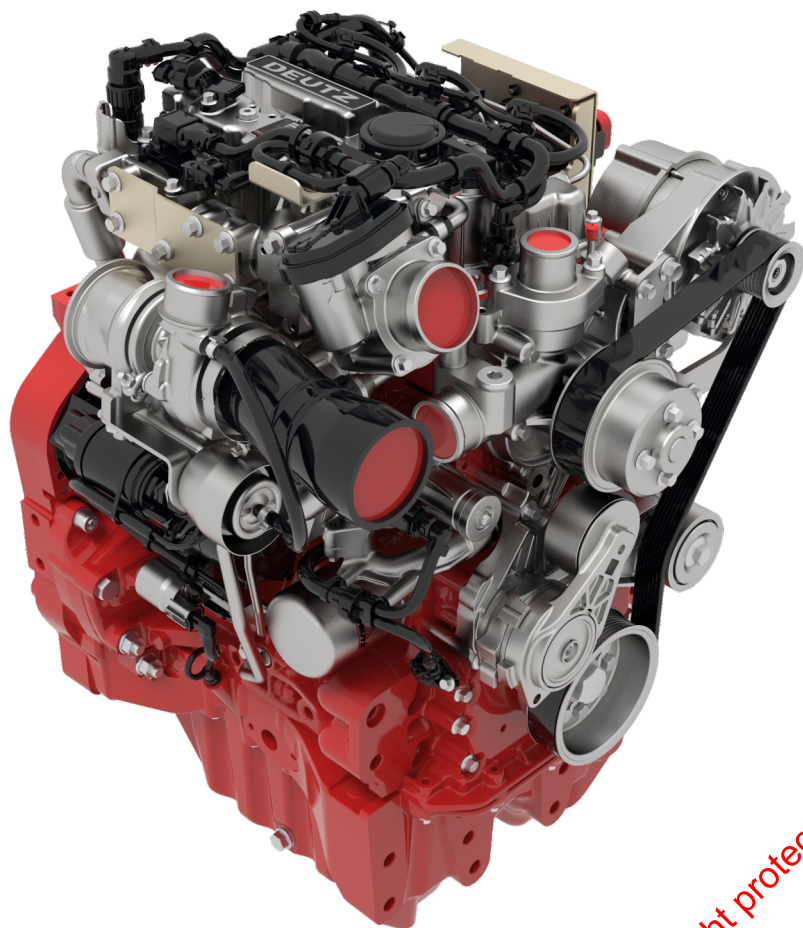


TCD 2.2 L3

Workshop Manual

competence level 2

EU Stage V / US EPA Tier 4
Agricultural technology



0312 5358 en

*This document is copyright protected.
Distribution in either printed or electronic form is not
allowed without our prior agreement.*

This document is subject to changes which may become necessary in the course of further development of the engines. Reprinting and reproductions of any kind, even in part, require our written permission.

The engine company.





WARNING: Breathing diesel engine exhaust exposes you to chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

- Always start and operate the engine in a well-ventilated area
- If in an enclosed area, vent the exhaust to the outside
- Do not modify or tamper with the exhaust system
- Do not idle the engine except as necessary

For more information go to www.P65warnings.ca.gov/diesel

Regarding copyright questions and licensing agreements
please contact :

MP-IL, Dieter Lippke
Phone: +49 (0) 221-822-2599
E-Mail: dieter.lippke@deutz.com

DEUTZ AG
Sales & Service
Information Systems
Ottostraße 1
D-51149 Köln (Cologne)
Phone: +49 (0) 221-822-0
Fax: +49 (0) 221-822-3525
Internet: www.deutz.com
E-Mail: info@deutz.com

Workshop Manual	1
General	6
Safety information / User information	7
Special tools.....	16
Job cards.....	29
01 Crankcase/Front cover	29
W 01-00-01 Check crankcase pressure	29
W 01-17-01 Removing and installing the control valve	34
W 01-90-23 Oil measuring device	37
05 Crankshaft/Torsional vibration damper/	38
W 05-02-03 Removing and installing the drive flange	38
W 05-03-01 Removing and installing the flywheel.....	45
W 05-07-01 Removing and installing sensor wheel	47
W 05-90-13 V-belt pulley / V-rib belt pulley (Fastening parts)	49
08 Cylinder head	50
W 08-00-01 Checking the compression pressure (when glow plugs/locking screws are removed).....	50
W 08-00-01 Checking the compression pressure (when injectors are removed).....	54
W 08-01-01 Removing and installing the cylinder head cover	60
09 Gear case/Gear drive	62
W 09-03-01 Removing and fitting the front cover (Fastening parts).....	62
W 09-04-01 Replacing the crankshaft sealing ring (opposite side to flywheel)	66
W 09-90-63 Oil pressure control valve	69
15 Lubricating oil cooler/Lubricating oil filter.....	70
W 15-02-01 Removing and installing the lubricating oil cooler.....	70
W 15-02-02 Removing and installing the lubricating oil cooler housing	72
W 15-90-37 Blanking cover (Crankcase).....	75
W 15-90-38 Lubricating oil filter installation.....	76
17 Injection pump/High pressure pump	77
W 17-01-04 Removing and installing the high-pressure pump.....	77
19 Fuel injector/Injector	84
W 19-01-01 Removing and installing the injector	84
20 Fuel filter/Fuel pump.....	91
W 20-90-16 Fuel pre-filter.....	91
W 20-90-17 Fuel filter	93
W 20-90-20 Pressure sensor installation (Fuel pressure)	95
W 20-90-40 Level sensor (Fuel pre-filter).....	97
W 20-90-47 Fuel supply pump (electric).....	98
21 Fuel pipes	100
W 21-04-01 Removing and installing the rail.....	100
W 21-04-03 Removing and installing the pressure relief valve (Rail).....	105
W 21-04-05 Removing and installing the rail pressure sensor	108
W 21-05-05 Removing and installing the fuel line (injector, rail, high-pressure pump).....	110
22 Air filter/Suction pipe/Charge air line	115
W 22-01-01 Removing and installing the charge air line	115

W 22-06-01 Removing and installing the mixing pipe	117
W 22-07-01 Removing and installing the throttle valve	119
37 Coolant pump	121
W 37-03-01 Removing and installing the coolant pump	121
38 Coolant pipes/Thermostat housing	125
W 38-01-01 Removing and installing the thermostat.....	125
W 38-01-02 Checking the thermostat (when removed).....	128
41 Exhaust pipe/Exhaust gas recirculation.....	130
W 41-05-10 Removing and installing the Venturi tube	130
W 41-06-01 Removing and installing the temperature sensor (Exhaust gas recirculation).....	132
W 41-06-02 Removing and installing the pressure sensor (Exhaust gas recirculation)	135
W 41-90-20 Pressure sensor installation (Exhaust gas back pressure).....	138
W 41-90-21 Line (Exhaust gas recirculation)	140
W 41-90-36 Exhaust manifold (Exhaust gas recirculation).....	141
43 Exhaust gas turbocharger	142
W 43-01-01 Removing and installing the exhaust gas turbocharger.....	142
44 Generator/Starter.....	144
W 44-01-01 Removing and installing the belt tensioner (V-ribbed belt)	144
W 44-02-01 Removing and installing the generator (Fastening parts).....	146
W 44-04-01 Removing and installing the deflection pulley (V-ribbed belts, air compressor).....	148
W 44-90-42 Generator.....	150
W 44-90-51 Console (belt tensioner, deflection pulley).....	151
W 44-90-90 Starter	152
48 Electric.....	153
W 48-90-19 Temperature sensor (Coolant)	153
W 48-90-20 Pressure sensor installation (Fuel pressure / lubricating oil pressure)	154
W 48-90-20 Relay (Heating flange, starter, glow plugs).....	156
49 Tools/Special tools	157
W 49-01-03 Check cooling system for leaks	157
51 Measuring instruments	160
W 51-02-01 Removing and installing the speed sensor (Crankshaft)	160
W 51-02-03 Removing and installing the speed sensor (Camshaft)	162
W 51-08-01 Removing and installing pressure/temperature sensor (Charge air)	164
W 51-90-20 Pressure sensor installation (Lubricating oil pressure)	167
W 51-90-20 Temperature sensor (Coolant)	168
71 Exhaust gas treatment.....	169
W 71-05-01 Dismantling and assembling the diesel particle filter (Module size 5.66")	169
W 71-10-01 Order of assembly (Installing catalyst) DOC (Diesel Oxidation Catalyst), SCR (Selective Catalytic Reduction).....	175
W 71-90-01 Sealing parts (diesel oxidation catalytic converter/diesel particle filter, SCR catalytic converter) (temperature sensor, differential pressure sensor of diesel particulate filter).....	181
W 71-90-09 Holder (Module size 5.66")	182
W 71-90-20 Differential pressure sensor (diesel particle filter).....	183
W 71-90-20 Temperature sensor (Air intake temperature, Ambient air temperature).....	184

83 Hydraulic pump/Hydraulic pump drive	185
W 83-90-01 Sealing parts (lubricating oil line).....	185

- **DEUTZ** engines are the result of years of research and development. The detailed know-how gained by this in connection with the high quality demands are the guarantee for production of engines with a long life, high reliability and low fuel consumption. Naturally the high demands for protection of the environment are also met.
- **Maintenance and care** are the prerequisite for the engine satisfying the demands placed on it. Compliance with the specified maintenance times and careful execution of maintenance and care work are therefore absolutely necessary. In particular, attention must be paid to more difficult operating conditions that deviate from normal operation.
- Please contact one of our assigned service agents in case of malfunctions and spare parts inquiries. Our specially trained personnel will ensure fast, professional repairs using original DEUTZ spare parts in case of damage.
Original replacement parts from DEUTZ AG are always manufactured in accordance with the state-of-the-art.
- Please read and take note of the information in this documentation. This will prevent accidents, preserve the manufacturer's guarantee and maintain a functional and operational engine.
- This engine is defined exclusively for purpose according to the scope of delivery and built by the equipment manufacturer (use for the intended purpose). Any other use above and beyond this will be considered as misuse. The manufacturer will not accept any liability for damages resulting from this. The user bears the sole risk.
- Proper intended use also includes compliance with the operating, maintenance and servicing conditions specified by the manufacturer. The engine may only be used, maintained and serviced by persons who are familiar with it and are aware of the hazards.
- Ensure the documentation is available to the relevant persons during operation, maintenance and servicing and that the contents are understood.
- Failure to observe this documentation may lead to malfunctioning and engine damage, as well as injuries to persons, for which the manufacturer bears no liability.
- A prerequisite for proper maintenance and servicing is the availability of all required equipment, standard and special tools in the industry and that they are in proper working order.
- Engine parts such as springs, clamps, elastic fasteners, etc. can pose an increased hazard if not used properly.
- Compliance with the relevant accident prevention regulations and other generally recognized safety and occupational medicine rules is required.
- The highest level of economic efficiency, reliability and a long service life can only be ensured if DEUTZ original parts are used.
- The servicing of the engine must comply with the proper use. Only parts approved for the respective use may be used for retrofitting. Unauthorised modifications to the engine will exclude the manufacturer from all liability for resulting damage. The guarantee will be void in the event of non-compliance!
- The engines from DEUTZ were developed for a wide spectrum of applications. A comprehensive range of variants ensures that the respective special requirements are fulfilled.
- The engine is equipped accordingly for the particular installation situation, i.e. not all the components and parts described in the documentation are installed in your engine.
- We made every effort to clearly highlight the differences so you can easily find the relevant operating, maintenance and repair instructions for your engine.

We will gladly consult with you if you have questions.

Your DEUTZ AG

General

The documentation of the workshop manual was created on the basis of the engine available on the editorial deadline.

Due to further developments, there may be deviations from descriptions, illustrations and components.

The valid documents published by DEUTZ AG (such as Service Info Technology, Technical Bulletin, Service Bulletins, Installation guidelines etc.) must be observed.

The prescribed tightening specifications as well as the test and setting data must be taken into consideration and adhered to.

The high safety and quality level of our engines is constantly guaranteed due to technical improvements and further developments. As a result, there may be deviations between the documentation and the current state of technological knowledge.

As a result of further developments, changes may be announced at short notice by means of bulletins (Service Info Technology, Technical Bulletin, Service Bulletin).

The maintenance work prescribed in the operating instructions and workshop manual must be carried out properly and completely. The maintenance staff must have the necessary expertise for carrying out the work. Any safety and protection devices which had to be dismantled during maintenance work must be reinstalled.

Caution!

Compliance with the accident prevention and safety regulations is required during servicing work.

In addition to the instructions within the job cards, the instructions of the chapter "Specifications" must be followed before and during the work on the engine under all circumstances.

The maintenance intervals and the maintenance work to be performed are specified in the maintenance plan in the operating manual. The job cards contain technical documentation of the execution of servicing work.

CALIFORNIA PROPOSITION 65 WARNING



WARNING: Breathing diesel engine exhaust exposes you to chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

- Always start and operate the engine in a well-ventilated area.
- If in an enclosed area, vent the exhaust to the outside.
- Do not modify or tamper with the exhaust system.
- Do not idle the engine except as necessary.

For more information go to
www.P65warnings.ca.gov/diesel

Regulations

Accident prevention and safety regulations

The statutory accident prevention regulations (available from professional associations or in specialist shops) must be followed. These depend on the location of use, operating mode and operating and auxiliary materials used.

Special protective measures that depend on the respective work are specified and marked in the work description.

In general, the following applies:

- to the personnel
 - To avoid injury and damage to health, always wear suitable personal protective equipment (e.g. respiratory protection, hearing protection, safety gloves, safety glasses, protective clothing, helmet, safety shoes, skin protection and skin care products).
 - Only trained personnel may operate or maintain the engine. Access to the engine room by unauthorized persons is prohibited.
 - Close-fitting clothing and hearing protection must be worn in the engine room when the engine is running.
 - Only trained experts may perform repairs or service work.
 - Do not carry out work on the fuel system when the engine is running. The fuel system is under high pressure — danger to life.
 - If there are leaks in the fuel system, shut the engine off as quickly as possible and contact an authorized service partner.
- for the engine room:
 - Sufficient ventilation and aeration must be ensured (do not cover air shafts).

- Install first-aid kits and suitable fire extinguishers. Regularly check the fill level and operational readiness.
- Only store flammable materials in the engine room if they are required for the operation of the system.
- Smoking and open flames are prohibited in the engine room!
- to operation, maintenance and repair work on the engine:
 - The fuel system is under high pressure. The common rail systems used work with operating pressures up to approximately 2000 bar. In the event of faults the pressure can even rise temporarily to much higher values before the pressure limiting valve opens.
 - The ignition must be switched off.
 - Do not start the engine.
 - Depending on version of the common rail system, the electrical fuel supply pump is activated when the ignition is switched or during starting and supplies the fuel directly.
 - Wait at least 30 seconds after shutting off the engine before working on the fuel system.
Depending on the version of common rail system, the fuel pressure in the common rail system will still not have dissipated after 30 seconds. The fuel pressure can permanently be several 100 bar.
The fuel pressure here does not drop until the fuel system is opened and the fuel can escape to the outside.
 - Restart the engine when all of the safety equipment has been installed. Make sure no one is in the hazard zone.
 - Only perform cleaning, maintenance and repair work when the engine is shut off and secured against being restarted.
 - Fuel lines, injection lines or fuel high-pressure lines must never be disconnected when the engine is running.
 - Caution Risk of injury!
The fuel jet can deeply penetrate the skin.
 - Do not come close to the leak area in the fuel high-pressure system with any body parts (e.g. hand, head). **Caution Risk of injury!**
 - Prior to performing tests on the engine, always perform a visual inspection of all high-pressure components. Wear suitable protective clothing (for example goggles, gloves) for this. Leaks indicate potential hazard sources for the workshop personnel.

- Even if no leaks can be discerned in the high-pressure fuel system, the workshop personnel should avoid the direct hazard zone or wear protective clothing (for example goggles, gloves) during tests when the engine is running and during the first test run.
- If there are leaks in the fuel system, shut the engine off as quickly as possible and contact an authorized service partner. **Caution Risk of explosion, injury and fire!**
- Always stay out of the range of a potential fuel jet which might result in severe injuries. **Caution Risk of injury!**
- Fuel lines, injection lines and high-pressure lines may not be deformed.
- Damaged fuel lines, injection lines and high-pressure lines must be replaced.
- Smoking is prohibited when working on the fuel system.
- Do not perform any work near sparks or flames.
- Never clamp off an injector while the engine is running.
- Loosen screw connections slowly and not abruptly.
- Open screw connections on the fuel system with extreme caution.
- Vent the fuel system after doing any work on it
 - see operating manual.

Cleanliness instructions and measures for working with common rail systems

The common rail systems used in DEUTZ engines comprise high-precision components subjected to extreme loads. In view of the high-precision technology, ensure utmost cleanliness when working on the fuel system.

References to be observed and measures to be taken prior to working on the fuel system

- The fuel system must be closed. Perform visual check for leaks / damage to the fuel system.
- Prior to starting the works on the fuel system, clean the entire engine and engine compartment with closed system.
- When starting the works on the fuel system, the engine must be dry.
- Blasting (drying) with compressed air is only admissible if the fuel system is closed.
- When using a steam blaster, the components (e.g. cable plugs, all other electrical plug connections, control unit, generator, starter, solenoid valves, transmitters, sensors etc.) must first be covered and must not be directly impacted with the steam blaster.
- Electrical plug connections must be plugged when blasting.

- Loose parts (for example paint chips during installation works) must be removed with an industrial vacuum cleaner or another suction system. Generally, during installation works at the open fuel system, only suction methods are permitted.
- Work at the fuel system only in a clean environment (no dust, no grinding or welding works). Avoid draught (dust). The workshop floor must be regularly cleaned. A brake or power test bench is not permitted in the same room and cannot be operated there.
- Air movements whirling up dust, for example caused by brake repairs or starting of engines, must be avoided.
- For works, for example dismantling and installation of defective hydraulic components on the Common Rail System, it is recommended to section a workshop area within the works; this means, this area must be separated from other areas (where general vehicle repairs are made, for example brake repairs).
- No general machine tools may be operated in this room.
- Regular cleaning of the workshop area is obligatory, draught, ventilation system and heating blower must be minimized.
- Cover areas of the engine compartment, from where dirt particles may come loose (for example, lower section of the tilted driver's cab), with new clean foil.
- Working means and tools must be cleaned before starting the works. Only use tools free from defects on the chromium layer or without chromium plating.

References to be observed and measures to be taken during the works on the fuel system or with open fuel system

- Perform works only in clean working clothes.
- For works at the fuel system, only lint-free cleaning cloths may be used.
- Loose parts (for example paint chips during installation works) must be removed with an industrial vacuum cleaner or another suction system. Generally, during installation works at the open fuel system, only suction methods are permitted.
- Working means and tools must be cleaned before starting the works. Only use tools free from defects on the chromium layer or without chromium plating.
- For cleaning, the use of cleaning or testing liquid is not permitted.
- If the fuel system is open, compressed air must not be used for cleaning.

- Works at dismantled components may only be performed at a suitably equipped working place.
- Upon dismantling and installing components, no materials may be used which can separate particles or fibres (cardboard, wood, cloths).
- If necessary, dismantled parts may be wiped with clean, lint-free cloths. No dirt particles may be wiped into the components.
- Openings at the components and the engine must immediately be closed with suitable locking plugs/caps.
- The locking plugs/caps shall only be removed prior to the installation.
- Store locking plugs/caps free from dust and protected against dirt in their original packing and dispose of them after having used them once.
- Withdraw new parts from their original packing shortly before their installation only.
- Dismantled components must be kept in new closable bags or – if available – in the packings of the new parts.
- For dispatching the dismantled components, always use the original packing of the new part.

Notes and measures for the vehicle /workshop area

- For works, for example dismantling and installation of defective hydraulic components on the Common Rail System, it is recommended to section a workshop area within the works; this means, this area must be separated from other areas (where general vehicle repairs are made, for example brake repairs).
- The workshop floor is sealed or tiled.
- No welding equipment, grinding machines, general machine tools, brakes and power test benches may be operated in this room.
- Regular cleaning of the workshop area is obligatory, draught, ventilation system and heating blower must be minimized.

References and measures for working place and tools in the vehicle hall

- For works at dismantled components, a special working place must be established.
- Regularly clean tools for dismantling and installation and keep them in a closed tool cabinet.
- Loose parts (for example paint chips during installation works) must be removed with an industrial vacuum cleaner or another suction system.
- Working means and tools must be cleaned before starting the works. Only use tools free from defects on the chromium layer or without chromium plating.

Additional information and measures for the handling of exhaust after-treatment systems

- In principle, all regulations and instructions up to and including chapter "Cleanliness instructions and measures for handling common rail systems" must also be observed in the same way when working on the exhaust gas aftertreatment systems!
- The utmost cleanliness is required for all work.

DPF (Diesel Particle Filter)

- The filter regeneration must be deactivated or, in systems with a filter regeneration prompt, not activated before performing service work.
- The duration of a complete filter regeneration cycle is, on average, 30 minutes. High exhaust temperatures in the exhaust system/on the exhaust pipe are generated regardless of the actual load on the engine (ergo, even when the engine is idling).
- No foreign substances may penetrate the exhaust line or combustion chamber. If this occurs, the engine must be "run clear" without a diesel particle filter.
- Tension and plastic deformations of the V-belt collar must be avoided. The DPF module may only be transported using the transport bushings.
- V-belt collars and seals may not be reused (this also applies as soon as the screw connection is loosened once).

Ignition system (engines with ignition system)

- Caution! Hazardous high voltage.
The ignition system works with ignition voltages of up to 10,000 volts.
- The ignition system may not be operated without a secondary load.
- Dirt and moisture on the primary and high-voltage connections can result in malfunctions (leakage currents, ignition failures, high-voltage flashovers).
- Check the protective caps on the ignition lines for discolouration, deformation and cracks prior to every reuse.
- In addition, the instructions in Chapter "Additional information and measures for all work (including work on the gas engine and the gas system)" and the instructions in the following chapters must be followed!

SCR (Selective Catalytic Reduction)

- AdBlue® is used as a NOX reduction agent for SCR exhaust aftertreatment.

AdBlue® is a highly pure, aqueous, 32.5 % urea solution. The 32.5% urea solution is sold on the market under the brand name AdBlue® or DEF (Diesel Exhaust Fluid). AdBlue® is a registered trademark of the Verband der Automobilindustrie e.V (VDA - German Association of the Automotive Industry). The product is designated as AdBlue® or AUS 32 (AUS: Aqueous Urea Solution) and corresponds to the ISO 22241-1 NOx reduction agent AUS 32.

AdBlue® is known by different names depending on the region:

- AdBlue® = Europe
- DEF = North America
- Arla 32 = Brazil
- AUS 32 = worldwide

- The urea solution must only be filled in the tank provided for this. Accidentally filling the tank with another operating medium (e.g. diesel fuel) causes irreparable damage to the dosing system.
- AdBlue® is a corrosive medium that causes severe corrosive damage when it comes into contact with electronic components or the like. The urea solution must never come into contact with copper or zinc, their alloys, or aluminium.
- Leaks in the AdBlue® lines, the tank, the transport module and the metering unit must be immediately rectified in order to prevent AdBlue® from escaping.
- Ensure sufficient ventilation.
- Contact with skin should be avoided. If possible, latex gloves should be worn.
- Wash hands thoroughly before taking breaks and at the end of shifts.
- If the substance comes into contact with eyes, rinse thoroughly with water.
- If swallowed, rinse out mouth with a lot of water, drink plenty of water and seek medical advice.
- If discomfort or illness continues, seek medical advice.
- Product can pose danger of slipping if spilled. It is essential to remove spilled liquid. In so doing, ensure that the liquid does not enter the sewage system or ground / surface water, i.e. the contamination should be physically removed and disposed of in suitable containers. Minimal amounts of remaining liquid may be rinsed away with a lot of water.

- The urea solution must be disposed of properly in accordance with waste recycling and disposal regulations. The waste must be classified according to its origin in accordance with the European Waste List (EWL). Following this regulation, it is recommended to use waste code 06 10 99 (wastes from MFSU of nitrogen chemicals, nitrogen chemical processes and fertiliser manufacture, wastes not otherwise specified).
- Packaging which has been contaminated with the urea solution and can no longer be used should initially be treated like the substance itself. After it has been emptied properly and cleaned thoroughly, it may be reused, as long as regulations are followed.
- The so-called lag time is application-dependent and may be up to 2 minutes because the SCR pipes have to be pumped empty in this time.

Additional information and measures for all work (including on the gas engine and the gas system)

Non-compliance with the following safety instructions may result in property damage (marked in the text with "Risk of property damage"), environmental damage and severe personal injury or death (marked in the text with "Attention risk of injury")!

- In principle, all regulations and instructions up to and including chapter "Cleanliness instructions and measures for handling common rail systems" must also be observed in the same way (including when working on the gas engine and the gas system)!
- Read the operating manual before use. If you have any trouble understanding these, please contact DEUTZ Support info@deutz.com or your local service partner.
- Make sure that the operating manuals are available to everyone who operates, maintains or repairs the engine and that the contents have been understood.
- Before use, have a qualified person instruct you in the operation of the device or the engine.
- Wear suitable personal protective equipment (e.g. ear protection, safety gloves, safety glasses, protective clothing, safety helmet, safety shoes).
- Only let the engine run when the bonnet / engine compartment is closed. **Caution Risk of injury!**
- Do not approach a running engine if the bonnet / engine compartment is not closed. **Attention Risk of injury!**
- It is generally not permitted to enter the engine and/or engine and exhaust after-treatment parts. Access is only permitted on specially designated and marked areas (treads). **Attention Risk of injury! Risk of property damage!**
- Do not reach into the engine compartment and do not touch any engine and exhaust-conducting components (only permitted in case of service or maintenance using suitable personal protective equipment and trained personnel). **Caution Risk of injury!**
- The engine, engine parts and the exhaust system can be very hot, even after they have been switched off for a long time. **Caution Risk of fire and injury!**
- Regardless of the operating condition of the engine, the exhaust gas can be very hot and suddenly change its temperature. This applies in particular to regeneration mode. **Caution Risk of fire and injury!**
- Engine parts and exhaust system may be sharp-edged. **Caution Risk of injury!**
- Before working on the engine, take suitable measures to ensure that the engine cannot be started unintentionally. **Caution Risk of injury!**
- Pay attention to unusual noises and switch off the engine in case of doubt! **Risk of property damage!**
- In the event of smoke or fire in the engine compartment, switch off the engine as quickly as possible. In the event of a fire, take yourself and other persons to safety. **Caution Risk of injury! Risk of property damage!**
- Avoid open flames and sources of heat anywhere near the engine, exhaust aftertreatment system and tank system under all circumstances (e.g. lighters, cigarettes, matches, mobile phones, batteries). **Caution Risk of injury! Risk of property damage!**
- Only operate the engine in areas where there is a risk of fire by observing special precautions. Note the risk assessment for working places. **Caution Risk of explosion, injury and fire! Risk of property damage!**
- Do not operate the engine in explosive areas (pursuant to ATEX Directive 2014/34/EU) or in areas with an especially high risk of fire (this also pertains to shutting off or storing the engine). **Caution Risk of explosion, injury and fire! Risk of property damage!**
- Be aware of fluids leaking out, particularly oil and fuel. If liquids, in particular oil, fuel and gases, are leaking, switch off the engine as quickly as possible. **Caution Risk of explosion, injury and fire! Risk of property damage! Risk of environmental damage!**

- Escaping fluids lead to an increased danger of slipping and falling and must therefore be immediately identified with a warning and then professionally removed as quickly as possible. **Caution Risk of injury!**
- The fuel system is under high pressure. The common rail systems used work with operating pressures up to approximately 2000 bar. In the event of faults the pressure can even rise temporarily to much higher values before the pressure limiting valve opens.
- Even after the engine shuts down, the fuel pressure may still be up to several 100 bar for a long time.
- If there are leaks in the fuel system, shut the engine off as quickly as possible and contact an authorized service partner. **Caution Risk of explosion, injury and fire!**
- Always stay out of the range of a potential fuel jet which might result in severe injuries. **Caution Risk of injury!**
- Do not come close to the leak area in the fuel high-pressure system with any body parts (e.g. hand, head). **Caution Risk of injury!**
- Frozen or damaged pipes/lines can tear/burst. Protect the engines in regions in which frost may develop with an adequate anti-freeze. Replace damaged pipes/lines before you use the engine. **Caution Risk of injury! Risk of property damage!**
- Operate the engine only outdoors and with adequate ventilation (including shutting down the device). **Attention Notice for LPG (Liquefied Petroleum Gas) engines:** LPG is heavier than air and can accumulate near the ground and in pits in high concentrations! **Caution Risk of explosion, injury, poisoning and suffocation!**
- Do not operate the engine unattended or without monitoring. Do not leave the engine running without someone watching it. **Caution Risk of injury! Risk of property damage!**
- Do not operate, maintain and service the engine if you are tired or unconcentrated. **Caution Risk of injury! Risk of property damage!**
- Do not operate, maintain or repair the engine if you are under the influence of medication, drugs or alcohol, if you have health restrictions or if you feel unable to do so. **Caution Risk of injury! Risk of property damage!**
- Do not leave children or helpless persons unattended near the engine. **Caution Risk of injury!**
- Do not swallow or drink any operating materials from the engine, especially oil, fuel, hydraulic fluids, UREA ("AdBlue®") and coolant. Observe the information in the safety data sheets. **Caution Risk of injury!**
- Do not swallow individual engine parts, in particular small parts. This can happen, for instance, if someone is working underneath the engine. **Attention risk of injury/choking!**
- Avoid inhaling exhaust gas, fuel or oil fumes (including gaseous fuels like liquid gas or natural gas), in particular fumes from the exhaust pipe or crankshaft vent. **Caution Risk of poisoning and suffocation!**
- Do not allow engine fluids to get into your eyes. Avoid skin contact with the operating materials. This applies in particular to oil, fuel, hydraulic fluids, UREA ("AdBlue®") and coolant. Observe the information in the safety data sheets. **Caution Risk of injury!**
- Comply with noise protection and environmental protection regulations (e.g. operation in drinking water protection areas). **Caution Risk of injury! Risk of environmental damage!**
- Loud engine noise can severely impair voice communication and the perception of audible warning signals. **Caution Risk of injury! Risk of property damage!**
- Optical warning devices (e.g. display) may not be legible or only be legible to a limited extent under unfavourable environmental conditions. **Caution Risk of property damage!**
- Engines with external ignition or engines with burners in the exhaust after-treatment system are equipped with a high-voltage ignition system. Observe the corresponding warnings. **Caution Risk of injury!**
- Electromagnetic fields emanating from the engine can influence the function of electrical and electronic devices despite compliance with the applicable directives on electromagnetic compatibility (EMC). **Caution Risk of property damage!**
- Disconnect the drive train from the engine if the engine output is not needed.
- Persons with pacemakers should avoid the immediate vicinity of the engine. **Caution Risk of injury!**
- Only trained, qualified personnel may operate, maintain or service the engine. Access to the engine by unauthorised persons is prohibited. **Caution Risk of injury! Risk of property damage!**
- Have the engine serviced regularly by DEUTZ authorised personnel in accordance with the manufacturer's instructions. **Caution Risk of injury! Risk of property damage!**
- DEUTZ recommends the use of genuine DEUTZ spare parts. Take into account and follow the service and assembly instructions **Risk of property damage!**

- When the intended engine service life is reached, the engine must be subjected to a general overhaul by authorised personnel or replaced. **Caution Risk of injury! Risk of property damage!**
- In addition to the safety instructions given in the operating manual, the safety instructions in the technical bulletins (TR) must also be observed.
- In addition to the safety instructions stated here, further regulations from the vehicle/device/machine manufacturer/OEM (Original Equipment Manufacturer) or the operator.
- The engine may only be used for the proper intended use in the installation situation/for the application specified by the machine manufacturer/OEM.
- The service and maintenance plan must be followed.

