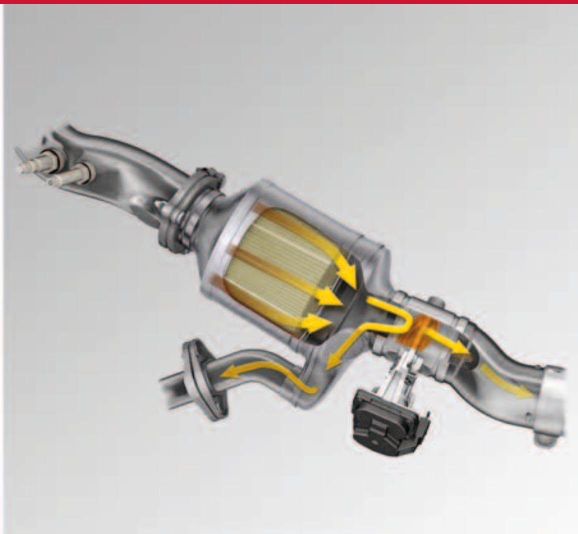


3.0l TDI engine EA897evo2 series

Self Study Programme 656

For internal use only.

Audi Service Training

The new V6 TDI engine increases power output by 30 kW (41 hp) for a total of 210 kW (286 hp) and delivers 620 Nm of torque between 1,500 and 3,000 rpm.
Audi's development engineers have extensively updated numerous aspects of the new 3.0 TDI developing 210 kW (286 hp). They have optimised combustion chamber filling, the charge cycles and thermal management. The result is increased performance coupled with a further improvement in fuel economy. A close-coupled exhaust treatment system provides effective treatment of the exhaust gas.
The V6 TDI engine features a newly developed turbocharger that is 20 percent lighter, with variable turbine geometry (VTG) and a maximum boost pressure of 3.3 bar. The developers put a lot of work into optimizing the gas flow, with the result that engine response to accelerator inputs is much more instantaneous.

656_002

Contents

The self study programme teaches a basic understanding of the design and mode of operation of new models, new automotive components or new technologies.
It is not a repair manual! Figures are given for explanatory purposes only and refer to the data valid at the time of preparation of the SSP.
This content is not updated.
For further information about maintenance and repair work, always refer to the current technical literature.

Note

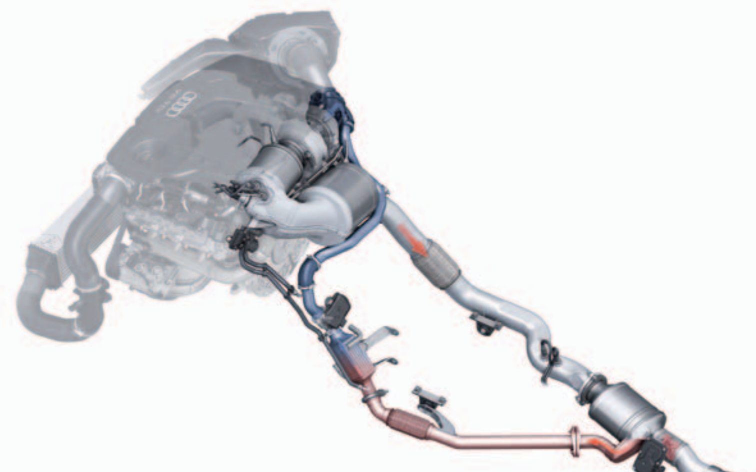
Reference

Introduction

Brief description

Exhaust gas recirculation

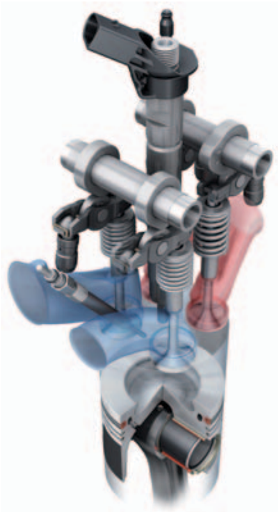
- Version with low-pressure exhaust gas recirculation



656_023

Combustion process

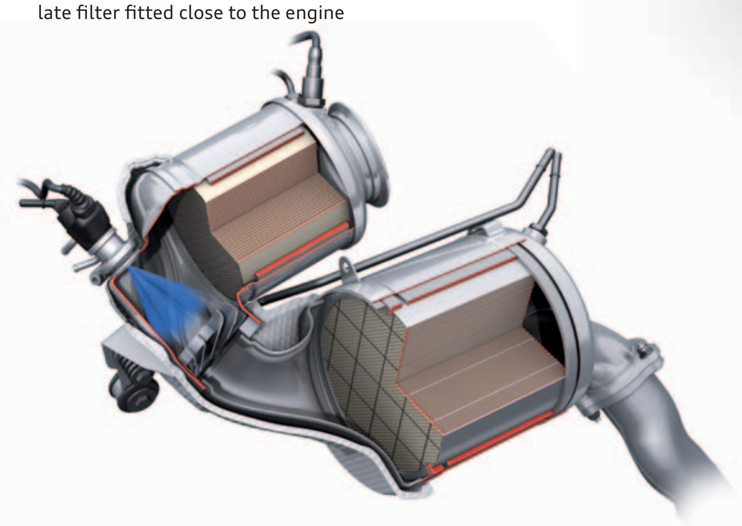
- Optimisation of the combustion process

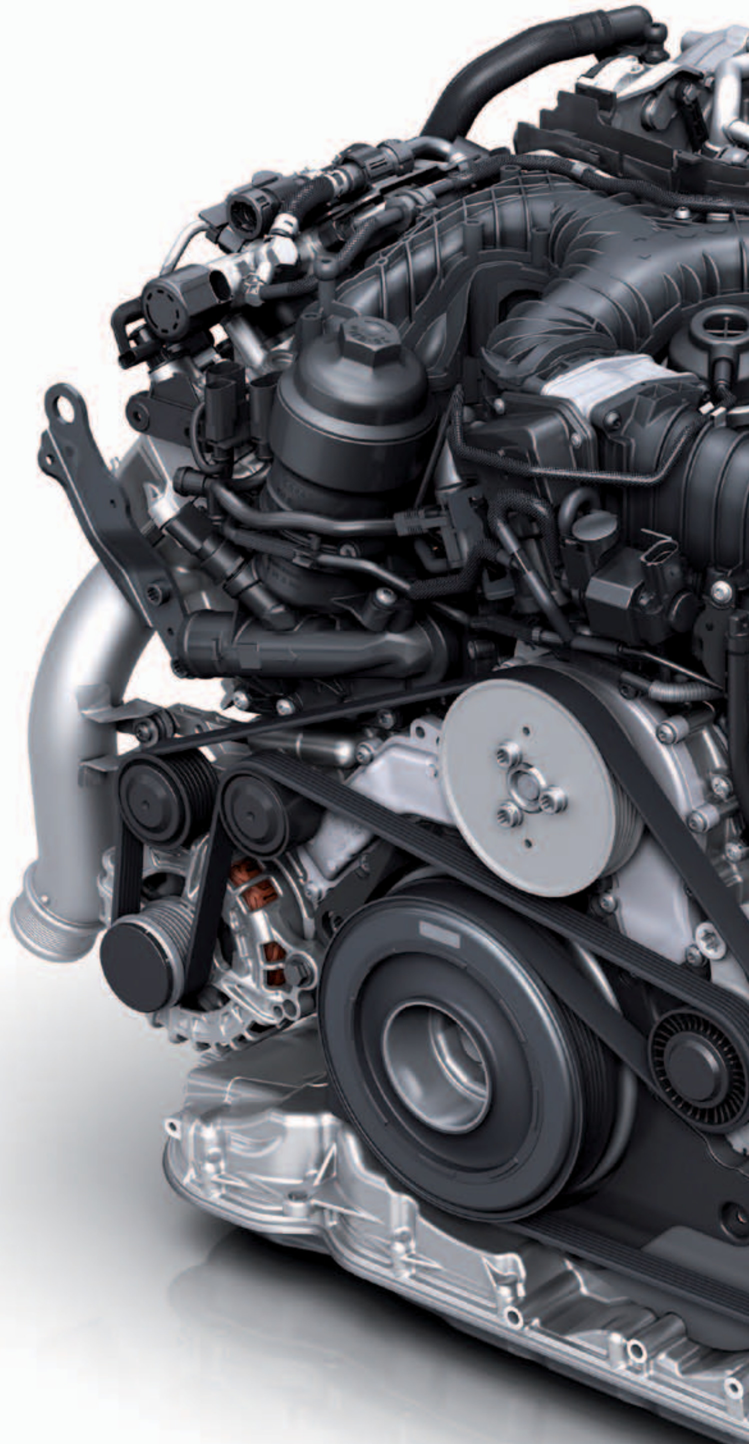


656_027

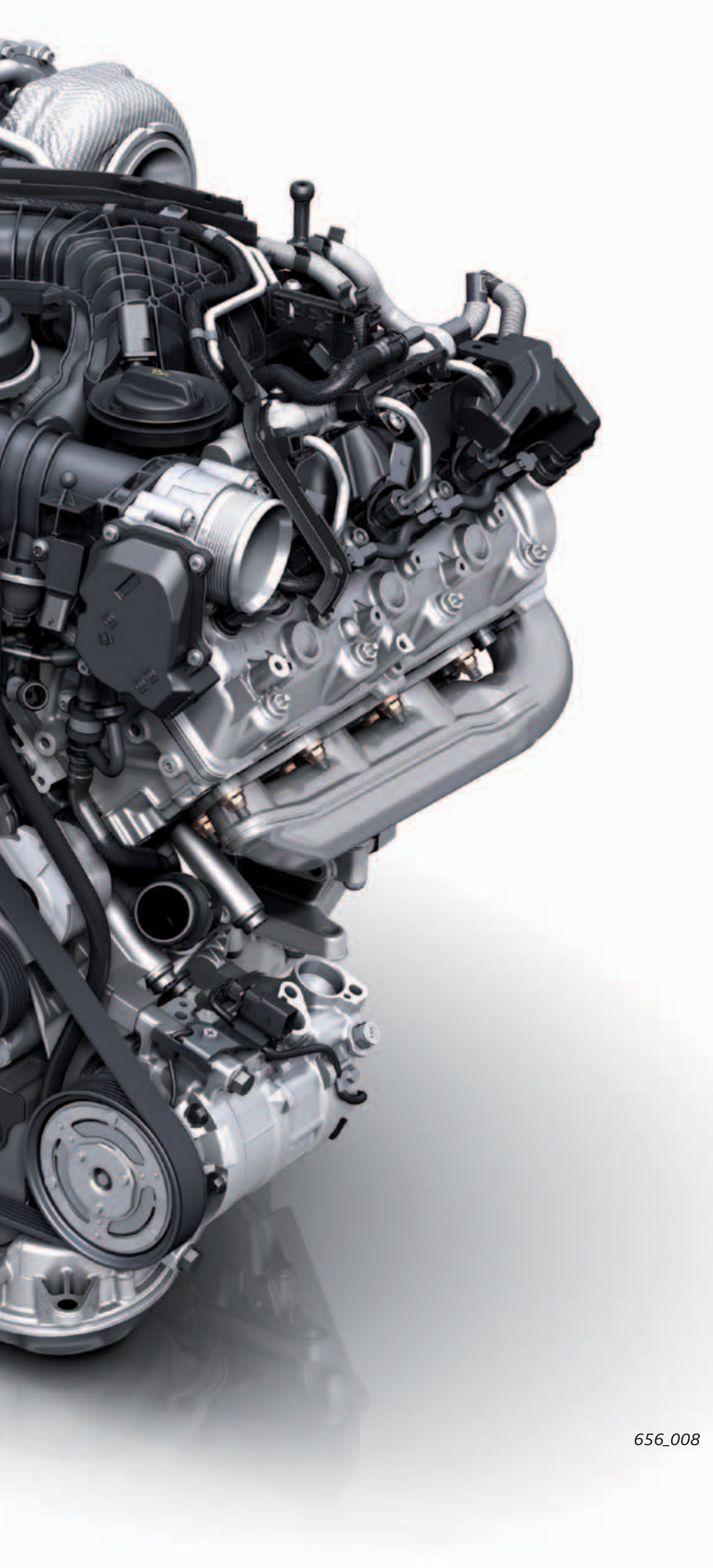
Combined exhaust aftertreatment systems

- Shared NOC-coated (NO_x oxidising catalyst) and SCR-coated diesel particulate filter fitted close to the engine





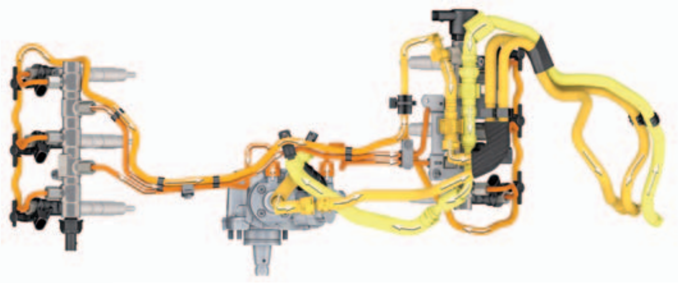
656_026



656_008

High-pressure fuel system

- Common rail injection system which delivers injection pressures of up to 2000 bar



656_031

Friction optimisation

- Friction is reduced by using coated piston rings and by reducing the piston ring preload.

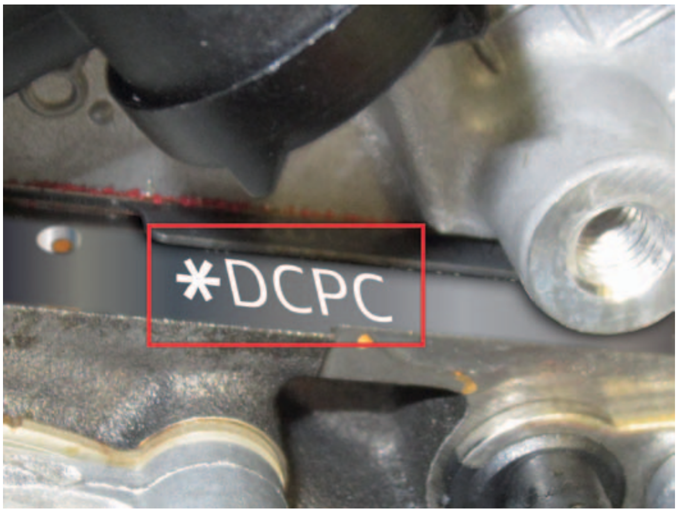
656_010

Specifications

Torque/power curve
Engine code DCPC

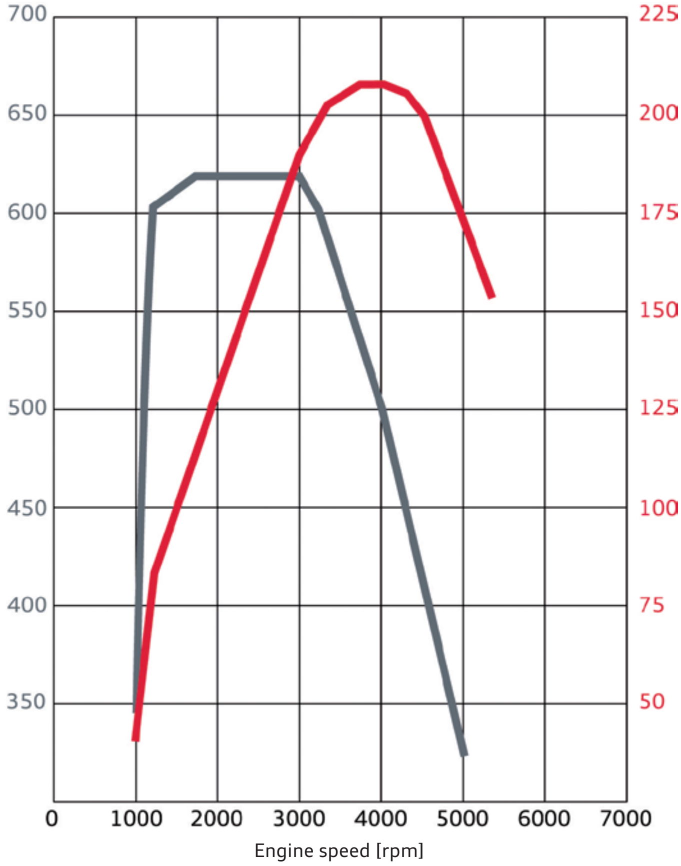
Power output in kW

Torque in Nm



656_055

The engine code is stamped into the engine block close to the temperature sensor for engine temperature regulation G694.



656_034

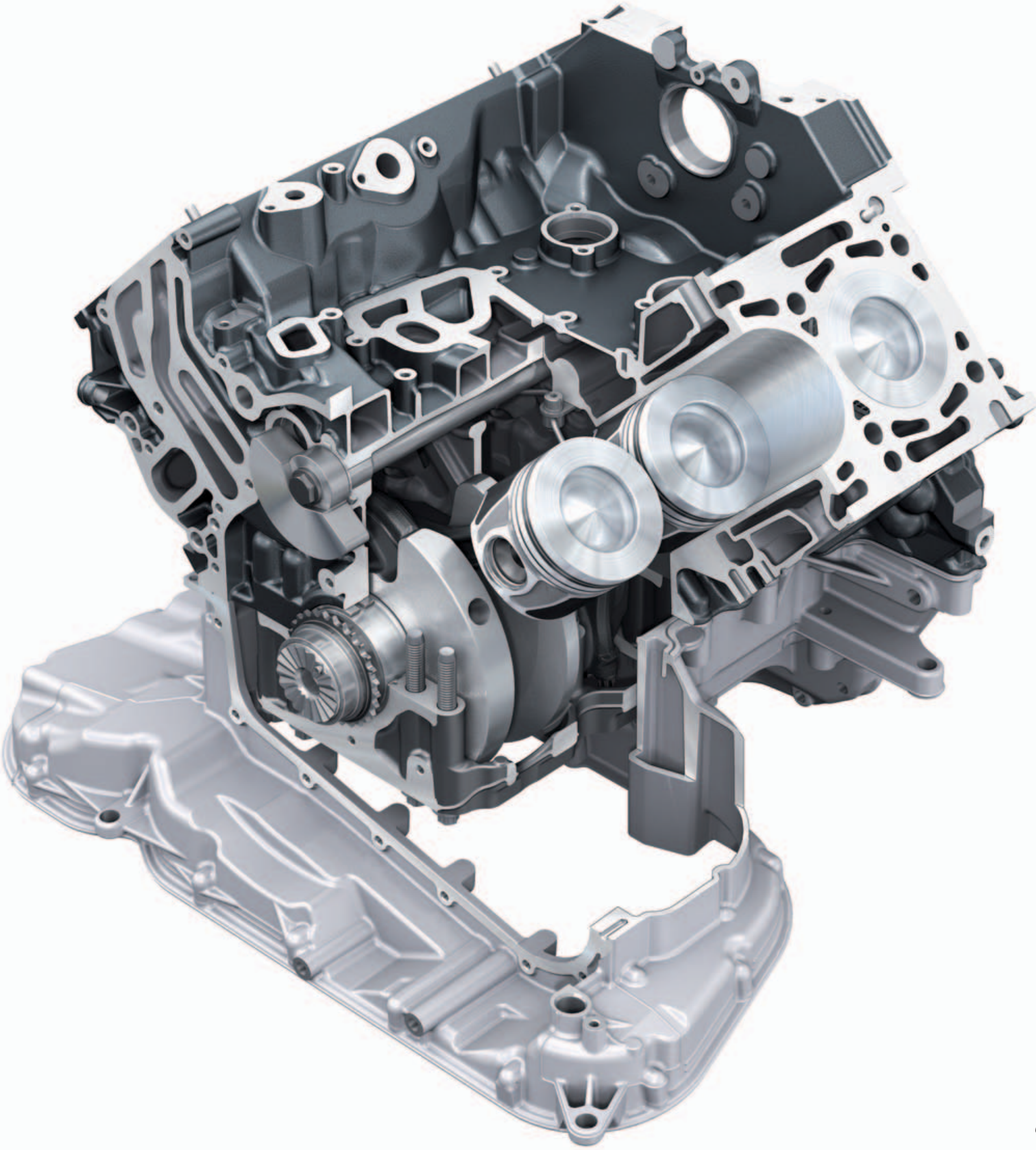
Features	Specifications
Engine code	DCPC
Type	V6 engine with 90° vee angle
Displacement in cm^3	2967
Stroke in mm	91.4
Bore in mm	83.0
Number of valves per cylinder	4
Firing order	1-4-3-6-2-5
Compression ratio	16.0 : 1
Power output in kW at rpm	210 at 4000
Torque in Nm at rpm	620 from 1750 – 3000
Fuel type	Diesel to EN 590
Turbocharging	Monoturbo charger with VTG and E-positioner
Engine management	Bosch MD1 with OBD
Maximum injection pressure in bar	2000
Exhaust gas treatment	NO_x storage catalyst with SCR-coated diesel particulate filter
Emission standard	EU6 (ZD/E/F)

Engine mechanicals

Overview

The GJV450 engine block, which is manufactured by sand mould casting (core package process) and split at the centre of the crankshaft, has been comprehensively revised for the new 3.0l V6 TDI engine. It has been made another 1.1 kg lighter than its predecessor by systematically reducing wall thickness, in addition to using shorter bores in the BDC zone. The capacity of the water jacket has been reduced by 0.4 l by means of reduced lengths and thicknesses. In combination with the separate head/block cooling system with standing coolant in the engine block, this results in an even faster warm-up phase after a cold start. Other improvements in the thermal management system of the 3.0l V6 TDI engine are described in detail in the chapter on the cooling system.

