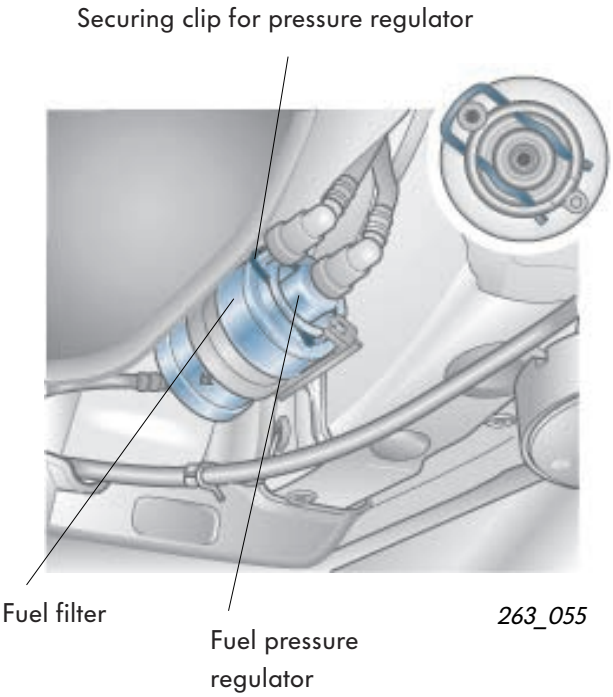
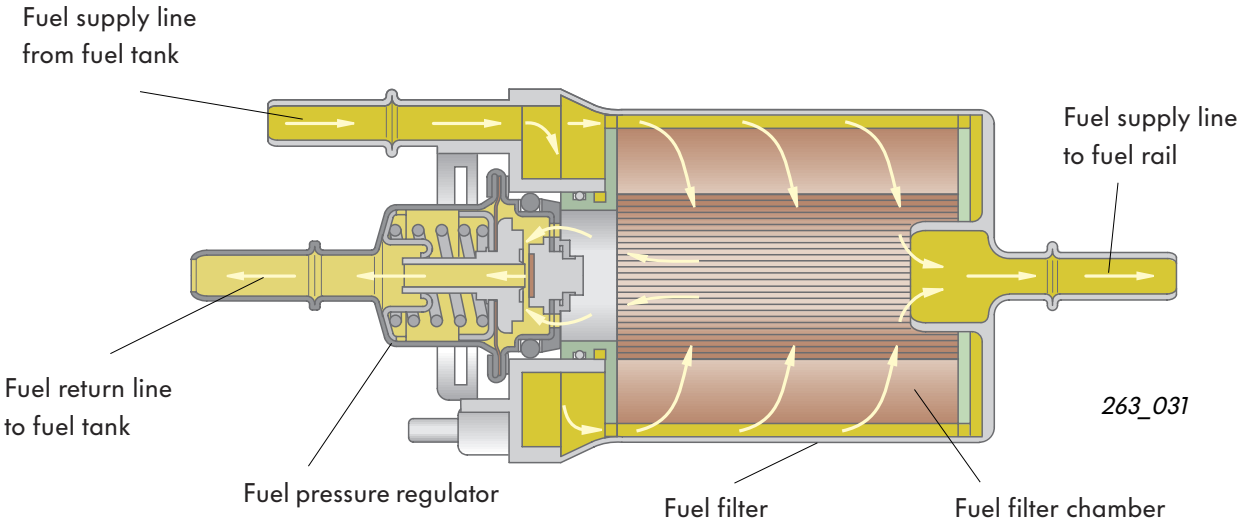
Fuel filter with fuel pressure regulator

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:

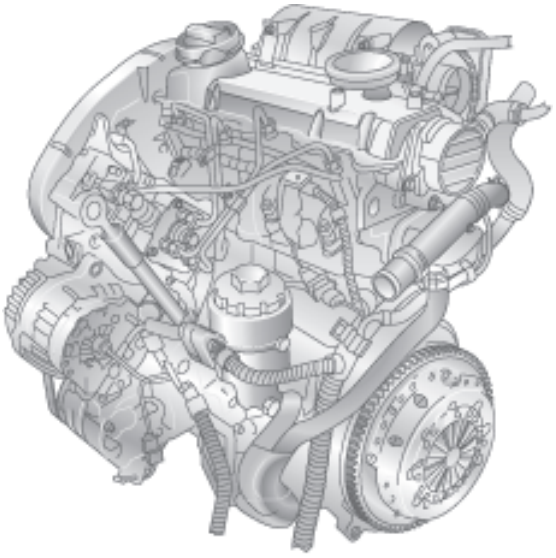
The electrical fuel pump delivers the fuel into the fuel filter chamber. There, the fuel is filtered and flows to the fuel rail and to the injectors.

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.