Ignition system (gas engine with ignition system)

- **Caution! Hazardous high voltage.**
The ignition system works with ignition voltages of up to several 10,000 volts.
- Hazardous voltages may arise in the entire ignition system (including the cable harness, plug connections, connections for testing equipment, etc.).
- Persons with pacemakers should avoid the immediate vicinity of the engine. **Caution! Risk of injury!**
- Any interventions and work or testing equipment connections in the engine area and on the ignition system may only be executed when the engine and ignition system have been shut down.

When working on the ignition system, the ignition must always be switched off or the voltage source disconnected.

Work on the ignition system, for example:
 - connecting test leads and test devices
 - removing and installing or renewing parts such as ignition coils, spark plugs for example
- When testing the ignition system with the ignition switched on, dangerous voltages occur in the entire ignition system. Therefore, testing should only be carried out by trained specialist personnel.
- Do not touch any live parts in the entire ignition system when the ignition is switched on. When performing testing and calibration work, this also applies to all testing equipment connections and connections for the aggregates on test benches.

- Dirt and moisture on the primary and high-voltage connections can result in malfunctions (leakage currents, ignition failures, high-voltage flashovers).
- Check the protective caps on the ignition lines for discolouration, deformation and cracks prior to every reuse.
- Check components of the ignition system for damage. Do not reuse defective or damaged components.

General information on the electrical system, electrical/electronic components/systems

- Do not touch live parts.
- Pay attention to correct polarity of the connections.
- When clamping off the battery, electronically stored data may be lost.
- When clamping off the battery, always disconnect the negative pole first. Otherwise there is a risk of a short circuit!
- When connecting, connect the plus pole first and then the minus pole. Otherwise there is a risk of a short circuit!
- During electrical welding work, the earthing terminal of the welding device must be directly clamped to the part to be welded.
- During electrical welding work, all plug connections must be disconnected from the control unit in order to protect the electronics.
- Opening sensors, encoders, actuators and control units is prohibited. Doing so results in a loss of potential warranty claims.
- Do not interrupt the connection between the battery, generator and controller while the engine is running.
- When using a steam blaster, the components (e.g. cable plugs, all other electrical plug connections, control unit, generator, starter, solenoid valves, transmitters, sensors etc.) must first be covered and must not be directly impacted with the steam blaster.
- Electrical plug connections must be plugged when blasting.
- Store components in a dry, clean room.
- The following are not permitted: Temporarily storing or stacking the components without the transport packaging.
- Components may only be stored and transported in the specified packages.
- Withdraw new parts from their original packing shortly before their installation only.
- Incorrectly operated or damaged components or components that have fallen may not be installed.

- Do not hit or otherwise use force against the components.
- Incorrect earthing connections, cable and plug connections can result in malfunctions. Electronic components can be destroyed.
- Potentially installed pressure equalization instruments and the sealed area of the components (e. g. control units) may not be immersed in water. Flooding the components with water, in particular cleaning them using a high-pressure cleaner or the like is prohibited.
- The provided attachment points must be used for fastening. Stresses during assembly must be avoided.
- Drilling into or installing additional mounts on the control unit casing is prohibited.
- The specified tightening regulations for all components (e. g. encoders, sensors, etc.).
- Cable plugs may only be connected or disconnected when the power supply is shut off, if necessary, after an after-run period has passed.
- Cable plugs must be plugged in and out so the metal brackets and plastic tabs are not damaged.
- Rubber seals on cable plugs must always be pressed flush with the edges of the casing.

Disposal regulations

The work described in the operating manual and in the workshop manual make the replacement of parts and operating materials necessary. These replaced parts / operating materials must be stored, transported and disposed of in accordance with regulations. The operator is responsible for this.

Disposal includes recycling and the disposal of parts / operating materials, whereby recycling takes precedence.

Regional, national and international laws and directives regulate the details on the disposal and the monitoring thereof, the observation of which is the responsibility of the plant operator.

Operation manual and workshop manual

In order to structure the information layout in a user-friendly way, the service documentation is divided into operating instructions and job cards (workshop manual).

The operating manual contains a general description as well as instructions for necessary maintenance work among other things.

It includes the following chapters:

- 1 Table of contents, general information
- 2 Engine description

- 3 Operation
- 4 Operating media
- 5 Maintenance
- 6 Servicing and maintenance work
- 7 Faults, causes and remedies
- 8 Transport and storage, protecting the engine against corrosion
- 9 Technical data

The use of job cards (workshop manual) presupposes knowledge of the operating instructions content, this applying in particular for the service specifications. Repairs to the engine and components are described in the job cards (workshop manual), for the implementation of which more effort and correspondingly qualified experts are required.

Job cards

The job cards are differentiated into "W", "I", "S" and "T".

The "W" job card documents the standard repairs to the engine and/or its components. The necessary tools and special tools are also indicated in the W job card.

The "I" job card also documents corresponding workflows for repairing the engine and/or its components. Special prerequisites must be fulfilled by the workshops for implementation of these workflows. For example, special tools and machine tools must be available.

The "S" job card documents circuit diagrams.

The "T" job card documents "technical data" on the electrical components (for instance sensors and encoders).

Numbering the job cards

The job cards are numbered based on the **W 08-03-01** scheme. The individual parts of this format are explained below:

Job card (W, I)

- **W 08-03-01**: Documentation type
 - **W** = Workshop manual
 - **I** = Repair manual
- **W 08-03-01**: Module
 - in accordance with module overview
- **W 08-03-01**: Component grouping
- **W 08-03-01**: Consecutive number

Circuit diagram (S)

- **S 91-10-00**: Documentation type
 - **S** = Circuit diagram
- **S 91-10-00**: Module
 - (Assigned only to module 91)

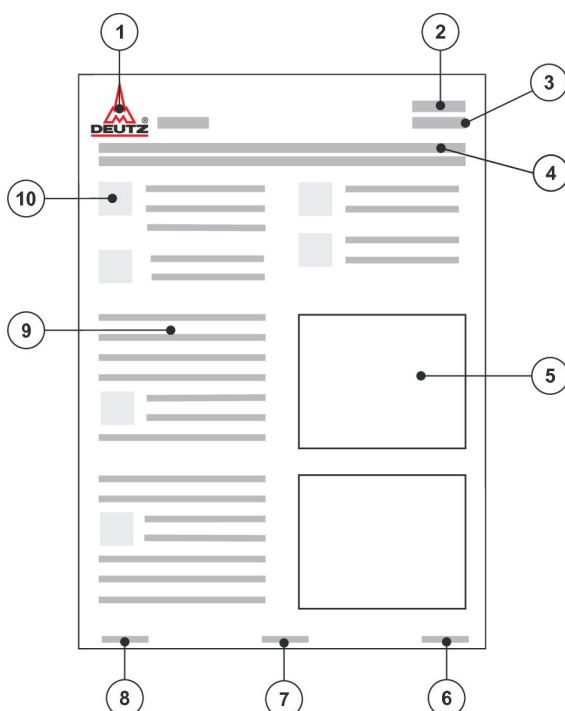
- S 91-10-00: Circuit diagram grouping
- S 91-10-00: Consecutive number

Technical data (T)

- T 48-10-02: Documentation type
 - T = Technical data
- T 48-10-02: Module
 - (Assigned only to module 48)
- T 48-10-02: Component grouping
- T 48-10-02: Consecutive number

Layout of a job card

(W, I, T)



- 1 DEUTZ AG, publisher of the service documentation
- 2 Module – Name
- 3 Job card numbering
- 4 Title of the job card
- 5 Graphic or photo
- 6 DEUTZ internal designation
- 7 Page number
- 8 Issue date of the job card
- 9 Parts list / workflow / information
- 10 See picture symbols explanation

Picture symbols explanation



DANGER

to life or health. Important!
For example: Incorrect installation or retrofitting of the exhaust turbo loader can result in severe injuries.



ATTENTION

Risk to the component/engine.
Non-compliance can result in the destruction of the component/engine.
Important!



Note

General notice regarding assembly, environmental protection, etc.
No potential risk to persons and the engine.



Tool

Standard and special tools required for the work.



Auxiliary materials

Necessary working materials in addition to tools required for performing the work (e.g. greases, oils, adhesives, sealants)



References

to important documents



Reference

within the workflow or to assemblies in which further documents or job cards are provided.



Test and adjustment data

The necessary values are indicated here (if necessary, with a link to a table within the job card).



Tightening specification

The necessary values are indicated here (if necessary, with a link to a table within the job card).

Special tools



Orders

The special tools must be ordered like normal DEUTZ spare parts with specification of the order number.



General

There may be several different installation application options depending on the the special tools. Not all applications are always listed as examples.

01899034

Compression gauge

for diesel engines

- Measuring range: 10 – 40 bar

Consists of:

- Compression pressure recorder
- Pressure hose with screw connection or quick coupling depending on version
- Chart sheets

Application example:

- Check compression pressure (in connection with corresponding connection piece).

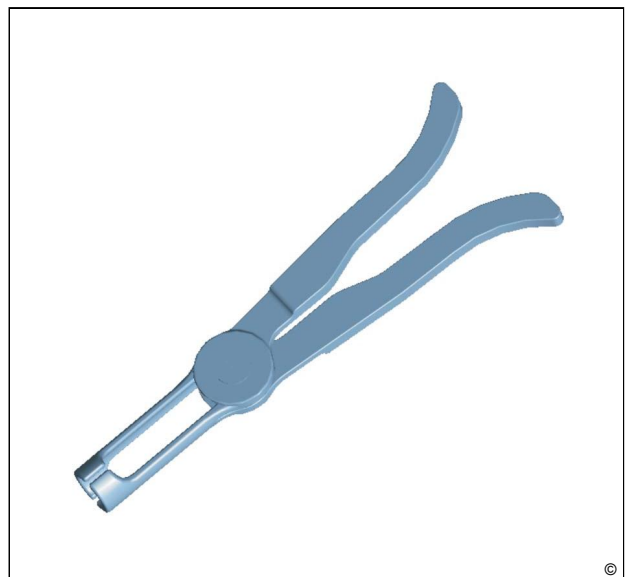


01899050

Assembly pliers

Application examples:

- Remove seized fuel injector sealing ring.
- Remove valve stem seal.



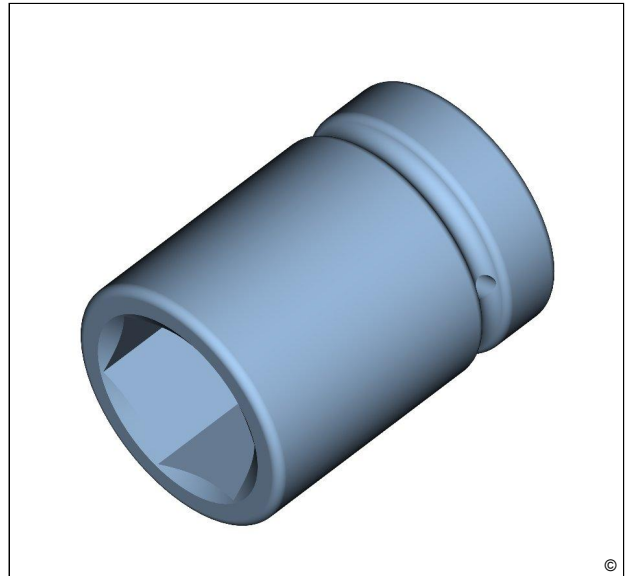
01899055

Socket wrench insert

- hexagonal
- Wrench size: 32 mm
- Model: Reinforced
- Drive: Inner square socket 1"

Application example:

- Remove and install central screw (in conjunction with force multiplier 01899370)



01899069

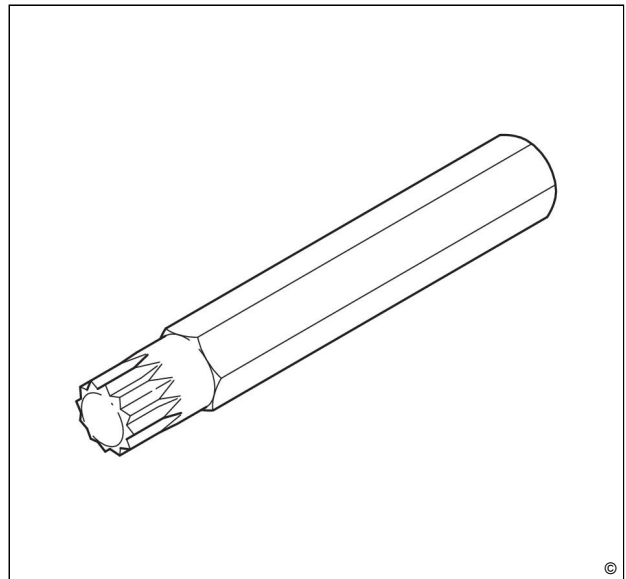
Multi-tooth socket wrench

for internal serrated socket

- Key figure: 10
- Wrench size: Hexagonal, 10 mm
- Model: Long, 75 mm

Application example:

- Removing and installing the pulley (generator).



01899092

Tool kit

Hexalobular double-ended ring wrench and wrench sockets

Case contents:

- Double-ended ring wrench
 - Sizes: E6 / E8
 - Sizes: E10 / E12
- Wrench sockets
 - Sizes: E8 / E10
 - Drive: Square socket 1/4"
 - Sizes: E10 / E12
 - Drive: Square socket 3/8"
 - Size: E18



Drive: Square socket 1/2"

Application example:

- Loosening and tightening hexalobular screw.

01899093**Rotation angle disc**

- flexible, bendable rod with magnet
- External square 1/2"
- Drive: Square socket 1/2"

Application examples:

- Screw torque with rotation angle.
- Set valve clearance based on the rotation angle.

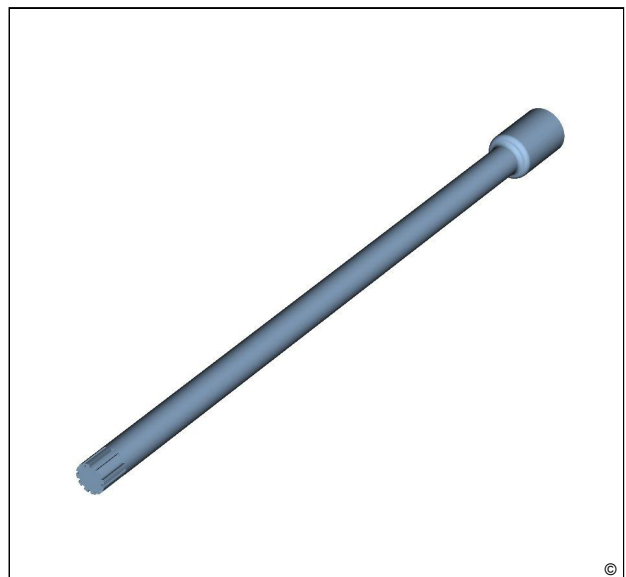
**01899098****Serrated screwdriver bit**

for internal serrated socket

- Key figure: 10
- Model: Long, 120 mm
- Drive: Square socket 3/8"

Application examples:

- Removing and installing the pulley (generator).
- Loosen and tighten the mounting screw on the air compressor (in connection with extension, length: 160 mm)

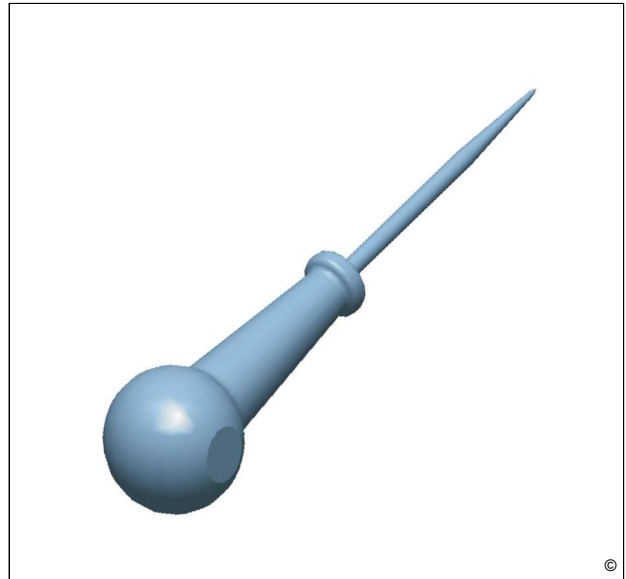


01899103**Pricker**

– Model: Long, 185 mm

Application examples:

– Punching and removing the shaft sealing ring.

**01899110****Assembly lever**

– adjustable

Application examples:

– Levering out the crankshaft sealing ring.

– Press the valve spring down.

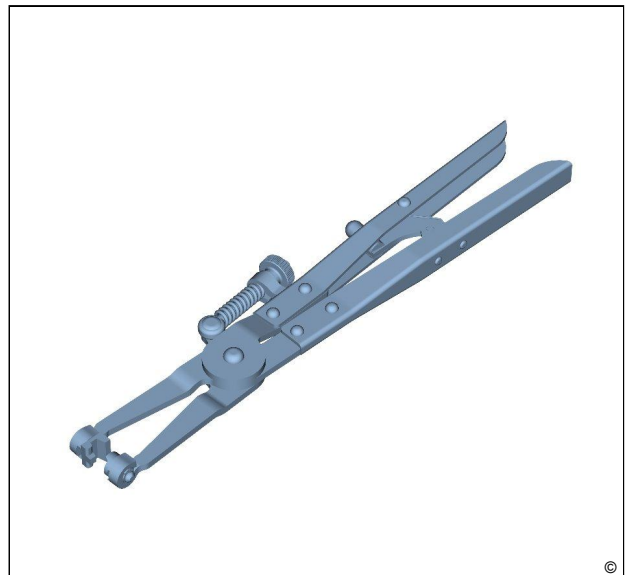
**01899112****Spring band pliers**

– Length: 320 mm

– Tension range: 90 mm

Application example:

– Opening and closing the spring band clip.



01899132

Wrench socket

- double-hex
- Wrench size: 27 mm
- Design: long
- Drive: Square socket 1/2"

Application example:

- Removing and installing the pressure sensors (rail pressure, lubrication oil pressure, fuel pressure).



01899185

Insert holder

- Drive: External square 1/4"
- Drive: External hexagon 1/4"
- Design: long

Application example:

- Tighten cable connection with torque (for example in combination with torque handle 01899184, torque screwdriver 01899463 or 01899464 and corresponding socket wrench insert).



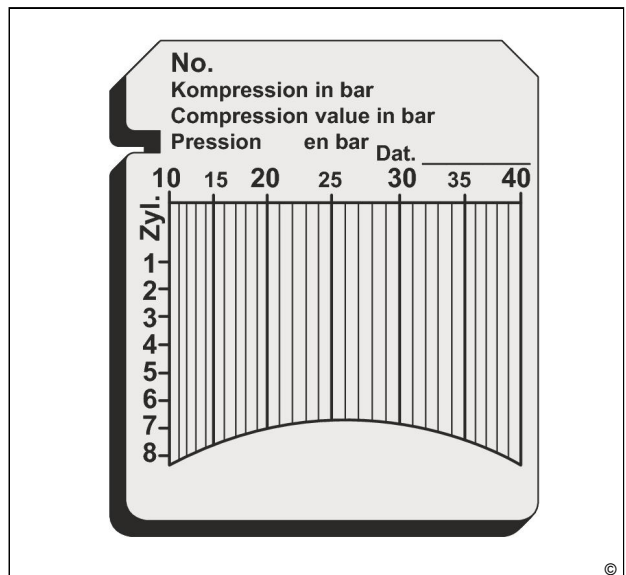
01899193

Chart sheets

- Measuring range: 10 - 40 bar

Application example:

- Checking compression pressure (in connection with compression pressure gauge 01899034)



01899368

Locking plugs/caps

1 set of plugs and caps of different sizes in a case

– Caps

- 01899371 (Ø 8 mm)
- 01899372 (Ø 10 mm)
- 01899373 (Ø 12 mm)
- 01899374 (Ø 14 mm)
- 01899375 (Ø 16 mm)
- 01899376 (Ø 18 mm)
- 01899377 (Ø 20 mm)

– Stopper

- 01899378 (Ø 10 mm)
- 01899379 (Ø 12 mm)
- 01899380 (Ø 14 mm)
- 01899381 (Ø 16 mm)
- 01899382 (Ø 18 mm)
- 01899383 (Ø 20 mm)
- 01899384 (Ø 22 mm)
- 01899385 (Lamellar plugs)
- 01899387 (for return line)

– Protective sleeve

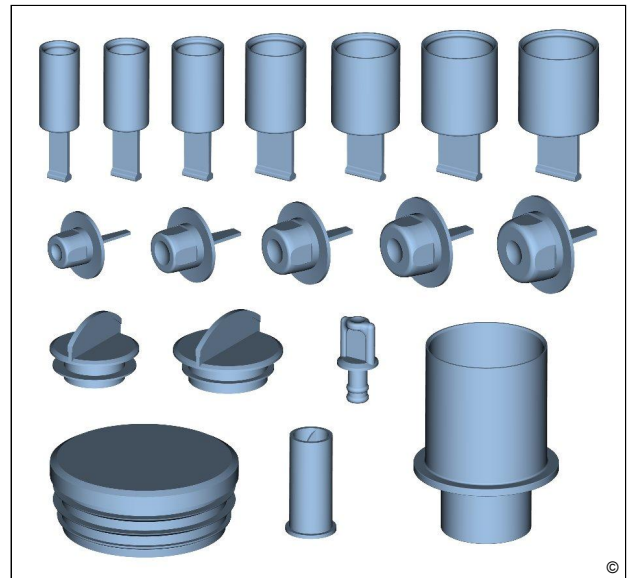
- 01899386 (for injector nozzle)

– Protective cap

- 01899388 (for injector)

Application example:

- Close the opening on the fuel system



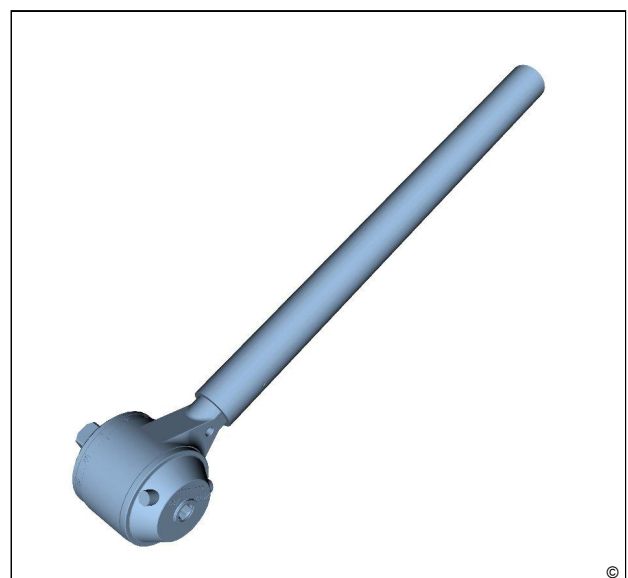
01899370

Force multiplier

- Tightening ratio: 13.6 : 1
- Torque output 2980 Nm
- Drive: Square socket 1"

Application example:

- Remove and install central screw (in conjunction with corresponding counter holder)



01899400

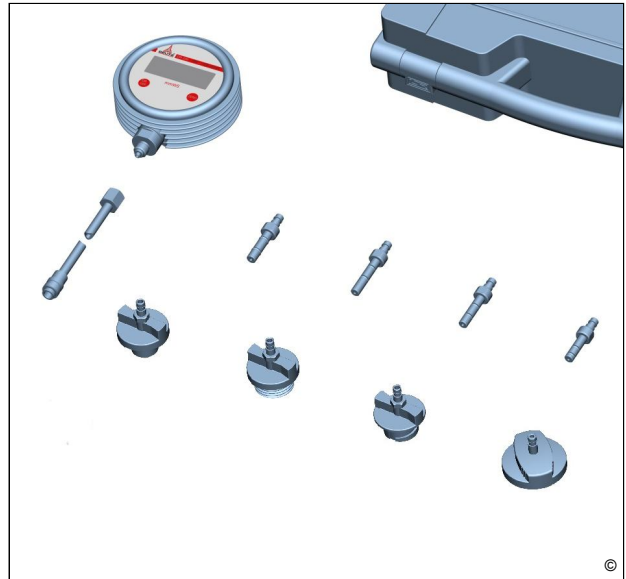
Crankcase pressure testing device

Case contents:

- 01899427 Test manometer
- 01899428 Hose pipe with quick release coupling
- 01899429 Test adapter
- 01899430 Test adapter
- 01899431 Test adapter
- 01899432 Test adapter
- 01899433 Connection piece
- 01899434 Connection piece
- 01899435 Connection piece
- 01899436 Connection piece
- 03124906 Operating instructions

Application example:

- Check crankcase pressure.



01899403

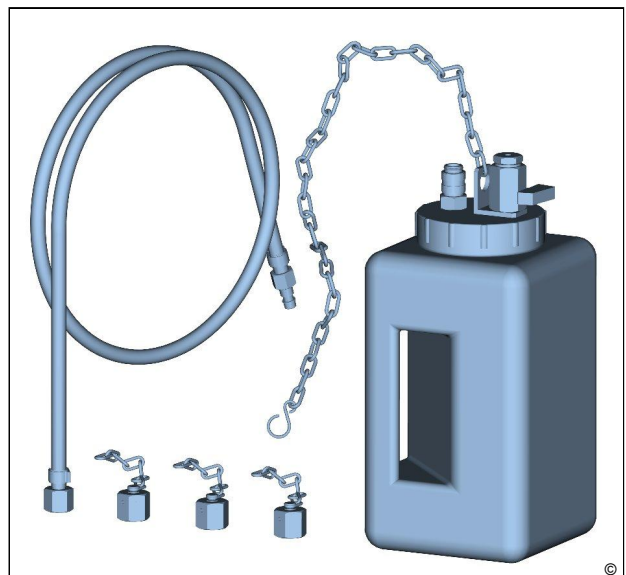
Tool kit (check compression pressure)

Contents:

- Caps
- Overflow pipe (hose and quick-release coupling)
- Collecting vessel

Application example:

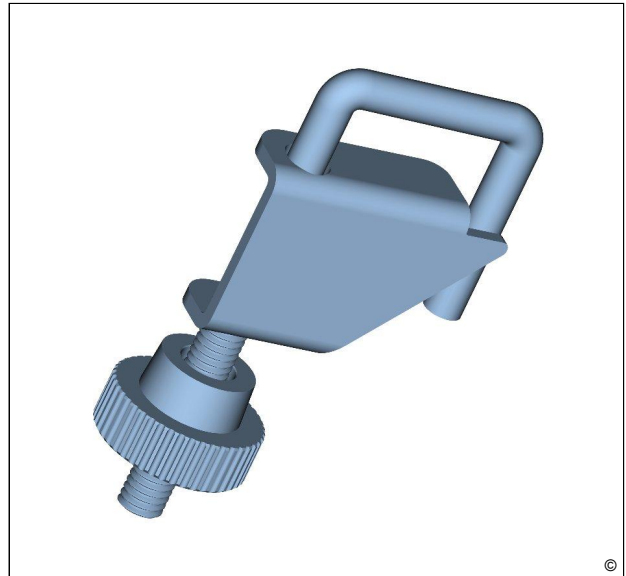
- Check compression pressure with the injectors disassembled (in connection with compression pressure tester 01899034).