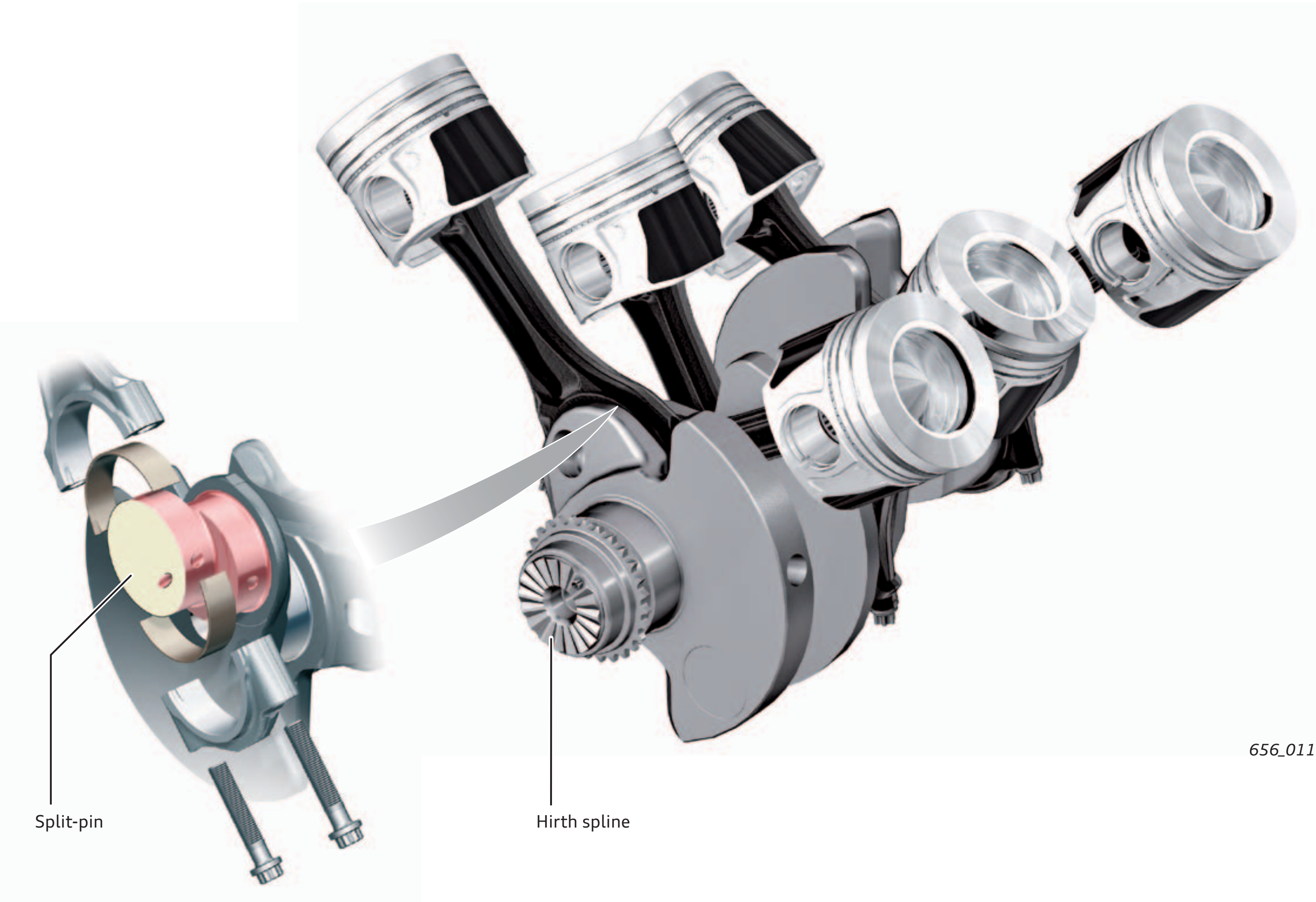
The cylinder liners are plate-honed to attain an optimal cylinder shape during engine operation. This technique is key to achieving a substantial reduction in piston ring preload.



656_012

Crankshaft

To achieve identical firing intervals, the forged 42 CrMoS4 crankshaft has a 30° split pin. Main bearing journals and crank pins are inductively hardened for strength reasons. In this case, too, the decision to dispense with central counterweights and relief bores in all crank pins reflects a consistent approach to lightweight design. The eight-way threaded connection of the elastomer vibration damper at the front end of the crankshaft has been replaced by a Hirth spline with only one central screw.



656_011

Pistons and conrods

For reasons of friction and strength, the aluminium piston with salt-core cooling port is designed as a sleeve piston with a DLC1)-coated gudgeon pin. Together with an all-new piston ring assembly, whose tangential tension has been reduced by more than 25 %, this amounts to a significant reduction in engine friction.

After casting and pre-machining, the highly stressed bowl rim is re-melted by means of laser energy to produce the finest and strongest possible aluminium microstructure.

To reduce piston ring preload in this order of magnitude without any trade-off in terms of wear, oil consumption and blow-by gas emissions, the design of the piston ring has been radically revised. In addition to a marked reduction in piston ring height, PVD (physical vapour deposition) and DLC (diamond-like carbon) are used for the first time in a combined-layer system.

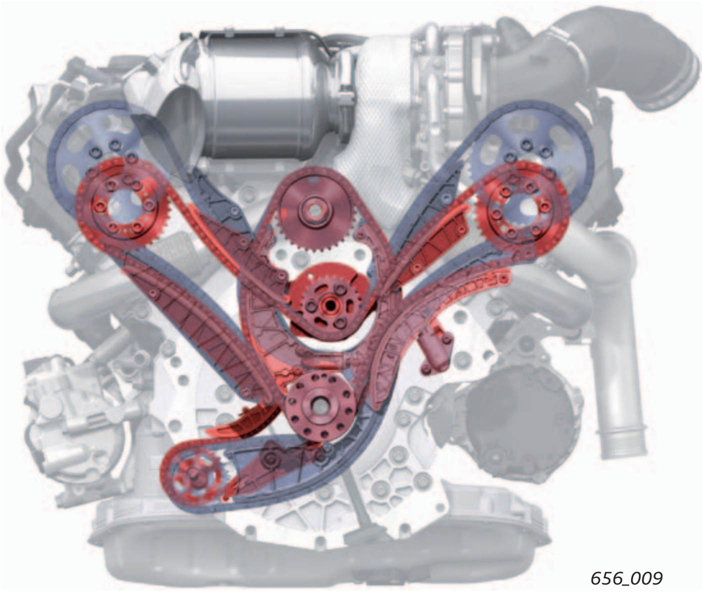
656_010

Chain drive

A key design requirement for the new 3.0l V6 TDI engine family was the integration of a close-coupled exhaust gas aftertreatment system in order to improve light-off through rapid heating.

To accommodate the enlarged volume and the NO_x accumulator catalyst, which is now flange-mounted to the coaxial turbine outlet of the turbocharger, installation space was created at the back of the inner V. This was achieved through a combination of compact timing assembly design with idler gears mounted in the cylinder head and a double gear step on the output side. For acoustic reasons, each gear step has backlash compensation. To minimise friction, the idler gear runs in needle bearings. In order to meet the more exacting requirements resulting from from increased fuel injection pressures, the oil and high pressure pumps are no longer driven by single chain as in the previous engine, but rather by two separate chains.
The dynamically highly stressed high-pressure pump chain drive is now configured as a torsionally rigid dual-shaft drive, thereby eliminating resonance and high chain forces across the rev band.

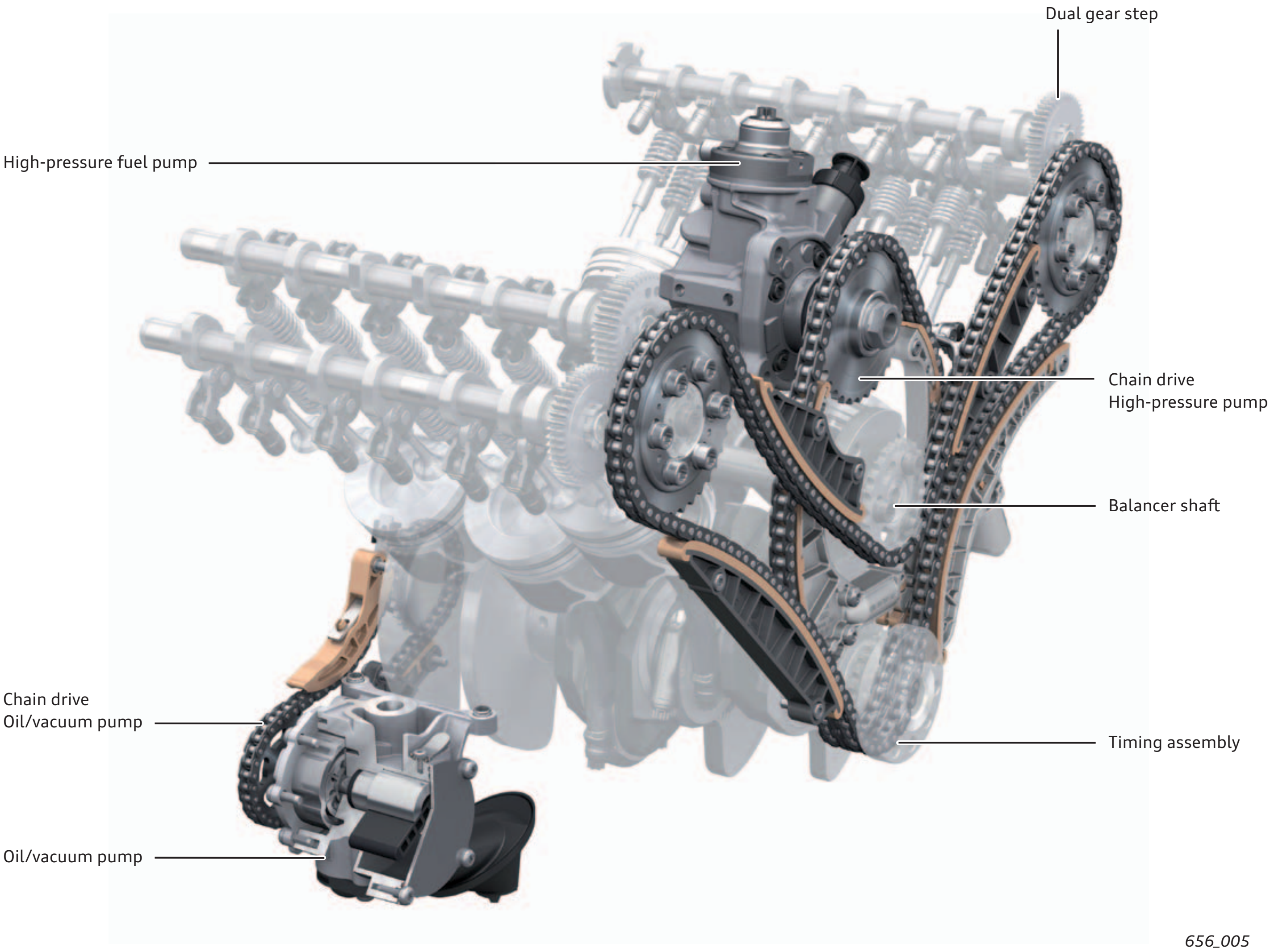
The oil/vacuum tandem pump, flange-mounted to the oil pan, is now driven directly from the front end of the crankshaft via a separate chain track. To provide a higher tolerance for oil quality and low viscosity oil (0-W30), the Audi V-configuration diesel engines exclusively use bush chains with chrome-plated pins.



656_009

Previous chain drive

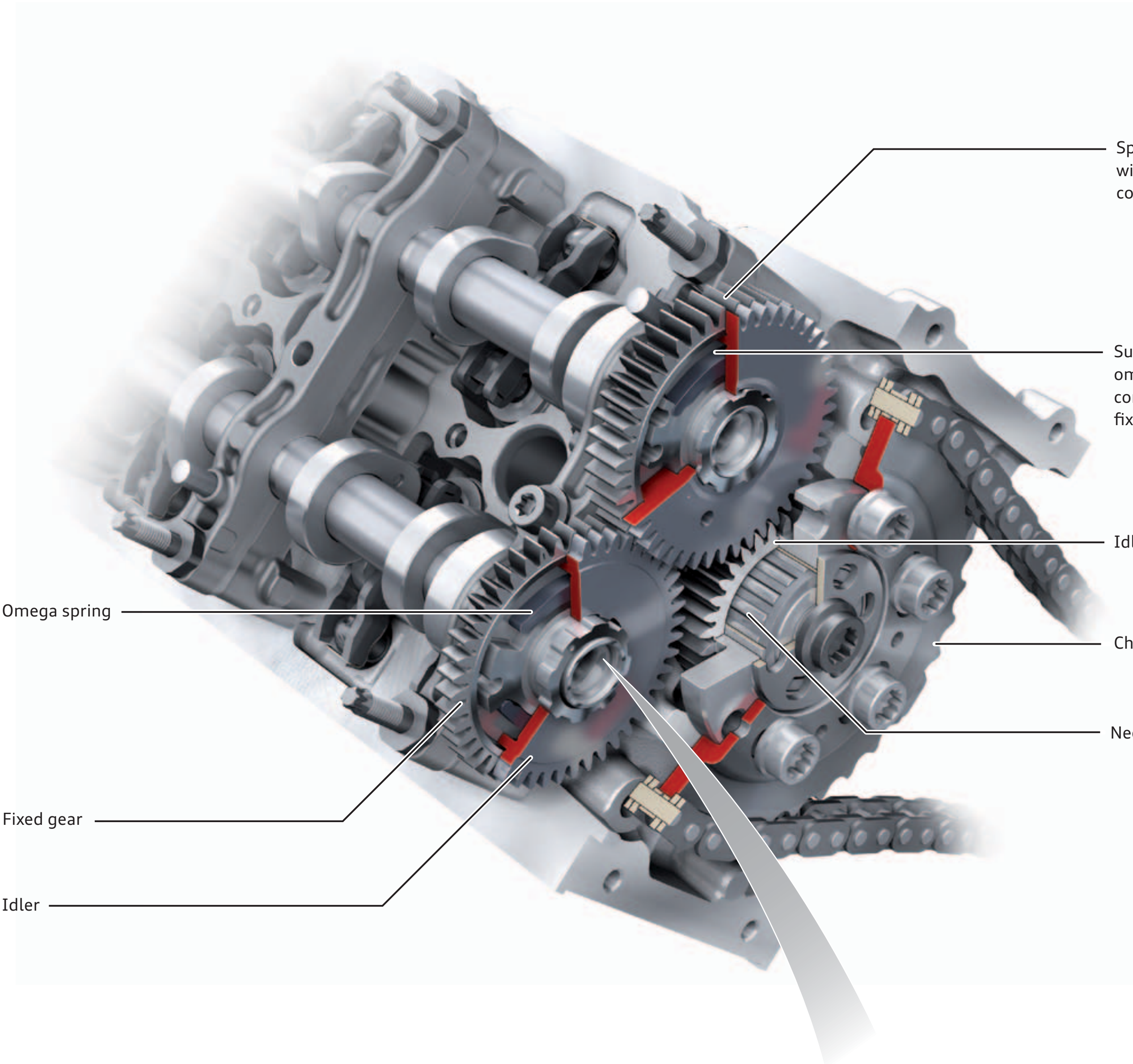
Adapted chain drive



656_005

Camshaft drive

An intermediate gear mounted in the cylinder head provides a 2:1 ratio without the need for large camshaft sprockets. Taking this intermediate gear as the starting point, camshaft drive is provided by a downstream double gear step, each gear wheel having backlash compensation for acoustic reasons. To minimise friction in these additional bearing points, the intermediate gear mounting is configured as a needle bearing.

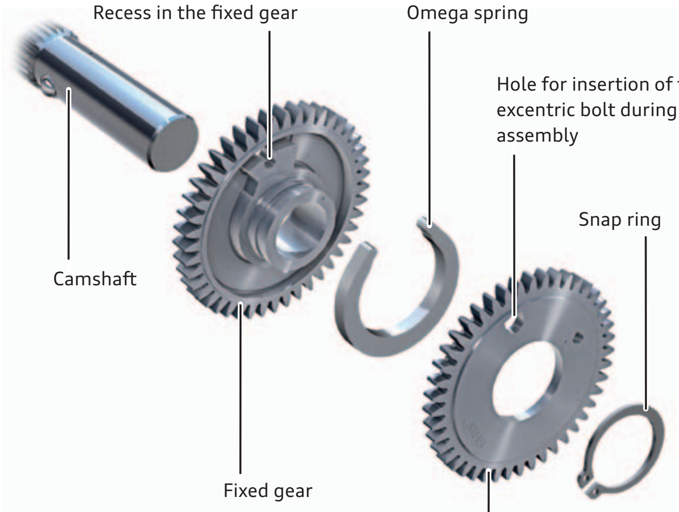


656_035

Backlash compensation

Backlash is compensated by the omega spring, which engages the recess in the fixed gear and is preloaded by a spring guide in the idler.

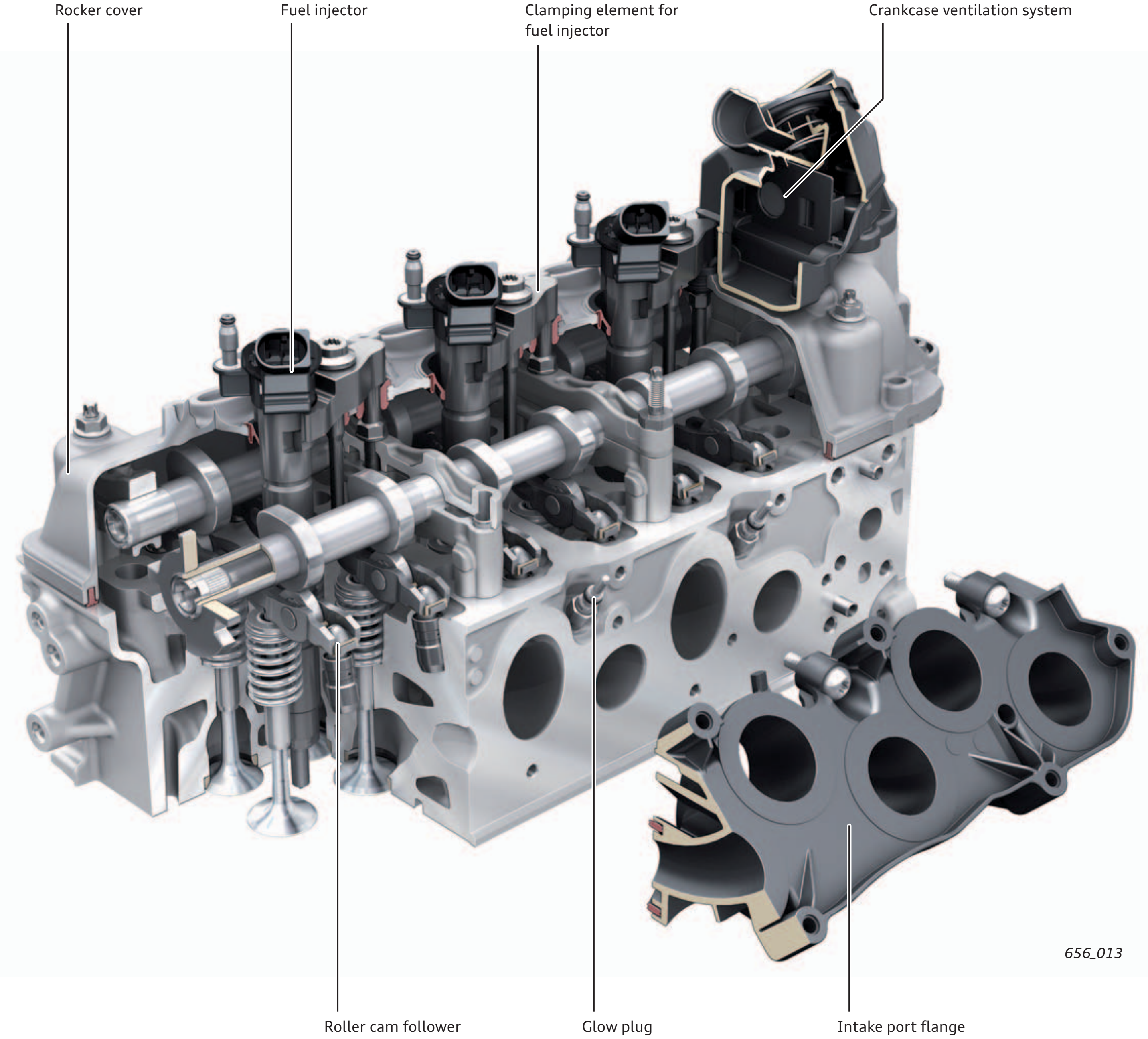
When the camshaft gear is installed, it is tensioned by an excentric bolt and engages the drive wheel with a degree of play. Upon completion of assembly, the excentric bolt is removed. The spring force rotates the two gears towards each other and the gear runs without backlash in the drive sprocket.



