Service.

Self-Study Programme 260

The 1.2 ltr. 3-cylinder petrol engines

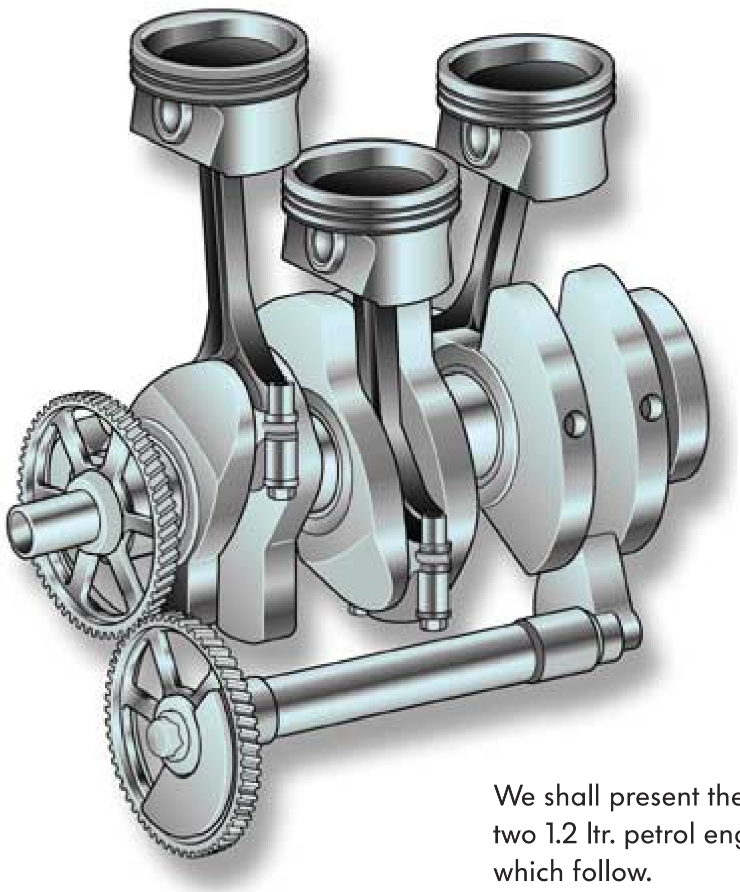
Design and Function

The two 1.2 ltr. engines mark the introduction of 3-cylinder petrol engines at Volkswagen.
This pair of entry-level engines rounds off the range of engines of the 2002 Polo.

The one engine featuring 2 valves per cylinder has a power output of 40 kW while the second engine featuring 4 valves per cylinder produces 47 kW.

The following objectives were paramount in the development programme:

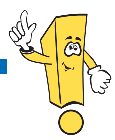
- good fuel economy
- compliance with emission standard EU4
- low level of servicing
- low weight
- same smooth running as a 4-cylinder engine

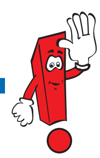


260_011

We shall present the design and function of the two 1.2 ltr. petrol engines to you on the pages which follow.
Because the base engine of both power plants is identical, with the exception of the cylinder head, the description for the most part presents the 1.2 ltr./47 kW engine.

NEW





Important Note

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

Please always refer to the relevant service literature for up-to-date inspection, adjustment and repair instructions.

At a glance

The 1.2 ltr. 3-cylinder petrol engines

The base engine of both power plants is identical, consisting of the cylinder block with the top and bottom parts, the crank assembly, the oil pump, the oil pan and the ancillaries.

The engines differ only in the cylinder heads, with either 2 or 4 valves per cylinder, and the resulting adaptations.

260_012

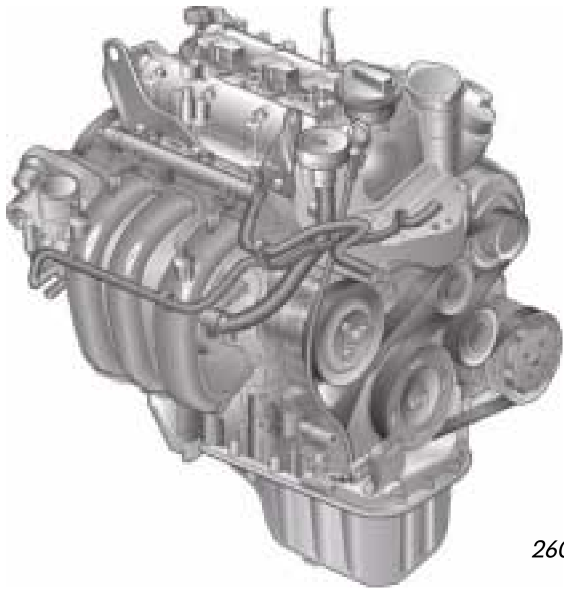
The 1.2 ltr./40 kW 3-cylinder petrol engine with 2-valve technology

Technical highlights - engine mechanics

- Camshaft driven by chain
- Split cylinder block
- Crank assembly with balancer shaft
- Cross-flow cooling in cylinder head
- Upright oil filter
- Crankcase ventilation

Technical highlights - engine management

- Single-spark ignition coils
- Emission control system with catalytic converter close to engine and two step-type lambda probes



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The 1.2 ltr./47 kW 3-cylinder petrol engine with 4-valve technology

Technical highlights - engine mechanics

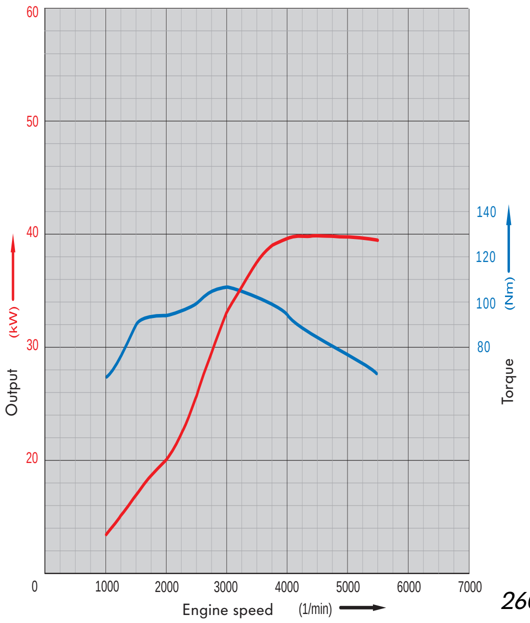
- Camshaft driven by chain
- Split cylinder block
- Crank assembly with balancer shaft
- Cross-flow cooling in cylinder head
- Upright oil filter
- Fuel system without return flow
- Crankcase ventilation

Technical highlights - engine management

- Single-spark ignition coils
- Electric exhaust gas recirculation valve
- Emission control system with catalytic converter close to engine, one broadband pre-cat lambda probe and one step-type post-cat lambda probe

Technical data

Power and torque curve of the 1.2 ltr. 6V engine



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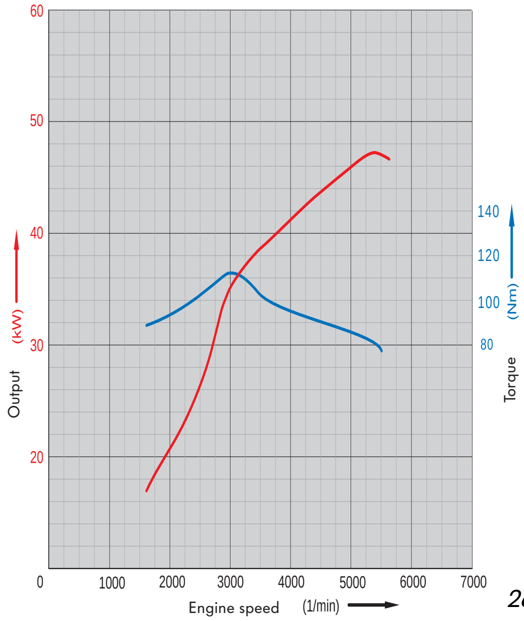
Power and torque curve of the 1.2 ltr. 12V engine



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Engine code	AWY	AZQ
Displacement	1198	1198
Type	3-cylinder in-line engine	3-cylinder in-line engine
Valves per cylinder	2	4
Bore	76.5 mm	76.5 mm
Stroke	86.9 mm	86.9 mm
Compression ratio	10.3 : 1	10.5 : 1
Maximum power output	40 kW at 4750 rpm	47 kW at 5400 rpm
Maximum torque	106 Nm at 3000 rpm	112 Nm at 3000 rpm
Engine management system	Simos 3PD	Simos 3PE
Fuel	Unleaded premium with RON 95 (unleaded regular with RON 91 with slight reduction in output)	Unleaded premium with RON 95 (unleaded regular with RON 91 with slight reduction in output)
Emission control system	Three-way catalytic converter with lambda control	Three-way catalytic converter with lambda control
Emission standard	EU4	EU4

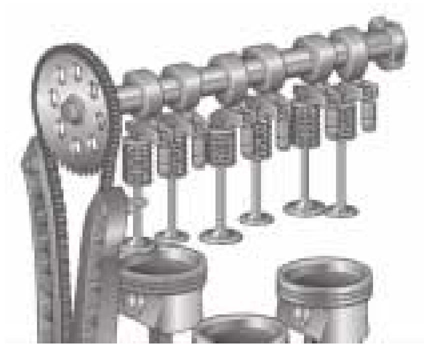
Engine mechanics

Drive of camshafts and of oil pump

Both the camshafts as well as the oil pump are driven by a maintenance-free chain drive from the crankshaft.

The chain drive for the camshafts is tensioned by a hydraulic chain tensioner, while that for the oil pump has a spring-loaded chain tensioner.

2-valve drive



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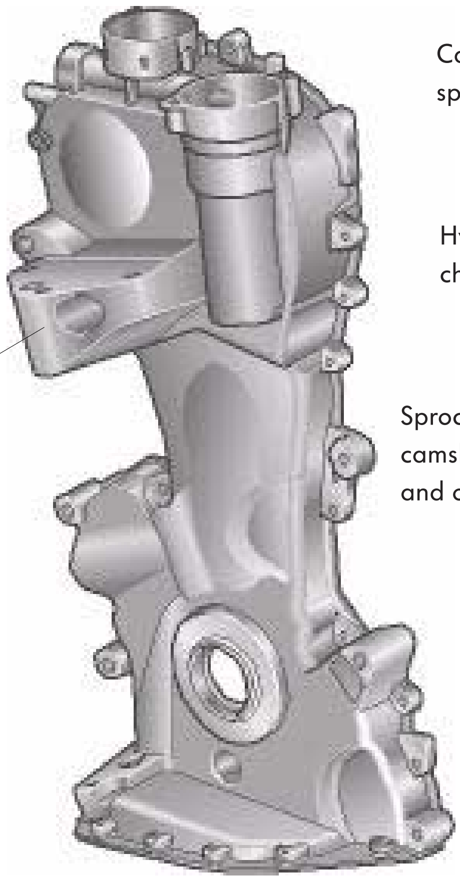
4-valve drive



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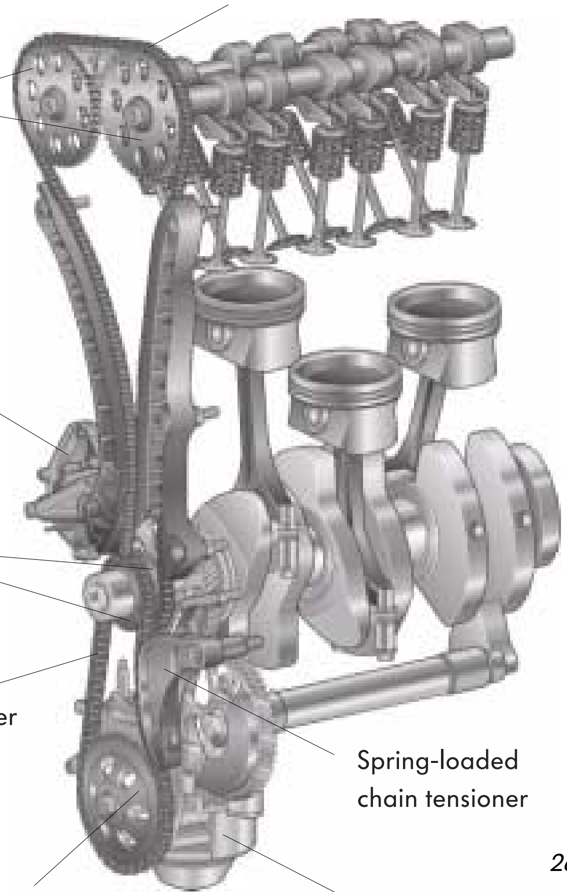

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The timing case

is bolted to the cylinder head, the cylinder block and the oil pan. The chain drive is sealed to the outside by a liquid seal.