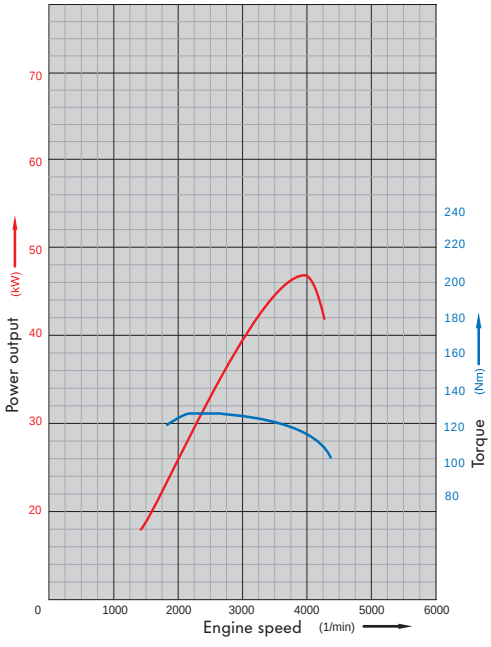


263_021

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



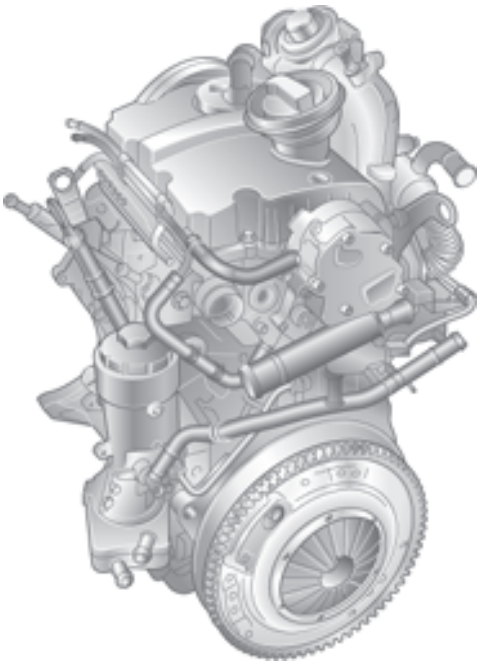
263_022

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



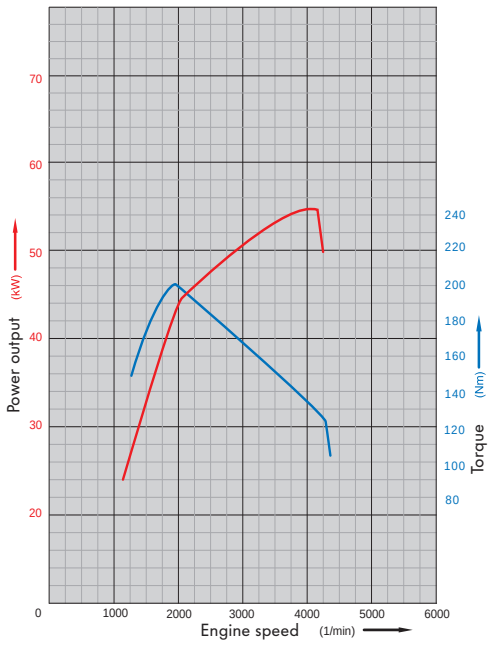
263_025

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

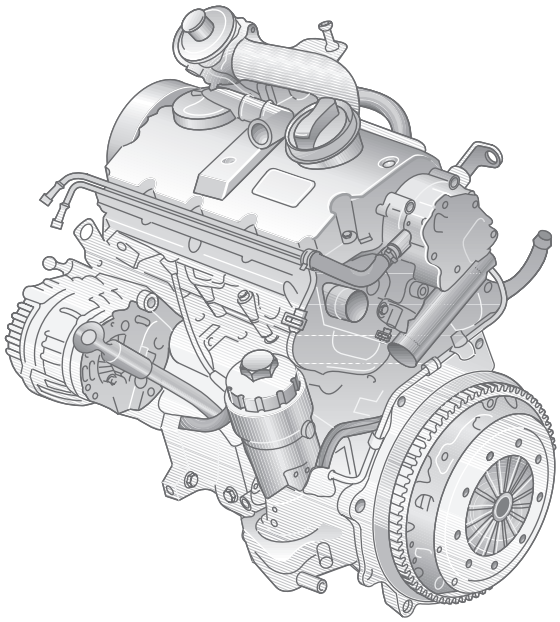
Engines

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

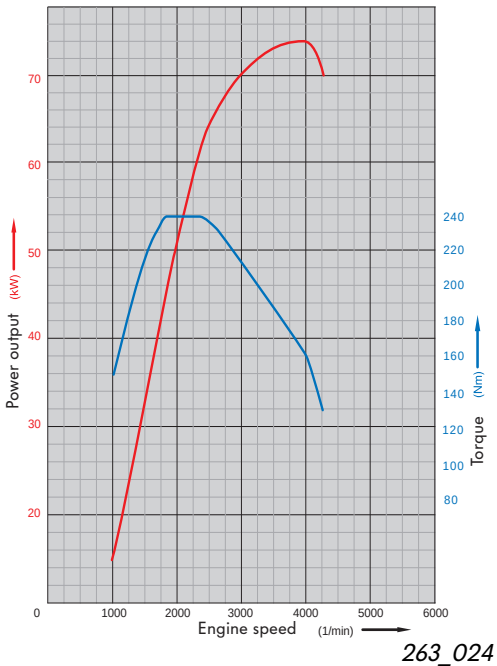


263_023

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

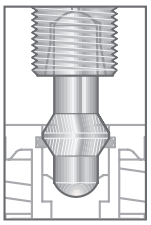


263_024

New features of unit injector

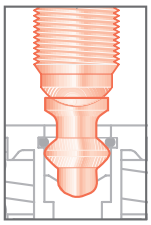
To meet the requirements with regard to extended service intervals and exhaust emission reduction, the unit injector has been improved in the following respects.