656_007

Cylinder head

A design feature of the new cylinder head is its extremely compact design, due, among other things, to the fact that the previously cast-on intake port flange has been eliminated. The intake port flange in the new 3.0l V6 TDI engine has been replaced by a separate, lightweight component made of polymer (PA6-GF35). This, together with other structural improvements, reduces the weight of both cylinder heads by 2.5 kg compared to the previous engine series EA896. The lightweight camshafts are configured as composite hollow camshafts and run in separate double bearing caps. Bearing diameter has been reduced in order to reduce friction. The valves are actuated by newly designed, rigid roller cam followers with a larger roller diameter than in the previous engine. Rotating roll pins provide the ruggedness needed to use low viscosity oil (0W30).



656_013

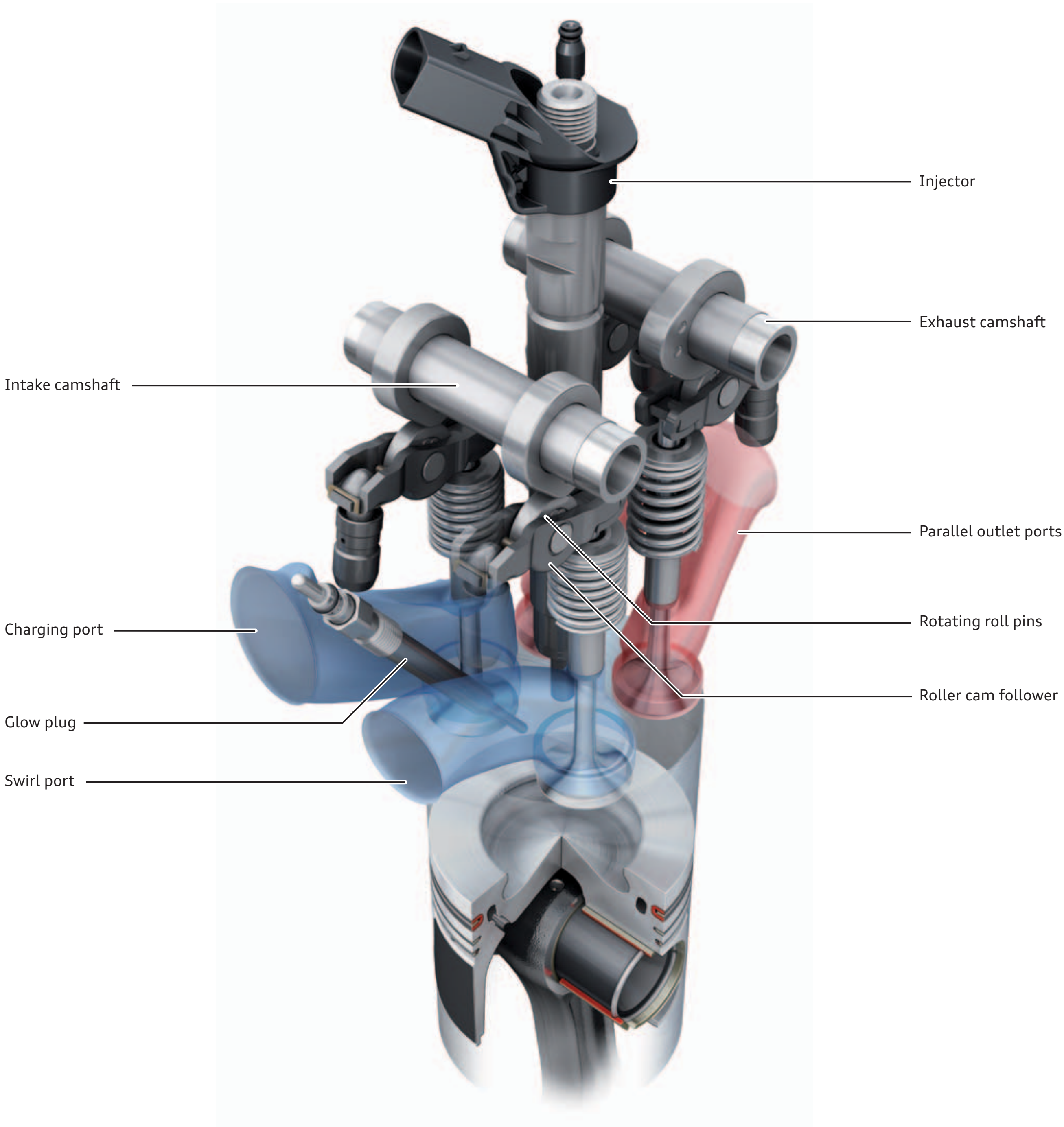
Valvegear

The engine valve gear utilises four valves per cylinder. The valves are arranged in parallel with the crankshaft and actuated by newly designed, extremely rigid roller cam followers. Large roller diameters in combination with rotating roll pins provide a high level of robustness. A focal point of development was on further improvement of the intake port design. The systematic further development of the V6 TDI is clearly reflected in the combustion process. In addition to higher performance, special emphasis was placed on improving fuel efficiency. To be able to achieve this, the thermodynamics of the Audi 4-valve combustion process have been radically revised.

The main focus here was on redesigning the intake port with regard to swirl and throughflow, as well as optimising flow in the exhaust ports.

The result is a significant improvement in volumetric efficiency combined with a reducion in charge cycle losses.
The combustion process was further enhanced by widening the piston recess and by reducing the compression ratio for the EU6 derivative by 0.8 units.

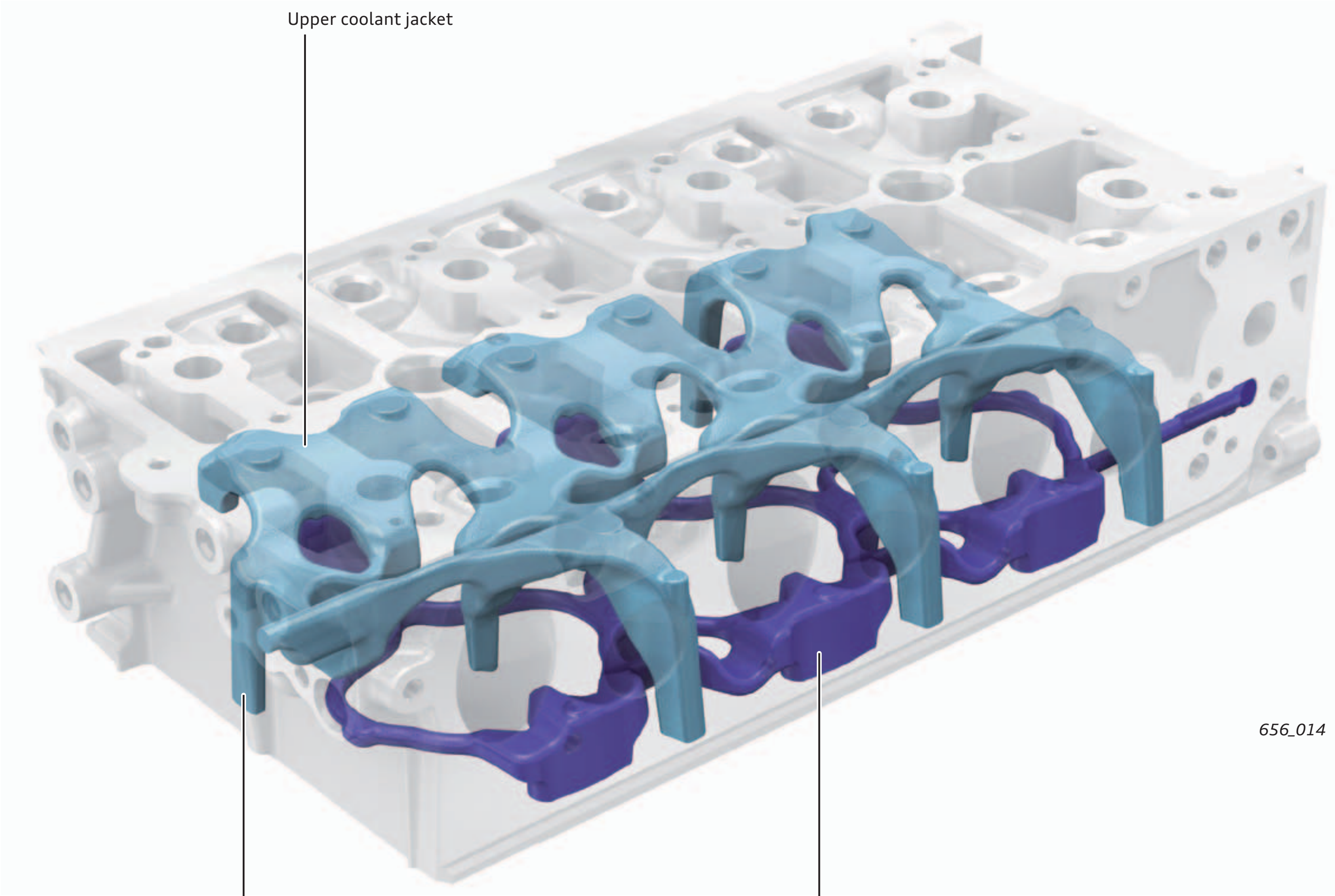
A high level of combustion efficiency with high emission potential regarding the NO_x/soot trade-off is the result of the new combustion process design.
An optimised intake valve lift curve, which improves throttle response at low engine speeds in particular, combines with the optimised exhaust turbocharger design to provide noticeable gains in responsiveness and driving enjoyment.



656_027

Cooling jacket

The radically redesigned cylinder head meets the higher demands on the cylinder head as regards performance and maximum cylinder pressure. The main features are axle-parallel, symmetrical valve star and a two-piece water jacket.
The two-piece water jacket concept, which has already proved highly effective in the 3.0l V6 TDI biturbo, has been systematically revised and is now used in all engine versions.
To ensure that the combustion chamber plate and the highly stressed valve webs are intensively cooled, high flow rates have been implemented in the lower water jacket. In spite of the increased performance, web temperatures have been reduced compared with the predecessor engine (EA896 series) with a one-piece water jacket. The homogeneous temperature distribution made it possible to dispense with the intake valve web.
The upper water jacket requires little cooling and uses low flow rates in order to keep water-side pressure losses to a minimum.



Oil supply

System overview

Key:

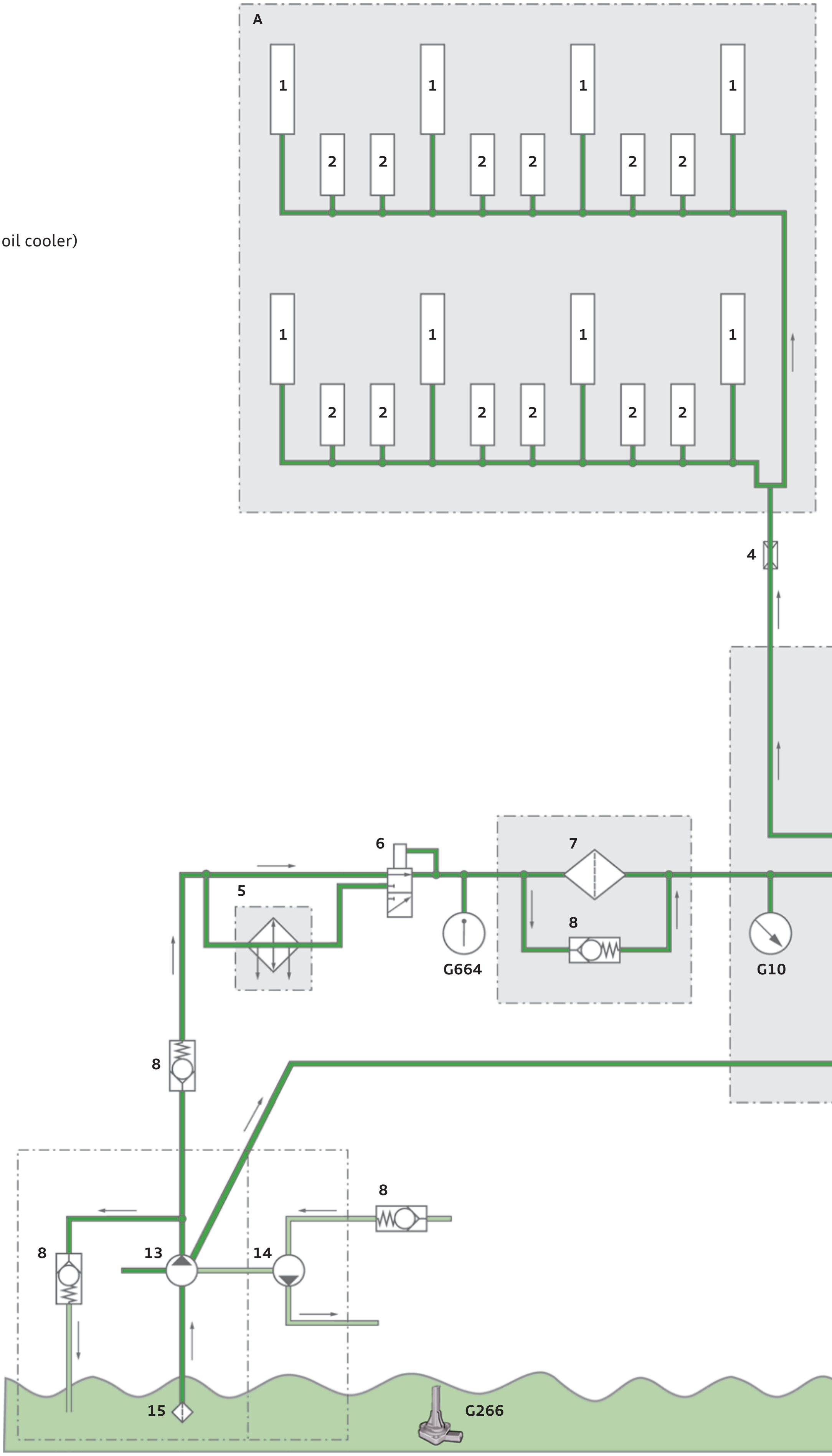
A Cylinder head 2
B Cylinder head 1
C Engine block

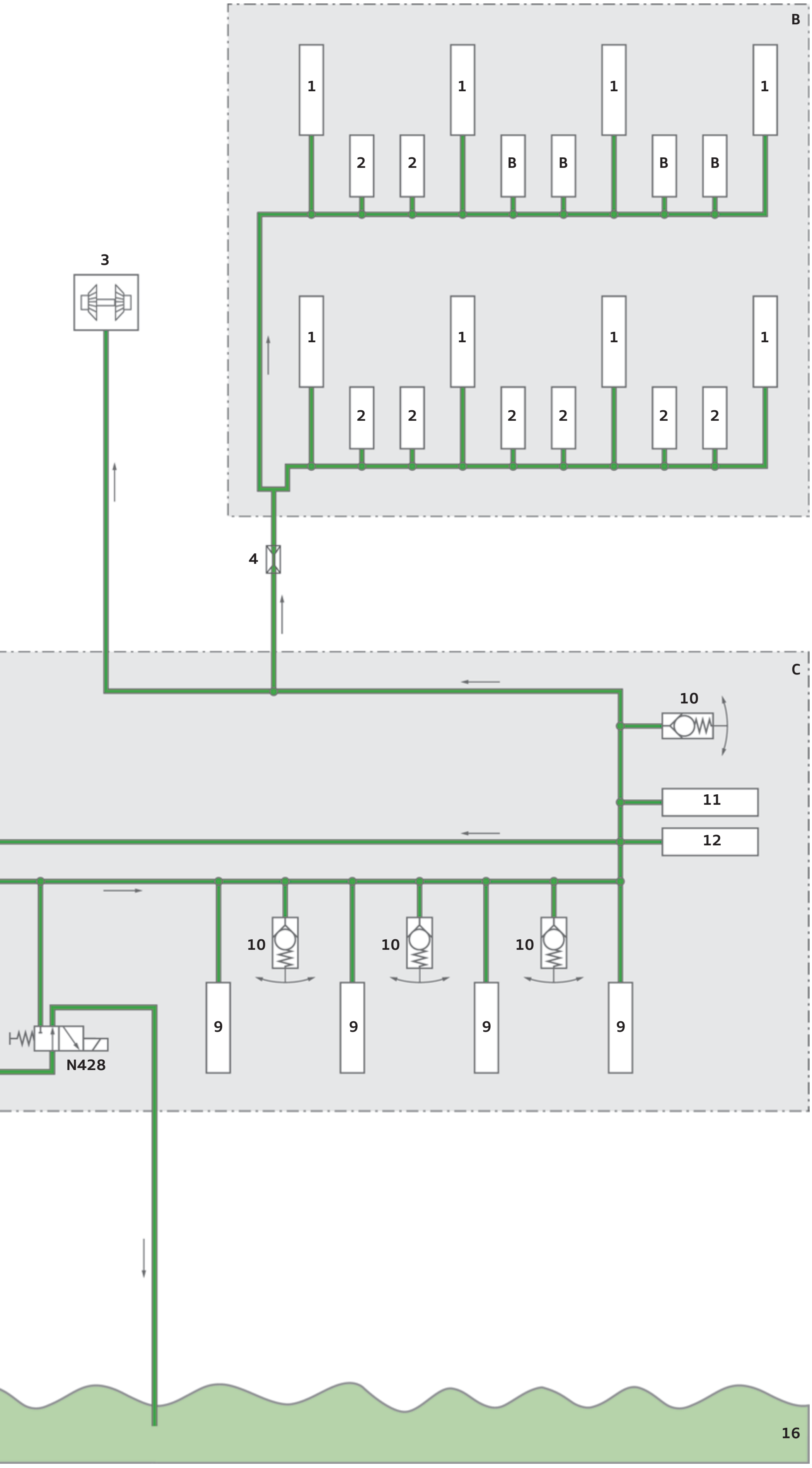
1 Camshaft bearing
2 Support element
3 Exhaust turbocharger
4 Flow restrictor
5 Oil/coolant heat exchanger (engine oil cooler)
6 Engine oil cooler thermostat
7 Oil filter
8 Nonreturn valve
9 Main bearing
10 Piston cooling nozzle
11 Chain tensioner pinion A:
12 Chain tensioner pinion D:
13 Controlled oil pump
14 Vacuum pump
15 Oil pump intake sieve
16 Oil pan

G10 Oil pressure sensor
G266 Oil level/temperature sensor
G664 Oil temperature sensor 2
N428 Oil pressure control valve

High pressure circuit

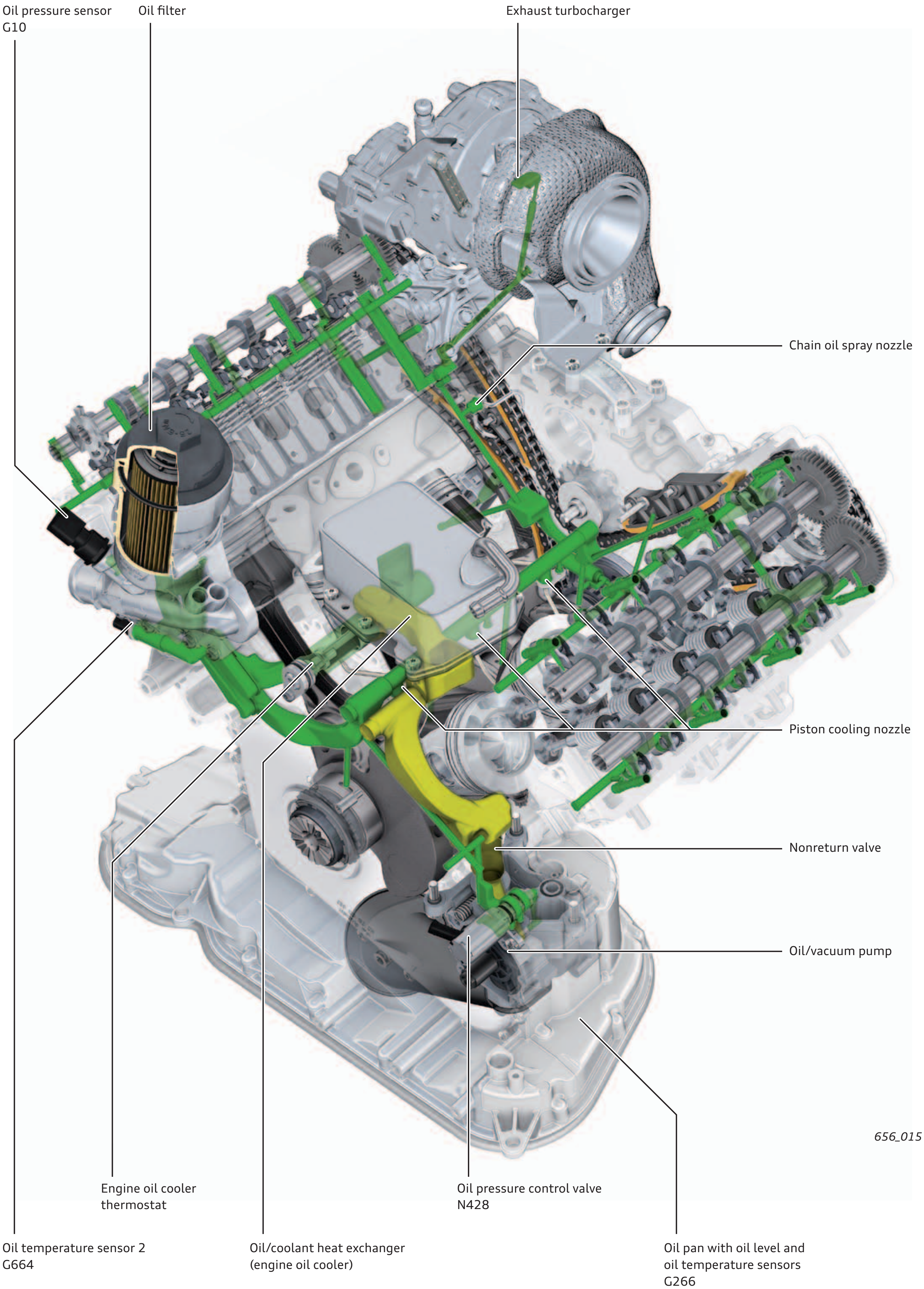
Low pressure circuit





656_003

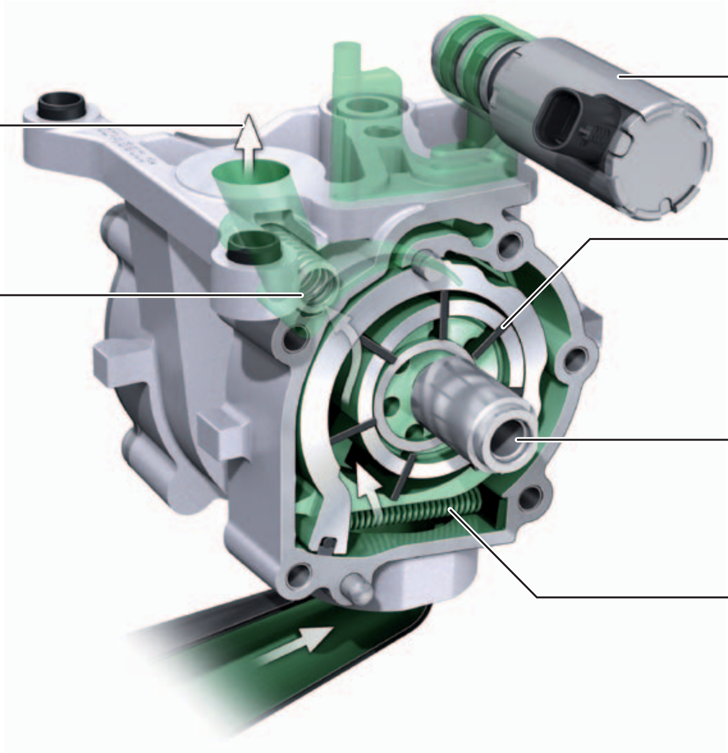
Oil circuit



656_015

Oil pump

A fully variable oil pump is used.
The vane pump is controlled continuously by means of an eccentric ring and allows the pressure/volume flow to be optimally adapted as a function of engine load and speed.
Vacuum is produced by a rotor with flexible vanes.

