reduced in order to prevent engine shudder during the gear change.

Accelerator pedal position sender G79 and G185



The two accelerator position senders G79 and G185 are integrated in the upright accelerator pedal module. They are inductive senders, which indicate the exact position of the accelerator pedal the engine control unit. From this data, the engine control unit computes the required injection quantity.

For further information on the design and function of the contactless senders, please refer to SSP 316 "2.0l TDI engine with 4-valve Technology" and SSP 321 "The 2004 Golf Running Gear".

The 6-speed direct shift gearbox 02E

The 6-speed **D**irect **S**hift **G**earbox (DSG) combines the advantages of a manual gearbox:

- high efficiency,
- as well as robustness and sportiness

with those of an automatic gearbox:

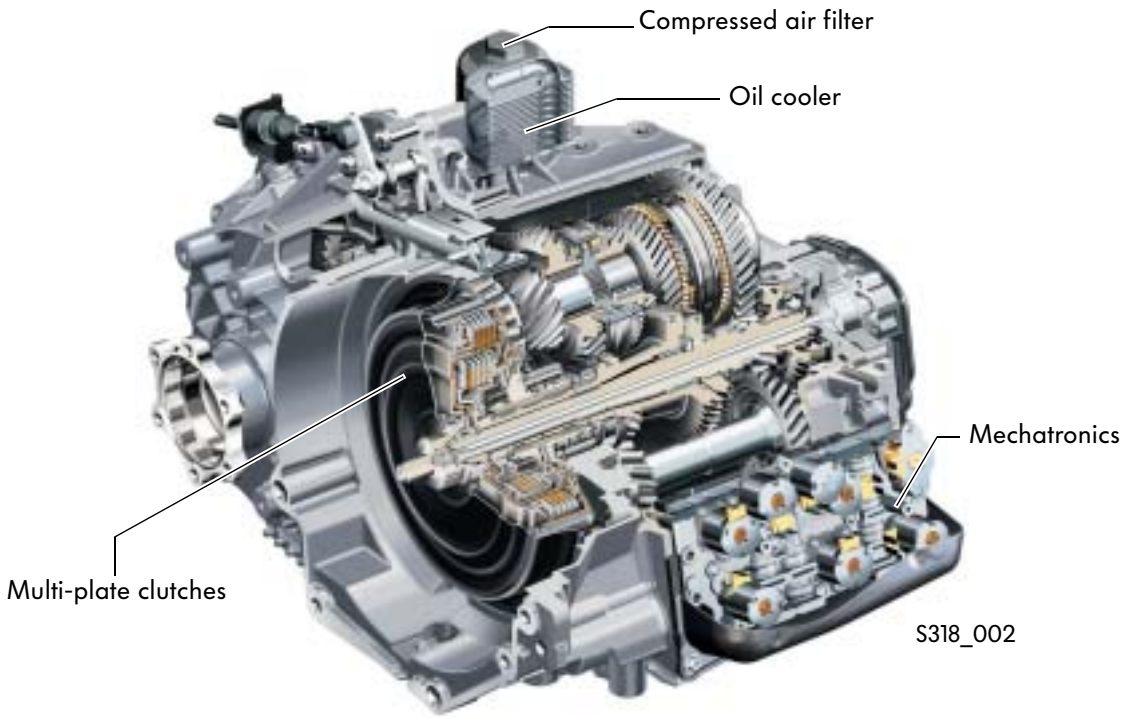
- a high level of comfort, particularly when changing gears.

DSG meets the high standards of comfort expected by automatic gearbox drivers thanks to its design, which comprises two multi-plate clutches and various automatic shift programs.

DSG also provides pure driving enjoyment for manual gearbox drivers by allowing the driver to actively influence the choice of gears and gearshifts and with its lightning-fast, jolt-free gearshifts. At the same time, it surpasses manual gearboxes in terms of fuel economy.

The gearbox is distinguished by:

- Six forward gears and one reverse gear
- Normal gearbox program "D", Sport gearbox program "S" as well as Tiptronic selector lever and steering wheel switches,
- Mechatronics: electronic and hydraulic control units form a single unit and are accommodated in the gearbox,
- Oil cooler and compressed air filter on the gearbox
- Maximum torque 350 Nm.



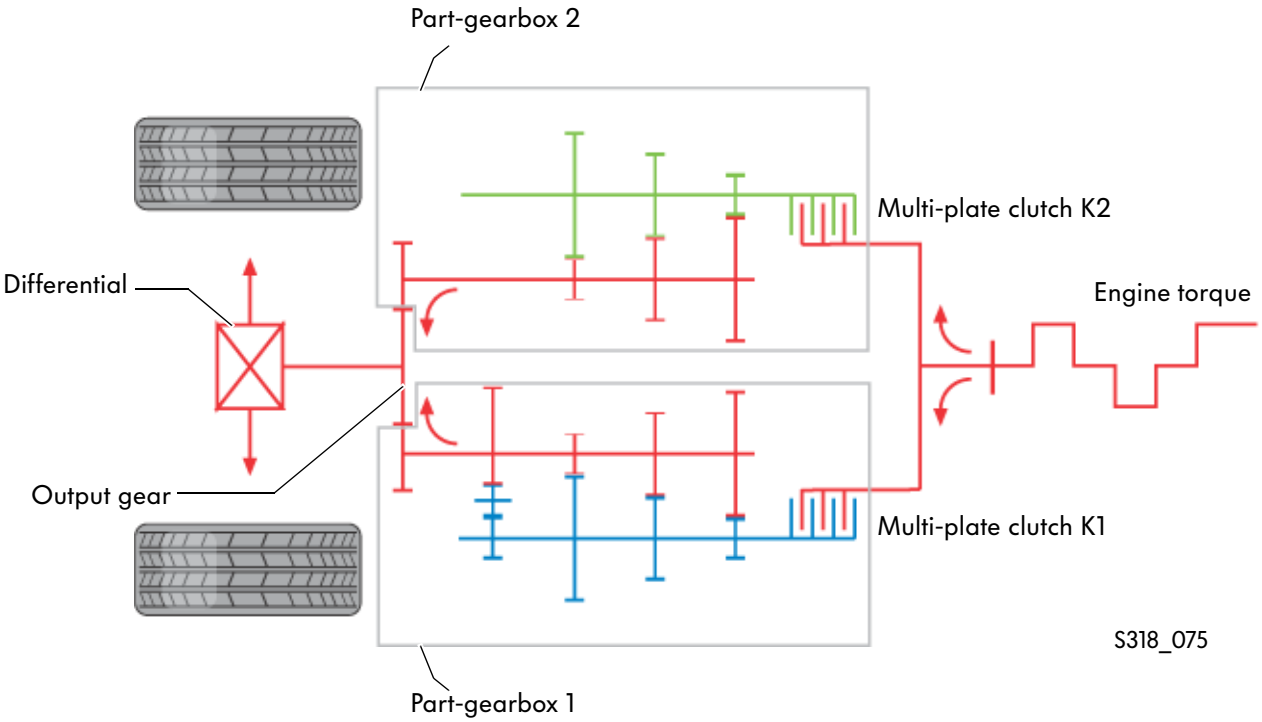
Design of the gearbox

The direct shift gearbox basically consists of two independent part-gearboxes. Each part-gearbox is built to function like a manual gearbox. Each part-gearbox has a dedicated multi-plate clutch. Both multi-plate clutches run in DSG oil and are controlled, opened and closed by the mechatronics, depending on the gear to be selected.

Gears 1, 3, 5 and reverse are selected via multi-plate clutch K1.

Gears 2, 4 and 6 are selected via multi-plate clutch K2.

The figure below shows the principle of the direct shift gearbox.



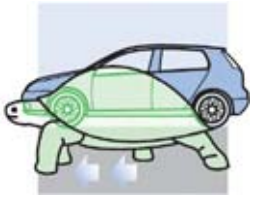
Both part-gearboxes transmit the engine's torque to a common output gear, which in turn transfers the torque to the differential.

Power transmission

Functions of the gearbox

Kickdown control

The kickdown function is activated by the fully depressed accelerator pedal. This information is sent via the CAN data bus to the engine control unit and to the mechatronics. The mechatronics then select the "S" programme for maximum acceleration.



Creep control

The creep control system enables driving manoeuvres to be executed without use of the accelerator pedal (e.g. parking). If the engine is idling and a drive program is selected, the creep control system triggers the production of a defined amount of slip torque at the multi-plate clutch, which causes the vehicle to move very slowly (creep).
A further function of the creep control system is initiated when the vehicle is stationary with the brake applied (e.g. when waiting at a red traffic light).
In this case, the multi-plate clutch is opened still further, thus reducing the vehicle's tendency to creep. This has the effect of improving fuel efficiency.

Hillholder function

If the vehicle rolls back when stationary on a hill with the brake only slightly depressed, the mechatronics increases the pressure in the multi-plate clutch. As a result, the vehicle is held securely in place on the hill.

For further information on the direct shift gearbox 02E, please refer to SSP 308 "The direct shift gearbox 02E".

The 6-speed automatic gearbox 09G

The 6-speed automatic gearbox 09G is a compact, lightweight, electronically controlled gearbox for transverse installation.

The electro-hydraulic system is based on the 6-speed automatic gearbox 09D.

S318_024

Features of the gearbox are:

- Max. torque of 310 Nm
- 84 kg in weight
- Approx. 350 mm in length
- Torque converter with torque converter lockup clutch
- Automatic and Tiptronic operation

The six forward gears and the reverse gear have a simple planetary gear set with a double Ravigneaux planetary gear set.
The planetary gear sets are arranged according to the Lepelletier principle.

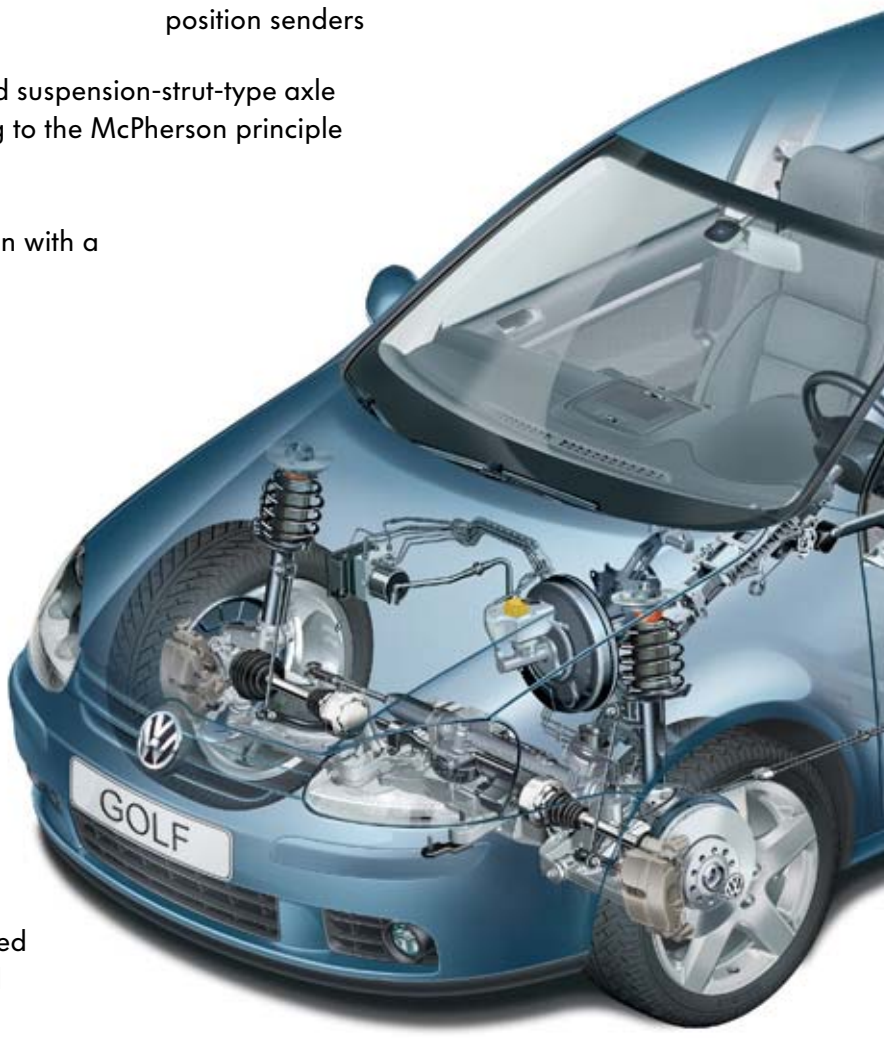
The automatic gearbox control unit controls pressure build-up in the multi-plate clutches and plate brakes via modulating valves.
The modulating valves allow a delayed pressure build-up. The result is fast gearbox response and jolt-free gearshifts.

