

Service.



Self-Study Programme 263

Polo Model Year 2002



The visual appearance of the new Polo features the 4-eyed face with round headlights and the hatchback.

The new Polo again sets new standards in its class by offering improved spatial comfort, innovative state-of-the-art technology and all-round safety. It also meets high quality standards.

In this Self-Study Programme, we will present the new technical features and innovations of the new Polo.



263_099



263_100

The following Self-Study Programmes relating to the Polo 2002 are also available:

- SSP 259 "Electro-hydraulic Power Steering"
- SSP 260 "1.2-litre 3-cylinder Petrol Engines"
- SSP 264 "Brake Assistant System (BAS)"
- SSP 265 "Vehicle Electrical System in Polo Model Year 2002"

New



Important Note



This Self-Study Programme explains the design and function of new developments! The contents are not updated.

Please always refer to the relevant Service Literature for current inspection, adjustment and repair instructions.



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Summary



The Polo Model Year 2002 is available in 2-door and 4-door body versions.

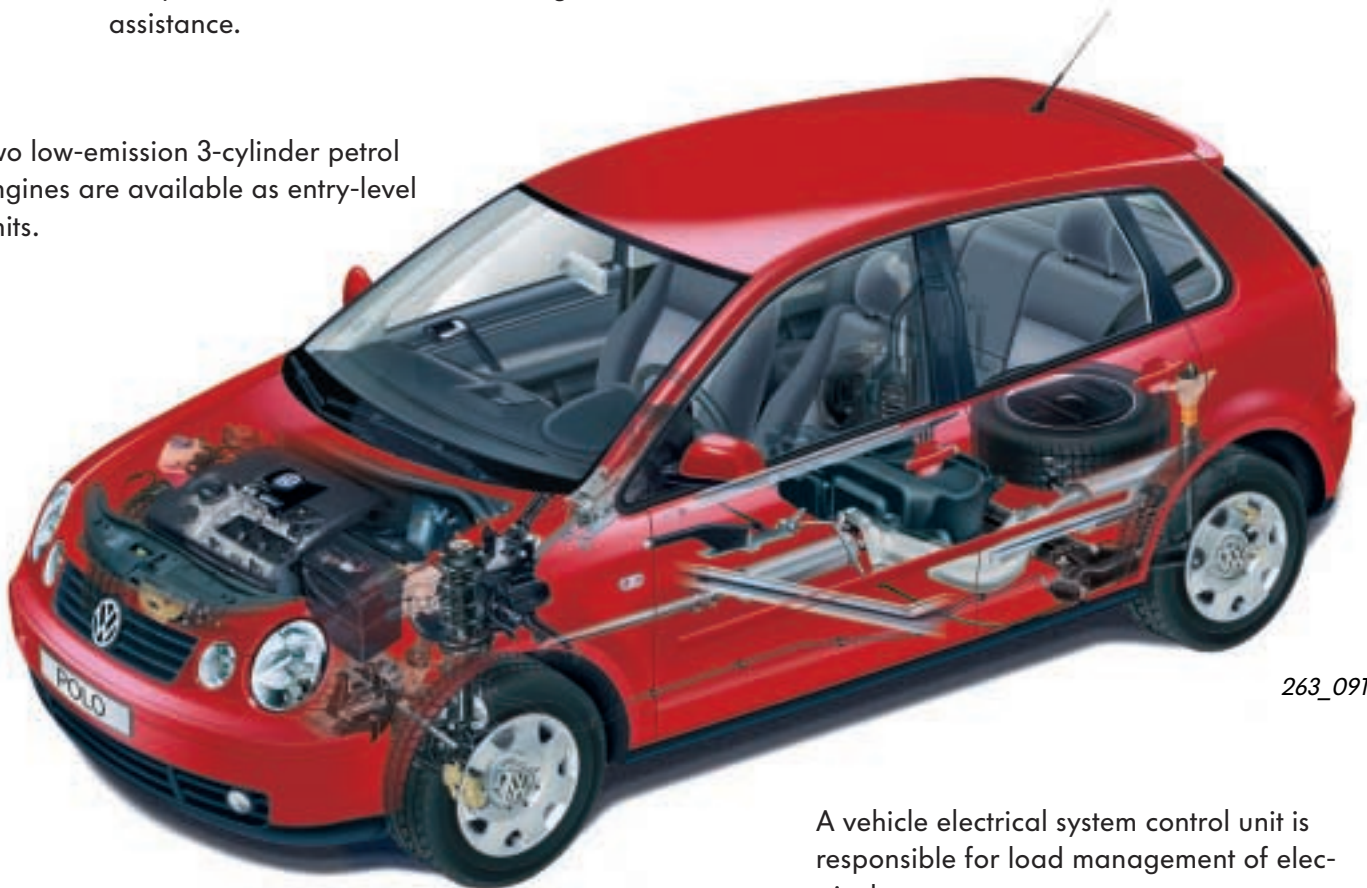
The vehicle is at the cutting edge with regard to safety, quality, performance, running gear and equipment.

A semi-automatic air conditioning system - Climatic - ensures a pleasant climate inside the passenger cabin.

An electro-hydraulic power steering system provides needs-oriented steering assistance.

Easy entry seats with memory function facilitate access to the rear seats.

Two low-emission 3-cylinder petrol engines are available as entry-level units.



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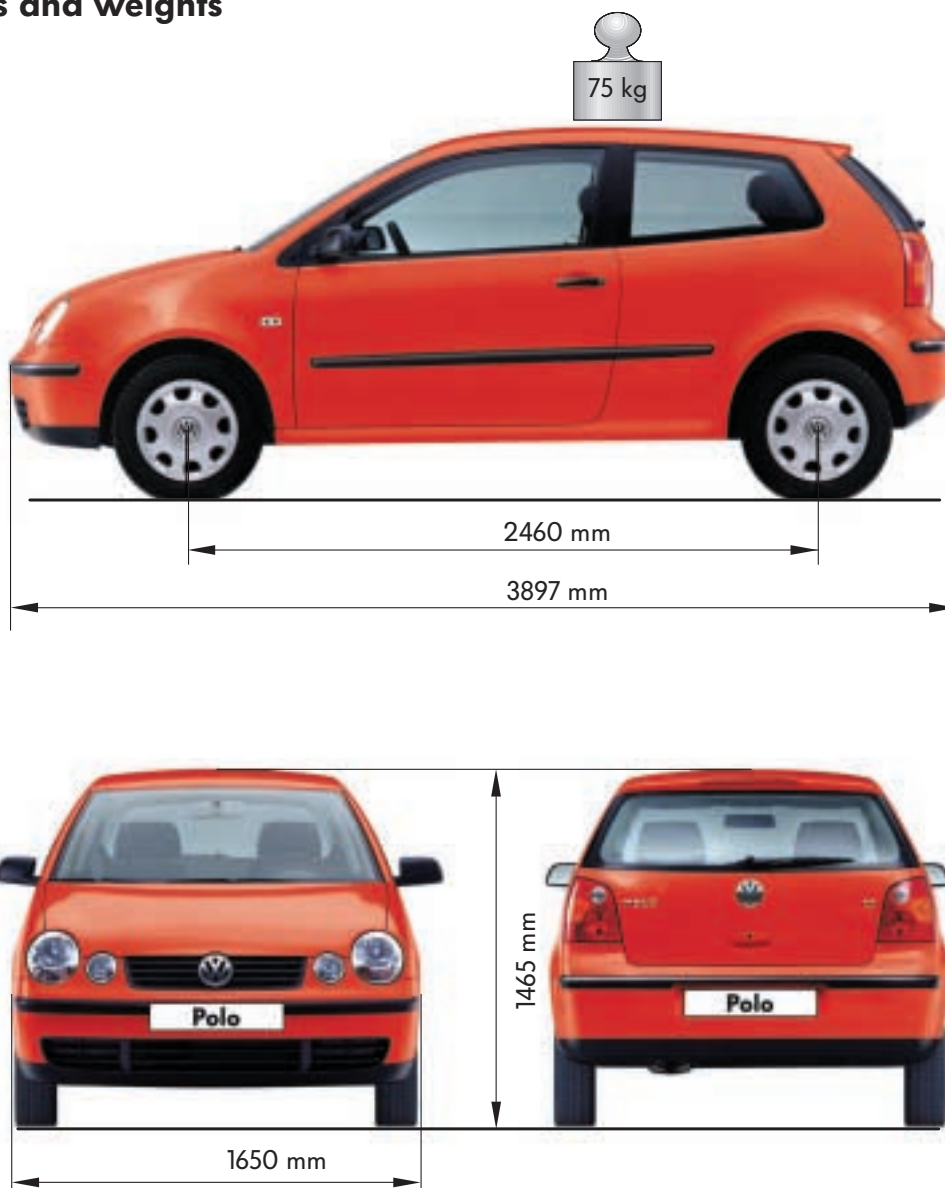
The front end obtains a certain friendly appearance from the round front headlights.

A vehicle electrical system control unit is responsible for load management of electrical system components.

It monitors automotive components not integrated in the two CAN bus systems.

A hydraulic brake assistant system (BAS) assists the driver with braking in hazardous situations.

Dimensions and weights



263_086

| | |
|----------------|---------|
| Length | 3897 mm |
| Width | 1650 mm |
| Height | 1465 mm |
| Wheelbase | 2460 mm |
| Turning circle | 10,6 m |
| Tank capacity | 45 l |

| | |
|-------------------------------|----------|
| Front track width | 1435 mm |
| Rear track width | 1425 mm |
| Max. permissible gross weight | 1560 kg* |
| Kerb weight | 1025 kg* |
| Max. permissible roof load | 75 kg |
| Drag coefficient c_d | 0,32 |

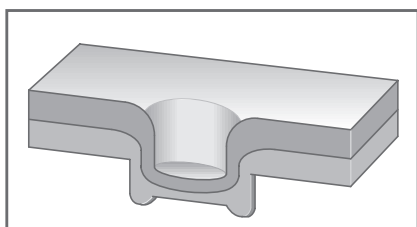
* Specifications refer to a 2-door Polo with 1.4-litre 55 kW engine and manual gearbox



Body

Body

The body of the Polo is fully galvanised and partly consists of high-strength panels. The front and rear side members, the B pillars and the front left and right floor pans are made of high-strength sheet metal. By increasing body rigidity, the shutlines of the doors and flaps have been reduced still further.



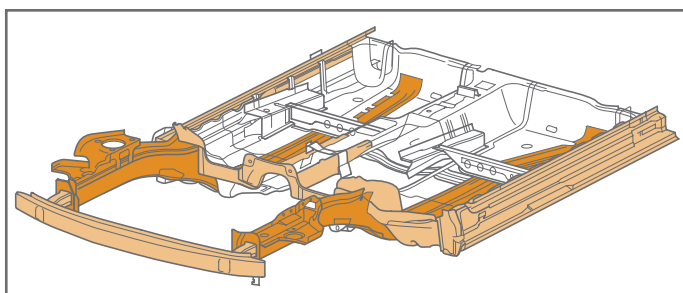
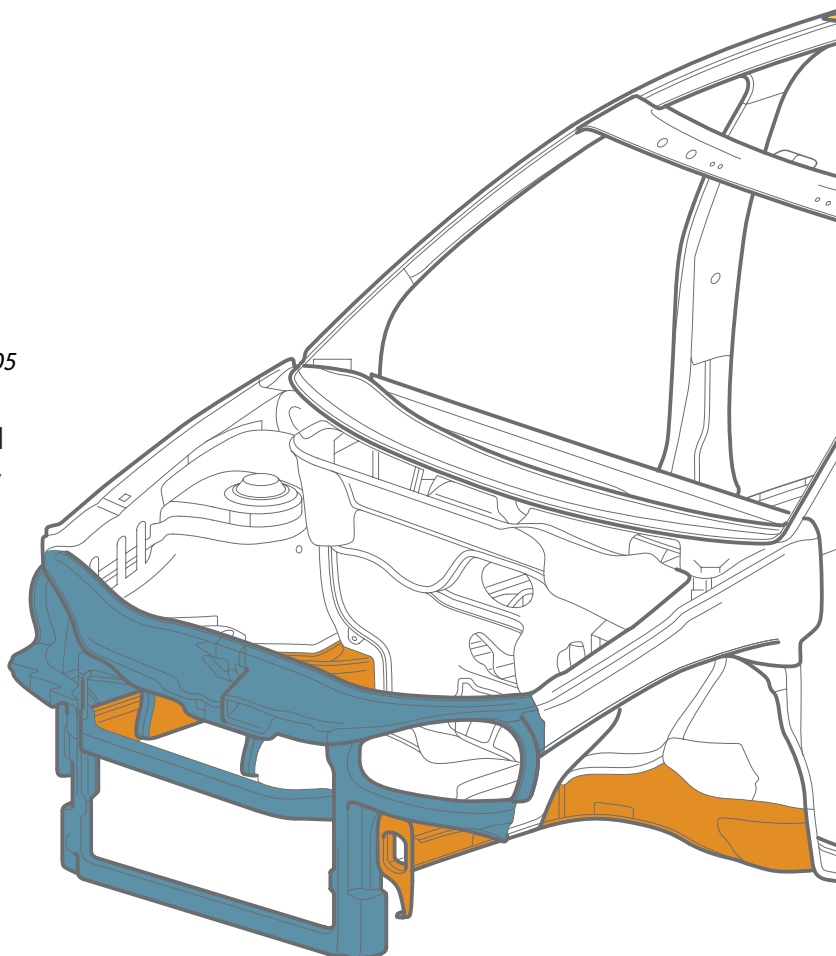
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A new technique is used to join the bonnet and tailgate. The sheet-metal panels are joined by clinching.

Advantages:

- Uniform appearance
- Low-cost method

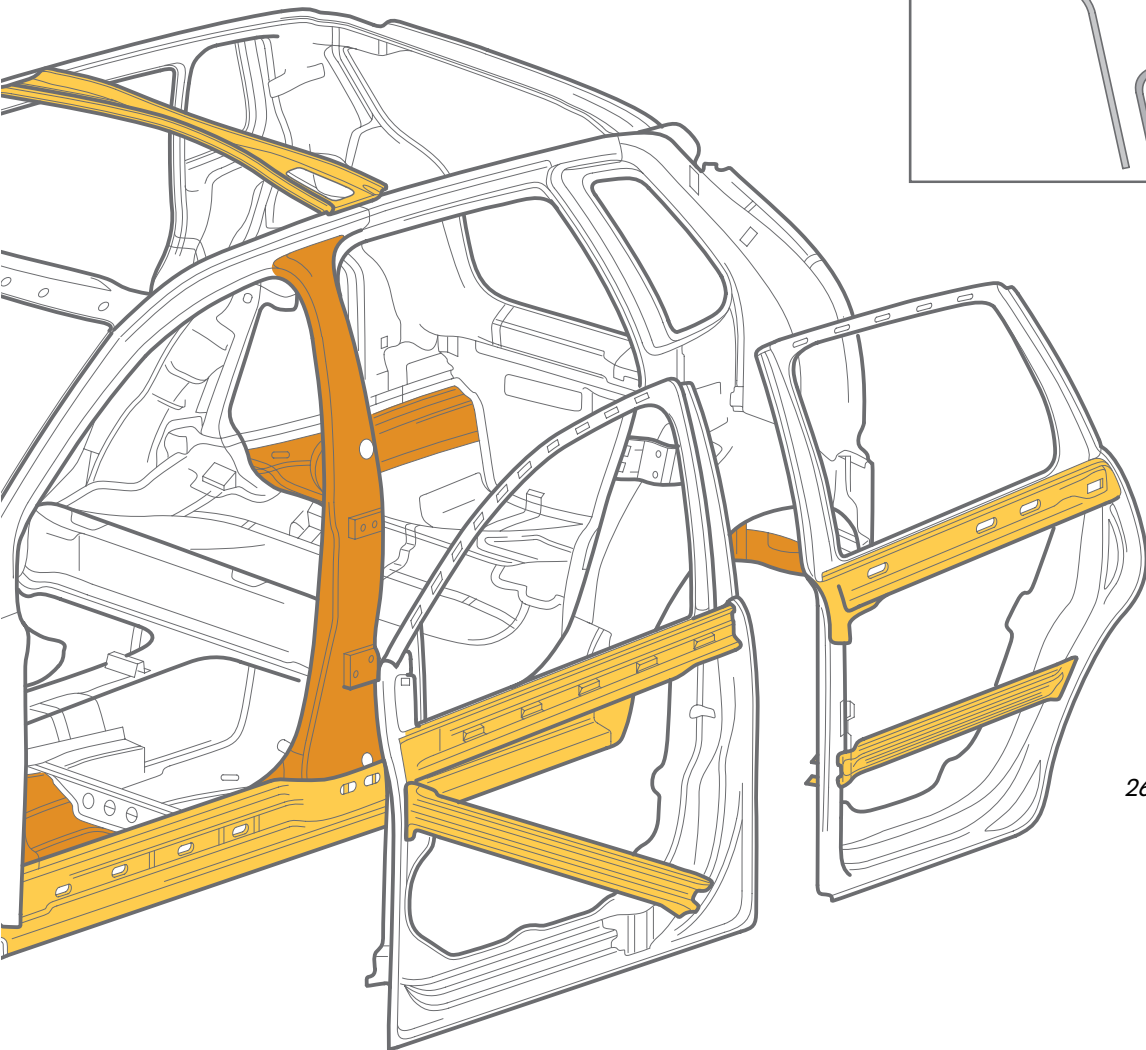
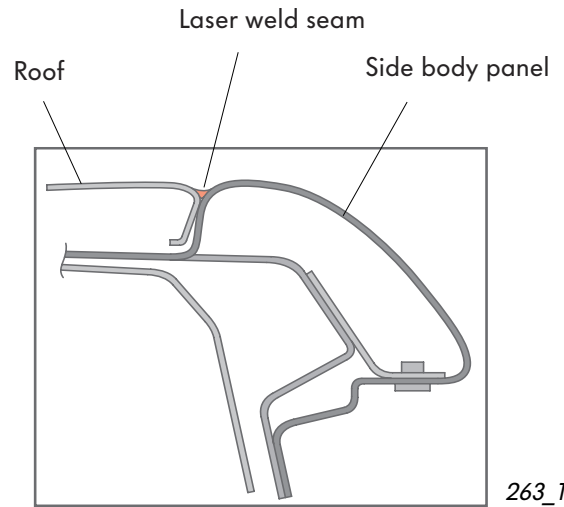
Clinching entails press-fitting metal sheets together by means of a mould and a plunger.



263_102

By optimising the design of the front, rear and lateral crash areas, occupant safety has again been increased.

The body side panels and the roof are joined together by a laser-welded seam. This does away with the sealing work otherwise required after spot welding

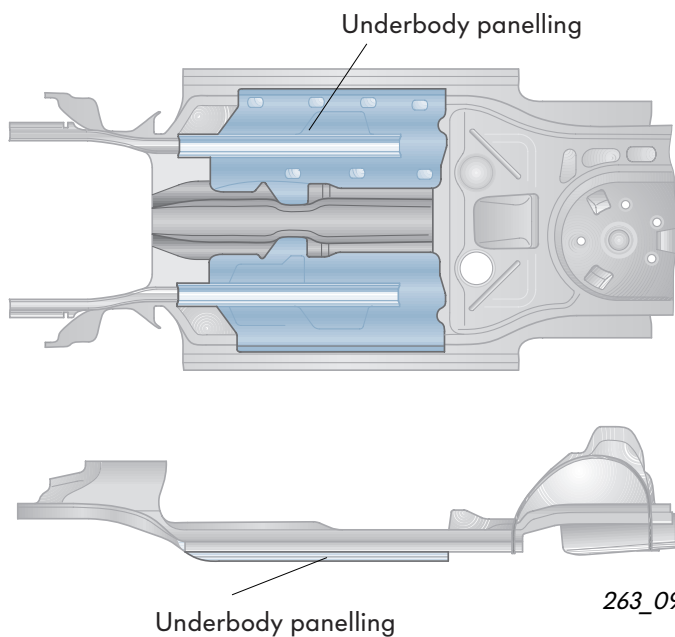


The doors and lids of the new Polo are made of Bonazink panels. Bonazink is a trade name for a type of sheet metal with a thin-film coating. The thin-film coating is based on a zinc-pigmented epoxy resin system. This allows us to reduce the use of PVC for fine seam sealing.

Body

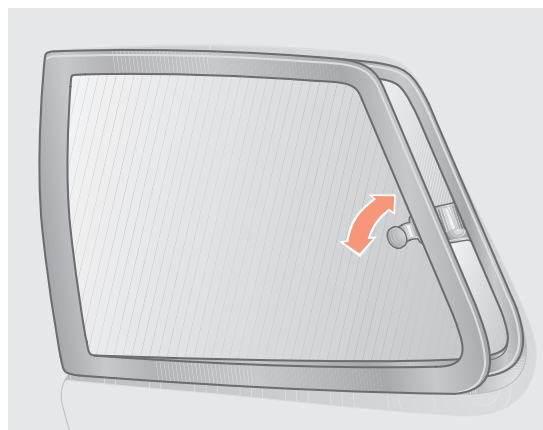
Underbody panelling

This is made of plastic and protects the rear end of the vehicle underbody. Because of its special shape, the underbody panelling keeps flying stone chips away from the body. There is no longer any need for a PVC coating in the rear underbody area.



Hinged (rear) windows

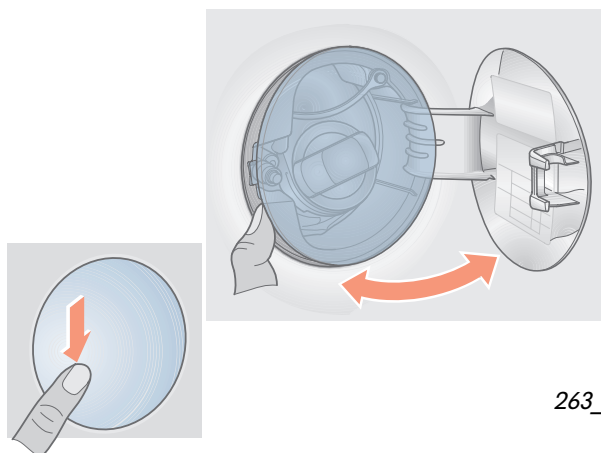
The rear side windows for the 2-door Polo are available as hinged windows.



Fuel filler flap

It is operated in the same way as a push-button.