01899404**Fuel hose clamp**

Application example:

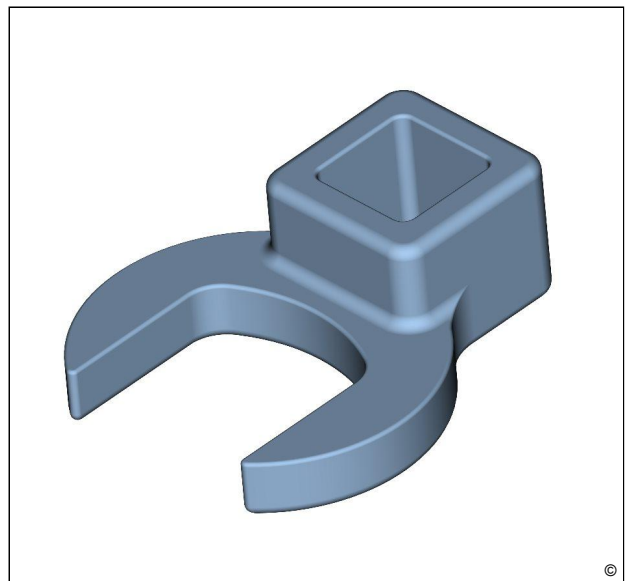
- Disconnect fuel pipe.

**01899406****Crow foot wrench**

- Spanner size: 24 mm
- Drive: Inner square socket 3/8"

Application example:

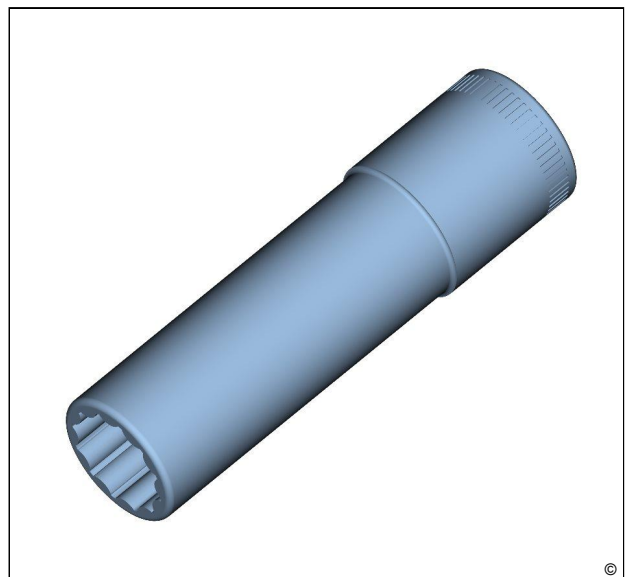
- Removing and installing the pressure sensor

**01899408****Wrench socket**

- double-hex
- Wrench size: 19 mm
- Design: long
- Drive: Inner square socket 3/8"

Application example:

- Removing and installing the temperature sensor.



01899415

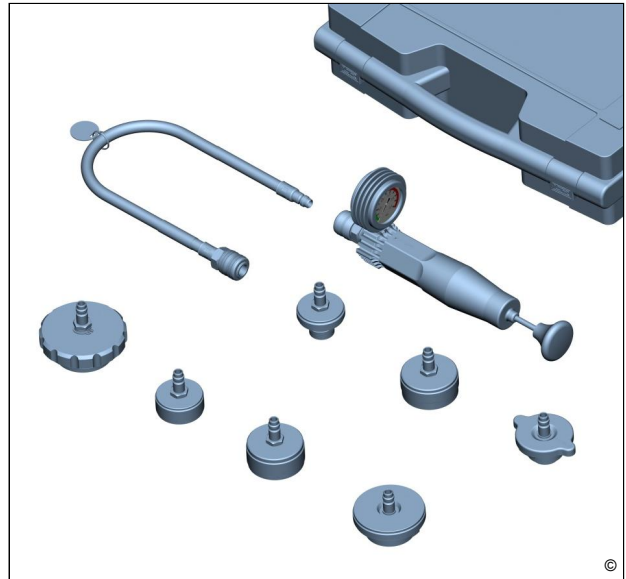
Cooling system pressure device

Case contents:

- 01899423 Pressure pump
- 01899422 Flexible hose with quick-release coupling
- Test adapter with coupling nipple
 - 01899416 Size: Ø 50 mm, RD30x1/8"
 - 01899417 Size: Ø 60 mm, M48
 - 01899418 Size: DV57, bayonet
 - 01899420 Size: Ø 90 mm, bayonet
 - 01899421 Size: Ø 50 mm
 - 01899424 Size: Ø 75 mm, bayonet
 - 01899425 Size: Ø 60 mm, M52

Application example:

- Check cooling system for leaks.



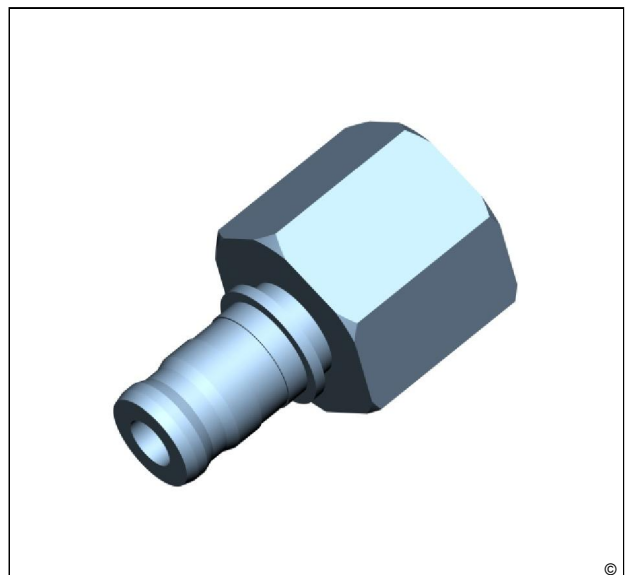
01899437

Adapter (with check valve)

- Screw thread R 1/4"
- for connection between connection piece and compression pressure gauge (version with quick coupling)

Application example:

- Check compression pressure (in connection with compression pressure gauge and quick coupling 01899034).



01899464**Torque screwdriver**

- Measuring range: 1.0 - 5.0 Nm
- Adapter: Hexagon socket

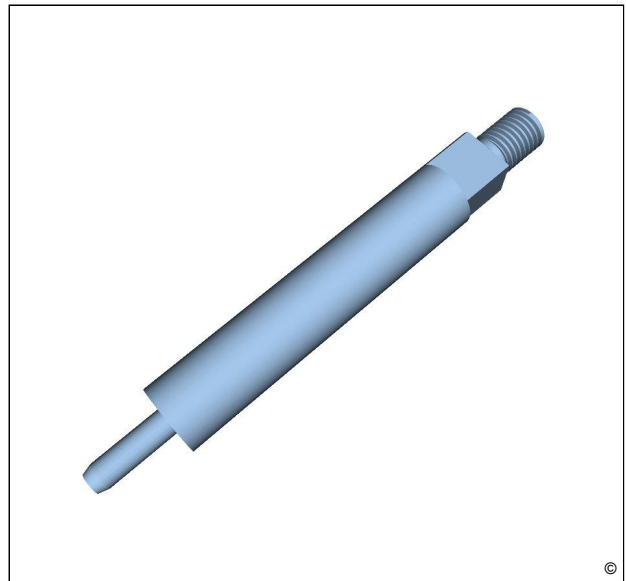
Application example:

- Tighten the cable connection with torque (in connection with insert holder 01899185 and socket wrench insert).

**02992017****Connection piece**

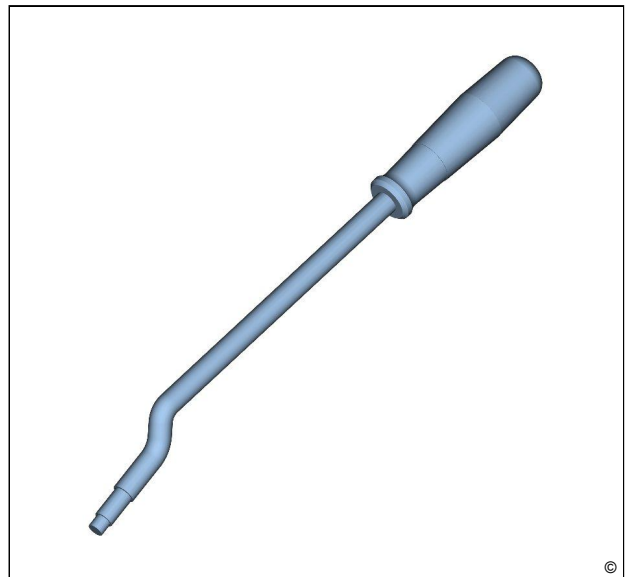
Application example:

- Check compression pressure with the injector disassembled (in connection with compression pressure tester 01899034).

**02992117****Lever tool**

Application example:

- Removing the injector.



02992127

Disassembly tool

(also included in assembly case 02992126)

Application example:

- Disassembling an O-ring.



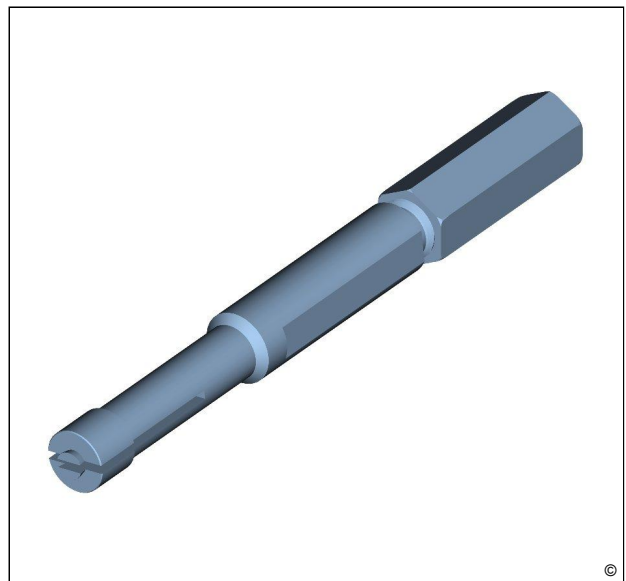
02992138

Extraction device

- Wrench size: 15 mm

Application example:

- Disassemble seized injector sealing ring (in connection with slide hammer 02992294).

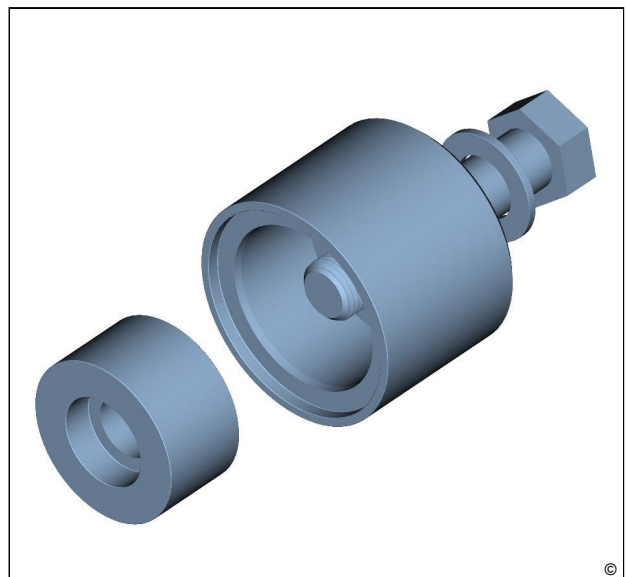


02992215

Assembly tool

Application example:

- Installing the crankshaft sealing ring (opposite side to flywheel).

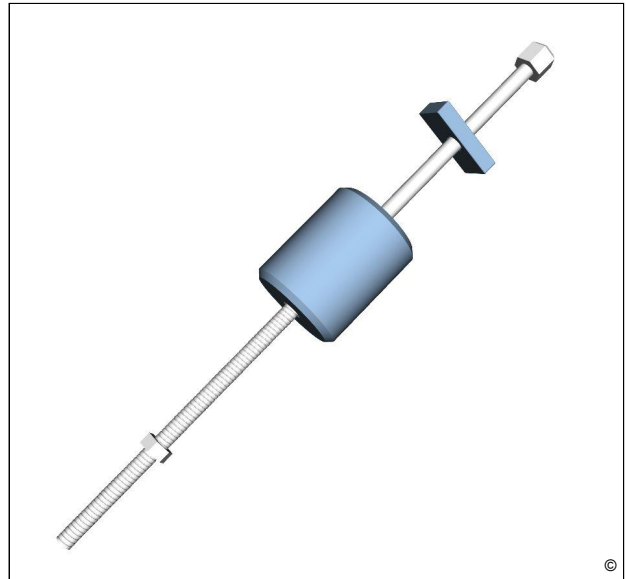


02992294

Slide hammer

Application example:

- Removing the injector sealing ring (in connection with the corresponding extraction device).



02992469

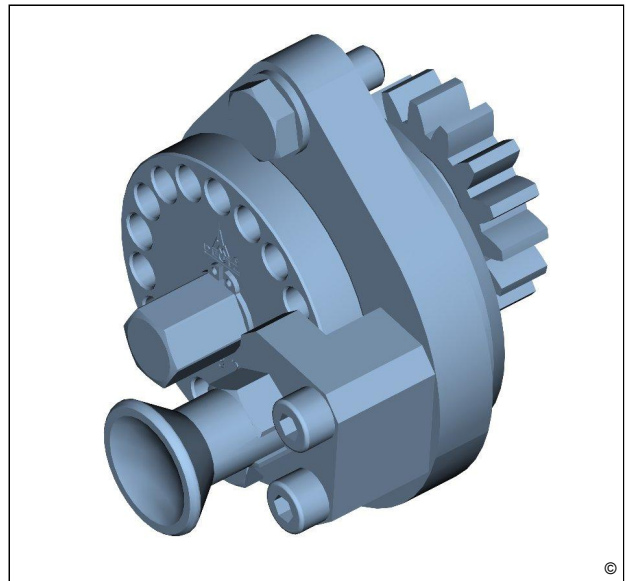
Turning gear/locking device

Adaptor in place of starter

- Spanner size: 17 mm
- Drive: External hexagon
- Fastening screws with collar

Application example:

- Turn or block crankshaft at the flywheel.



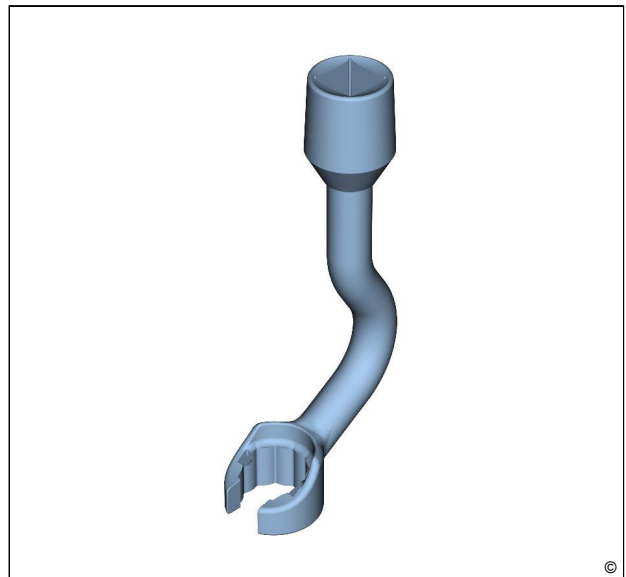
02992477

Special wrench

- Wrench size: 17 mm
- Drive: Square socket 1/2"

Application examples:

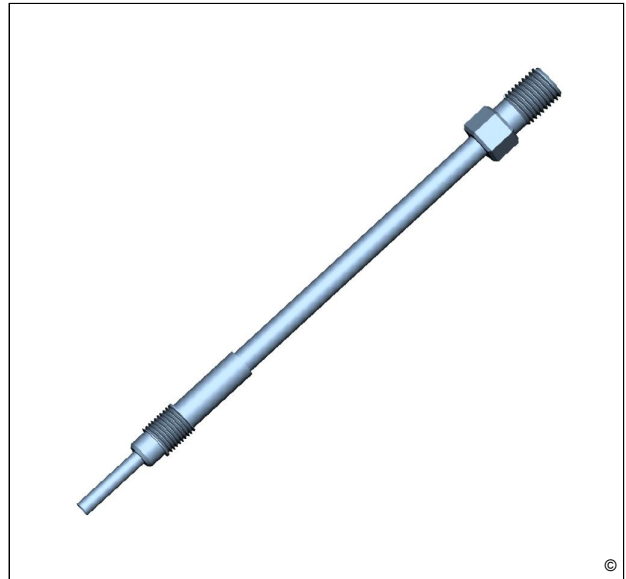
- Removing and installing the high-pressure line.
- Tightening the high-pressure line with torque.



02992481**Connection piece**

Application example:

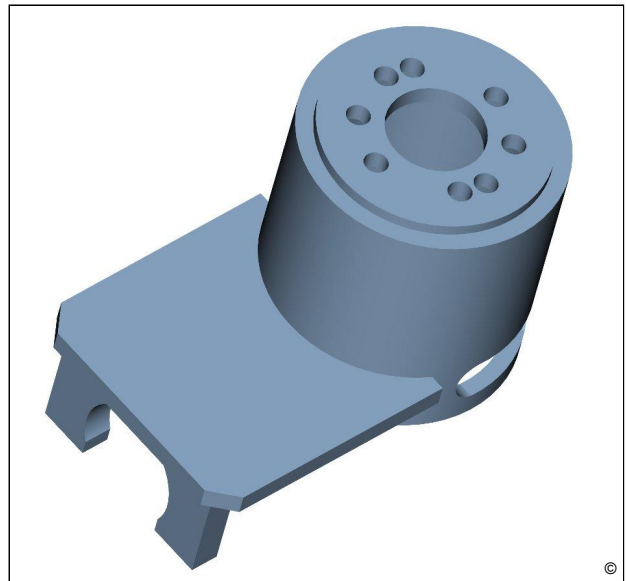
- Check compression pressure with the glow plugs disassembled (in connection with compression pressure tester 01899034).

**02992483****Counter holder**

- Fixing screws

Application example:

- Remove and install central screw (in conjunction with force multiplier 01899370 and socket wrench insert 01899055)

**Diagnostic tool SerDia 2010**

Check crankcase pressure



Conventional tools

Special tools:

- Crankcase pressure testing device 01899400



- Safety information/User information
- Service Bulletin
- Crankcase pressure testing device operating instructions



ATTENTION

Prerequisites:

- engine already in operation
- proper lubricating oil level
- engine at operating temperature
- air pressure normal

The test results may deviate from the target values slightly depending on the elevation of the engine.

Do not load the test manometer beyond the terminal values.



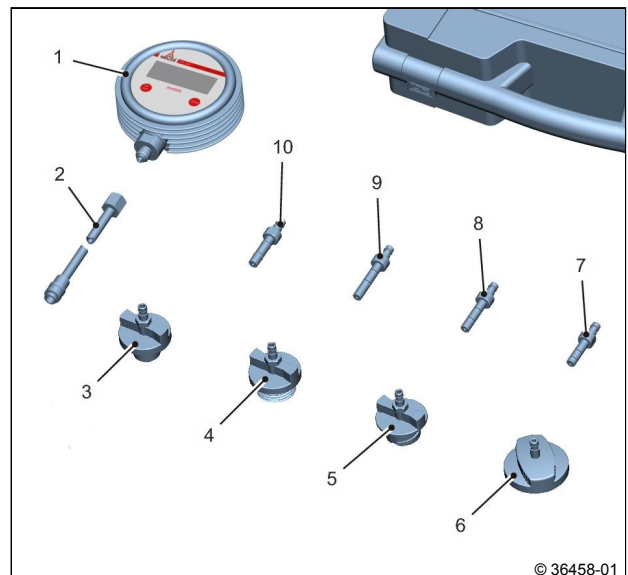
The test is carried out via the lubricating oil filler opening as standard.

If it is not possible to carry out the test via the lubricating oil filler opening then the test can be carried out via the lubricating oil dipstick guide using the appropriate connection piece.

All illustrations are shown as examples.

The following procedure describes the work process for all series by way of example.

- 1 Test manometer
01899427
- 2 Hose pipe
01899428
- 3 Test adapter
01899429
- 4 Test adapter
01899430
- 5 Test adapter
01899431
- 6 Test adapter
01899432
- 7 Connection piece
01899433
- 8 Connection piece
01899434



© 36458-01

9 Connection piece
01899435

10 Connection piece
01899436



The above-mentioned tools are components of the crankcase pressure testing device 01899400.

Check crankcase pressure (lubricating oil filler opening)

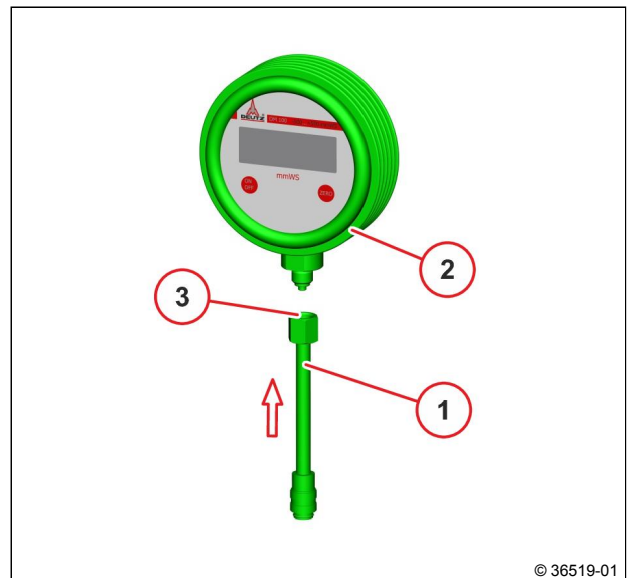
- Connect hose pipe (1) to the test manometer (2).

 hand tight



ATTENTION

Pay attention to the sealing ring (3).
Do not fasten the hose pipe too tightly.

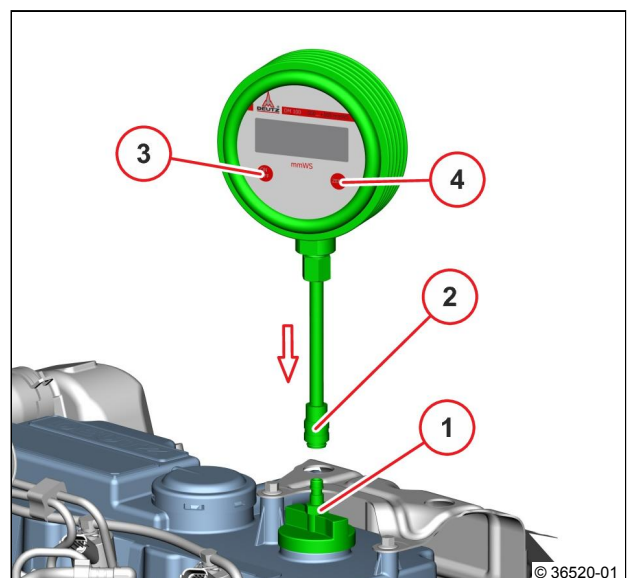


- Remove sealing cover.
- Position the corresponding test adapter (1).



Ensure that the installation position is correct.

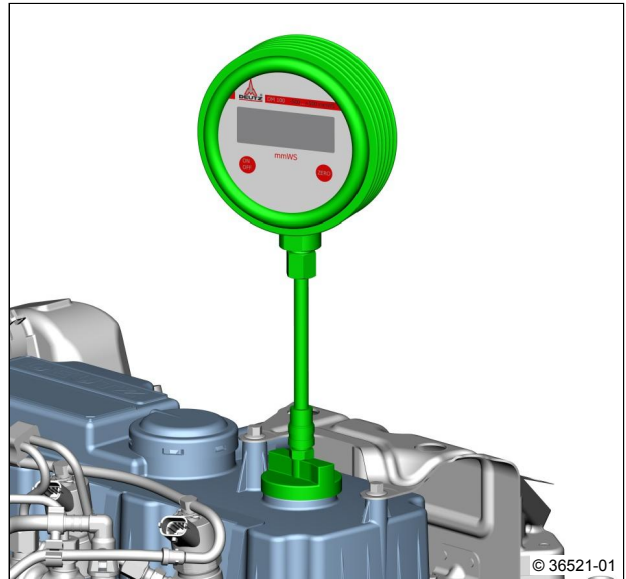
- Connect the quick release coupling (2) to the test adapter (1).
- Briefly press the button (3).
- The test manometer switches on.
- Keep button (4) pressed, until the test manometer shows 0 mmwg.



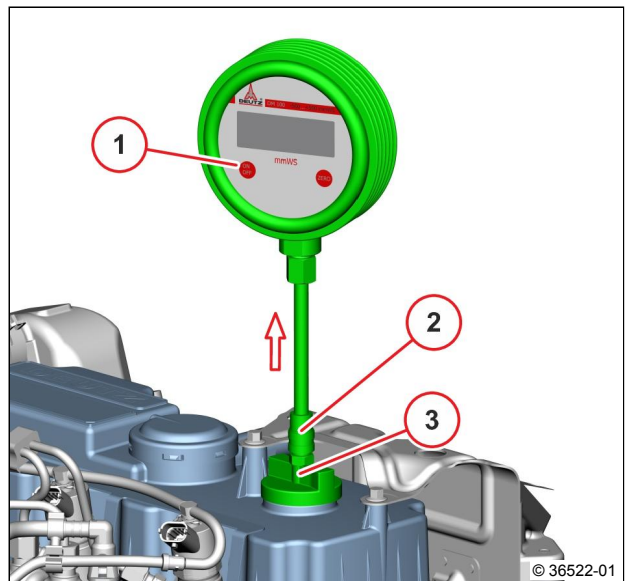
- Start the engine.
 - Read off the crankcase pressure from the test manometer.
 - Fast idler
 - Full load
- Target value:
-  Technical data for the corresponding series
Service Bulletin 0199-01-09521



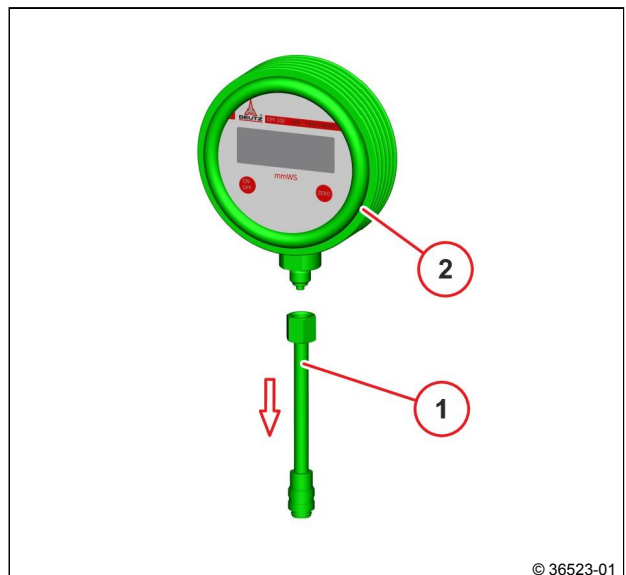
The values displayed fluctuate within the target range.



- Briefly press the button (1).
- The test manometer switches off.
- Detach the quick release coupling (2).
- Remove the test adapter (3).
- Fit the sealing cover.



- Disconnect the hose pipe (1) from the test manometer (2).
- Clean the parts.



Check crankcase pressure (lubricating oil dipstick guide)

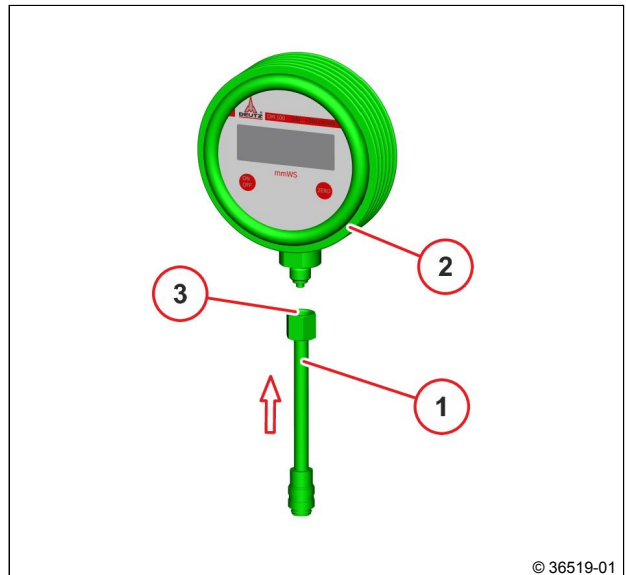
- Connect hose pipe (1) to the test manometer (2).

 hand tight



ATTENTION

Pay attention to the sealing ring (3).
Do not fasten the hose pipe too tightly.