Running gear

The running gear

Once again, the running gear of the 2004 Golf sets new standards in its class. Use has been made of a strut front axle which has in many respects been perfectly optimized. In respect of handling dynamics and driving comfort, the perfectly balanced new four link rear axle points the way to the future.
The electromechanical power assisted steering in the Golf provides handling assistance par excellence. It conveys a precise steering feel and harmoniously adapts the steering effort with increasing vehicle speed. In addition to the Golf, the Touran and the Audi A3 currently utilise this running gear platform.

- Floor mounted accelerator pedal with contactless accelerator pedal position senders
- Optimised suspension-strut-type axle according to the McPherson principle
- Direct anti-roll bar connection with a ratio of 1:1
- Electromechanical power assisted steering
- Brake servo with dual rate characteristic
- Electronic stabilisation program based on the MK 60 system by Continental Teves



The Golf can be equipped with a standard running gear, sports running gear or heavy-duty running gear. The running gear packages are distinguished in terms of their springs, dampers, anti-roll bars and the bearing elements. The sports running gear has been lowered 15 mm compared to the responsive and yet comfort-oriented standard running gear. The heavy-duty running gear has been lifted 20 mm compared to the standard running gear.

- Four link rear axle
- 4-motion drive, optional
- Tyre pressure monitoring system, optional
- Brake assist system
- Separately adjustable rear suspension toe and camber

S318_008

For further information on the Running gear, please refer to SSP 321, "The 2004 Golf Running Gear".

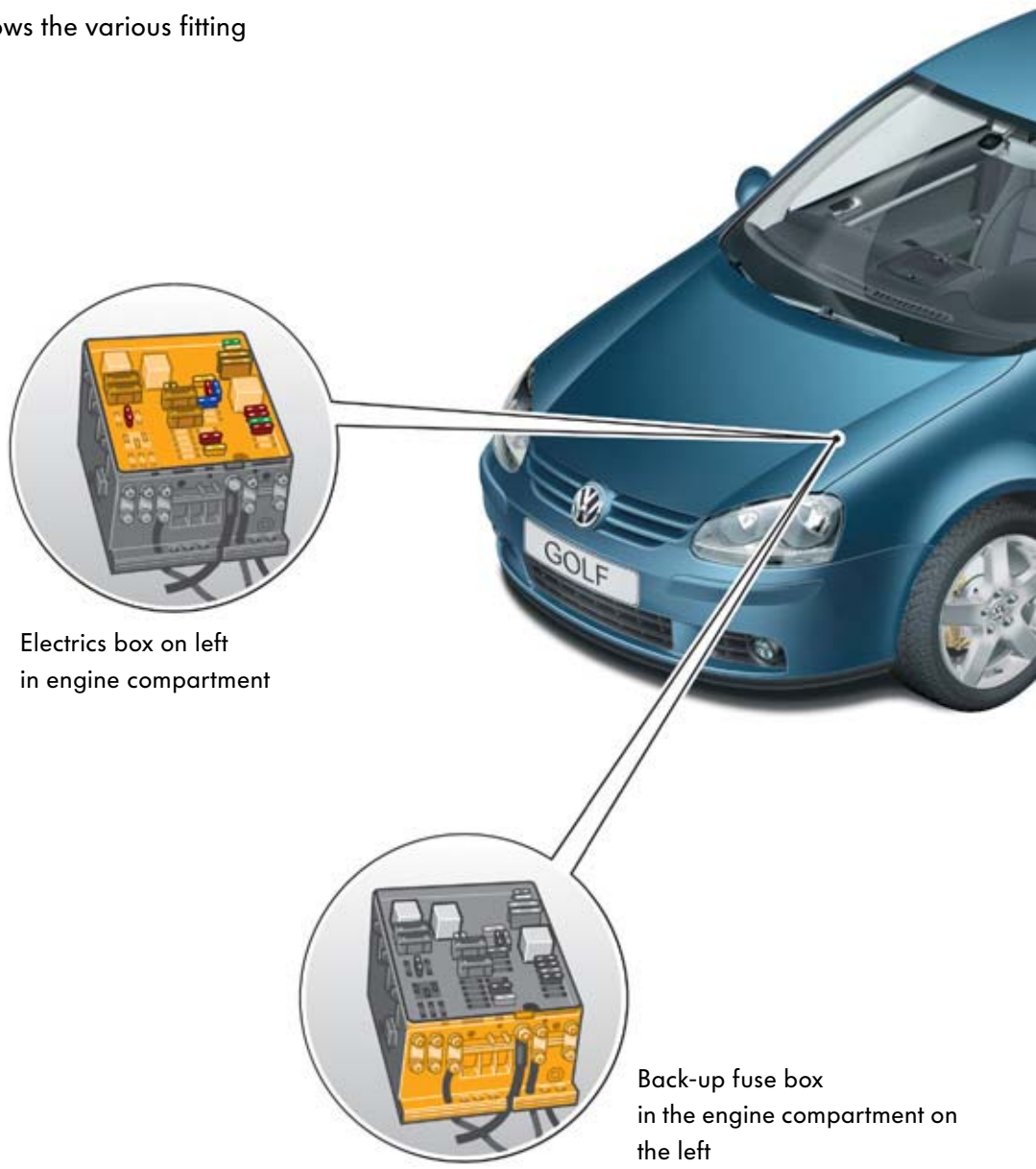
Electrical system

Fuse boxes and relay slots in vehicle's electrical system

Fitting locations

The electrical system of the 2004 Golf is configured decentrally and almost identical to that of the Touran, since both vehicles are based on the same platform. Due to different installation conditions, the fuse boxes and the relay slots are at different locations on board the vehicle.

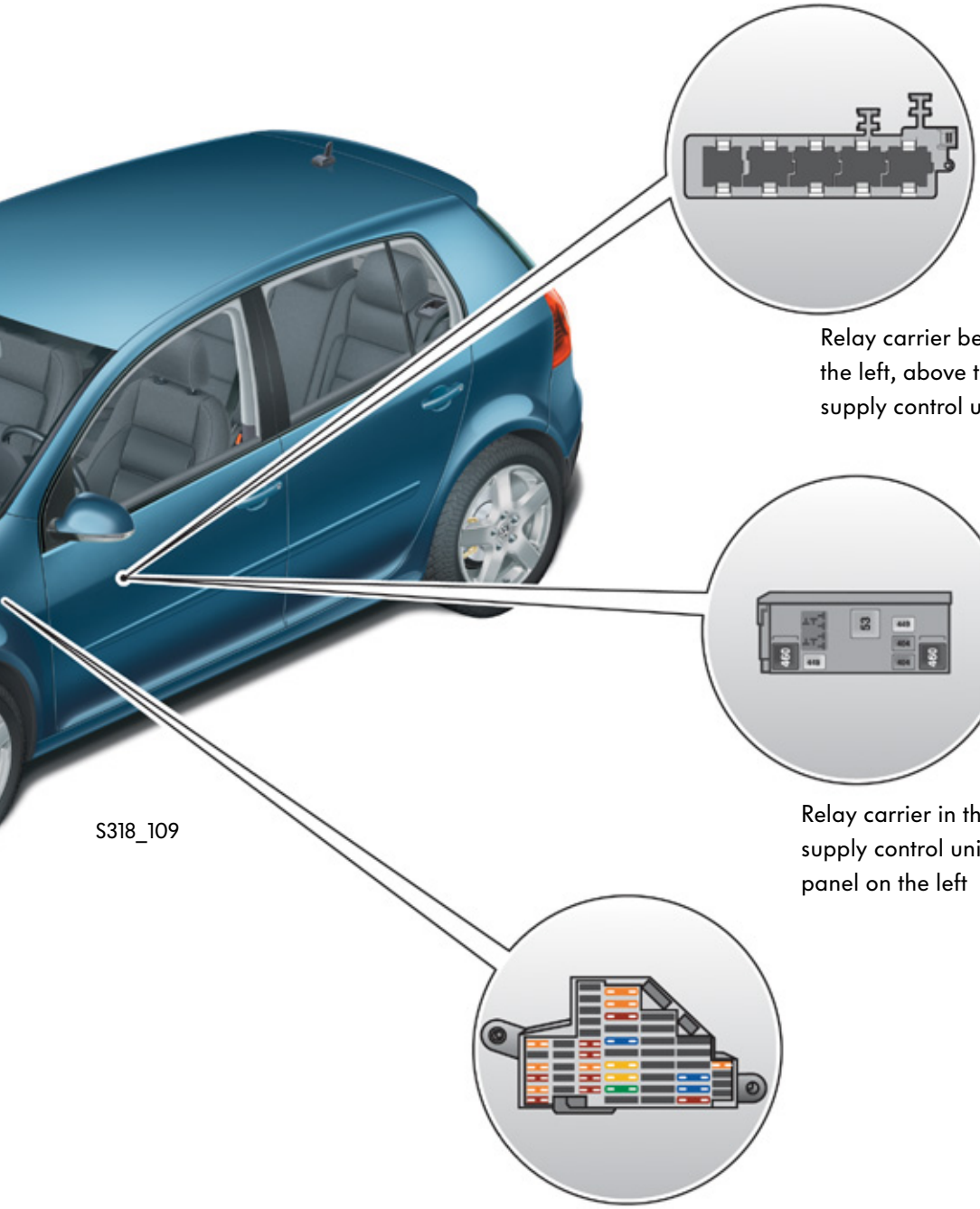
The adjacent diagram shows the various fitting locations.



Electrics box on left
in engine compartment

Back-up fuse box
in the engine compartment on the left

For further information on the electrical system, please refer to SSP 319 "The 2004 Golf Electrical System".



S318_109

Relay carrier below the dash panel on the left, above the onboard power supply control unit

Relay carrier in the onboard power supply control unit, below the dash panel on the left

Fuse box
in the dash panel on the left

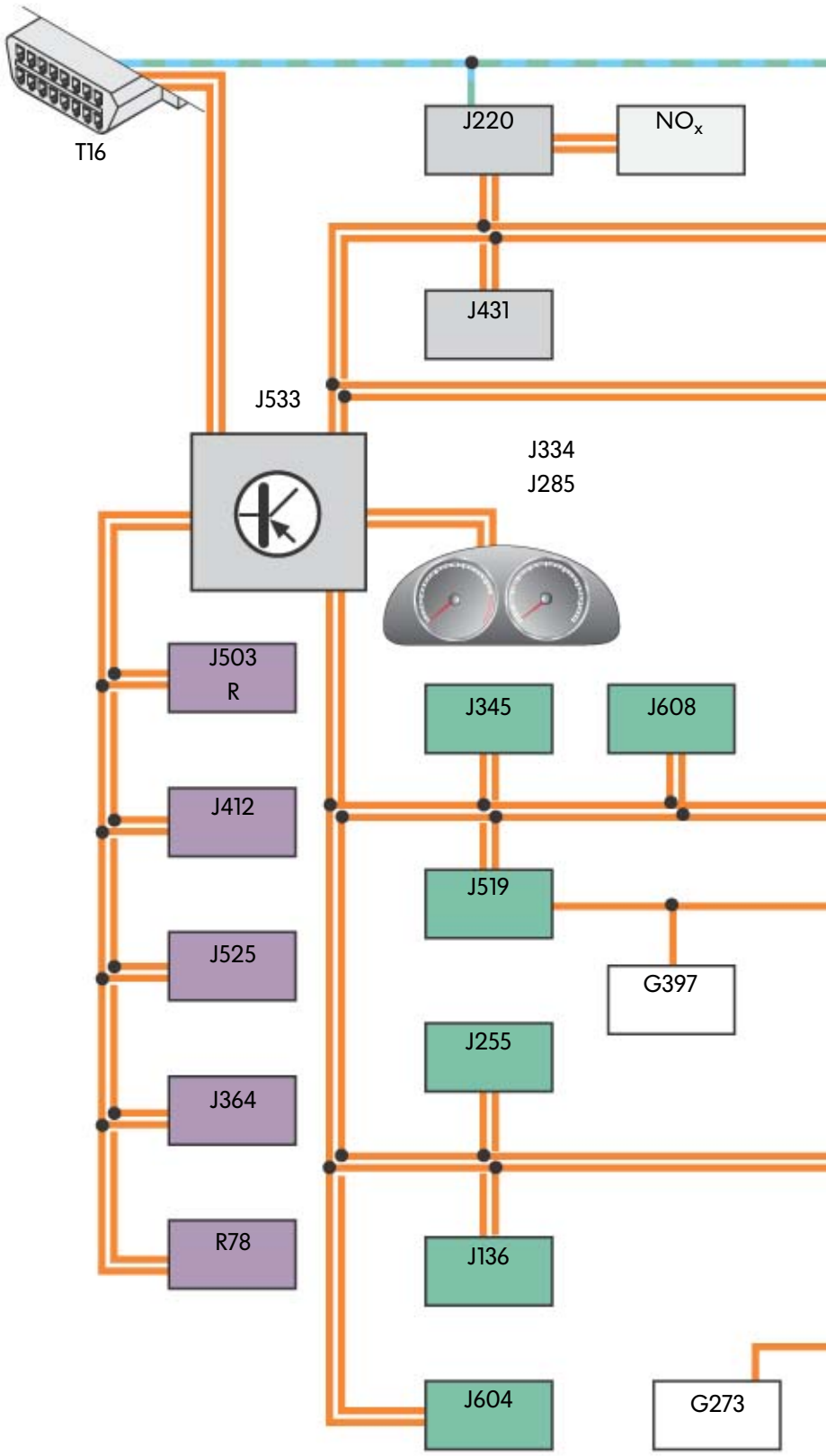
The networking concept

Overview of networked control units

To allow data to be transferred between the control units, the control units are internetworked via various data bus systems.