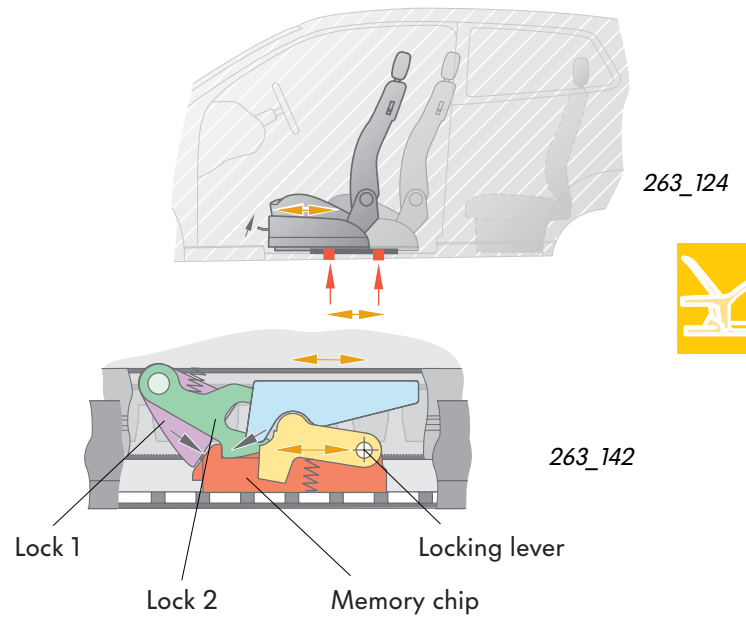
- To open, press the fuel filler flap
- To close, push back the fuel filler flap until it snaps into place.



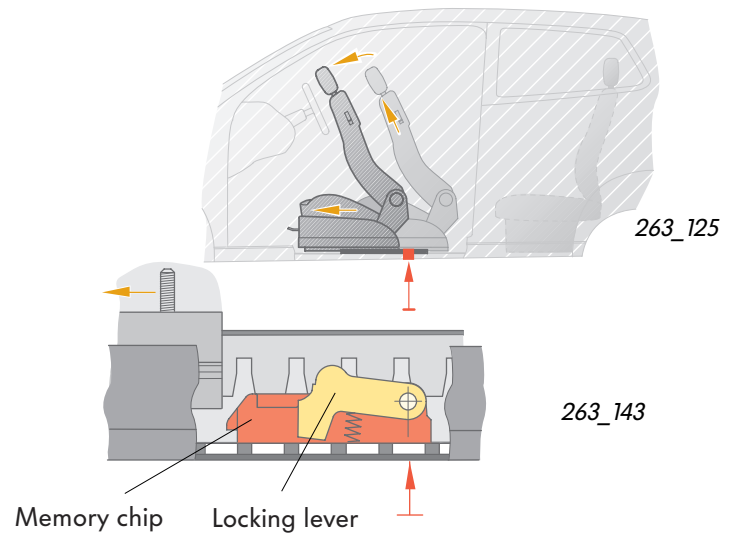
Front seats

The front seats for the 2-door Polo are available optionally with an easy entry facility and a manual memory function.

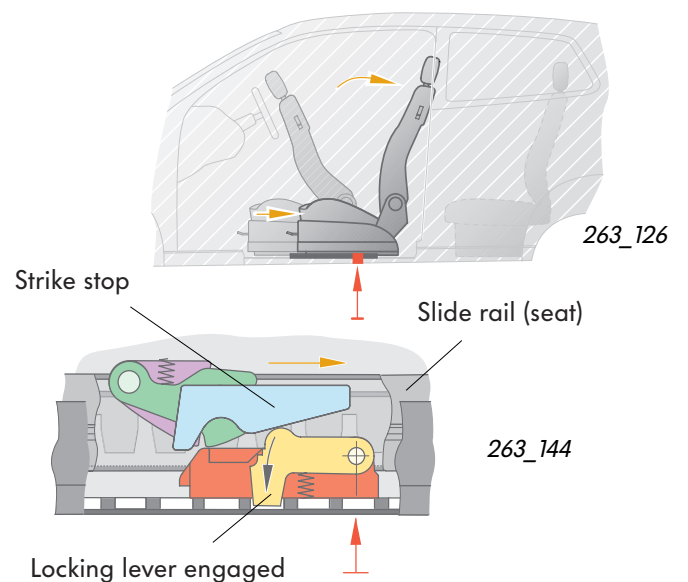
Integrated in the sill-side rail is a so-called memory block which moves back and forth together with the seat when the longitudinal adjustment is released by locks 1 and 2.



The rear seats can be accessed by unlocking the front seat backrest and folding it forwards as usual. The seat can be pulled forward at the same time for easier access to the rear seats (easy entry function). The memory chip remains in position (memory position) as the locks in the longitudinal follower are released when the backrest is folded forward.



The seat can be pulled back to its initial position (memory position) after the backrest is folded back. The seat then locks automatically due to the memory chip, the locking lever and the strike stop on the slide rail (seat).

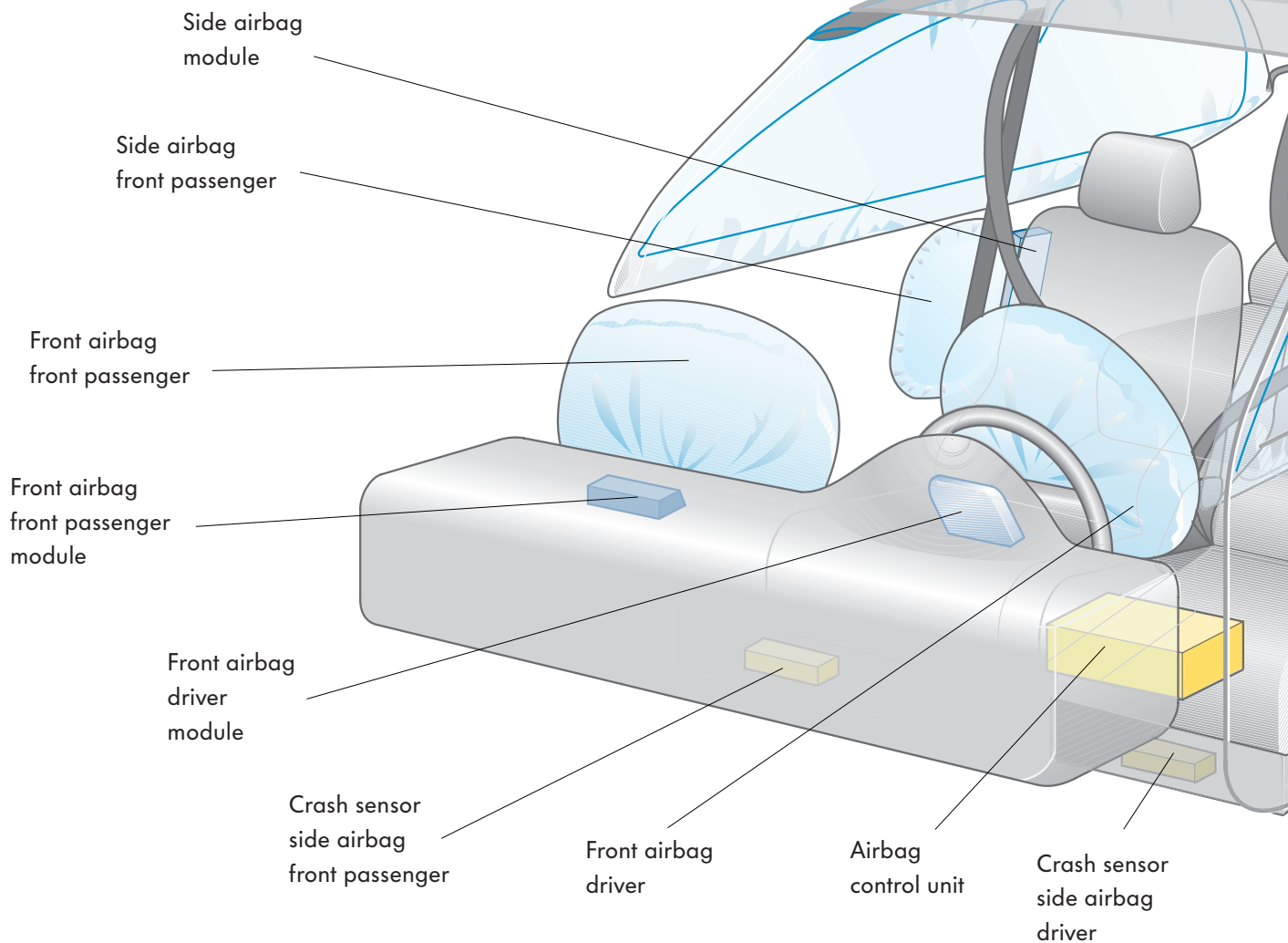


Occupant protection

Occupant protection

Occupant protection is assured by the airbag system. It comprises two front airbags, side and head airbags, seat belts and belt tensioners, as well as the child restraint system.

The Polo Model Year 2002 has two full-size front airbags on the driver and front passenger sides with filling volumes of 64 and 120 litres respectively. The central airbag control unit is located behind the central console, on the tunnel.



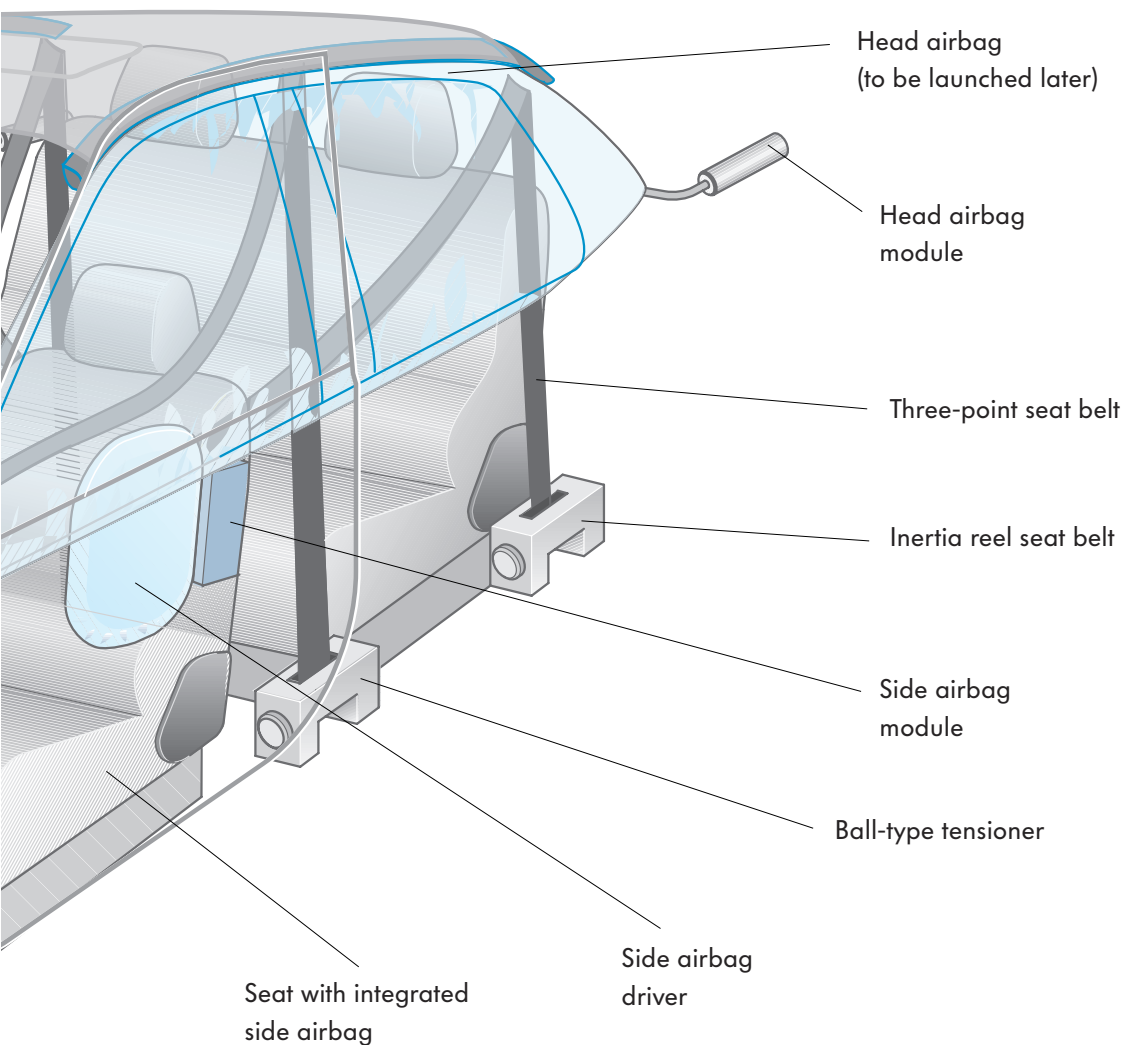
The side airbags are integrated in the front seats and have a filling volume of 12 litres. The head airbags have a filling volume of 23 litres each and are installed in the vehicle headlining above the doors.

The airbag sensor system comprises two lateral acceleration sensors (vehicles with head airbags have four lateral acceleration sensors). They are located below the front seats.

Standard inertia-reel seat belts are employed in the outer front and rear seating positions. In the front seating positions, ball-type tensioners are fitted.

In vehicles without side airbags, the belt tensioners are triggered mechanically and pyrotechnically.

In vehicles equipped with side airbags, the belt tensioners are triggered electrically and pyrotechnically.



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In the new Polo, the front passenger airbag can be deactivated by a key switch.

Occupant protection

Deactivation of front passenger's airbag

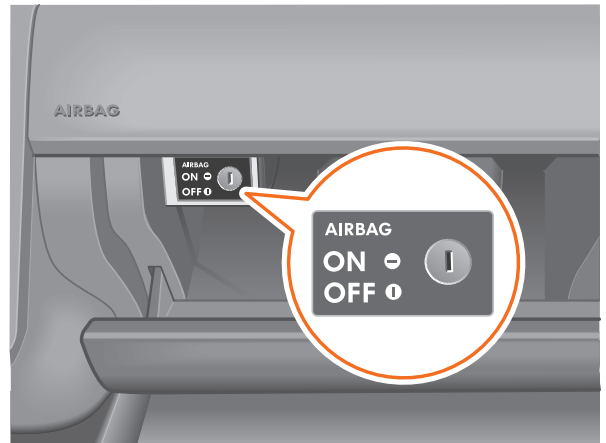
Airbag switch

A key switch for deactivating the front and side airbags for the front passenger is located in the glove compartment.

To deactivate these airbags, the airbag switch must be turned to the "OFF" position using the ignition key.



The airbag switch may only be operated when the ignition is OFF.

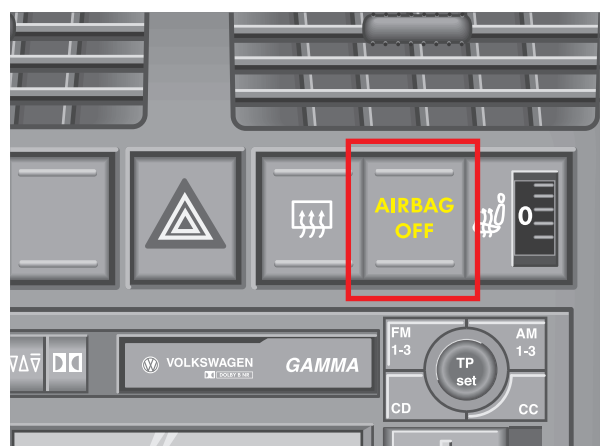


263_119

"AIRBAG OFF" indicator lamp

When the front passenger airbags are deactivated, the "AIRBAG OFF" indicator lamp comes on when the ignition is turned on.

If a fault occurs in the airbag system, the indicator lamp begins to flash.

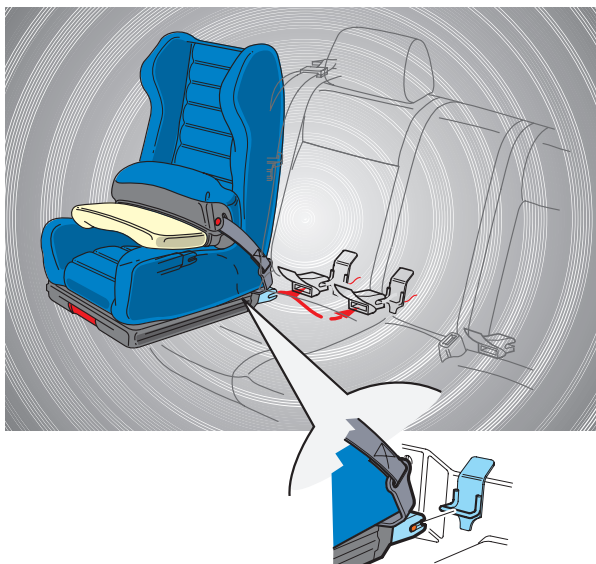


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Child restraint system

Isofix system

The new Polo comes as standard with retaining eyelets for mounting Isofix child safety seats.



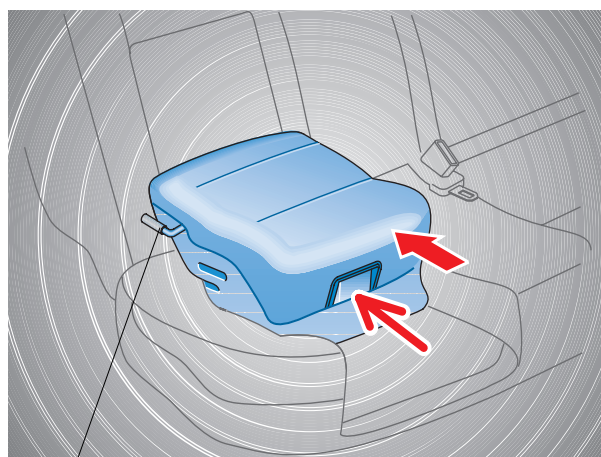
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Integrated child safety seat

A rear bench seat with integrated child safety seat is available as an optional extra. To make use of the integrated child safety seat, the child safety seat elements of the seat cushion must be moved up and locked into place.

For children between 1.30 m and 1.50 m in height, the belt height is corrected by an additional shoulder belt guide. A belt guiding hook on the raised cushion ensures that the belt fits snugly around the child's pelvis.



263_118

Belt guide hook

Engines

General

The range of engines in the new Polo is presented on the following pages. It comprises a mixture of newly developed assemblies and assemblies with a proven track record.

For all engines, you will find specifications, power and torque diagrams, as well as details of technical features.

The key aim for engine design engineers was to reduce fuel consumption and exhaust emissions.

All petrol engines comply with the EU4 exhaust emission standard. The TDI diesel engine with unit injector system conforms to the D4 exhaust emission standard.

In the Federal Republic of Germany, owners of vehicles which conform to the D4 or EU4 exhaust emission standard receive financial incentives from the government.

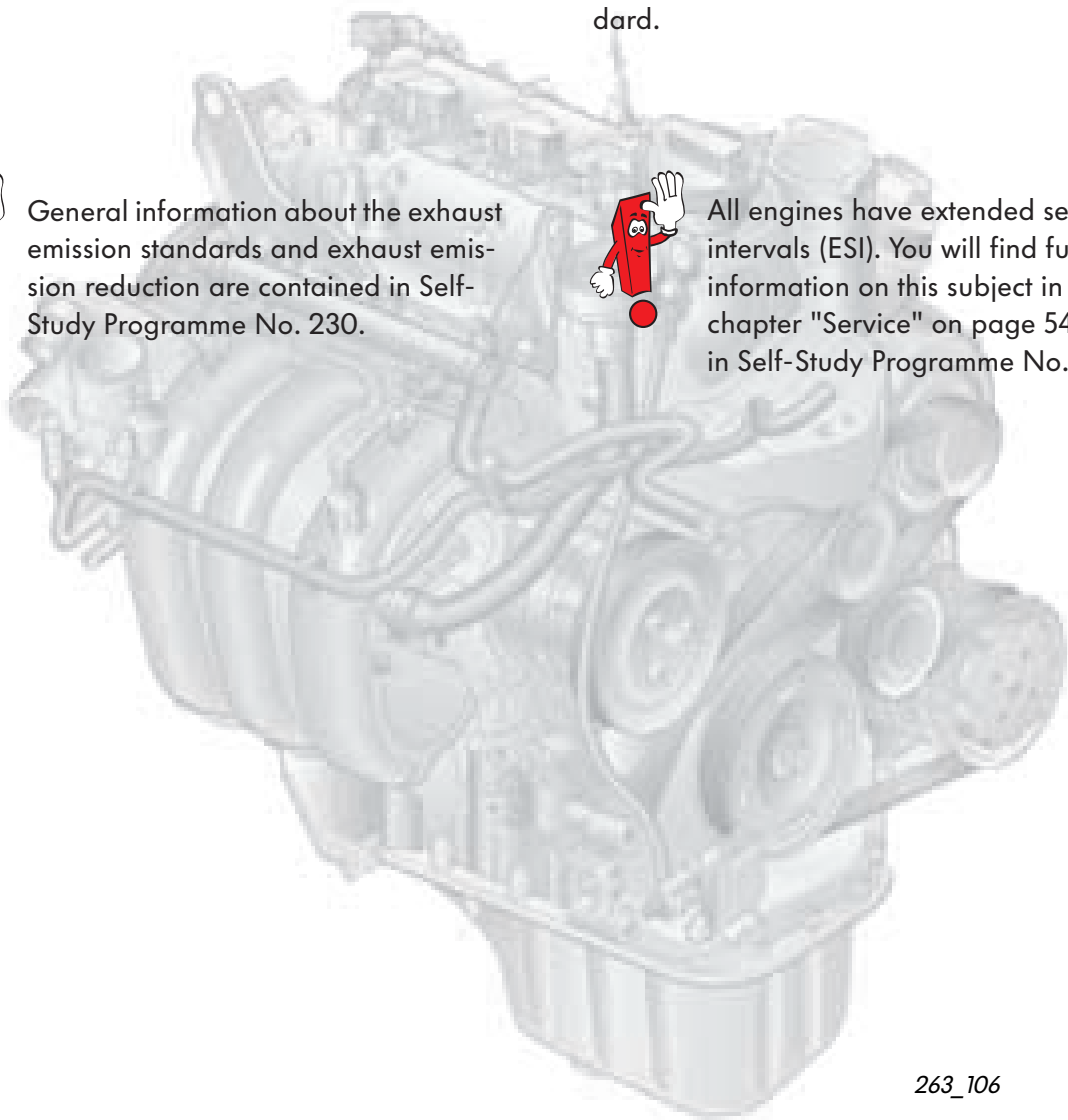
As compliance with the D4 and EU4 exhaust emission standard involves higher technical complexity, the engines are supplied in several countries in slightly modified versions. They are compliant with a different exhaust emission standard.



General information about the exhaust emission standards and exhaust emission reduction are contained in Self-Study Programme No. 230.