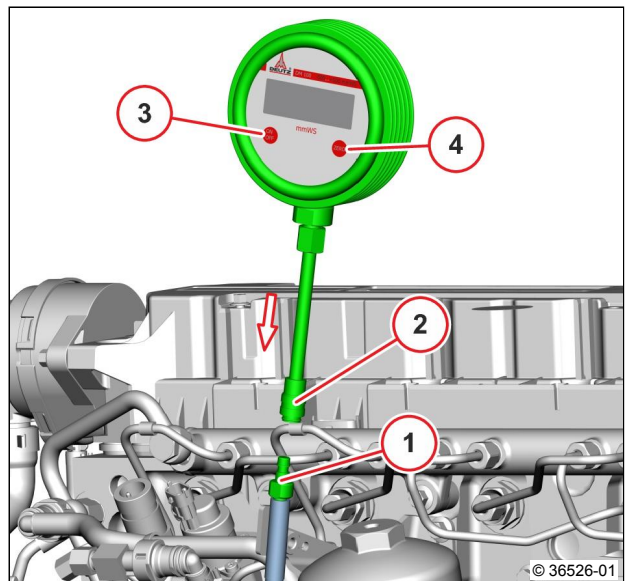
© 36519-01

- Pull out the lubricating oil dipstick.
- Determine the connecting piece according to the inner diameter.
- Insert connection piece (1).



Pay attention to the O-ring.
Ensure that the installation position is correct.

- Connect the quick release coupling (2) to the connection piece (1).
- Briefly press the button (3).
– The test manometer switches on.
- Keep button (4) pressed, until the test manometer shows 0 mmwg.

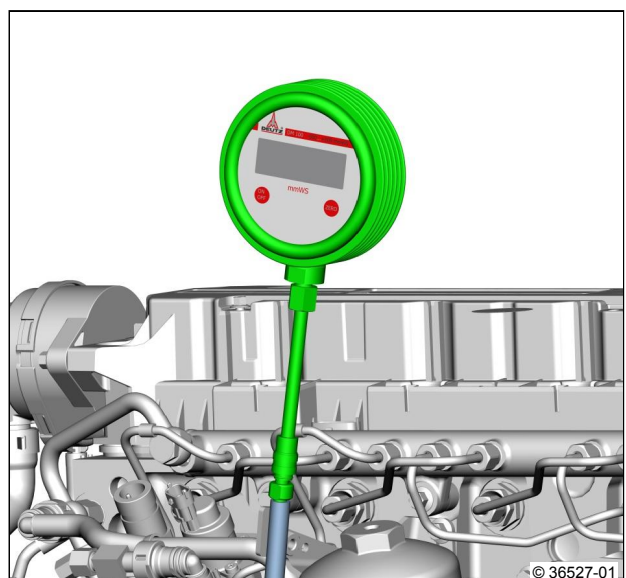


© 36526-01

- Start the engine.
- Read off the crankcase pressure from the test manometer.
– Fast idler
– Full load

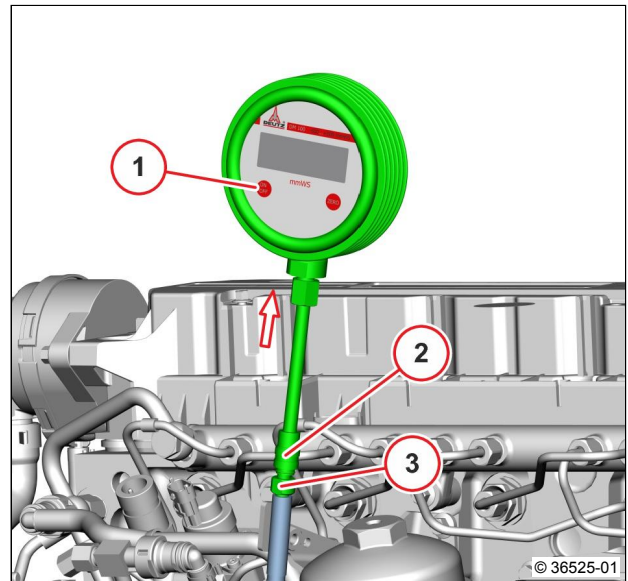
Target value:

 Technical data for the corresponding series
Service Bulletin 0199-01-09521

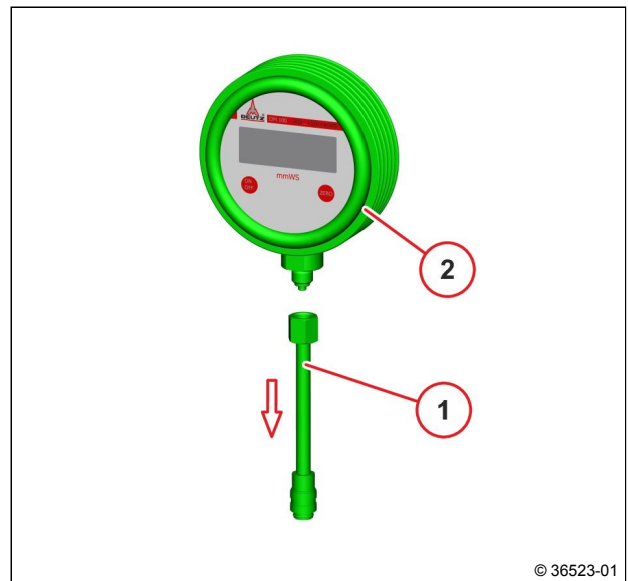


© 36527-01

- Briefly press the button (1).
- The test manometer switches off.
- Detach the quick release coupling (2).
- Pull out the connection piece (3).
- Insert the lubricating oil dipstick.



- Disconnect the hose pipe (1) from the test manometer (2).
- Clean the parts.



Removing and installing the control valve



Conventional tools



- Safety information/User information
- Service Bulletin
0199-99-11066



DANGER

Hot parts!

Risk of burns / Risk of explosion!
Let the engine / components cool down sufficiently (to at least ambient temperature).



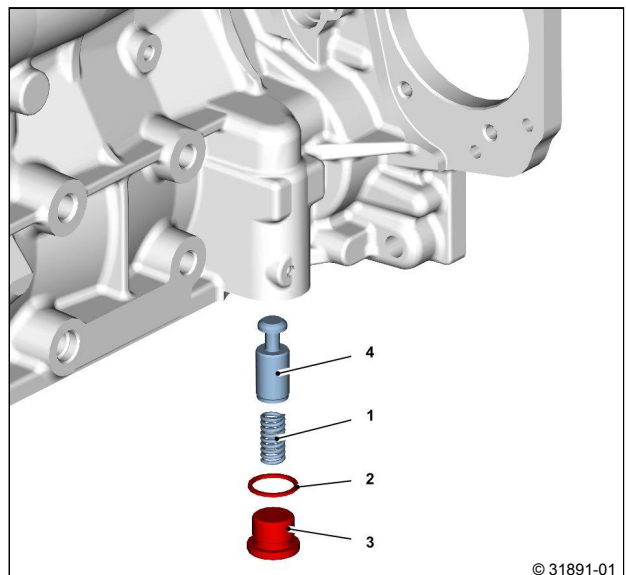
Collect escaping operating media in suitable vessels and dispose of them according to regulations.
For emptying and filling the engine, the corresponding operating manual must be observed.



For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

Removing the control valve

- 1 Compression spring
- 2 Sealing ring
- 3 Locking screw
- 4 Valve piston



© 31891-01



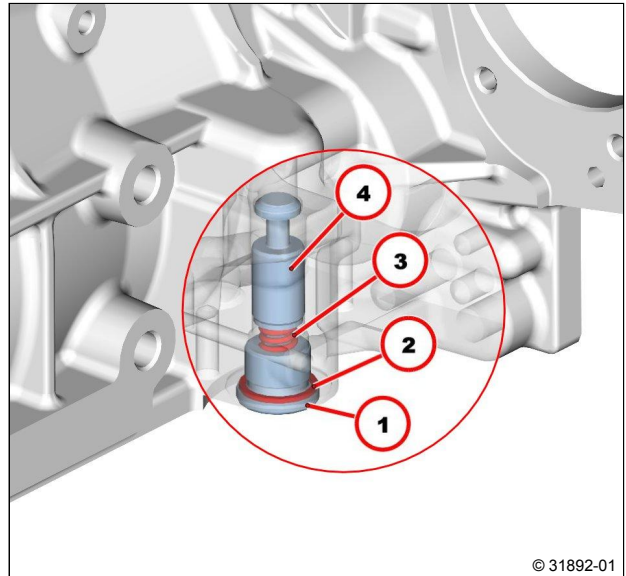
DANGER

Hot parts!
Risk of injury!
High spring tension!
Components can spring out during removal!

- Remove locking screw (1).
- Remove sealing ring (2).
- Remove valve spring (3).
- Remove valve piston (4).



Collect draining lubricating oil and dispose of properly.



© 31892-01

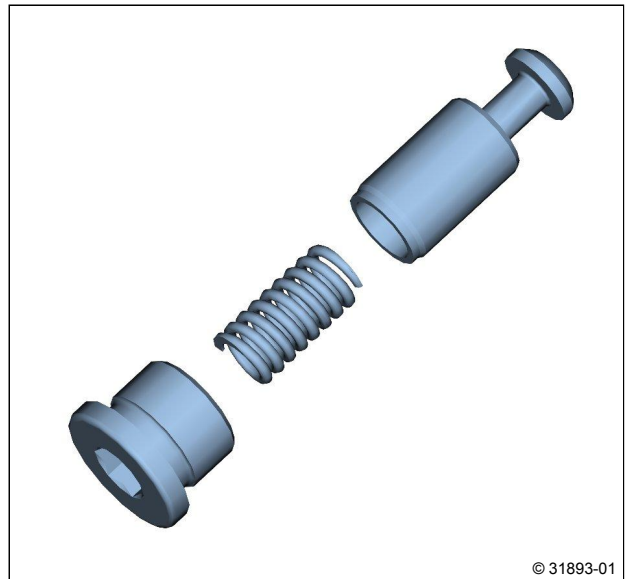
- Clean the parts.
- Visually inspect components.



Renew components if worn.



Service Message 0199-99-11066



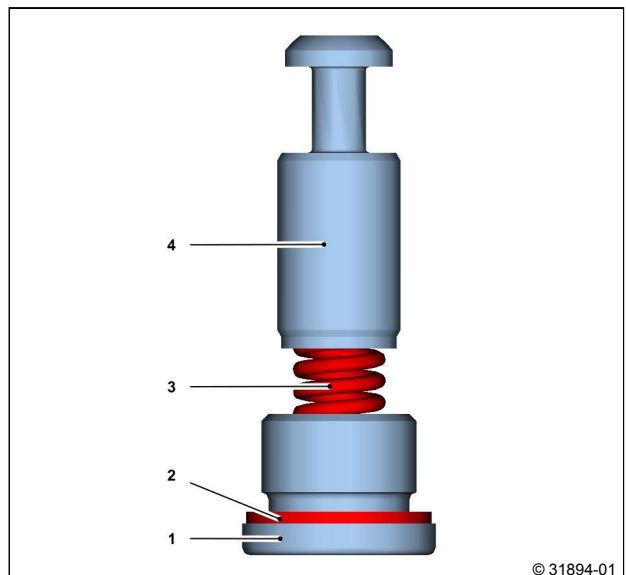
© 31893-01

Installing the control valve

- Assemble control valve.



Use new sealing ring.
Note order of assembly.
See graphic.



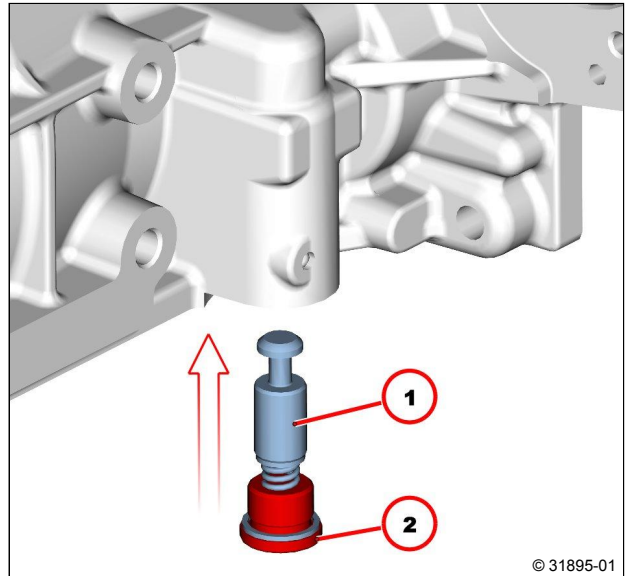
© 31894-01



DANGER
High spring tension!

- Insert control valve (1) completely in the direction of the arrow.
- Screw on locking screw (2).
- Tighten locking screw (2).

 65 Nm



Oil measuring device



Conventional tools

Special tools:

– Disassembly tool

02992127



– Safety information / User information



Different add-on variants are used depending on the engine.

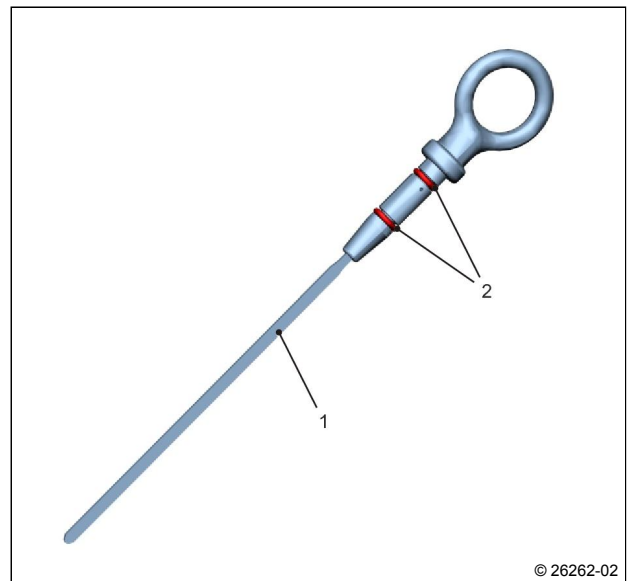
The following procedure is described, using one installation variant as an example.

The procedure is the same for other installation variants.

All illustrations are shown as examples.

Disassembly / Assembly

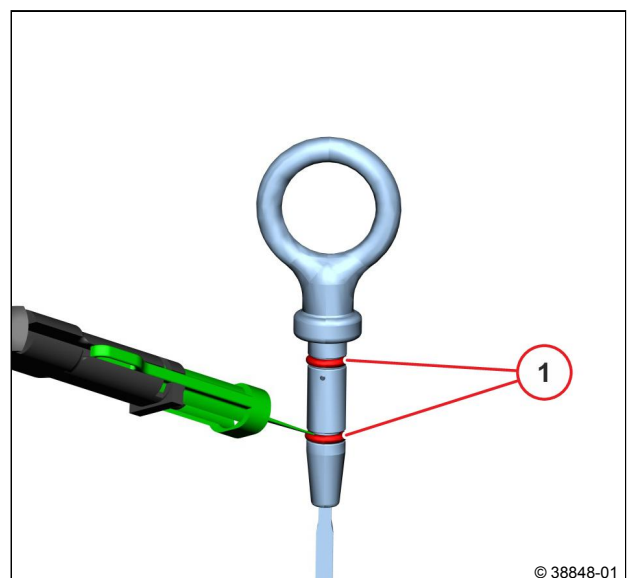
- 1 Oil dipstick
- 2 O-ring



- Remove round sealing rings (1) with disassembly tool.



Use new O-rings.



Removing and installing the drive flange



Conventional tools:

- Torque wrench
≥150 Nm
- Adaptor 1/2" inner square
socket to 1" outer square
socket

Special tools:

- Socket wrench insert,
spanner size 32 mm 01899055
- Force multiplier 01899370
- Counter holder 02992483
- Turning gear/locking device 02992469



- Screws M10x25 01183652



- Safety information / User information
- Operating manual



ATTENTION

Ensure utmost cleanliness.
A new friction disc must always be used if
there is no friction disc present.
The friction disc must always be renewed
after dismantling.



For the tightening procedure according to
torque using a torque wrench, a maximum
variation of the tightening torque of +/- 10%
is permissible.

Remove drive flange

- Remove the V-belt / V-ribbed belt.
 Operation manual
- Remove V-ribbed pulley / V-belt pulley.
 Module 05

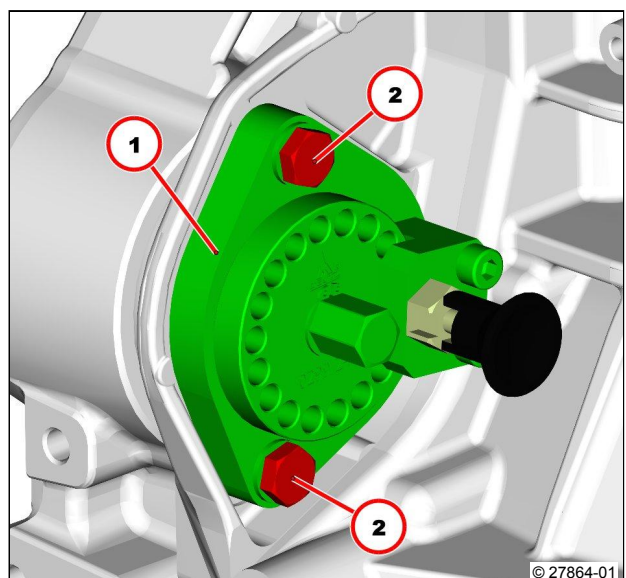
- Remove starter.
 Module 44

- Insert turning gear/locking device (1).



Toothed wheel of the turning gear / locking
device in the toothed starter ring.

- Tighten screws (2).
 25 Nm



- Pull out and turn detent pin (1).

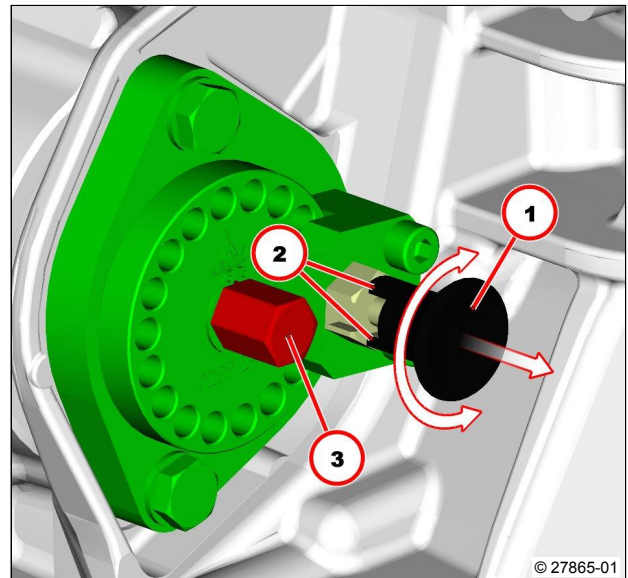


Observe position of the latches (2).

- Turn drive (3) carefully until the detent pin latches into place.



Observe engine direction of rotation.



- Mount counter holder (1).

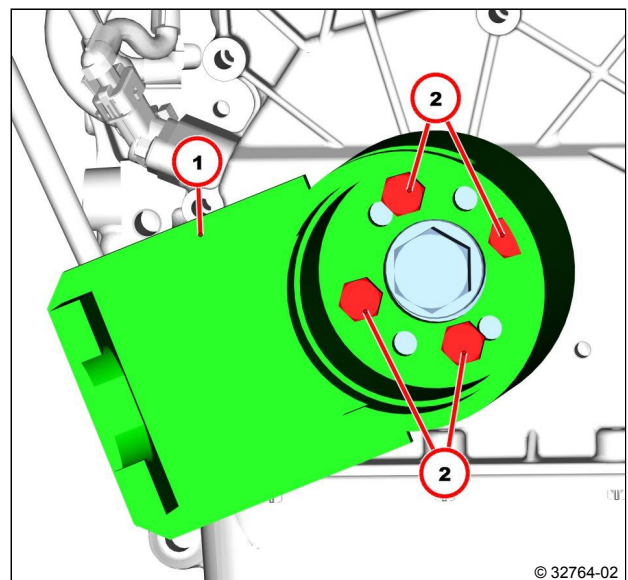


ATTENTION

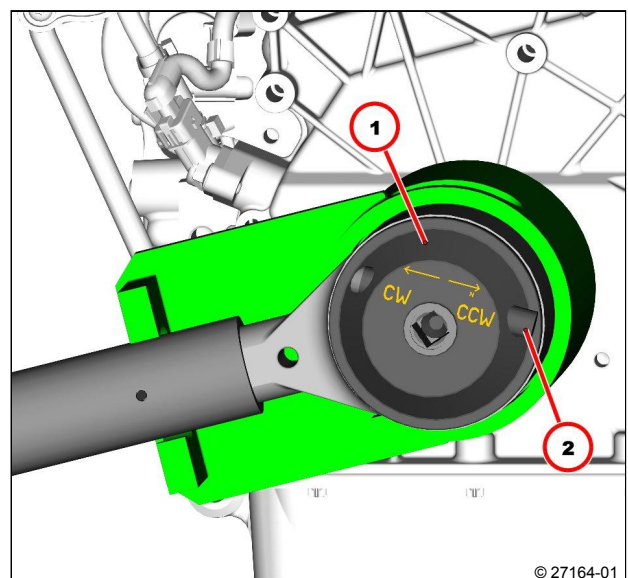
Do not twist crankshaft.

- Tighten screws (2).
- M10x25
- Tighten screws (2).

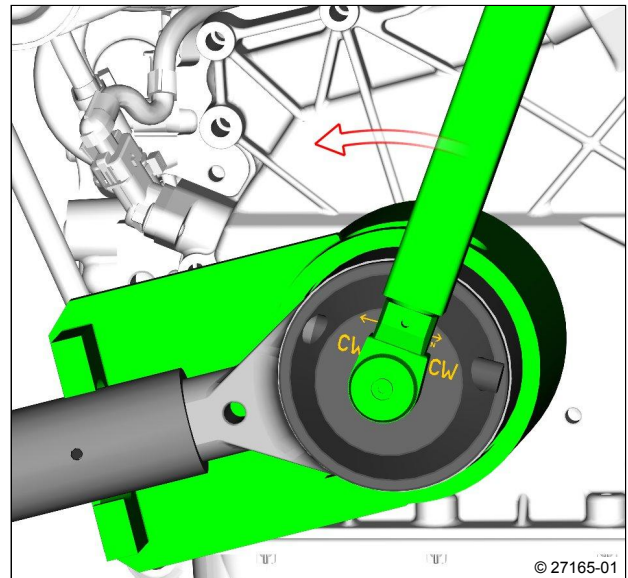
 30 Nm



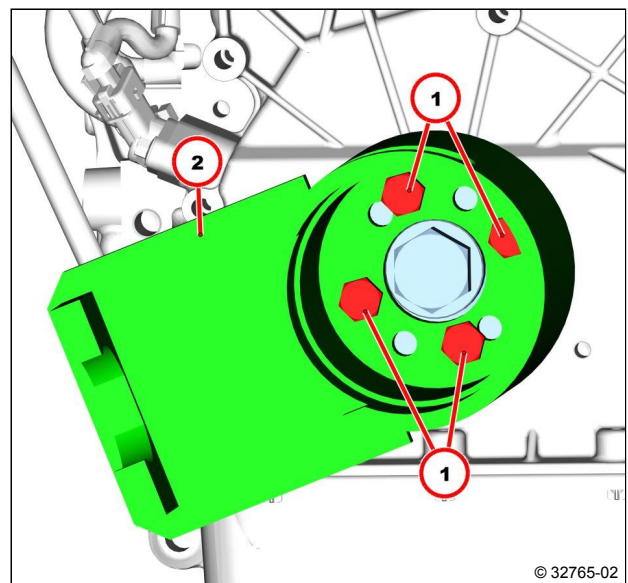
- Insert socket wrench insert and force multiplier (1).
- Snap in non-return device (2) in position CCW.



- Hold force multiplier.
- Loosen central screw in direction of arrow.
- Remove force multiplier and socket wrench insert.



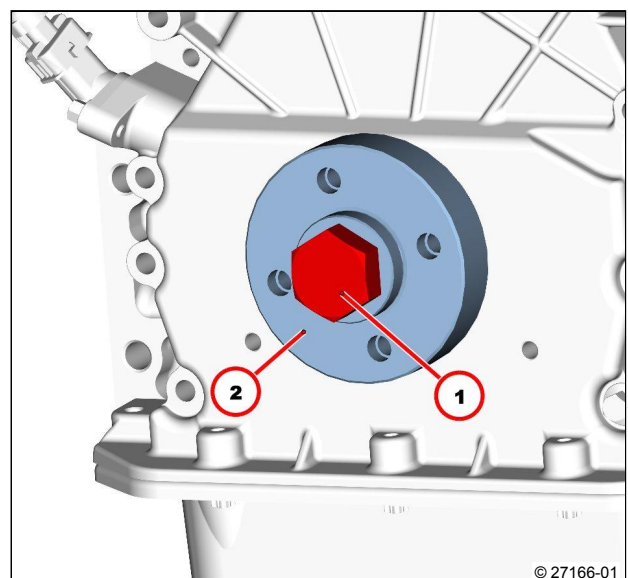
- Unscrew screws (1).
- Remove counter holder (2).



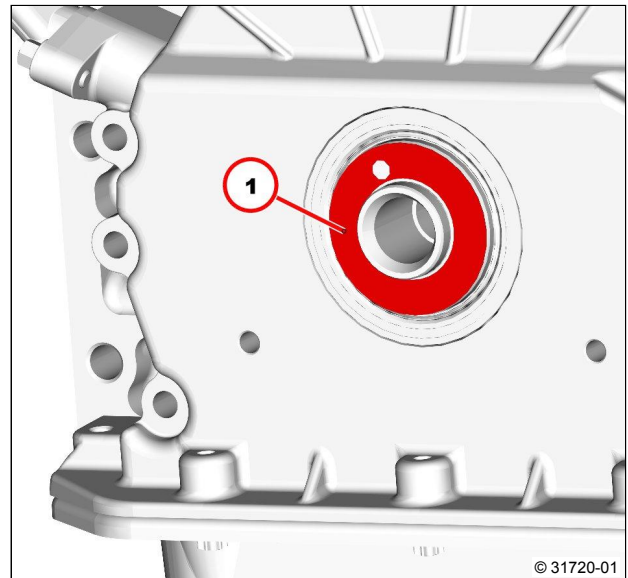
- Unscrew screw (1).
- Remove flange (2).



Figure is an example.



- If present:
- Remove friction disc (1).

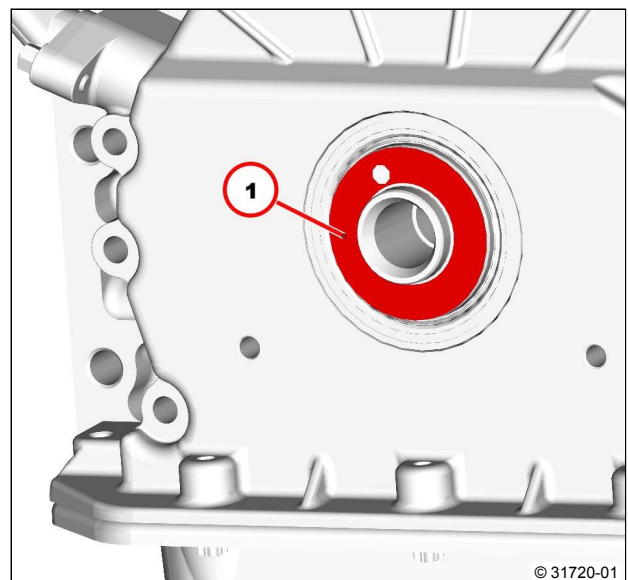


Install drive flange

- Position new friction disc (1).



ATTENTION
Ensure that the installation position is correct.

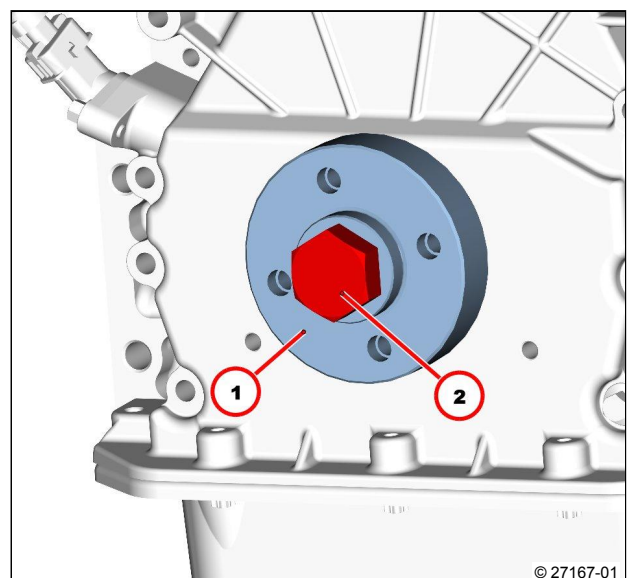


- Mount flange (1).



All connecting surfaces must be clean and free of oil.
Figure is an example.

- Screw on new central screw (2).



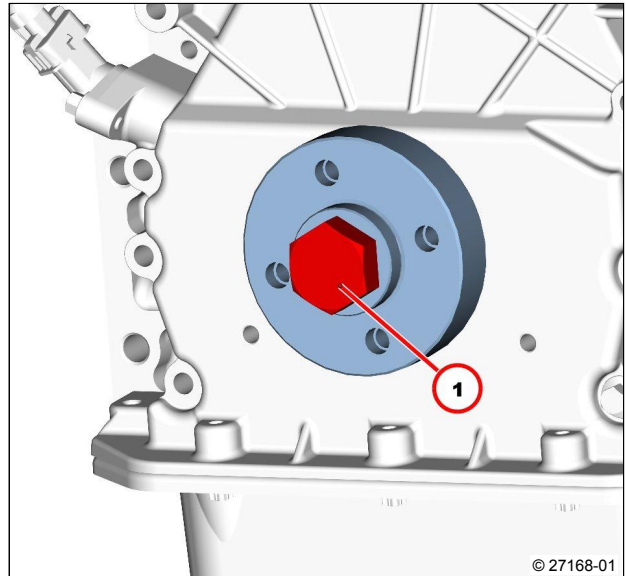
- Tighten central screw (1) using socket wrench insert.