The data bus diagnostic interface J533 (gateway) forms the interface to the data bus systems:

- Drivetrain CAN data bus
- Convenience CAN data bus
- Infotainment CAN data bus
- Combi CAN data bus
- Diagnosis CAN data bus

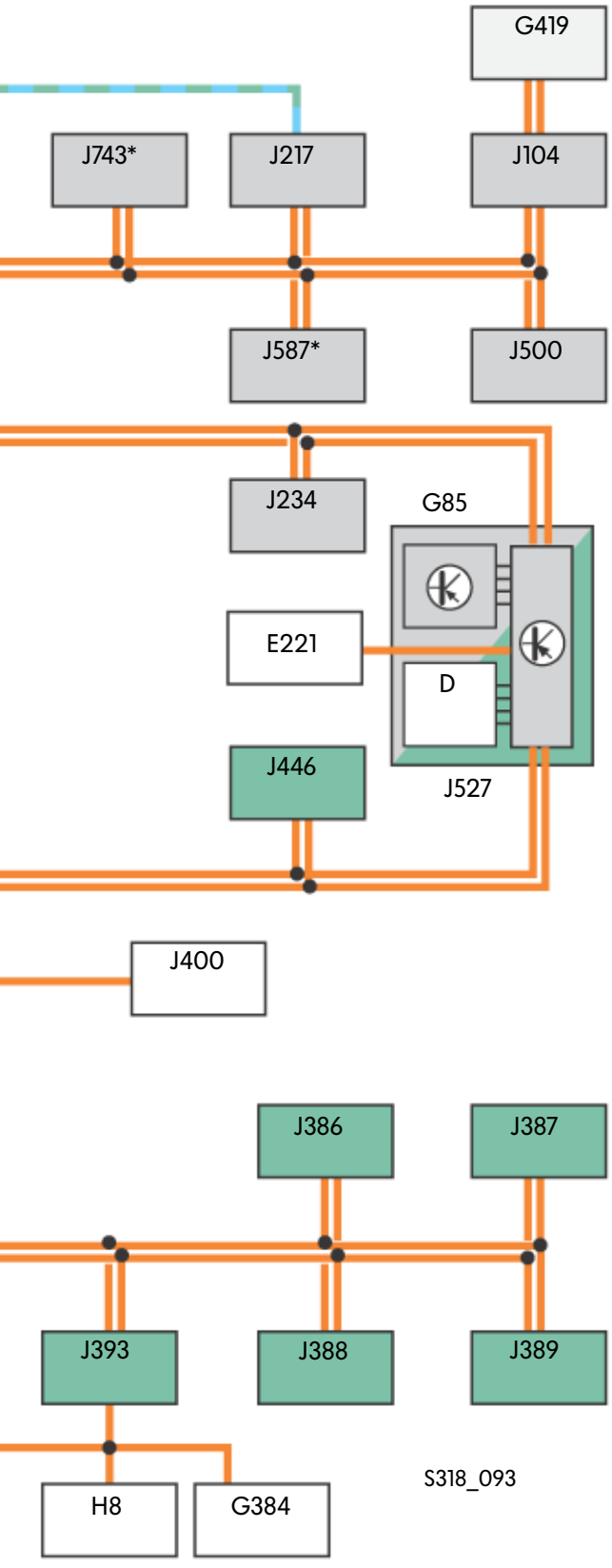


Control units connected to:

- Drivetrain CAN data bus
- Convenience CAN data bus
- Infotainment CAN data bus
- CAN data bus sensor
- LIN data bus
- CAN data bus line (high speed and low speed)
- Communications line
- LIN data bus line

In addition to the CAN data bus, a number of electric components are networked via the LIN data bus.

* only with direct shift gearbox



S318_093

Key:

D	Ignition/starter switch
E221	Operating unit in steering wheel (multi-function steering wheel)
G85	Steering angle sender
G273	Rear left interior locking switch
G384	Vehicle inclination sender
G397	Rain and light detector sensor
G419	ESP sensor unit
H8	Anti-theft alarm system horn
J104	ABS with EDL control unit
J136	Seat and steering column adjustment control unit with memory
J217	Automatic gearbox control unit
J220	Motronic control unit
J234	Airbag control unit
J255	Climatronic control unit (and Climatic)
J285	Control unit with display in dash panel insert
J334	Immobiliser control unit
J345	Trailer detection control unit
J364	Additional heater control unit
J386	Door control unit, driver side
J387	Door control unit, front passenger side
J388	Door control unit, rear left
J389	Door control unit, rear right
J393	Convenience system central control unit
J400	Wiper motor control unit
J412	Mobile telephone operator electronics control unit
J431	Headlight range control, control unit
J446	Parking aid control unit
J500	Power steering control unit
J503	Control unit with display for radio and navigation
J519	Onboard power supply control unit
J525	Digital sound package control unit
J527	Steering column electronics control unit
J533	Data bus diagnosis interface
J587	Selector lever sensors control unit*
J604	Auxiliary air heater control unit
J608	Special vehicle control unit
J743*	Mechatronics for direct shift gearbox
NO_x	NO_x sensor
R	radio
R78	TV tuner
T16	Diagnostic connection

The data protocols have been changed. As a result, the control units cannot be replaced with control units from other vehicle types, e.g. Touareg or Phaeton.

Heating and air conditioning

Introduction

The 2004 Golf will be equipped with the heating and air conditioning system concept that has already been introduced to the Touran. It comprises three variants:

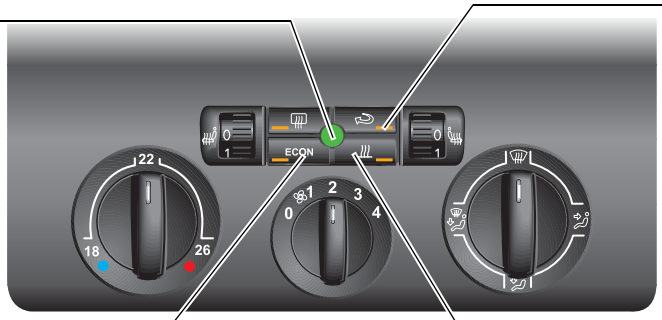
- The 2C-Climatronic heating and air conditioning system (2C = "2 **C**orner" = zones)
- The Climatic heating and air conditioning system
- The manual heating and ventilation system.

Each variant has a separate operating unit. All operating units are available in four different versions, depending on the vehicle's equipment specification:

- with or without instant heat button for auxiliary water heater,
- with or without seat heating potentiometer.

As usual, all operating elements which are relevant to temperature and ventilation as well as the control unit are combined in the operating units. New are the feedback LEDs on all buttons; they provide the occupants with an overview of all active functions. In the case of the 2C-Climatronic and Climatic systems, an unventilated interior temperature sensor is attached to the operating unit already known from other models. The figure below shows by way of example the operating unit of the 2C-Climatronic system.

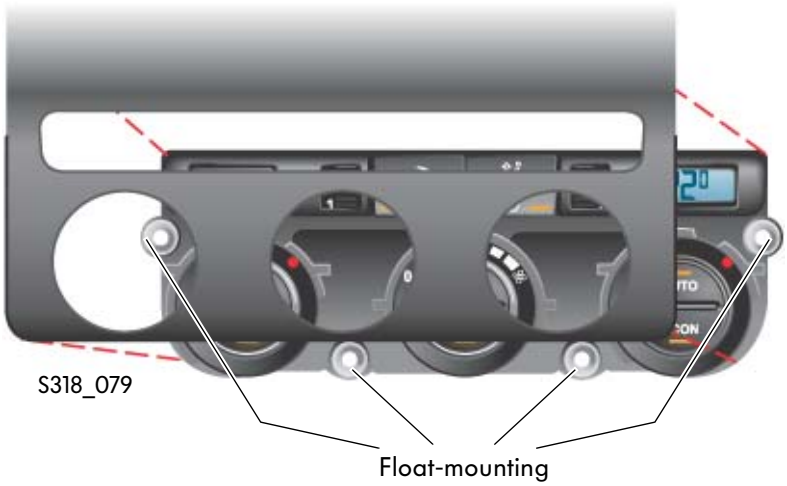
In the case of the Climatic operating unit, the button "AC" has been renamed "ECON".



The cooling function is deactivated by pressing the "ECON" button; on diesel models, the electrical auxiliary air heater is also deactivated this way.

The floating-mounted operating units

The operating units are floating-mounted, i.e. they are mounted non-rigidly in the instrument panel and are centred automatically by the trim panel when it is fitted.
This ensures uniform shut lines.



Heating and air conditioning

Functions of the systems in overview

Components	2C-Climatronic	Climatic	Heating/ventilation
Pollen filter	✗	✗	✓
Pollen filter with activated charcoal	✓	✓	✗
Air recirculation flap with control motor	✓	✓	✓
Air flow flap with control motor	✓	✗	✗
Temperature flap	Two flaps actuated by control motors	one flap actuated by control motor	one flap actuated by bowden cable
Central dash panel/footwell flap	actuated by control motor	actuated by flexible shaft	
Defrost flap	actuated by control motor	actuated by flexible shaft	
Left vent temperature sender G150 Right vent temperature sender G151	left and right	left	✗
Vent temperature sender, left footwell G261 Vent temperature sender, right footwell G262	left and right	left	✗
Fresh air intake duct temperature sensor G89	✓	✗	✗
Evaporator out-flow temperature sender G263	✓	✓	✗
High pressure sender G65	✓	✓	✗
Fresh air blower V2	with electronic control	with Series resistor	
Sunlight penetration photo sensor G134	✓	✗	✗
Unventilated interior temperature sensor	✓	✓	✗
Electrical auxiliary air heater*	✓	✓	✓
Air recirculation mode	by pressing the air recirculation button		
	when driving in reverse		✗
	in wipe-wash mode of the windscreen washer system		✗

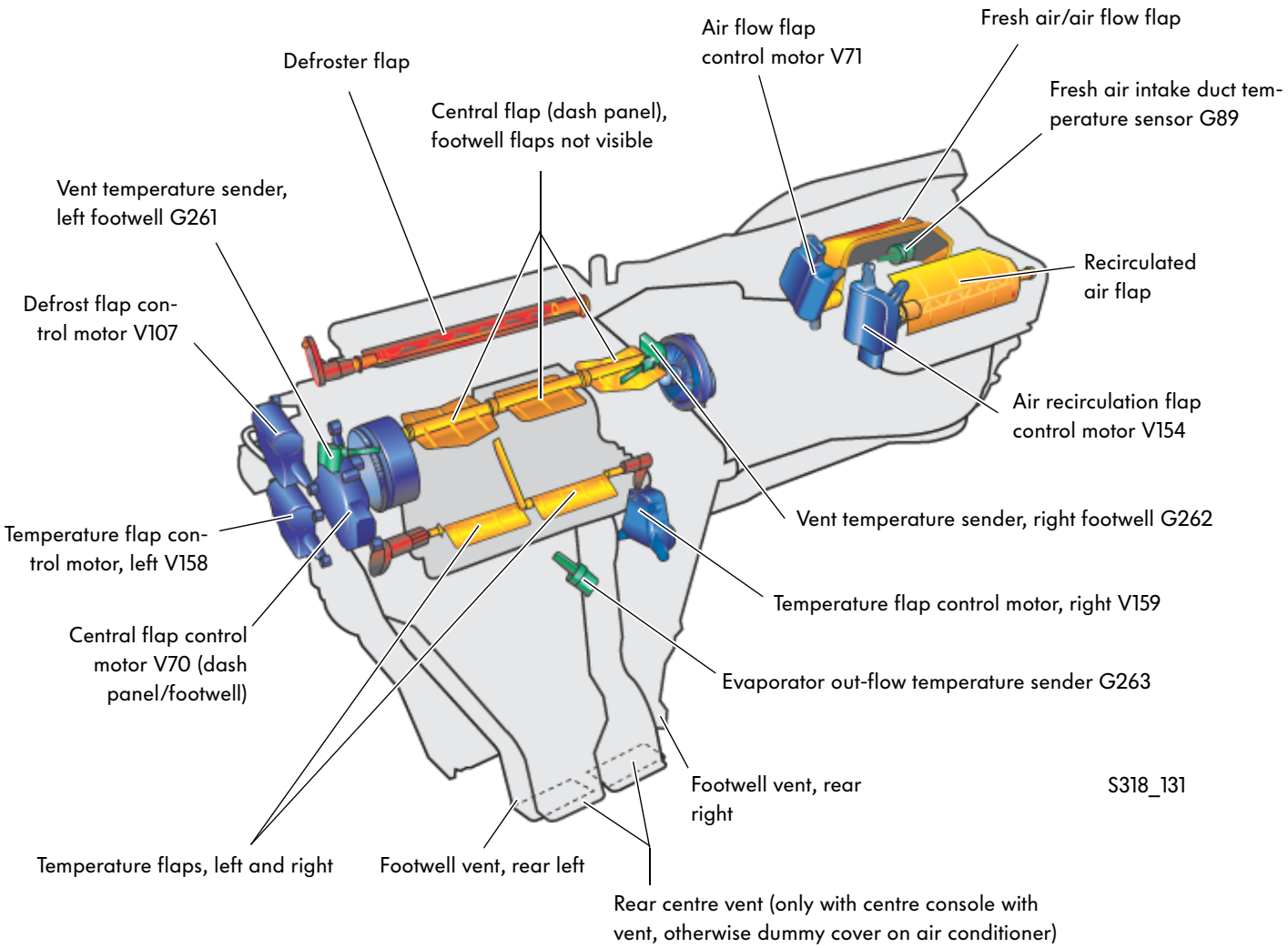
✓ = available
✗ = not available

* with all diesel vehicles without additional water heater

The air conditioner

All variants are based on the same basic air conditioner. The fundamental difference between the individual systems is the way in which the air distribution flaps are actuated. The 2C-Climatronic has an additional fresh air flow flap, which is closed at increasing speeds in excess of 100 kph. The result is a constant fresh air intake even at different vehicle speeds.
The figure below shows by way of example the air conditioner of the 2C-Climatronic system.