All engines have extended service intervals (ESI). You will find further information on this subject in the chapter "Service" on page 54 and in Self-Study Programme No. 224.



263_106

The 1.2-litre 40 kW 3-cylinder petrol engine with 2-valve technology

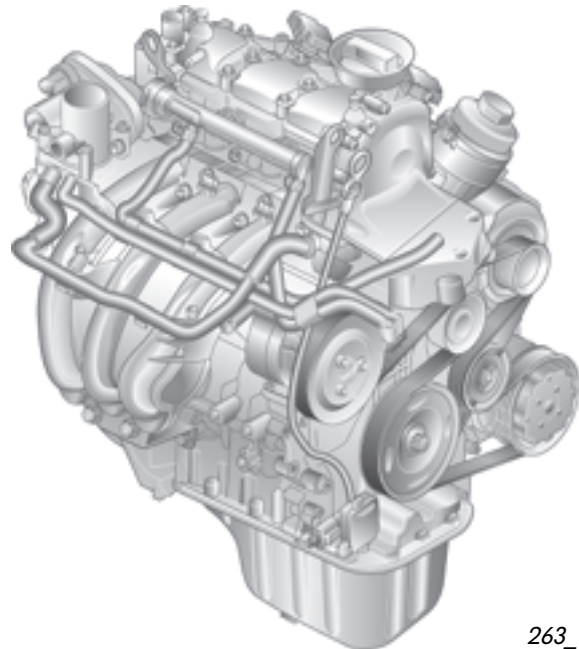
The 1.2-litre engine is the first 3-cylinder petrol engine to be built by Volkswagen.

Technical features - Engine mechanicals

- Air filter integrated in engine cover
- Chain driven camshaft
- Split cylinder block
- Crankshaft drive with balancer shaft
- Crossflow cooling in cylinder head
- Upright oil filter
- Crankcase ventilation

Technical features - Engine management

- Single-spark ignition coils with integrated power output stage
- Exhaust treatment with near-engine catalyst and two non-linear lambda sensors



263_016

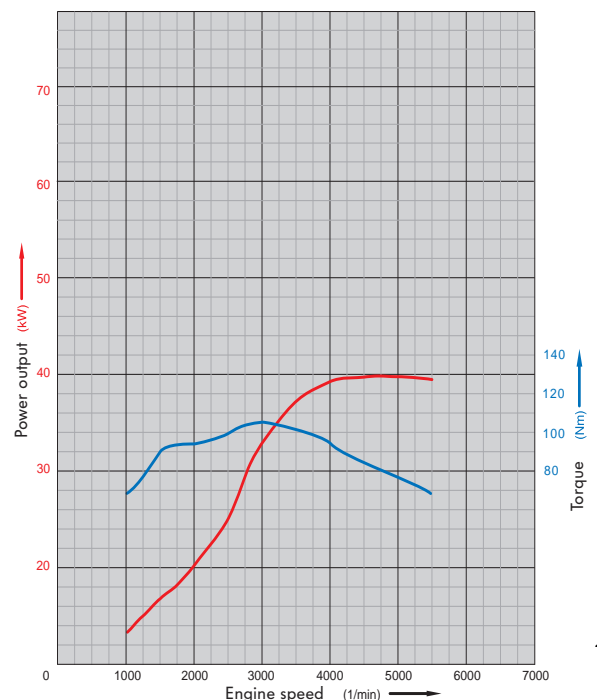


More detailed information about this engine is contained in Self-Study Programme No. 260 - 1.2-litre 3-cylinder petrol engines.

Specifications

| | |
|---------------------------|---|
| Engine code | AWY |
| Displacement | 1198 cc |
| Type | 3-cylinder inline engine |
| Valves per cylinder | 2 |
| Bore | 76,5 mm |
| Stroke | 86,9 mm |
| Compression ratio | 10,3 : 1 |
| Max. power | 40 kW at 4750 rpm |
| Max. torque | 106 Nm at 3000 rpm |
| Engine management | Simos 3PD |
| Fuel | 95 RON unleaded premium (91 RON unleaded petrol can be used alternatively. This reduces performance slightly) |
| Exhaust treatment | Three-way catalyst with lambda regulation |
| Exhaust emission standard | EU4 |

Power/torque diagram



263_001

Engines

The 1.2-litre 47 kW 3-cylinder petrol engine with 4-valve technology

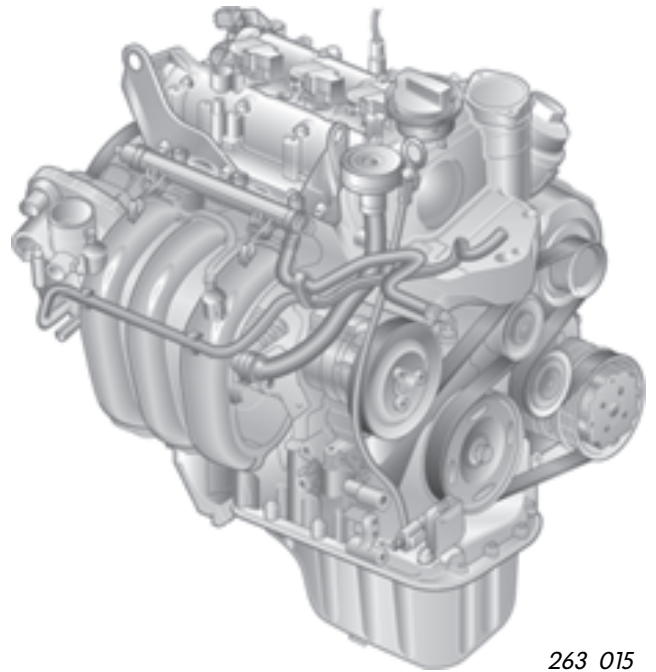
4-valve technology distinguishes this engine from the 1.2-litre 40 kW engine.

Technical features - Engine mechanicals

- Air filter integrated in engine cover
- Chain driven camshaft
- Split cylinder block
- Crankshaft drive with balancer shaft
- Crossflow cooling in the cylinder head
- Upright oil filter
- Non-return fuel system
- Crankcase ventilation

Technical features - Engine management

- Single-spark ignition coil with integrated power output stage
- Electrical EGR valve
- Exhaust treatment with near-engine catalyst, broadband lambda probe and non-linear lambda probe



263_015

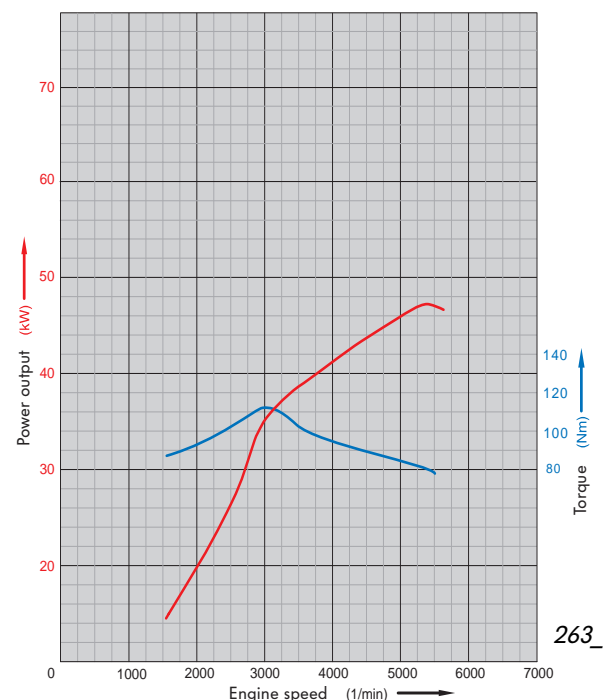


More detailed information about this engine can be found in Self-Study Programme No. 260 - 1.2-litre 3-cylinder petrol engines.

Specifications

| | |
|---------------------------|--|
| Engine code | AZQ |
| Displacement | 1198 cc |
| Type | 3-cylinder inline engine |
| Valves per cylinder | 4 |
| Bore | 76,5 mm |
| Stroke | 86,9 mm |
| Compression ratio | 10,5 : 1 |
| Max. power | 47 kW at 5400 rpm |
| Max. torque | 112 Nm at 3000 rpm |
| Engine management | Simos 3PE |
| Fuel | 95 RON unleaded premium (91 RON unleaded can be used alternatively. This reduces performance slightly) |
| Exhaust treatment | Three-way catalyst with lambda regulation, exhaust gas recirculation |
| Exhaust emission standard | EU4 |

Power/torque diagram



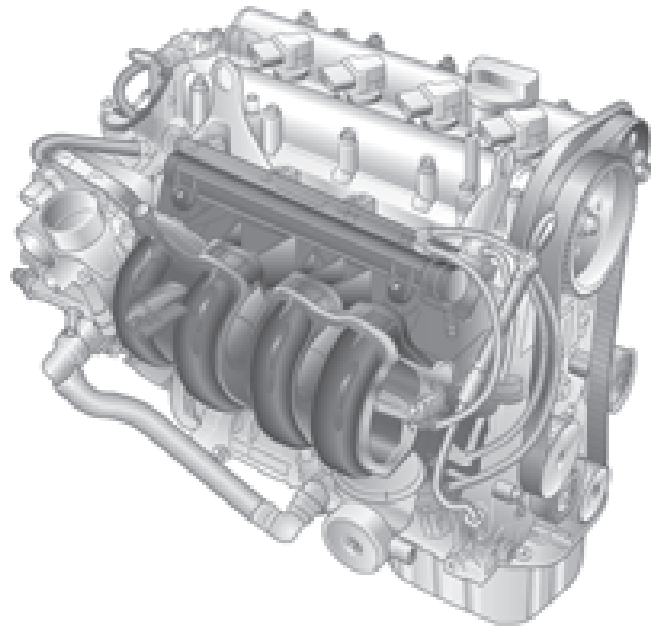
263_002

The 1.4-litre 55 kW 4-cylinder petrol engine with 4-valve technology

The 1.4-litre 55 kW engine with engine code AUA will be launched in combination with the manual gearbox. This engine, however, already has a non- return fuel system.

A more advanced 1.4-litre 55 kW engine with engine code BBY will be introduced at a later date.

This engine (BBY) is available at launch in conjunction with the automatic gearbox.



Technical new features - Engine mechanicals

- Air filter integrated in engine cover
- Non-return fuel system
- Crankcase ventilation

Technical new features - Engine management

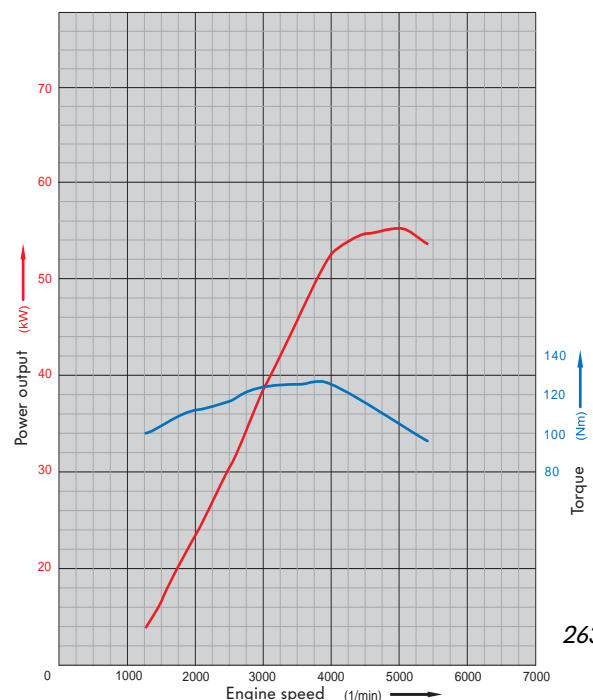
- Single-spark ignition coil
- Electrical EGR valve

263_127

Specifications

| | |
|---------------------------|---|
| Engine code | AUA/BBY |
| Displacement | 1390 cc |
| Type | 4-cylinder inline engine |
| Valves per cylinder | 4 |
| Bore | 76,5 mm |
| Stroke | 75,6 mm |
| Compression ratio | 10,5 : 1 |
| Max. power | 55 kW at 5000 rpm |
| Max. torque | 126 Nm at 3800 rpm |
| Engine management | Magneti Marelli 4MV |
| Fuel | 95 RON unleaded premium (91 RON unleaded petrol can be used alternatively. This reduces performance slightly) |
| Exhaust treatment | Primary catalyst, main catalyst with lambda regulation, exhaust gas recirculation |
| Exhaust emission standard | EU4 |

Power/torque diagram



263_018

Engines

The 1.4-litre 74 kW 4-cylinder petrol engine with 4-valve technology

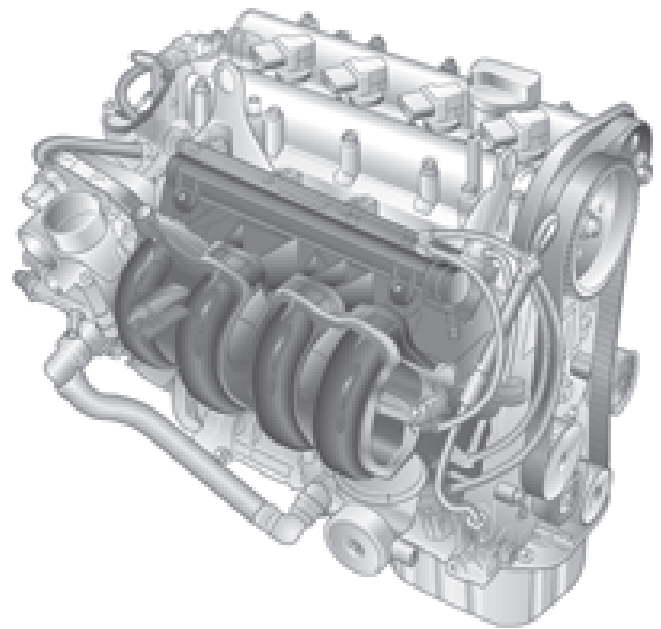
This engine is an advanced development of the 1.4-litre 74 kW engine from the previous model.

Technical new features - Engine mechanicals

- Air filter integrated in engine cover
- Non-return fuel system
- Crankcase ventilation
- Plastic intake manifold

Technical new features - Engine management

- Single-spark ignition coil
- Electrical EGR valve

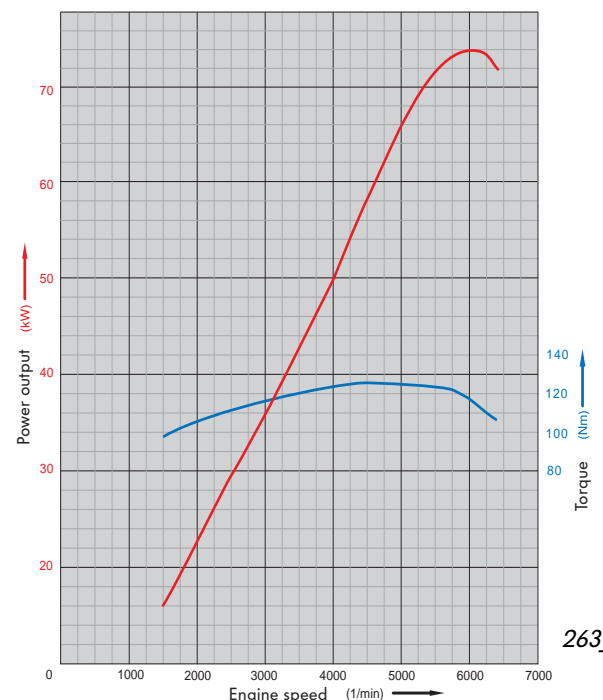


263_127

Specifications

| | |
|---------------------------|--|
| Engine code | BBZ |
| Displacement | 1390 cc |
| Type | 4-cylinder inline engine |
| Valves per cylinder | 4 |
| Bore | 76,5 mm |
| Stroke | 75,6 mm |
| Compression ratio | 10,5 : 1 |
| Max. power | 74 kW at 6000 rpm |
| Max. torque | 126 Nm at 4400 rpm |
| Engine management | Magneti Marelli 4LV |
| Fuel | 95 RON unleaded premium (91 RON unleaded petrol can be used alternatively. This reduces performance slightly) |
| Exhaust treatment | Primary catalyst, main catalyst with lambda regulation, exhaust gas recirculation |
| Exhaust emission standard | EU4 |

Power/torque diagram



263_019

Crankcase breather

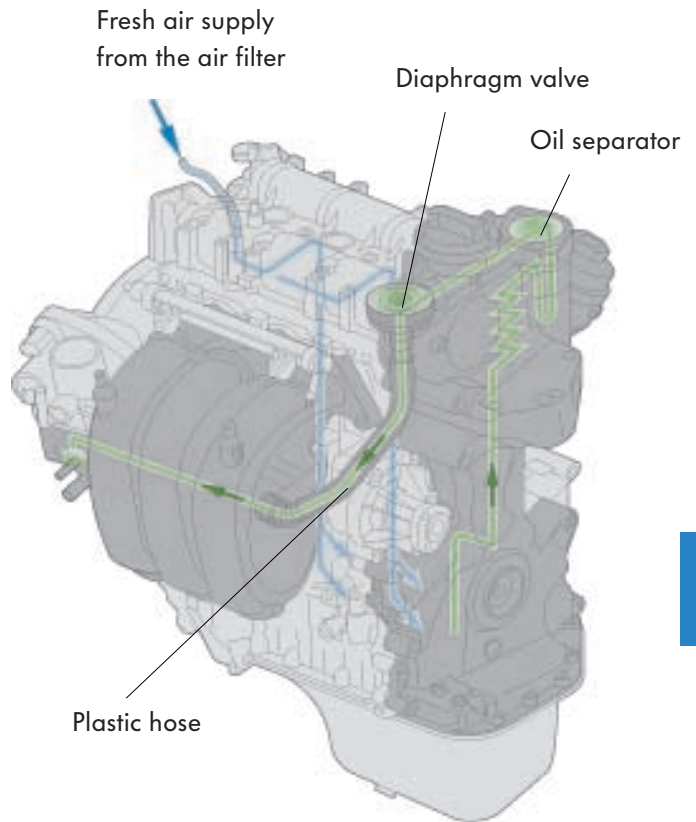
The crankcase breather is used in all petrol engines.

The system consists of:

- an oil separator
- a diaphragm valve
- a plastic hose, and
- a tube with a non-return valve for ventilation purposes (on the air filter)

The crankcase breather prevents oil and unburned hydrocarbons from being expelled into the environment.

Crankcase ventilation is improved by inducing additional fresh air. This reduces condensation, and dramatically improves oil quality and anti-freezing protection.

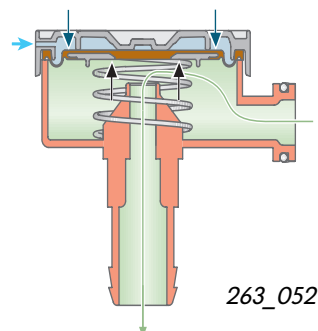
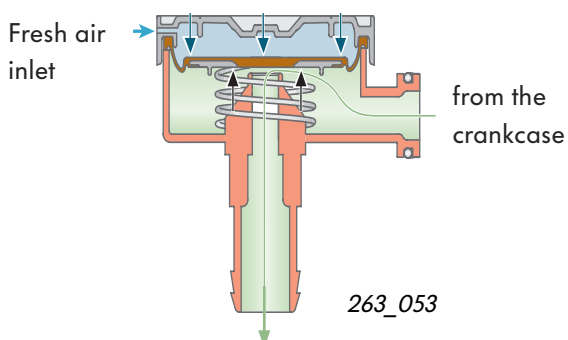


263_079

Diaphragm valve

Ensures that the pressure level inside the crankcase stays constant and that the crankcase is well-ventilated. This valve is divided into two chambers by a diaphragm. One chamber leads out into the open air and the other is connected to the intake pipe.

- At a high intake manifold vacuum (e. g. when the engine is idling), the diaphragm is drawn towards the port cross section in the opposite direction to the spring pressure. As a result, less gas is drawn out of the crankcase.
- At a low intake pipe vacuum (e. g. at full throttle), the spring pushes the membrane back. As a result, the port cross-section is open wide and more gas is sucked out of the crankcase.



Engines

Non-return fuel system

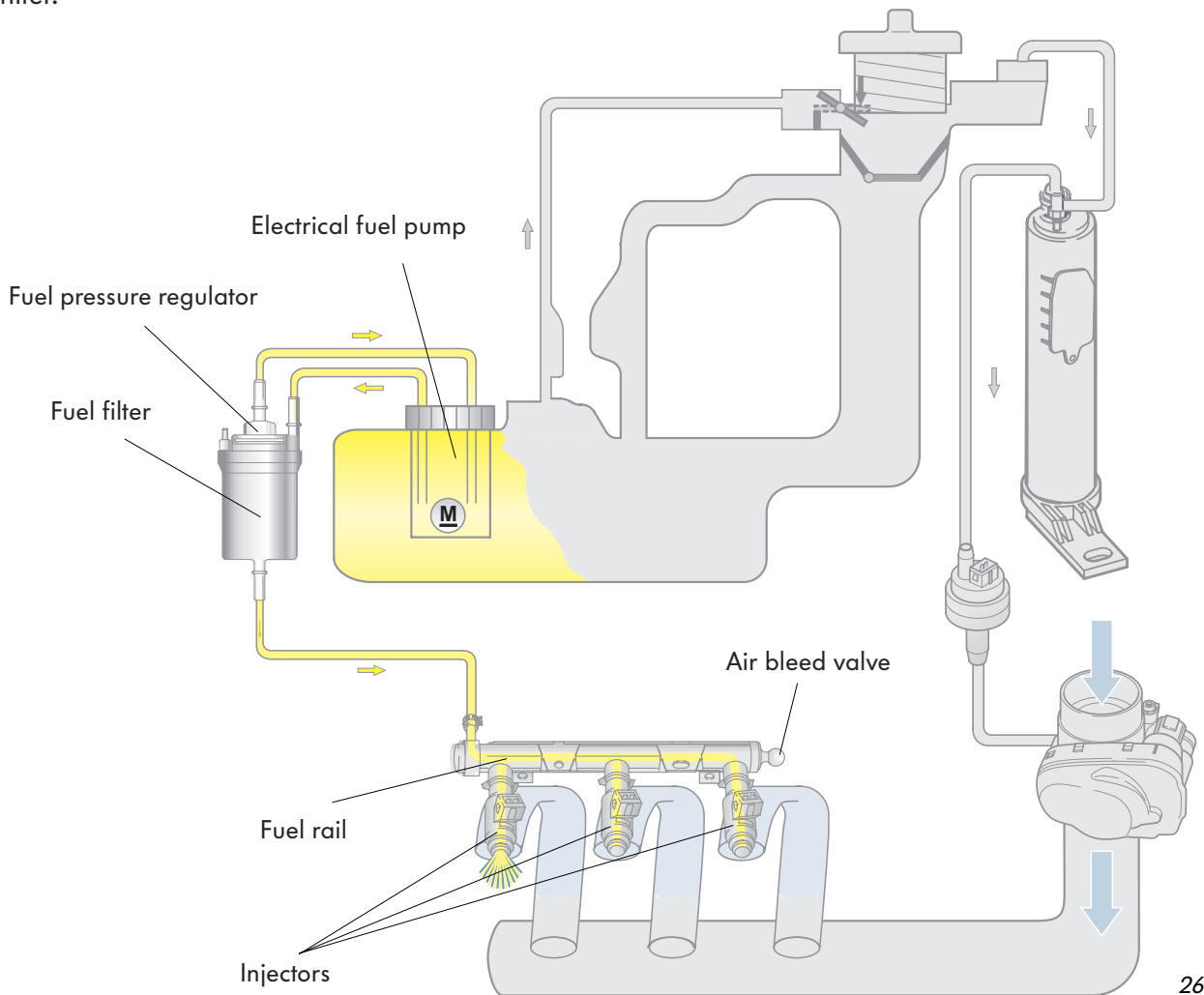
The non-return fuel system is used in all petrol engines, with the exception of the 1.2-litre 40 kW engine.