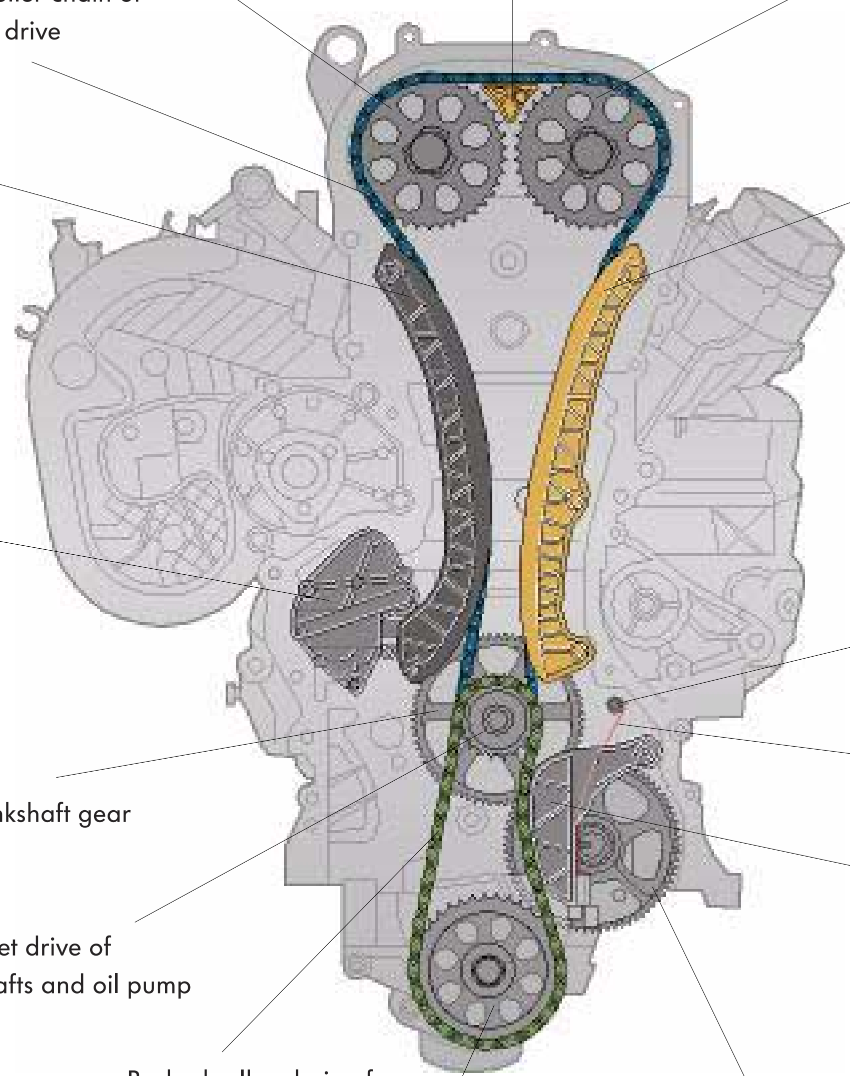
If the timing case is removed, it is also necessary to take off the oil pan and to re-seal it.
Refer to the Workshop Manual.

Overview

The illustration below provides you with an overview of the following drives:

- Chain drive of camshafts
- Chain drive of oil pump
- Gear drive of balancer shaft

New special tools are used for holding the camshafts in place and for locking the crankshaft.
Please also refer to the appropriate Workshop Manual.



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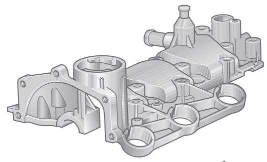
Engine mechanics

The cylinder head and the camshaft housing

Both components are aluminium die castings.

On the engine with 2-valve technology

half of the camshaft is mounted in the cylinder head cover and the other half in the cylinder head.



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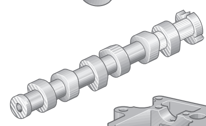

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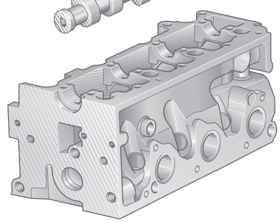

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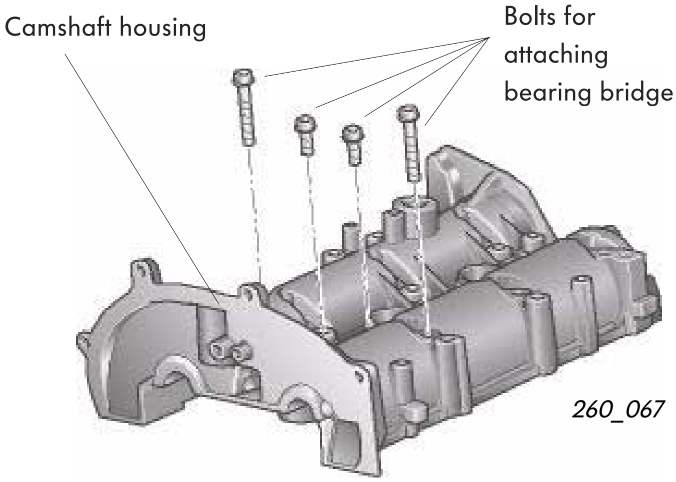
On the engine with 4-valve technology

the inlet camshaft and exhaust camshaft are mounted in the camshaft housing. The mounting features four bearing bridges which are bolted to the camshaft housing.
They are seated in the housing in such a way that they fit flush with the contact surface of the camshaft housing.



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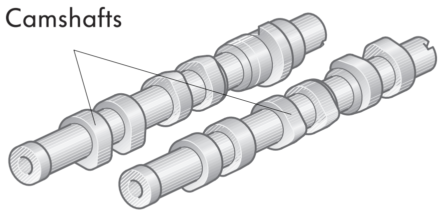

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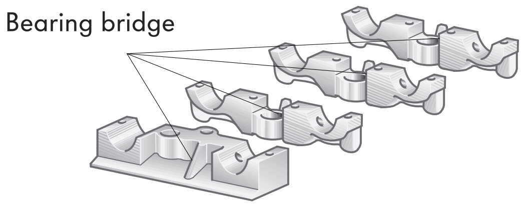

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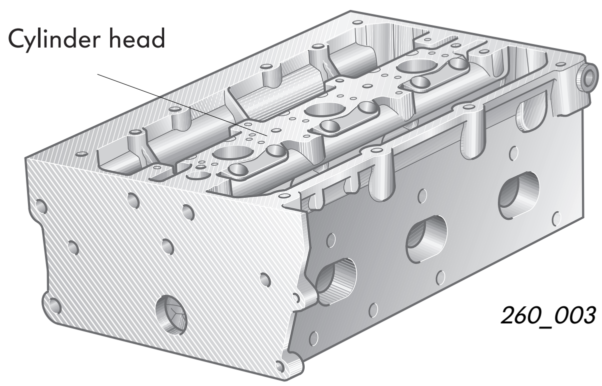

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The cooling of the cylinder head is based on the cross-flow cooling principle.
You can find further information regarding this in the section on the cooling system on page 13.

The valve gear

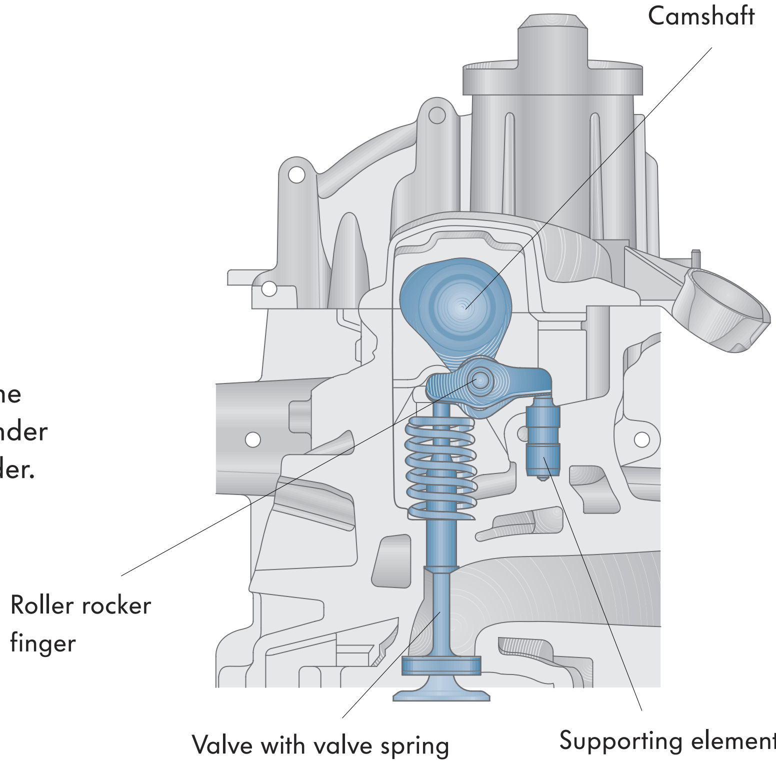
is installed in the cylinder head and in the camshaft housing.

The valve mechanism consists of

– the camshaft,
– the valve,
– the valve spring,
– the roller rocker finger and
– the supporting element.

The design of the valve gear is basically the same on the engine with 2 valves per cylinder and on the engine with 4 valves per cylinder.

2-valve technology



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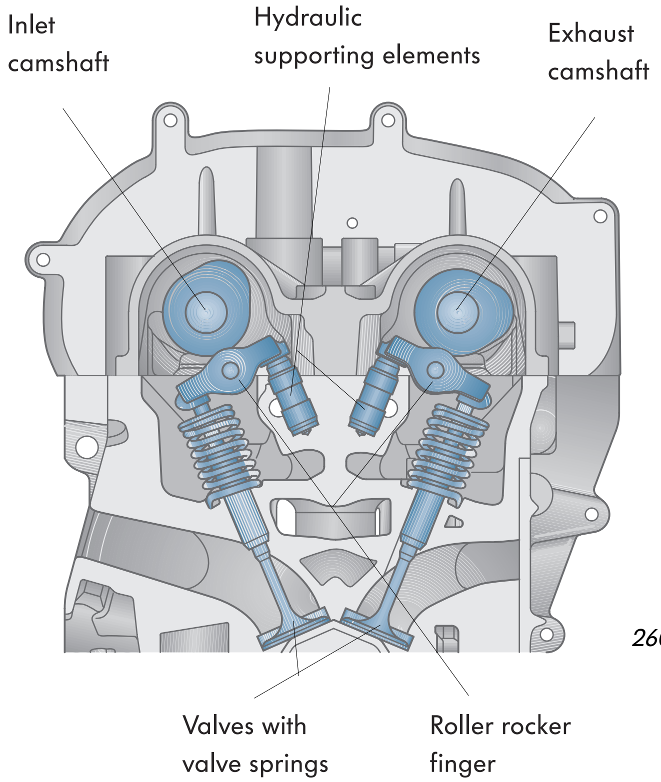
4-valve technology



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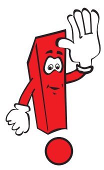


You can find further information on the operation of the valve mechanism in the Self-Study Programme 196 „The 1.4 l 16V 55 kW engine“

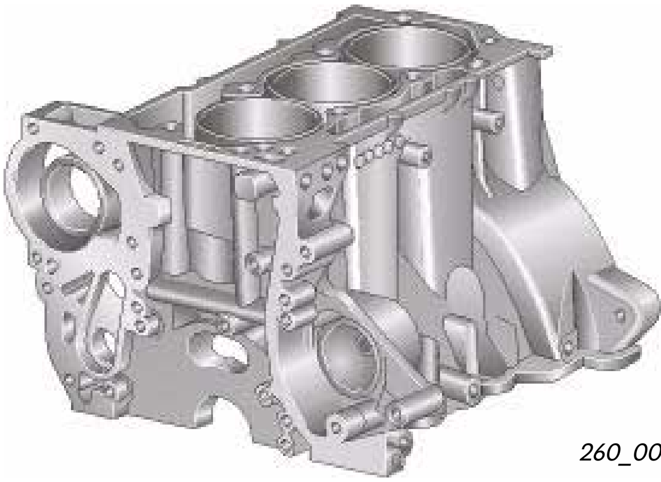
Engine mechanics

The cylinder block

It is an aluminium die casting and is split at the level of the middle of the crankshaft. It is sealed by means of a liquid seal.

Top part of cylinder block

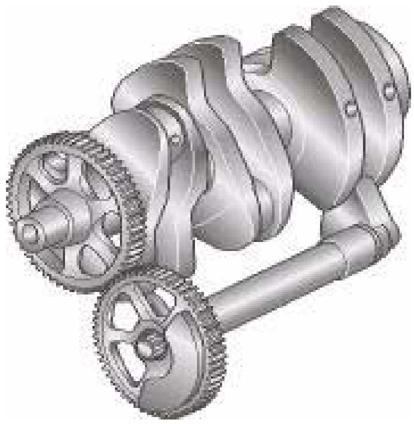
The grey cast iron cylinder liners are cast in the top part of the cylinder block.



260_005

Crankshaft and balancer shaft

The crankshaft runs in 4 bearings and is mounted half in the top part of the cylinder block and half in the bottom part of the cylinder block.
The balancer shaft is installed in the bottom part of the cylinder block and enhances the smooth running of the engine.



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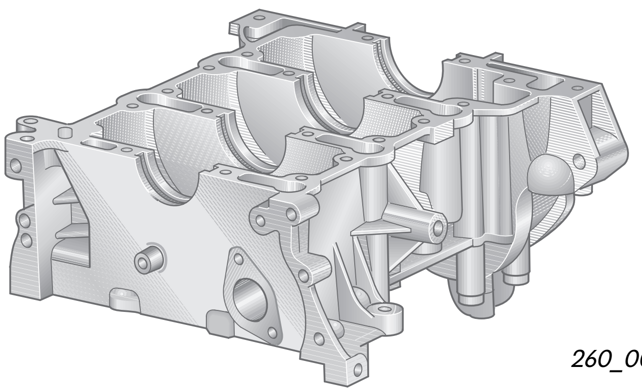
Bottom part of cylinder block

The bottom part of the cylinder block is designed as a stable bearing bridge. This improves the stiffness in the area of the crankshaft and also results in smoother engine running.