The heating and Climatic systems have a fresh air/air recirculating flap. The 2C-Climatronic has a fresh air/air flow flap as well as a separate air recirculating flap.

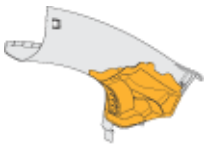


Heating and air conditioning

The air distribution

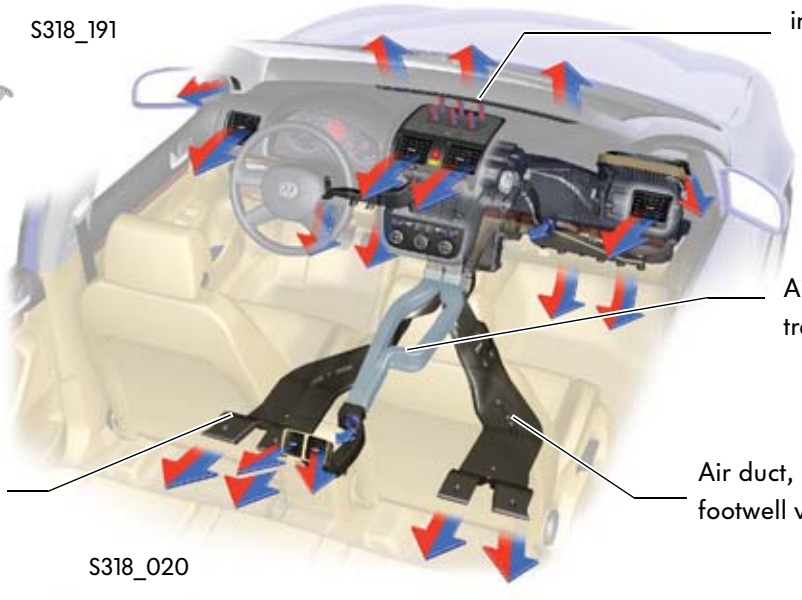
The air distribution is almost identical in all variants and feature the following modifications:

- All air duct cross-sections have been enlarged compared to the predecessor model.
- The air duct to the defrost and dash panel vents runs through the dash panel.
- The front side windows are ventilated through new vents in the A-pillar.
- For ventilation in the rear passenger compartment, a single air duct leads to each of the left and right footwells.
- In the case of the 2C-Climatronic, air ducts integrated in the dash panel lead to the vents on the upper side of the dash panel to provide indirect ventilation.



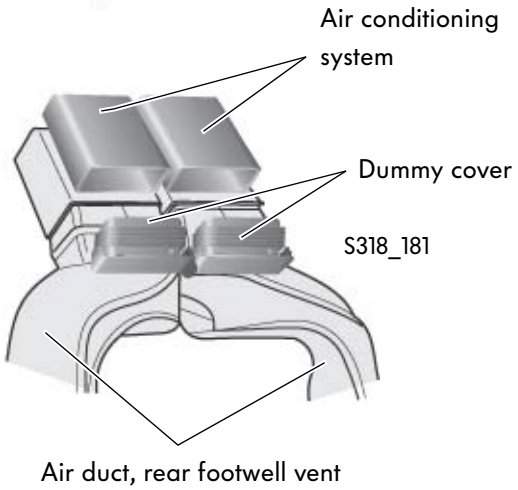
S318_191

Vents
in the A-pillar



S318_020

A centre console with vent can be ordered as an optional extra for the air conditioning systems and the heating and ventilation system.
Air is ducted from the air conditioner to the centre vents along a common air duct. In vehicles without a vent in the centre console, the outlet on the air conditioner is sealed by a dummy cover.

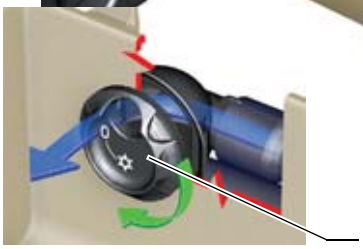


The refrigerant circuit

The refrigerant circuit with expansion valve in the 2004 Golf is technically identical to the refrigerant circuit in other vehicles with an externally controlled compressor.
The drier is bolted onto the capacitor, and an externally controlled compressor is used. The electronic high pressure sender G65 and the evaporator out-flow temperature sender G263 are installed for monitoring and control purposes.

Those vehicles which are fitted with an air conditioner have as standard equipment a cooled storage compartment on the front passenger side. The storage compartment is cooled by cold air which is extracted directly at the outlet end of the
evaporator and channeled to the storage compartment. Refrigeration output can be adjusted manually using an adjustable outlet.

S318_004



S318_006

If the vehicle has a centre console with rear vents, the storage compartment in the centre console also has a temperature control function. In this case, the air is extracted from the air duct leading to the centre console vent.
Again, the air supply can be set manually with an adjustable nozzle.

S318_143

Heating and air conditioning

Air conditioning systems

The 2C Climatronic

Following in the footsteps of the Touran, the 2004 Golf will become the second vehicle in this vehicle class to be equipped with a 2-zone air conditioning system. This means that the temperature on the driver's and front passenger's sides can be set separately to between 16 °C and 29.5 °C. If the "Auto" button is pressed for longer than two seconds, the temperatures in both zones can be adjusted simultaneously from the driver's side.
The division into two air-conditioning zones is achieved by using two temperature flaps within the air conditioner. In the case of the 2C-Climatronic, all air conditioner flaps are actuated by six control motors with integrated potentiometer. The 2C-Climatronic can be operated both automatically and manually.

S318_036

To prevent the windscreen from fogging, the 2C-Climatronic automatically increases the air flow to the windscreen if the compressor is deactivated and the windscreen wipers are activated.
To this effect, the defrost flap is opened wider.

The 2C-Climatronic also has a function which reduces the output of the fresh air blower depending on vehicle speed. To minimise the airflow noise of the air conditioner after wind and tyre noise have been eliminated, the fresh air blower voltage is adjusted as a function of road speed - without this being noticed by the vehicle occupants. Air distribution is thus reduced. When the cooling function is active, the system compensates for the reduction in air distribution by reducing the air outlet temperature and, if heating mode is active, by increasing the ventilation temperature.

The Climatic system

For climate control, the interior of the vehicle is seen as one climate zone.
The Climatic air conditioner has a combined fresh air recirculating flap which, like the temperature flap, is driven by a control motor. In the Climatic system, the air distribution flaps are actuated by a flexible shaft. The temperature request is transferred directly to the control unit by a potentiometer integrated in the rotary switch. The desired temperature is achieved by adjusting the temperature flap.

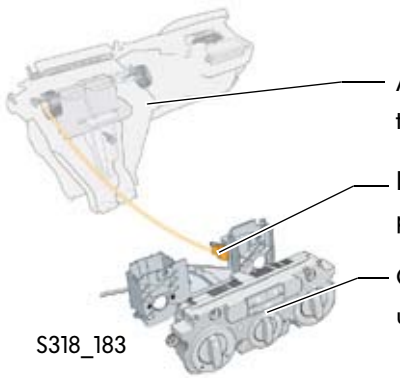
S318_034

Interface to the air conditioner

The operating units of the Climatic and the manual heating are divided into a rear mechanical part, which is connected to the flexible shaft, and a front electronic part.
The heater is additionally attached by a bowden cable. The air conditioner is installed and removed according to the same procedure as in the Touran.

In comparison with the Touran, the connection to the flexible shaft on the air conditioner has, for space reasons, been relocated from the left-hand side of the flaps to the right-hand side of the flaps.
As a result, the intermediate part of the operating unit had to be adapted to the modified routing of the flexible shaft.

Touran 2003:



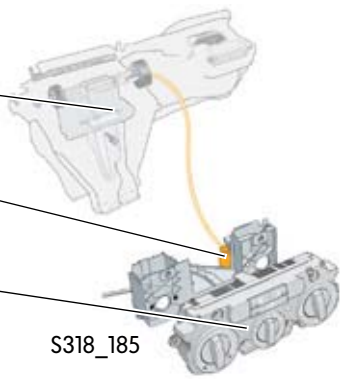
S318_183

Air conditioner

Intermediate part

Operating unit

2004 Golf:



S318_185

Heating and air conditioning

Overview of the 2C-Climatronic/Climatic system

Fresh air intake duct temperature sensor G89*

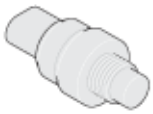
Vent temperature sender, left footwell G261

Vent temperature sender, right footwell G262*

Left vent temperature sender G150

Right vent temperature sender G151*

High pressure sender G65



Evaporator out-flow temperature sender G263

Sunlight penetration photo sensor G134*

Defroster flap control motor potentiometer G135*

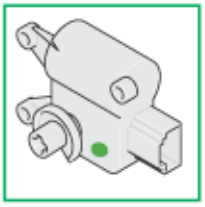
Air recirculation flap control motor potentiometer G143