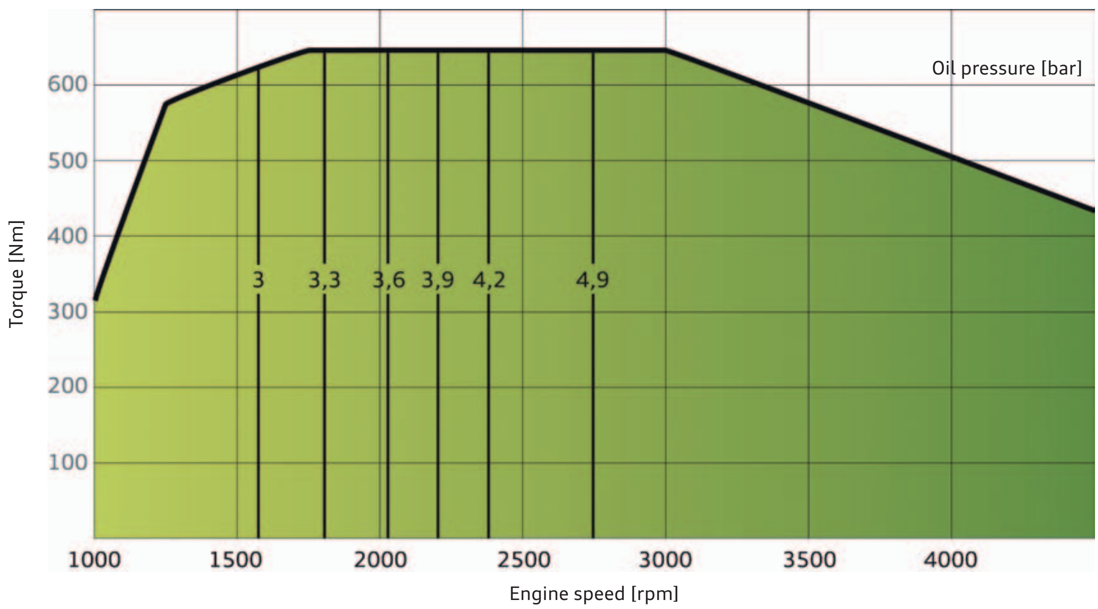


656_017

Oil pump control range

The diagram shows the oil pump control range at an oil temperature of 90 °C.
Up to 60 % of pump pressure is fully variable and delivered on demand.

Furthermore, flow through the piston spray nozzles can be controlled by means of the pressure characteristic and shut off at presures below 1.2 bar.



656_016

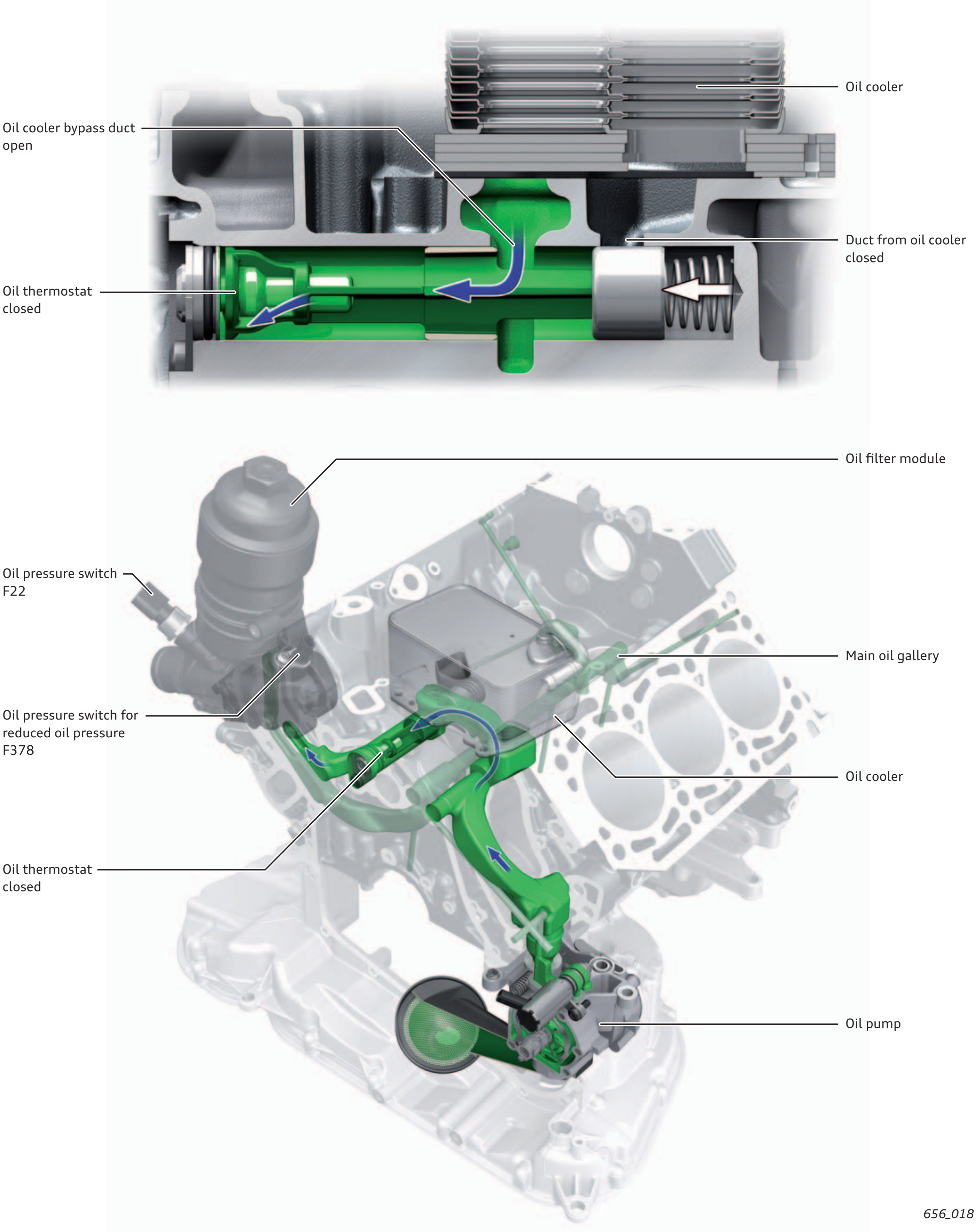
Key:

Low oil pressure
Maximum oil pressure

Oil cooler bypass

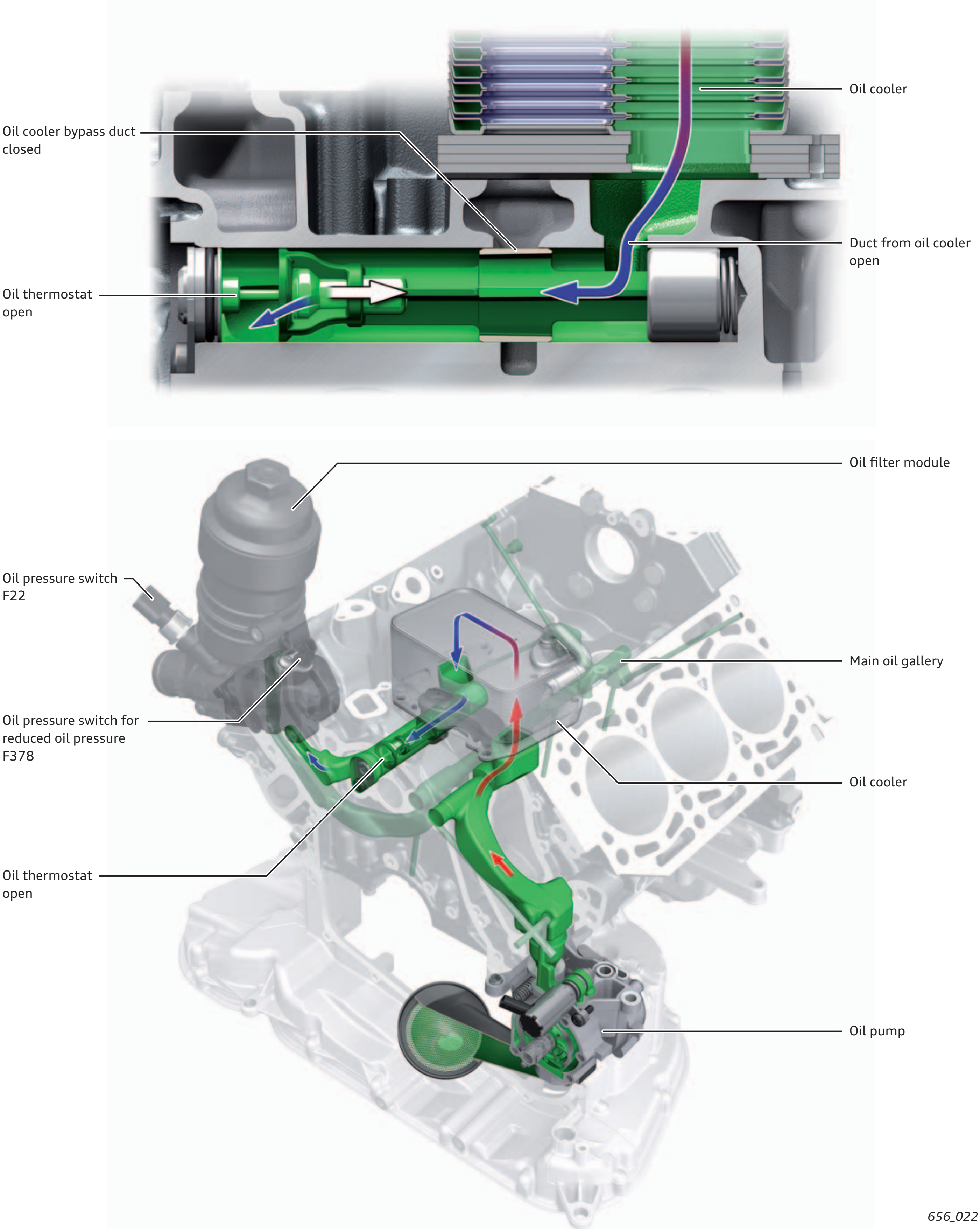
An oil thermostat consisting of an expanding wax element with a sliding sleeve is integrated in the pressurised oil gallery of the cylinder crankcase and allows the oil cooler bypass to be thermostatically controlled, thereby ensuring that the oil heats up rapidly after a cold start. The oil thermostat opens at an oil temperature of approx. 114 °C and is fully open at approx. 140 °C.

Oil thermostat closed



656_018

Oil thermostat open

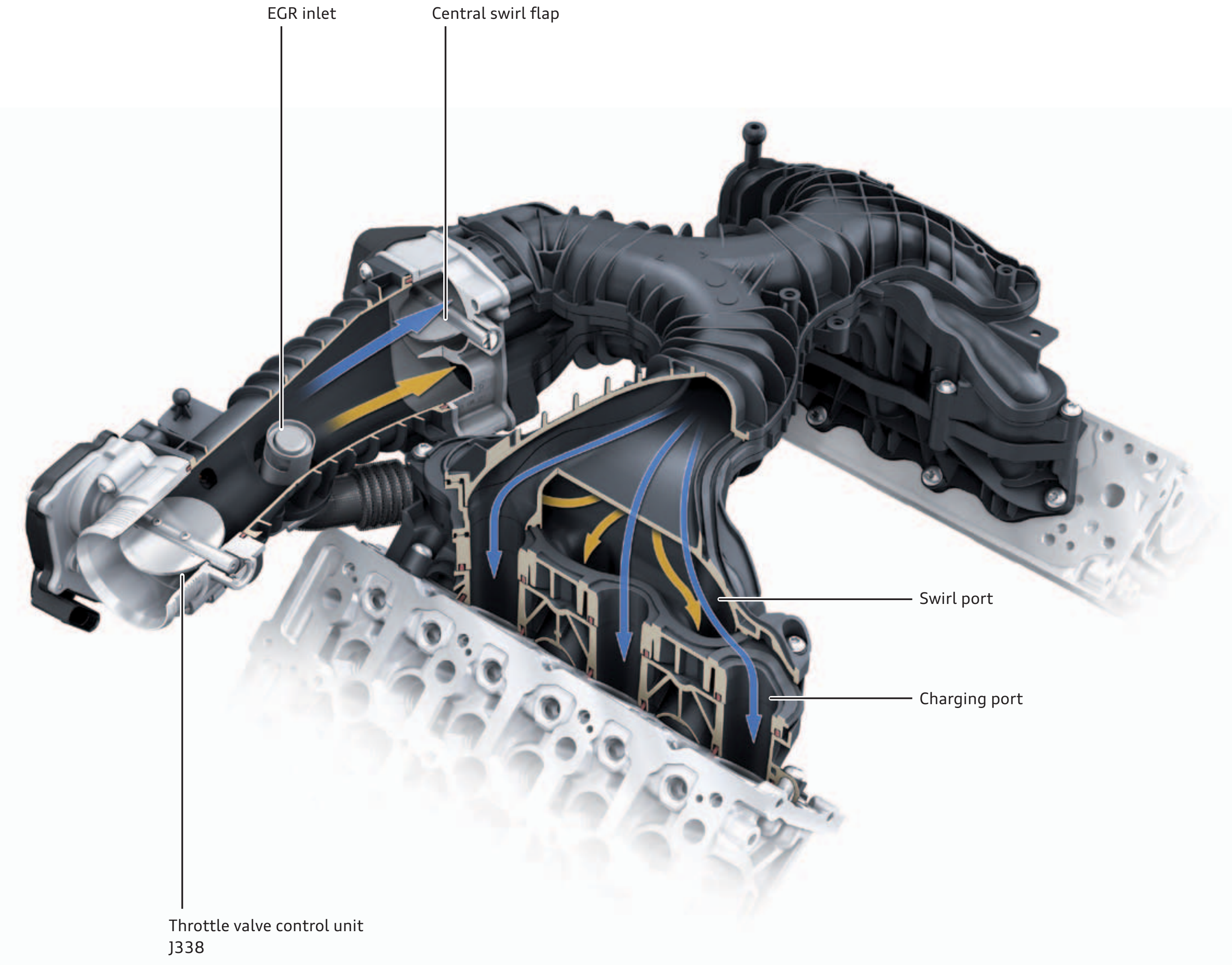


656_022

Air supply and turbocharging

Intake manifold

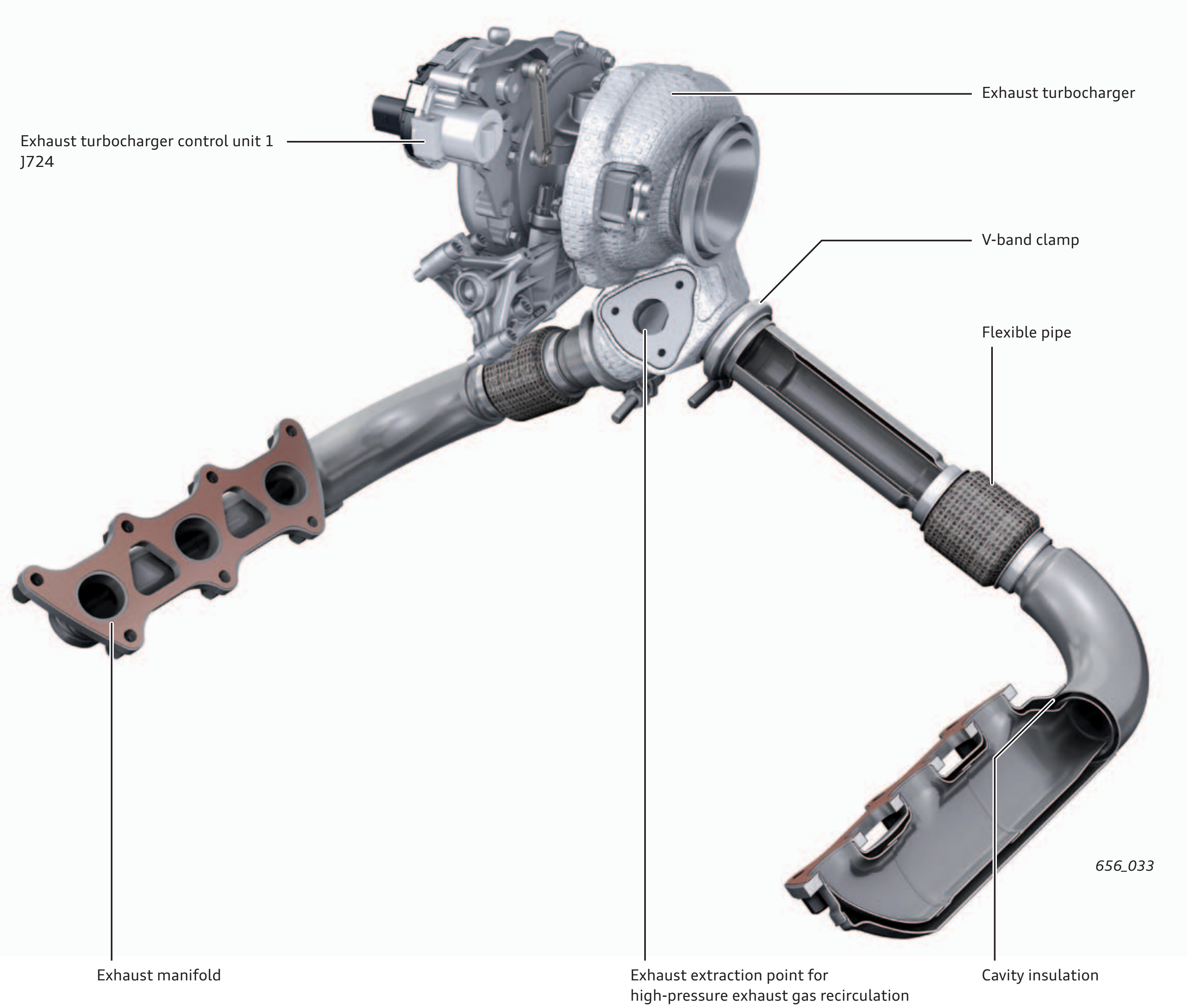
The swirl flap ports channel the air into the charging ports. The permanently open ports channel the air into the swirl ports. At low engine speeds, the air is ducted into the swirl ports. The air flows in a swirling motion into the combustion chamber. This leads to high combustion quality and, in turn, to high fuel economy and low exhaust emissions. The swirl flap opens the charging port under load, resulting in optimal charging of the combustion chamber.