In the non-return fuel system there is no return line from the fuel rail to the fuel tank.

The fuel is delivered from the electrical fuel pump to the fuel filter. Once in the fuel filter, the fuel flows to the fuel rail and the injectors.

The fuel pressure is a constant 3 bar, and is regulated by the fuel pressure regulator in the fuel filter.



263_054

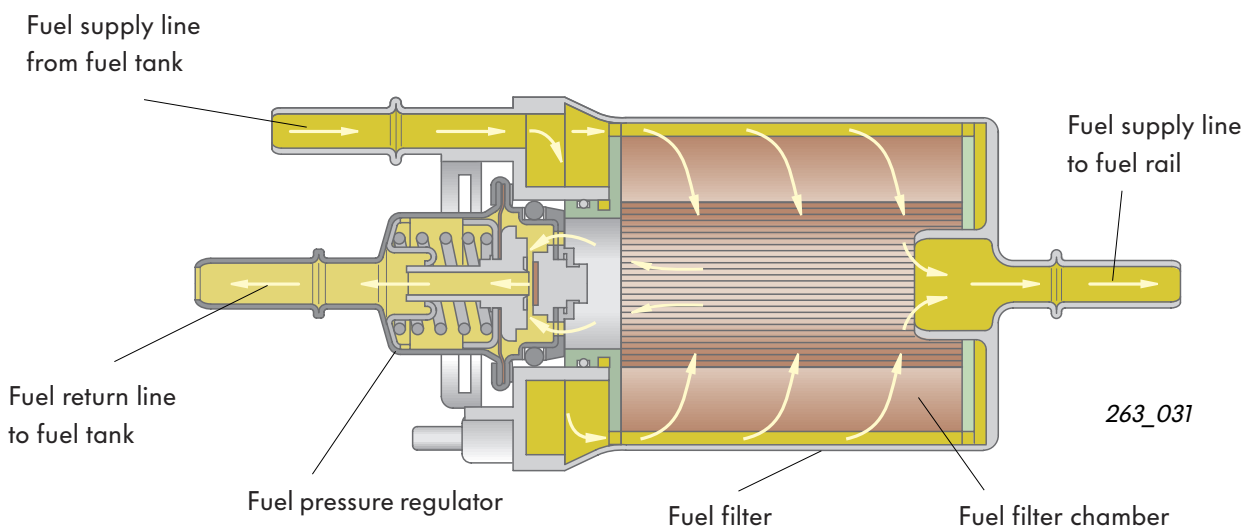
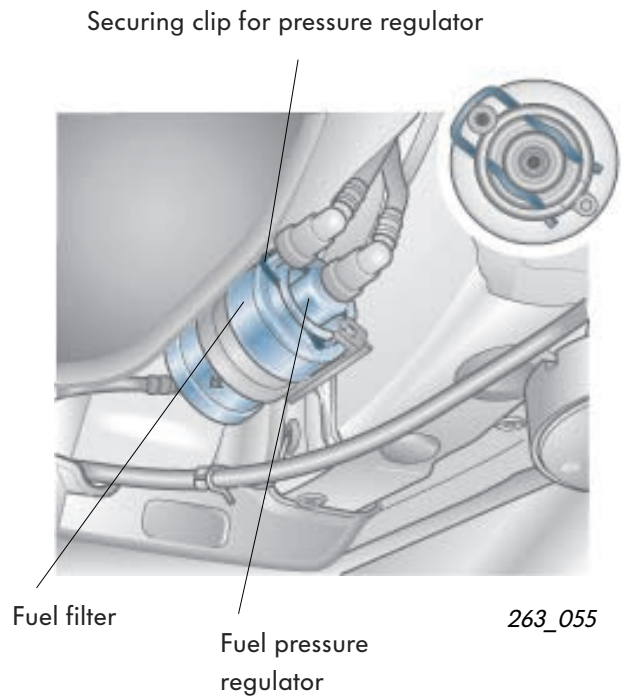


In the non-return fuel system, there is an air bleed valve on the fuel rail. You must bleed the system after working on the system. Please follow the instructions given in the Workshop Manual.

Fuel filter with fuel pressure regulator

The fuel filter is located on the right-hand side of the fuel tank.

The fuel pressure regulator is connected to the fuel filter and secured with a retaining clip. It keeps the fuel pressure in the fuel system at a constant 3 bar.



The function of the fuel pressure regulator:

The electrical fuel pump delivers the fuel into the fuel filter chamber. There, the fuel is filtered and flows to the fuel rail and to the injectors.

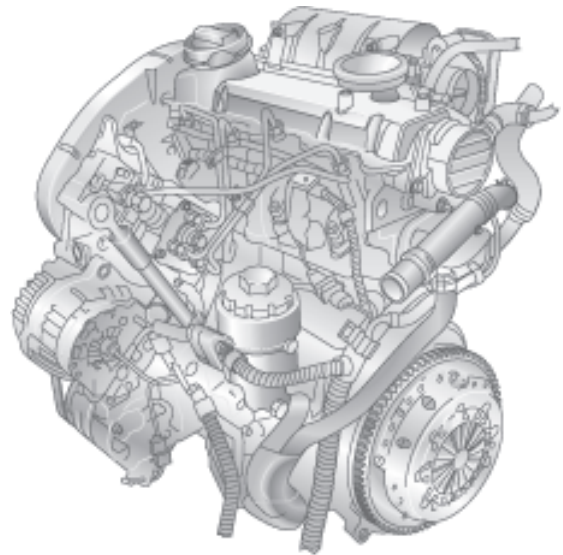
The fuel pressure of 3 bar is adjusted by a spring-loaded diaphragm valve in the fuel pressure regulator. When the pressure exceeds 3 bar, the diaphragm valve opens up the return line to the fuel tank.



Engines

The 1.9-litre 47 kW SDI engine

This engine was adopted from the previous model.

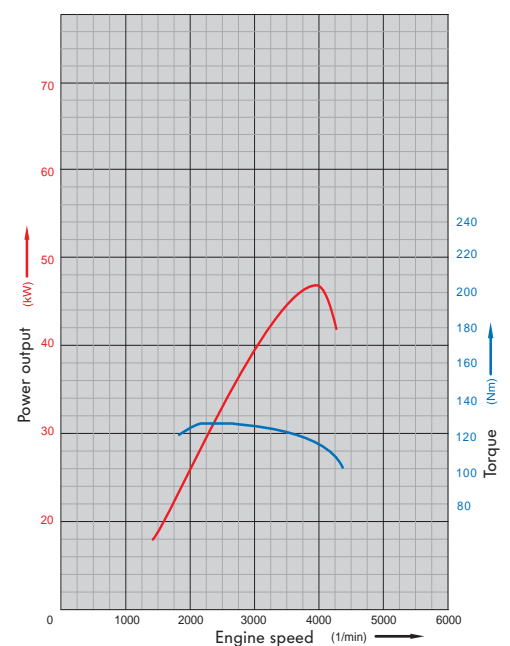


263_021

Specifications

| | |
|---------------------------|--|
| Engine code | ASY |
| Displacement | 1896 cc |
| Type | 4-cylinder inline engine |
| Valves per cylinder | 2 |
| Bore | 79,5 mm |
| Stroke | 95,5 mm |
| Compression ratio | 19 : 1 |
| Max. power | 47 kW at 4000 rpm |
| Max. torque | 125 Nm at 2200 - 2600 rpm |
| Engine management | Bosch EDC 15 V |
| Fuel | Diesel (min. 49 CN diesel or biodiesel) |
| Exhaust treatment | Exhaust gas recirculation and oxidising catalyst |
| Exhaust emission standard | D3 |

Power/torque diagram



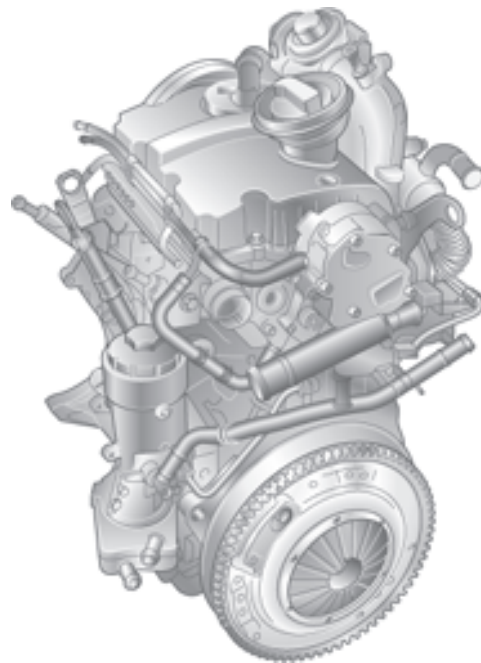
263_022

The 1.4-litre 55 kW 3-cylinder TDI engine with unit injector system

This engine is an advanced development of the 1.4-litre 55 kW TDI engine from the previous model.

To meet the D4 exhaust emission standard, the following innovations were employed:

- new unit injector design
- exhaust gas recirculation with electrically-actuated intake manifold flap
- nitrous oxide emissions were reduced by using an exhaust gas recirculation cooler
- the combustion sequence was improved by modifying the combustion chamber



263_025

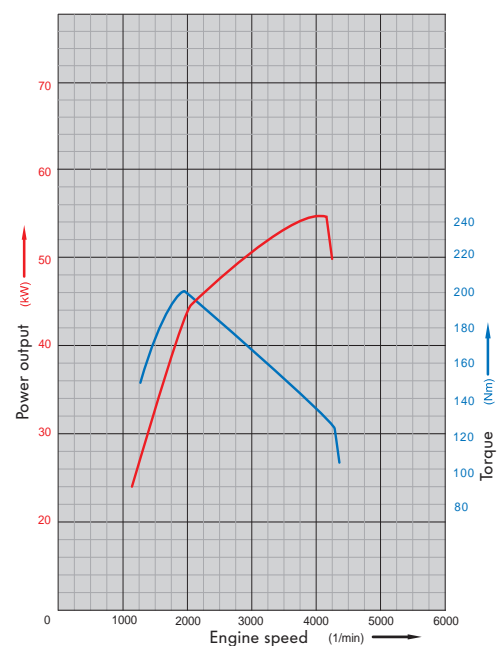


The design and function of the 1.4-litre 55 kW 3-cylinder TDI engine are explained in Self-Study Programme No. 223.

Specifications

| | |
|---------------------------|--|
| Engine code | BAY |
| Displacement | 1422 cc |
| Type | 3-cylinder inline engine |
| Valves per cylinder | 2 |
| Bore | 79,5 mm |
| Stroke | 95,5 mm |
| Compression ratio | 19,5 : 1 |
| Max. power | 55 kW at 4000 rpm |
| Max. torque | 195 Nm at 2200 rpm |
| Engine management | Bosch Electronic Damper Control 15 P |
| Fuel | Diesel min. 49 CN diesel or biodiesel (RME) |
| Exhaust treatment | Exhaust gas recirculation and oxidising catalyst |
| Exhaust emission standard | D4 |

Power/torque diagram



263_026

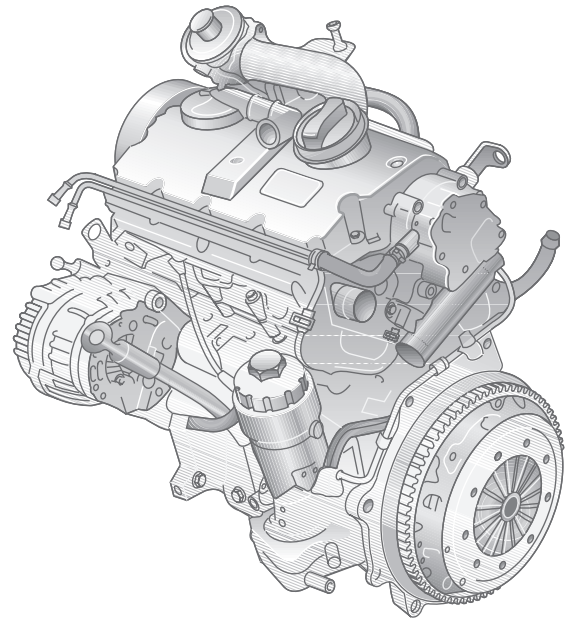
Engines

The 1.9-litre 74 kW 4-cylinder TDI engine with unit injector system

This engine is an advanced development of the 1.9-litre 74 kW engine from the previous model.

To meet the D4 exhaust emission standard, the following innovations were employed:

- new unit injector design
- exhaust gas recirculation with electrically-actuated intake manifold flap
- nitrous oxide emissions were reduced by using an exhaust gas recirculation cooler
- the combustion sequence was improved by modifying the combustion chamber
- the oxidising catalyst is of thin wall design so that it quickly reaches its operating temperature

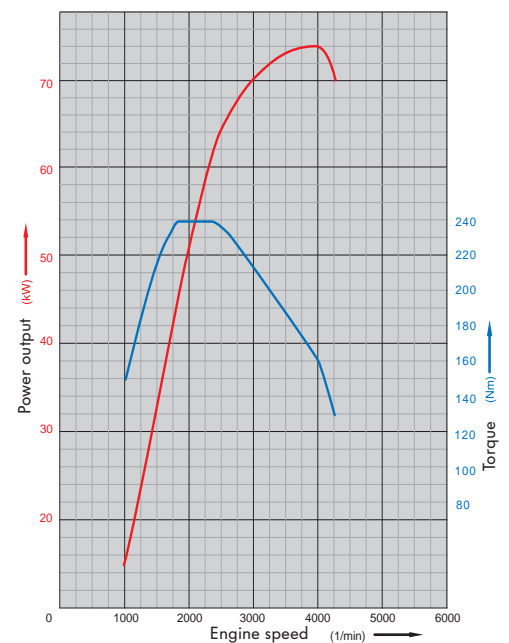


263_023

Specifications

| | |
|---------------------------|--|
| Engine codes | AXR |
| Displacement | 1896 cc |
| Type | 4-cylinder inline engine |
| Valves per cylinder | 2 |
| Bore | 79.5 mm |
| Stroke | 95.5 mm |
| Compression ratio | 19 : 1 |
| Max. power | 74 kW at 4000 rpm |
| Max. torque | 240 Nm at 1800 - 2400 rpm |
| Engine management | Bosch Electronic Damper Control 15 P |
| Fuel | Diesel min. 49 CN diesel or biodiesel |
| Exhaust treatment | Exhaust gas recirculation and oxidising catalyst |
| Exhaust emission standard | D4 |

Power/torque diagram

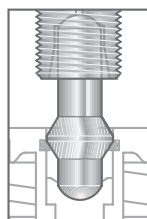


263_024

New features of unit injector

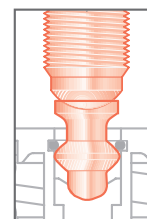
To meet the requirements with regard to extended service intervals and exhaust emission reduction, the unit injector has been improved in the following respects.

Previous version



263_108

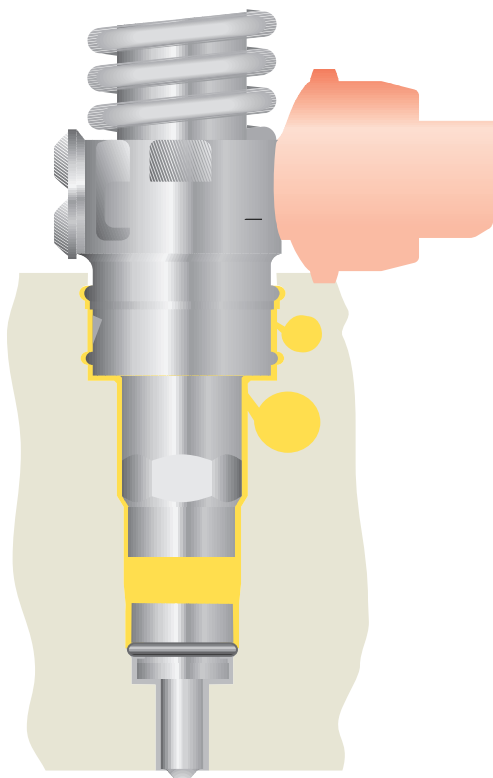
New version



263_109



Inlet drilling

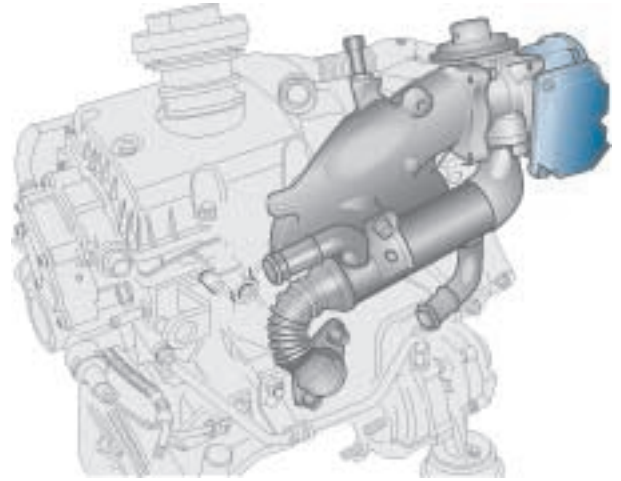


Engines

Electrical intake manifold flap

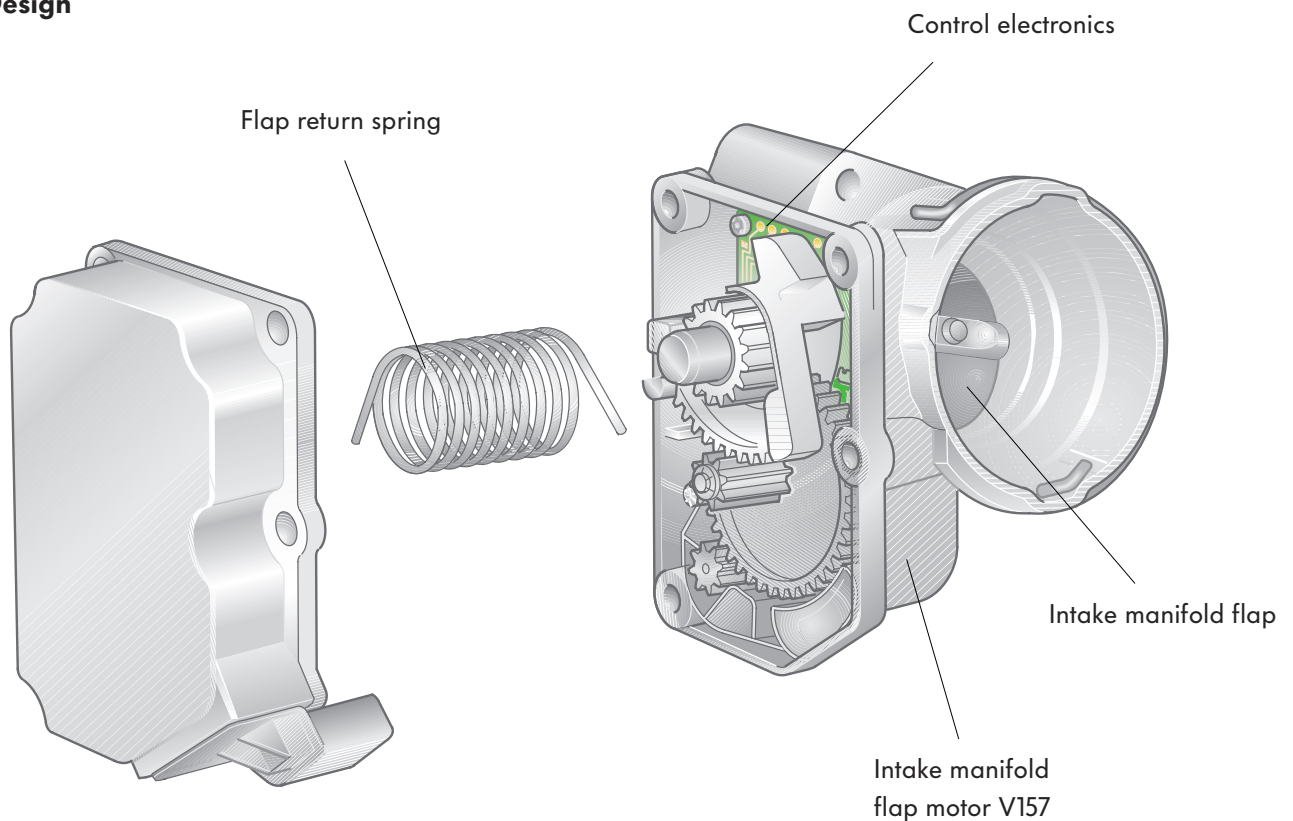
The 1.4-litre and 1.9-litre TDI engines with unit injector system have an electrical intake manifold flap so they meet the strict emission limits of the D4 exhaust emission standard. Because adjustment of the electrical intake manifold flap is continuously variable, the vacuum required for effective exhaust gas recirculation can be achieved in all engine speed ranges.

The electrical intake manifold flap also has a second function. When the engine is shut off, the flap is closed to stop air supply and prevent engine shudder when it cuts out.