Central flap control motor potentiometer G112*

Air flow flap control motor potentiometer G113*

Left temperature flap control motor potentiometer G220

Right temperature flap control motor potentiometer G221*



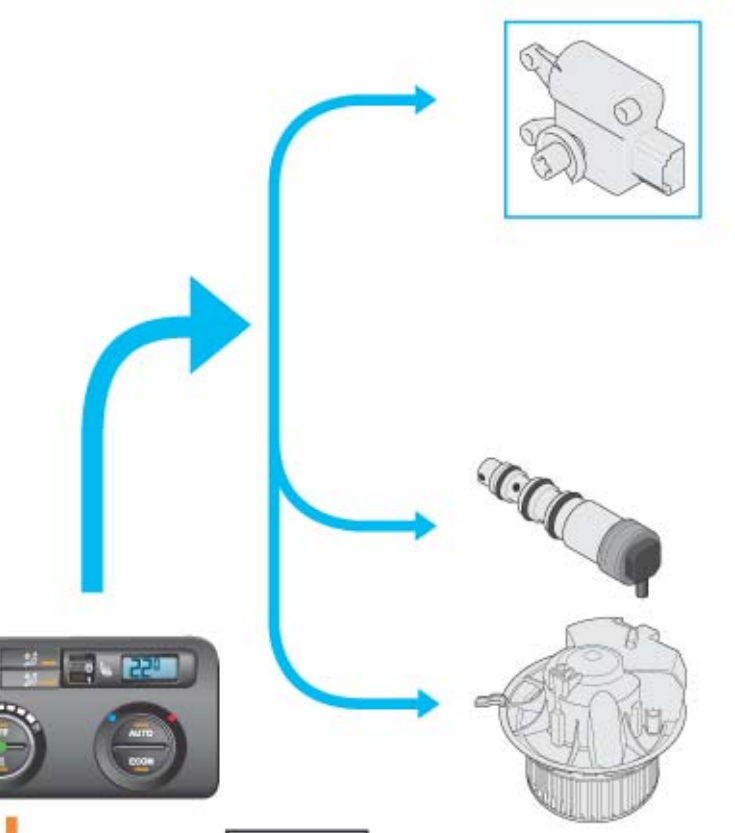
Climatronic control unit J255

Control unit with display unit in dash panel insert J285

Combi CAN data bus

Motronic control unit J220

Drivetrain CAN data bus



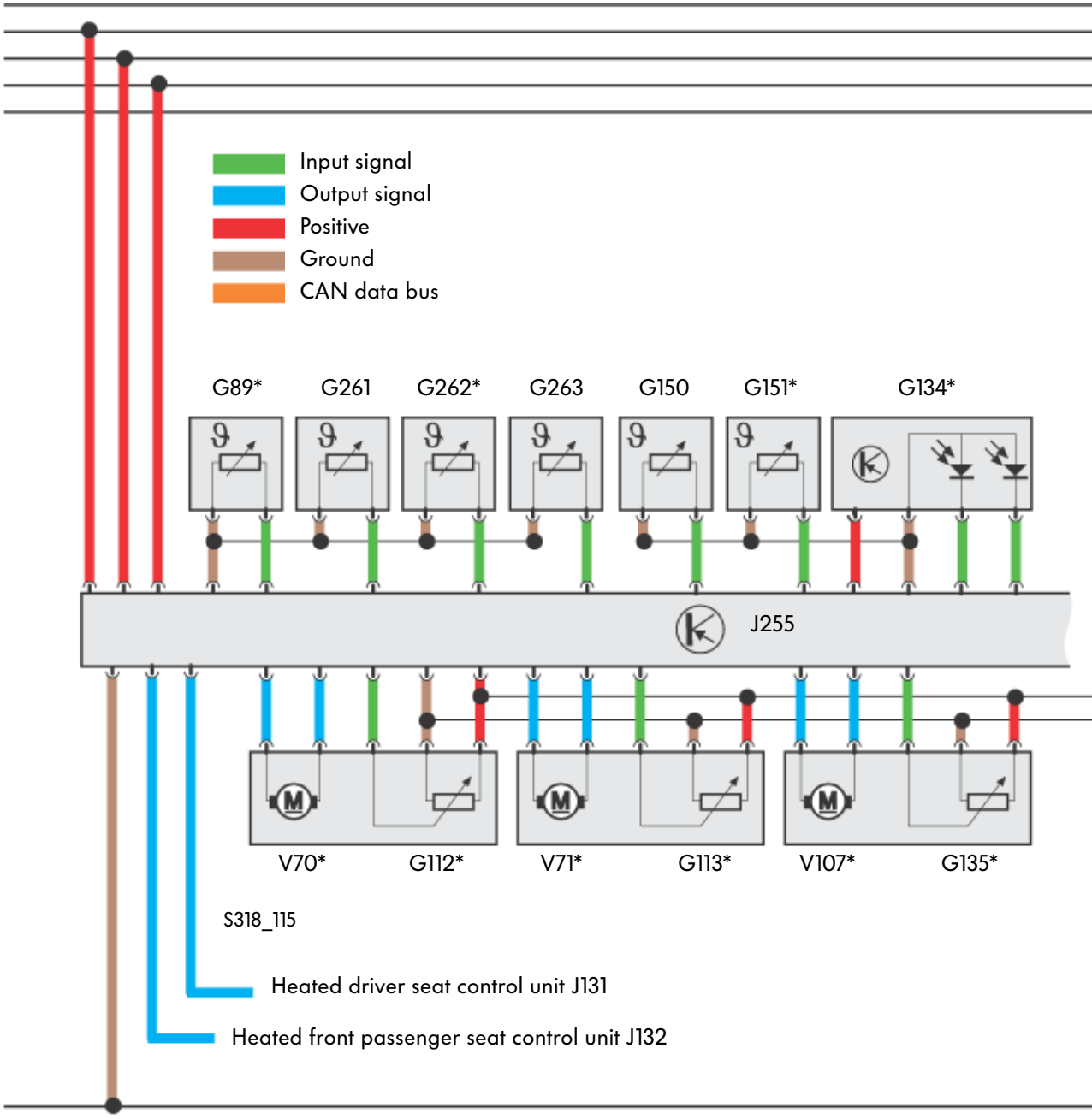
S318_083

* only in combination with 2C-Climatronic

** only in combination with diesel engine with no auxiliary water heater

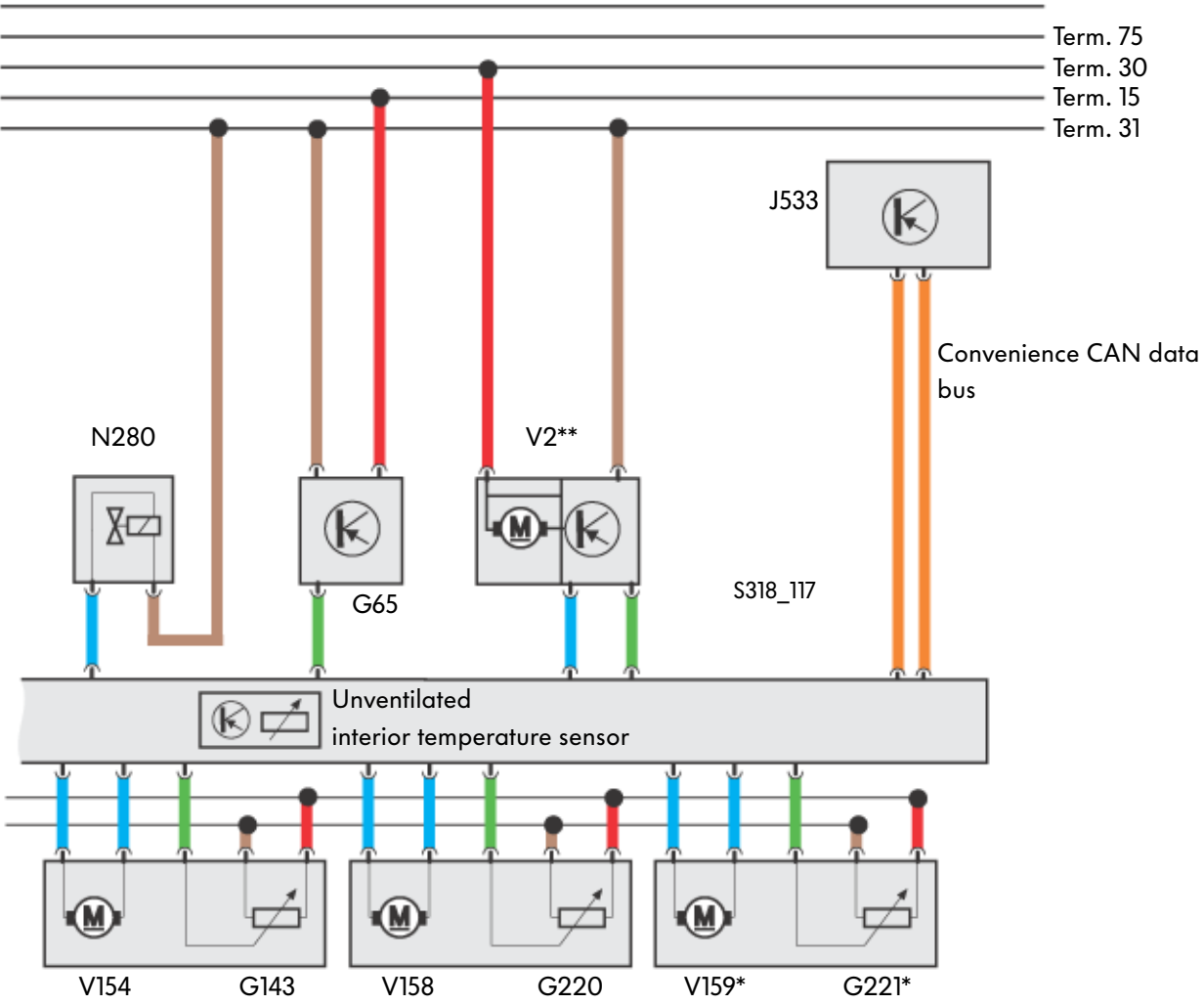
Heating and air conditioning

Function diagram - air conditioning systems



G89 Fresh air intake duct temperature sensor
G261 Vent temperature sender, left footwell
G262 Vent temperature sender, right footwell
G263 Evaporator out-flow temperature sender
G150 Left vent temperature sender
G151 Right vent temperature sender
G134 Sunlight penetration photo sensor

J255 Climatronic control unit
V70 Central flap control motor (dash panel/footwell)
G112 Central flap control motor potentiometer
V71 Air flow flap control motor
G113 Air flow flap control motor potentiometer
V107 Defroster flap control motor
G135 Defroster flap control motor potentiometer



* only in combination with 2C-Climatronic

** The V2 fresh air blower motor with electronic control is only fitted in combination with 2C-Climatronic. Climatic and the heater are controlled through series resistors.

In the case of Climatic, the sensors and actuators have in part different designations. For details, please refer to the latest current flow diagrams.

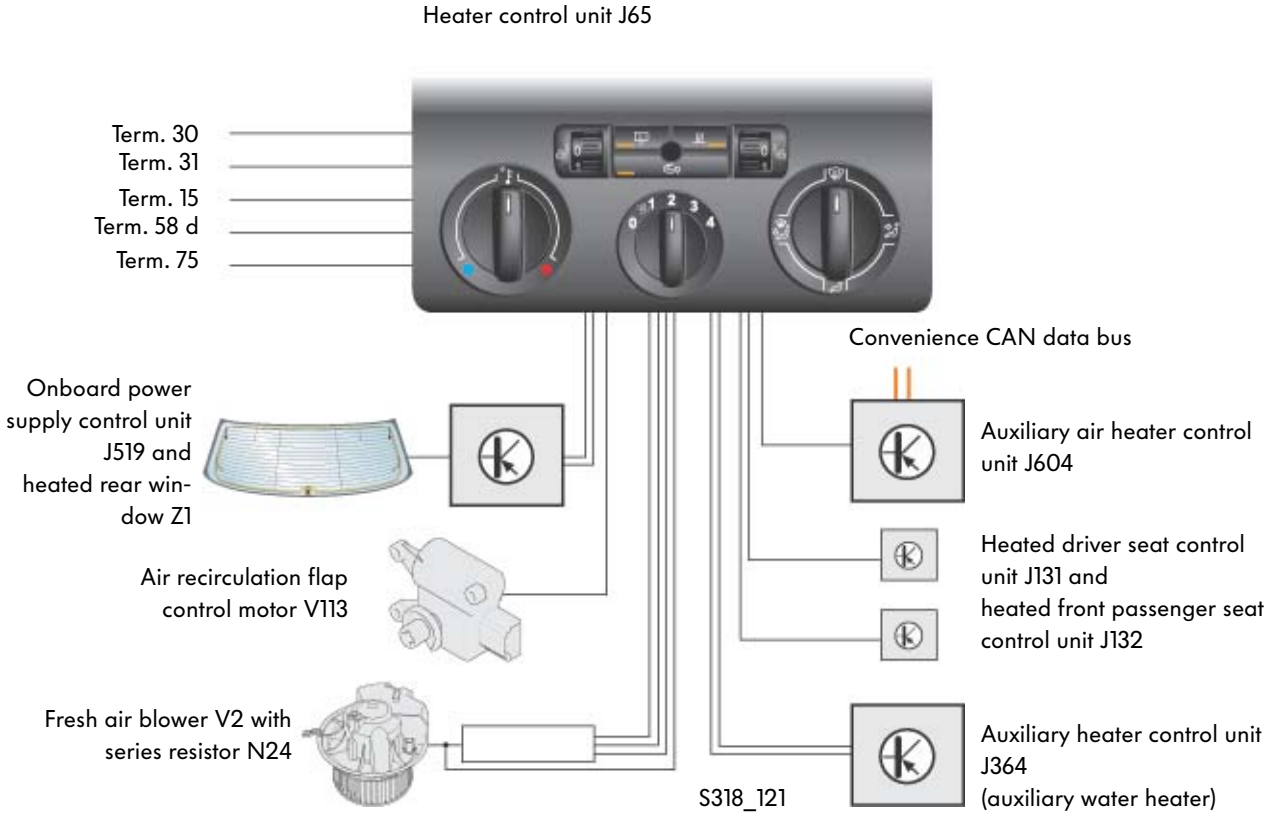
N280 Air conditioning system compressor regulating valve
G65 High pressure sender
V2 Fresh air blower
J533 Data bus diagnostic interface
V154 Air recirculation flap control motor
G143 Air recirculation flap control motor potentiometer
V158 Temperature flap control motor, left
G220 Left temperature flap control motor potentiometer
V159 Temperature flap control motor, right
G221 Right temperature flap control motor potentiometer

Heating and air conditioning

The heating and ventilation system

In the case of the heating and ventilation system, the temperature is not controlled automatically. The two rotary knobs are only mechanically connected to the air conditioner: The rotary knob for temperature adjustment is connected by a Bowden cable and the rotary knob for air distribution is connected by a flexible shaft, like in the Climatic system. The fresh air recirculating flap is selected manually by a button and actuated by a control motor.
All input and output signals are converted to analog signals. The heated rear window activation command is transmitted to the onboard power supply control unit, which switches the heated rear window on depending on the utilization factor of the vehicle electrical system. The feedback signal for activating the LED in the button is generated simultaneously. The process for the additional water heater is similar. The auxiliary water heater is activated by the instant heat button. When the auxiliary water heater starts to operate, the LED in the instant heat button is activated by the feedback signal.