Previous version



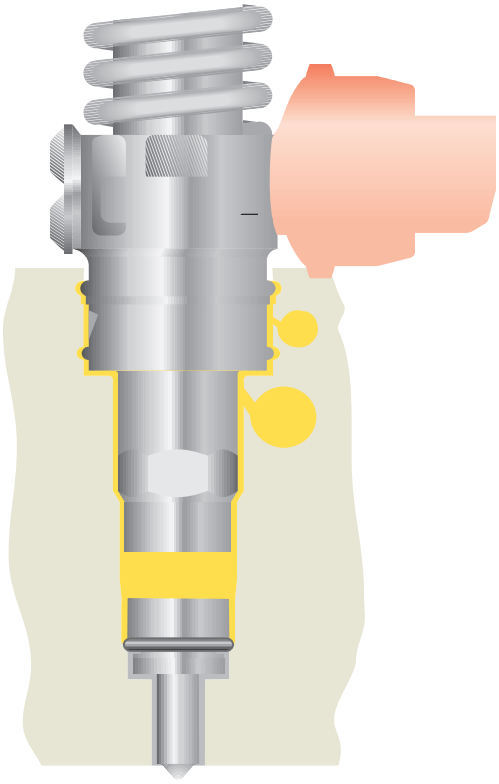
263_108

New version



263_109

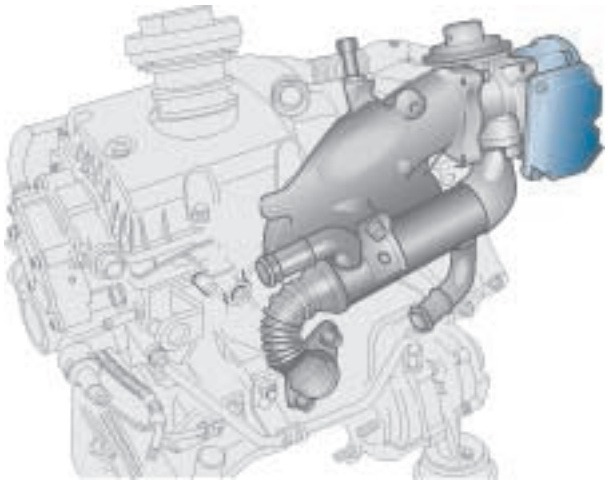
Inlet drilling



Electrical intake manifold flap

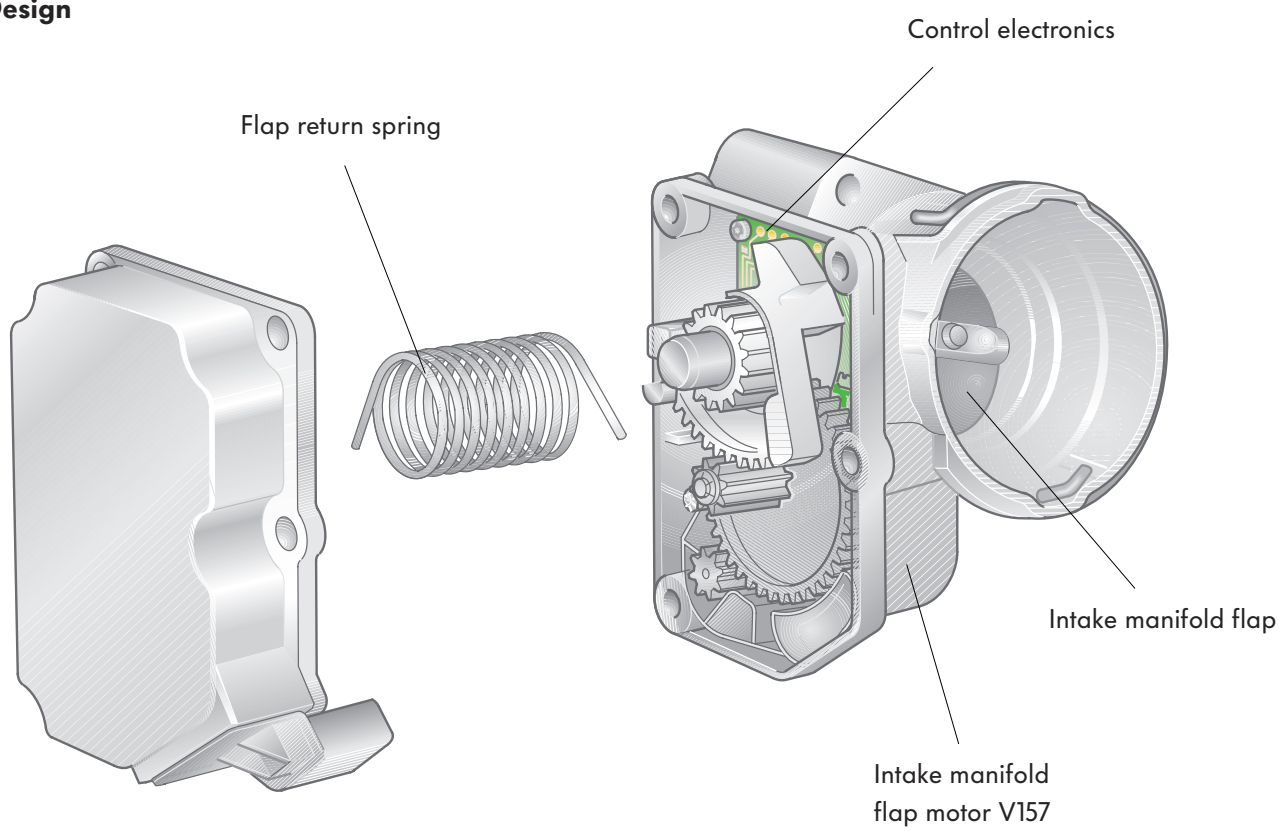
The 1.4-litre and 1.9-litre TDI engines with unit injector system have an electrical intake manifold flap so they meet the strict emission limits of the D4 exhaust emission standard. Because adjustment of the electrical intake manifold flap is continuously variable, the vacuum required for effective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

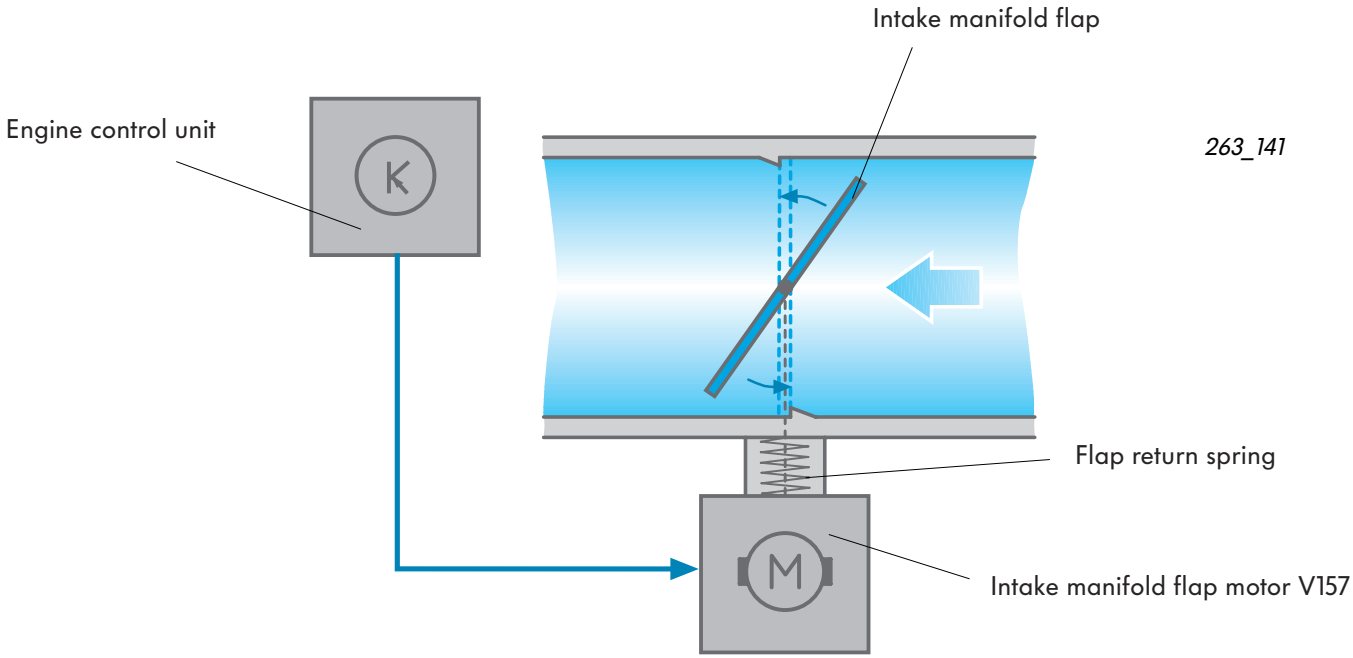


263_009

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.