263_008

Design

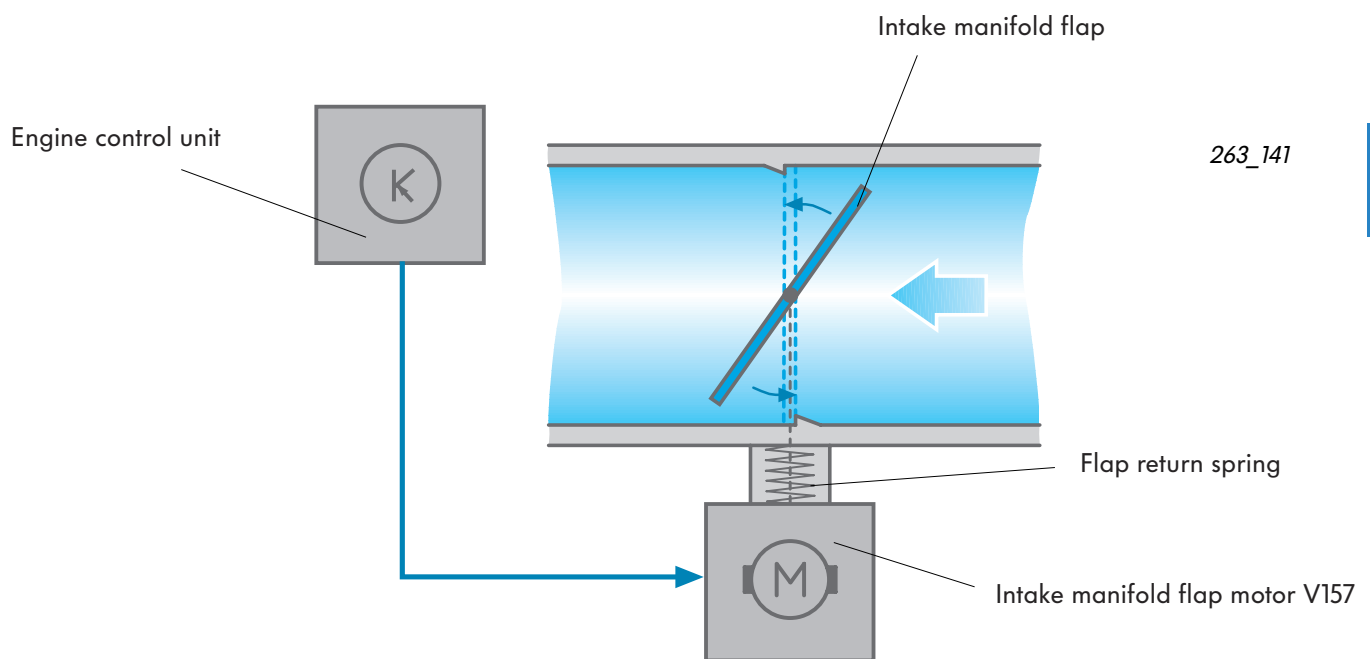


263_009

Function

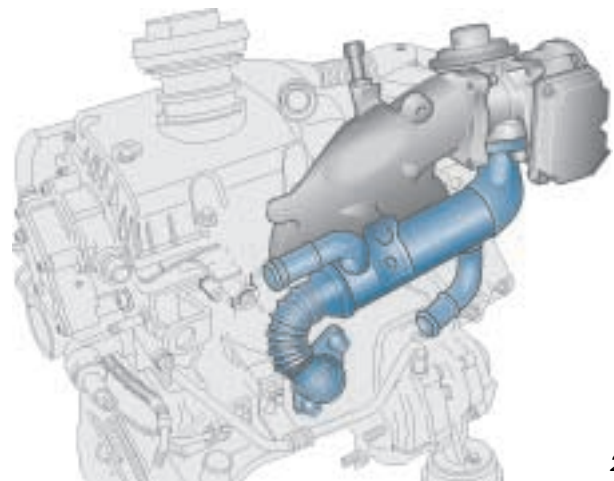
To adjust the intake manifold flap, the engine control unit sends a signal to the intake manifold flap motor (V157). An angle sensor measures the actual intake manifold flap angle. The internal control electronics process the signal and adjust the flap to the specified angle via the drive system.

A flap return spring permits emergency operation by keeping the intake manifold flap open when de-energised.



Cooler for exhaust gas recirculation

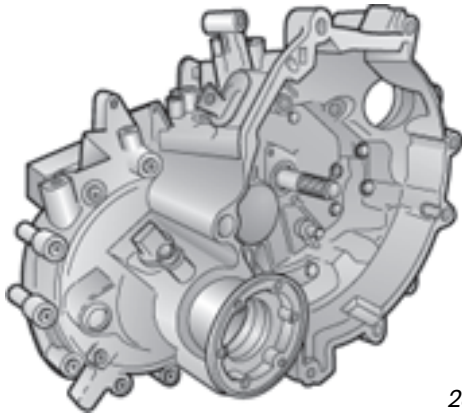
The 1.4-litre and 1.9-litre TDI engines have a cooler for exhaust gas recirculation. This cooler is coupled to the coolant circuit. By cooling the recirculated exhaust gases, a higher volume of exhaust gas can be discharged into the combustion chamber. This reduces combustion temperature and nitrogen oxide emissions.



Power transmission

Gearboxes

5-speed manual gearbox 02T



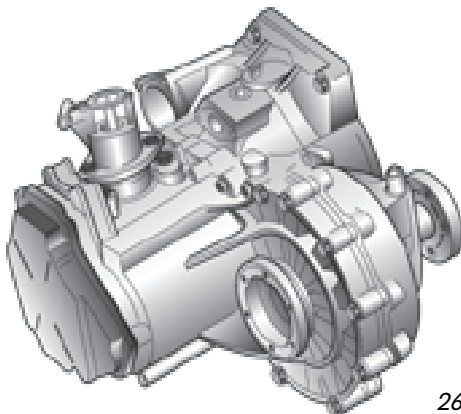
263_059



Detailed information about the design and function of the gearbox is contained in Self-Study Programme No. 237.

The remarkable features of the 5-speed manual gearbox 02T are its low weight, its modular design and its easy and precise gear changeability. It can transfer a torque of up to 200 Nm.

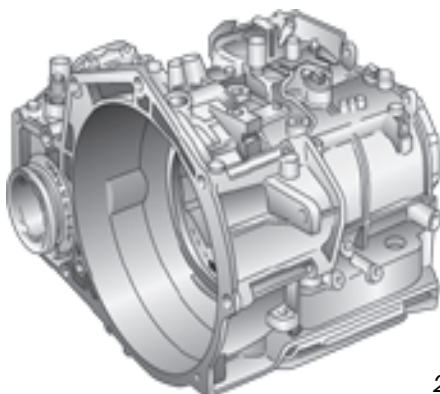
5-speed manual gearbox 02R



263_060

The 5-speed manual gearbox 02R is based on the proven 5-speed manual gearbox 02J. The shape of the gearbox housing as well as the cover for 5th gear have been adapted to fit into the engine compartment of the new Polo.

4-speed automatic gearbox 001




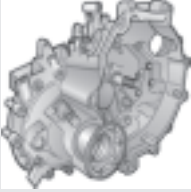

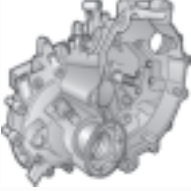

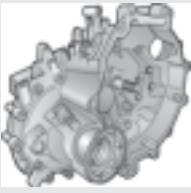







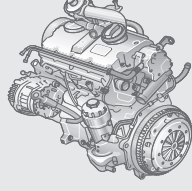

263_061



Detailed information about the design and function of the gearbox is contained in Self-Study Programme No. 176.

The 4-speed automatic gearbox 001 remains unchanged in terms of its design and function. It is used in combination with the 1.4-litre 55 kW engine.

Engine-gearbox combinations

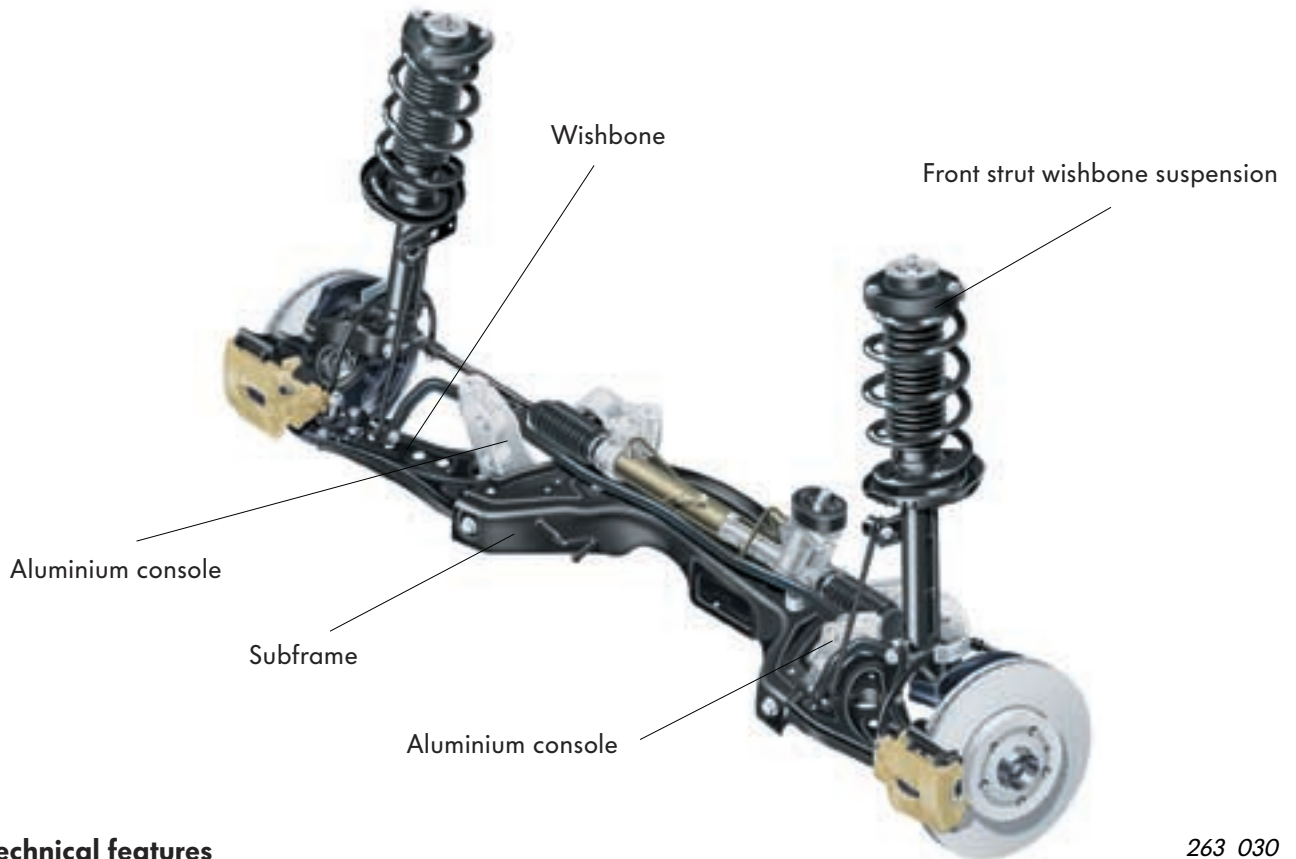
| Engine | 5-speed manual gearbox 02T | 5-speed manual gearbox 02R | 4-speed automatic gearbox 001 |
|--|---|--|---|
|  <p>1.2-litre 40 kW Petrol engine AWY</p> |  | | |
|  <p>1.2-litre 47 kW Petrol engine AZQ</p> |  | | |
|  <p>1.4-litre 55 kW Petrol engine AUA/BBY</p> |  | |  |
|  <p>1.4-litre 74 kW Petrol engine BBZ</p> |  | | |
|  <p>1.9-litre 47 kW SDI engine ASY</p> |  | | |
|  <p>1.4-litre 55 kW TDI engine BAY</p> | |  | |
|  <p>1.9-litre 74 kW TDI engine AXR</p> | |  | |



Running gear

The front axle

The front axle of the new Polo is a MacPherson strut axle with a wishbone. It has been improved with regard to weight and comfort.

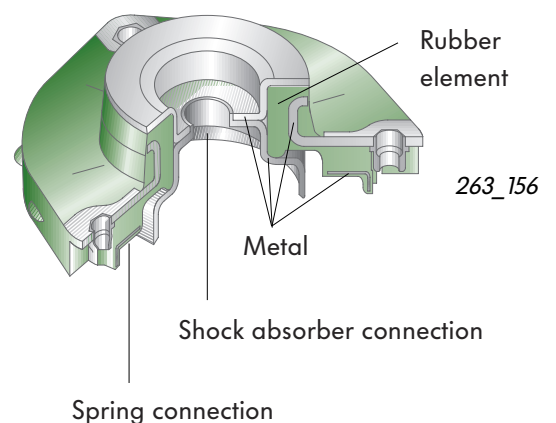


Technical features

- Weight has been saved by using a three-part subframe with a sheet steel subframe, aluminium consoles and sheet steel wishbones.
- The front strut wishbone suspension is a bonded rubber bush. The springs and shock absorbers are connected separately to the body. Through this concept, spring pressure is applied separately to the body, and the shock absorber mounting is not submitted to initial stress. This, in turn, enhances rolling comfort and reduces noise transmission from the road to the body.

263_030

Front strut wishbone suspension



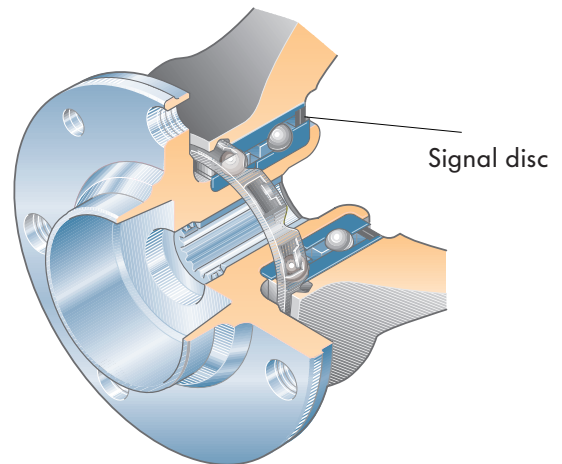
263_156

Wheel bearing

The wheel bearing is a two-row angular contact ball bearing with an integrated wheel hub. It contains the signal disc for the active wheel sensors.



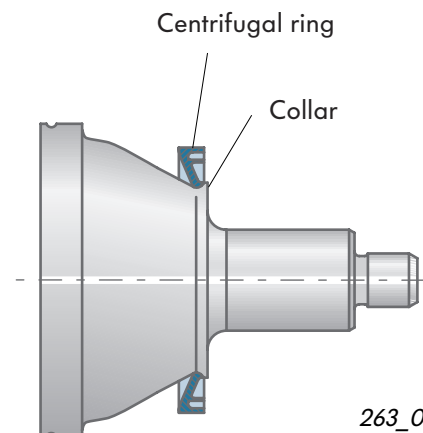
The active wheel sensors as well as the two-row angular contact ball bearing are described in Self-Study Programme No. 218 "The Lupo 3L".



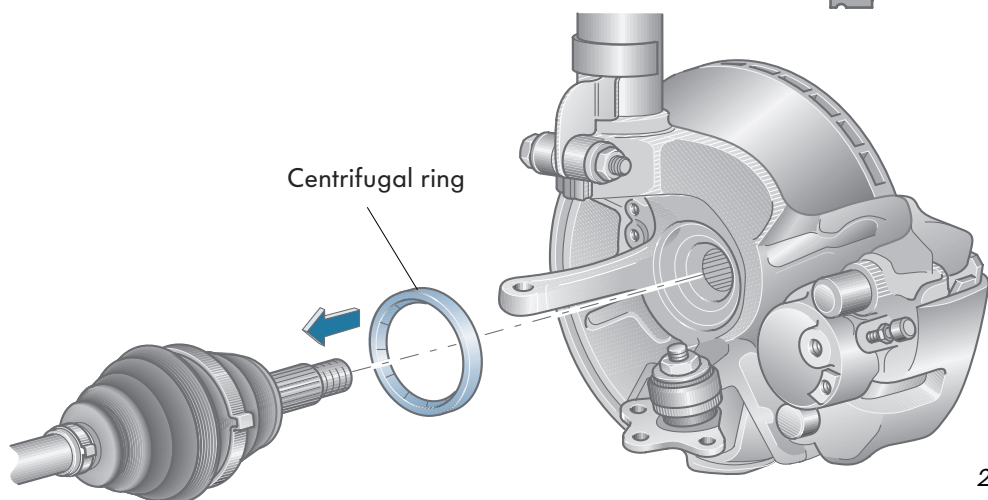
263_130

Centrifugal ring

A centrifugal ring mounted on the drive shaft protects the wheel bearings against soiling and de-icing salt. The plastic ring is clipped onto the drive shaft by means of a small collar.



263_074



263_036



Running gear

Rear axle

The rear axle is a torsion beam axle. As an all-new construction, it makes a substantial contribution to weight saving.



263_032



Technical features

- A specially-shaped axle beam with a V cross-section provides the axle with high stability. A separate anti-roll bar is therefore not needed.
- Coil springs and shock absorbers are located separately from one another, in order to maximise loading width.
- The rear axle is secured to the body by inclined, track-aligning and large-sized bonded rubber bushes. The inclination of the bearings corrects track alignment when lateral forces occur. It provides added driving stability, particularly at high road speeds.

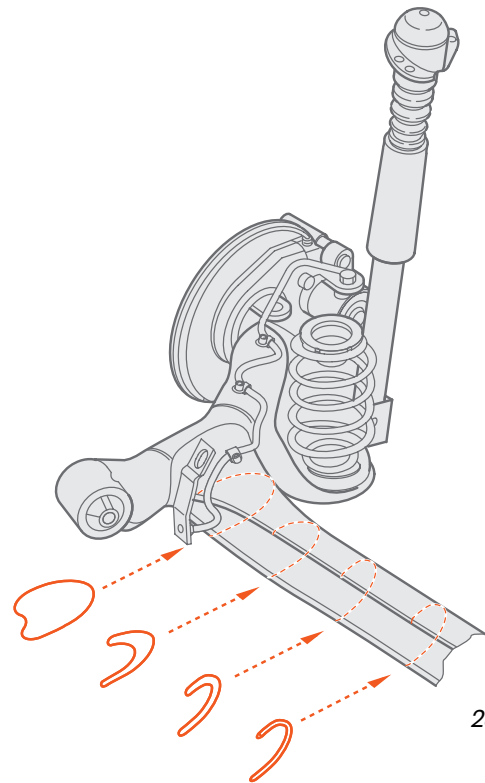


Toe and camber are defined by the structural design. There is no facility for adjusting the rear axle.

Axle beam cross-sections

A specially-shaped axle beam with a V cross-section endows the axle with high stability. An anti-roll bar is therefore not needed. The axle beam is made by reshaping a tube.

There are three axle beams with varying degrees of rigidity. They are adapted to each engine type. The differences in axle beam profile rigidity are due to the different wall thicknesses and geometries.



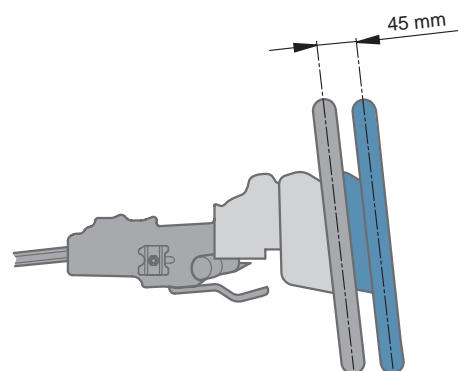
263_103

Steering column

The steering column is of safety design. It compresses on collision and optimises the position of the airbag in relation to the driver.

Longitudinal adjustment

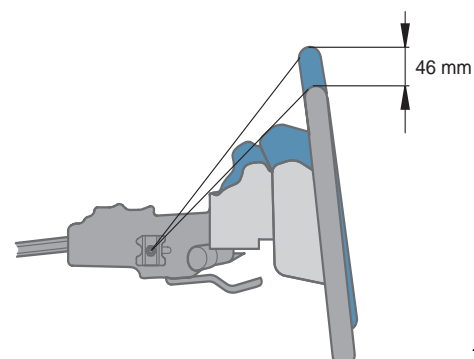
The steering column has a manually adjustable length of 45 mm.



263_115

Height adjustment

The steering column can be adjusted for height by 46 mm.



263_028



Running gear

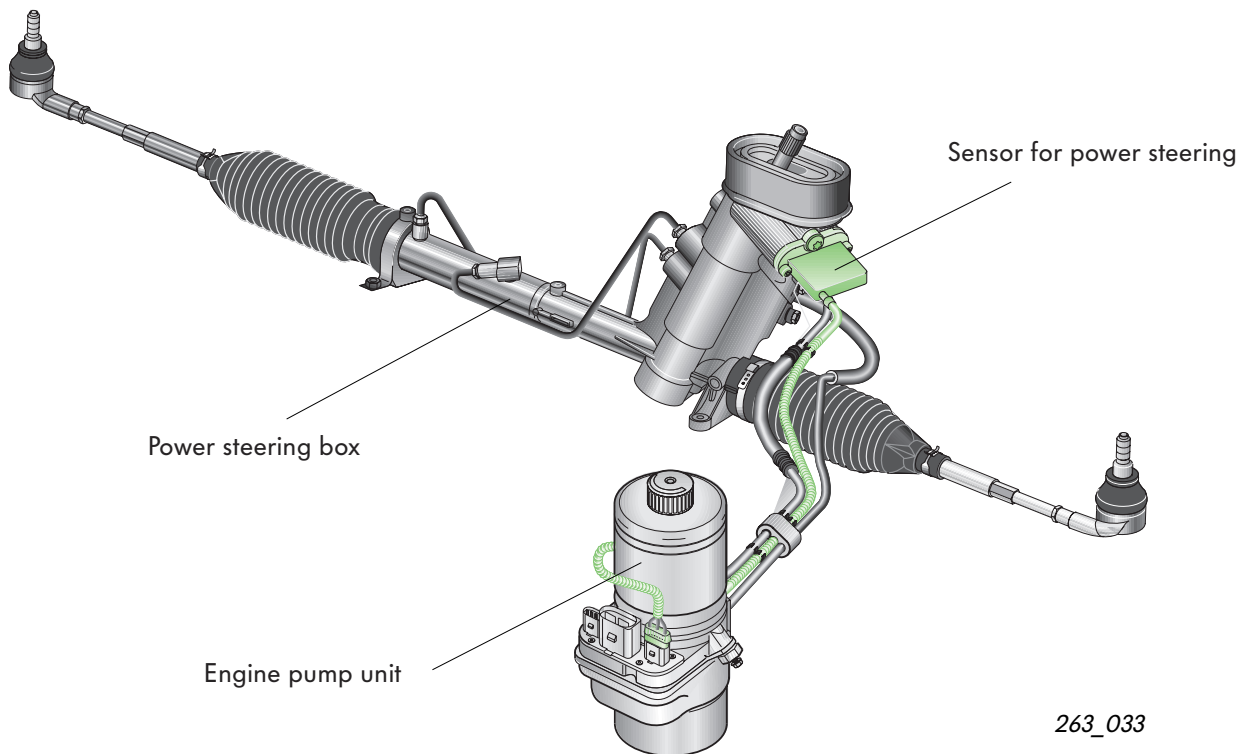
Electro-hydraulic power steering

The electro-hydraulic power steering is a new steering system with a hydraulic pump driven by an electric motor.