656_032

Exhaust turbocharger and manifold

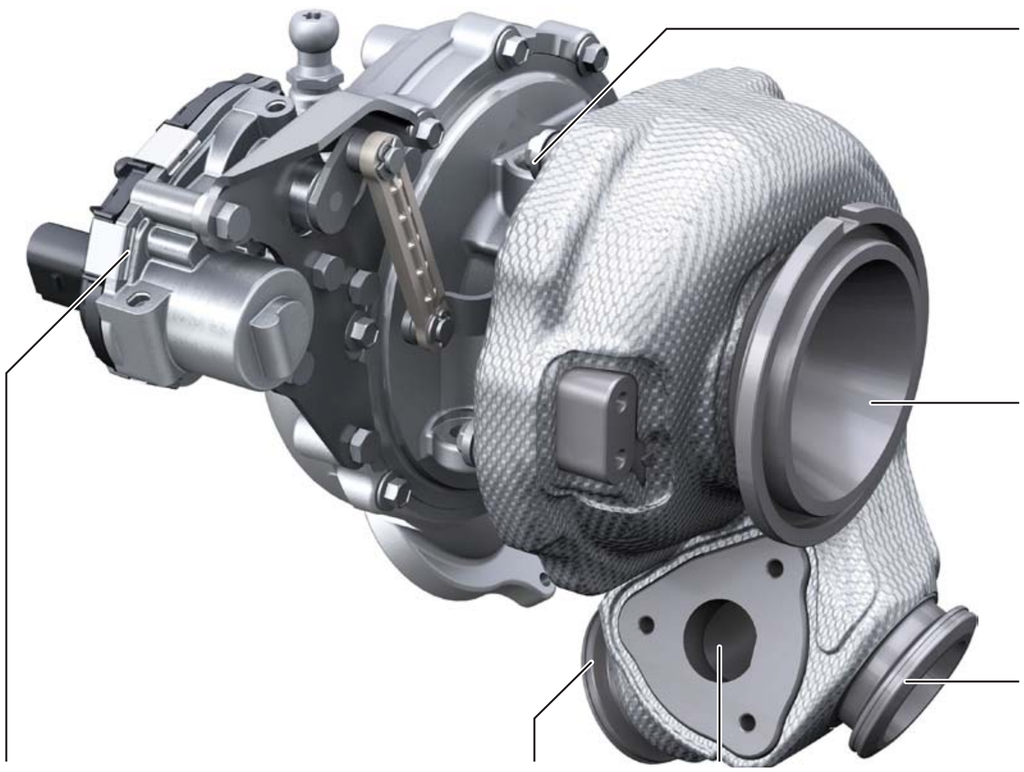
The exhaust manifold has a cavity-insulated outer shell. The inner tubes are manufactured by internal high pressure forming. A 20 % reduction in weight was achieved by using a weight-optimised cylinder head flange with a reduced number fixing points (7 instead of 8) and by using V-band clamps for attaching the two manifolds to the exhaust turbocharger.



Turbocharging

The engine is charged by an exhaust turbocharger with a variable turbine geometry delivering a maximum charge pressure of 3.3 bars. The exhaust flows from both cylinder banks are merged within the turbocharger housing before reaching the turbine wheel through the flow-optimised the variable turbine geometry (VTG).

The VTG is adjusted by a control motor. The exhaust gas temperature is monitored by a temperature sensor integrated in the housing. The exhaust turbocharger is also integrated in the coolant circuit.

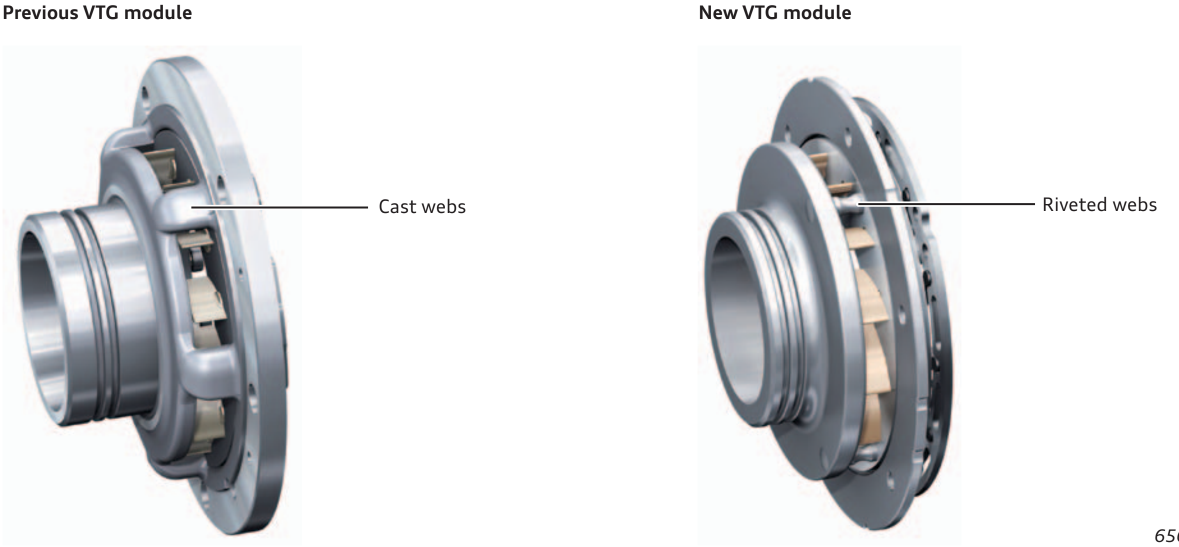


656_019

656_056

Variable turbine geometry module

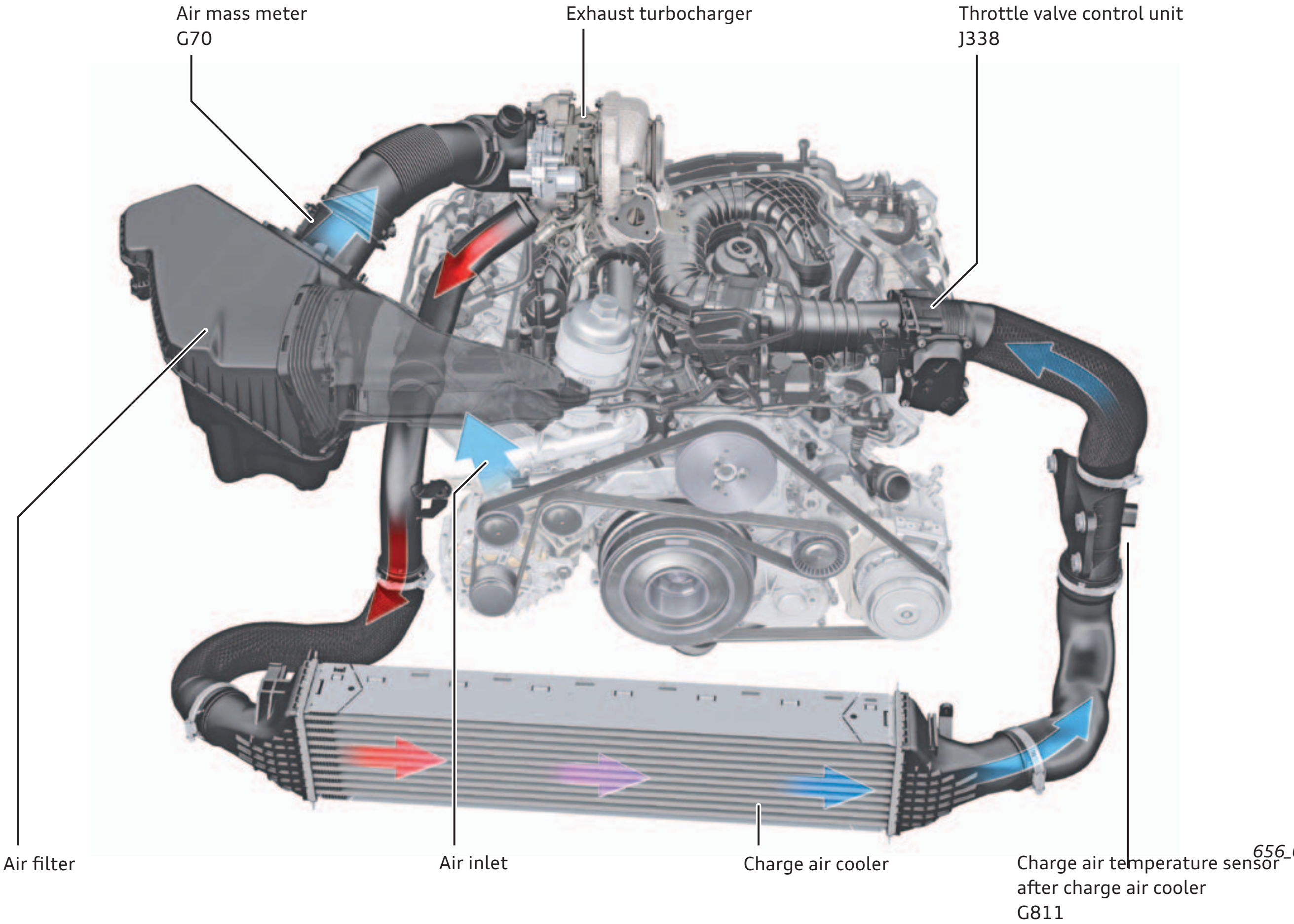
The new 3.0l TDI engine is configured for a power output of up to 210 kW in the power class using resulting in optimal engine response and a noticeable improvement in driving dynamics in all applications.
Key features include a reduction in play within the variable turbine geometry (VTG) and a riveted VTG cartridge in place of the cast support as used in the predecessor generation. The cartridge concept allows the turbine inlet cross-section to be optimised in terms of flow. This, in combination with a friction-optimised bearing, provides high efficiency at low engine speeds and improved transient response thanks to more dynamic response to accelerator inputs.



656_020

Charge air cooling

The complete air circulation system from the air filter to the turbocharger has been revised and designed for minimum pressure loss. The pressure-side air circulation system, which (depending on model and engine type) has only one charge air cooler, has also been optimised by minimising swirl at the transitions between the hose couplings. This has resulted in improved engine response, emissions and fuel efficiency.



656_042

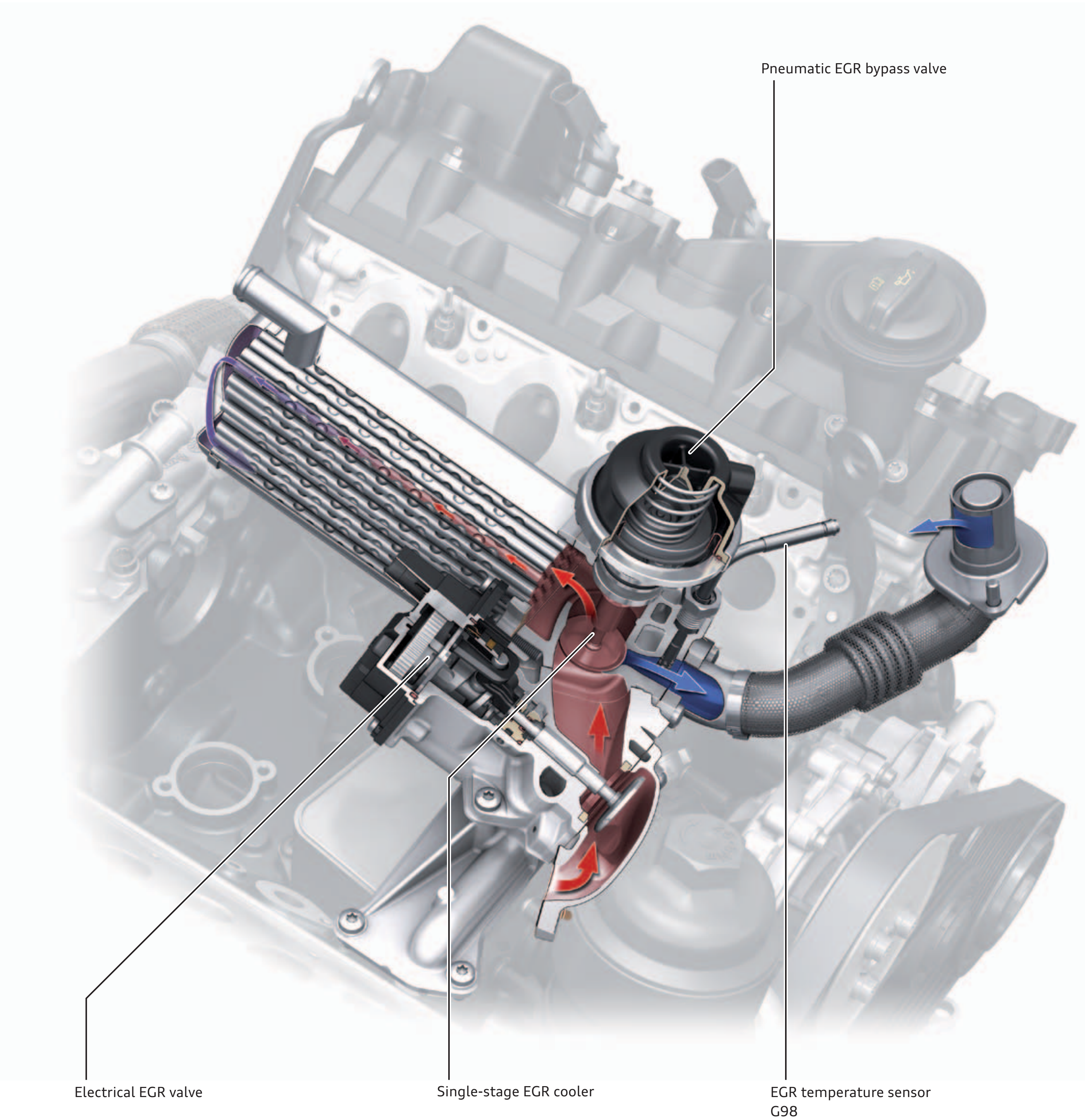
Exhaust gas recirculation

High pressure exhaust recirculation

To curb NO_x emissions in diesel models, a portion of the exhaust gas flow is mixed with the intake air. With new and more stringent laws regulating the maximum allowable limits for pollutant emissions likely to be adopted in future, it is important that emissions of environmentally harmful gases and particulates be reduced still further. This can be achieved by cooling the recirculated exhaust gas flow. The recirculated exhaust gases are cooled on demand only by a bypass system, which channels the exhaust gases past the exhaust heat exchanger.
Since the recirculated exhaust gases are extracted upstream of the exhaust turbocharger, this system is referred to as a high-pressure exhaust gas recirculation (EGR) system.

The exhaust gas recirculation module comprises the following components:

- Exhaust gas heat exchanger
- EGR valve
- Seal at the interface between the EGR cooler and valve
- Bypass system which channels the exhaust gas mass flow past the exhaust gas turbocharger
- Temperature sensor receptacle



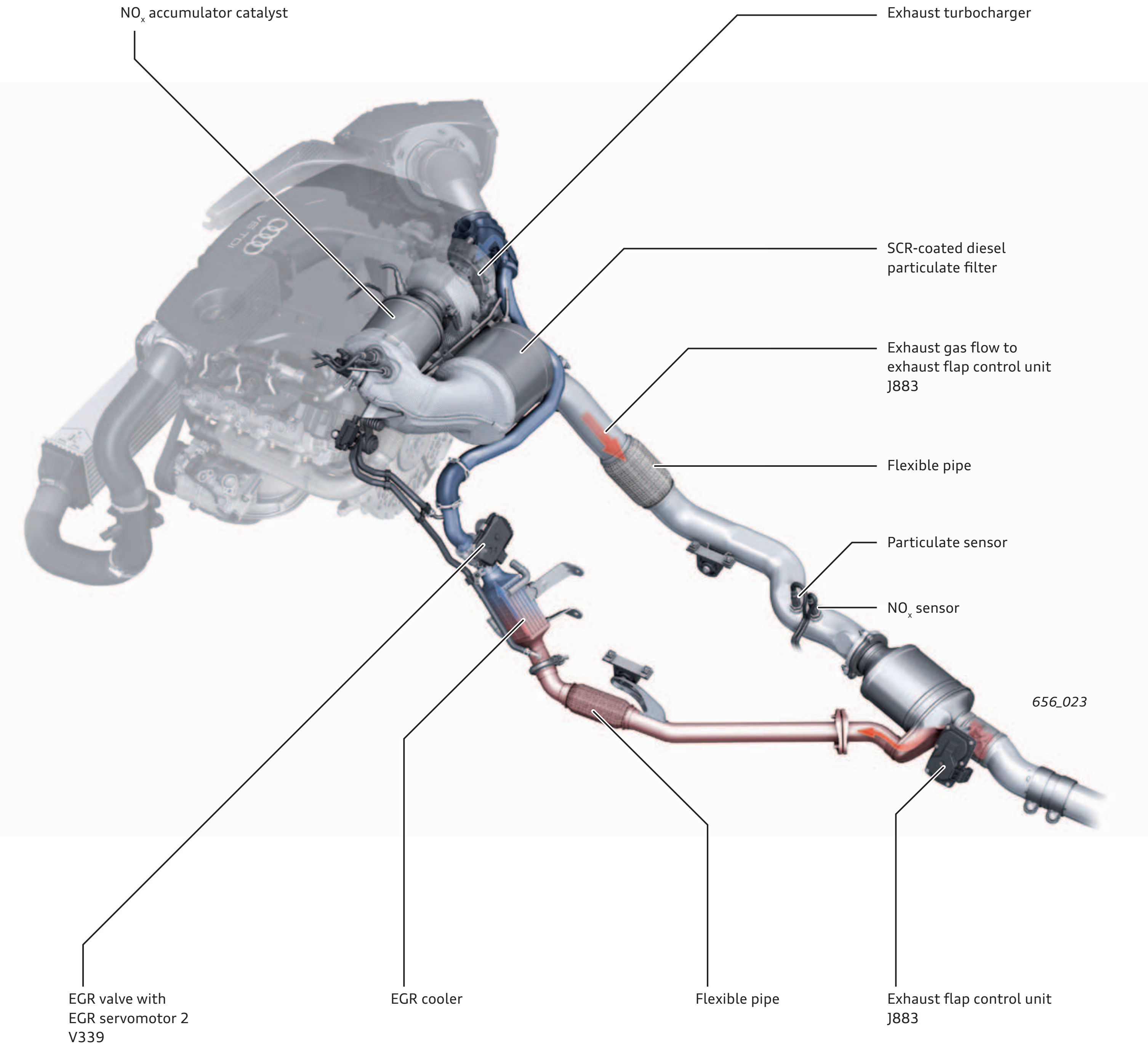
656_021

Low-pressure exhaust recirculation

The new V6 TDI engine is equipped with an additional low-pressure exhaust gas recirculation system. The recirculating exhaust gas is extracted downstream of the turbocharger turbine, the NO_x storage catalyst and the diesel particulate filter. Advantages of low-pressure exhaust recirculation:

- The extracted exhaust gas is free of particulates.
- The extracted exhaust gas is cooler.
- The exhaust gas can be introduced upstream of the turbo-charger compressor wheel and further cooled via the charge air cooler.
- The mixing zone (exhaust air/fresh air) is much longer.
- The temperature of the intake air is lower than in a high-pressure exhaust gas recirculation system

The low-pressure exhaust gas recirculation system allows higher EGR rates to be achieved and exhaust gases to be recirculated under high engine load. To improve turbocharger response, the exhaust gases are extracted downstream of the turbine and admitted upstream of the compressor.



Exhaust flap control unit

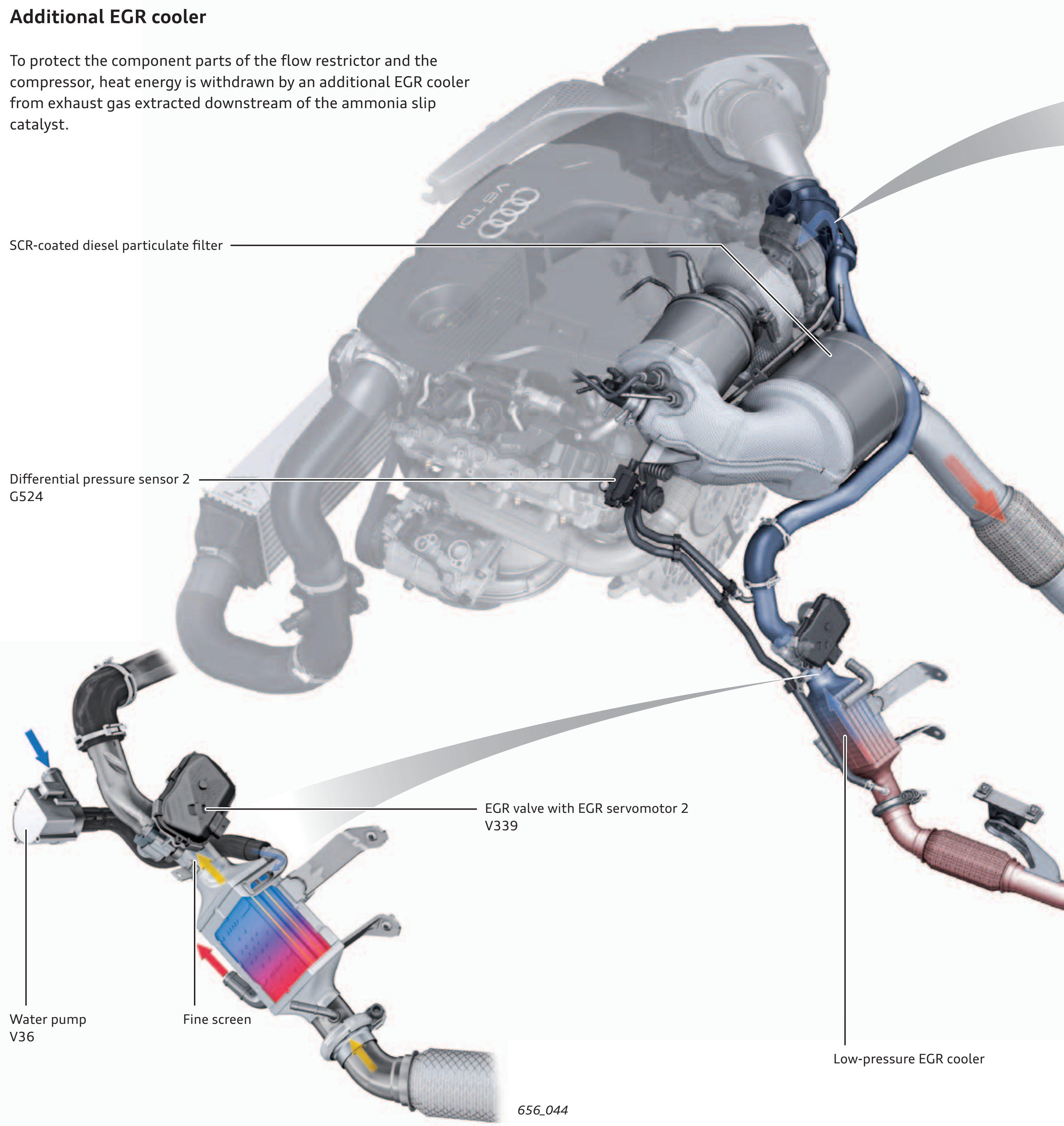
The exhaust flap control unit is positioned downstream of the ammonia slip catalyst in the exhaust system. To ensure that the required amount of exhaust gas can be admitted upstream of the turbocharger compressor wheel, the EGR valve is adjustable. To utilise the low-pressure exhaust gas recirculation system across the full mapped range, the complete exhaust gas flow from the ammonia slip catalyst is shut off in a controlled fashion by a motorised exhaust flap. This produces an excess pressure relative to the exhaust gas pressure in the particulate filter. This excess pressure splits the exhaust gas flow and produces a flow gradient (scavenging rate) in the EGR cooler. The amount of exhaust gas recirculated is regulated by the EGR valve downstream.