The heater and ventilation control unit has its own address word (7D), however it is not CAN-networked.



Sensors

The unventilated interior temperature sensor

Function

The new unventilated interior temperature sensor replaces the dash panel temperature sensor G56 with ventilation motor. It is integrated in the operating unit together with the control unit.

The new sensor measures the following values:

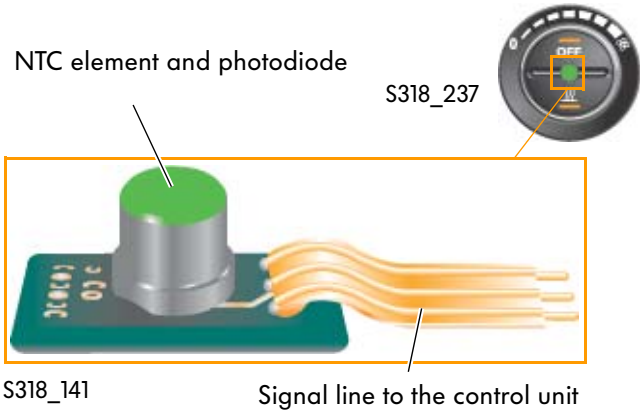
- surface temperature,
- unit temperature and
- sunlight penetration.

It has the following
advantages over its predecessor:

- it is less susceptible to soiling as the sensor housing is protected, so there is less interference with temperature regulation,
- there are no components which rotate mechanically, so the sensor is more wear-resistant,
- there is no ventilation grille in the trim (design advantage),
- lower costs.

Construction

The unventilated interior temperature sensor essentially consists of an "integrated thermo-optical sensor" - an NTC element in combination with a photodiode.
This electronic component can measure the temperature and intensity of the solar radiation incident on its surface. As a result, the sensor is able to measure exactly the air temperature in the vehicle interior even if the sensor's surface has heated up considerably. The sensor signals are transmitted via signal lines to the control electronics of the Climatic or 2C-Climatronic. An intelligent software function of the control electronics then evaluates the sensor signals and regulates the temperature of the occupant cell.

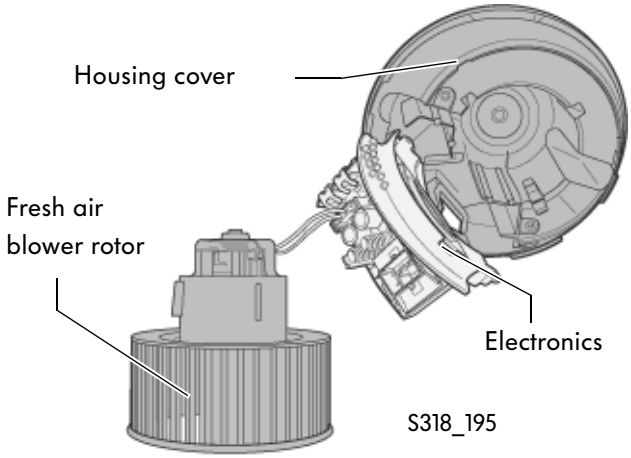


Further information:
SSP 208 "Air Conditioners in the Motor Vehicle",
SSP 271 "The Phaeton Heating and Air Conditioning System"
SSP 301 "The Touareg heating/ air conditioning system".

Actuators

The fresh air blower with integrated fresh air blower controller V2

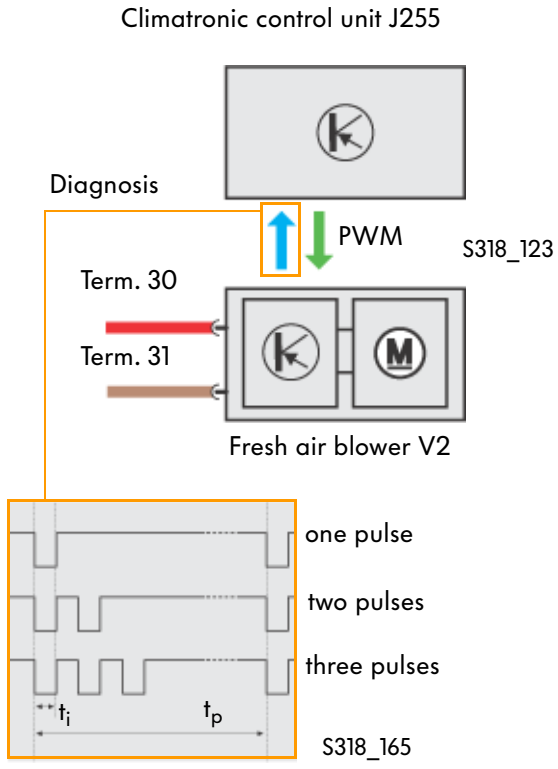
In the case of the 2C-Climatronic, a fresh air blower with an integrated electronic control is installed. The fresh air blower is accessible from the front passenger footwell.



Activation of the fresh air blower controller

The fresh air blower with integrated electronic fresh air blower controller V2 is addressed by the air conditioner control unit via a pulse-width modulated signal (PWM) and can send back a diagnostic feedback signal.

If, for example, a pulse is transmitted in the diagnostic feedback signal, this indicates to the air conditioner control unit that no fault is present.
Two pulses signal that the current is limited; three pulses signal that the temperature is too high and can lead to a reduction in output or deactivation of the fresh air blower.



t_i = time segment of one pulse
t_p = time segment of one period

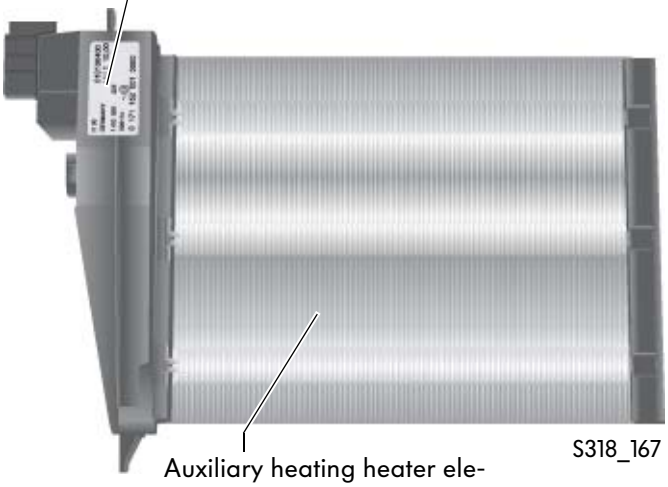
For information on other actuators, please refer to SSP 208 "Air Conditioners in the Motor Vehicle", SSP 271 "The Phaeton Heating and Air Conditioning System" and SSP 301 "The Touareg - Heating/air-conditioning system".

The electrical auxiliary air heater

An electrical auxiliary air heater is installed in diesel vehicles. The electrical auxiliary air heater is a combination of a PTC heater element with an integrated control unit. It is installed downstream of the heat exchanger and provides additional heating of the vehicle interior after cold-starting the engine. The electrical auxiliary air heater directly heats the air which enters the vehicle interior. It acquires all information needed for operation via the convenience CAN data bus.

In the "Heating" version, the heating request is issued via a separate signal line.

The electrical auxiliary air heater is not installed if the vehicle has an additional water heater, as the latter is used to provide additional heating at low outside temperatures.



Activation conditions

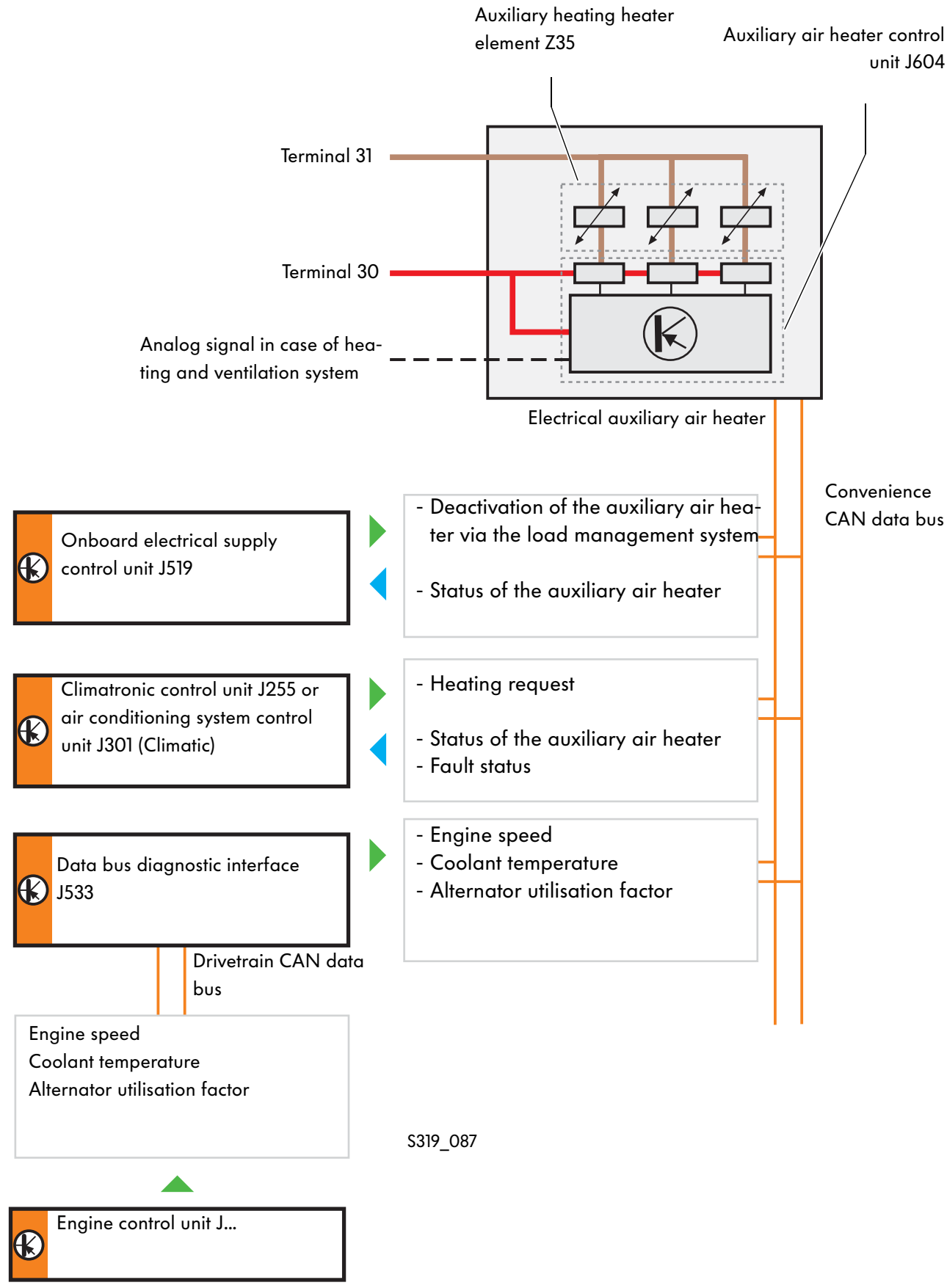
The electrical auxiliary air heater is activated:

- in the case of the 2C-Climatronic and Climatic: automatically via the CAN data bus; in the case of the heating system: if the occupants set the heating output to over 90% at the operating unit (analog signal),
- if the water temperature is below 75°C,
- if the engine speed is higher than 500 rpm,
- if no load management system is active and
- if the ECON button is not pressed.