Stage 1: 130 Nm



Figure is an example.



- Mount counter holder (1).



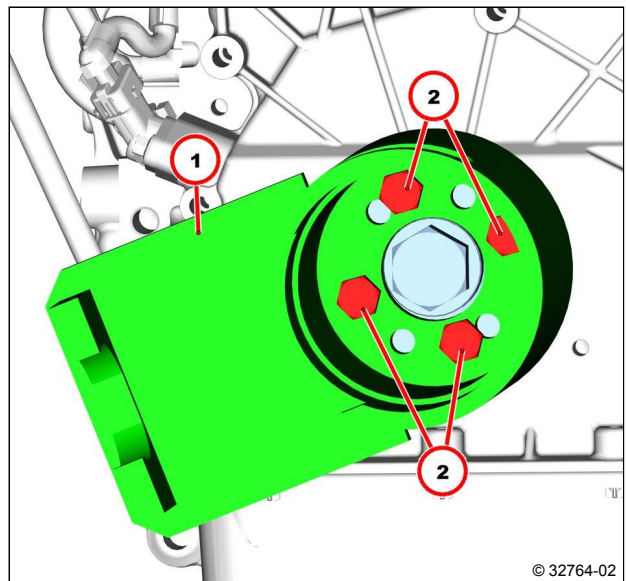
ATTENTION

Do not twist crankshaft.

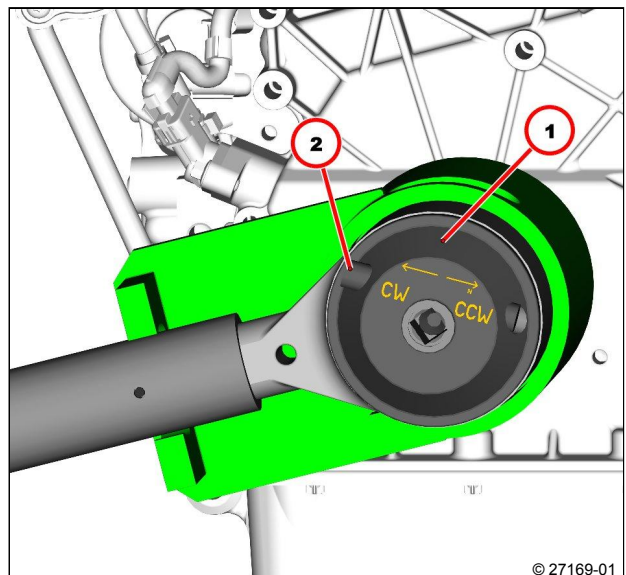
- Tighten screws (2).
- M10x25
- Tighten screws (2).



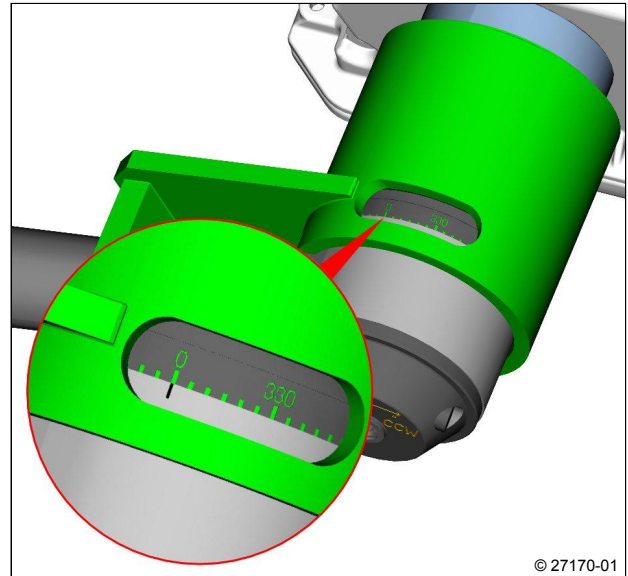
30 Nm



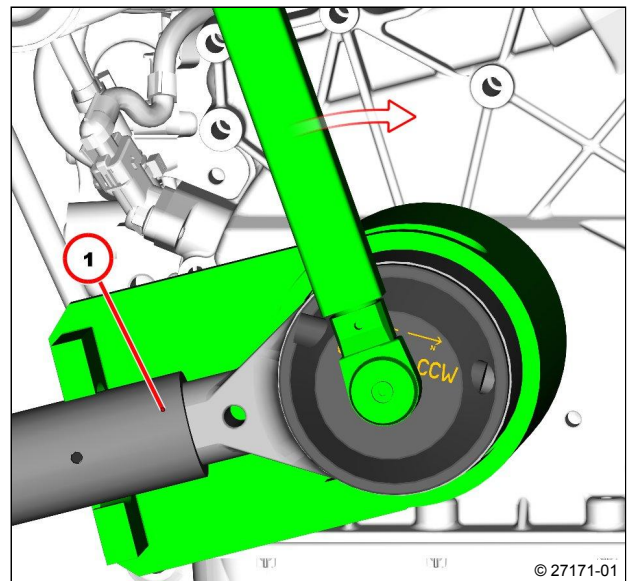
- Insert socket wrench insert and force multiplier (1).
- Snap in non-return device (2) in position CW.



- Set graduated collar to "0".



- Hold force multiplier (1).
 - Tighten central screw in direction of arrow.
-  Stage 2: 150°



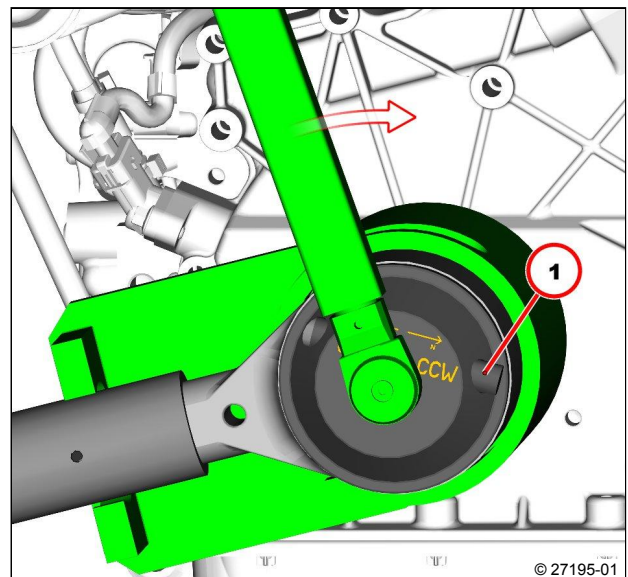
- Keep torque wrench pressed in direction of arrow.
- Move non-return device (1) into position CCW.



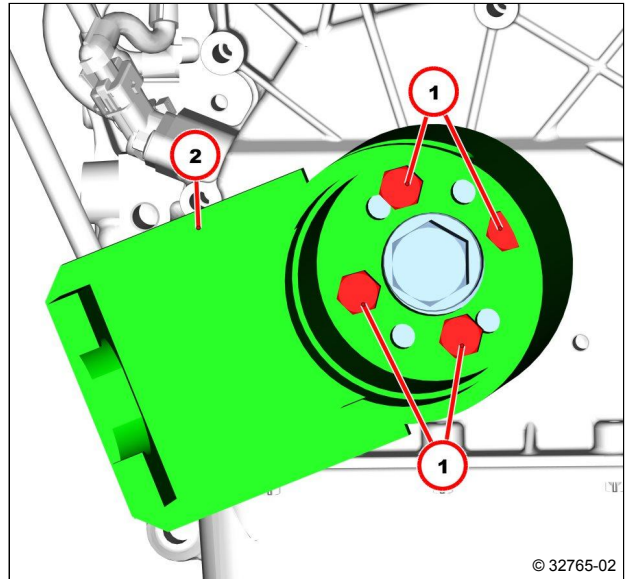
DANGER

There is danger of injury if a force multiplier is removed without being discharged.

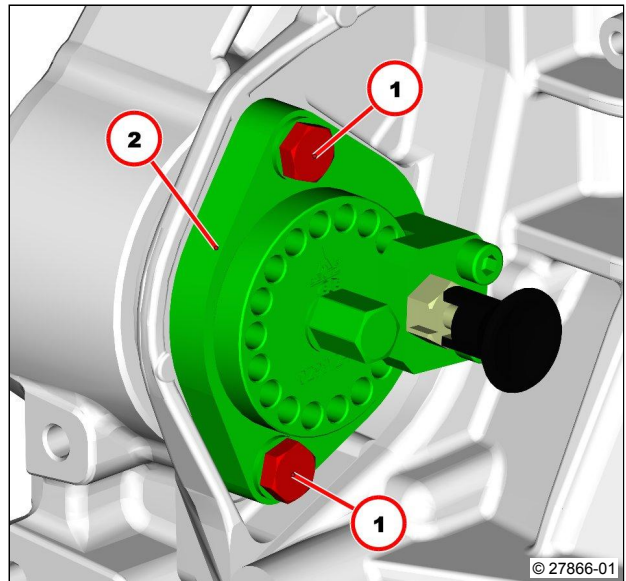
- Remove force multiplier and socket wrench insert.



- Unscrew screws (1).
- Remove counter holder (2).



- Unscrew screws (1).
- Remove turning gear/locking device (2).
- Install the starter.
 Module 44
- Fit V-ribbed pulley / V-belt pulley.
 Module 05
- Fit and tension V-belt / V-ribbed belt.
 Operating manual



Removing and installing the flywheel



Conventional tools

Special tools:

– Rotation angle disc 01899093



– Guide pin (self-production of screw - DEUTZ part number 04207955)
M10x1
length 85 mm

– Auxiliary screws M8x100

– Auxiliary screws M10x120



– Safety information / User information



Different flywheels are used depending on the engine. The following procedure is described, using a flywheel as an example. Proceed in the same way for other flywheels.

All illustrations are shown as examples.

The auxiliary screw to be used depend on the respective flywheel. Due to there being various versions, the listed auxiliary screws are also examples.

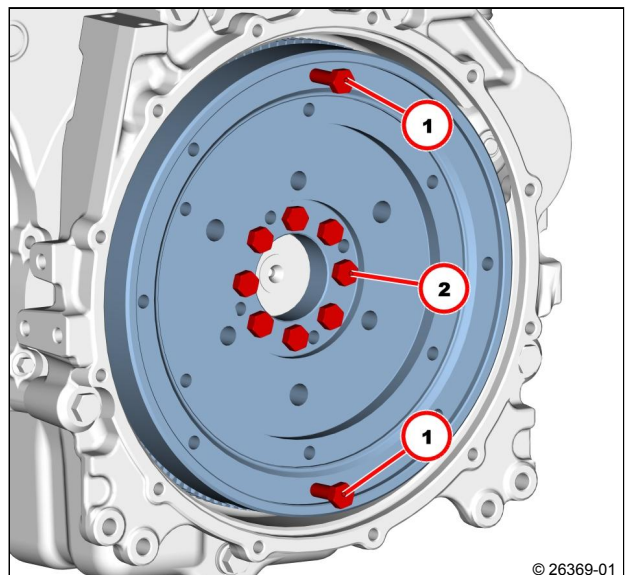
For versions with a bearing liner, the bearing liner must be pressed in and out with a press.



For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

Remove flywheel

- Hold the crankshaft at the central screw.
- Screw in auxiliary screws (1).
- Unscrew screws (2).
- Remove flywheel using auxiliary screws.
- Visually inspect the components.



© 26369-01

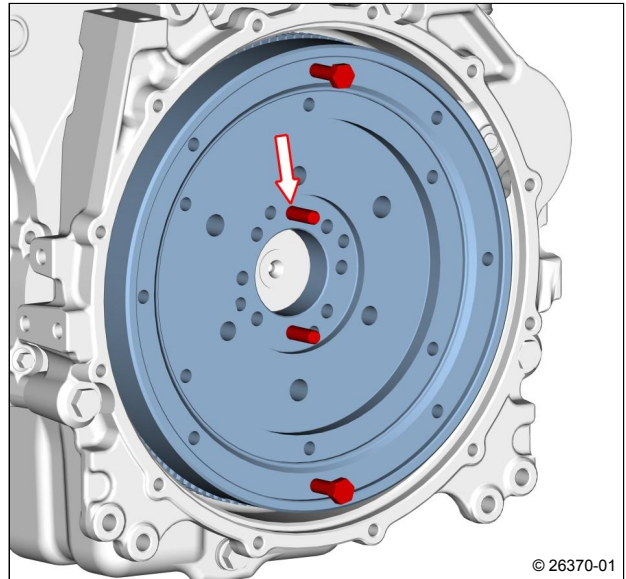
Install the fly wheel

- Install internally manufactured guide pins (arrow).



The bores in the flywheel must be aligned with the threaded holes in the crankshaft flange.

- Mount flywheel using auxiliary screws.



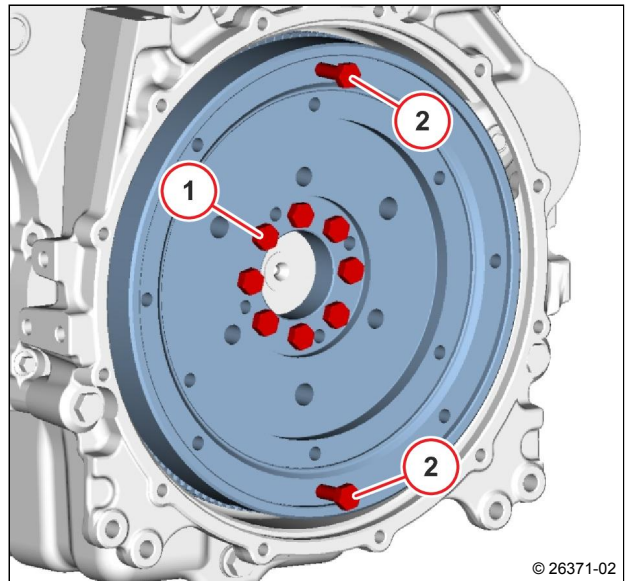
© 26370-01



ATTENTION

Replace screws every time they are loosened.

- Oil the screws lightly.
- Tighten screws (1).
- Remove guide pins.
- Tighten screws (1) alternately.
 -  Stage 1: 30 Nm
- Tighten screws (1) with rotation angle disc.
 -  Stage 2: 60°
 -  Stage 3: 30°
- Unscrew auxiliary screws (2).



© 26371-02

Removing and installing sensor wheel



Conventional tools



– Locking agent DEUTZ DW 72



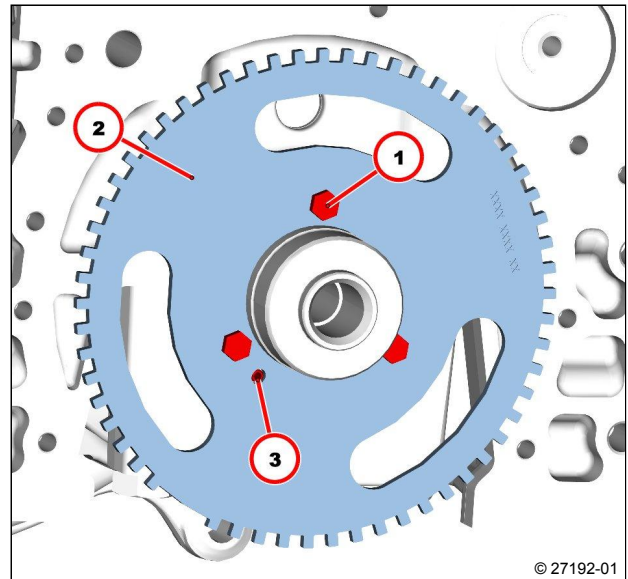
– Safety information / User information



For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

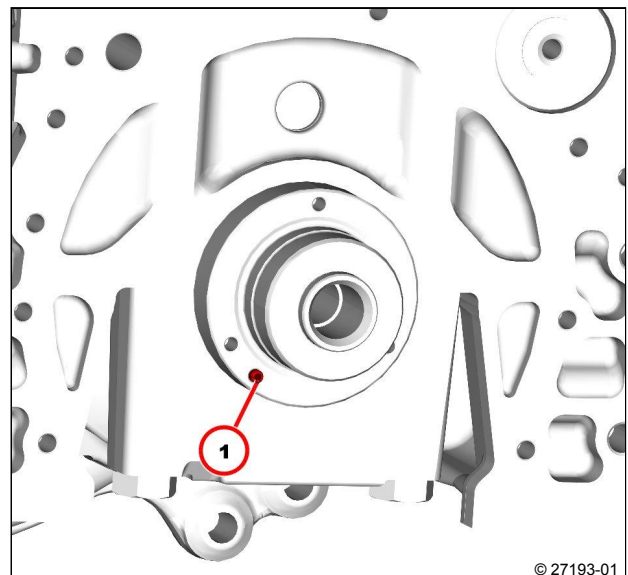
Removing sensor wheel

- Remove lubricating oil pan.
 Module 02
- Remove front cover.
 Module 09
- Unscrew screws (1).
- Remove sensor wheel (2).
- Remove clamping pin (3).
- Clean threaded bores.



Installing sensor wheel

- Drive in the new clamping pin (1) as far as it will go.



- Position sensor wheel (1).
- Insert screws with locking agent.
- Tighten screws (2).



8.5 Nm

- Fit front cover.

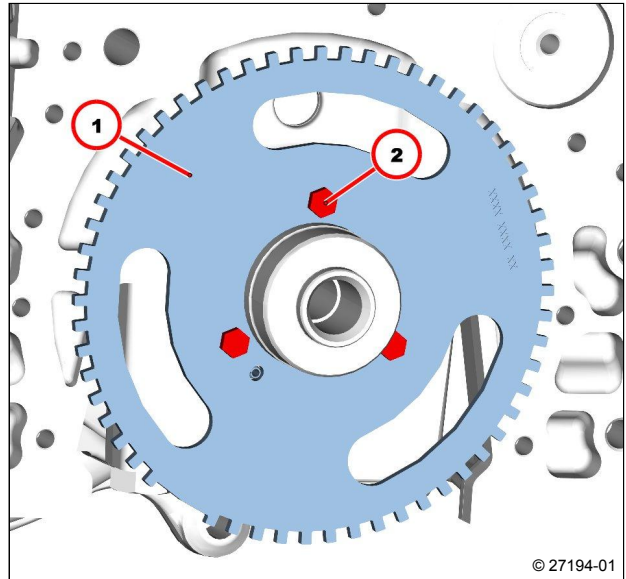


Module 09

- Install lubricating oil pan.



Module 02



© 27194-01

V-belt pulley / V-rib belt pulley (Fastening parts)



Conventional tools



- Safety information / User information
- Operating manual



For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

Disassembly / Assembly

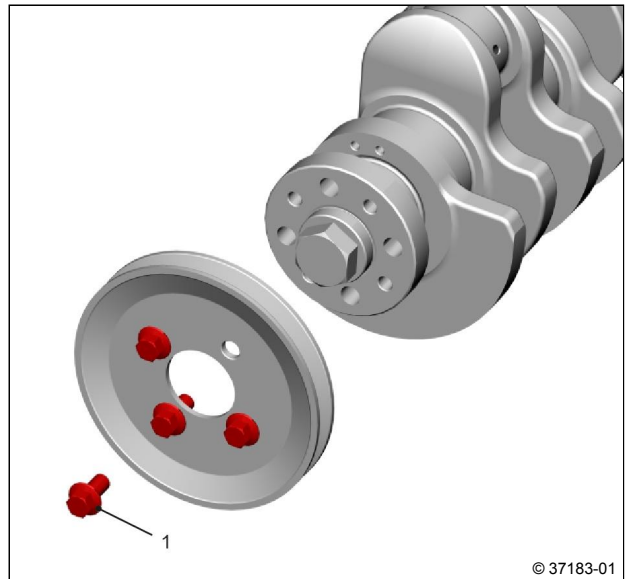
Variant with V-belt pulley

- 1 Hexagon head screw

 60 Nm

- Tighten screws alternately.
- Remove/install the V-belt.

 Operating manual



© 37183-01

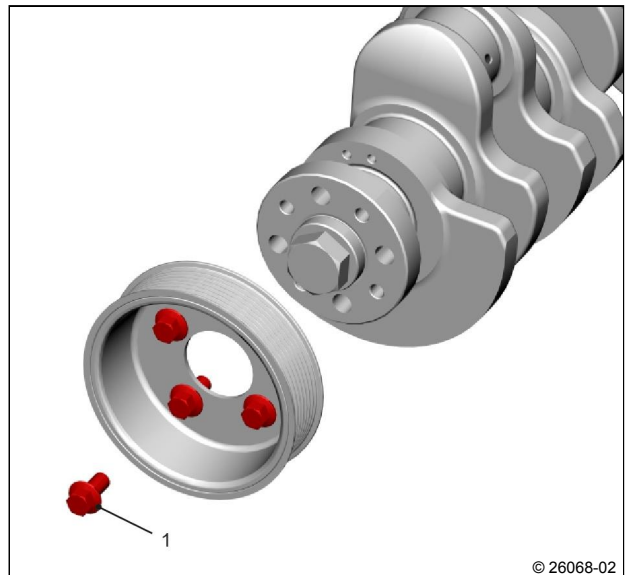
Variant with V-rib belt pulley

- 1 Hexagon head screw

 60 Nm

- Tighten screws alternately.
- Remove/install the V-ribbed belt.

 Operating manual



© 26068-02

Checking the compression pressure (when glow plugs/locking screws are removed)



Conventional tools

Special tools:

- Compression pressure gauge 01899034
- Chart sheets 01899193
- Adapter (for compression pressure gauge with quick coupling) 01899437
- Connection piece 02992481
- Diagnostic tool SerDia 2010



- Protective glasses
- Protective gloves



– Safety information / User information



These instructions are described for a 4-cylinder engine.

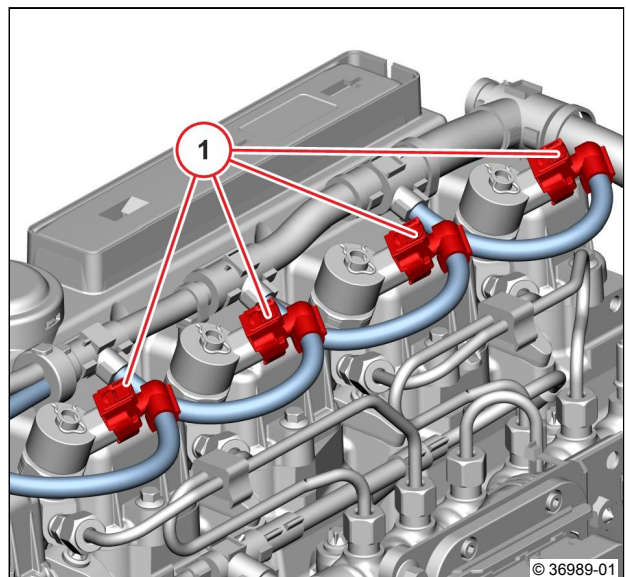
Perform the compression check on all cylinders consecutively.
The following work procedure is described for cylinder 1 as an example.
Repeat this procedure for the remaining cylinders.
Read out the error log on the engine control unit with SERDIA.



For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

Checking the compression pressure

- Unlock and pull off cable plug (1).
- **Version with glow plugs:**
 - Remove the glow plugs. Module 63
- **Version with locking screws:**
 - Remove locking screws (glow plugs). Module 63

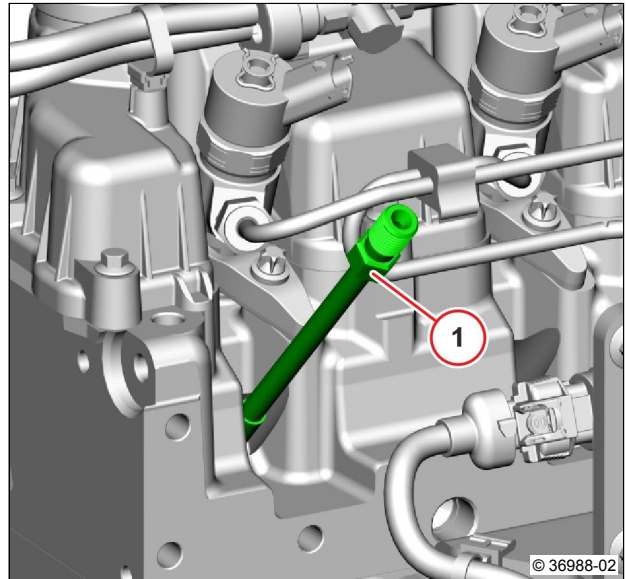




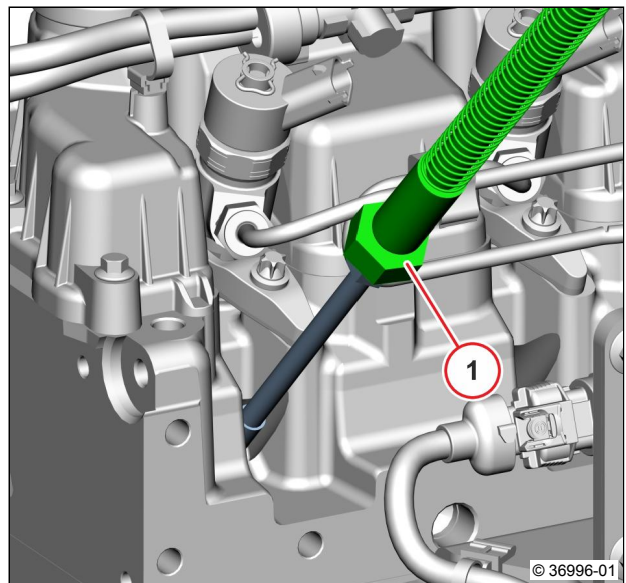
The following work procedure is to be performed on every cylinder.

- Screw in connection piece (1).
- Tighten the connection piece (1).

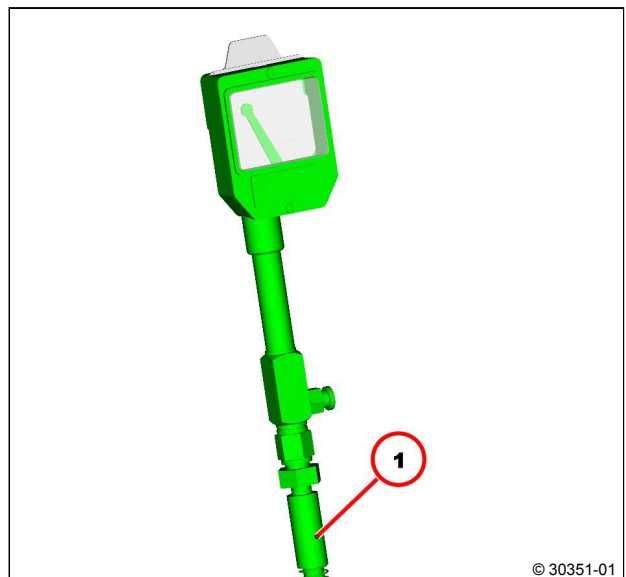
 15 Nm



- **Compression pressure gauge with quick release coupling design:**
 - Screw the adapter 01899437 onto connection piece.
 - Connect the quick release coupling to the adapter 01899437.
- **Compression pressure gauge with screw connection design:**
 - Screw adapter (1) onto the connection piece.

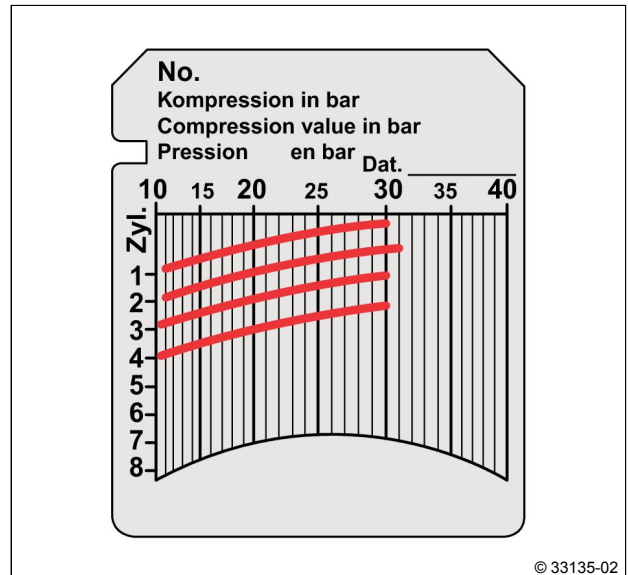


- Connect compression pressure gauge to adapter (1).
- Rotate the engine with the starter.
- Check the compression pressure.

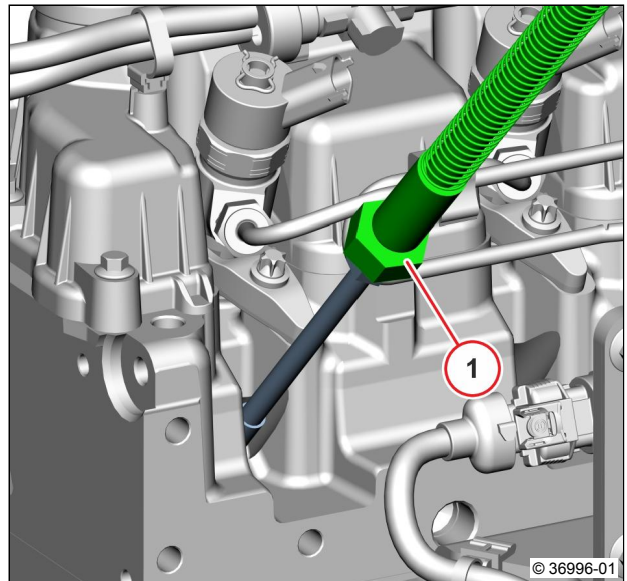




The measured compression pressure depends on the start-up speed during the measuring process and the elevation of the engine installation site. Threshold values can therefore not be exactly determined. It is advisable to take compression pressure measurements as a comparison measurement of all cylinders in the engine. If more than 15% deviation is determined, the cause must be determined by disassembling the relevant cylinder unit.