The 73° operating range of the exhaust flap is defined by:
- the exhaust pressure downstream of the exhaust flap
- the nominal exhaust pressure upstream of the exhaust flap
- the mass flow through the exhaust flap

Low-pressure exhaust gas recirculation is initiated when a temperature of about +5°C is exceeded.

Additional EGR cooler

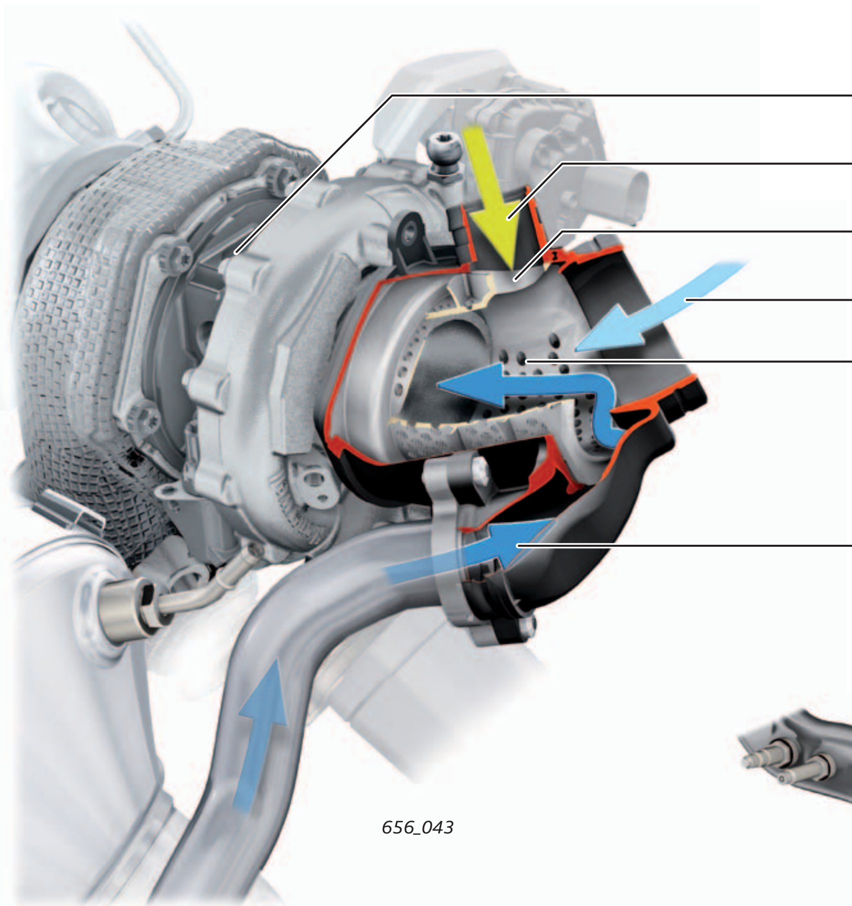
To protect the component parts of the flow restrictor and the compressor, heat energy is withdrawn by an additional EGR cooler from exhaust gas extracted downstream of the ammonia slip catalyst.



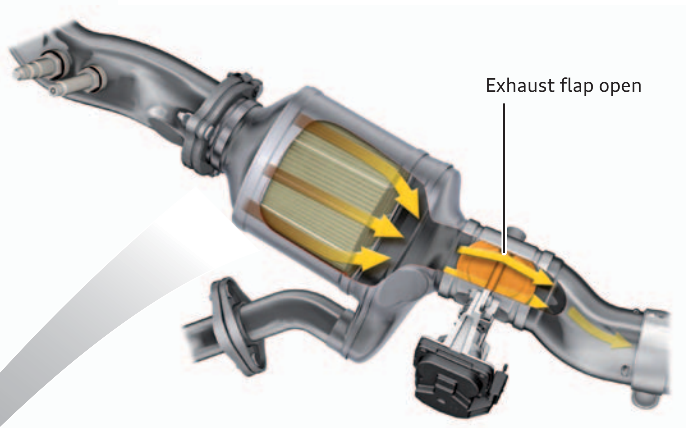
656_044

Differential pressure monitoring

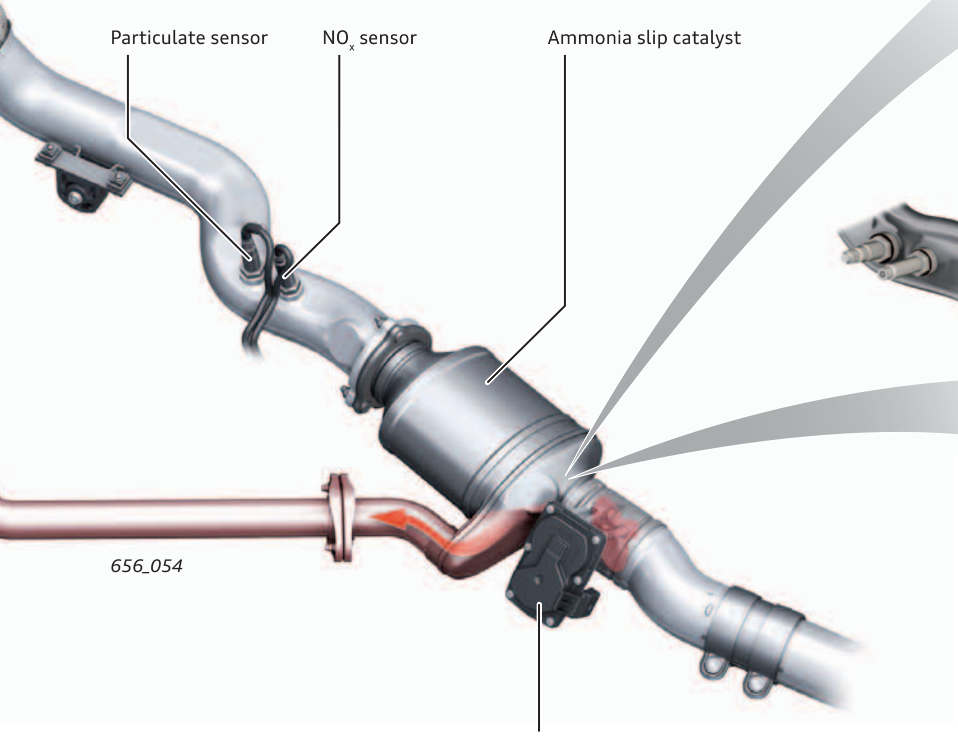
The exhaust gas extracted downstream of the ammonia slip catalyst is admitted upstream of the turbocharger compressor wheel. The compressor wheel is protected against the ingress of foreign bodies by a fine screen at the additional EGR cooler outlet. To ensure that clogging of the fine screen can be reliably detected, the additional EGR cooler is monitored by a differential pressure sensor. Differential pressure is also used to detect the position of the EGR valve downstream of the EGR cooler.
The differential pressure as well as the position of the baffle plate and the exhaust gas recirculation valve serve as input variables for low-pressure EGR control.



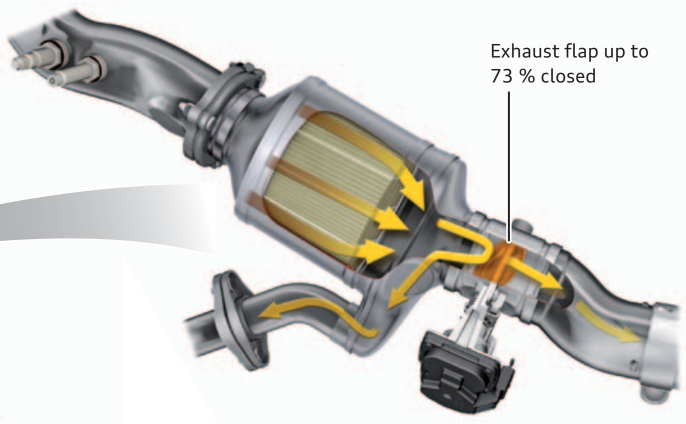
656_043



656_045



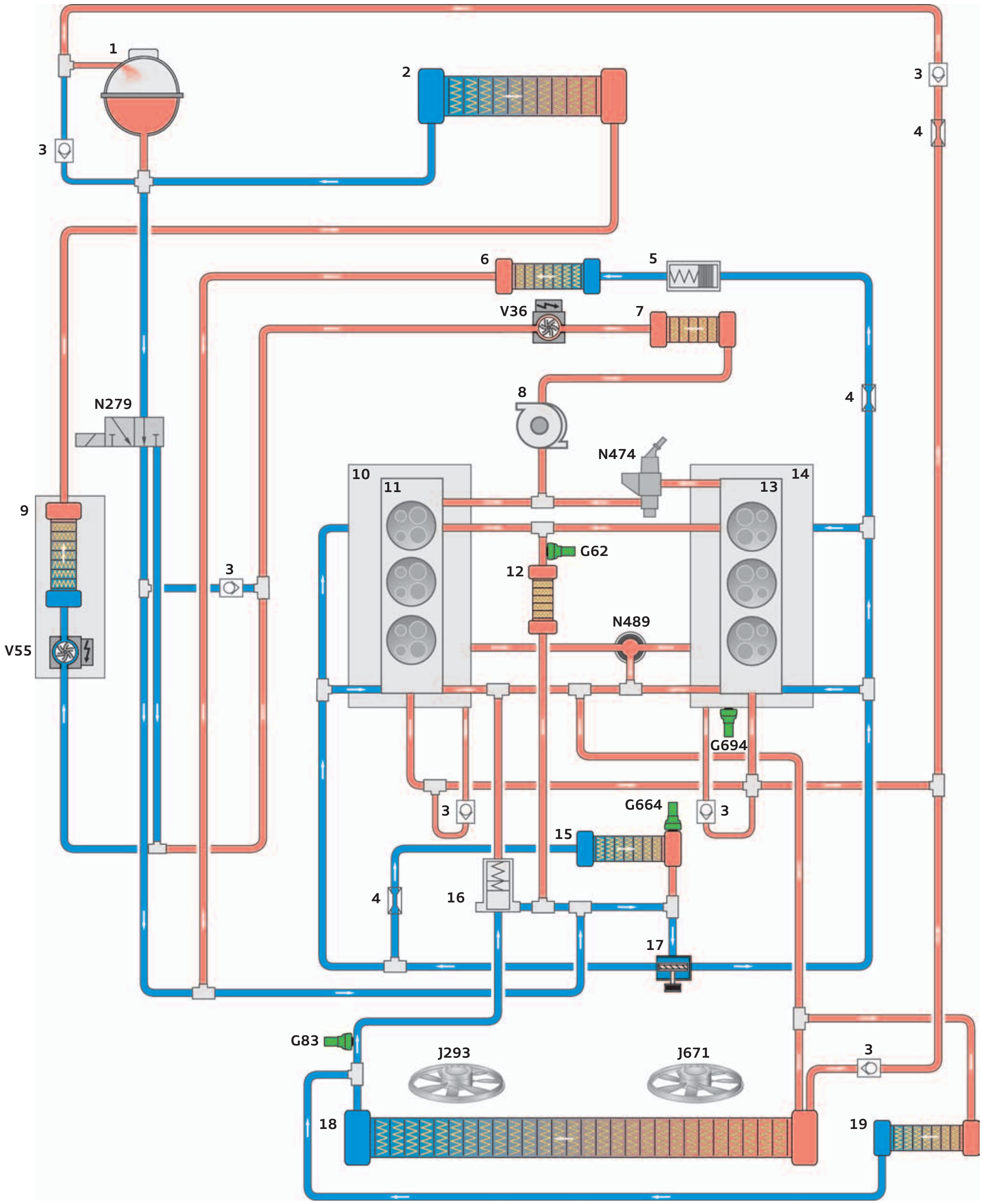
656_054



656_046

Cooling system

System overview



656_004

Key to figure on page 28:

1 Coolant expansion tank
2 Heater heat exchanger
3 Nonreturn valve
4 Flow restrictor
5 Thermostat for ATF cooler
6 ATF cooler
7 Low-pressure EGR cooler
8 Exhaust turbocharger
9 Auxiliary heater
10 Cylinder block in the area of bank 2
11 Cylinder head, bank 2
12 High-pressure EGR cooler with EGR cooler change-over valve N345
13 Cylinder head, bank 1
14 Cylinder block in the area of bank 1
15 Engine oil cooler
16 Thermostat for engine cooling
17 Coolant pump
18 Radiator
19 Auxiliary radiator

G62 Coolant temperature sensor
G83 Coolant temperature sensor at radiator outlet
G664 Oil temperature sensor 2
G694 Temperature sensor for engine temperature regulation

J293 Radiator fan control unit
J671 Radiator fan control unit 2

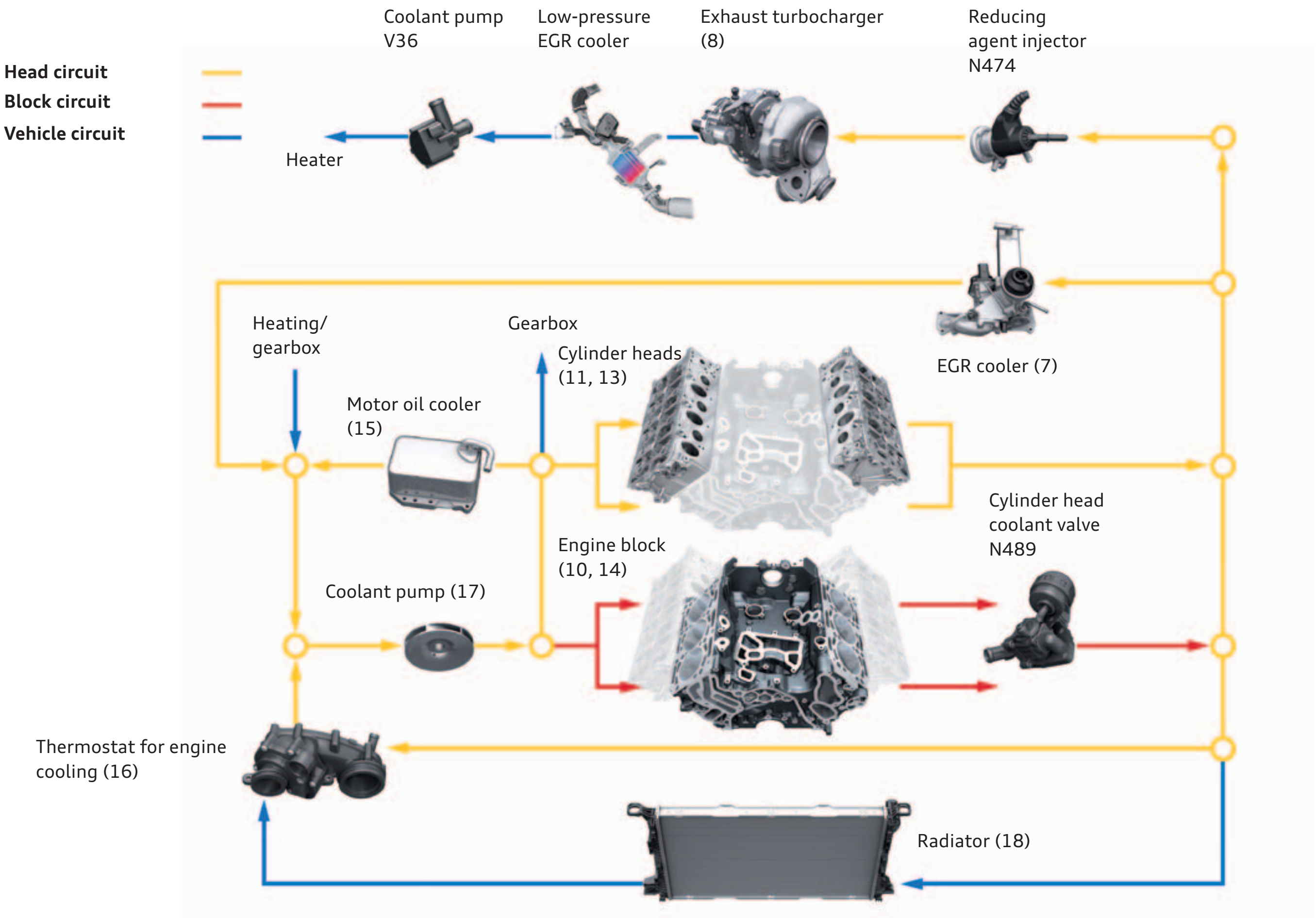
N279 Heater coolant shut-off valve
N474 Reducing agent injector
N489 Cylinder head coolant valve

V36 Water pump
V55 Circulation pump

Cooled coolant
Warm coolant

Innovative Thermal Management (ITM)

The innovative thermal management concept permits autonomous supply to the cabin and gearbox oil heating system via the cylinder head circuit, irrespective of the coolant standing in the engine block. This imporoves fuel economy throughout the engine operating cycle relevant to the customer.
Coolant flows through the engine block and the cylinder heads in two parallel cooling circuits. The coolant pump in the inner vee has a covered impeller with three-dimensionally curved blades. The coolant pump supplies both subcircuits continuously. The proven, separate head-block cooling concept (split cooling) has been retained and improved still further. The main aims here were to reduce pressure losses and provide even faster block heating after a cold start.



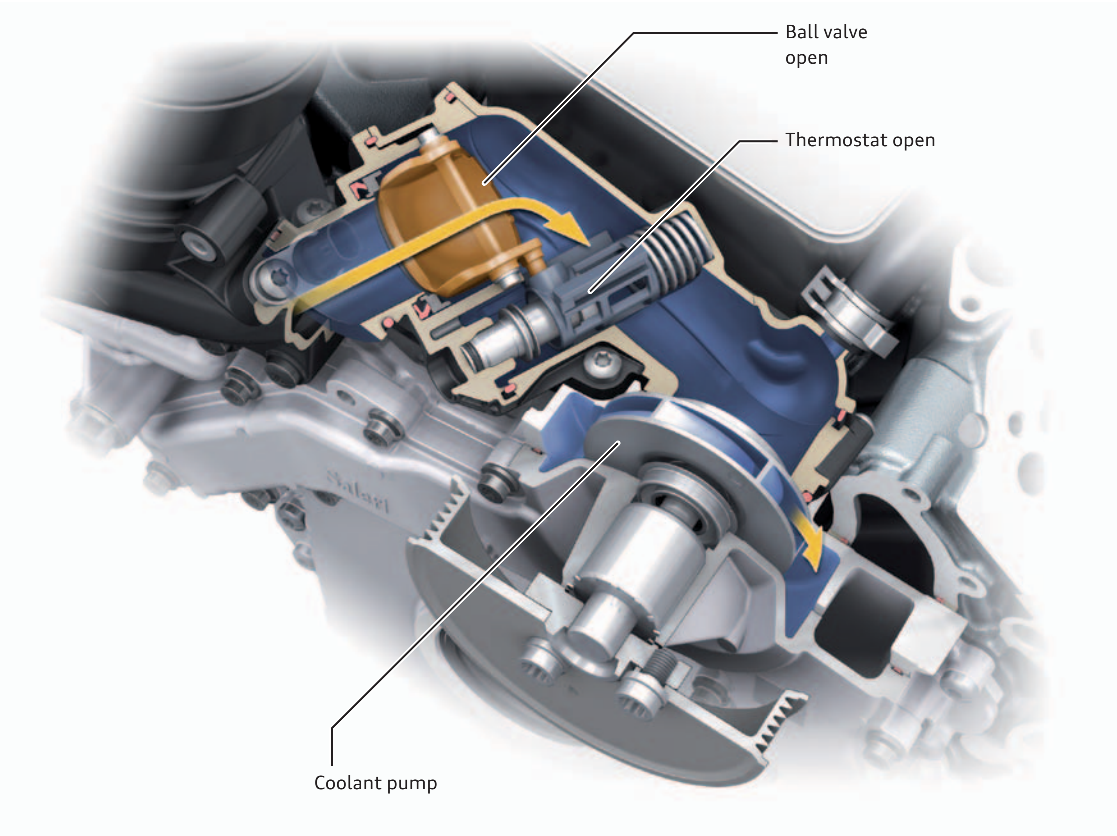
656_028

Thermostat for engine cooling

The continuous-flow cylinder head cooling circuit primarily consists of the coolant chambers for both cylinder heads, the oil cooler and the EGR cooler as well as the heater heat exchanger, gear oil/water heat exchanger and the main radiator.