The power steering, therefore, is independent of the engine operating state. It permits needs-oriented power steering. This makes the vehicle easier to manoeuvre and saves fuel.

The Polo Model Year 2002 features electro-hydraulic power steering in the entry-level version. Steering systems manufactured by TRW and KOYO are fitted.

Both steering systems function according to the same principle.



263_033

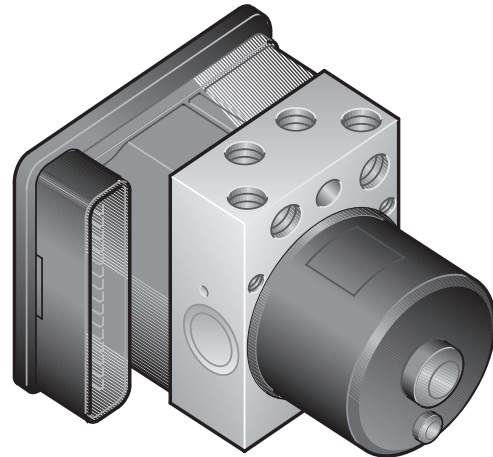


The design and function of the electro-hydraulic power steering are described in detail in Self-Study Programme No. 259.

Brake system

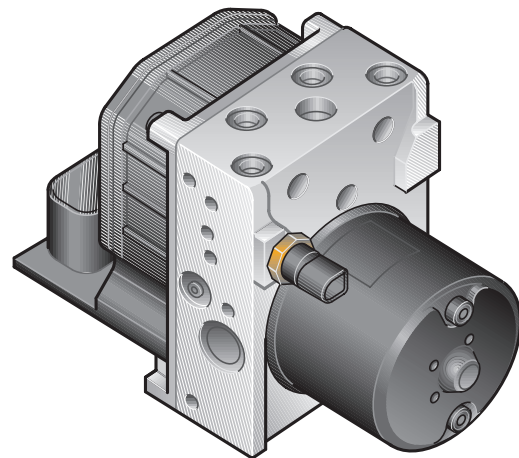
The Polo has a diagonally-split dual-circuit brake system. Two different brake systems are fitted.

ABS is standard in the new Polo. The hydraulic unit with integrated control electronics is supplied by Continental Teves (Conti-Teves MK60).



263_087

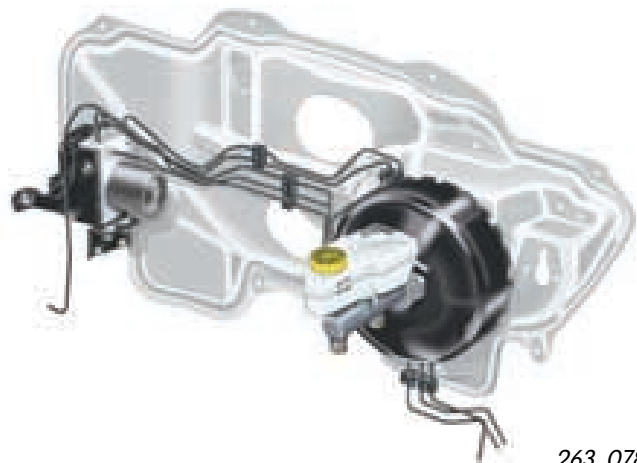
Vehicles fitted with Electronic Stability Programme (ESP) are equipped with the Bosch 5.7 brake system.



263_088



In both systems, the brake servos and the master brake cylinder are positioned physically separated from the hydraulic unit for ABS/ESP. The hydraulic unit is located on the right-hand side of each system, adjacent to the shock absorber dome.

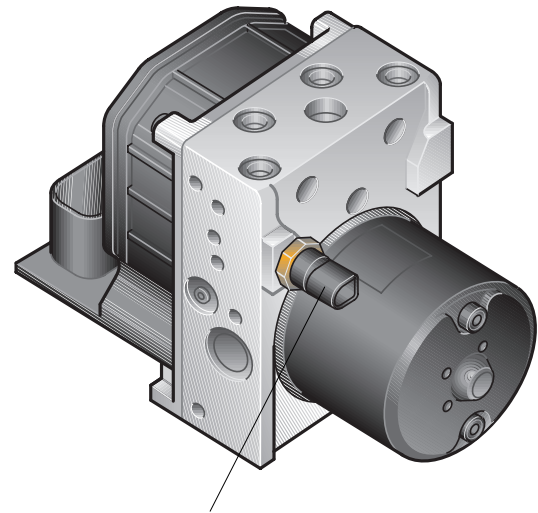


263_078

Running gear

Hydraulic Brake Assistant System (BAS)

This is integrated in the ABS/ESP unit. Accident research has shown that the majority of drivers do not apply the brakes sufficiently in a hazardous situation. Consequently, the brake pressure is insufficient to achieve maximum vehicle deceleration.

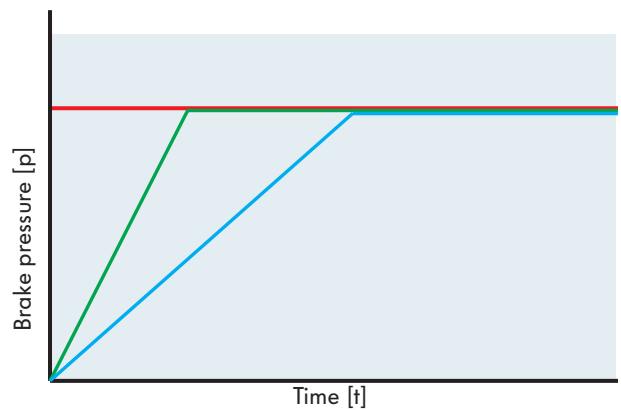


Pressure sensor

263_006

Pressure sensor G201 determines the pressure gain within the brake system. The control unit recognises an emergency stop by an abrupt rise in brake pressure within a specific period of time. After detecting the emergency situation, the control unit increases the brake pressure within the ABS control range. This shortens the vehicle's stopping distance, and the vehicle comes to a halt more quickly.

Pressure gain within brake system



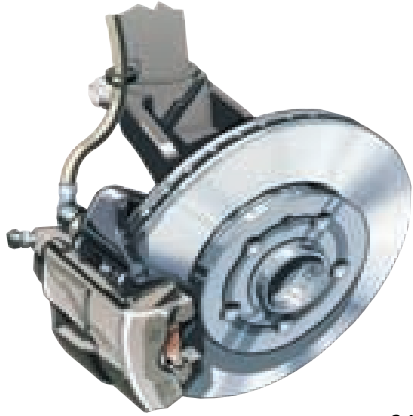
263_005

- ABS control range
- Emergency stop
- Normal braking operation



The design and function of the hydraulic brake assistant system (BAS) are described in detail in Self-Study Programme No. 264.

Front brake



263_037

The front brakes on the Polo are 256 x 22 mm ventilated disc brakes.

Rear brake



263_038

The rear brakes on the Polo are drum brakes. All vehicles with engine outputs of less than 55 kW have 200 x 40 mm brake drums.



263_039

Polo models with an engine output higher than 55 kW have 232 x 9 mm disc brakes.



Running gear

Breakdown set

To save weight, the spare wheel will be replaced by a breakdown set. This set consists of an inflating bottle together with a tyre sealant and a compressor powered via the cigarette lighter.

In the event of a breakdown, the sealant is pressed out of the inflating bottle and into the tyres via the tyre valve. The tyre is reinflated with the compressor.

The rolling motion of the tyres ensures an even distribution of sealant inside the tyre. The heat generated while travelling is sufficient to vulcanise the sealant and the tyre.

In the event of minor damage, the tyre can be made serviceable using the breakdown set so that the vehicle can reach next workshop. The vehicle still has a full-size tool kit including a jack.



263_101



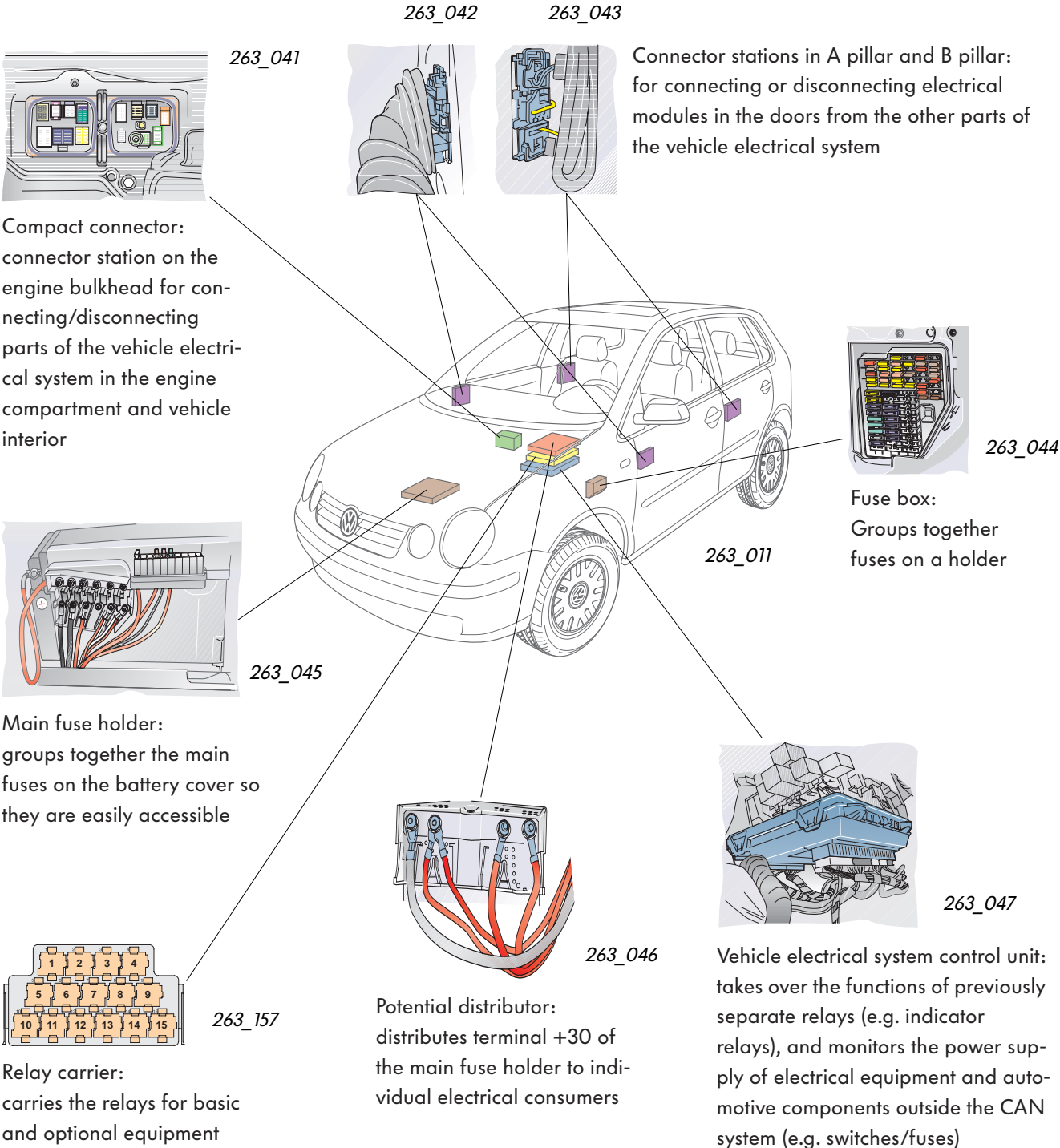
The breakdown set is not delivered to all countries. Depending on national statutory requirements, vehicles can also be equipped with a space-saver spare wheel or a fully-fledged spare wheel instead of the breakdown set.

Vehicle electrical system

The vehicle electrical system has a decentralised configuration. The main stations are:



Detailed information about the electrics can be found in Self-Study Programme No. 265 "The vehicle electrical system in the Polo Model Year 2002".

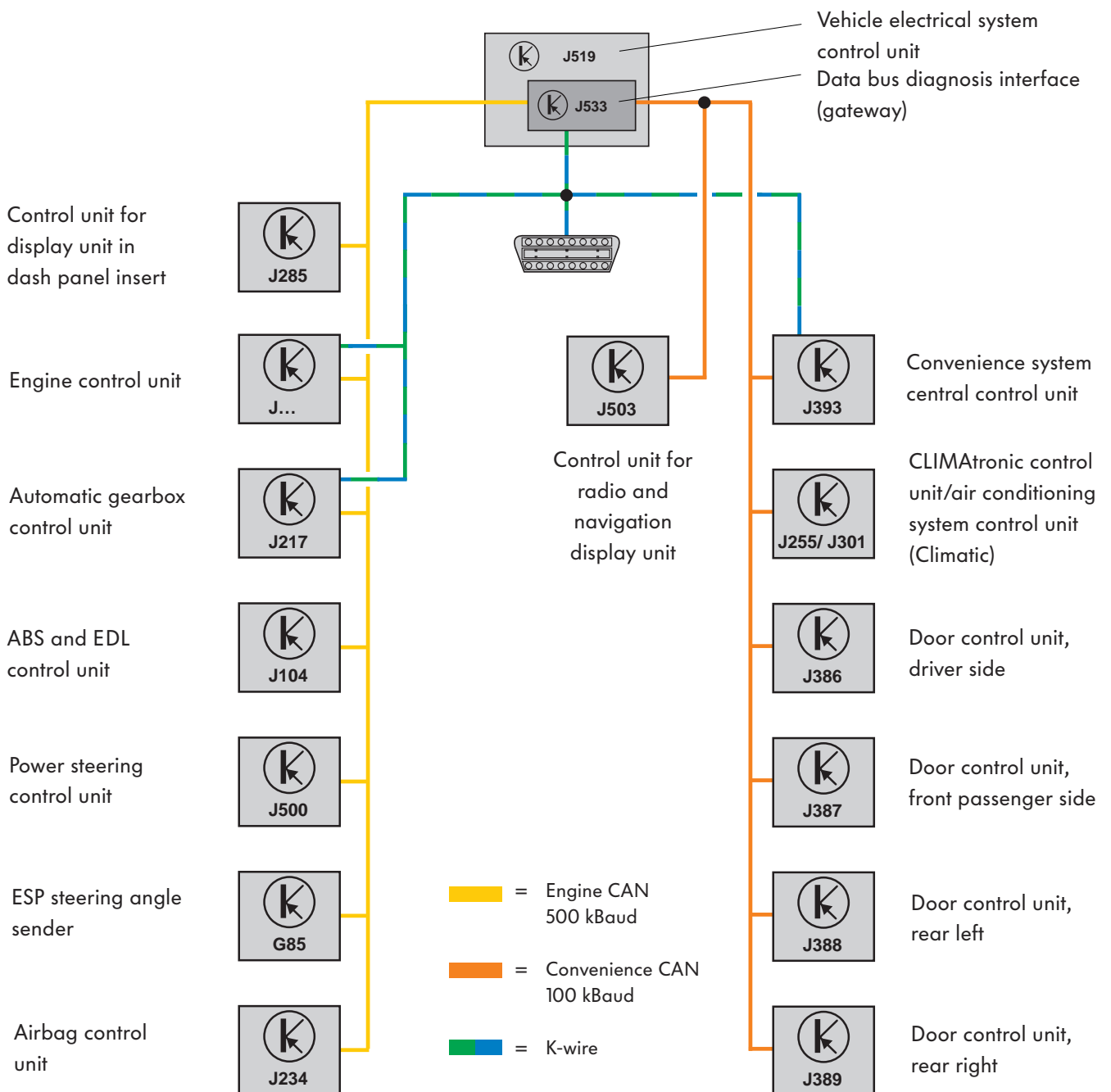


Electrical system

CAN bus system network

The data bus diagnostic interface (gateway) plays a key role in the CAN bus system. It is integrated in the vehicle electrical system control unit and combines the two CAN bus systems.

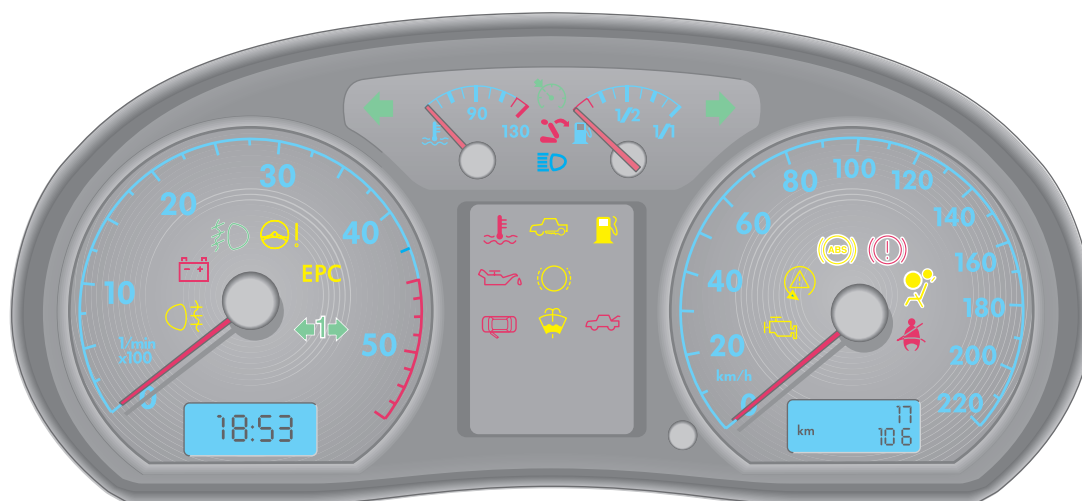
Data interchange is organised via this integrated gateway.









263_104

Dash panel insert

A number of new warning and indicator lamps have been added to the display in connection with the launch of the new vehicle electrical system.



263_040

| Display symbol | Designation/definition | Display symbol | Designation/definition |
|---|--|---|--|
|  | Foglights Lamp comes on when foglights are switched on |  | Electronic immobiliser Lamp comes on when unauthorised car key is used |
|  | Electro-hydraulic power steering Lamp comes on and stays on while steering malfunctions |  | Brake pad wear indicator lamp Lamp comes on when brake linings reach their wear limit |
|  | Engine oil level/pressure (yellow/red) "Yellow" indicates problem with oil level, "red" indicates problem with oil pressure |  | Windscreen washer fluid Lamp comes on when washer fluid level in the washer fluid tank drops below min. level |
|  | Cruise control system Lamp comes on when cruise control is on |  | Door opened Lamp comes on when not all doors are locked |
|  | Rear seat back lock comes on when the middle seat of the rear bench seat is not locked in position |  | Trailer indicator system Lamp flashes when direction indicator system is operating in trailer towing mode |



Electrical system

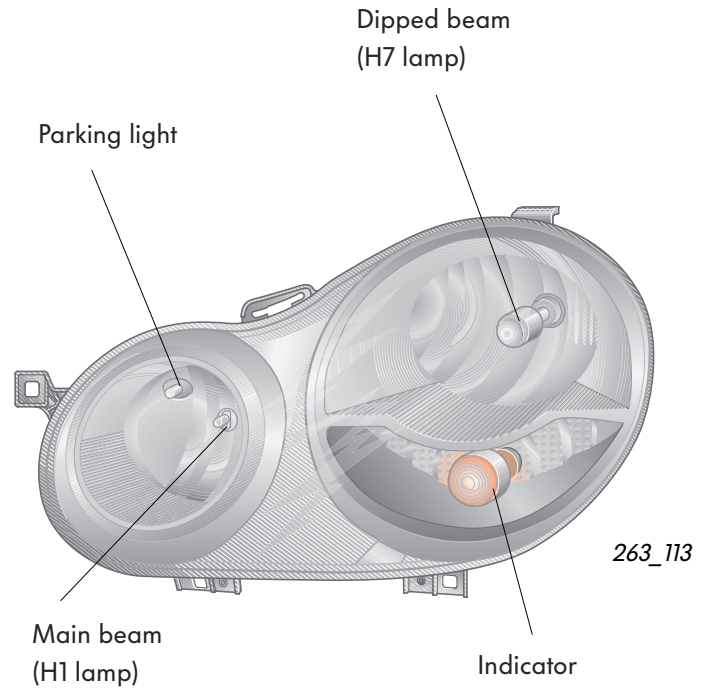
Headlights

The new headlights are of duplex design and have clear plastic lenses.

The headlight assembly has two reflectors. The reflector for the main beam and parking light consists of a single chamber. The reflector for the dipped beam and indicator is split into two chambers.

The bulb for the indicator is coloured yellow. Light is distributed by the shape of the reflector chamber.

The foglights are integrated in the bumper, not in the headlight assembly.



Taillights

The reflector consists of a single part and is divided into four main chambers. The chamber for the taillight/rear foglight is again divided internally.

A lamp for the taillight is located in the upper chamber half. A twin-filament lamp for the taillight/rear foglight is located in the lower chamber half.

When the light is on, one filament of this twin-filament lamp comes on as a taillight together with the taillight in the upper chamber half. This serves to enhance safety should a taillight lamp fail.

When the rear foglight is switched on, the second filament of the twin-filament lamp comes on too.

Reflectors are integrated throughout the illuminated area of the taillight assembly.



CD changer

The new compact disc changer is fitted in the dash panel and holds 6 standard audio CDs in all.

It can only be used in connection with the "BETA" or "GAMMA" radio system.

The previous CD changer can be used in combination with a radio navigation system.

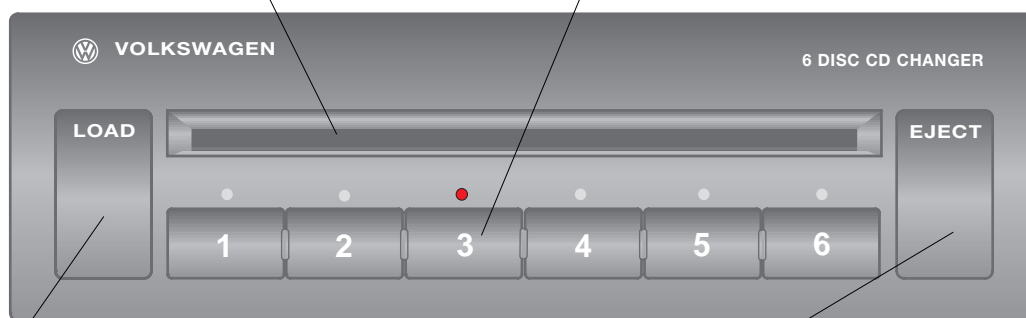


263_122

Audio CD tray

Selector keys for desired CD

If a CD is loaded in a CD tray, the diode above the associated button is lit permanently to indicate this.