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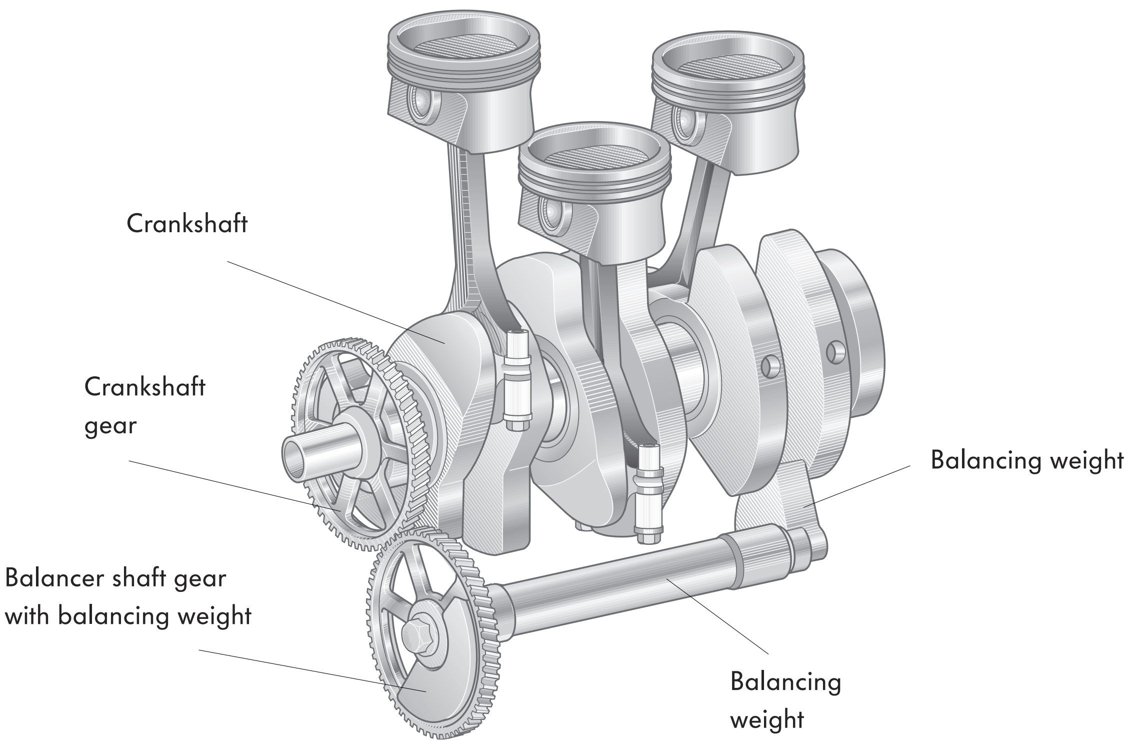
The top part of the cylinder block and the bottom part of the cylinder block must not be separated. If this is done, it will cause stresse in the crankshaft bearings and will result in engine damage during operation.

The crank assembly with balancer shaft

The crank assembly features a balancer shaft. Its task is to reduce oscillations and thus to achieve smooth engine running.

The balancer shaft runs in the bottom part of the cylinder block and is driven through two gears by the crankshaft. The balancer shaft rotates in the opposite direction of the crankshaft at engine speed.

The up and down movements of the pistons and conrods produce forces which cause oscillations. These oscillations are transmitted through the assembly mounting to the body. The task of the balancer shaft is to counteract the forces produced by the pistons, conrods and crankshaft in order to minimize such oscillations.



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Please note that you must not remove either the crankshaft or the balancer shaft.

You can find further information regarding the operation of the balancer shaft in Self-Study Programme 223 „The 1.2 ltr. and 1.4 l TDI engine“.

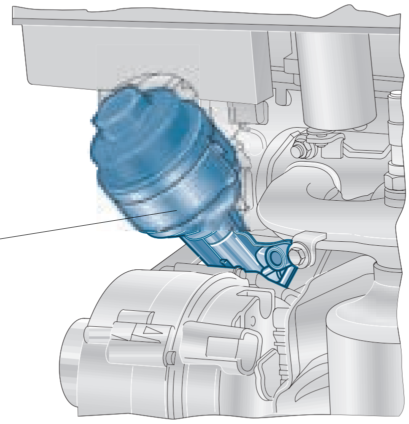
Engine mechanics

The oil filter and the oil pump

The oil filter

is attached upright to the cylinder block at the exhaust side. It has a paper filter element which can be lifted up and out for replacing, and is therefore easy to service and environmentally friendly.

A further advantage of this arrangement is that it is possible to use a larger exhaust manifold catalytic converter. This is sufficient to comply with the emission standard EU4. At the same time, it eliminates the need for a second catalytic converter.



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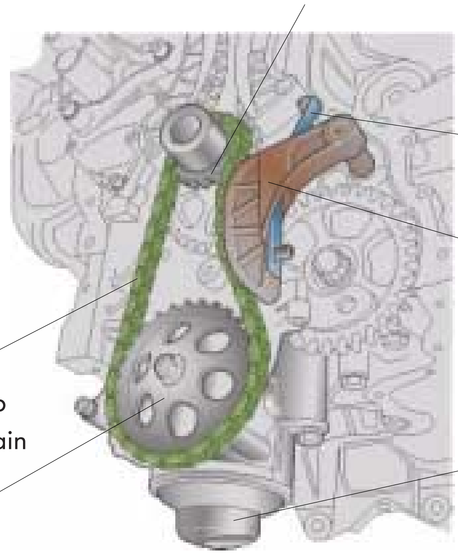
The oil pump

is known as a duocentric oil pump. It is bolted to the bottom part of the cylinder block and is chain-driven by the crankshaft.
The chain is tensioned by means of a leaf spring at the chain tensioner.



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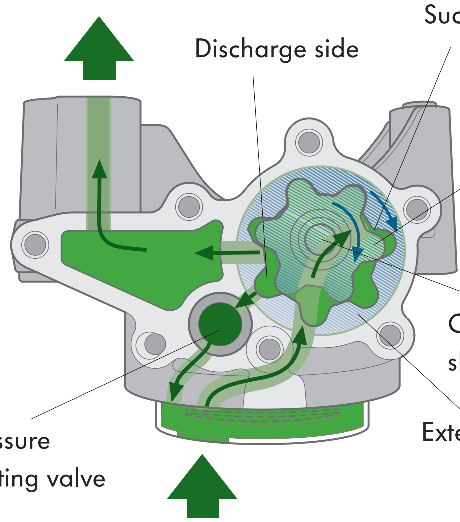
The drawing opposite shows you the flow of oil in the oil pump.
The function of the oil pump is described in the Self-Study Programme 196 „The 1.4 l 16V 55 kW engine".



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The cooling system

The special feature of the cooling system is the cross-flow cooling of the cylinder head and the flow of the coolant through the cylinder head.

This design offers the following advantages:

- In cross-flow cooling, the coolant flows from the inlet side to the exhaust side of each of the cylinders. This makes it possible to achieve a uniform temperature level at all three cylinders.

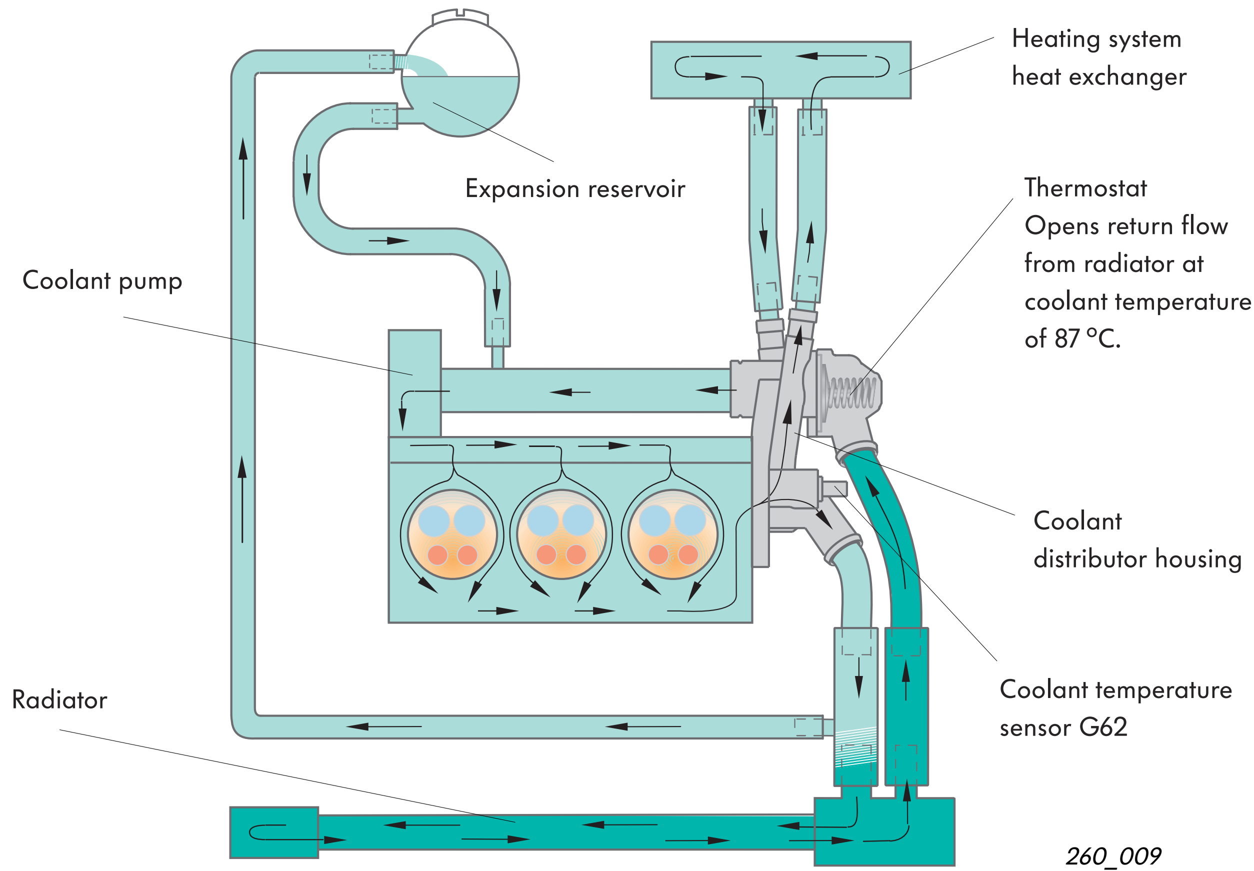
- The coolant galleries, arranged in parallel in the cylinder head, collectively result in a larger opening cross-section than is the case for a cylinder head with a back-to-front flow. This in turn reduces the flow resistance and thus also the power consumption of the coolant pump by as much as 30 %.

- The coolant in the cylinder head flows in a focused way at a high speed along the combustion chambers. As a result, they are more efficiently cooled which in turn reduces the knocking tendency.

Colour coding/Legend

Small cooling circuit (until operating temperature reached)

Large cooling circuit (additionally once operating temperature is reached)



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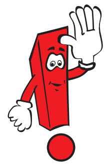
The fuel system without return flow

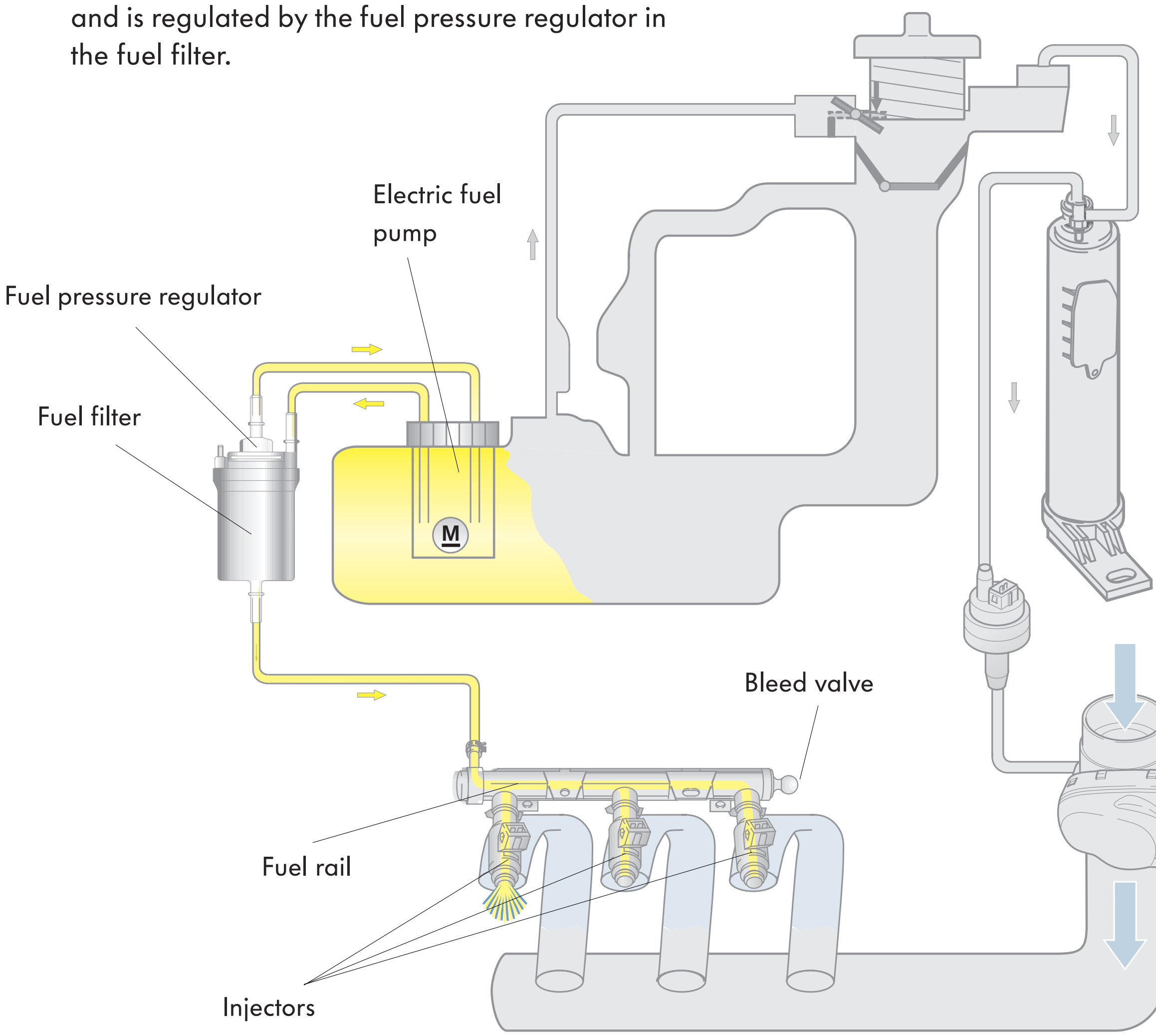
The fuel system without return flow is used on the 1.2 ltr. engines only on the 47 kW version. This fuel system makes it possible to eliminate the return-flow line from the fuel rail up to the fuel tank.