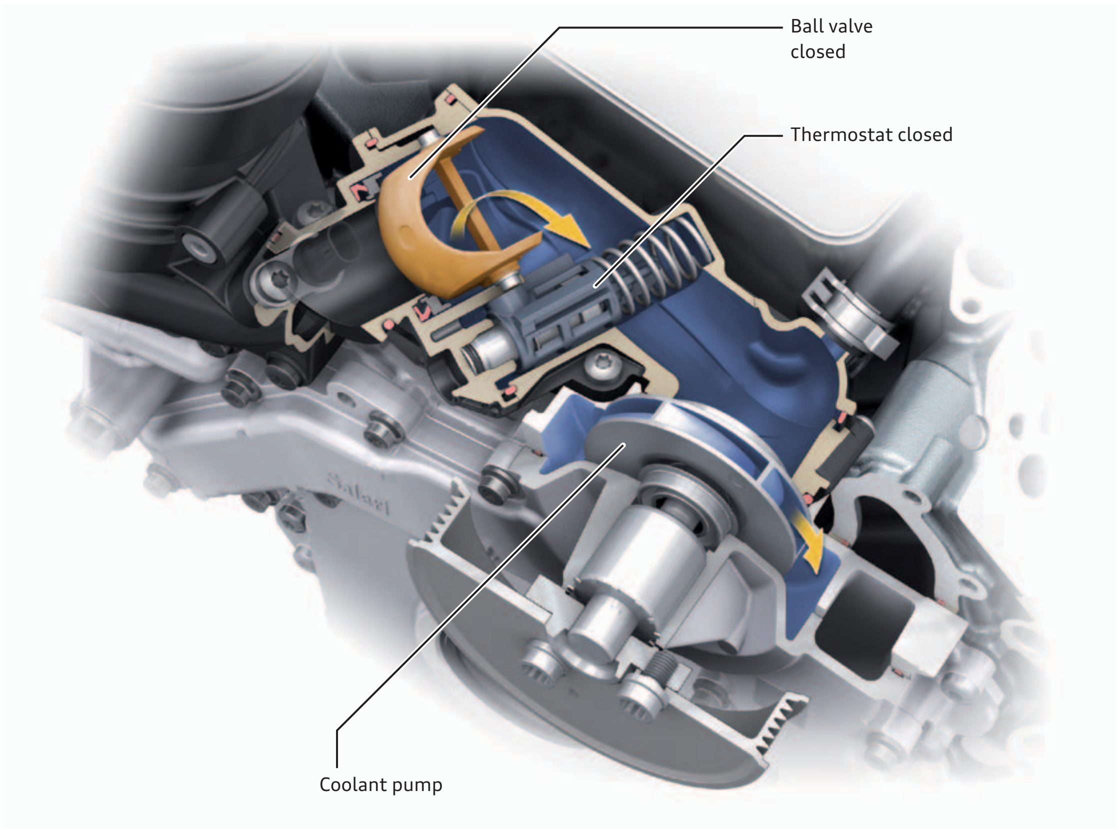
The temperature level in this circuit is regulated by a thermostat with ball valve. Thanks to its near-unobstructed cross section when fully open, the ball valve thermostat reduces pressure losses considerably compared to a disc-type thermostat.

Thermostat open



656_024

Thermostat closed

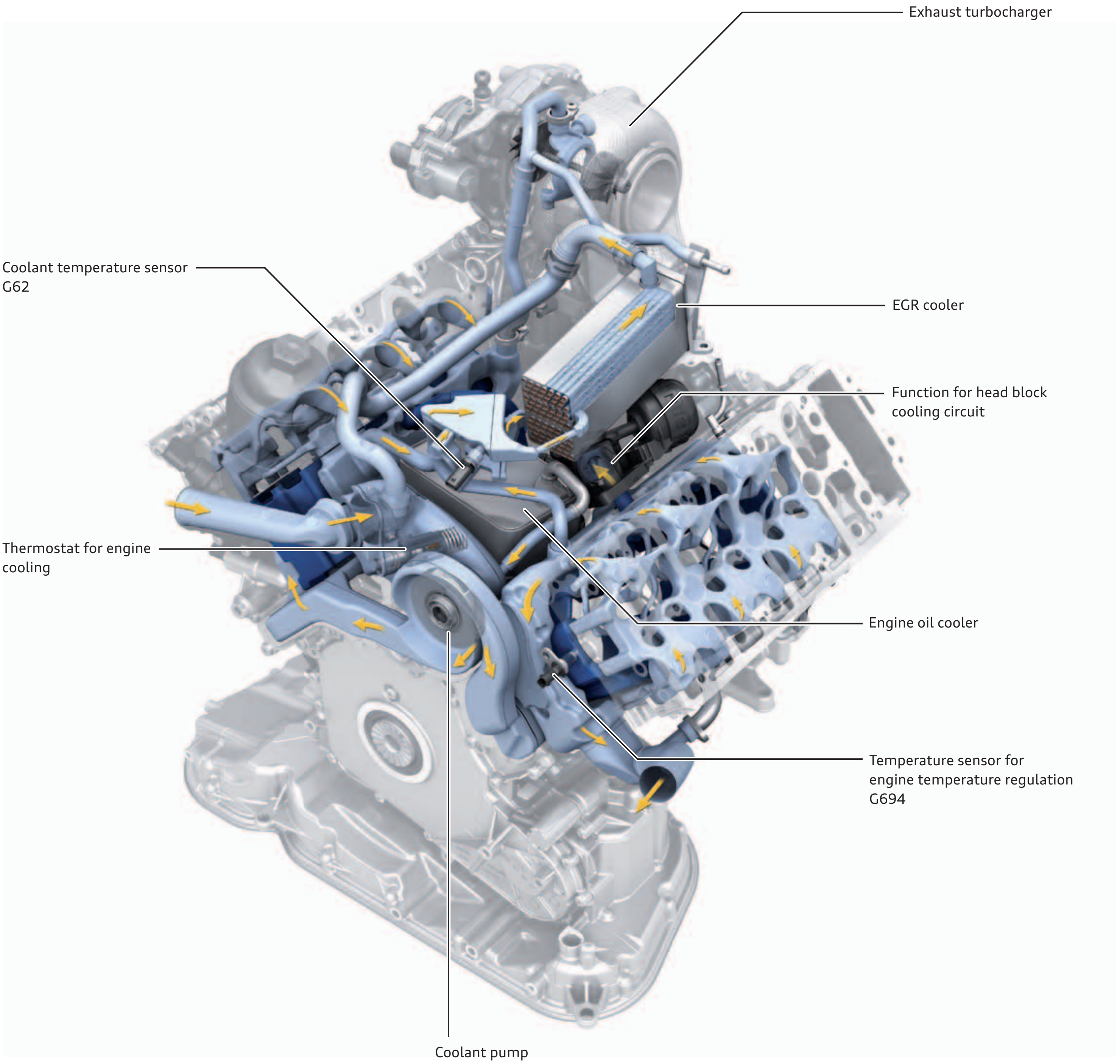


656_025

Cylinder crankcase circuit with head-block valve

A vacuum-controlled rotary valve in the inner vee allows the coolant to stand inside the engine block after a cold start. When closed, the rotary valve integrated in the engine block circuit inhibits coolant flow and thereby prevents unwanted heat dissipation.

It sets the coolant temperature in the engine block to 105 °C to allow the engine to run easily and is monitored by the temperature sensor for engine temperature regulation G694. This means that the non-return valves required in the previous engine are no longer needed, resulting in reduced pressure losses when the valve is fully open.

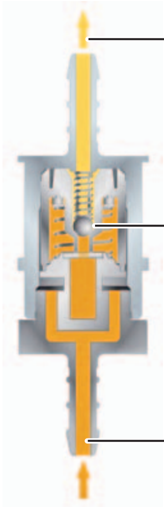


656_029

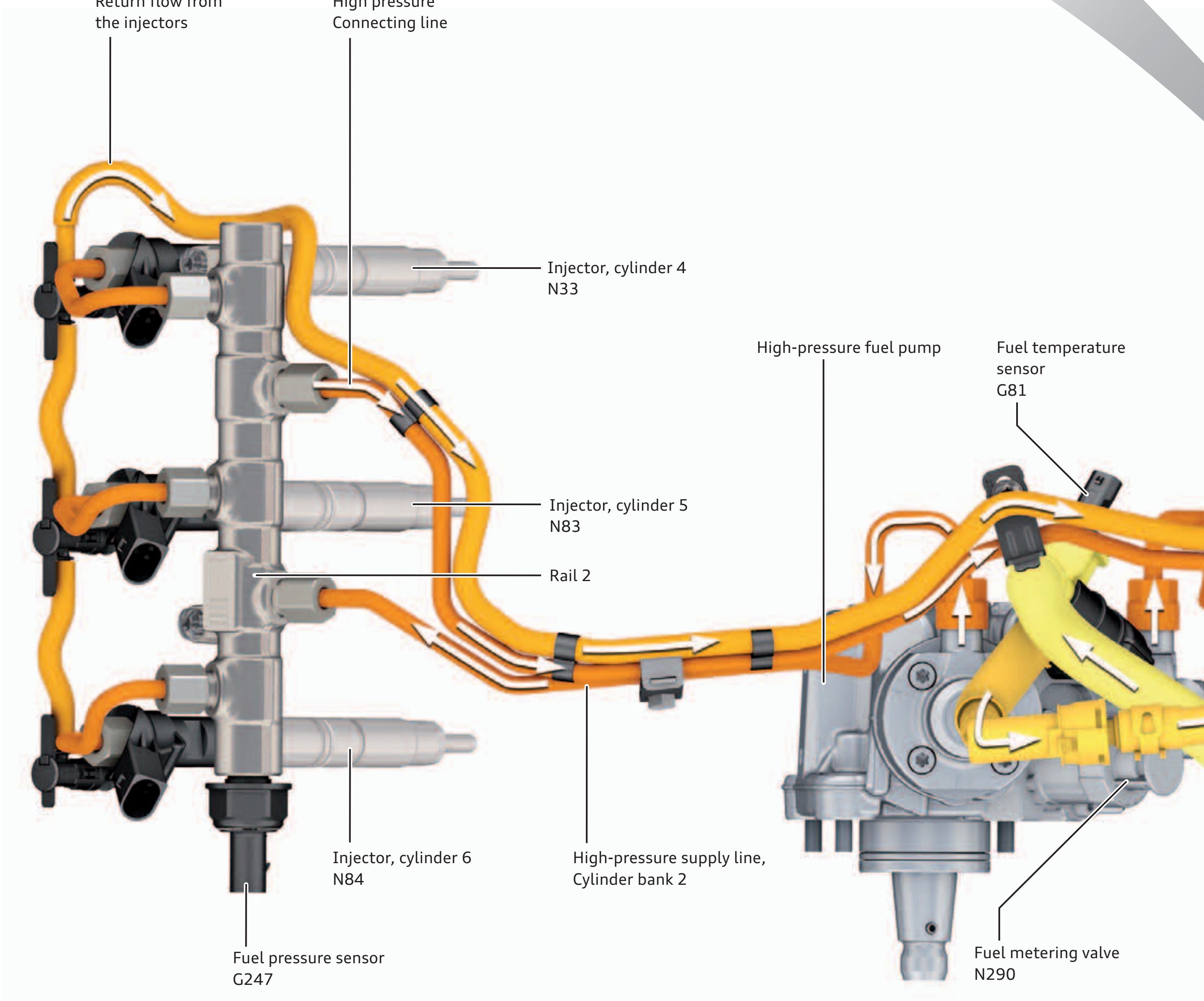
Fuel system

Pressure retaining valve

The pressure retaining valve is an all-mechanical valve. It is located between the return lines from the injectors and the fuel supply line to the fuel system. The pressure retaining valve maintains a fuel pressure of about 14 bar in the fuel return line from the injectors. This fuel pressure is required for functioning of the injectors.



System overview

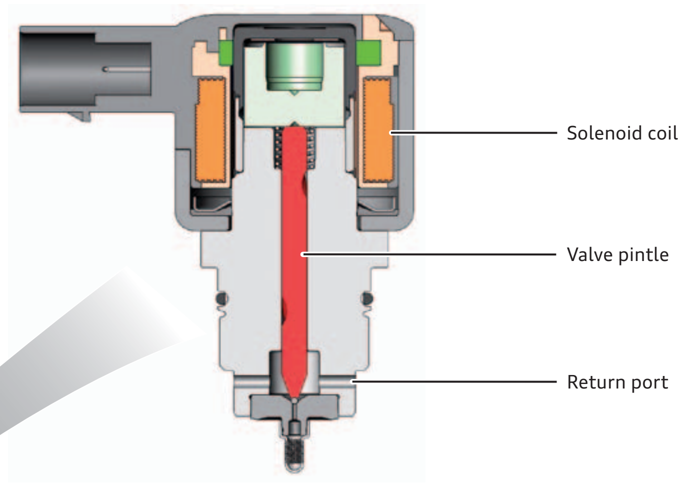


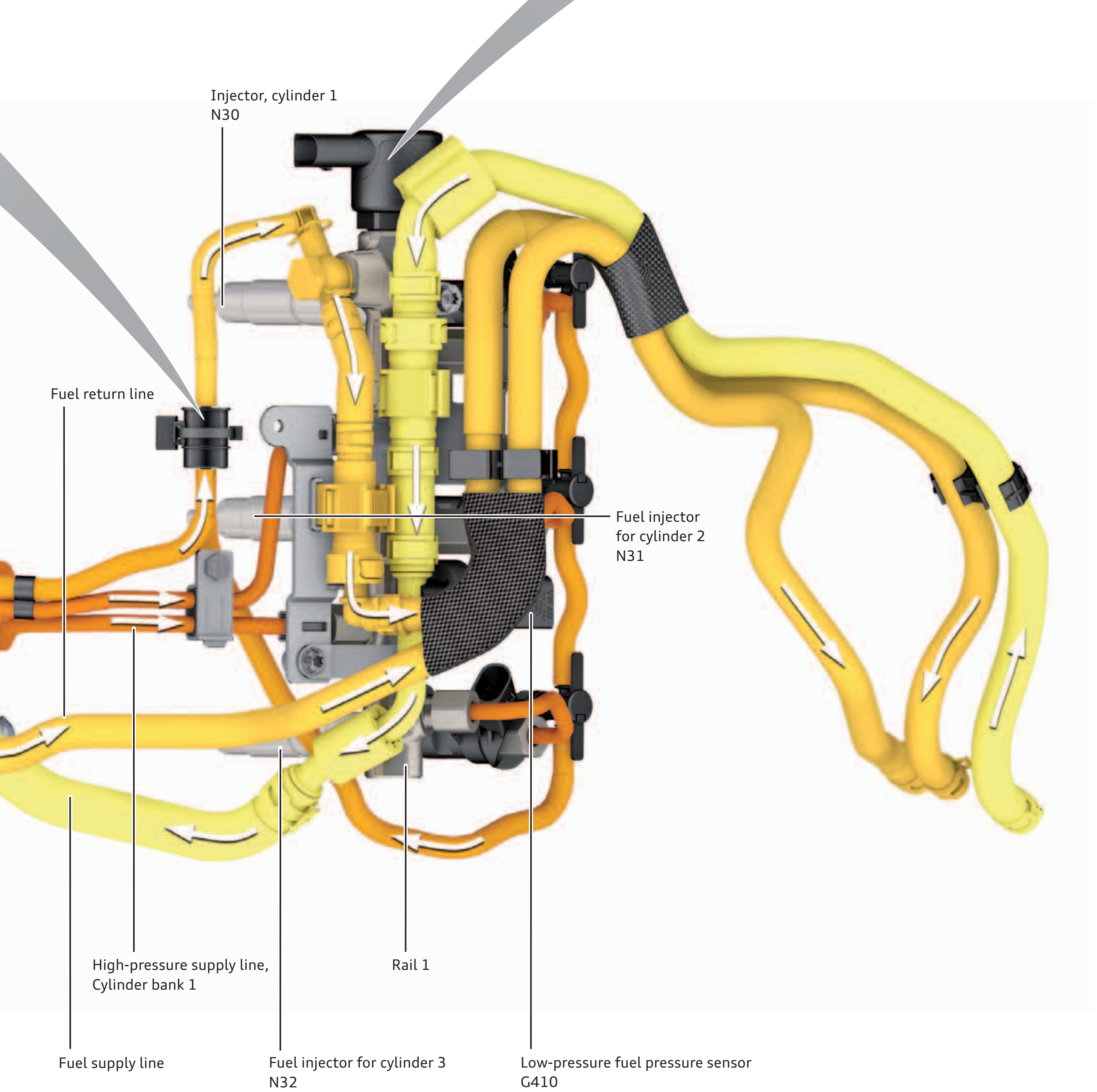
The fuel system is subdivided into 3 pressure areas:

- High pressures of up to 2000 bar
- Return flow from the injectors at a pressure of about 14 bar
- Supply pressure: approx. 6 bar, return pressure: approx. 2 bar

Fuel pressure control valve N276

The fuel pressure control valve is located on the high-pressure accumulator (rail) of cylinder bank 1 and it is used to set the fuel pressure in the high-pressure area. If the fuel pressure in the high-pressure area is too high, the control valve opens a return duct so that a portion of the fuel flows from the high-pressure accumulator into the fuel return line.
If the fuel pressure in the high-pressure area is too low, the control valve closes and seals the high-pressure area off from the fuel return line.

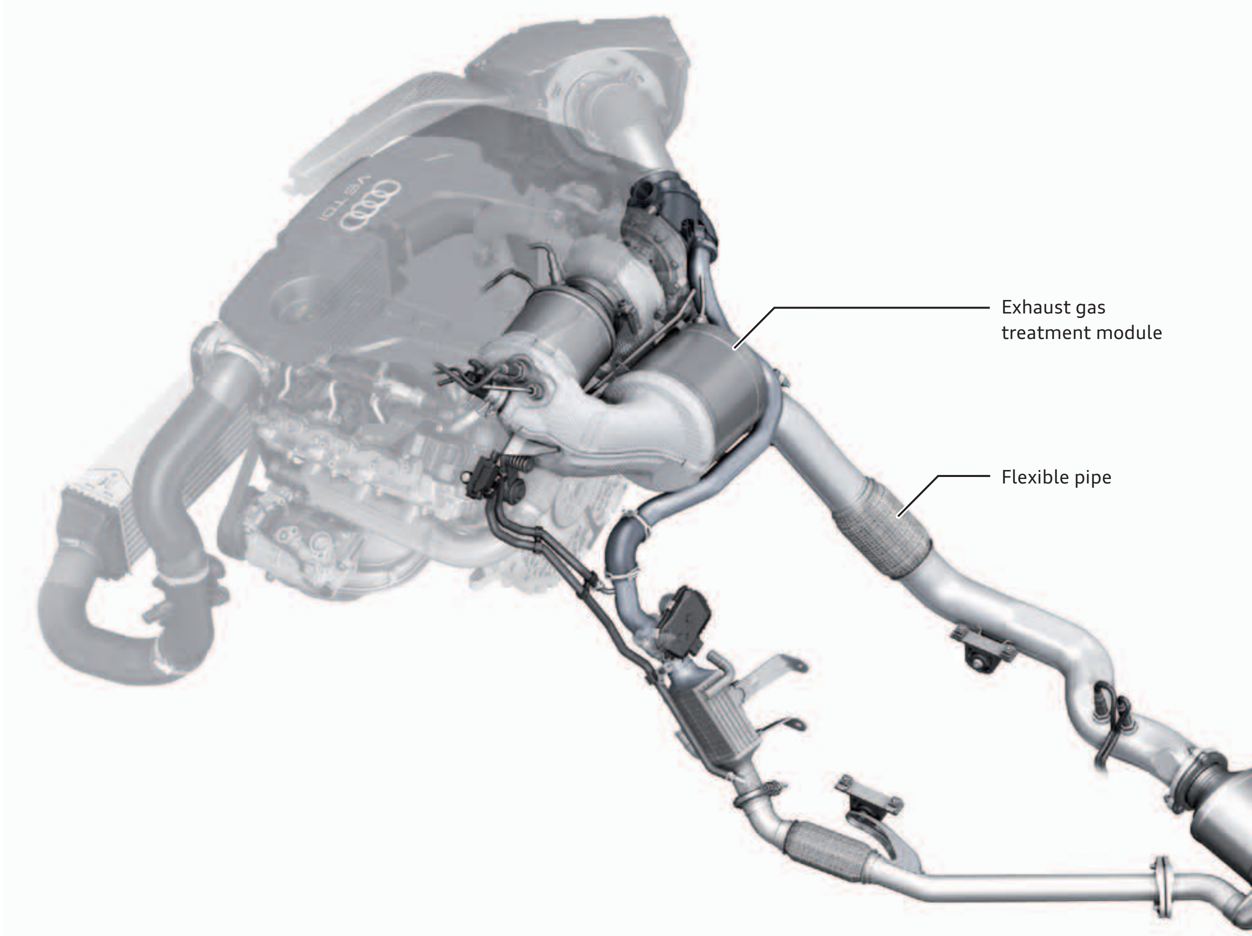




656_031

Exhaust system

Overview



The exhaust gas treatment system is a combined system comprising a close-coupled NO_x ammonia slip catalyst and an SCR system.