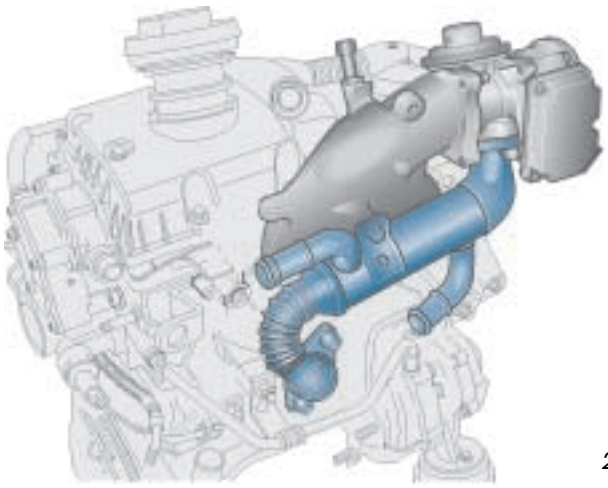
A flap return spring permits emergency operation by keeping the intake manifold flap open when de-energised.



263_141

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.

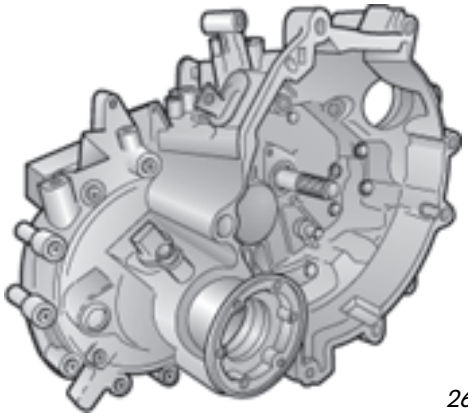


263_159

Power transmission

Gearboxes

5-speed manual gearbox 02T

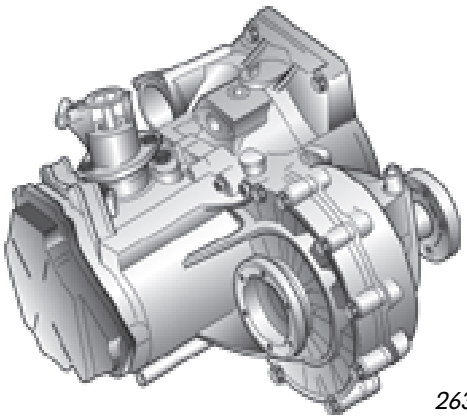


263_059

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

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

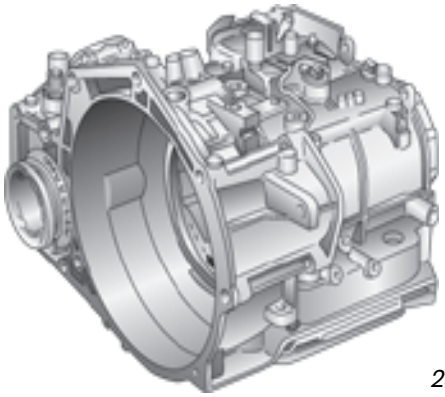
5-speed manual gearbox 02R



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

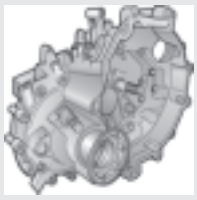
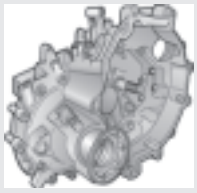
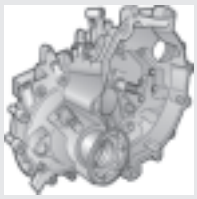
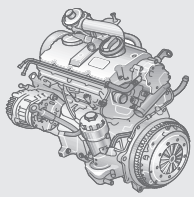


263_061

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.

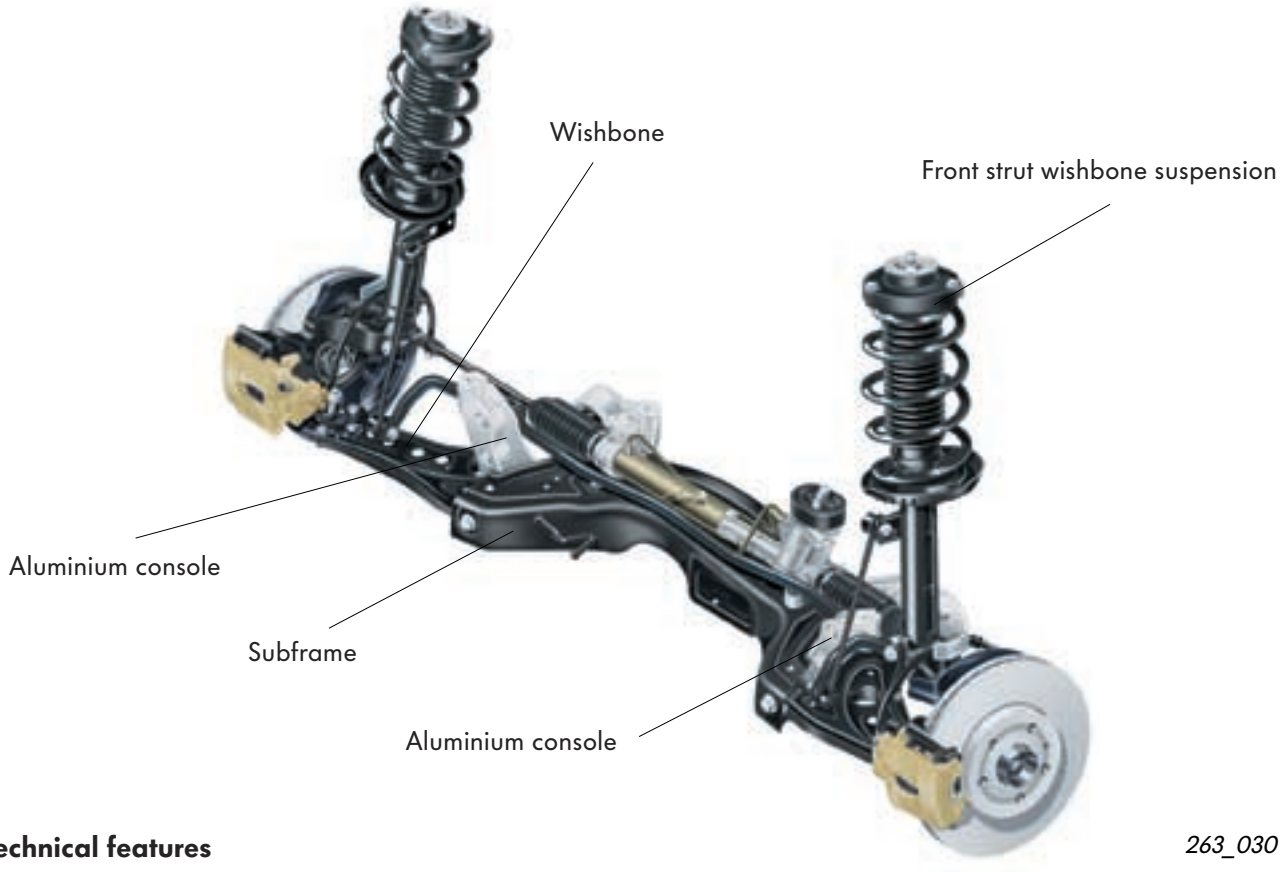
Detailed information about the design and function of the gearbox is contained in Self-Study Programme No. 176.