The fuel is pumped by the electric fuel pump to the fuel filter.
From this point, it flows to the fuel rail and to the injectors.

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



Because the fuel pressure in the system is a constant 3 bar, but the intake manifold pressure varies, the engine control unit adapts the injection time to the intake manifold pressure. The signal which is required for this is supplied by the intake manifold pressure sensor.



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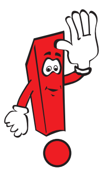
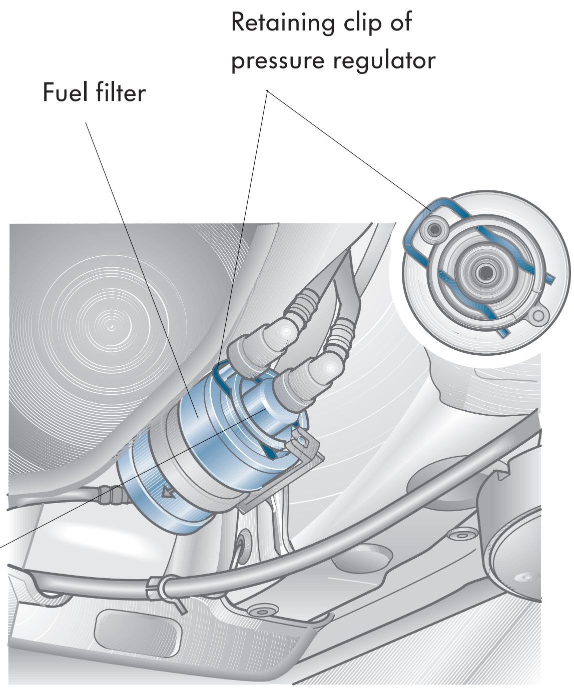


In the return flow-free fuel system there is a bleed valve to the fuel rail. You have to bleed the system after completing any work.
Please also refer to the Workshop Manual.

The 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 inserted into the fuel filter and held in place by means of a retaining clip. The regulator maintains the fuel pressure in the fuel system at a constant 3 bar.



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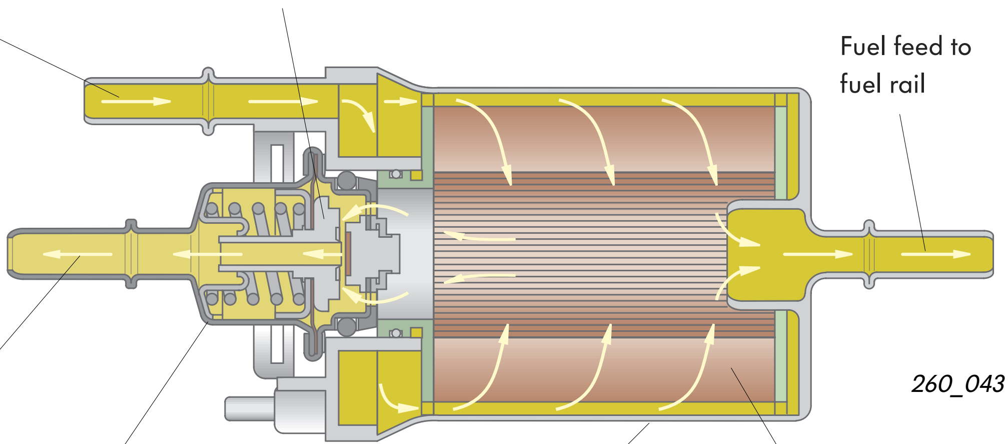

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Function of the fuel pressure regulator:

The electric fuel pump pumps the fuel into the filter chamber of the fuel filter. The fuel is cleaned at this point and flows to the fuel rail and to the injectors.

The fuel pressure of 3 bar is maintained by a spring-loaded diaphragm valve in the fuel pressure regulator. If the pressure rises beyond 3 bar, the diaphragm valve opens the return flow to the fuel tank.

The engine cover with air filter

Engine cover with integrated air filter

The following components are integrated in the engine cover

– the air filter,
– the air guide up to the throttle valve control unit,
– the warm air regulator and
– the insulation of the intake noises.

The result is a compact and low-cost component.

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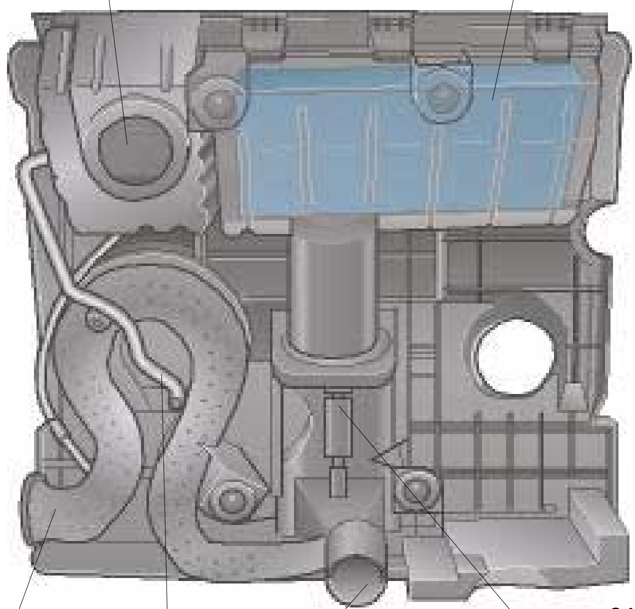

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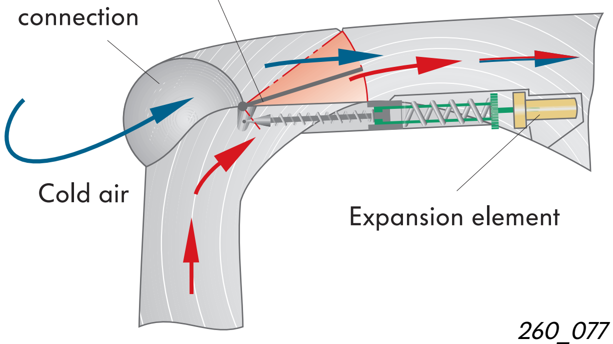
Regulating the warm air

The engine cover contains an expansion element which operates a regulating flap in line with the temperature.
At low temperatures the cross-section to the warm air is increased while it is reduced to the cold air. At high temperatures, this situation is exactly reversed.

This makes it possible to achieve a uniform intake air temperature during engine operation.

It in turn also has a positive effect on engine power output, fuel consumption and emission levels.

Regulating flap in intake air connection



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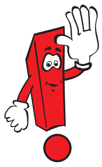
Crankcase ventilation

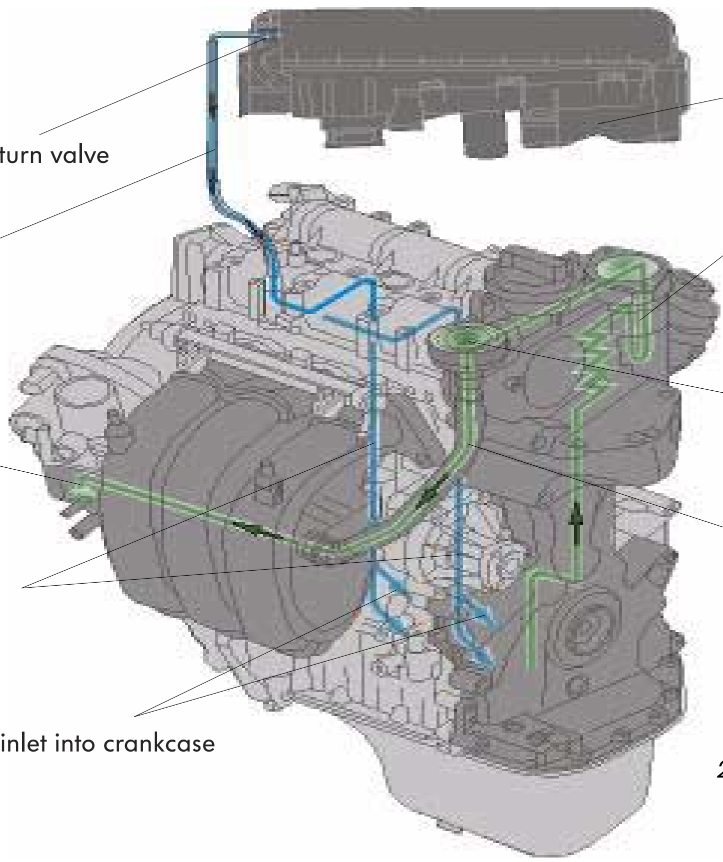
The crankcase ventilation is a feature of both engines.
It reduces the formation of water in the oil and prevents oil vapours and uncombusted hydrocarbons escaping to the atmosphere.



The non-return valve prevents oil from being forced out of the camshaft housing into the air filter.

The system consists of:

- an oil separator in the timing case,
- a diaphragm valve at the timing case,
- a plastic hose from the diaphragm valve to intake manifold and
- an air inlet hose with non-return valve from the air filter to the camshaft housing



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Crankcase air inlet

Air is admitted to the crankcase through a hose from the air filter.
The fresh air inducted by the vacuum in the intake manifold flows through the oil return-flow galleries into the crankcase.
At this point, it is mixed with the combustion gases before these condense to water on the cold walls of the cylinder block.

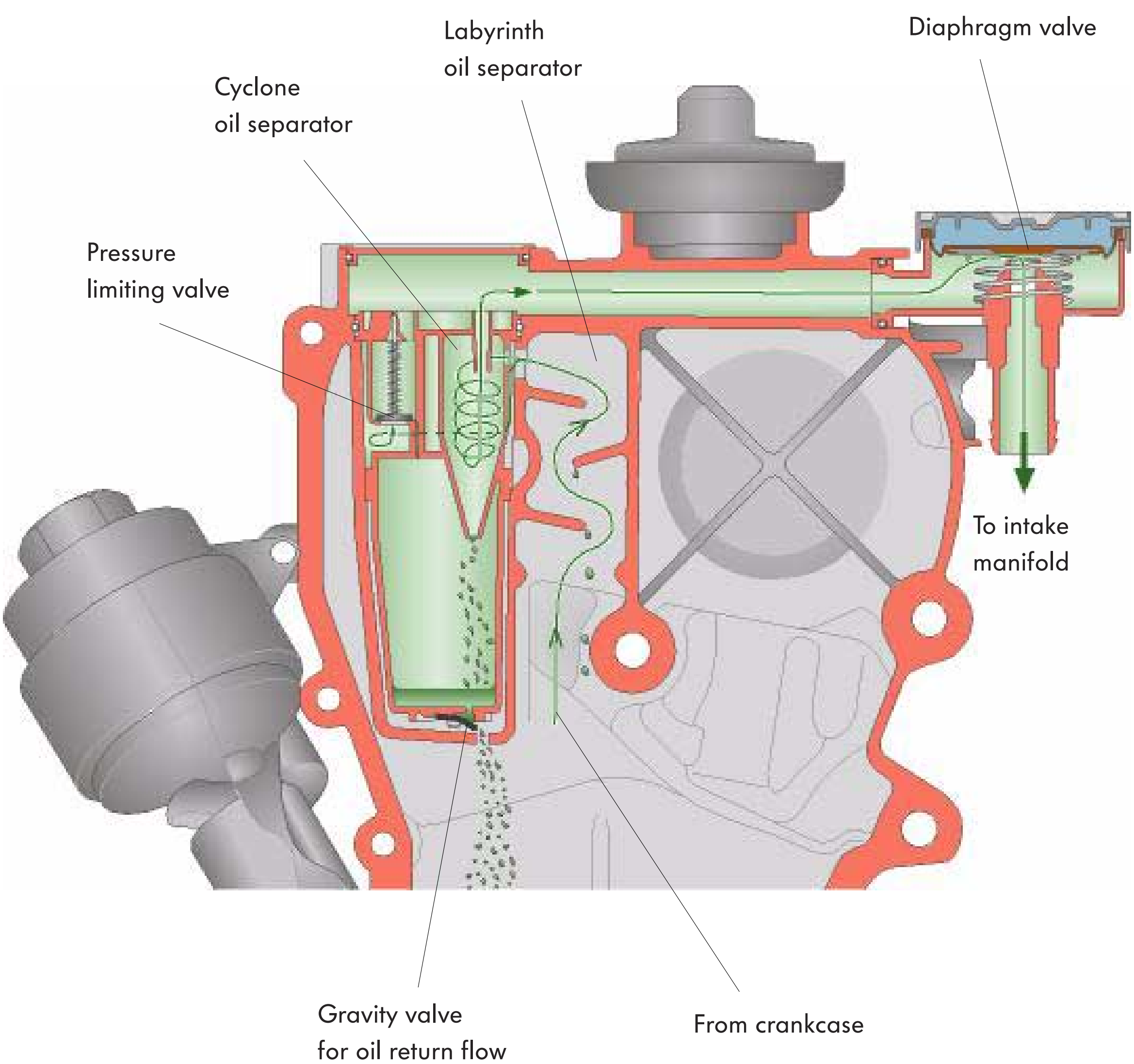
Together they then flow through the crankcase air outlet to combustion. The result of this is a reduction in the formation of water in the oil and enhanced security against icing up.