The importance of the load management system

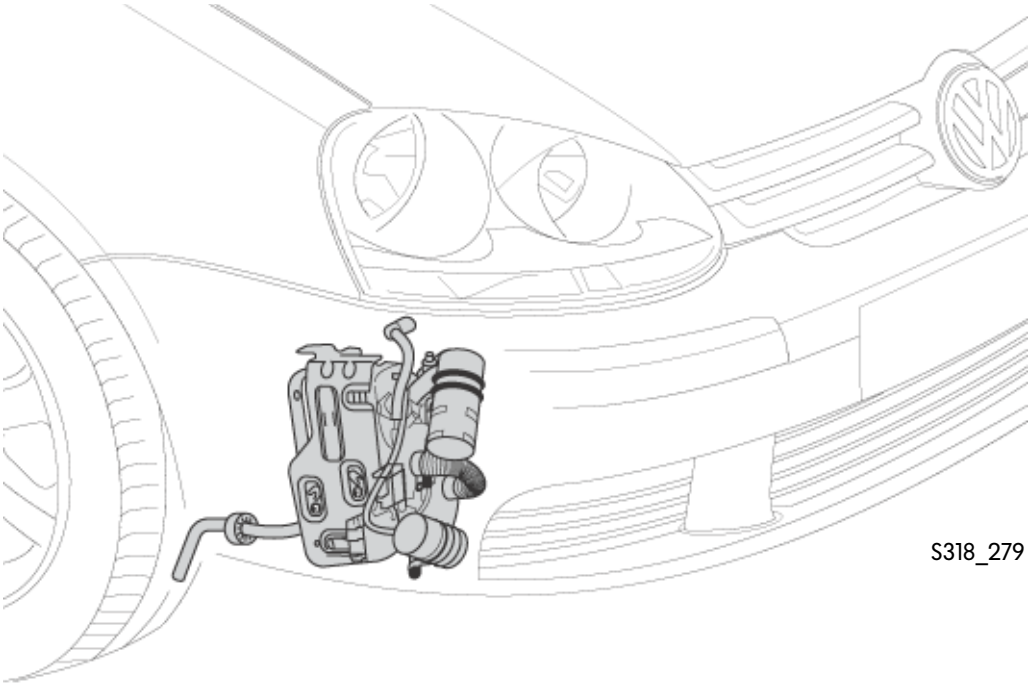
The onboard power supply control unit controls the load management system, which has a special part to play in operation of the electrical auxiliary air heater. It can deactivate the electrical auxiliary air heater partially or completely. The load management system's status is indicated in the data blocks of the electrical auxiliary air heater. Power output can be reduced in steps of 75%, 50% and 25%.

Function flowchart of the electrical auxiliary air heater



The auxiliary water heater

There is a growing demand for engine-independent heaters. Whether in the summer or in the winter, customers seek a pleasant interior climate - without misted-up or iced-up windows.
To meet these customer specifications, the Golf can be ordered with the Thermo Top V auxiliary water heater as optional equipment.



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Tasks of the auxiliary water heater

The auxiliary water heater is used for the following tasks:

- as an auxiliary heater for heating the vehicle interior and defrosting the vehicle's windows,
- as an auxiliary ventilation system for lowering the interior temperature when the vehicle is parked in sunlight and
- as an auxiliary heater for petrol and diesel engines. If a diesel vehicle is equipped with an auxiliary water heater, the electrical auxiliary air heater is not required; in this case, the auxiliary water heater automatically provides an additional heating function at outside temperature of below 5°C.

For further information on additional water heaters, please refer to the SSP 280 "The Phaeton - Thermo TOP C Additional Water Heater and Thermo TOP Z Additional Heater".

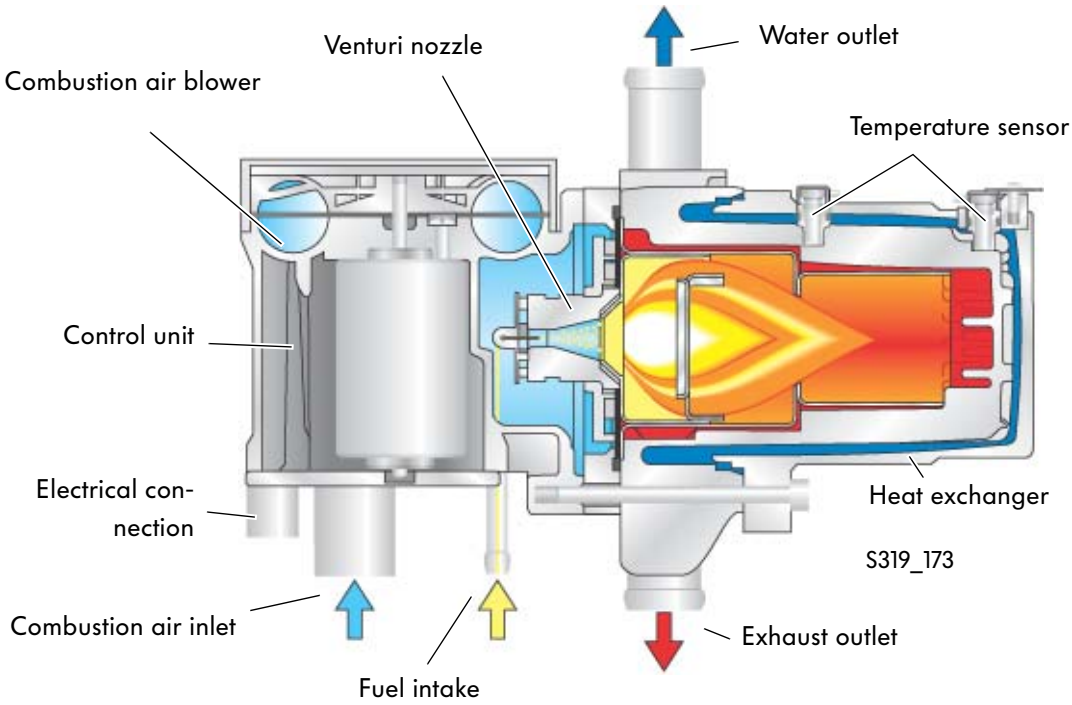
Heating and air conditioning

New features of the Thermo Top V

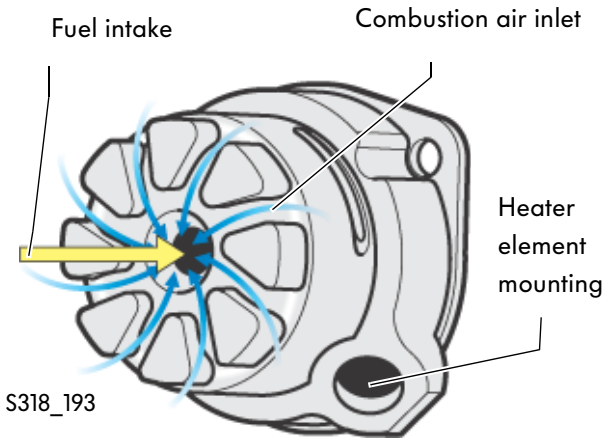
The auxiliary water heater control unit is also integrated in the heater, but its design has been modified. The electrical contacts of the combustion air blower are fastened directly to the control unit.

In addition, the new auxiliary water heater has a second NTC temperature sensor in the heater. This provides for improved water temperature monitoring and regulation.

Another new feature is the fuel injection system: the fuel is no longer mixed with the combustion air in a fuel evaporator (non-woven material). A Venturi nozzle is used in place of the non-woven material.

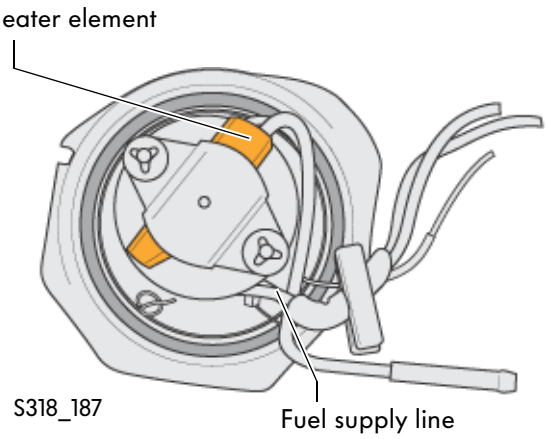


The Intake air is ducted through a ceramic housing which is shaped to form a Venturi nozzle. Fuel injection is assisted by the suction effect.



The fuel preheater

The Thermo Top V is also suitable for RME fuels (biodiesel). This is made possible by a fuel preheater. The fuel is preheated by a PTC heater element directly before the commencement of injection into the combustion chamber. In addition, this avoids heavy smoke formation during the start phase.
To achieve this, the PTC heater element is switched on for approx. one minute when the additional water heater is operated at outside temperatures of below 5°C.



Activation of Thermo Top V

There are three ways to activate the Thermo Top Vauxiliary water heater.
The "Heat" and "Ventilate" functions can be set on the display on the dash panel insert.

1. Activation of the auxiliary water heater with the instant heat button on the operating unit.

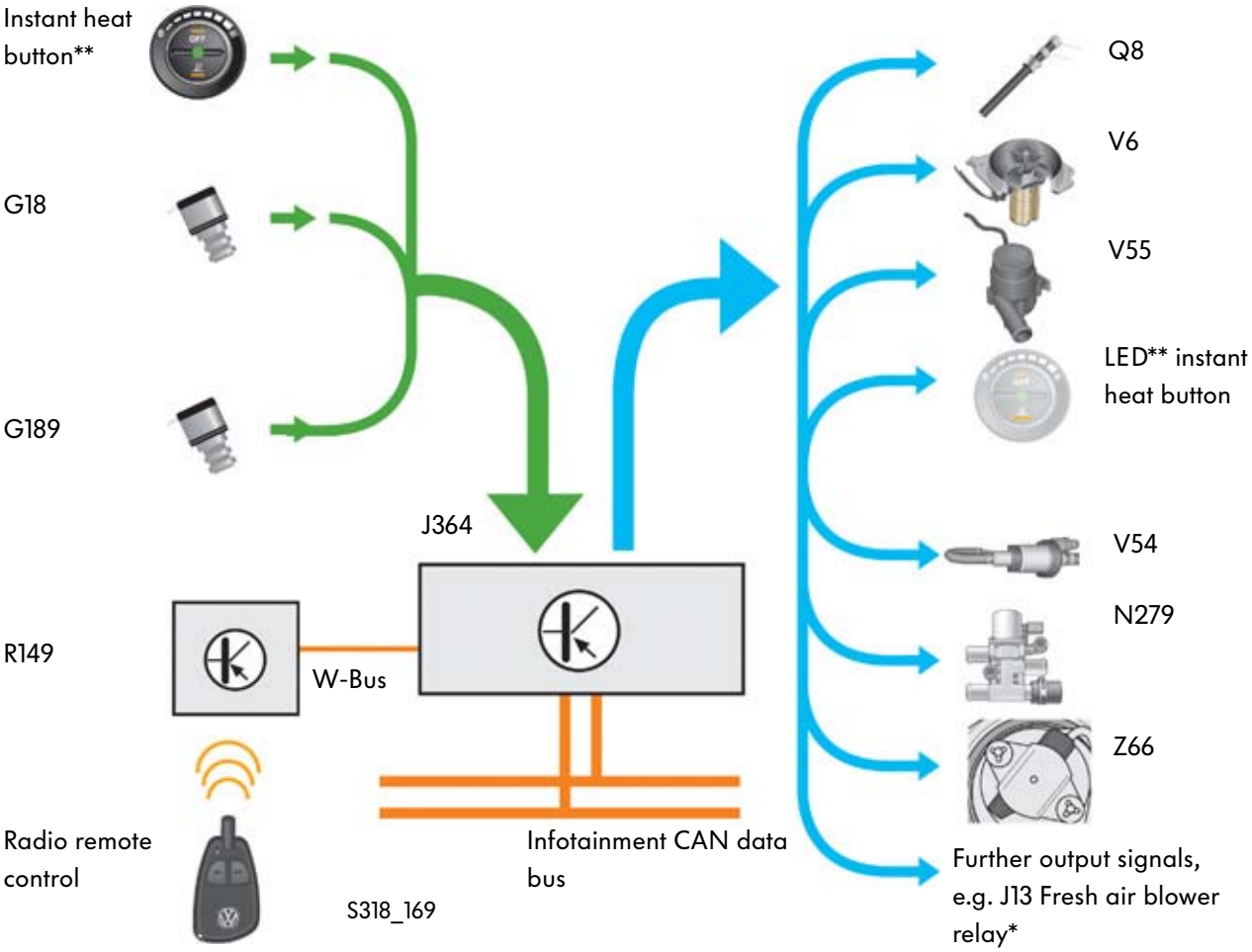
2. Programming of the auxiliary water heater via the multi-function display (MFA) with Data Display Protocol (DDP). Thermo Top V can be programmed via the display on the dash panel insert under the menu item "Auxiliary heater" (personalisation).

3. With the separate radio remote control for the additional water heater, Thermo Top V is switched on and off via the remote control.

The instant heat button in the operating unit indicates the status of the auxiliary water heater: if it is active, the feedback LED is lit yellow. If a programmed on-time is active for theauxiliary water heater, the feedback LED comes on for approx. 10 seconds after the ignition is turned on.