This ideally combines the advantages of both exhaust treatment systems:

- Optimal low-temperature activity of the NO_x storage system to avoid the heating measures which would otherwise be necessary in SCR systems.
- Reduced rich operation as the SCR system is responsible for conversion at medium temperatures
- High NO_x conversion rates by the SCR system at high engine loads

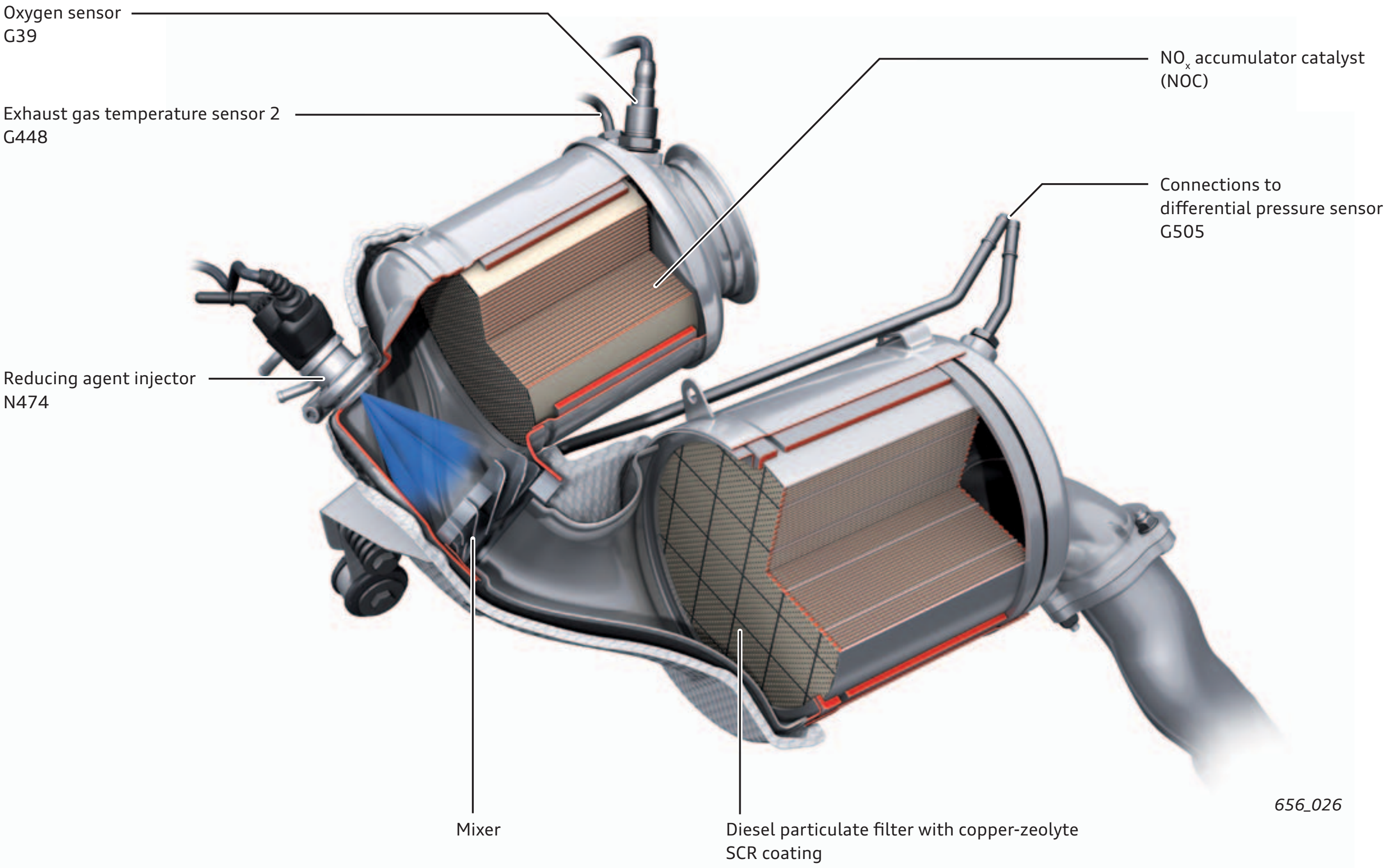
Without exhaust aftertreatment, it would no longer be possible to meet the more stringent exhaust emission laws now in effect world-wide. For this reason, the design of the exhaust system as a key component of the new V6 TDI is closely connected to the development of the new engine family.

Compared with the second-generation ES897 engine series, the following modifications have been made to the design of the exhaust system for the new generation of V6 TDI engines:

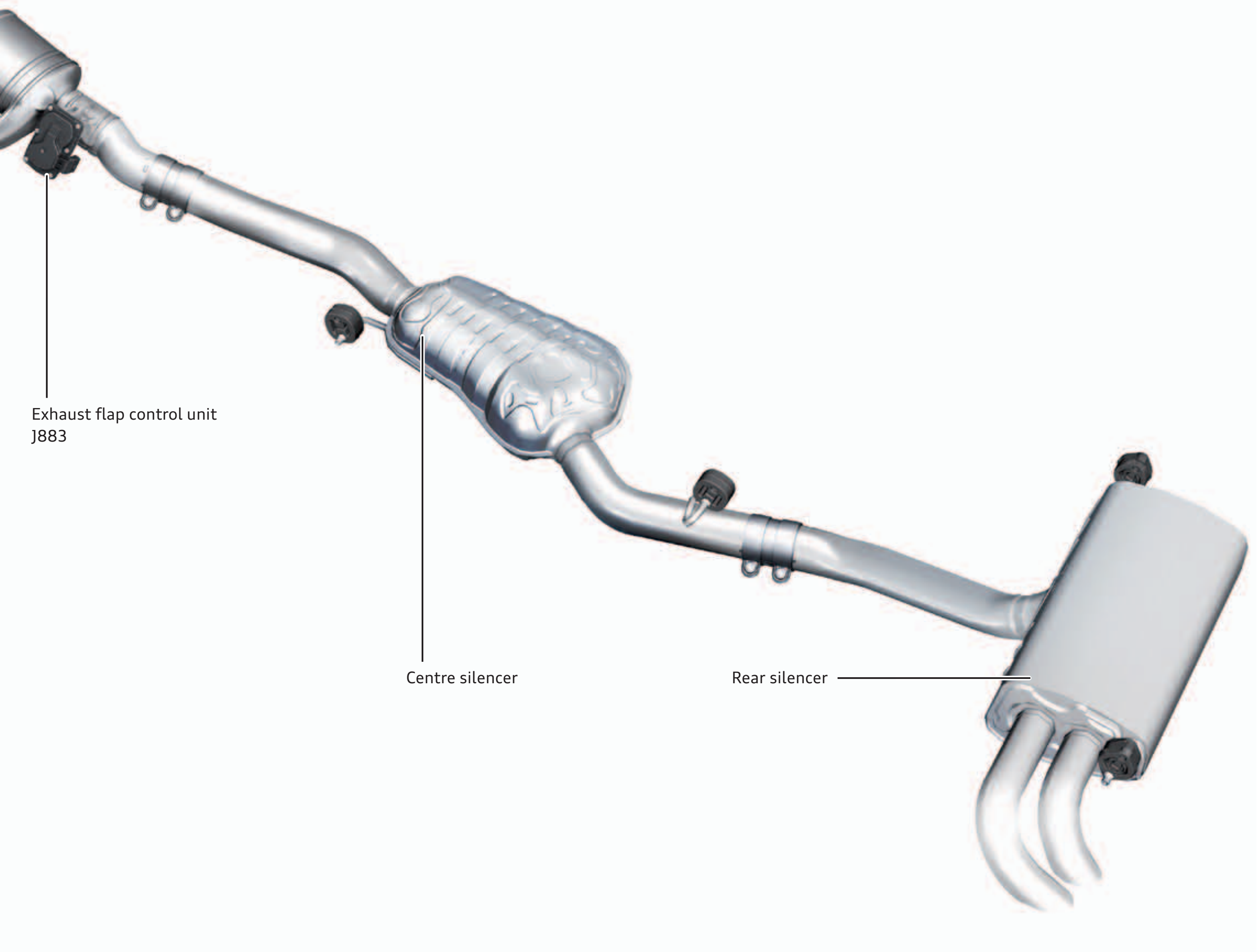
- Optimisation of the reduction agent mixer in order to reduce backpressure
- Improved SCR coating of the diesel particulate filter

A storage catalyst is located downstream of the unit comprising the NO_x storage catalyst and the SCR-coated diesel particulate filter. In conjunction with a combined SCR-coated catalyst and an oxidising catalyst, the storage catalyst performs two tasks. Firstly, the CO which occurs during soot regeneration is oxidised to CO_2 oxidised by a coating containing precious metals. Secondly, NH_3 slip is reliably eliminated.

Exhaust gas treatment module



656_026



656_030

Engine management

System overview

Sensors

Air mass meter G70

Engine speed sensor G28

Intake manifold pressure sensor G71

Charge air temperature sensor after charge air cooler G811

Hall-effect sensor G40

Accelerator pedal position sensor G79 with
Accelerator pedal position sensor 2 G185

Brake light switch F

Combustion chamber pressure sensor for cylinder 2 G678[1]

Fuel pressure sensor G247

Low-pressure system fuel pressure sensor G410

Fuel temperature sensor G81

Biodiesel concentration sensor G855[1]

Water separator sensor G63[1]

Coolant temperature sensor G62
Temperature sender for engine temperature control G694

Radiator outlet coolant temperature sensor G83

Oil level/temperature sensor G266

Oil temperature sensor G8

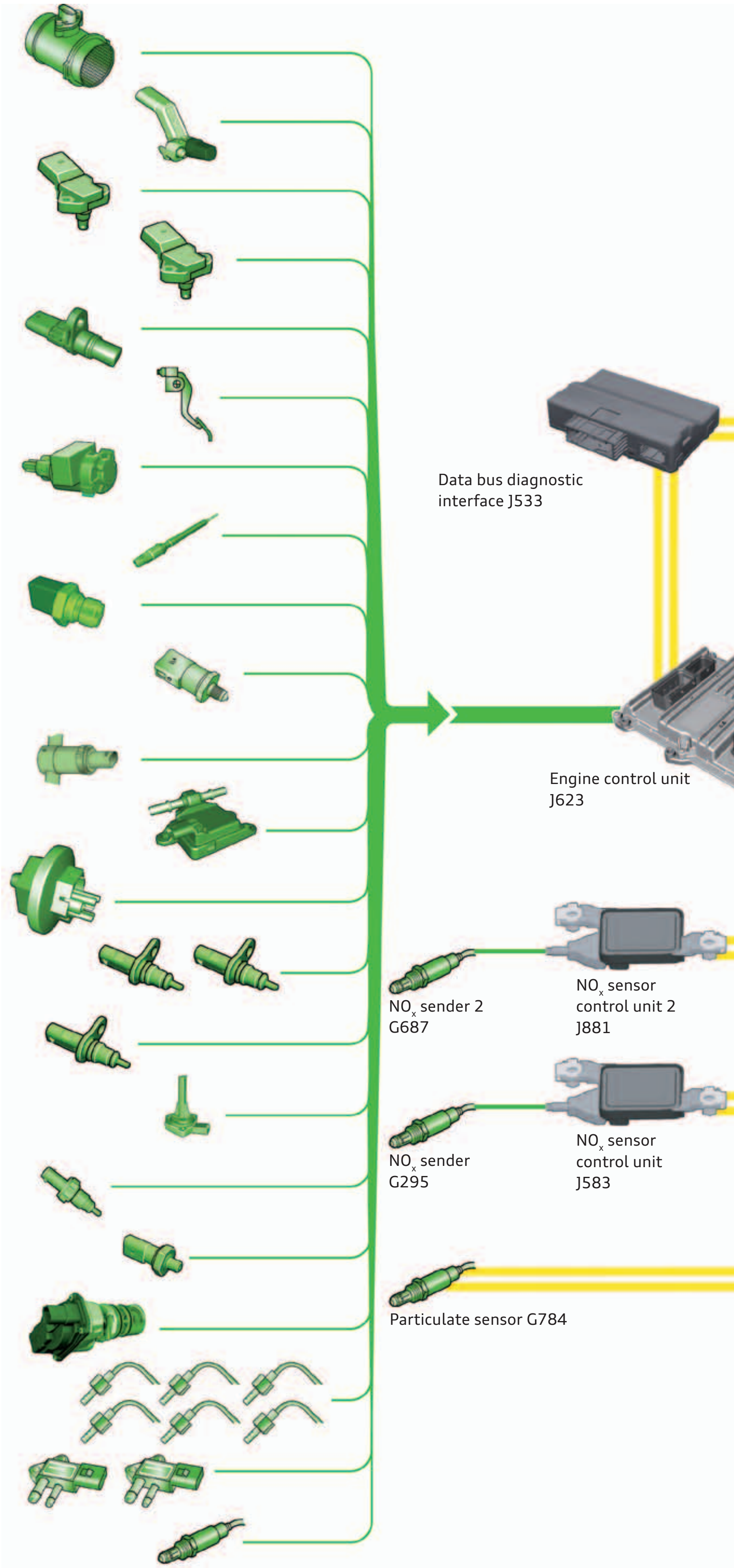
Oil pressure sensor G10

EGR potentiometer G212

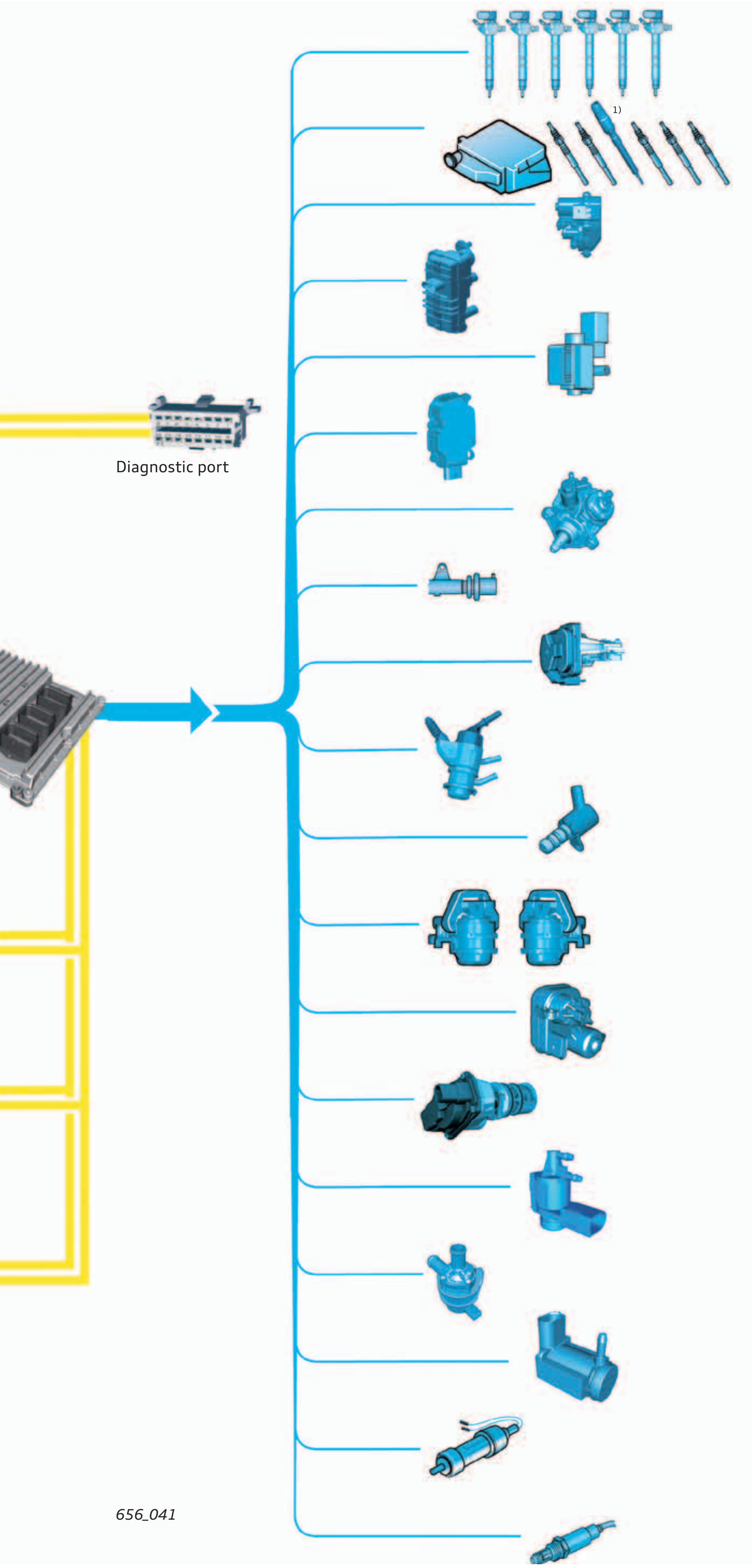
Exhaust gas temperature sensors 1 - 3, exhaust gas temperature sensor 1 for bank 2 G235, G236, G448, G495
Catalytic converter temperature sensor 1 G20[1]
EGR temperature sensor G98

Differential pressure sensor G505
Differential pressure sensor 2 G524

Oxygen sensor G39



[1] Only installed in NAR models



656_041

Actuators

Injector, cylinders 1 - 4 N30 - N33
Injector for cylinders 5 - 6 N83 - N84

Automatic glow period control unit for J179
Glow plug 1 + 4 Q10, Q13
Glow plug 6 + 7 Q15, Q16

Throttle valve control unit GX3

Exhaust turbocharger control unit 1 J724 with V465

Coolant circuit solenoid valve N492

Radiator louvre control motor V544

Fuel metering valve N290

Fuel pressure control valve N276

Exhaust valve control unit J883

Reducing agent injector N474

Oil pressure control valve N428

Electro/hydraulic engine mounting solenoid valve, left and right N144, N145

Intake manifold control unit GX14

EGR valve 1 GX5
EGR valve 2 GX6

EGR cooling bypass valve N386

Water pump V36

Pressure reducing valve N155

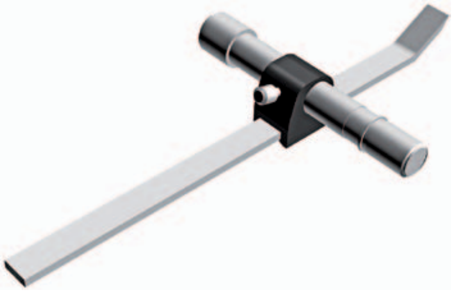
Thermostat for mapped engine cooling F265

Oxygen sensor heater Z19

Service

Special tools and workshop equipment

2068A Setting device



656_047

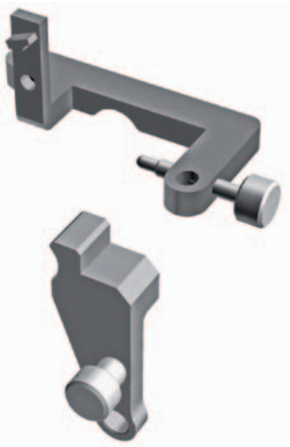
Setting the TDC point.

T40298 Counterhold tool

656_048

Counter-holding the vibration damper.

T40309 Assembly tool



656_049

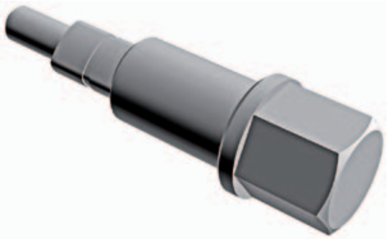
Locking the chain tensioner.

T40310 Adapter

656_050

Tensioning the chain sprocket when setting the camshaft timing.

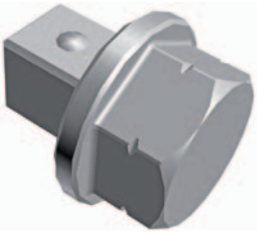
T40313 Setting pin



656_051

Tracking the camshaft gears when setting the camshaft timing.

T40314 Adapter



656_052

Rotating the crankshaft.

VAS 6095/1-14 Bracket for V6 TDI engine

656_053

Bracket for V6 TDI engine.

Note
For further and up-to-date information on the special tools and workshop equipment, refer to ETKA under Tools.

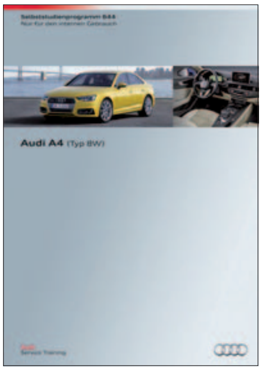
Appendix

Self study programmes

For more information about the 3.0l V6 TDI engine, refer to the following self study programmes.

SSP 479 Audi 3.0l V6 TDI Engine (2nd generation)

SSP 604 The Audi 3.0l V6 TDI biturbo engine



SSP 644 Audi A4 (type 8W)

SSP 652 Audi 4.0l V8 TDI engine EA898 series

SSP 657 Audi Q5 (type FY)

All rights reserved.
Subject to revision.

Copyright
AUDI AG
I/VK-35
service.training@audi.de

AUDI AG
D-85045 Ingolstadt
Technical status 05/17