Crankcase ventilation outlet

The gases are drawn out of the crankcase by the vacuum in the intake manifold.

The oil is separated from the gases in the labyrinth and in the cyclone oil separator and drips back into the oil pan. The remaining gases flow through the diaphragm valve into the intake manifold. At this point, the gases are mixed with the inducted air and flow to combustion.

The pressure limiting valve opens if an overpressure exists in the crankcase. In this case, the gases also flow past the pressure limiting valve and the pressure is reduced.
An overpressure develops, for example, as a result of wear at the piston rings and cylinder walls. In this case, there is an increased flow of gases from the cylinder into the crankcase.



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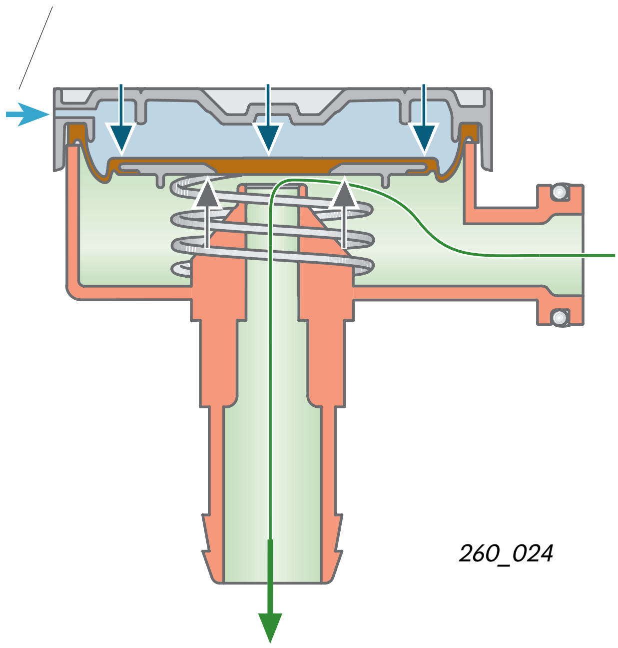
The diaphragm valve

ensures a uniform pressure level and good ventilation of the crankcase.
It is split into two chambers by a diaphragm. One chamber is connected to the outside air and the other to the intake manifold.

- At a high intake manifold vacuum (e.g. idling) the diaphragm is pulled against the force of the spring in the direction of the opening cross-section. As a result, less gas is drawn out of the crankcase.



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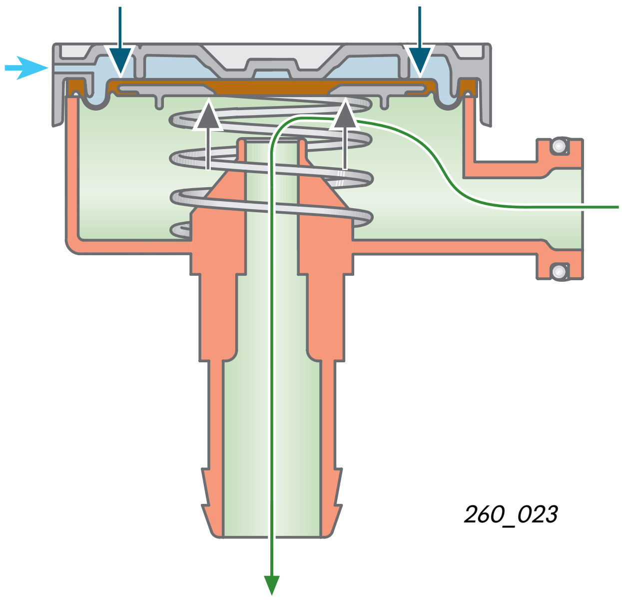
- At a low intake manifold vacuum (e.g. full throttle) the spring pushes the diaphragm back. As a result, the cross-section is opened wide and more gas is drawn out of the crankcase.



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Engine management system

System overview

Intake air temperature sender G42
and intake manifold pressure sender G71

Engine speed sender G28

Hall sender G40
(for camshaft position)

Throttle valve control unit J338
Throttle valve drive angle sender
G187 and G188 (el. throttle)

Accelerator pedal position sender G79
and G185

Clutch pedal switch F36

Brake light switch F and
Brake pedal switch F47

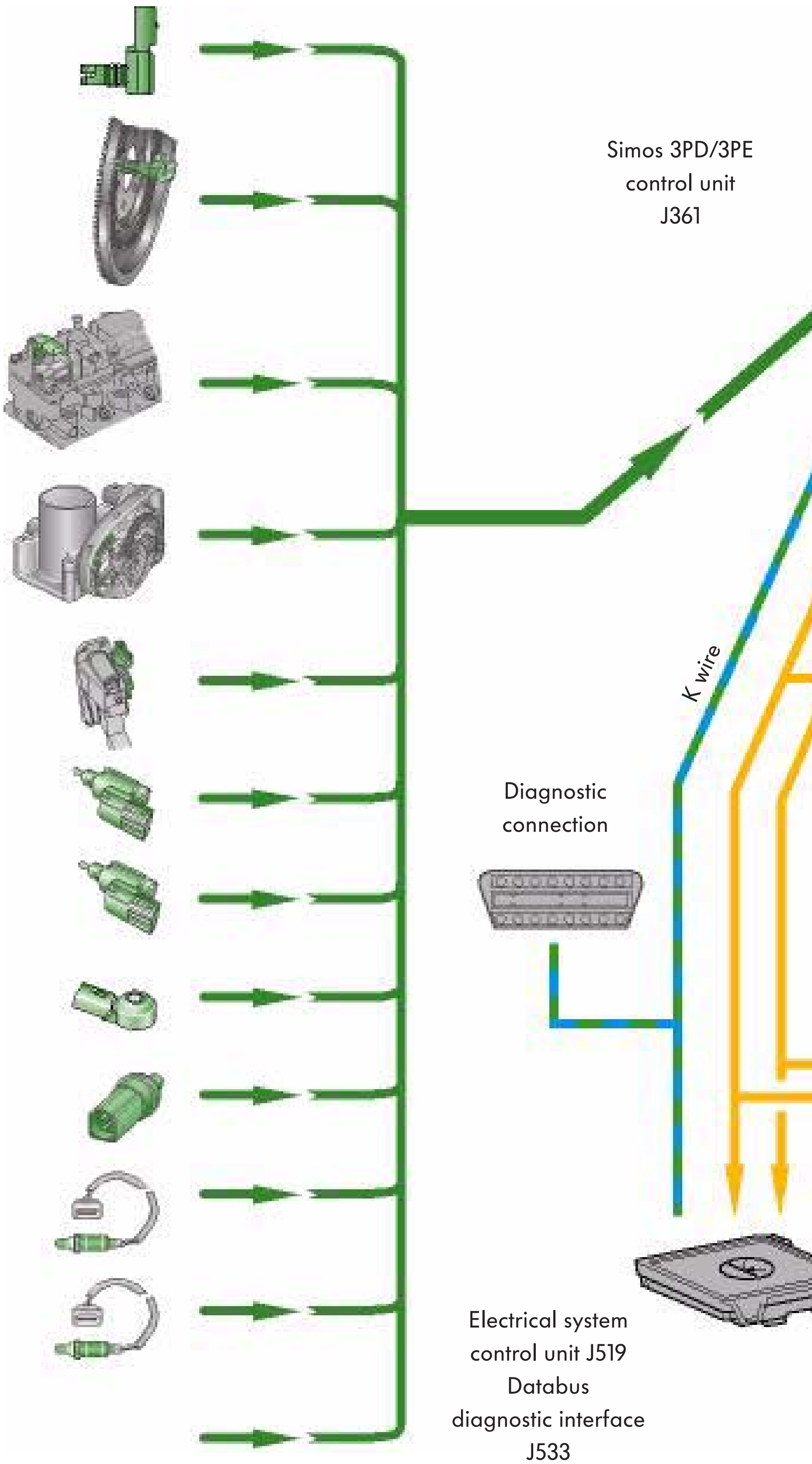
Knock sensor G61

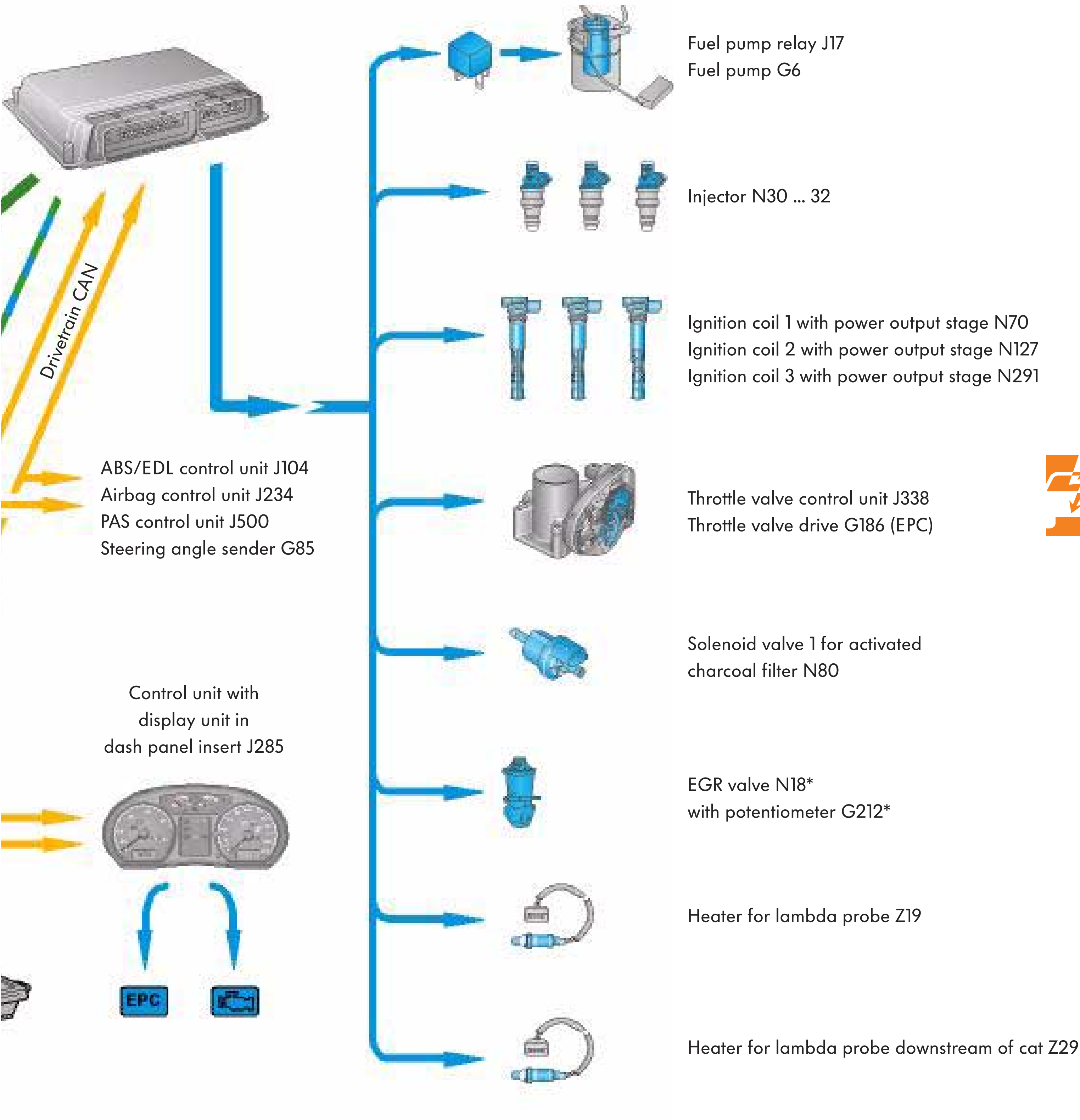
Coolant temperature sender G62

Lambda probe G39

Lambda probe downstream of cat G130

Additional signals:
Alternator terminal DFM
Vehicle speed signal
Switch for cruise control system (ON/OFF)





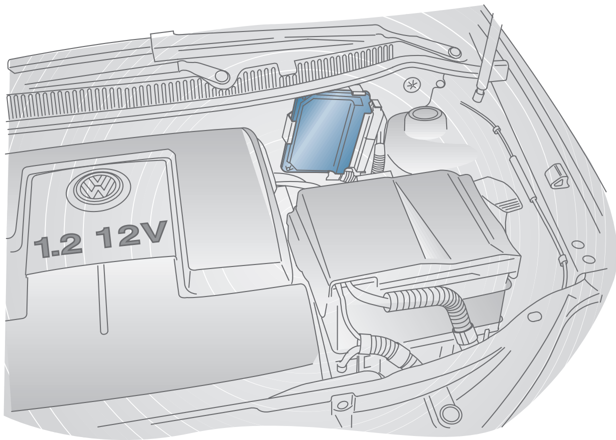
260_026

* only on engine with 4-valve technology

Engine management system

The engine control unit

is located on the engine side at the bulkhead and has 121 pins.
This installation position has been selected to provide easy access to the engine control unit, while at the same time protecting it from moisture.



260_032

The engine management systems used are

– on the 1.2 ltr./40 kW engine the Simos 3PD and
– on the 1.2 ltr./47 kW engine the Simos 3PE.

Both are designed for single-spark ignition coils.

The difference between the two engine management systems relates to the differing lambda regulation.

– The 1.2 ltr./40 kW engine features two step-type lambda probes
– while the 1.2 ltr./47 kW engine uses one broadband and one step-type lambda probe.