Heating and air conditioning

Overview of the auxiliary water heating system

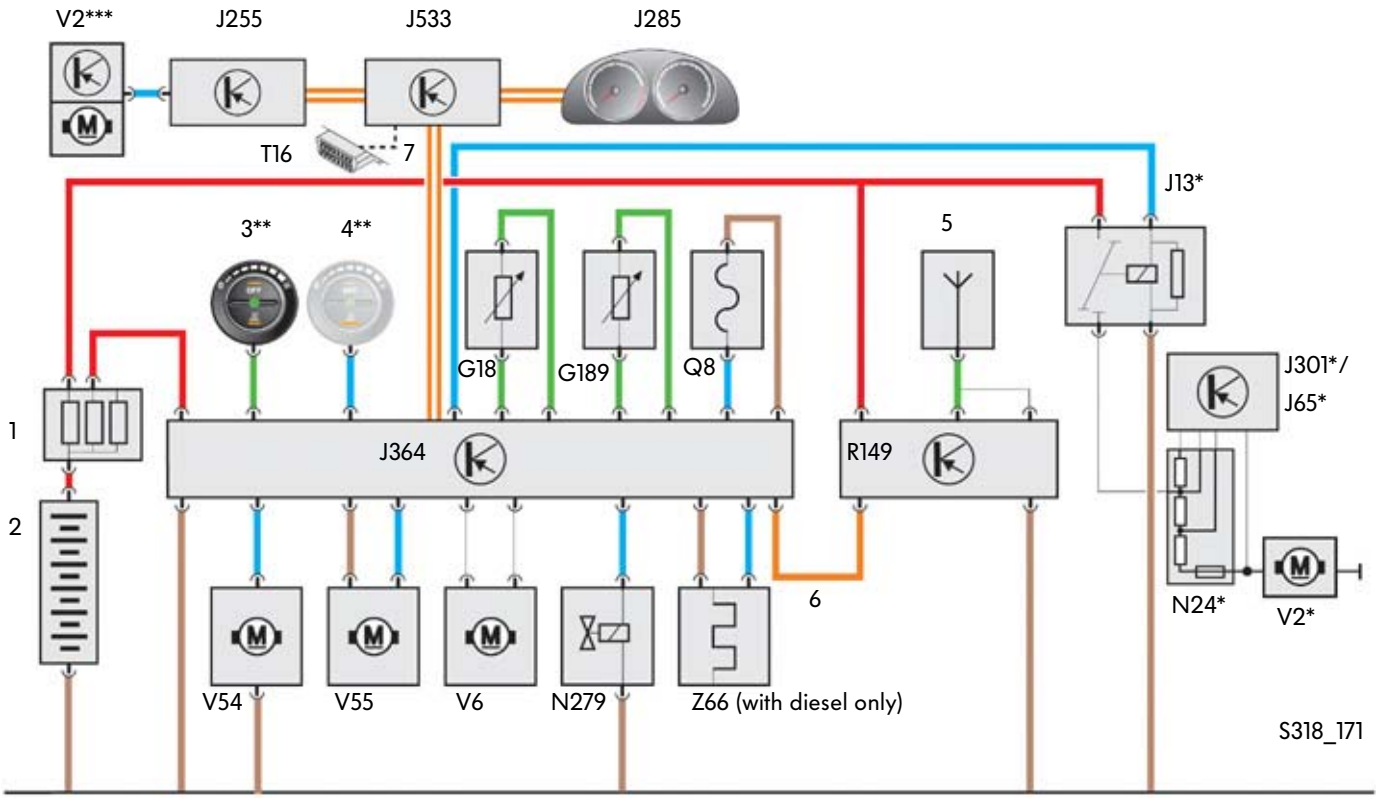


* only in combination with Climatic and heating
** as analog signal only in combination with heating, otherwise via CAN data line

G18 Temperature sensor
G189 Overheating sensor
R149 Auxiliary coolant heater radio receiver
Q8 Glow plug with flame monitor
V6 Combustion air blower
V55 Recirculation pump

W-Bus Special data line of the manufacturer Webasto
J364 Additional heater control unit (additional water heater)
V54 Metering pump
N279 Heater coolant shut-off valve
Z66 Fuel pre-heating heater element (with diesel only)

Function diagram of the additional water heater



* only in combination with Climatic and heating

** as analog signal only with heating, otherwise via CAN data line

*** In the case of 2C-Climatronic, fresh air blower V2 is used with an electronic control and is activated directly.

1 Fuse
2 Battery
3 Instant heat button
4 Instant heat button LED
5 Aerial
6 W-Bus, special data line of the manufacturer Webasto
7 Infotainment CAN data bus
V2 Fresh air blower
J255 Climatronic control unit
J533 Data bus diagnostic interface
J285 Control unit with display in dash panel insert
T16 Diagnosis plug
G18 Temperature sensor
G189 Overheating sensor
Q8 Glow plug with flame monitor
J364 Additional heater control unit (additional water heater)
R149 Auxiliary coolant heater radio receiver
V54 Metering pump
V55 Recirculation pump
V6 Combustion air blower
N279 Heater coolant shut-off valve
J13 Fresh air blower relay
Z66 Fuel pre-heating heater element (with diesel only)
J301 Air conditioning system control unit
J65 Heater control unit
N24 Fresh air blower series resistor with overheating fuse

Input signal
output signal
Positive
Ground
CAN data bus

Radio and navigation

The radio systems in the 2004 Golf

The R100 radio

The R100 radio is available to large customers, e.g. fleet operators. It is a radio system with the following functions:

- two loudspeaker channels (front only, each 20 W),
- RDS FM/AM Europe Radio (AM without LW),
- without integrated drive,
- controls for external 6 disc CD changer,
- telephone control (hands-free operation),
- speed-dependent volume control (GALA),
- self-diagnosis incl. loudspeaker diagnosis,
- Transport Mode (power demand reduction while in transportation and idle).

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The RCD 300 radio

The RCD 300 radio is available to private customers as a standard radio system.
It has the following functions:

- two or four loudspeaker channels (each 20 W),
- RDS FM/AM Europe Radio (AM without LW),
- display of stored stations together with RDS names,
- Diversity FM-2 tuner,
- control via multi-function steering wheel (MFS) and multi-function display (MFD),
- integrated single CD drive,
- controls for external 6 disc CD changer,
- telephone control (hands-free operation),
- GALA,
- self-diagnosis incl. loudspeaker diagnosis,
- Transport Mode.

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The RCD 500 radio

The flagship radio in the 2004 Golf is the RCD 500 with the following functions:

- four loudspeaker channels (each 20 W),
- RDS FM/AM Europe Radio (AM without LW),
- display of stored stations together with RDS names,
- Diversity FM-2 tuner,
- control via MFS and MFD,
- integrated 6 disc CD changer,
- controls for external 6 disc CD changer,
- telephone control (hands-free operation),
- GALA,
- Traffic Information Memory (TIM),
- model-specific sound adaptation,

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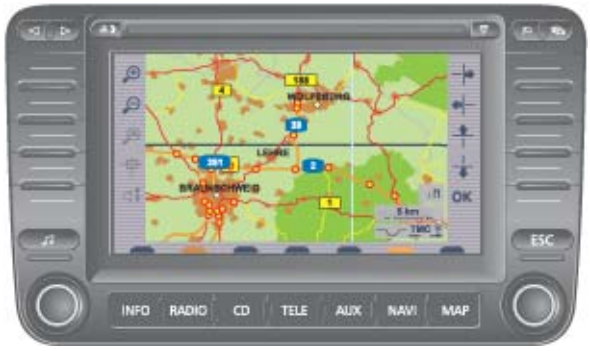
- self-diagnosis incl. loudspeaker diagnosis,
- Transport Mode,
- optional external sound amplifier can be connected.

The MFD 2 radio navigation system

A radio system with an integrated navigation system is also available for the Golf.
It is operated in much the same way as the radio navigation system from the Touareg.
Features include:

- multi-colour display (MCD),
- dynamic traffic guidance,
- four loudspeaker channels (each 20 W),
- RDS FM/AM Europe Radio (AM without LW),
- display of stored stations together with RDS names,
- external Diversity switching box,
- control via MFS and MFD,
- controls for external 6 disc CD changer,
- telephone control (hands-free operation),
- GALA,
- TIM,
- self-diagnosis incl. loudspeaker diagnosis.



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To remove and install a radio, the cover frame must be removed to obtain access to the screwed connection behind it.

The Euro On-Board Diagnostic System (EOBD)

The 2004 Golf meets the European EU 4 exhaust emission standard and has the Euro On-Board Diagnostic System (EOBD).
An EOBD system has been compulsory for new cars with petrol engines since the year 2000 and for diesel vehicles since 2003.

EOBD monitors continuously the components, subsystems and electrical components of the vehicle which are relevant to exhaust emissions and affect emission values in case of failure or malfunction.

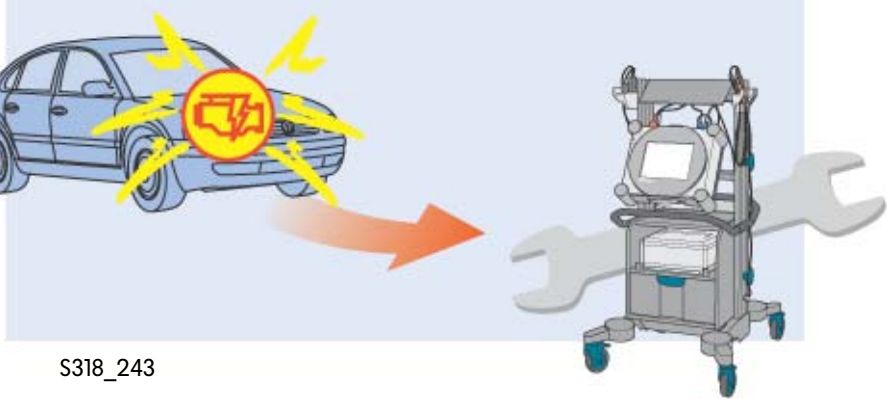
The system is distinguished by:

- a standardised exhaust emissions warning lamp (MIL),
- a standardised diagnosis interface and
- a standardised data profile through the use of standardised fault codes.

A fault relevant to exhaust emissions is signaled to the driver by the MIL.
In this case, the owner must have the vehicle checked immediately at a workshop.

The fault memory is read out and existing faults are remedied via the standardised diagnosis interface using the VAS 5051 or VAS 5052. Faults relevant to exhaust emissions can also be read out with any OBD display unit (Generic Scan Tool).

For further information on EOBD, please refer to the SSP 231 "Euro On-board Diagnostic System for petrol engines" and the SSP 315 "European On-board Diagnosis for diesel engines".



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New workshop equipment

The alignment bracket set VAS 6240 can be used together with supplementary set VAS 6240/2 for the 2004 Golf.

New workshop equipment

- Alignment bracket set VAS 6240,
- Supplementary set VAS 6240/2,
- Portal gauge supplement VAS 5007/18.

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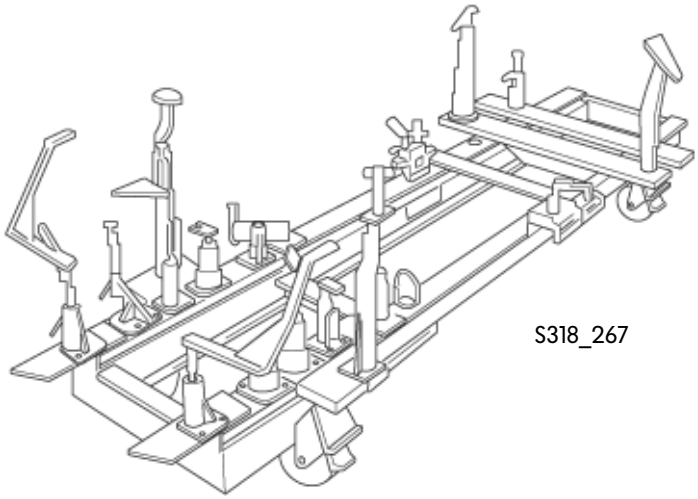
Straightening bracket set VAS 6240



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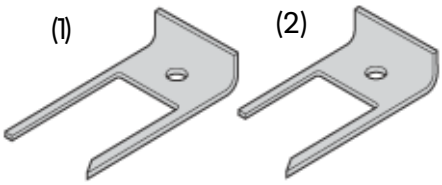
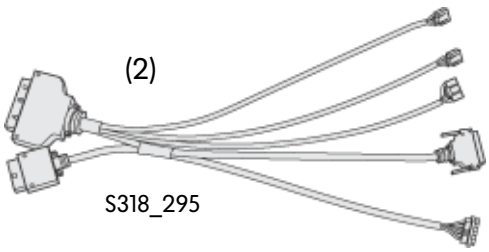
New special tools

Tool no.	Diagram	Application
T10237	 S318_269	Door setting tool
T10236	 S318_265	Removing tool for rear door
T10238 (1) T10240 (2)	 S318_291	Releasing tool for accelerator pedal module Left-hand drive (1) and right-hand drive (2)
V.A.G. 1598/42 (1) V.A.G. 1598/47 (2)	(1)  S318_293  S318_295	Test box (1) and test adapter (2) for checking and troubleshooting the 2C-Climatronic and Climatic systems as well as the heating and ventilation system in the 2004 Golf and in the Touran

Notes

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000.2811.39.20 Technical status 09/03