Engine-gearbox combinations

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

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.



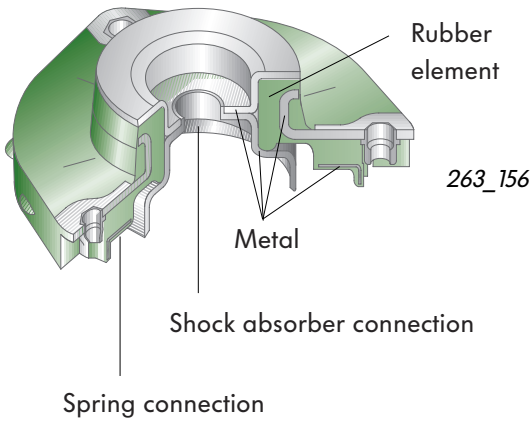
263_030

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.

Front strut wishbone suspension

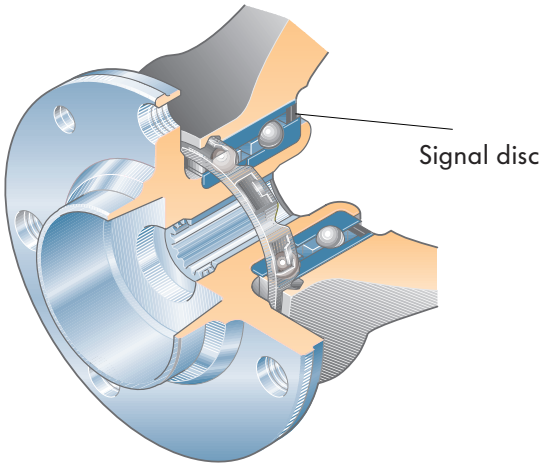


263_156

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.

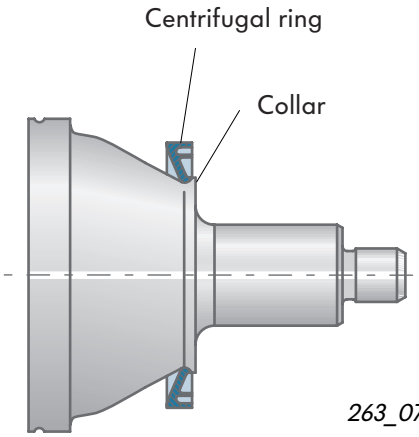
The active wheel sensors as well as the two-row angular contact ball bearing are described in Self-Study Programme No. 218 "The Lupo 3L".



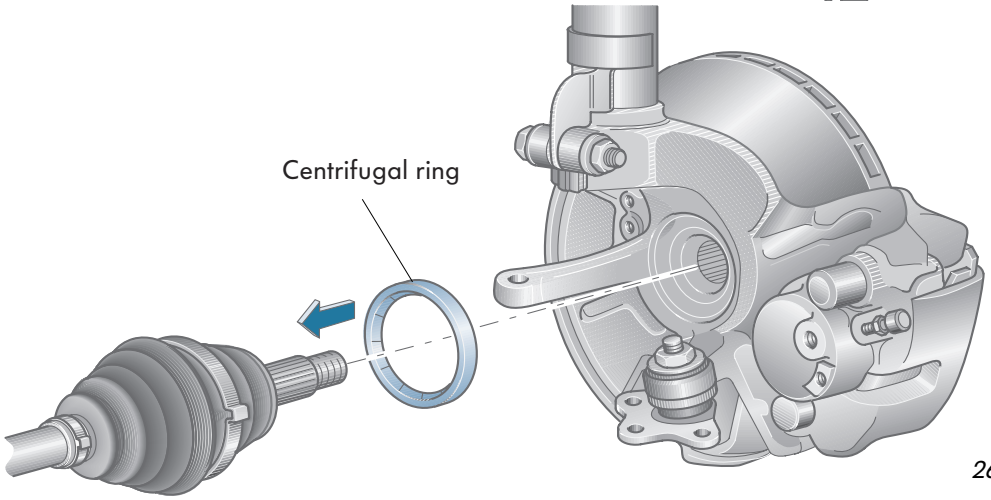
263_130

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

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

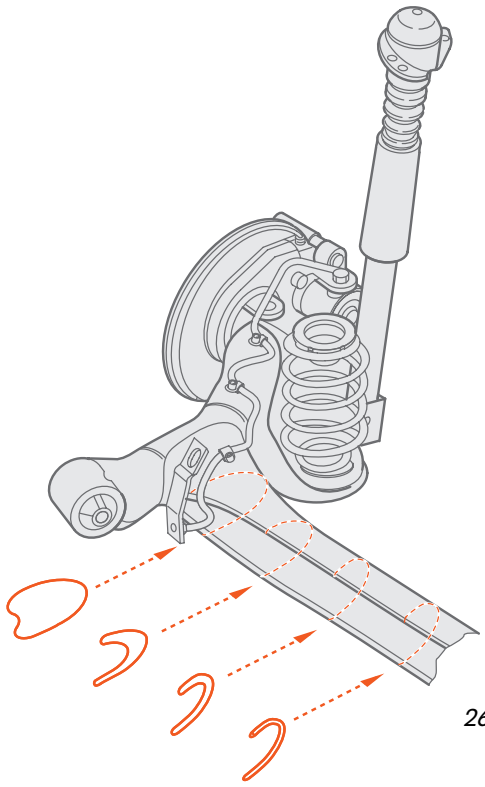
- A specially-shaped axle beam with a V cross-section provides the axle with high stability. A separate anti-roll bar is therefore not needed.
- Coil springs and shock absorbers are located separately from one another, in order to maximise loading width.
- The rear axle is secured to the body by inclined, 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.