The designations Simos 3PD and 3PE mean:

1.2 ltr./40 kW engine

Simos	Manufacturer Siemens
3	Version with electric power control
P	Load detected by intake manifold pressure sender
D	Development stage with single-spark ignition coils and two step-type lambda probes

1.2 ltr./47 kW engine

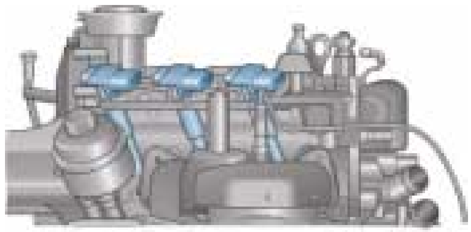
Simos	Manufacturer Siemens
3	Version with electric power control
P	Load detected by intake manifold pressure sender
E	Development stage with single-spark ignition coils, one broadband and one step-type lambda probe

The single-spark ignition coils

Both engines feature single-spark ignition coils with integrated power output stage.

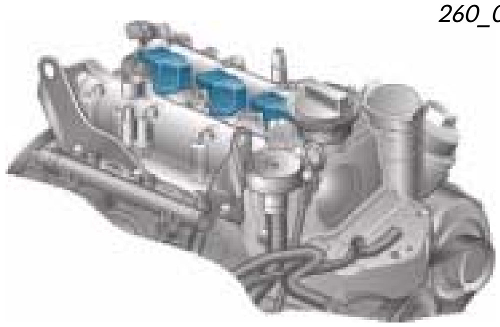
Installation position

– on the 1.2 ltr./40 kW engine inserted into the side of the cylinder head and



260_079

– on the 1.2 ltr./47 kW engine inserted into the middle of the cylinder head.



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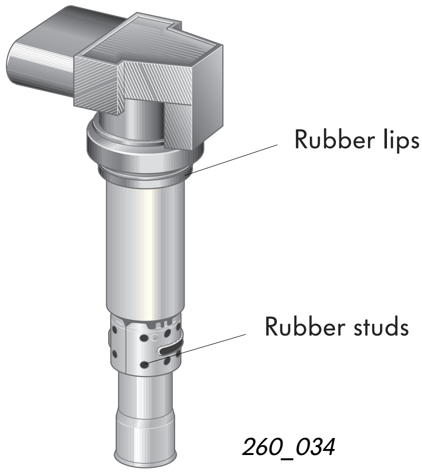


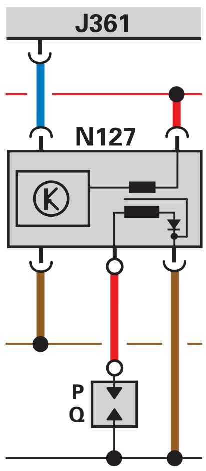
260_034

Effects in the event of failure

If a single-spark ignition coil fails, this is detected by the misfiring detection system.
The corresponding injector is then no longer actuated.

Electric circuit

J361 Simos control unit
N127 Ignition coil 2 with power output stage
P Spark plug connector
Q Spark plugs

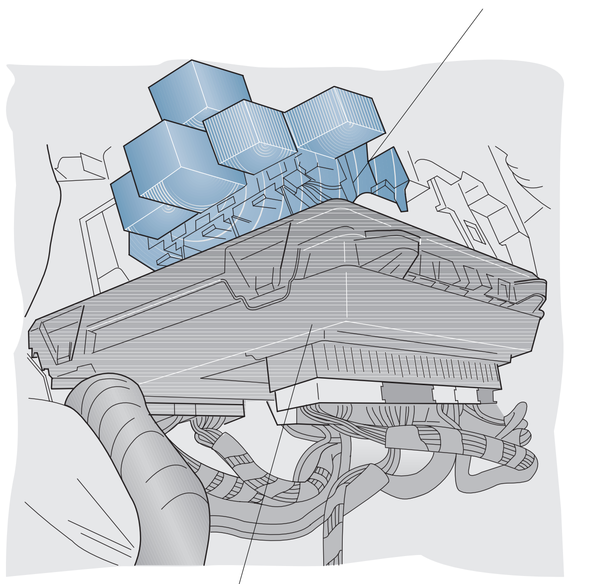


260_068

The fuel pump feed control

The 2002 Polo features a new fuel pump feed control.

Two parallel relays take the place of the individual fuel pump relay with integrated crash fuel shut-off. The fuel pump relay J17 and the fuel feed relay J643. Both relays are located on the relay carrier above the vehicle electrical system control unit J519.



260_075

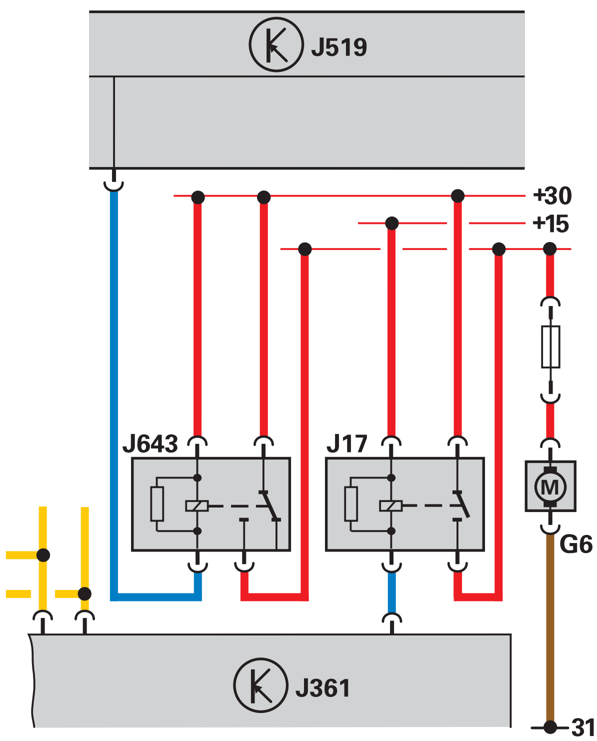
The fuel pump relay J17 is actuated by the engine control unit and the fuel feed relay J643 by the vehicle electrical system control unit.

Ignition (terminal 15) „off“

At ignition „off“, the fuel pump feed control is performed by the vehicle electrical system control unit J519 and by the fuel feed relay J643.

Ignition (terminal 15) „on“

At ignition „on“, the fuel pump feed control is performed by the engine control unit J361 and the fuel pump relay J17.



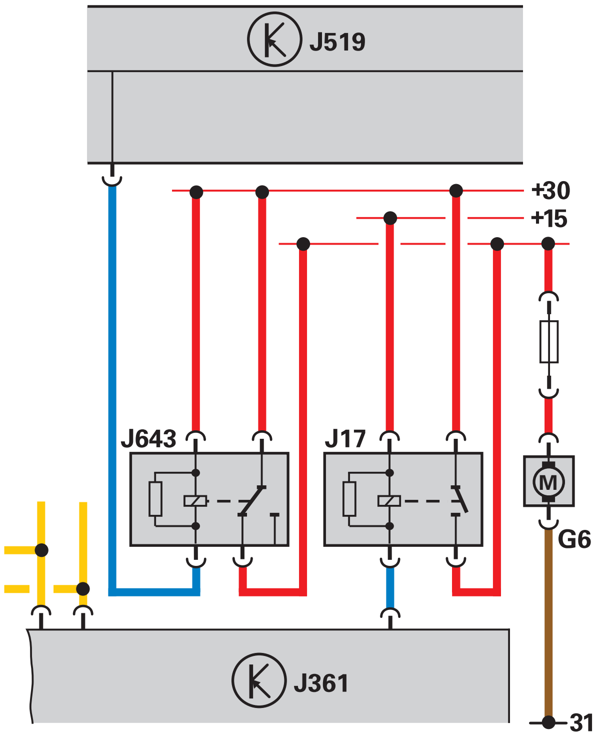
260_072

Ignition (terminal 15) „off“

When the ignition is off, the fuel pump feed control is activated if „driver door open“ is detected by the door contact switch. The vehicle electrical system control unit thereupon actuates the fuel feed relay and the fuel pump runs for about two seconds.

A timer switch in the vehicle electrical system control unit

– prevents the fuel pump from running constantly if the driver door is opened at short intervals.
– once again actuates the fuel pump if the driver door remains open for longer than 30 minutes.



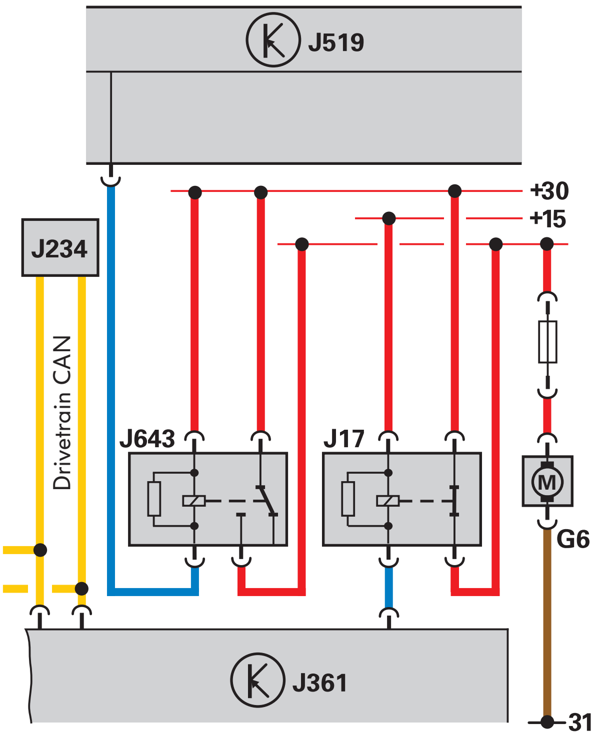
260_073

Ignition (terminal 15) „on“

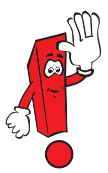
If ignition is on, the engine control unit actuates the fuel pump relay and the fuel pump runs for about two seconds.
If the engine is started and an engine speed of more than 30 rpm is detected, the fuel pump relay is constantly actuated and the fuel pump is switched on.

The fuel pump relay continues to be actuated until

– terminal 15 „off“ is detected,
– engine speed is less than 30 rpm or
– a crash signal has been transmitted by the airbag control unit J234 to the engine control unit.



260_074



After a crash signal it is not possible to switch the fuel pump on again until the ignition has been switched off and on.

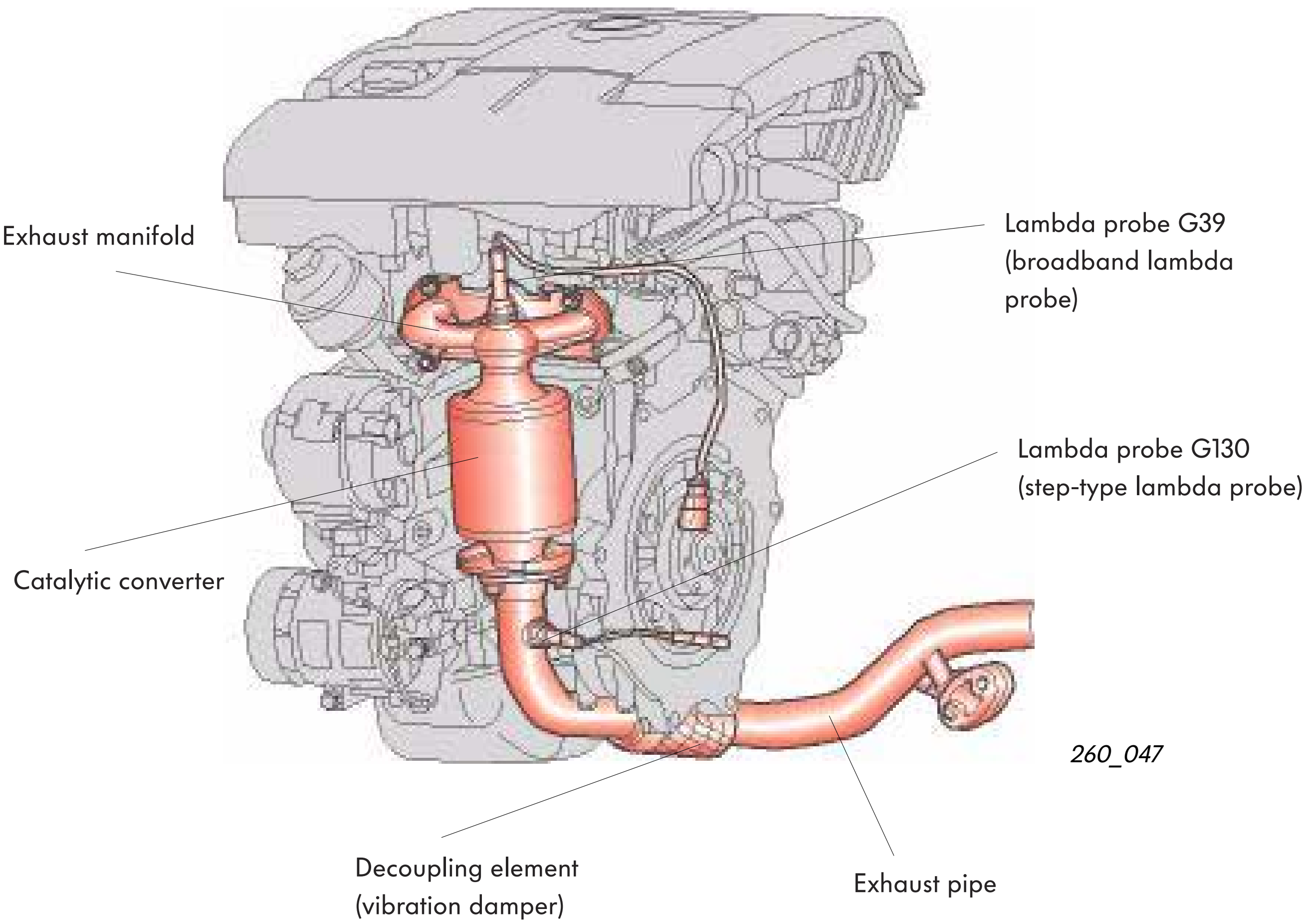
Exhaust post-treatment

The exhaust post-treatment features a large three-way catalytic converter. This is installed directly downstream of the exhaust manifold in the exhaust line.