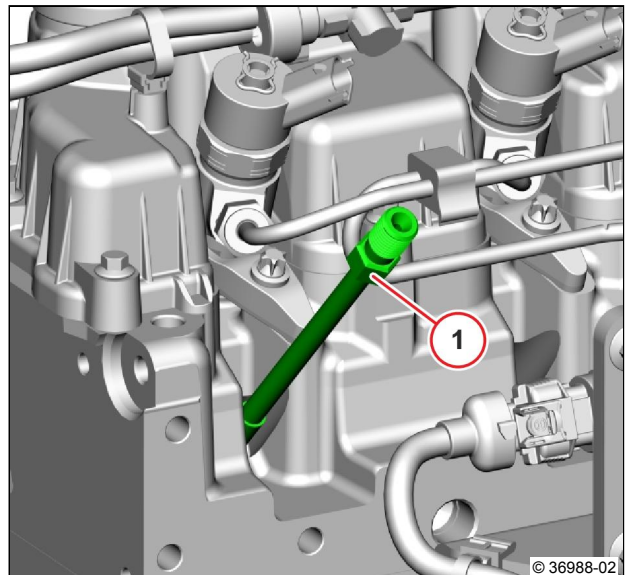
- **Compression pressure gauge with quick release coupling design:**
 - Take apart the compression pressure gauge with quick release coupling.
- **Compression pressure gauge with screw connection design:**
 - Disconnect the adapter (1) from the connection piece.



- Unscrew the connection piece (1).
- Remove connection piece (1).



Perform the compression check on the next cylinder.



- **Version with glow plugs:**

- Install the glow plugs.

 Module 63

- **Version with locking screws:**

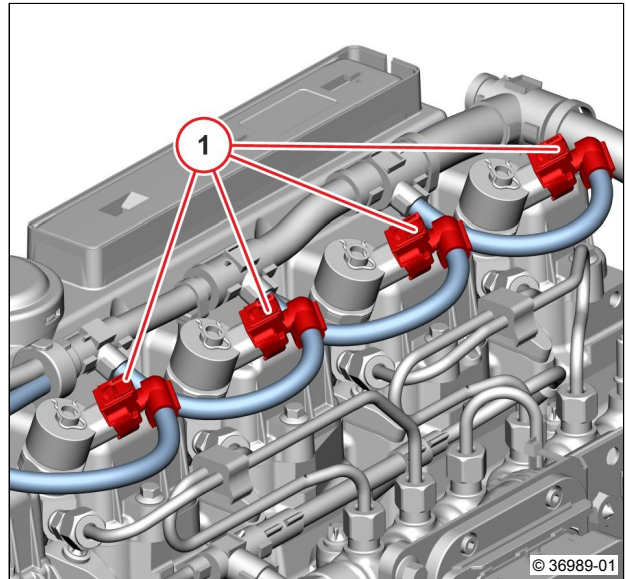
- Install locking screws (glow plugs).

 Module 63

- Insert and lock cable plug (1) into place.



Ensure that there is a proper connection.
Read out the error log on the engine control
unit with SERDIA.



Checking the compression pressure (when injectors are removed)



Conventional tools

Special tools:

- Compression pressure gauge 01899034
- Chart sheets 01899193
- Hexalobular tool kit 01899092
- Tool kit (check compression pressure) 01899403
- Fuel hose clamp 01899404
- Adapter (for compression pressure gauge with quick coupling) 01899437
- Connection piece 02992017
- Diagnostic tool SerDia 2010



- Protective glasses
- Protective gloves



– Safety information / User information



DANGER

Under no circumstances should the rail be closed completely.
No electrical wiring should be left exposed.
Prevent sparking.
Wear protective gloves and glasses!



These instructions are described for a 4-cylinder engine.
Perform the compression check on all cylinders consecutively.
The following work procedure is described for cylinder 1 as an example.
Repeat this procedure for the remaining cylinders.
Read out the error log on the engine control unit with SERDIA.



For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

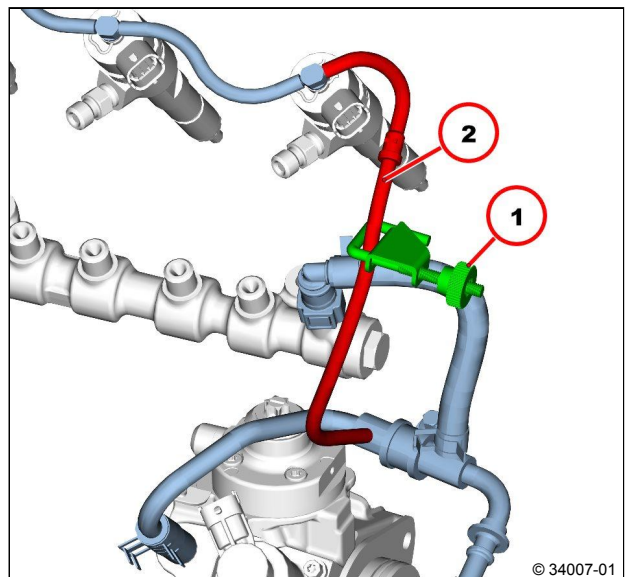
Checking the compression pressure

- Removing the injector.
 Module 19
- Attach fuel hose clamp (1) to return line (2).



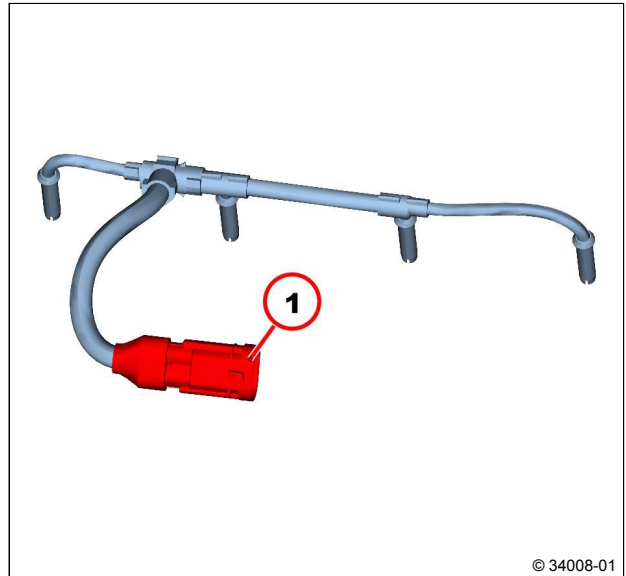
ATTENTION

Do not damage return line.
Do not lay return line on hot parts.



© 34007-01

- Unlock and pull off cable plug (1).
– from cable harness of glow plugs

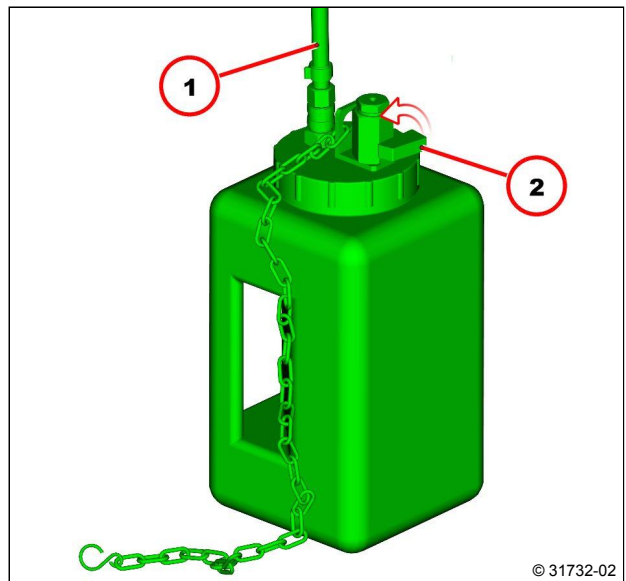


- Mount hose pipe (1) on collecting vessel.
- Open breather valve (2) in the direction of the arrow.
- Position collecting vessel securely.



ATTENTION

Secure collecting vessel against overturning, heat and damage.

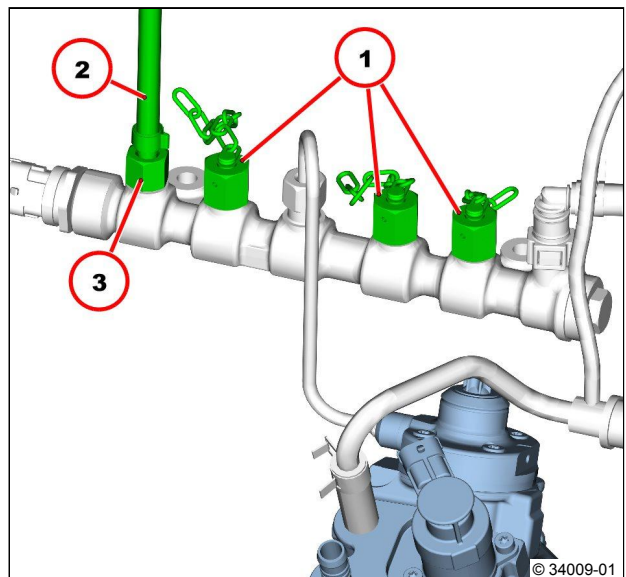


- Screw on caps (1).
– Tighten caps (1).
- Mount hose line (2).
– Tighten union nut (3).



ATTENTION

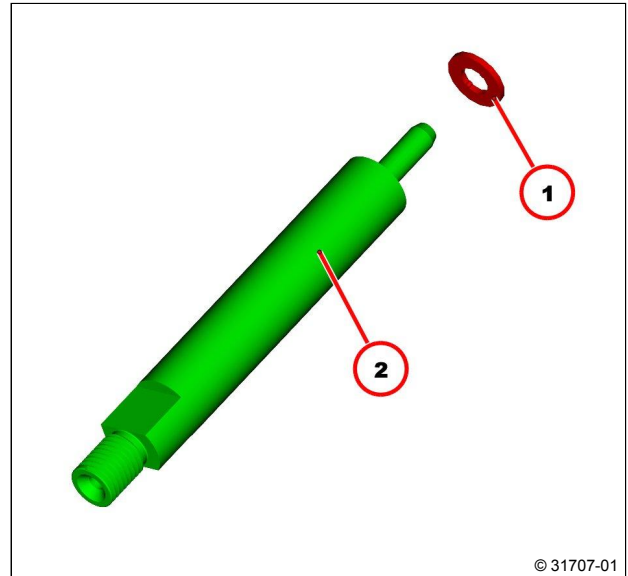
Do not damage sealing cone





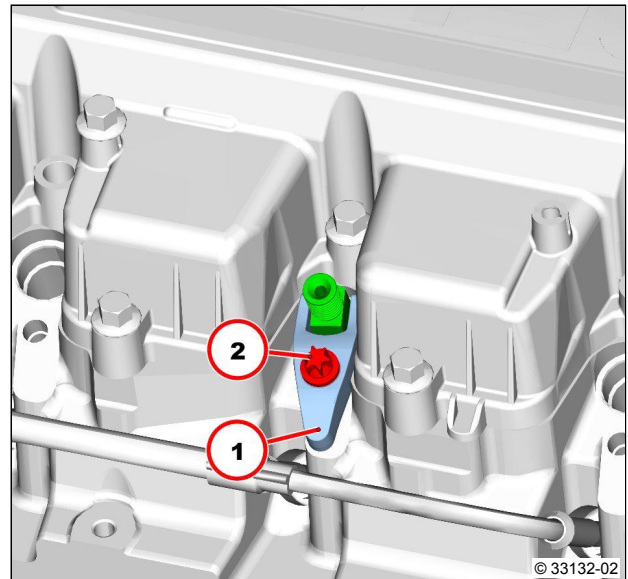
The following work procedure is to be performed on every cylinder.

- Attach sealing ring (1).
- Insert connection piece (2) in cylinder head.

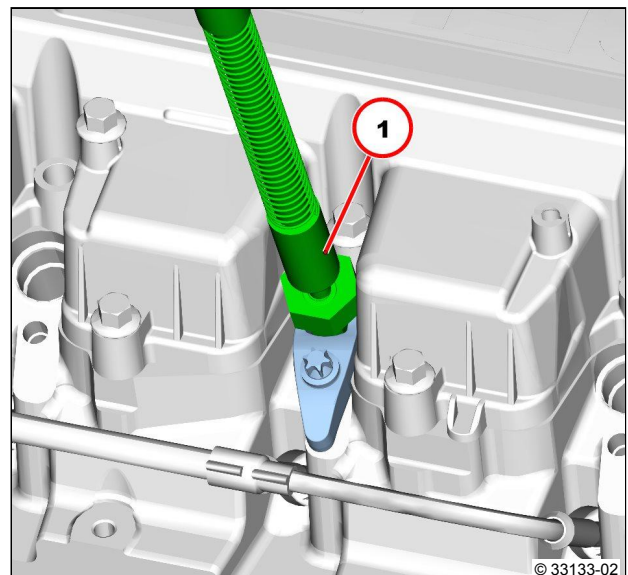


- Mount clamping claw (1).
- Tighten screw (2).

 30 Nm



- **Compression pressure gauge with quick release coupling design:**
 - Screw the adapter 01899437 onto connection piece.
 - Connect the quick release coupling to the adapter 01899437.
- **Compression pressure gauge with screw connection design:**
 - Screw adapter (1) onto the connection piece.



- Connect compression pressure gauge to adapter (1).
- Rotate the engine with the starter.



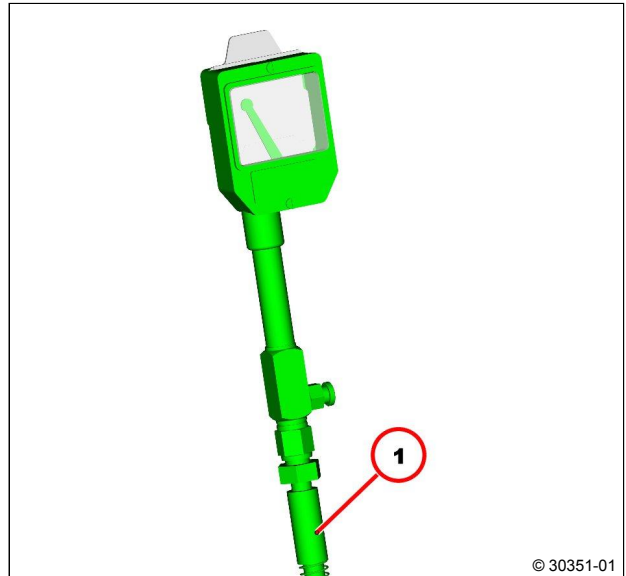
DANGER

The fuel system is under high pressure - risk of death.

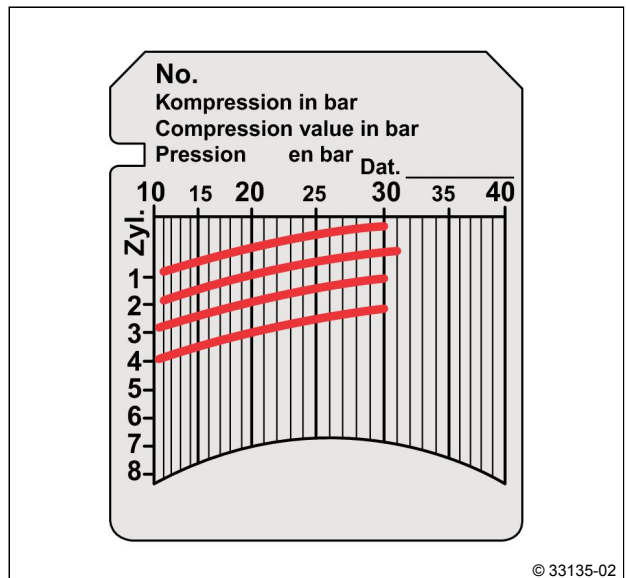
Ensure that the fuel system is free of leaks. Check that the fuel system is free of leaks (visual check for leaks).

Due to the starting process, materials (for example gaseous materials, solid materials) are ejected from the injector shaft. Take corresponding protective measures (wear protective glasses/protective gloves, cover openings).

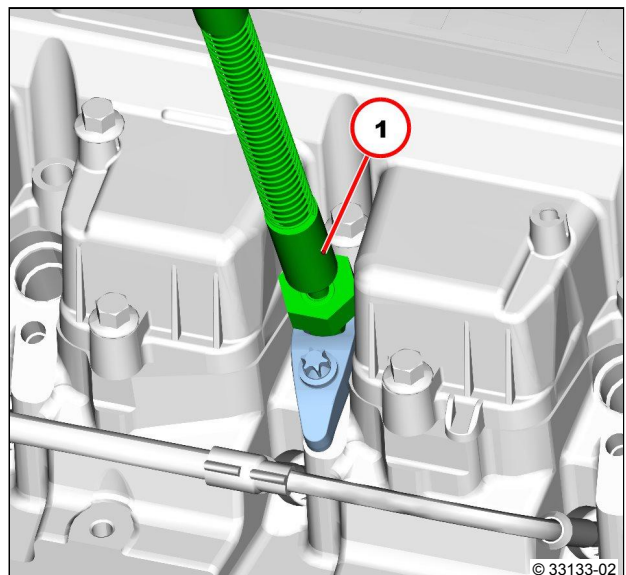
- Check the compression pressure.



The measured compression pressure depends on the start-up speed during the measuring process and the elevation of the engine installation site. Threshold values can therefore not be exactly determined. It is advisable to take compression pressure measurements as a comparison measurement of all cylinders in the engine. If more than 15% deviation is determined, the cause must be determined by disassembling the relevant cylinder unit.



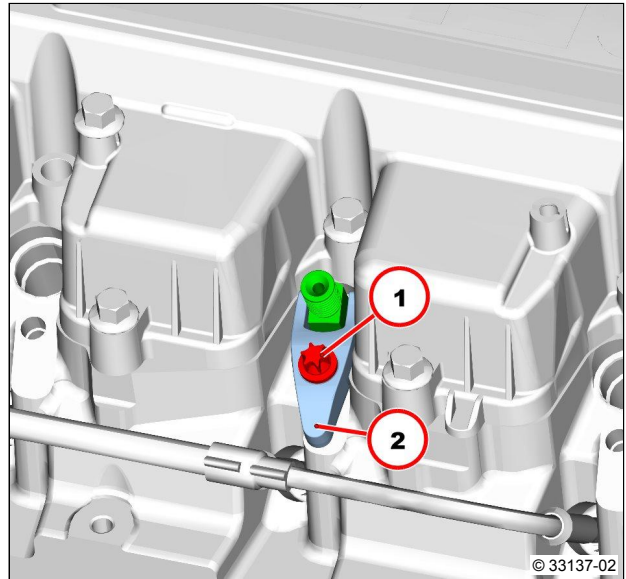
- **Compression pressure gauge with quick release coupling design:**
 - Take apart the compression pressure gauge with quick release coupling.
- **Compression pressure gauge with screw connection design:**
 - Disconnect the adapter (1) from the connection piece.



- Unscrew screw (1).
- Remove clamping claw (2).
- Remove connection piece.
- Remove sealing ring.



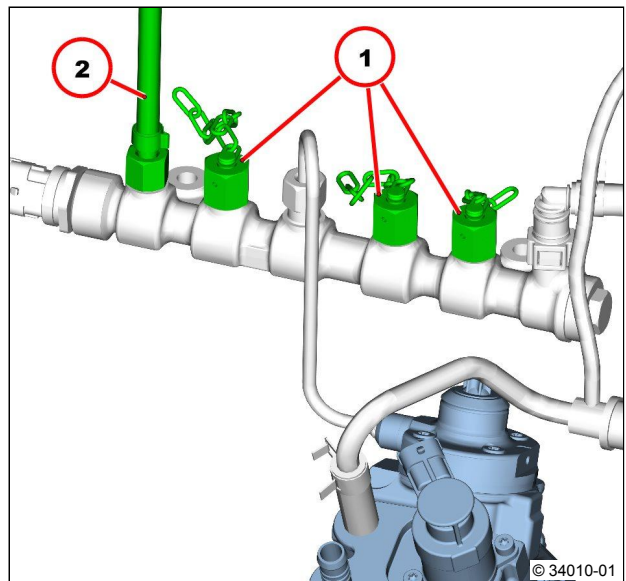
Perform the compression check on the next cylinder.



- Unscrew the caps (1).
- Mount hose line (2).



Collect any escaping fuel and dispose of it according to regulations.

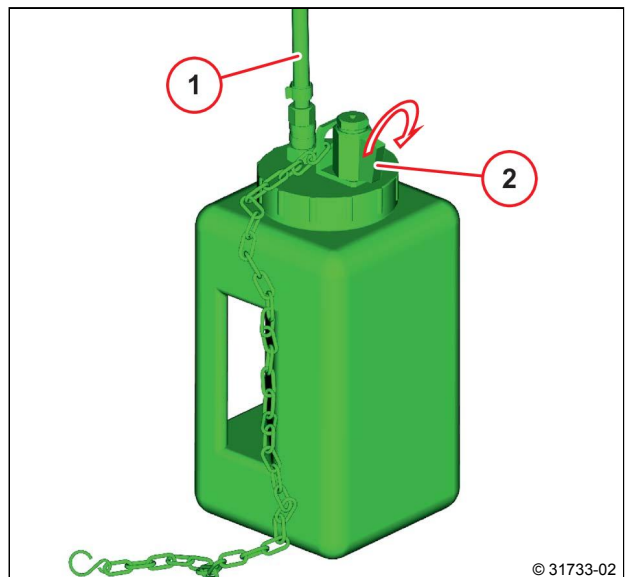


- Disconnect hose pipe (1) from collecting vessel.
- Close breather valve (2) in the direction of the arrow.
- Position collecting vessel securely.
- Remove collecting vessel and dispose of fuel in an environmentally-friendly way.



ATTENTION

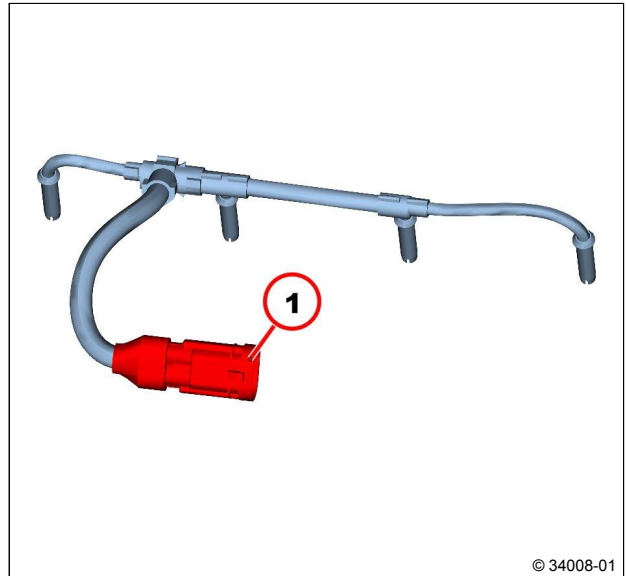
Observe safety regulations and national regulations when working with fuels.



- Fit cable plug (1) together and lock into place.

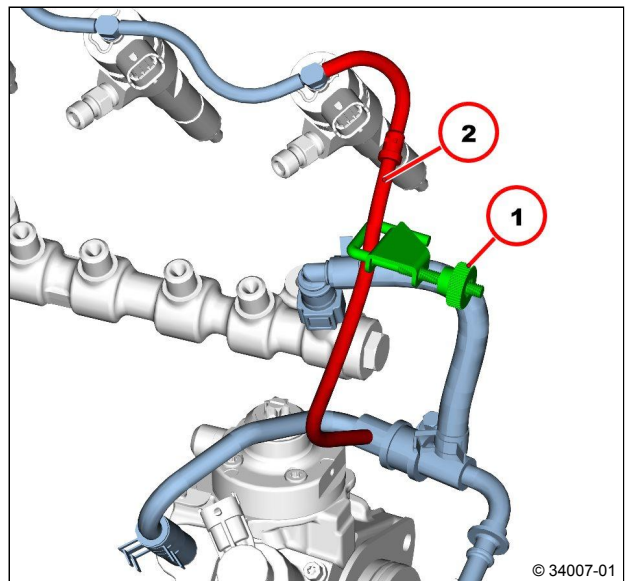


Ensure that there is a proper connection.



- Release fuel hose clamp (1) from return line (2).
- Remove fuel hose clamp (1).
- Install injectors.

 Module 19



Removing and installing the cylinder head cover



Conventional tools

Special tools:

– Disassembly tool

02992127



– Safety information / User information



For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

Removing the cylinder head cover

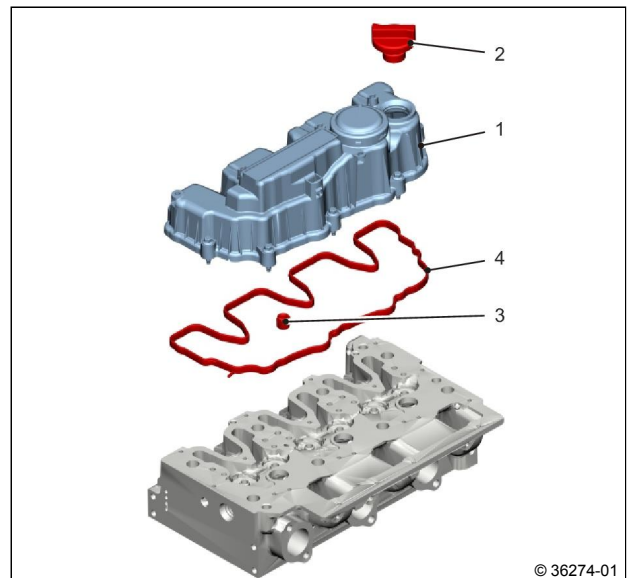
1 Cylinder head cover

Screws are securely locked on to cylinder head cover

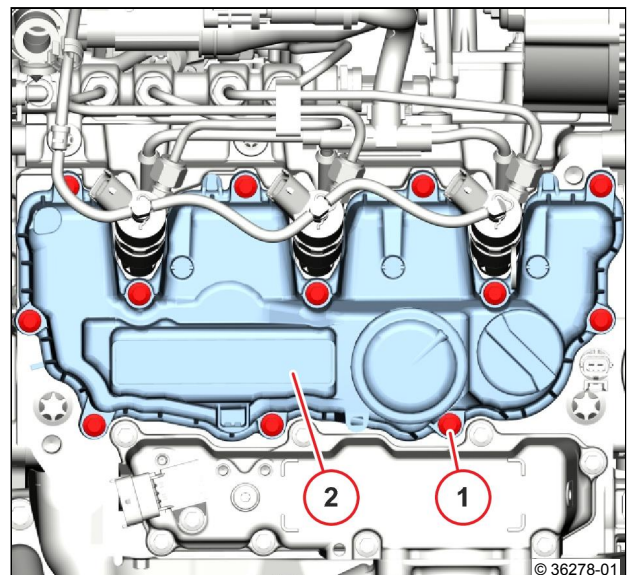
2 Filler lock

3 Transition piece

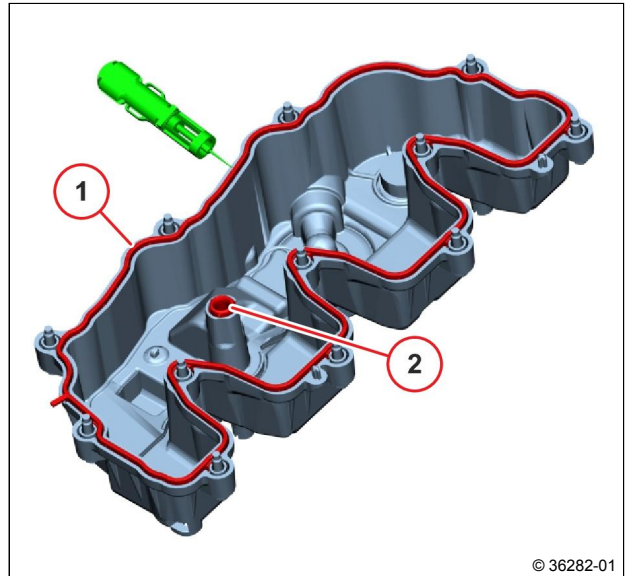
4 Seal



- Unscrew screws (1).
- Remove cylinder head cover (2).



- Remove seal (1) with disassembly tool.
- Remove transition piece (2) with disassembly tool.