263_081

LOAD button

To load a CD, press the **LOAD** button.

EJECT button

Press the button to select and eject the currently loaded CD.

To eject all CDs, the button must be pressed for longer than 3 seconds.



Detailed information on operating the CD changer can be found in the relevant operating manual.



Heater, air conditioning system

For the first time, a semiautomatic air conditioning system with automatic temperature control (Climatic) will be used in the Polo.

Whereas the interior temperature is adjusted automatically to the value set on the control panel, the air distribution and fresh air blower speed are adjusted manually.

In addition to the new semi-automatic air conditioning system (Climatic), the fully automatic air conditioning system (CLIMAtronic) or the heater with fresh air/air recirculation mode is available as a possible variant.

In both air conditioning systems, two new components ensure temperature control in accordance with demand:

- Evaporator vent temperature sender G263
- Externally-controlled compressor with regulating valve N280 and integrated over-load protection

The needs-orientated demand temperature control reduces energy consumption and helps to save fuel.

Other innovations are:

- function-enhanced controls matched to the dash panel design
- flexible flap adjustment shafts
- separate fresh air and air recirculation flaps
- dust/pollen filter integrated in the heater and air conditioning system housing



263_129

The heater and air conditioning system housing

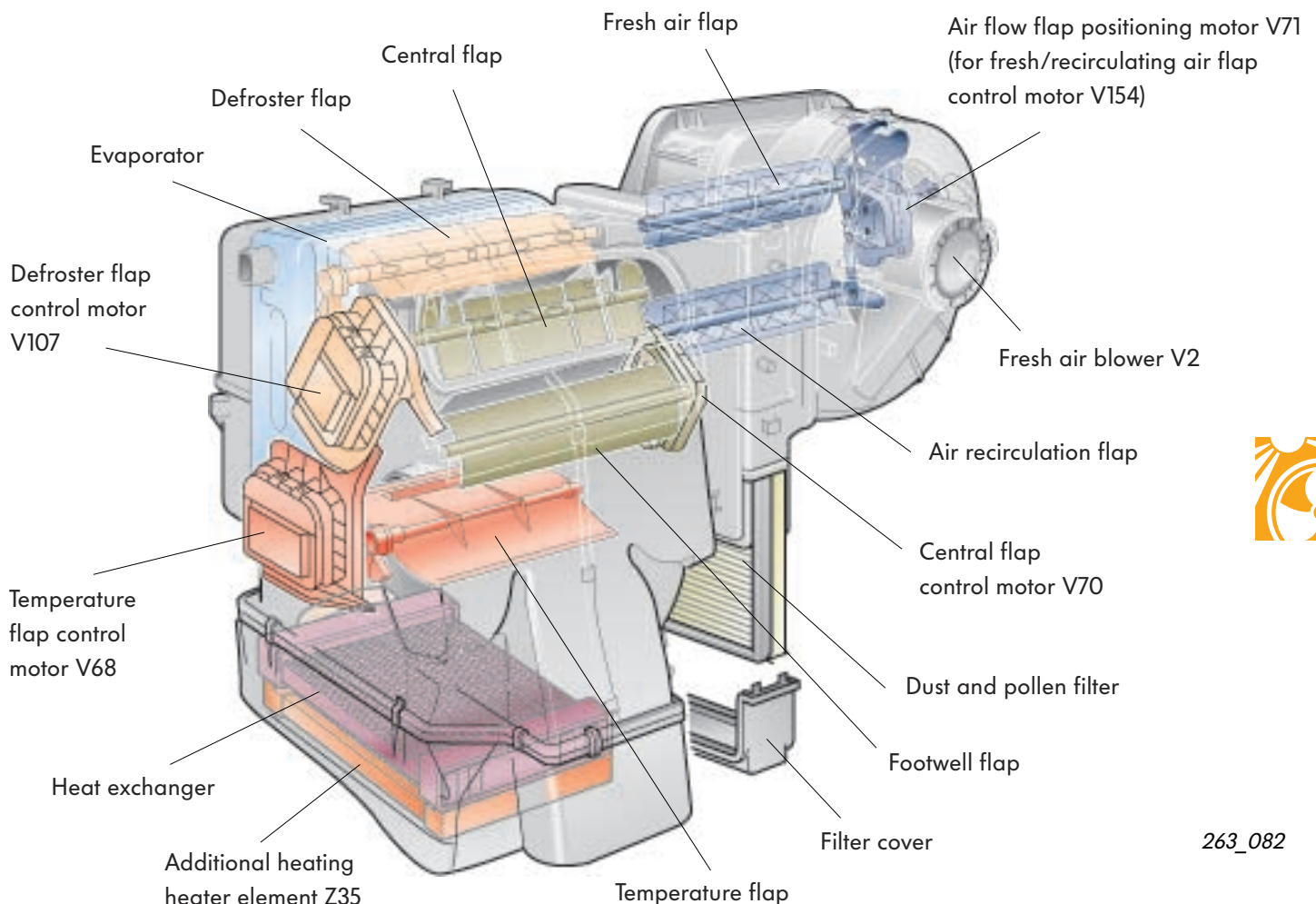
The housings are designed very similarly. Depending on equipment specification, the housings are specially adapted for operation of the heater or air conditioning system.

The dust/pollen filter, fitted externally to date, was integrated in the housing, and is located in between the fresh air intake and the distributor housing. The filter is accessible from the vehicle interior and can be pulled out downwards after detaching the filter cover.

The housing illustrated below shows the CLIMAtronic version.

In all variants, the fresh air and air recirculation flap are adjusted by an electric motor. Both flaps are adjusted in dependence on one another by a common lever mechanism.

The fresh air flap in the CLIMAtronic also serves as a throttle. The faster the vehicle is travelling, the more the flap closes. This keeps the volume of air flowing into the vehicle interior almost constant.



263_082

Heater, air conditioning system

The heater

In the heater, the temperature flap and the air distribution flaps are adjusted with the rotary knobs on the control panel. The heater is adjusted by flexible shafts, each of which is engaged in the control panel and the heater and air conditioning system housing. The shafts for the temperature flap and air distribution are not of equal length. To avoid confusion, the plug and socket connections of the shafts are colour-coded.

The flexible shafts have the following advantages over the Bowden cable:

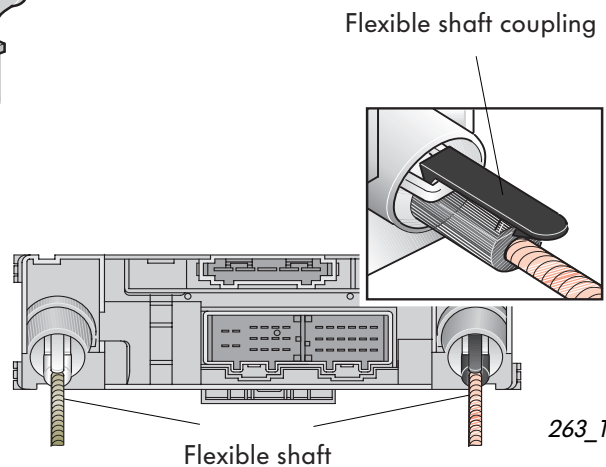
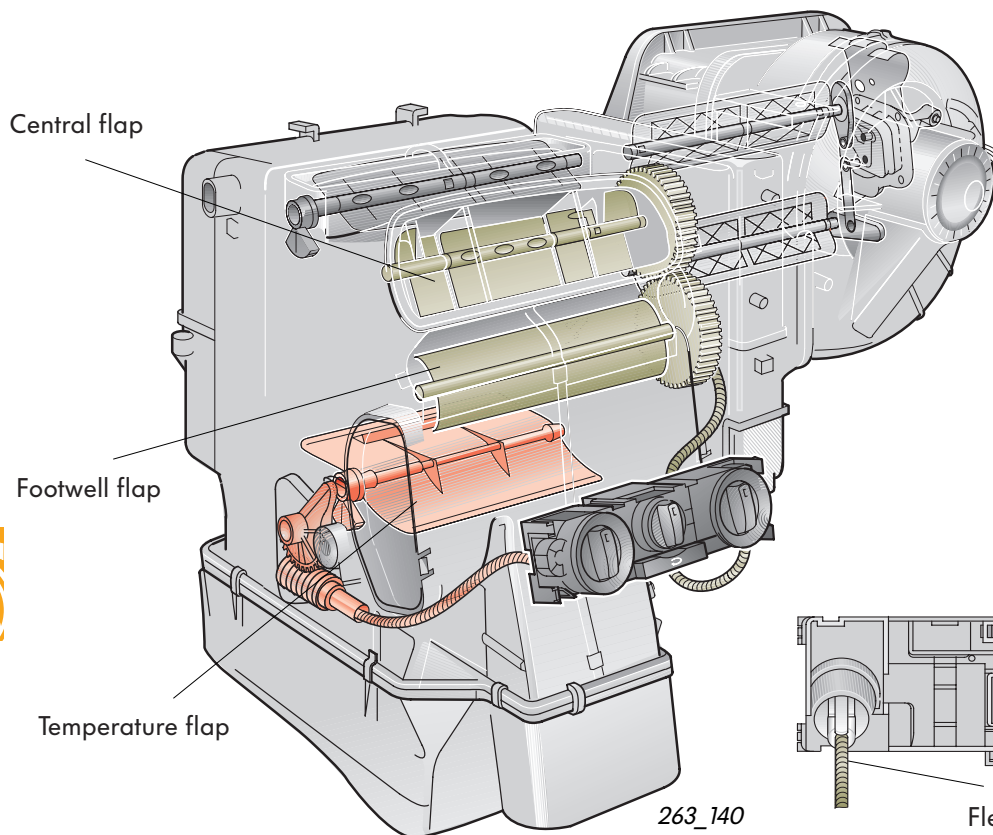
- short routing with narrow curve radius
- no length adjustment is needed

The air recirculation mode can be switched on and off using the air recirculation button.

In diesel engine vehicles, an additional heating element is used in combination with the heat exchanger to warm up the vehicle interior quickly.



263_063



Before you decouple the shafts from the control panel or from the heater and air conditioning system housing, please follow the inspection and installation instructions given in the Workshop Manual.

Microswitches for the additional heating element and defroster

The microswitches are located in the control panel housing. The microswitch is pressed against the electrically-conductive contact surface by a cam on the rotary knobs for temperature selection or air distribution. The control electronics utilise the earth signal generated simultaneously as a criterion for activating the additional heating element "ON" function, or recirculating air mode automatic "OFF" when this is adjusted to Defrost mode.

The air recirculation function can be activated by again pressing the air recirculation button in the Defrost position.

Both microswitches work according to the same principle.

The mode of operation of the microswitch is described on the following pages using the additional heating element "ON/OFF" function as an example.

Contact open

The contact is open when the rotary knob is in the operating range 'Cooling' and heating output is up to approx. 90%.

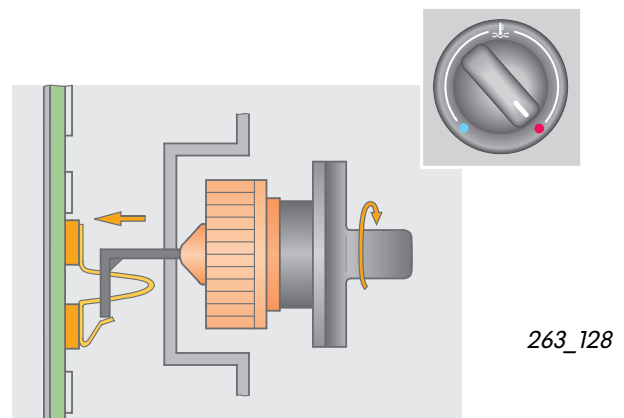
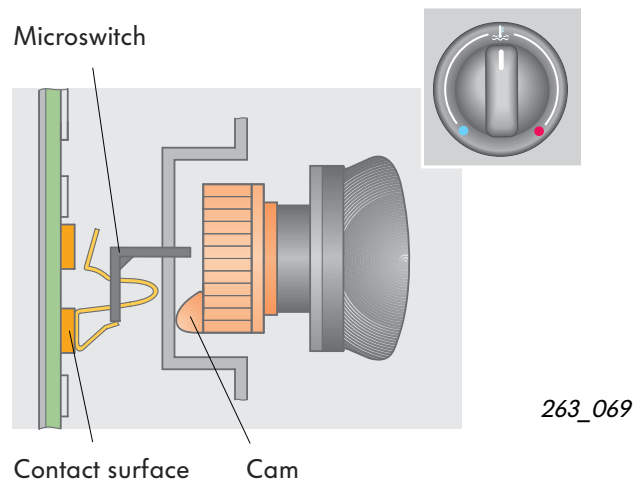
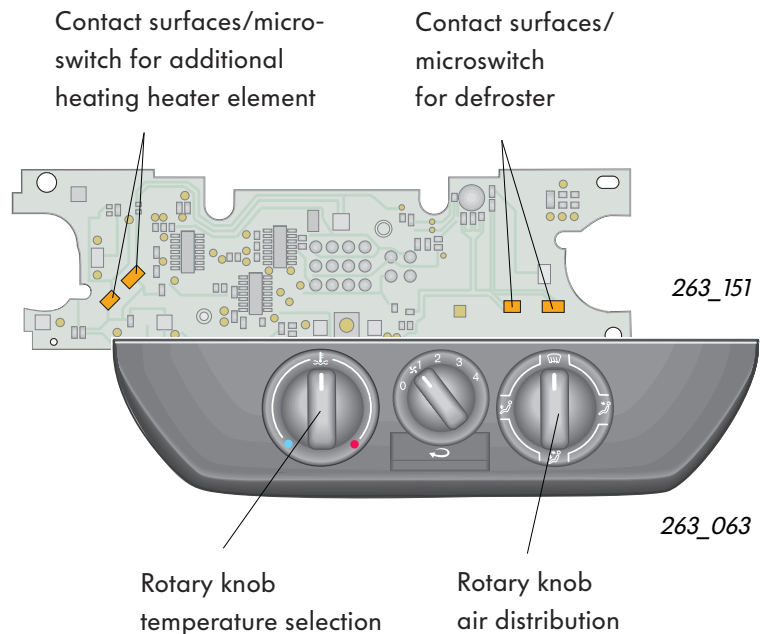
This breaks the signal earth contact to the engine control unit.

The additional heater heating element does not cut in within this operating range.

Contact closed

The contact switch is closed in the operating range Cooling and between 90% and 100% heating output.

When the contact switch is in this state, the earth signal is present at the engine control unit. If all these switch-on conditions are met, the additional heating element switches on.



Heater, air conditioning system

Additional heating element Z35

Heating output control

Approximately 10 seconds after the engine is started, the diesel direct injection system control unit enables the additional heating element. This ensures that the engine runs properly straight away.

If the rotary knob for interior temperature is positioned to 90 -100% heating output and higher, the additional heating element switches on under certain conditions.

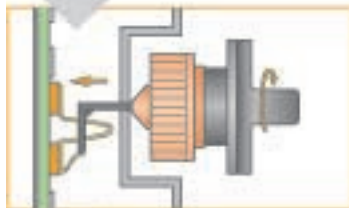
Switch-on conditions

Rotary knob for temperature selection



Position of rotary knob: between 90% and 100% heating output

Microswitch for additional heating element



Contact switch opened 90% heating output and higher

Diesel direct injection system control unit J248



The control unit checks the following signals as switch-on conditions



Coolant temperature less than 80°C



Battery voltage greater than 11 V



3-phase AC alternator load factor not higher than 50% (terminal DF)



Engine speed higher than 450 rpm

Additional heating element Z35



If all these switch-on conditions are met, the additional heating element is switched on.

263_065

Air conditioning system

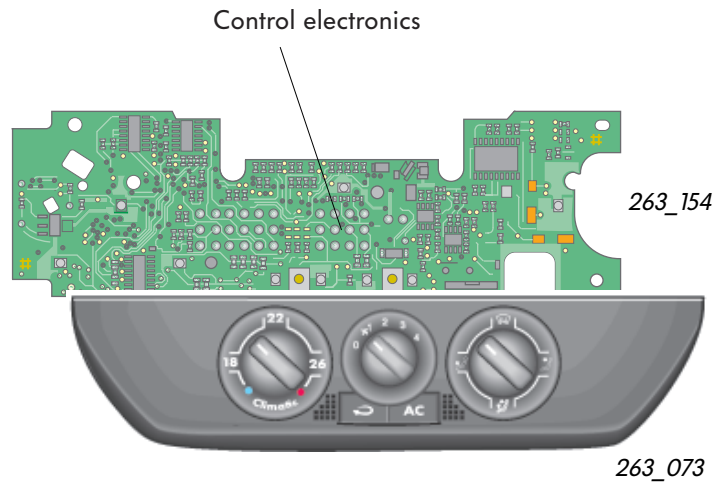
Climatic

The control electronics with the air conditioning system control unit J301 are located behind the control elements.

The control unit evaluates the signals from the sensors and actuators and controls the automatic interior temperature regulation.

The temperature flap is adjusted by an electric motor.

The central flap, footwell flap and the defrost flap are adjusted by a flexible shaft with a rotary knob for air distribution.

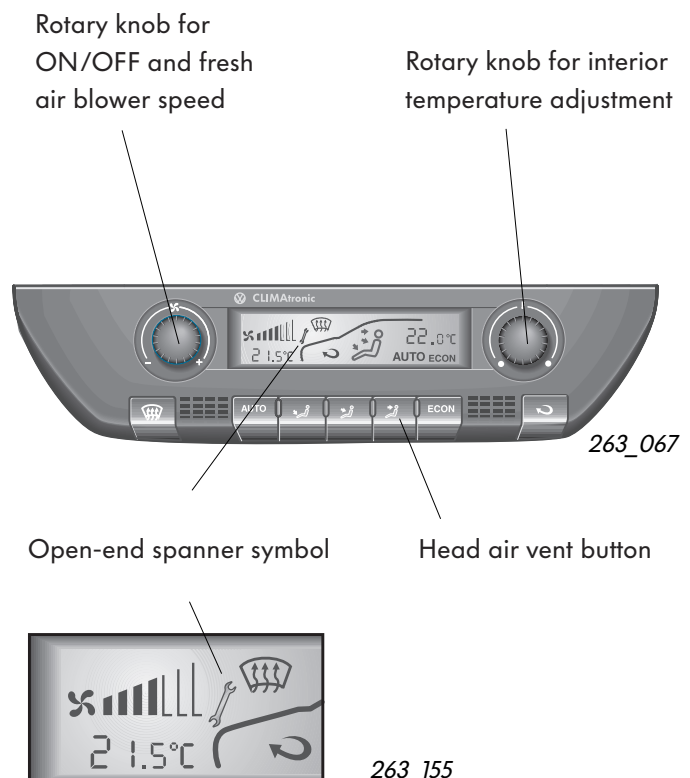


CLIMAtronic

The CLIMAtronic control panel was revised in terms of its function and design, and has the following new features:

- blower output adjustment by rotary knob
- temperature adjustment in 0.5 °C increments
- head air vent button
- enlarged display
- an open-end spanner symbol is displayed when the fault reader is connected

As before, all functions of the CLIMAtronic are controlled fully automatically.

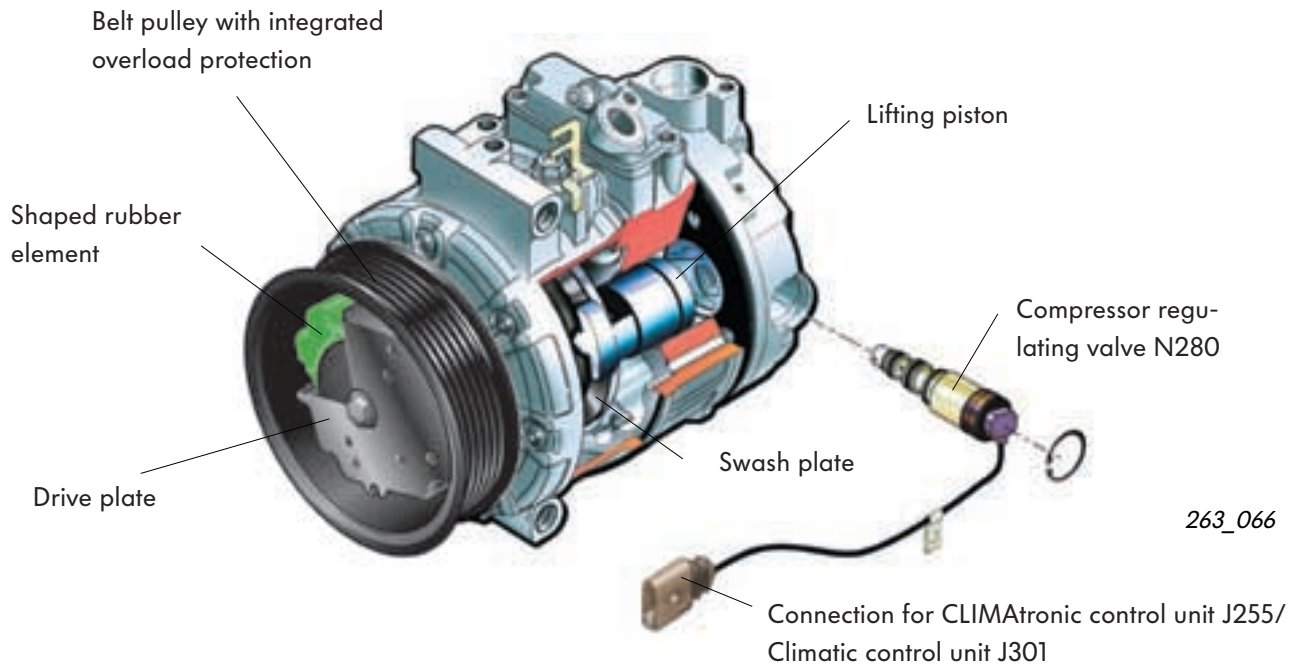


Heater, air conditioning system

Externally regulated compressor

The compressor basically operates according to the drive plate principle. The design features which distinguish this compressor from the internally-regulated compressor are as follows:

- one-sided drive plate compressor with 6 lifting pistons
- variable cubic capacity for adaptation to refrigerating demand
- hollow pistons
- pulley drive with integrated overload protection and no magnetic clutch
- external compressor regulating valve N280 for control of the pressure conditions inside the compressor



Function

The CLIMAtronic control unit J255 or the Climatic J301 activates the compressor regulating valve N280 in continuously variable mode.