The catalytic converter must heat up rapidly and thus be operational within a short time in order to comply with the EU4 emission standard. This is achieved by positioning the catalytic converter close to the engine.

Until now, though, the catalytic converter was too small in design, for space reasons, to alone comply with the emission standard. That is why a main catalytic converter was used in addition to the pre-catalytic converter.

On the 3-cylinder engines, the installation situation is more favourable as a result of the upright oil filter. The catalytic converter is positioned close to the engine and is now so generously dimensioned that it is able to comply by itself with the EU4 emission standard.



260_047

Emission control

This is performed by means of two lambda probes.

The pre-cat lambda probe

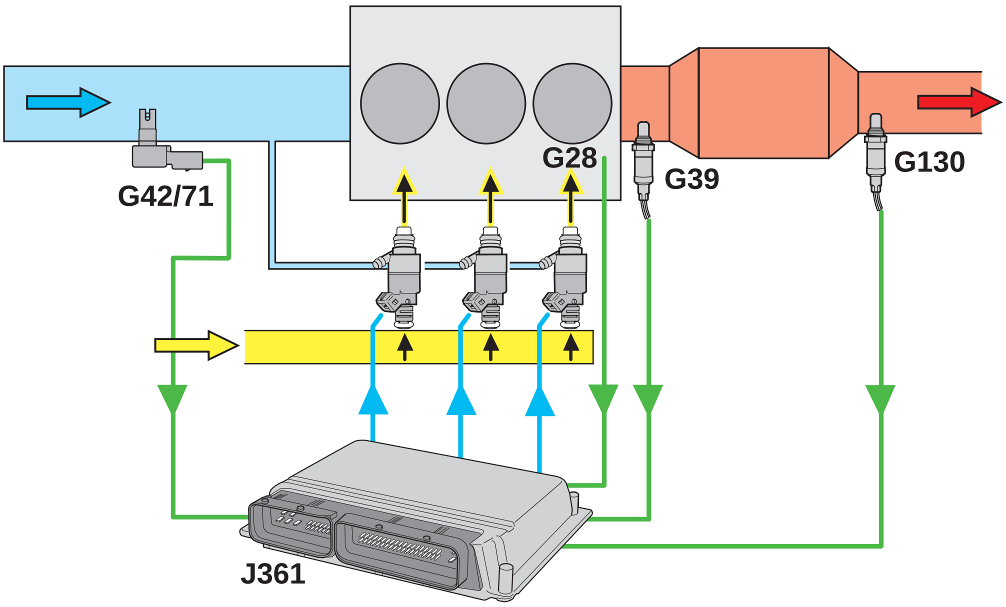
On the 1.2 ltr./40 kW engine a step-type lambda probe is used as the pre-cat lambda probe. On the 1.2 ltr./ 47 kW engine a broadband lambda probe is used.

The pre-cat lambda probe determines the oxygen concentration in the exhaust upstream of the catalytic converter. If deviation from $\lambda = 1$ occurs, the injection period is varied accordingly.

The post-cat lambda probe

On both engines a step-type lambda probe is used as the post-cat lambda probe.

The post-cat lambda probe is used for verifying the function of the catalytic converter.
Adaptation of the pre-cat lambda probe G39 is also performed.

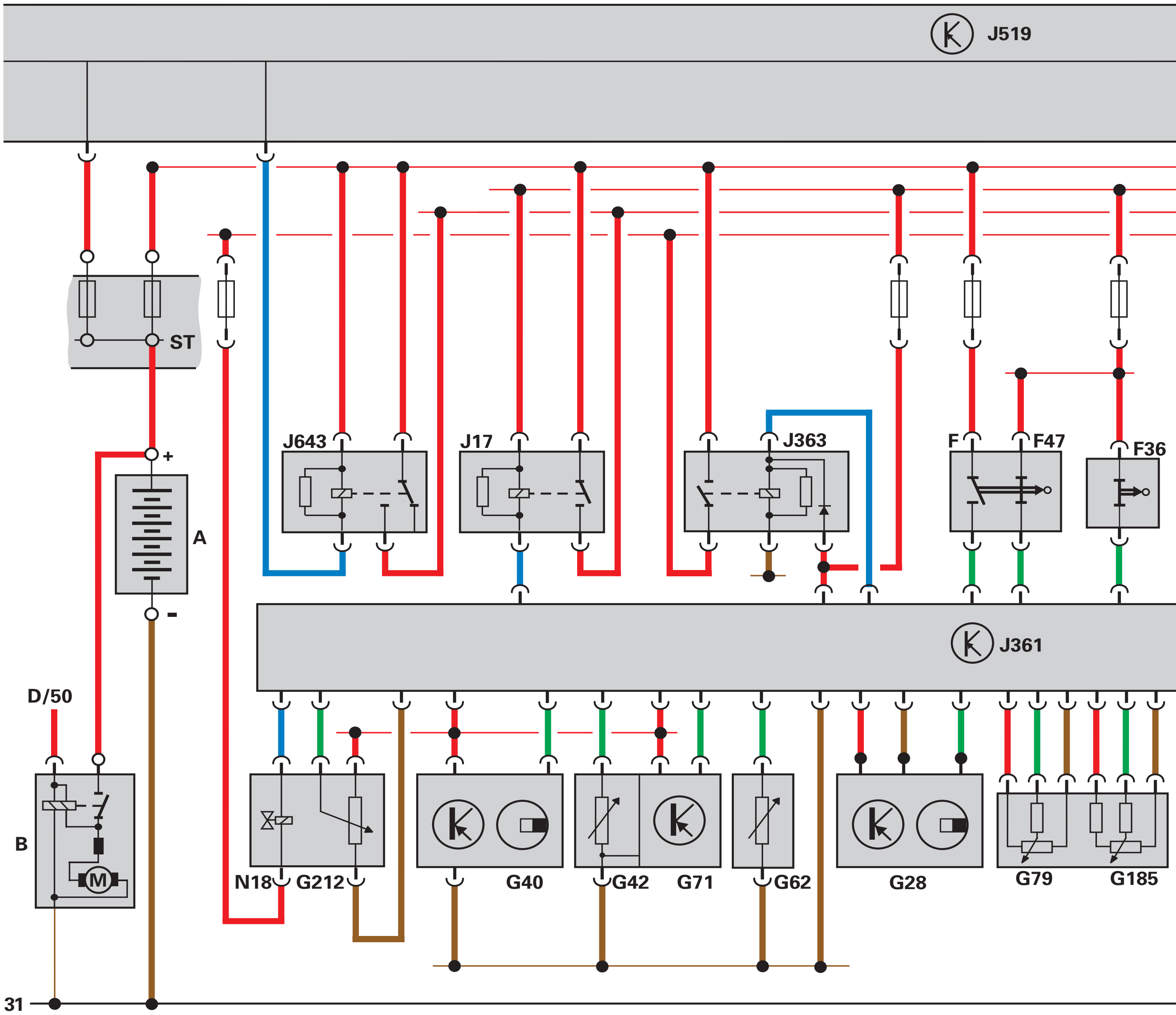


260_019

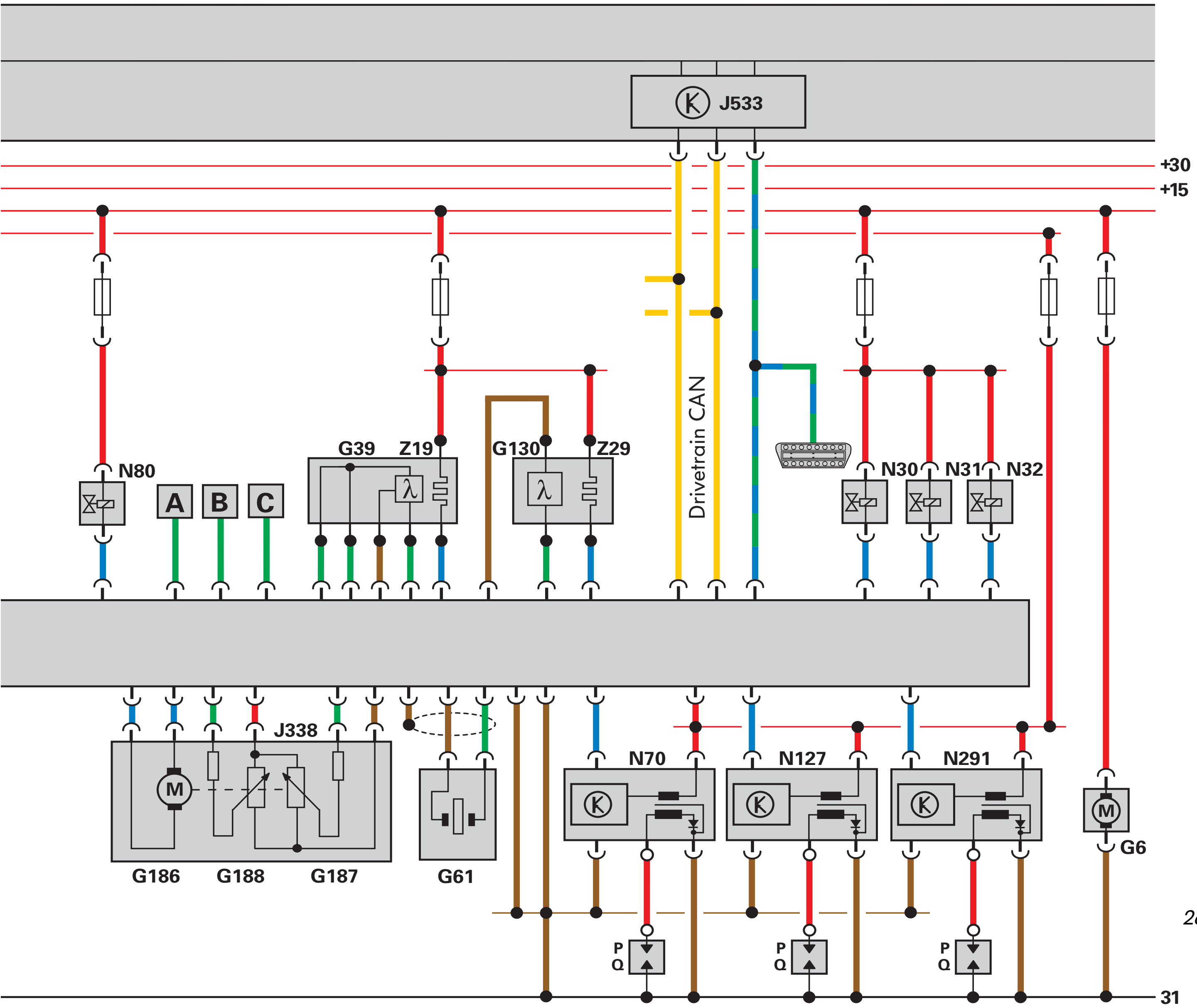
Legend:

G28 Engine speed sender
G39 Lambda probe (pre-cat)
G42/71 Intake air temperature sender/ Intake manifold pressure sender
G130 Lambda probe (post-cat)
J361 Simos 3PD/3PE control unit

Function diagram



A	Battery
B	Starter
D/50	Ignition-start switch/terminal 50
F	Brake light switch
F36	Clutch pedal switch
F47	Brake pedal switch
G6	Fuel pump
G28	Engine speed sender
G39	Lambda probe
G40	Hall sender
G42	Intake air temperature sender
G61	Knock sensor
G62	Coolant temperature sender
G71	Intake manifold pressure sender
G79	Accelerator pedal position sender
G130	Lambda probe downstream of catalytic converter
G185	Sender 2 for accelerator pedal position
G186	Throttle valve drive
G187	Angle sender 1 for throttle valve drive
G188	Angle sender 2 for throttle valve drive
G212	EGR potentiometer*
J17	Fuel pump relay
J338	Throttle valve control unit
J361	Simos control unit
J363	Power supply relay for Simos control unit
J519	Vehicle electrical system control unit
J533	Databus diagnostic interface

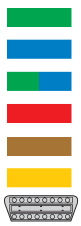


260_035

J643	Fuel feed relay
N18	EGR valve*
N30...32	Injectors, cylinders 1...3
N70	Ignition coil 1 with power output stage
N80	Activated charcoal filter solenoid valve
N127	Ignition coil 2 with power output stage
N291	Ignition coil 3 with power output stage
P	Spark plug connector
Q	Spark plugs
ST	Fuse carrier on battery
Z19	Heater for lambda probe
Z29	Heater for lambda probe 1, downstream of cat

* only on engine with 4-valve technology

Colour coding/Legend



= Input signal
= Output signal
= Bidirectional
= Positive
= Earth
= CAN databus
= Diagnostic connection

Additional signals

A	Alternator terminal DFM
B	Cruise control switch (ON/OFF)
C	Vehicle speed signal