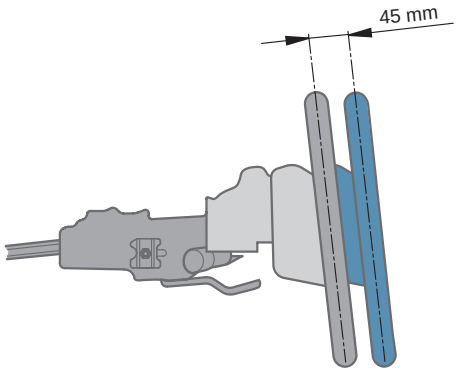
263_103

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

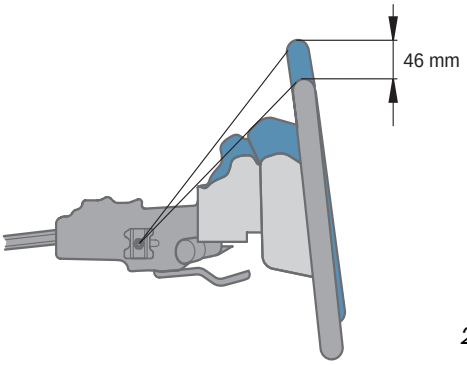
The steering column has a manually adjustable length of 45 mm.



263_115

Height adjustment

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



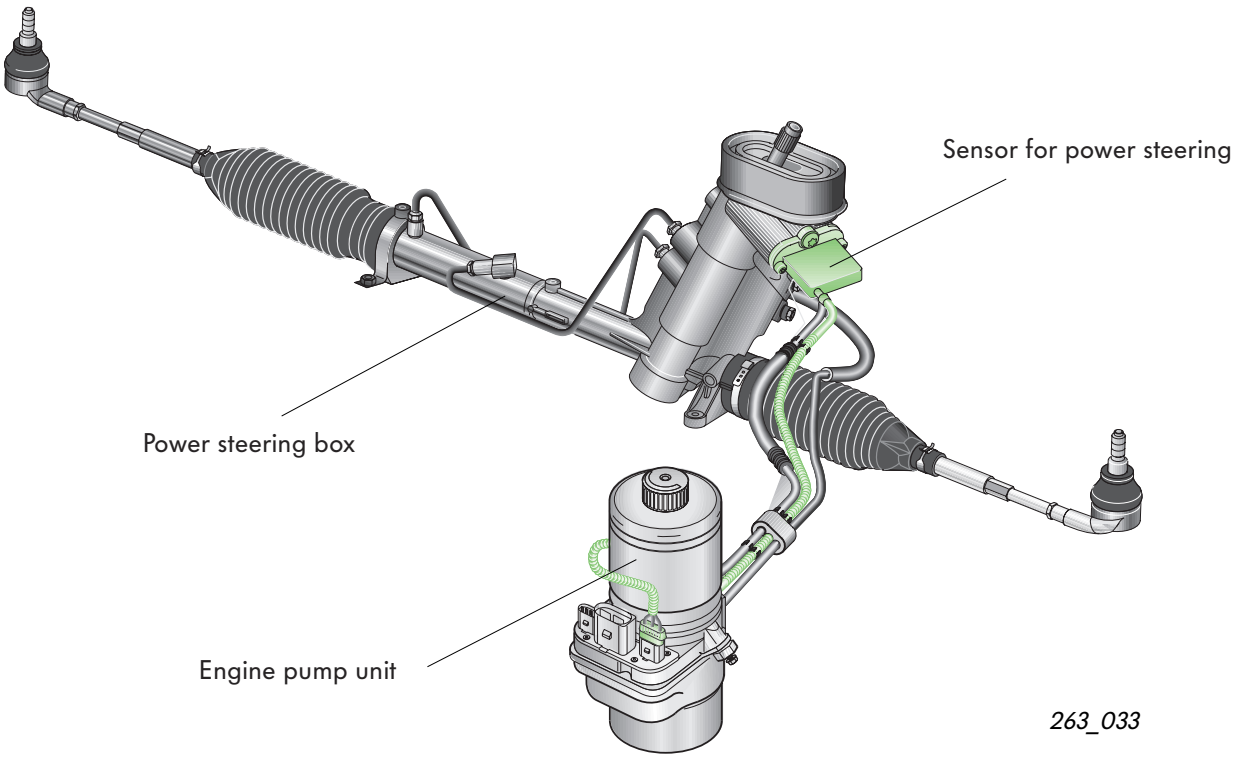
263_028

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-orientated power steering. This makes the vehicle easier to maneouvre 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.

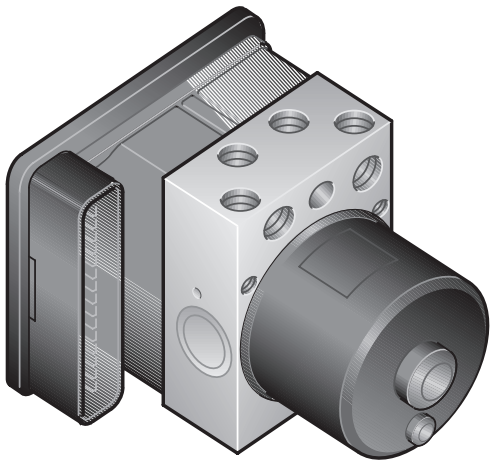


The design and function of the electro-hydraulic power steering are described in detail in Self-Study Programme No. 259.

Brake system

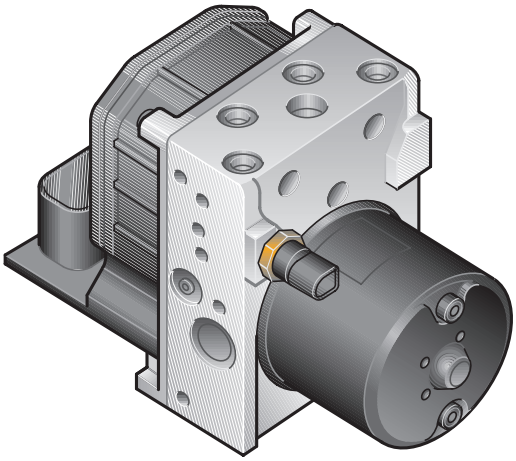
The Polo has a diagonally-split dual-circuit brake system. Two different brake systems are fitted.