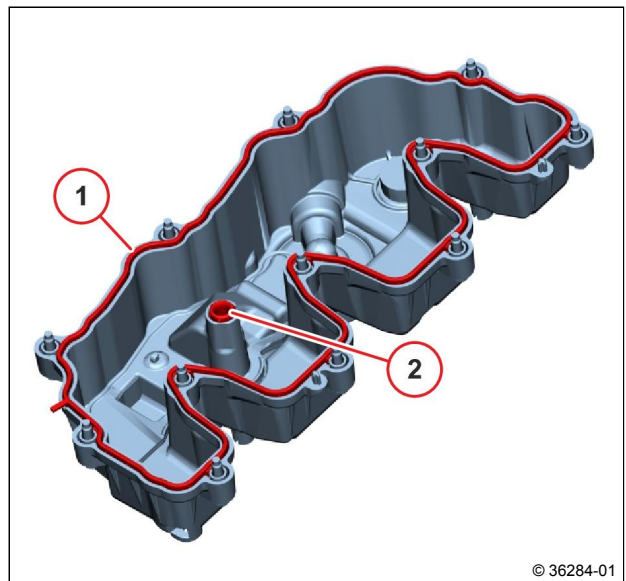
Installing the cylinder head cover

- Insert new seal (1).
- Insert new transition piece (2).



ATTENTION

Make sure that they fit tightly.
Transition piece must not fall out.

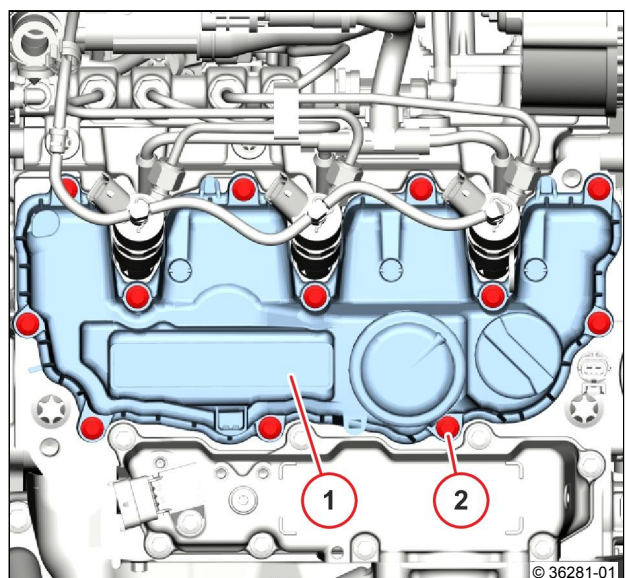


ATTENTION

Make sure that the installation position of the seal and the transition piece is correct.

- Mount cylinder head cover (1).
- Screw on screws (2).
- Tighten screws (2).

 8 Nm



Removing and fitting the front cover (Fastening parts)



Conventional tools



– Safety information / User information



Different add-on variants are used depending on the engine.

The following procedure is described, using one installation variant as an example.

The procedure is the same for other installation variants.

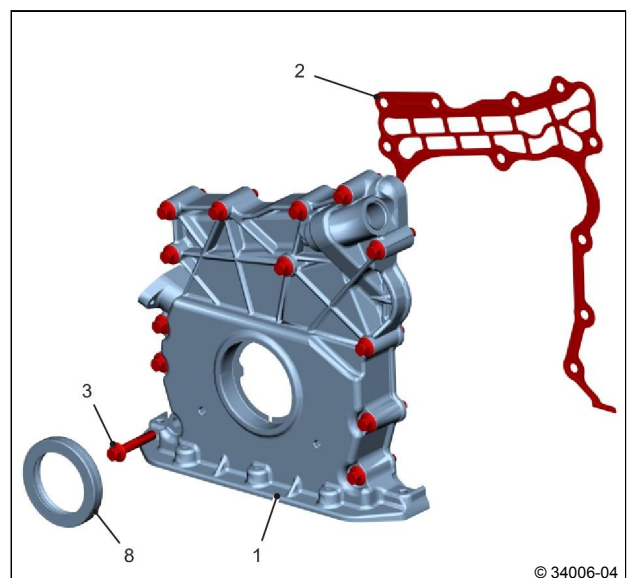
All illustrations are shown as examples.



For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

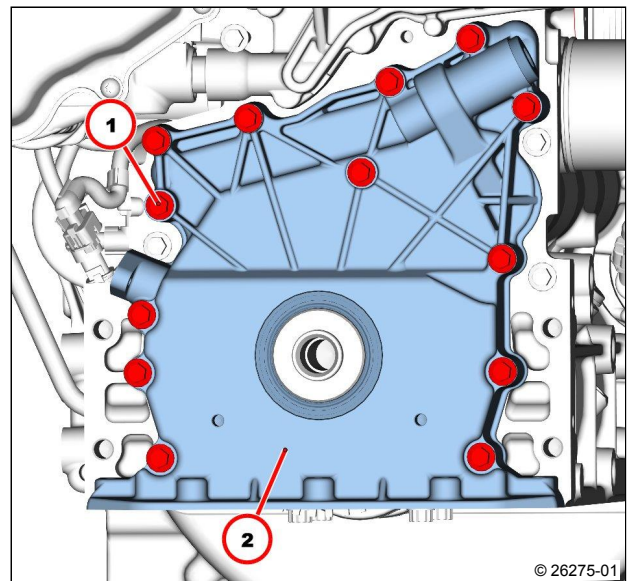
Remove front cover

- 1 Front cover
- 2 Seal
- 3 Hexagon head screw
- 8 Crankshaft sealing ring

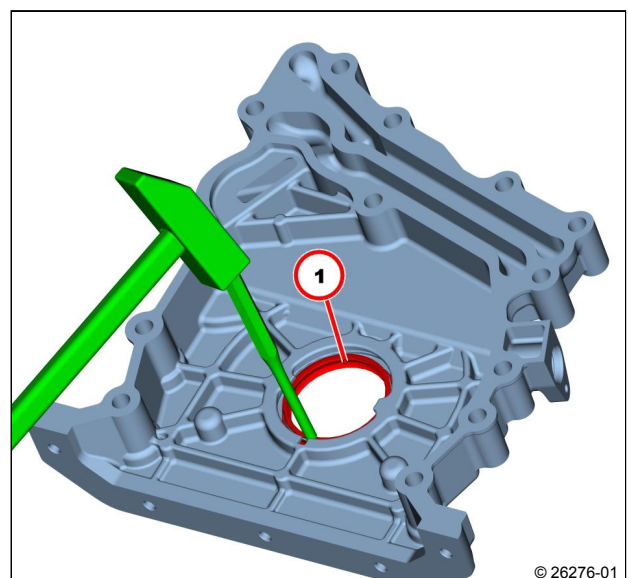


- Remove the V-belt pulley / V-ribbed pulley.
 Module 05
- Remove the console (belt tensioner, deflection pulley).
 Module 44
- Remove speed sensor (crankshaft).
 Module 51
- Remove lubricating oil pan.
 Module 02
- Remove oil pressure regulating valve.
 Module 09

- Unscrew all screws (1).
- Remove front cover (2).
- Remove gasket.

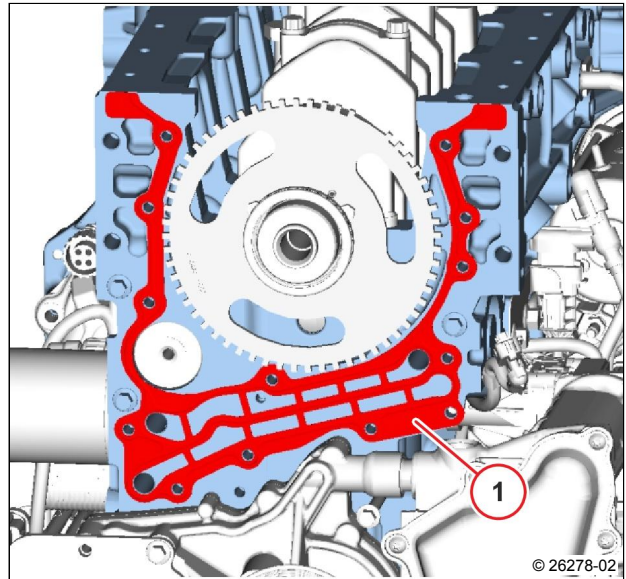


- Knock out the crankshaft sealing ring (1).
-  **ATTENTION**
Do not damage sealing surface when removing.
- Visually inspect the components.



Fitting the front cover

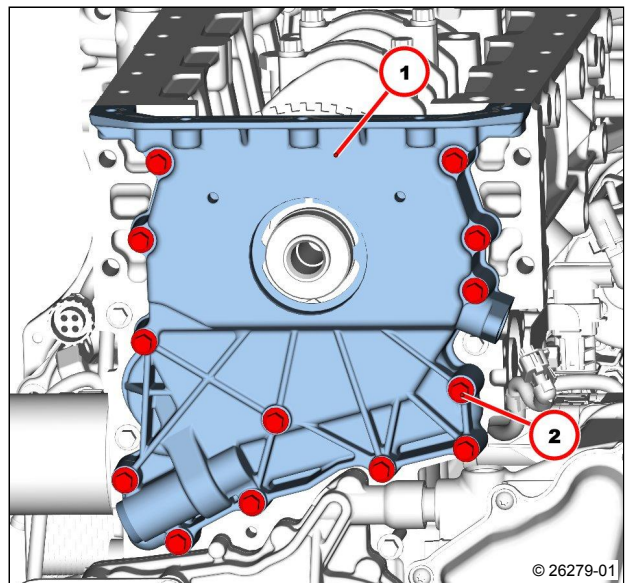
- Clean all sealing surfaces.
- Mount new seal (1).



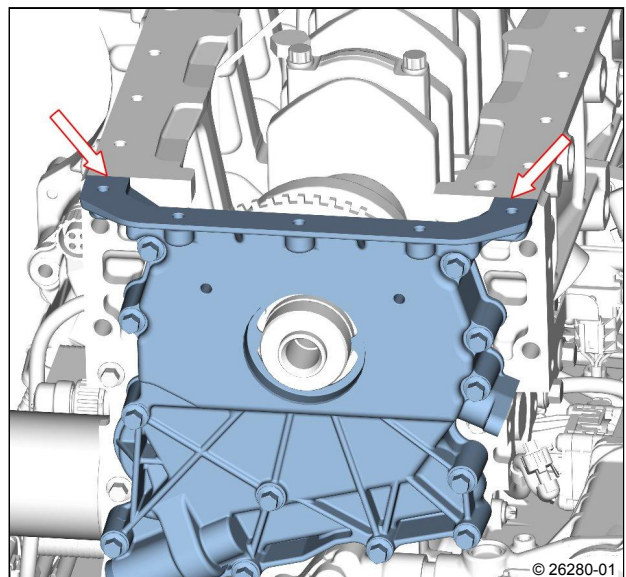
- Attach front cover (1).
- Screw on all screws (2).



Do not tighten the screws.

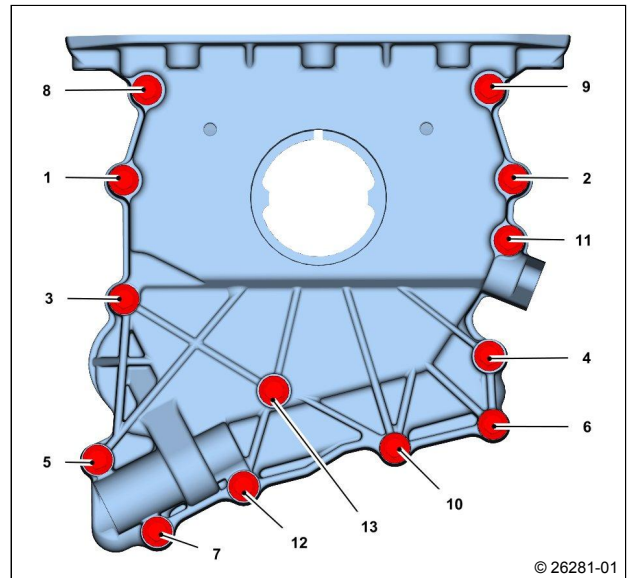


- Press the front cover up and align flush with the oil pan sealing surface (arrows).



- Tighten screws according to the tightening sequence.

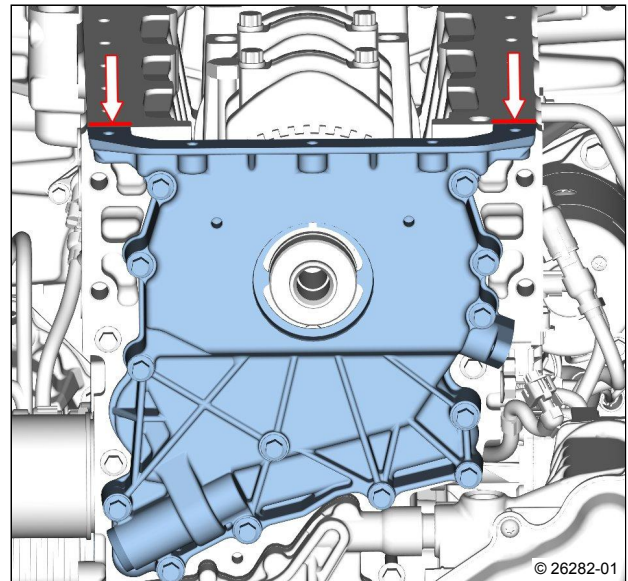
 30 Nm



ATTENTION

Projecting rubber (arrows) must not be removed.

- Install oil pressure regulating valve.
 Module 09
- Install crankshaft sealing ring.
 Module 09
- Install lubricating oil pan.
 Module 02
- Fit speed sensor (crankshaft).
 Module 51
- Install the console (belt tensioner, deflection pulley).
 Module 44
- Install the V-belt pulley / V-ribbed pulley
 Module 05



Replacing the crankshaft sealing ring (opposite side to flywheel)



Conventional tools

Special tools:

- Pricker 01899103
- Assembly lever 01899110
- Assembly tool 02992215



- Self-tapping screw 3.5 mm
- Washer



– Safety information / User information

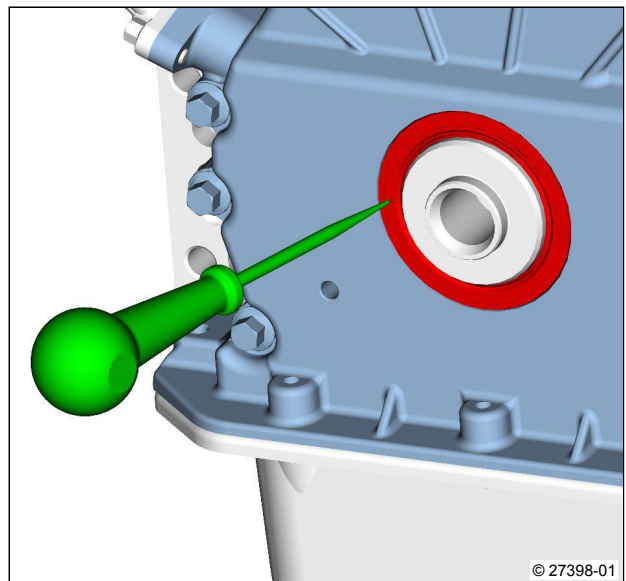
Removing the crankshaft sealing ring

- Remove output flange.
 Module 05
- Make a hole of approx. 3 mm in the crankshaft sealing ring with a pricker.

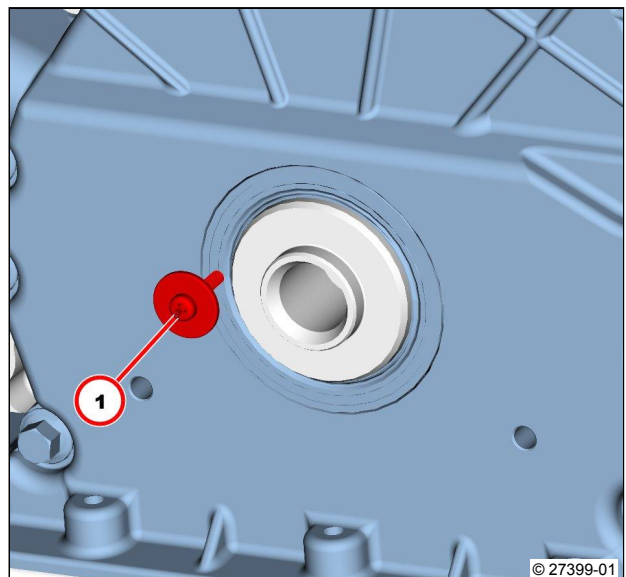


ATTENTION

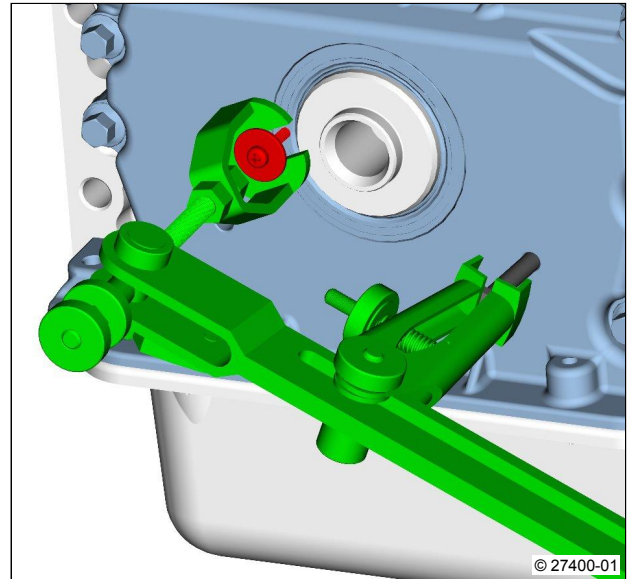
Do not damage the front cover or crankshaft.



- Screw in a self-tapping screw (1) with washer.



- Pull out crankshaft sealing ring with assembly lever.
- Visually inspect the running surface of the crankshaft sealing ring.
- Visually inspect all contact surfaces.

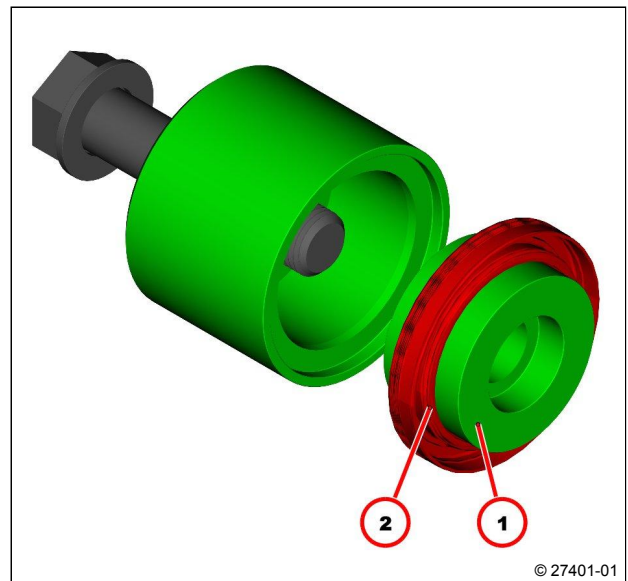


Installing the crankshaft sealing ring

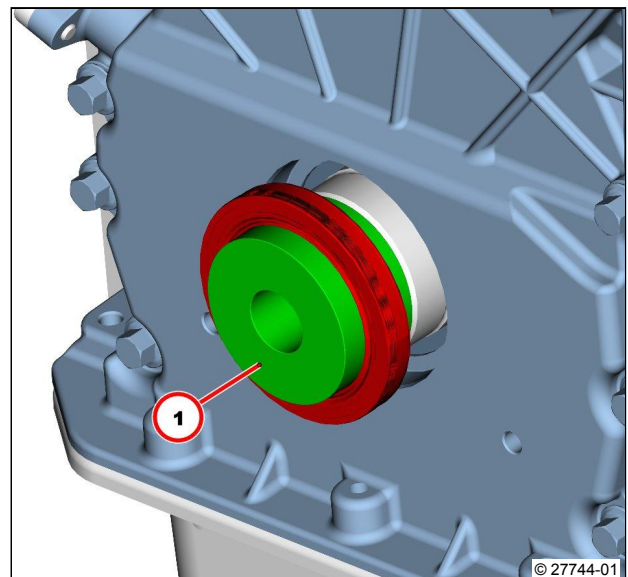
- Place new crankshaft sealing ring on guide (1).



Do not oil waxed crankshaft sealing rings.
The sealing lip (2) faces the crankcase.



- Attach guide (1).



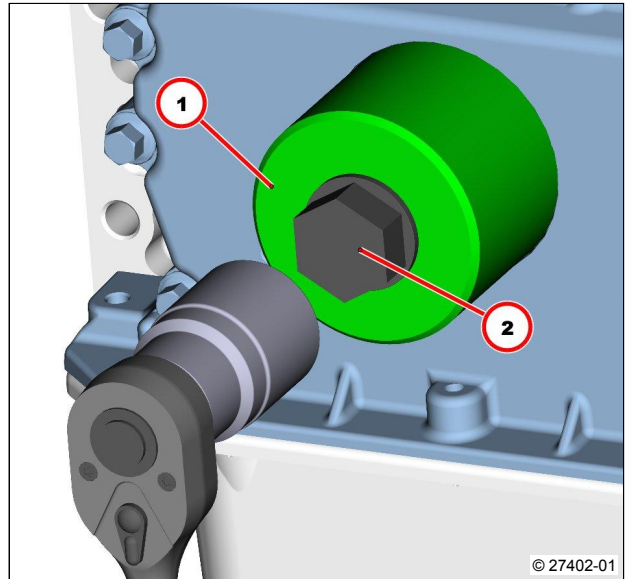
- Fit assembly sleeve (1).
- Screw on screw (2).
- Tighten the screw (2) to the end stop.



The installation depth is determined by the assembly tool.

- Unscrew screw (2).
- Remove assembly tool
- Install output flange.

 Module 05



Oil pressure control valve



Conventional tools



– Safety information / User information



DANGER

Hot parts!

Risk of burns / Risk of explosion!

Let the engine / components cool down sufficiently (to at least ambient temperature).



Collect escaping operating media in suitable vessels and dispose of them according to regulations.

For emptying and filling the engine, the corresponding operating manual must be observed.



For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

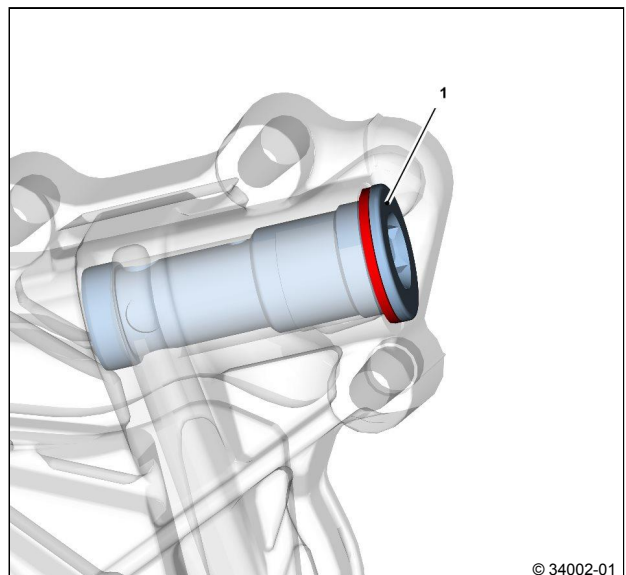
Disassembly / Assembly

1 Oil pressure control valve

 60 Nm



Use new sealing ring.



© 34002-01

Removing and installing the lubricating oil cooler



Conventional tools

Special tools:

– Disassembly tool

02992127



– Safety information / User information

– Operating manual



Collect escaping operating media in suitable vessels and dispose of them according to regulations.

For emptying and filling the engine, the corresponding operating manual must be observed.

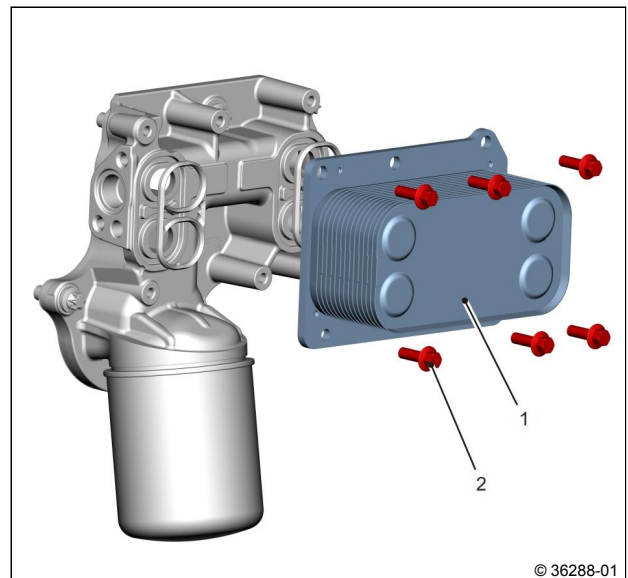


For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

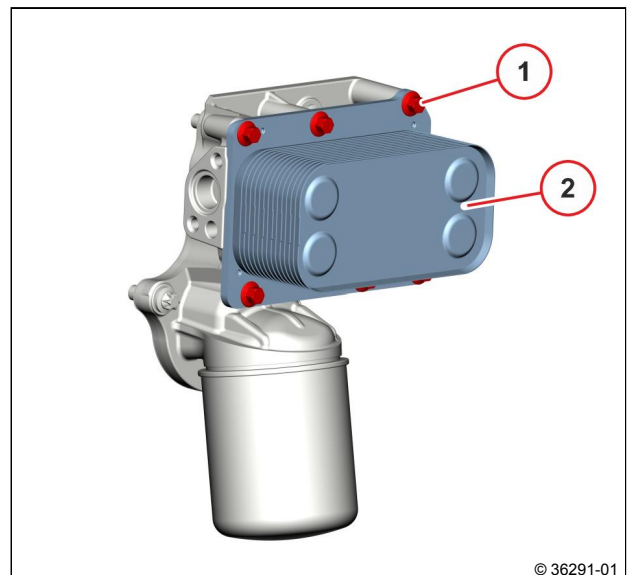
Removing the lubricating oil cooler

1 Lubricating oil cooler

2 Hexagon head screw



- Unscrew all screws (1).
- Remove lubricating oil cooler (2).

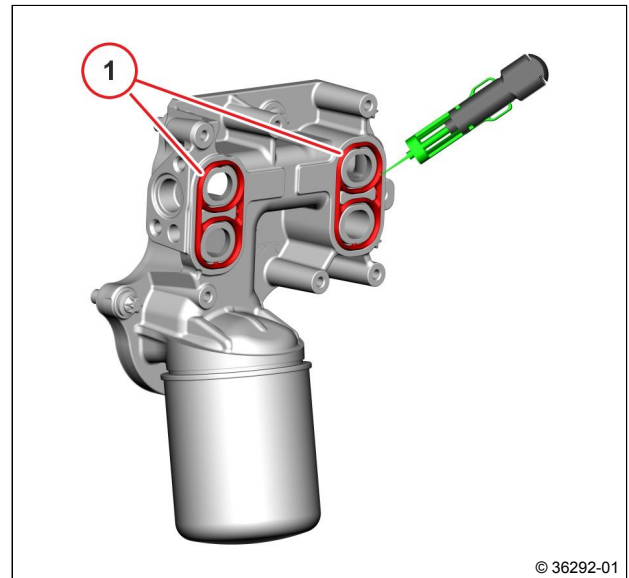


- Remove seal (1) with disassembly tool.



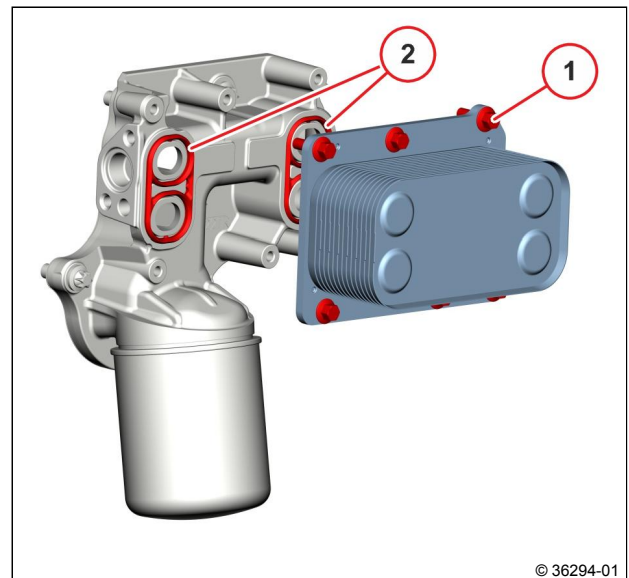
Collect draining lubricating oil and dispose of properly.

- Visually inspect components.



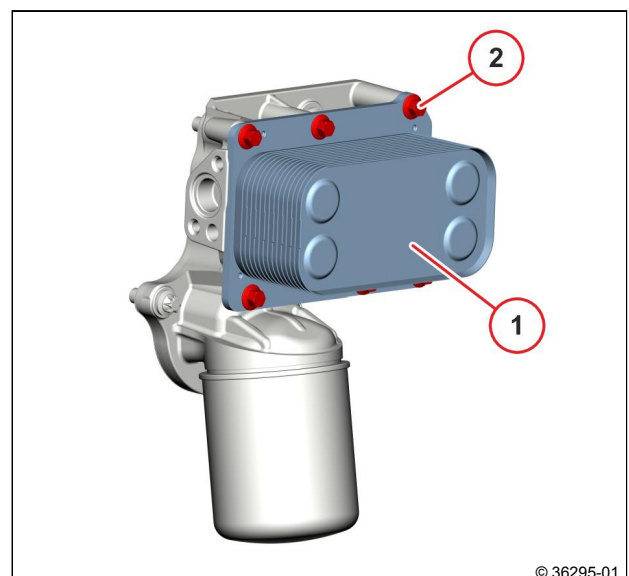
Installing the lubricating oil cooler

- Visually inspect components.
- Clean sealing surfaces.
- Screw in screws (1).
- Insert new seals (2).