Engine management system

Self-diagnosis

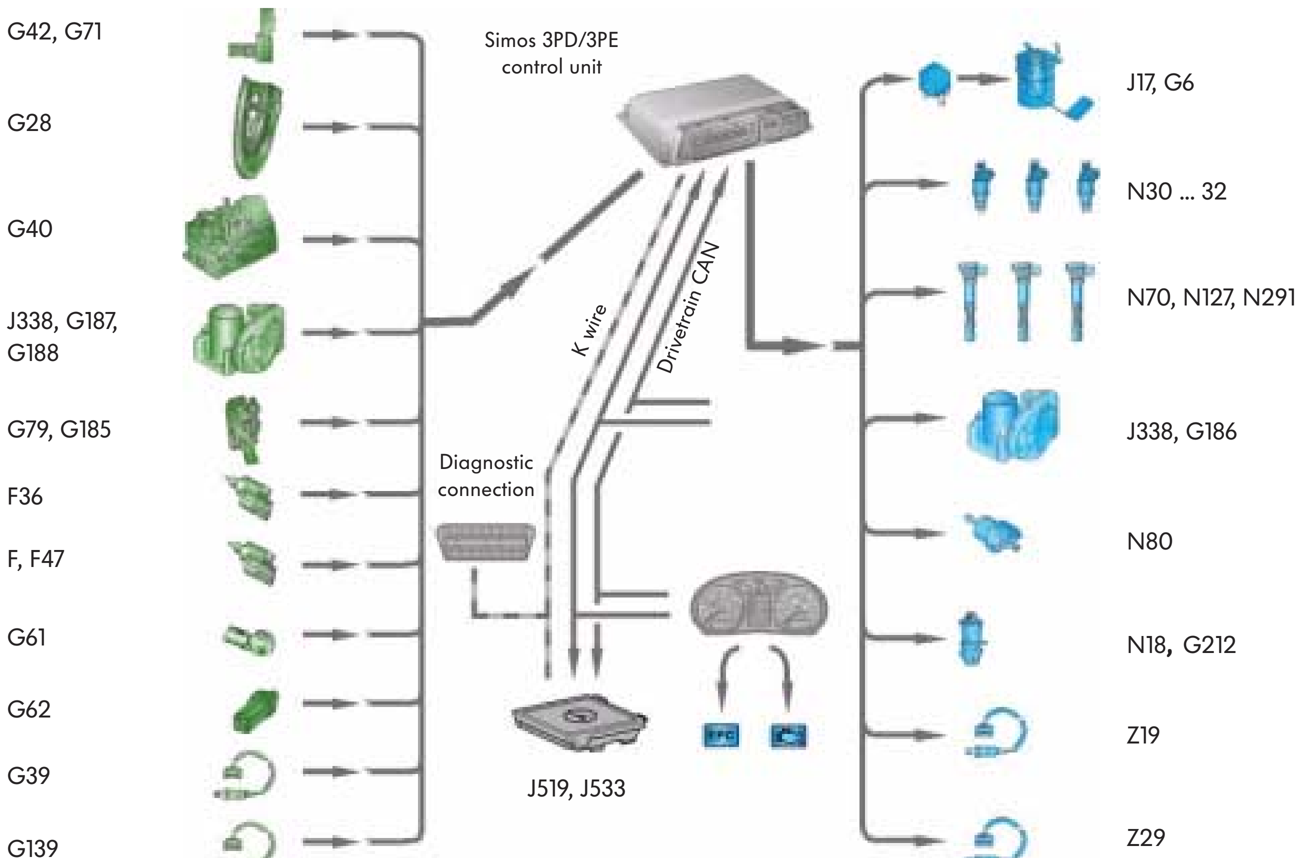
The sensors and actuators of both engines are tested as part of the self-diagnosis.
For diagnosis, please use the up-to-date workshop literature and the Vehicle Diagnostic, Testing and Information System VAS 5051 or the Vehicle and Service Information System VAS 5052.

260_053

260_041

Please note that Repair Group 01 is integrated in the „Guided fault finding“. It also contains the functions of „Read datablock“ and „Final control diagnosis“.

The colour-coded sensors and actuators are tested as part of the self-diagnosis and the guided fault finding.



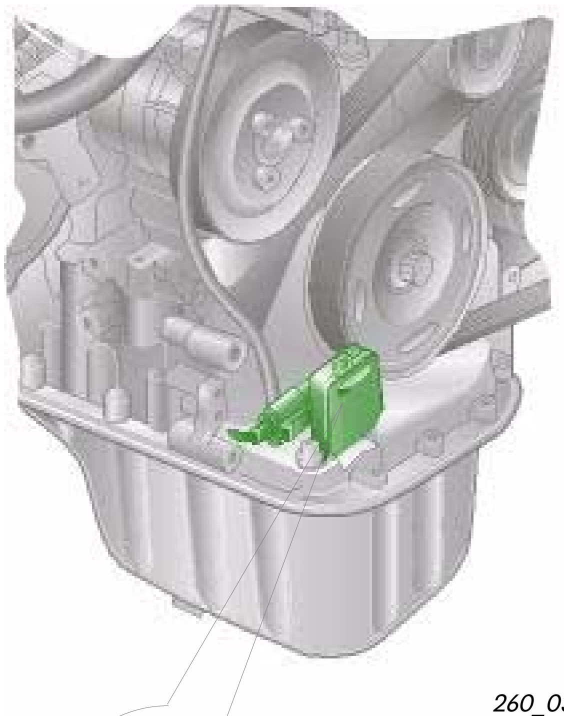
260_052

Extended service interval

The extended service interval is a feature of both engines.

The service intervals of both engines can consequently be up to 30,000 km or up to 2 years, respectively.

There has been no change in terms of the function - compared to the present models which currently feature the extended service interval.
Only the installation position of the oil level/oil temperature sender G266 has been modified for space reasons.
It is attached to the timing case at the belt side and projects into the oil pan.



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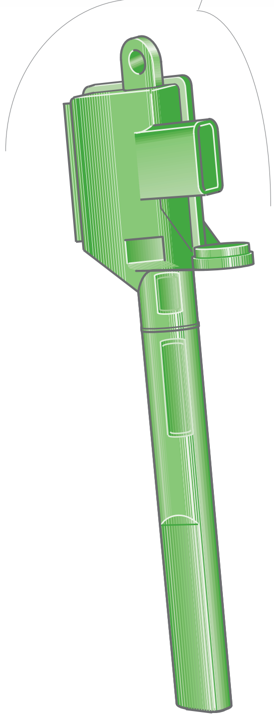
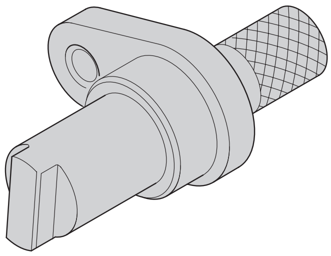
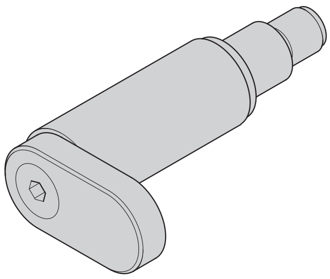
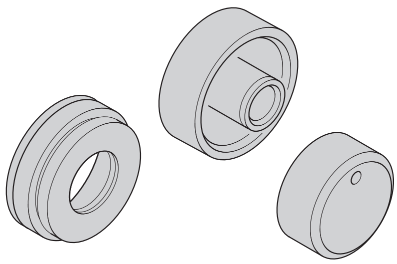
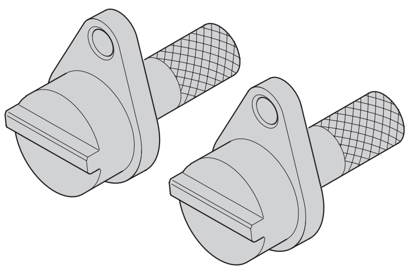


260_040

The work instructions for the extended service interval are described in detail in the „Maintenance“ manual for the particular model.
Please also make use of the workshop forms for the particular vehicle model.

Service

Special tools

Designation	Tool	Use
T10120 Locating pin		For locking camshaft in place, 3-cylinder 2-valve engine
T10121 Locating pin		For locking crankshaft in place, 3-cylinder 2-valve engine and 4-valve engine
T10122 Assembly device		For replacing crankshaft seal at flywheel side, 3-cylinder 2-valve and 4-valve engine
T10123 Camshaft lock		For locking camshafts in place, 3-cylinder 4-valve engine

Test your knowledge

Which answers are correct?
There may be only one or even several correct answers!

1. Which statements regarding the chain drive are correct?

   A. There is one chain drive for driving the camshafts and one for driving the oil pump.
   B. The balancer shaft is chain-driven together with the oil pump by the crankshaft.
   C. The advantage of chain drives is that they do not require any maintenance.

2. Which statements regarding the split cylinder block are correct?

   A. The grey cast iron cylinder liners are cast in the top part of the cylinder block.
   B. Half of the crankshaft is accommodated in the top part of the cylinder block and the other half in the bottom part of the cylinder block.
   C. The bottom part of the cylinder block may be separated from the top part for repair purposes.

3. What is the task of the balancer shaft?

   A. Its task is to reduce oscillations and thus to improve engine running.
   B. It acts as a drive gear for the oil pump.
   C. It is used to drive ancillary components.

4. What are the advantages offered by cross-flow cooling in the cylinder head?

   A. The same temperature level prevails at all three cylinders.
   B. The knocking tendency is reduced because the combustion chamber walls are cooler.
   C. Large opening cross-sections result in a lower flow resistance and thus in a reduced power consumption of the water pump.

Test your knowledge

5. What is the new feature of the fuel system of the 1.2 ltr./47 kW engine?

   A. There is no longer a fuel return-flow line from the fuel rail to the fuel tank.
   B. The fuel pressure regulator is inserted into the filter and held in place by a retaining clip.
   C. The fuel pressure in the system is a constant 3 bar.

6. Which statements regarding the fuel pump feed control are correct?

   A. A relay with integrated crash fuel shut-off is installed for the fuel pump feed control.
   B. There are two relays, both of which are actuated by the engine control unit.
   C. There are two relays, one of which is actuated by the vehicle electrical system control unit and the second one by the engine control unit.

7. Which statements regarding the exhaust post-treatment and control are correct?

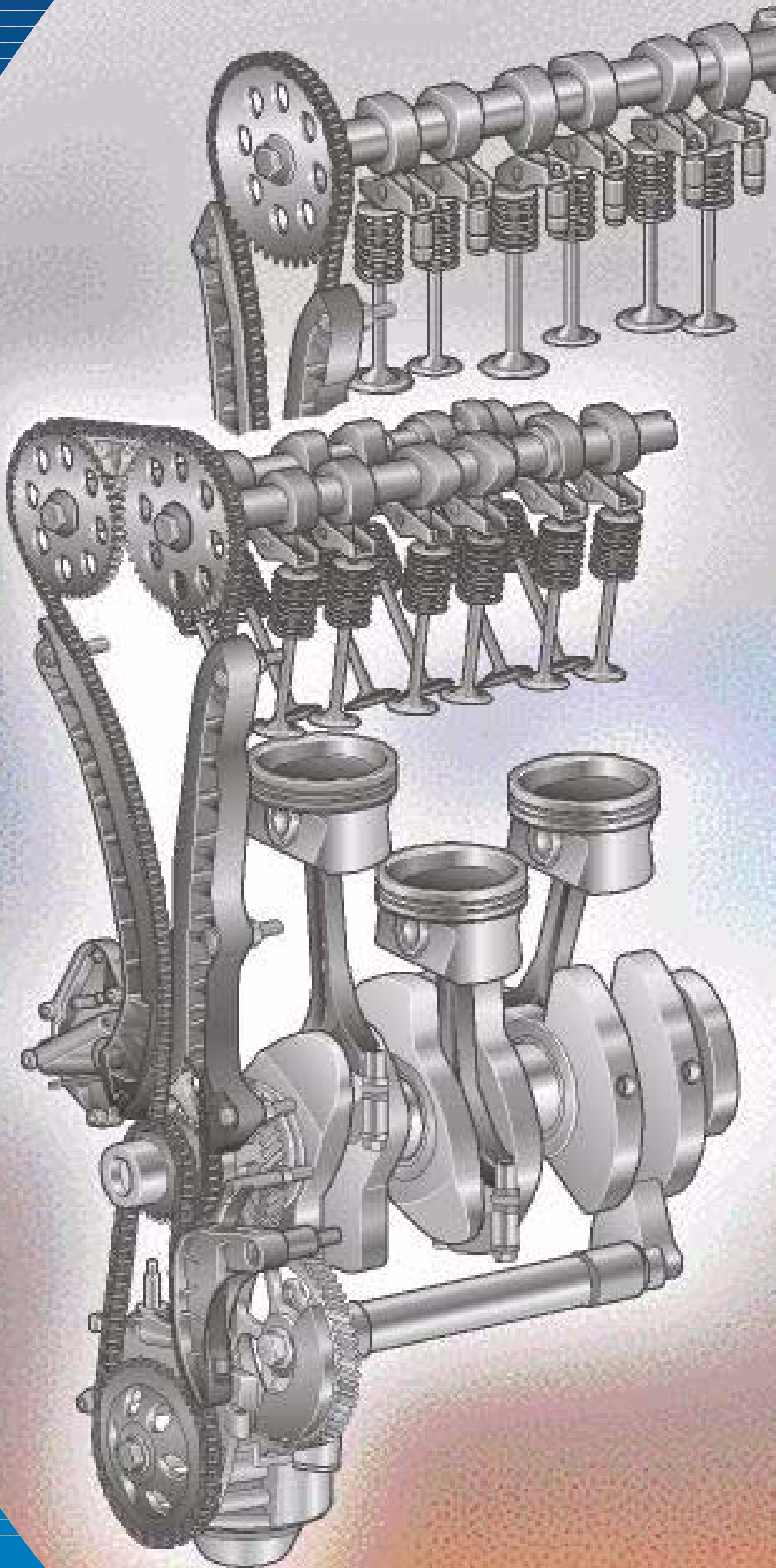
   A. Both engines have a pre-catalytic converter close to the engine and the main catalytic converter.
   B. The 1.2 ltr./40 kW engine has one catalytic converter and two step-type lambda probes.
   C. The 1.2 ltr./47 kW engine has one catalytic converter, a broadband pre-catalytic converter lambda probe and a step-type post-catalytic converter lambda probe.

Answers

1. A., C.; 2. A., B.; 3. A.; 4. A., B., C.; 5. A., B., C.; 6. C.; 7. B., C.

Service.

260



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140.2810.79.20 Corresponds to technical state 10/01

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