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



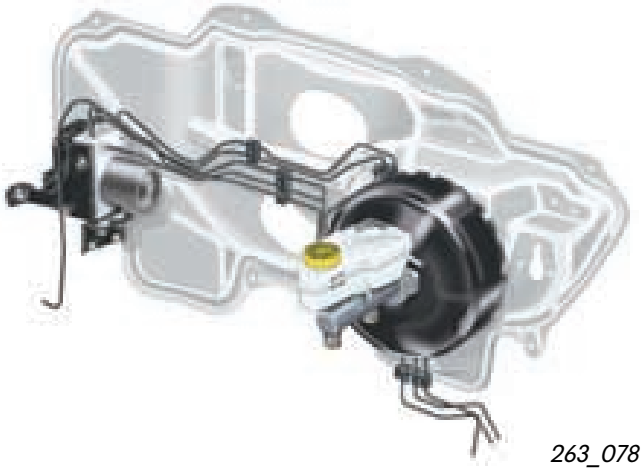
263_087

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



263_088

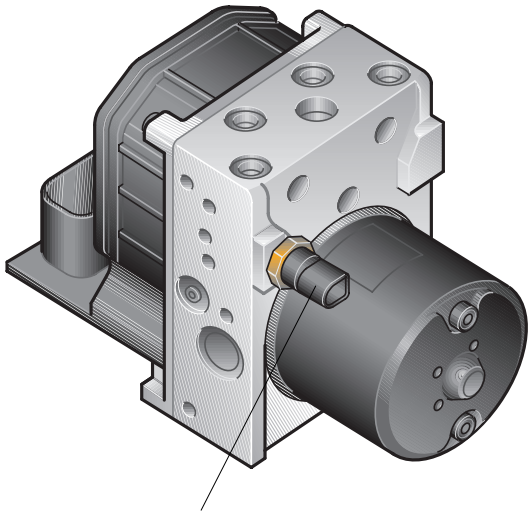
In both systems, the brake servos and the master brake cylinder are positioned physically separated from the hydraulic unit for ABS/ESP.
The hydraulic unit is located on the right-hand side of each system, adjacent to the shock absorber dome.



263_078

Hydraulic Brake Assistant System (BAS)

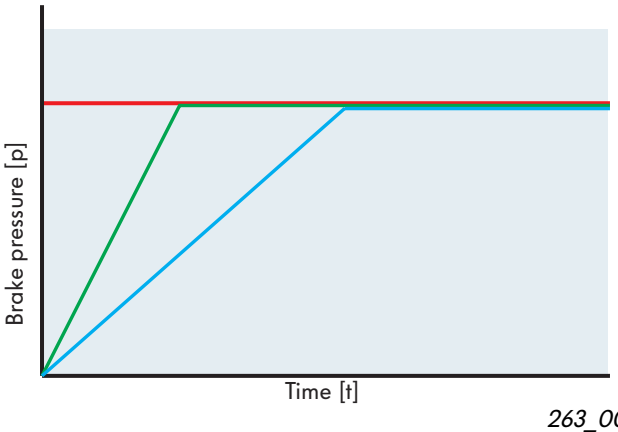
This is integrated in the ABS/ESP unit.
Accident research has shown that the majority of drivers do not apply the brakes sufficiently in a hazardous situation. Consequently, the brake pressure is insufficient to achieve maximum vehicle deceleration.



263_006

Pressure sensor G201 determines the pressure gain within the brake system. The control unit recog-nises an emergency stop by an abrupt rise in brake pressure within a specific period of time. After detecting the emergency situation, the con-trol 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

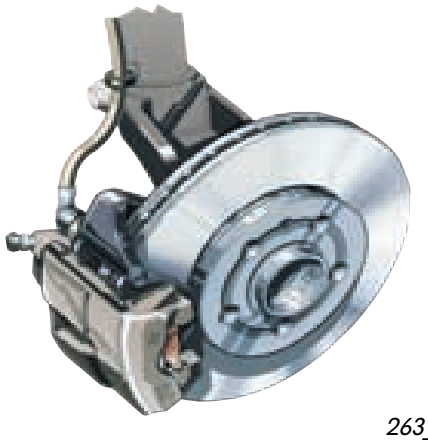


263_005

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.

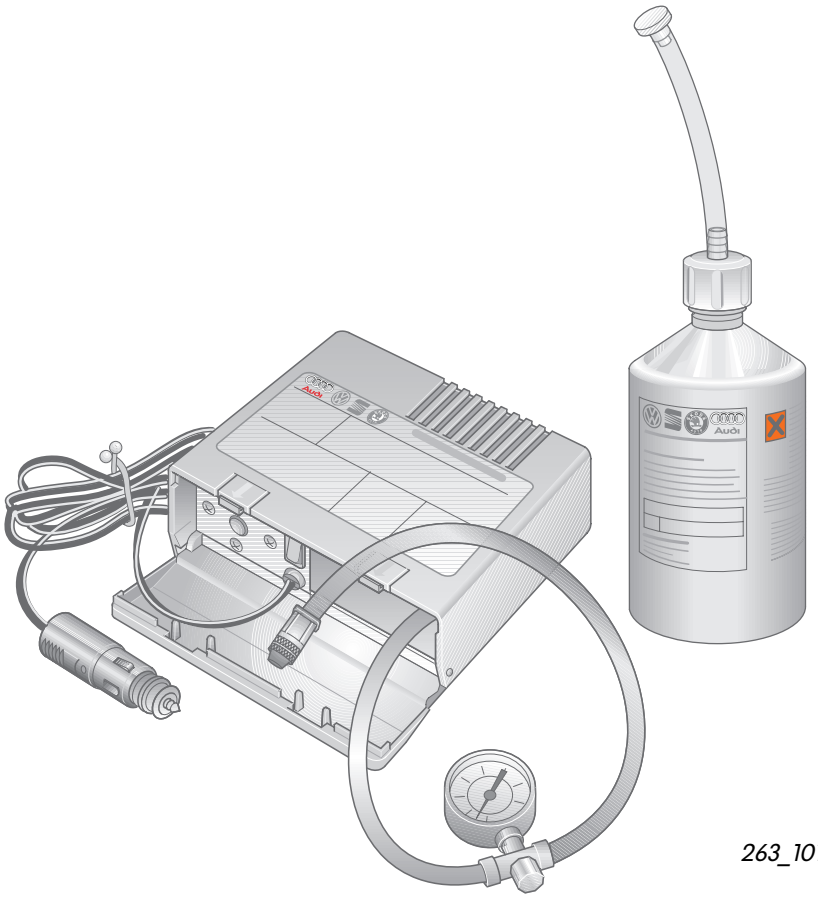
Breakdown set

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

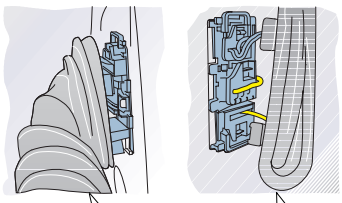
The breakdown set is not delivered to all countries. Depending on national statutory requirements, vehicles can also be equipped with a space-saver spare wheel or a fully-fledged spare wheel instead of the breakdown set.