The pressure conditions on the low pressure side are adjusted via a control voltage depending on the following parameters:

desired temperature setting, exterior and interior temperature, evaporator temperature and refrigerant pressure in the refrigerant circuit.

The variable swash plate inclination defines the working volume, and therefore the refrigeration capacity.

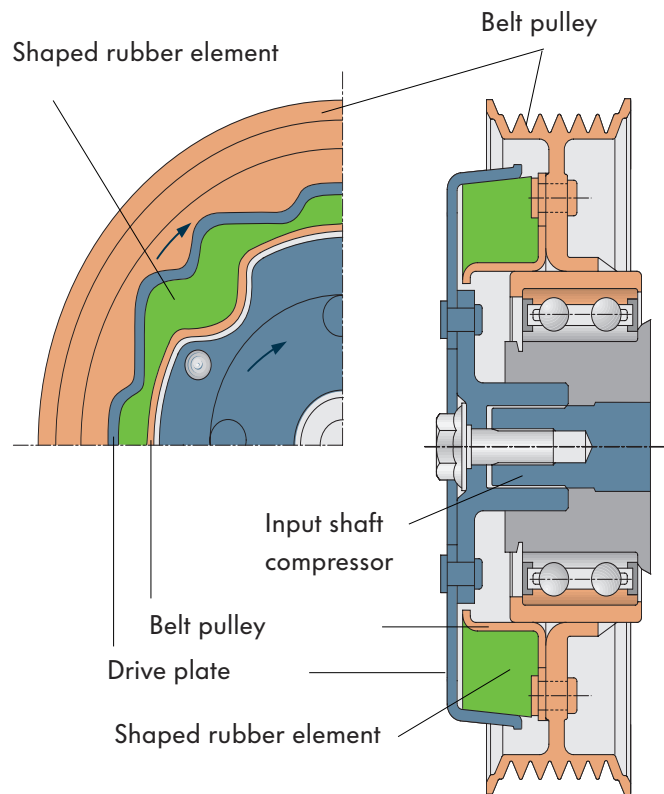
The compressor continues to run via the V-belt drive when the air conditioning system is switched off. The delivery volume of the refrigerant is set to less than 2%.

Overload protection

Compressor in operation

The ribbed belt pulley and the drive plate are positively connected by a shaped rubber element.

When the compressor is functional, the two plates rotate in unison.



263_076

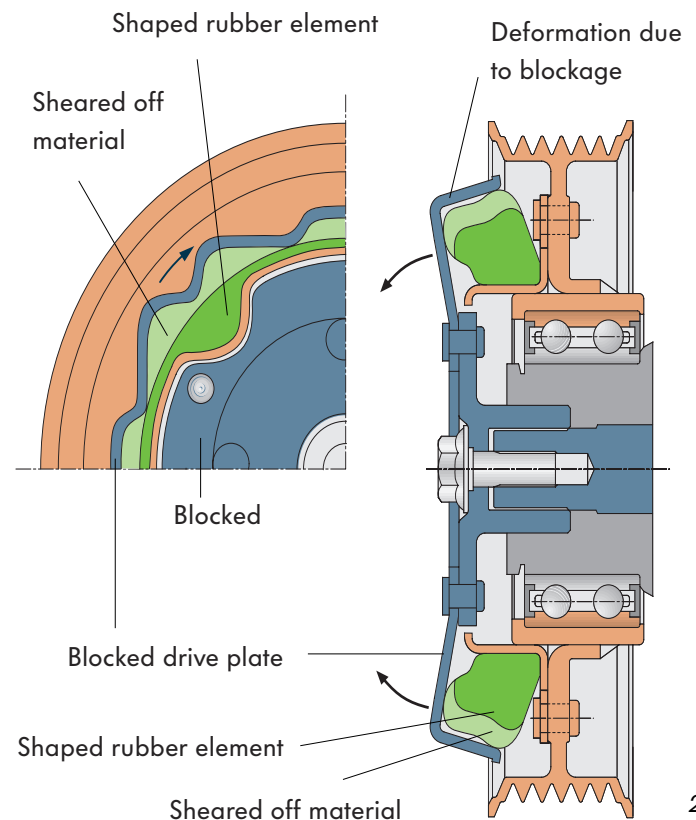
Compressor blocked

If the compressor becomes damaged internally, the drive gears may block. The drive plate is also brought to a halt.

This increases considerably the transmission forces between the belt pulley and the drive plate. The belt pulley pushes the shaped rubber element towards the blocked drive plate in the direction of rotation.

The outside parts of the rubber element are sheared off, and the belt pulley and drive plate are disconnected. The belt pulley continues to rotate unobstructed.

This prevents the V-belt and the engine from damage.



263_077



Heater, air conditioning system

Evaporator control circuit

When the CLIMAtronic/Climatic is switched on, the cooling requirements are determined and adjusted on the basis of the temperature setting and various influencing factors.

The components described on the following pages form a closed control loop and facilitate needs-orientated temperature control.

Compressor regulating valve N280

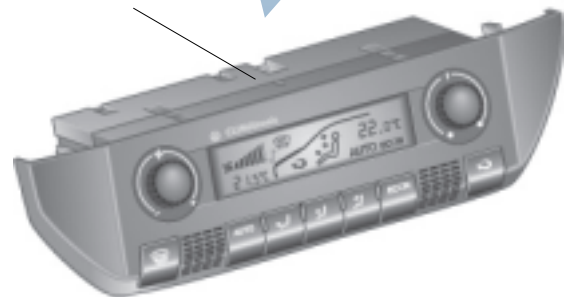
The external regulating valve is the interface between the low-pressure side and the high-pressure side of the compressor. It has a pressure-equalising function.

If increased cooling is required, the CLIMAtronic control unit J255 or the Climatic control unit J301 activates the regulating valve.

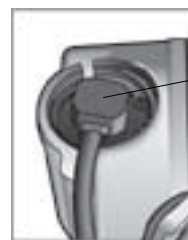
A actuating rod in the regulating valve is moved when a control voltage is applied to the solenoid regulating valve.

The period over which the control voltage is applied defines the adjustment range. The adjustment affects the cross section between the low-pressure and high-pressure sides in the valve. The high pressure increases with decreasing low pressure, and increases the drive plate inclination via the piston stroke.

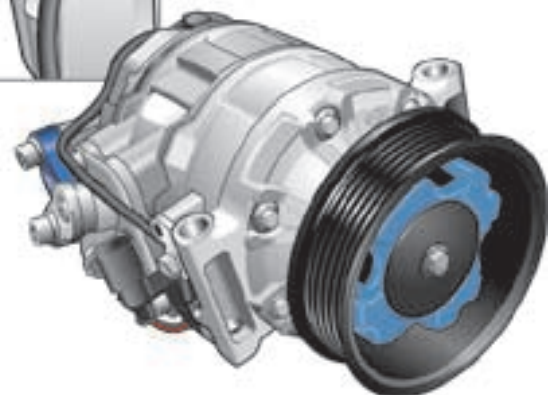
CLIMAtronic control unit J255



263_080



Compressor regulating valve N280



263_068



Influencing factors:

desired temperature input
ambient temperature
interior temperature
air conditioner vent temperatures
the pressure level in the refrigerant circuit

Evaporator vent temperature sender G263

Evaporator vent temperature sender G263 is built into the ventilation duct behind the evaporator and measures the vent temperature downstream of the evaporator.

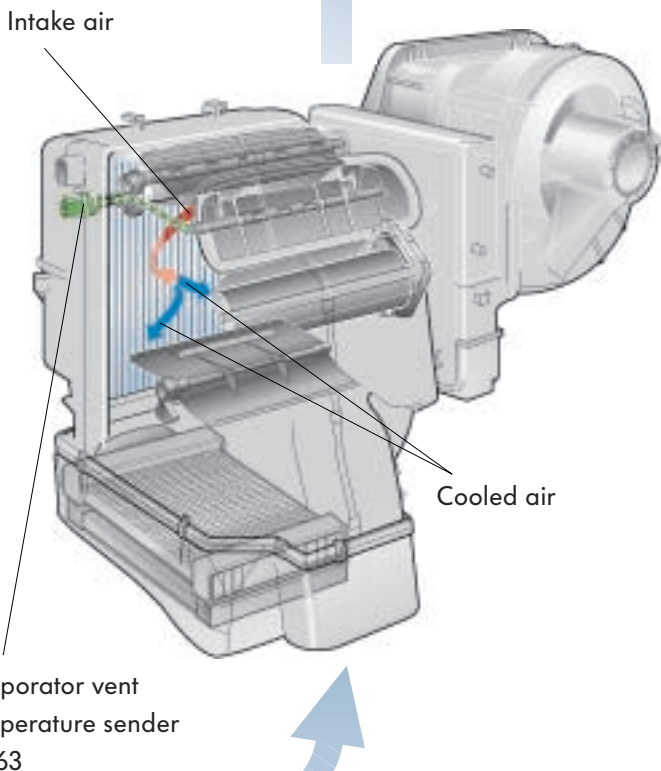
It performs two important tasks:

- It ensures that the air conditioning system cuts out at a temperature of approx. 0 °C downstream of the evaporator and that icing does not occur.
- In connection with the externally-regulated compressor, the vent temperature downstream of the evaporator can now be adjusted to between 0 °C and approx. 10 °C downstream of the evaporator.

Advantage:

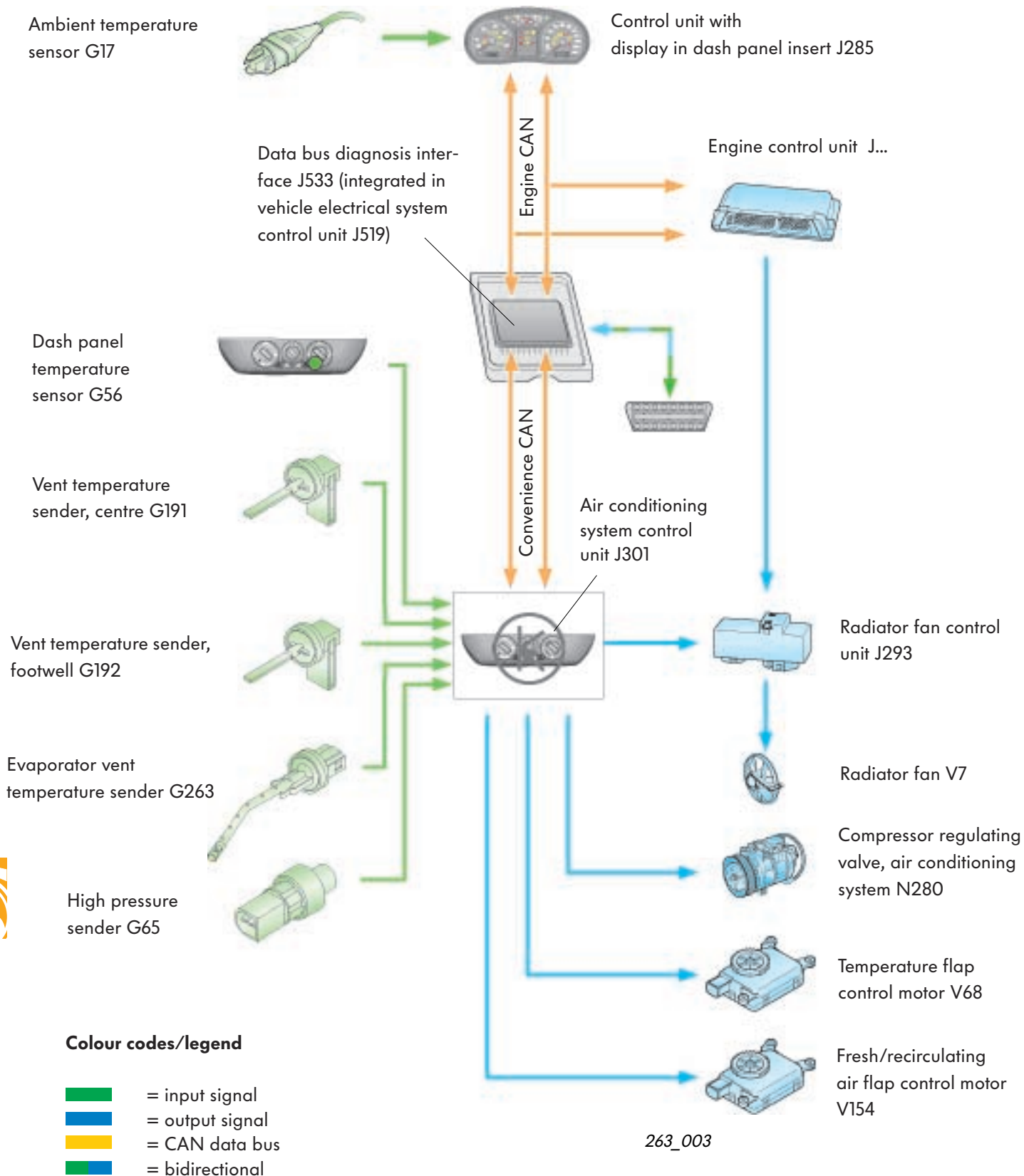
It is no longer necessary for cold air to be "reheated" by the heat exchanger to achieve specific desired temperatures.

All in all, the evaporator control circuit helps to reduce energy consumption, and thus saves fuel.

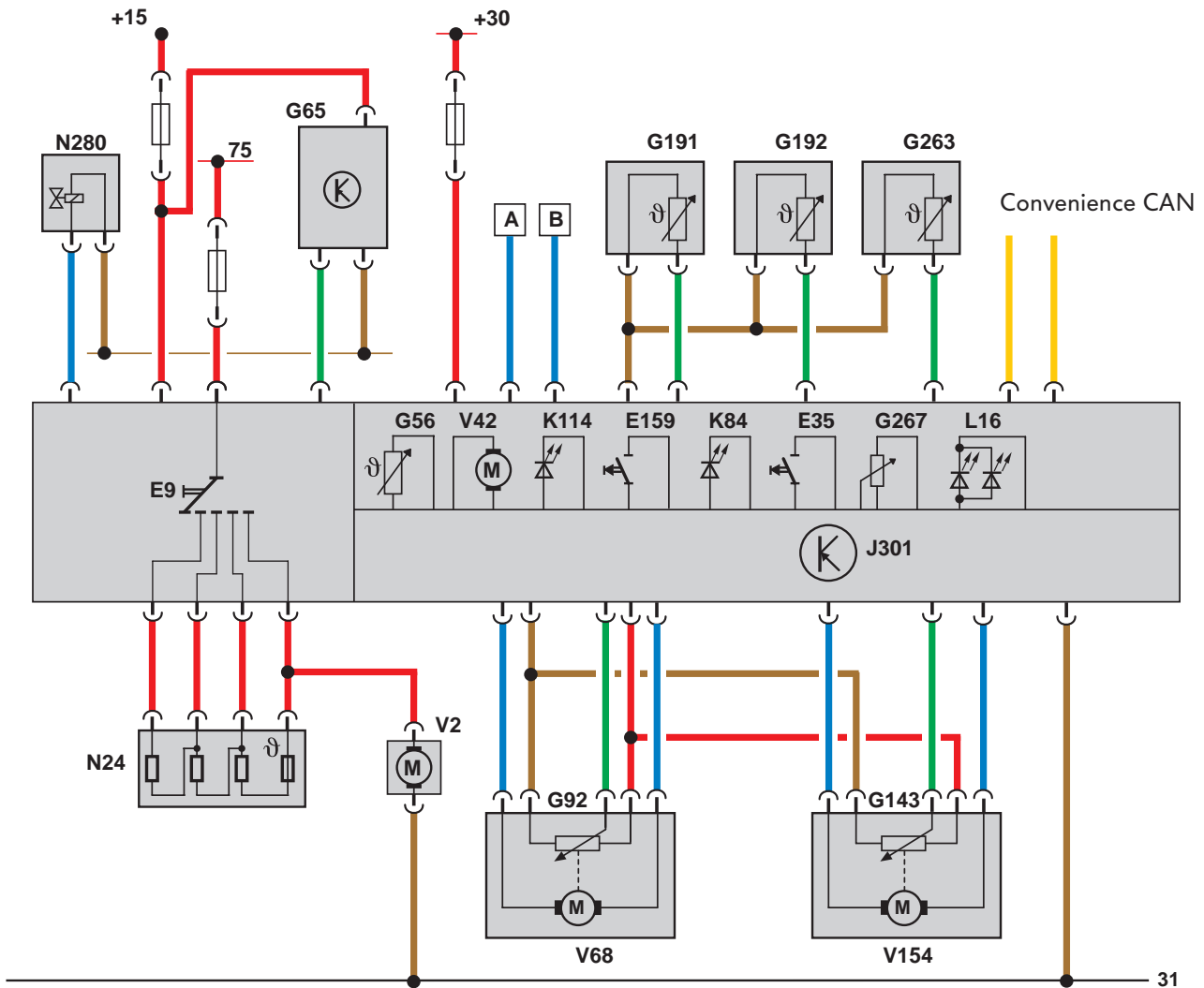


Heater, air conditioning system

System overview - Climatic



Function diagram - Climatic



263_027

Components

| | | | |
|------|---|------|--|
| E9 | Fresh air blower switch | N24 | Fresh air blower with overheating fuse series resistor |
| E35 | Air conditioner switch | N280 | Compressor regulating valve, air conditioning system |
| E159 | Fresh air/air recirculating flap switch | V2 | Fresh air blower |
| G56 | Dash panel temperature sensor | V42 | Temperature sensor blower |
| G65 | High pressure sender | V68 | Temperature flap control motor |
| G92 | Control motor potentiometer for temperature flap | V154 | Fresh/recirculating air flap control motor |
| G143 | Control motor potentiometer, air recirculation flap | | |
| G191 | Vent temperature sender, centre | | |
| G192 | Vent temperature sender, footwell | | |
| G263 | Evaporator vent temperature sender | | |
| G267 | Rotary knob temperature selection potentiometer | | |
| J301 | Air conditioning system control unit | | |
| K84 | Air conditioning system warning lamp | | |
| K114 | Fresh air/air recirculation warning lamp | | |
| L16 | Fresh air controls light bulb | | |

Code codes/Legend

| | |
|---------------------------------------|-----------------|
| █ | = input signal |
| █ | = output signal |
| █ | = positive |
| █ | = earth |
| █ | = CAN data bus |

Auxiliary signals

| | |
|---|-------------|
| A | Fan speed 1 |
| B | Fan speed 2 |



Extended service intervals

All engines used in the Polo Model Year 2002 feature extended service intervals (ESI).

- The service interval of petrol engine vehicles are 15,000 km/year to max. 30,000 km/2 years.
- The service interval of diesel engine vehicles are 15,000 km/year to max. 50,000 km/2 years.

To enable the two TDI engines with unit injector system to achieve service intervals up to 50,000 km, the following components of the engines with unit injector system were improved:

- The friction created by the drive of the unit injector on account of low surface pressure was reduced by enlarging the radii of the pressure pin (also refer to page 25 "New features of unit injector").
- By widening the connecting rod head, the contact surface of the piston pin was enlarged in relation to the small end.
- Piston cooling has been improved by a revised cooling channel in the piston and modified oil spray nozzles.



Detailed information about extended service intervals can be found in Self-Study Programme No. 224.

Diesel engines with a unit injector system **and** extended service intervals must be filled with long-life engine oil compliant with the VW 50601 standard.

This oil can also be used for diesel engines with extended service intervals which do not have a unit injector system.



263_084



Engines **without** extended service intervals should not be filled with long-life engine oil.

Please pay attention to the oil standards prescribed in the Workshop Manual.



Service Interval Display

A new symbol and other display parameters have been added to the flexible Service Interval Display in the Polo.

The driver's personal driving style is taken into account to determine the service intervals besides the individual conditions of use and the quality of the engine oil.

Service advance warning

If a service is due shortly, a spanner symbol and the mileage to next service in "km" appears in the kilometre counter on the dash panel insert.



263_136

After 10 seconds, the display changes. A clock symbol and the number of days to the next service are then displayed.



263_137

On vehicles with an on-board computer, the following message appears in the display on the dash panel insert:

Service in 2000 km or 40 days
(Service in 2000 km oder 40 Tagen)



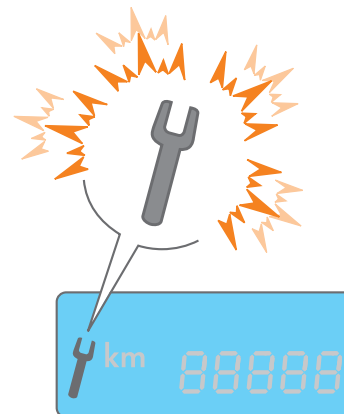
263_138



Service

Service due

If a service is due, a gong signal sounds and a flashing spanner symbol appears in the kilometre counter on the dash panel insert for 20 seconds.



263_145

The following message appears on the display of the dash panel insert.

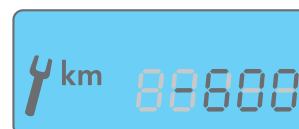
Service now
(Service jetzt)



263_146

Service overdue

An overdue service is indicated by a minus sign before the displayed number of kilometres or days to the next service.



263_147



263_148

The following message appears on the display of the dash panel insert.

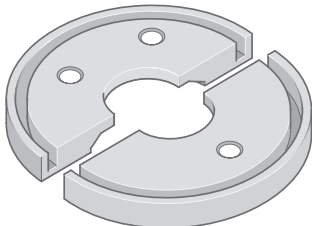
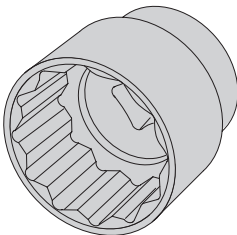
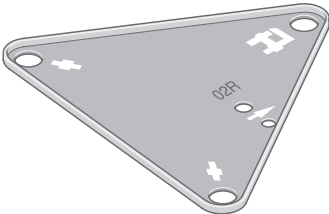
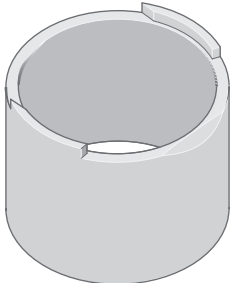
Service since 600 km or 8 days
(Service seit 600 km oder 8 Tagen)



263_146



Special tools

| Designation | Tool | Use |
|------------------------------------|---|---|
| T10064/6A 2-piece backing plate |  | For removing the wheel bearing |
| T10125 Socket |  | For mounting the double hexagon nut to the outer CV joint the wheel hub |
| T30020 Adjustment plate |  | For removing and installing 5-speed manual gearbox 02R |
| T30035 Thrust piece |  | For mounting the bonded rubber bush to the axle bracket |






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