Vehicle electrical system

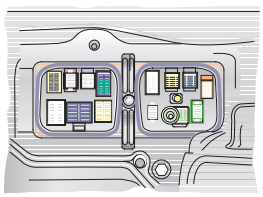
The vehicle electrical system has a decentralised configuration. The main stations are:

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

263_042 263_043

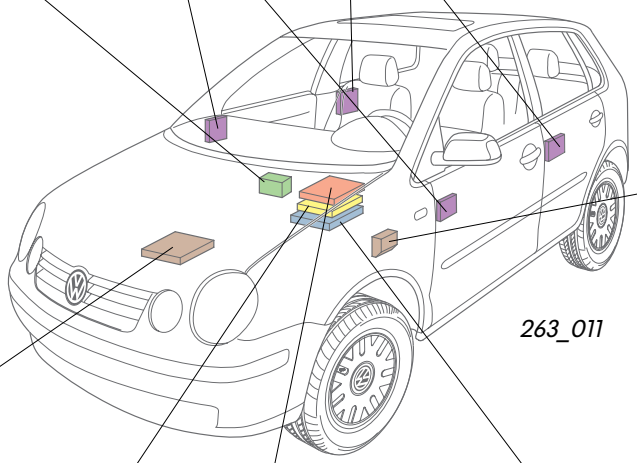


263_041



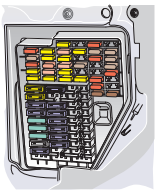
Connector stations in A pillar and B pillar: for connecting or disconnecting electrical modules in the doors from the other parts of the vehicle electrical system

Compact connector: connector station on the engine bulkhead for connecting/disconnecting parts of the vehicle electrical system in the engine compartment and vehicle interior

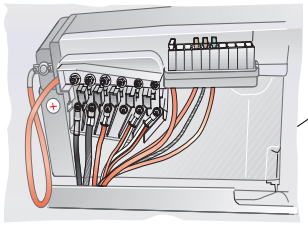


263_011

263_044

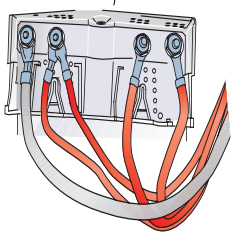


Fuse box: Groups together fuses on a holder



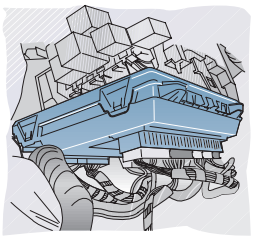
263_045

Main fuse holder: groups together the main fuses on the battery cover so they are easily accessible



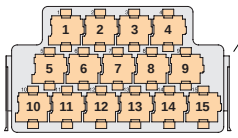
263_046

Potential distributor: distributes terminal +30 of the main fuse holder to individual electrical consumers



263_047

Vehicle electrical system control unit: takes over the functions of previously separate relays (e.g. indicator relays), and monitors the power supply of electrical equipment and automotive components outside the CAN system (e.g. switches/fuses)



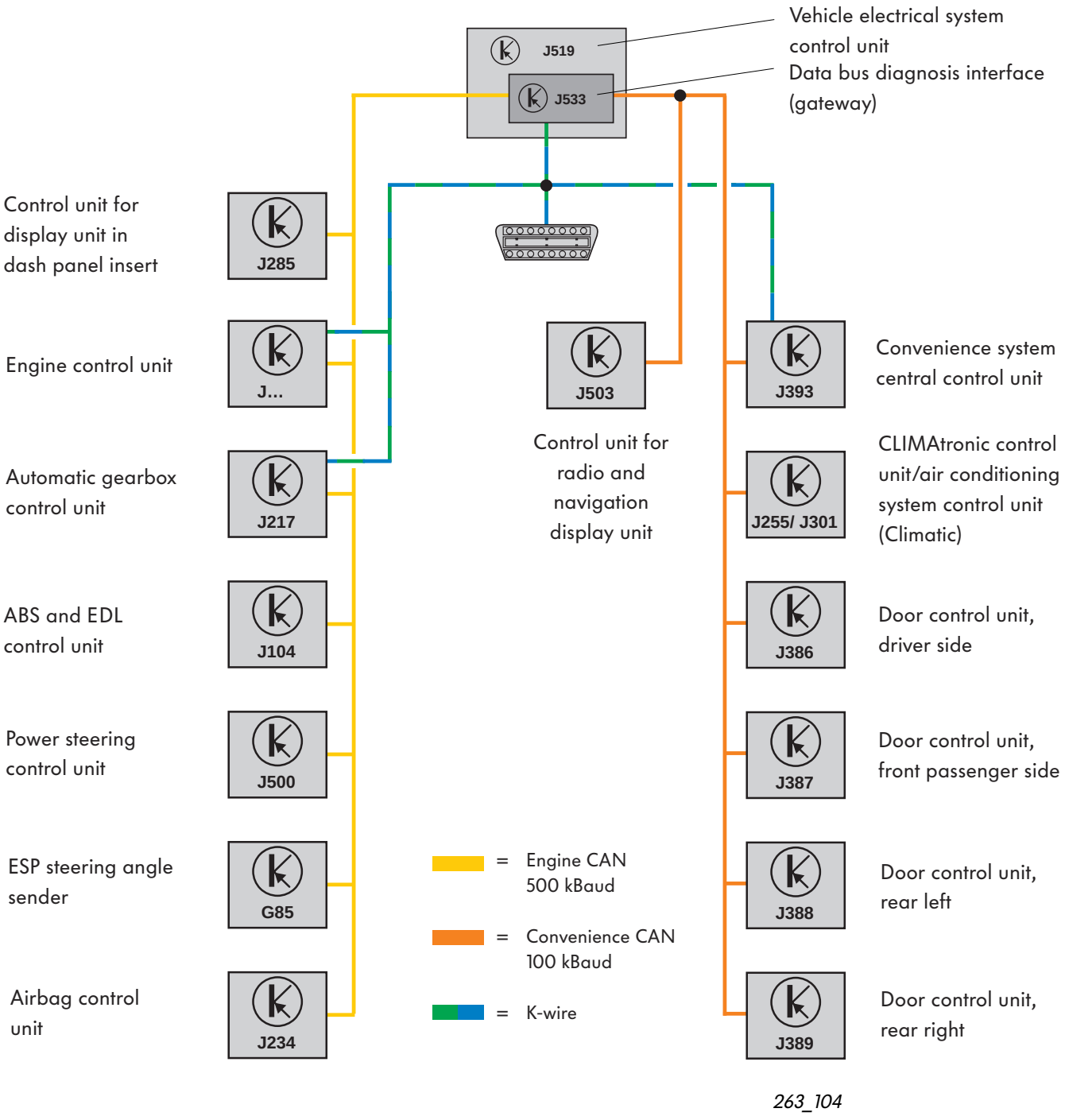
263_157

Relay carrier: carries the relays for basic and optional equipment

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