- Mount lubricating oil cooler (1).
- Screw on screws (2).
- Tighten all screws (2) alternately.

 13 Nm



Removing and installing the lubricating oil cooler housing



Conventional tools



- Safety information / User information
- Operating manual



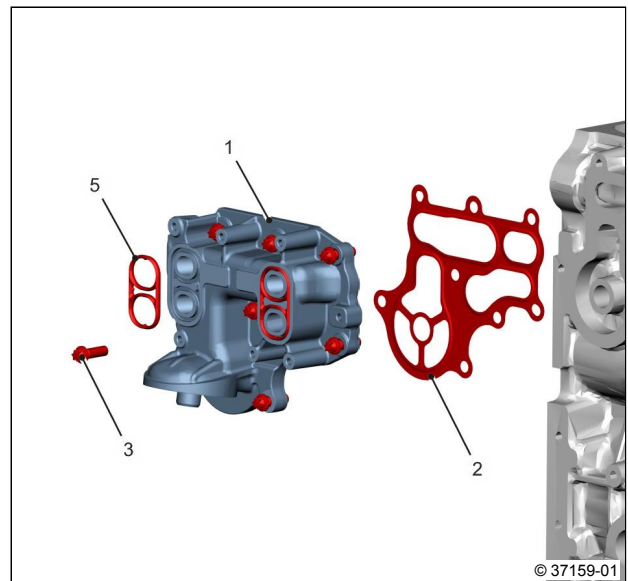
Collect escaping operating media in suitable vessels and dispose of them according to regulations.
For emptying and filling the engine, the corresponding operating manual must be observed.



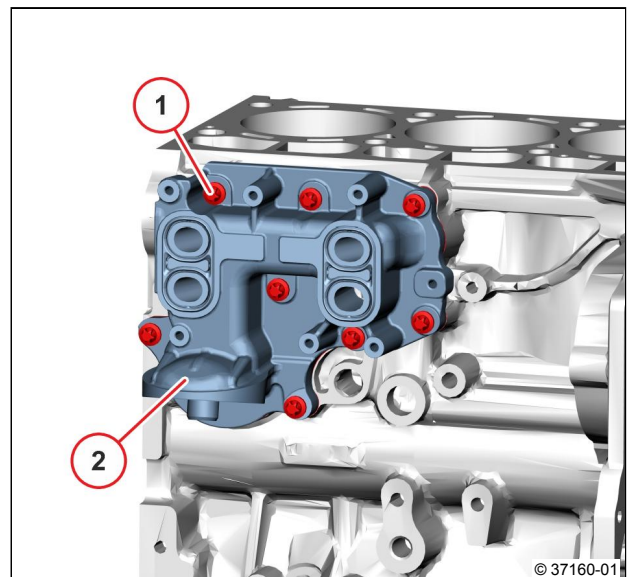
For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

Removing the lubricating oil cooler housing

- 1 Lubricating oil cooler housing
- 2 Seal
- 3 Hexalobular screw
- 5 Seal

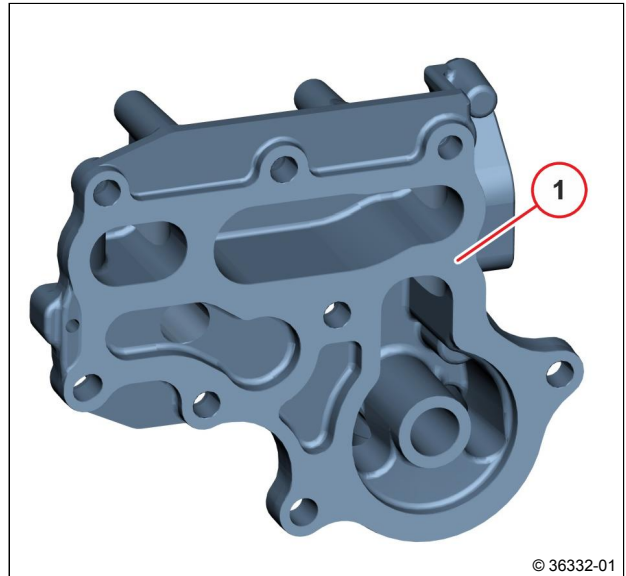


- Remove the lubricating oil cooler.
 Module 15
- Remove lubricating oil filter.
 Operating manual
- Unscrew all screws (1).
- Remove lubricating oil cooler housing (2).
- Remove gasket.

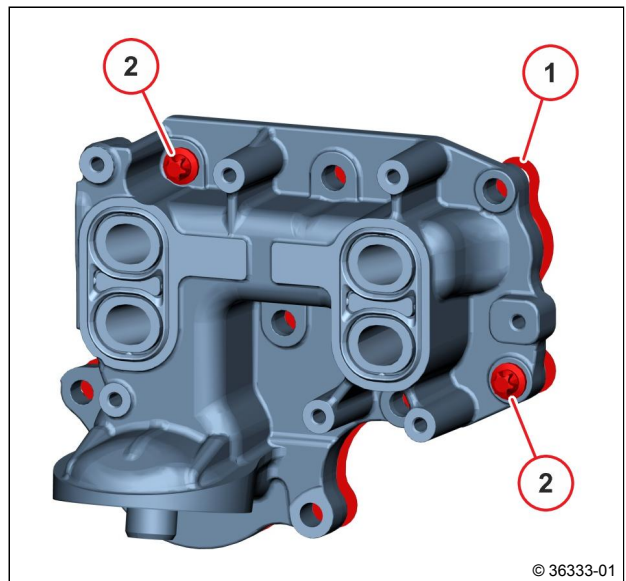


Installing the lubricating oil cooler housing

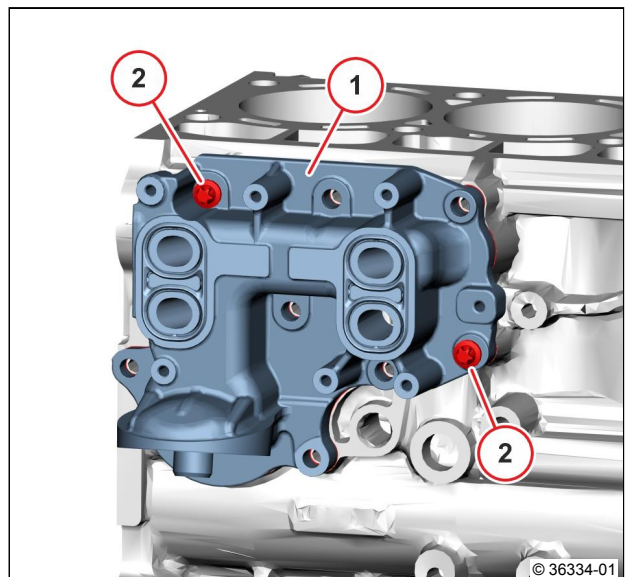
- Visually inspect component.
- Clean sealing surfaces (1).



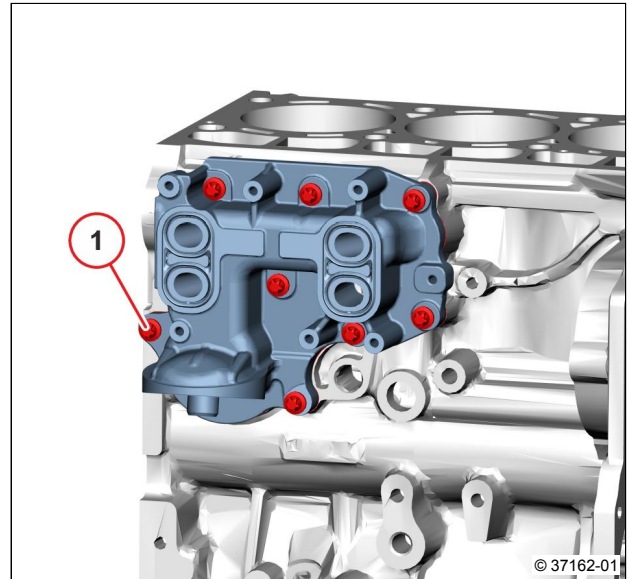
- Fix new seal (1) to the oil cooler housing using screws (2).



- Mount the lubricating oil cooler housing (1).
- Tighten screws (2).



- Screw on all screws (1).
- Tighten all screws (1)
 20 Nm
- Install the lubricating oil cooler.
 Module 15
- Install lubricating oil filter.
 Operating manual



Blanking cover (Crankcase)



Conventional tools

Special tools:

– Disassembly tool

02992127



– Safety information / User information

– Operating manual



Collect escaping operating media in suitable vessels and dispose of them according to regulations.

For emptying and filling the engine, the corresponding operating manual must be observed.



For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

Disassembly / Assembly

1 Exchange filter

2 Blanking cover

 41 Nm

3 O-ring

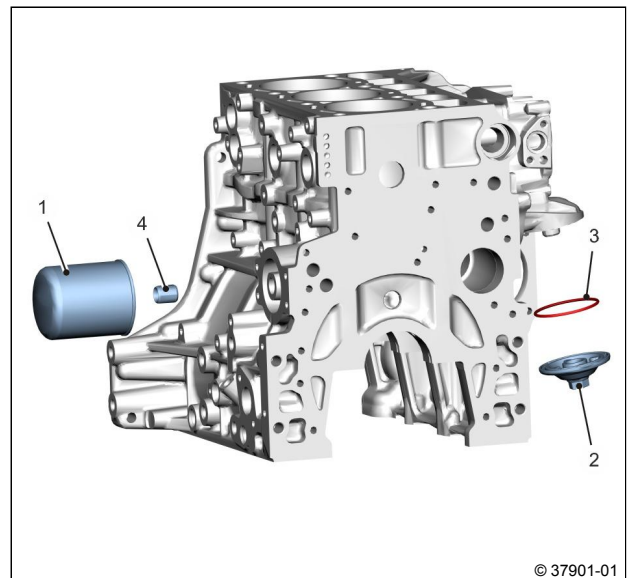
4 Threaded bush

 40 Nm

• Remove round sealing rings with disassembly tool.



Position 1:
see operating manual.



© 37901-01

Lubricating oil filter installation



Conventional tools



– Safety information / User information



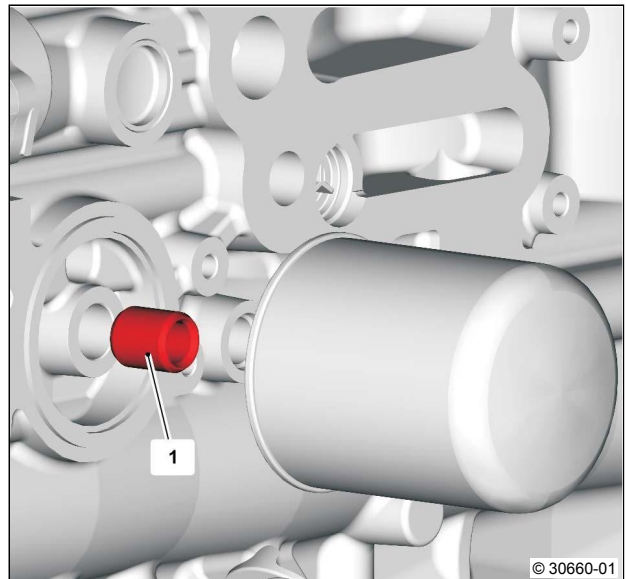
For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

Disassembly / Assembly

1 Threaded bush



40 Nm



Removing and installing the high-pressure pump



Conventional tools:

– Separating tool

Special tools:

– Locking plugs/caps

– Disassembly tool

– Special wrench

01899368

02992127

02992477



– Mounting compound
(anhydrous)

01008420



– Safety information / User information

– Operating manual



DANGER

Do not carry out work on the fuel system when the engine is running.

The fuel system is under high pressure - risk of death.

Even after the engine shuts down, the fuel pressure may still be up to several 100 bar for a long time. The fuel pressure here does not drop until the fuel system is opened and the fuel can escape to the outside.



ATTENTION

Ensure the utmost cleanliness when performing all work.

Remove any paint residue and dirt particles before disassembly.

Carefully clean the area around the components concerned. Blow wet parts dry with compressed air.

Observe safety regulations and national regulations when working with fuels.

Close all connections immediately after opening with new, clean locking plugs/caps.

Do not remove locking plugs/caps until immediately before assembling.



Collect leaking operating media in suitable vessels and dispose of them according to regulations.

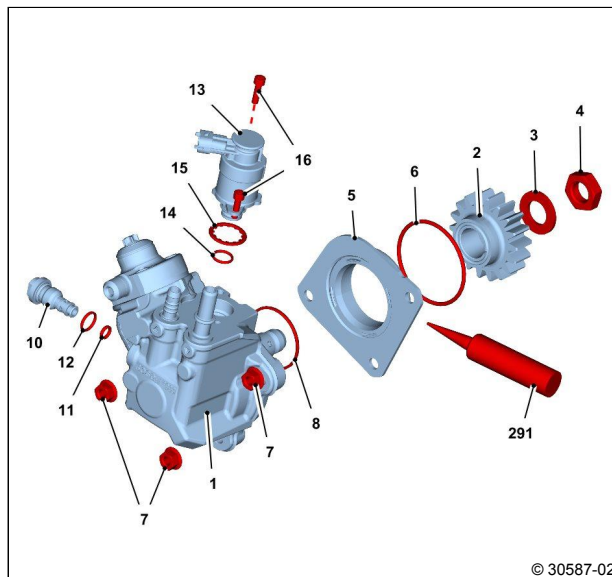
Vent the fuel system after doing any work on it - see operating manual.



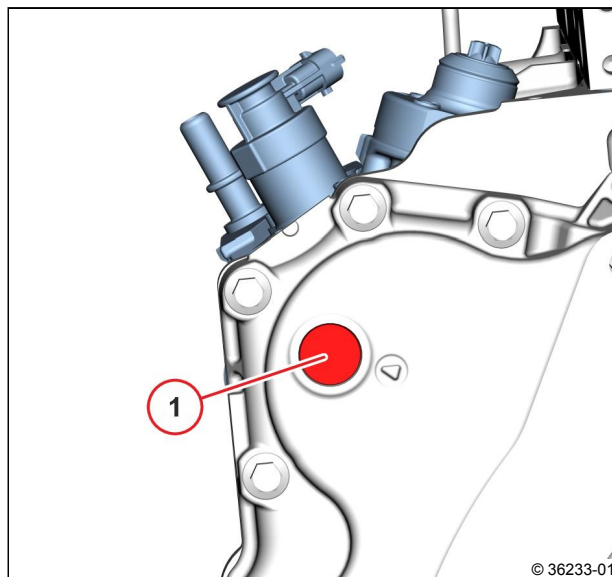
For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

Removing the high-pressure pump

- 1 High-pressure pump
- 2 High-pressure pump gear wheel
- 3 Washer
- 4 Hexagon nut
- 5 Spacer
- 6 O-ring
- 7 Hexagonal nut with flange
- 8 O-ring
- 10 Overflow valve
- 11 O-ring
- 12 O-ring
- 13 Solenoid valve
- 14 O-ring
- 15 Seal
- 16 Hexalobular screw
- 291 Mounting compound



- Unlock and pull off the cable plug.
- Remove high-pressure line.
 Module 21
- Remove fuel lines.
 Module 21
- Remove sealing cover (1).
 Module 09
- Install turning gear / locking device.
 Module 49
- Remove lubricating oil filter housing.
 Module 15



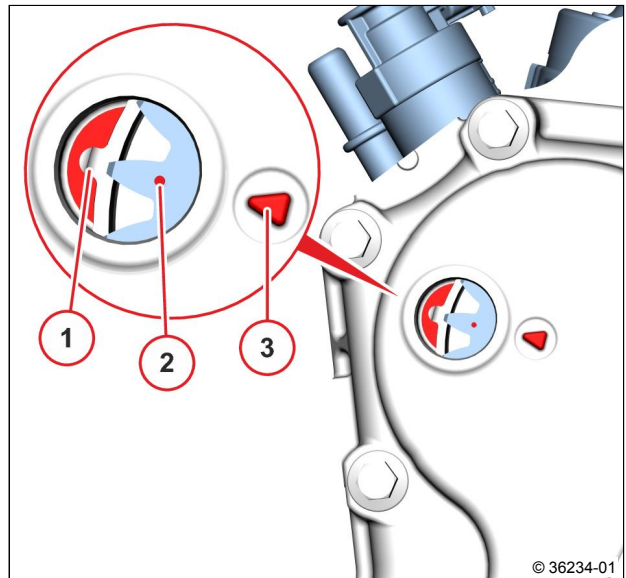
- (1) Marking gear case (recess)
- (2) Marking high-pressure pump gear wheel
- (2) Marking gear case (arrow)

- Rotate the crankshaft in the direction of the engine rotation, until guide marks (1), (2) and (3) are in alignment.

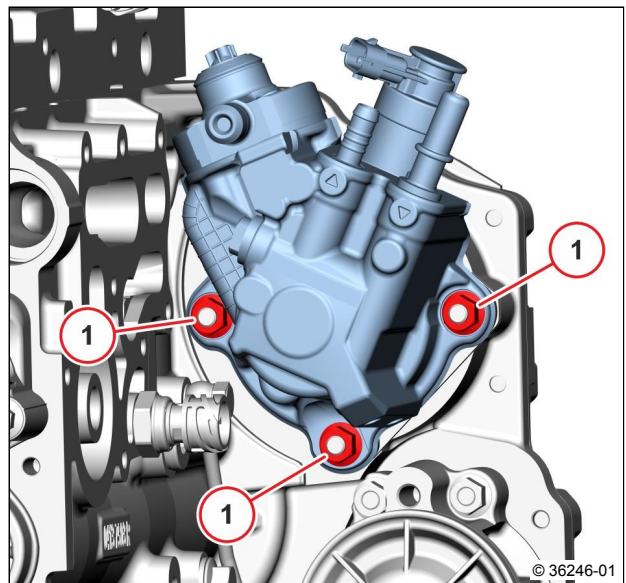


ATTENTION

Do not turn the crankshaft any more!



- Unscrew nuts (1).



ATTENTION

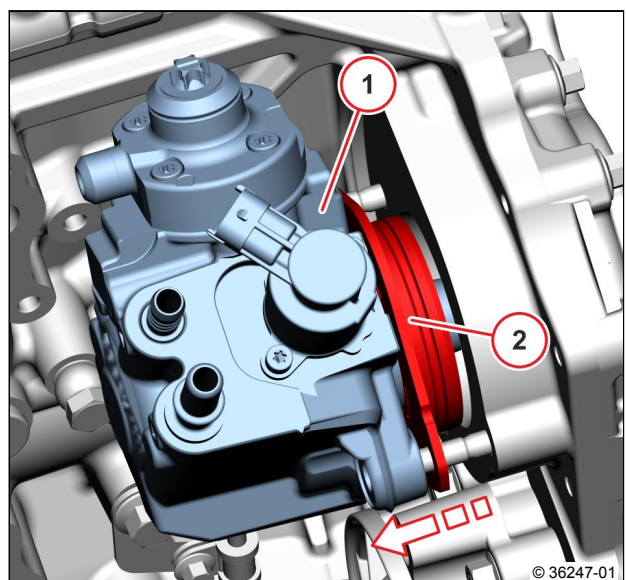
Do not twist the high-pressure pump.
Do not twist the spacer.
Do not damage the components.

- Pull out high-pressure pump (1) slightly.
- Loosen spacer (2) carefully.
- Remove high-pressure pump (1) and spacer (2).



ATTENTION

Do not turn the crankshaft any more!





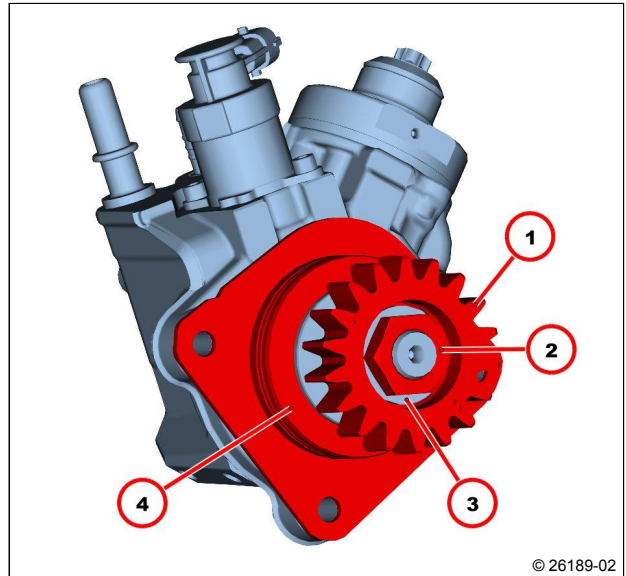
ATTENTION

Do not damage the high-pressure pump gear wheel.
Do not damage the components.

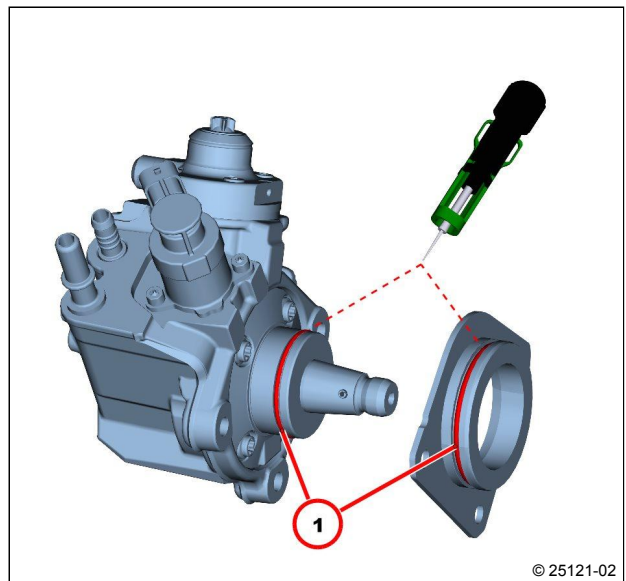


Use aluminium protective jaws.

- Hold high-pressure pump gear wheel (1).
– Clamp in the vice.
- Unscrew nut (2).
- Remove washer (3).
- Pull off high-pressure pump gear wheel (1) with separating tool.
- Remove spacer (4).
- Visually inspect components.



- Remove round sealing rings (1) with disassembly tool.
- Visually inspect components.



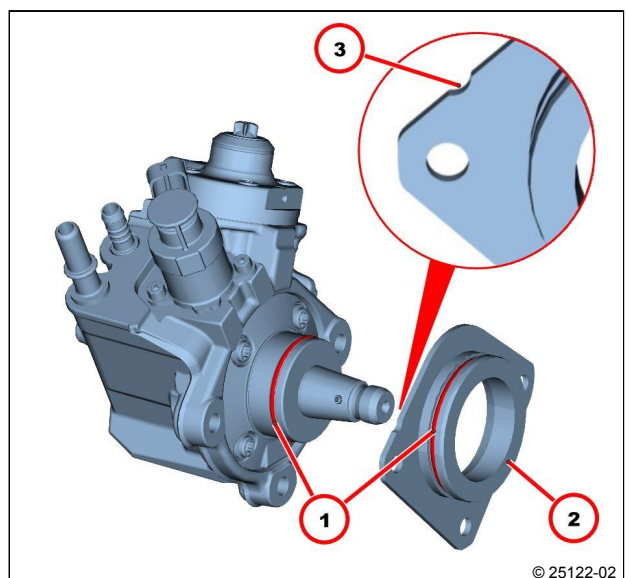
Installing the high-pressure pump

- Clean sealing surfaces.
- Mount new O-rings (1).
- Push on spacer (2).



ATTENTION

Ensure that the installation position is correct.
Recess (3) is on the fuel supply side.





ATTENTION

Ensure that the installation position is correct.
Do not damage the high-pressure pump gear wheel.
The clamping pin (1) must engage in the groove (2).

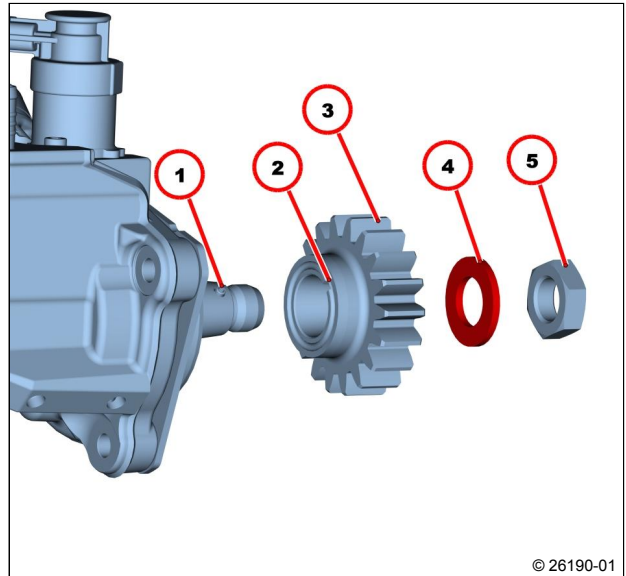
- Mount high-pressure pump gear wheel (3).
- Fit washer (4).
- Screw on nut (5).



Use aluminium protective jaws.

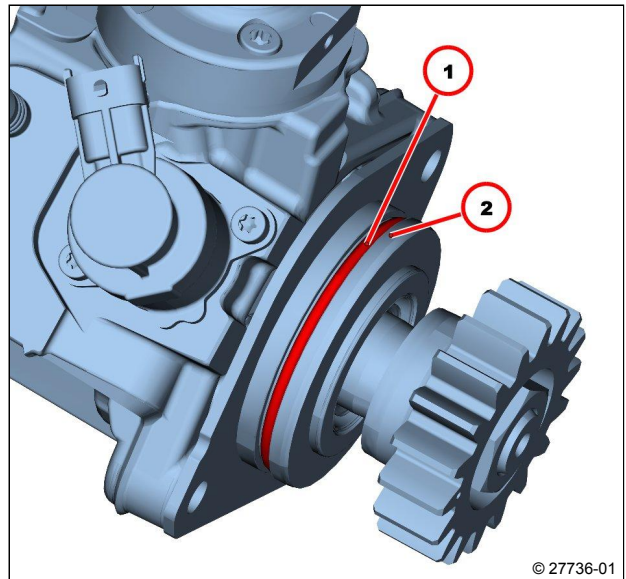
- Hold high-pressure pump gear wheel (3).
– Clamp in the vice.
- Tighten nut (5).

 80 Nm



© 26190-01

- Coat O-ring (1) with mounting compound.
- Coat adjacent surfaces of the spacer (2) with mounting compound.



© 27736-01



ATTENTION

Observe direction of rotation of the high-pressure pump drive!

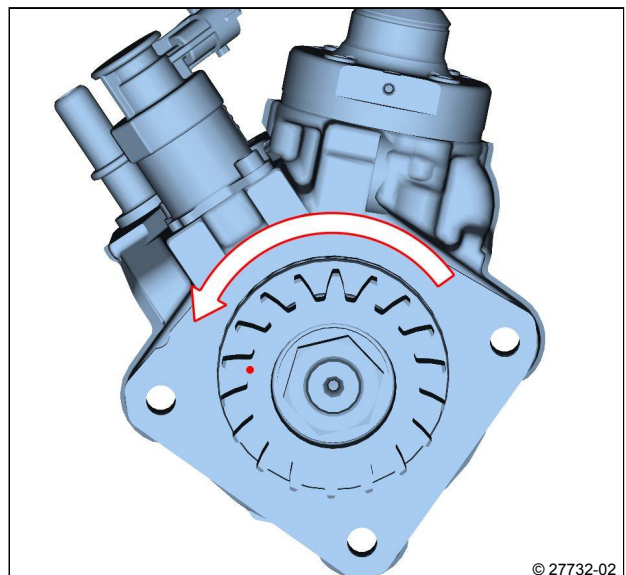
- **View:**
On high-pressure pump drive
- **Direction of rotation:**
left (anti-clockwise)



ATTENTION

Dry running is not permissible.
Sufficient fuel pressure must be available at the high-pressure pump.

- Fuel pressure at the supply:
at least 3.2 bar



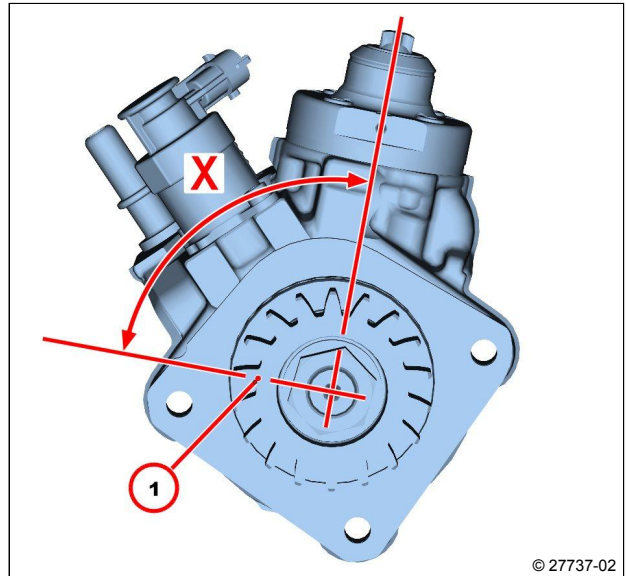
© 27732-02



ATTENTION

Observe position of the drive shaft and high-pressure pump.

- (1) Marking high-pressure pump gear wheel
- Dimension X: 90°

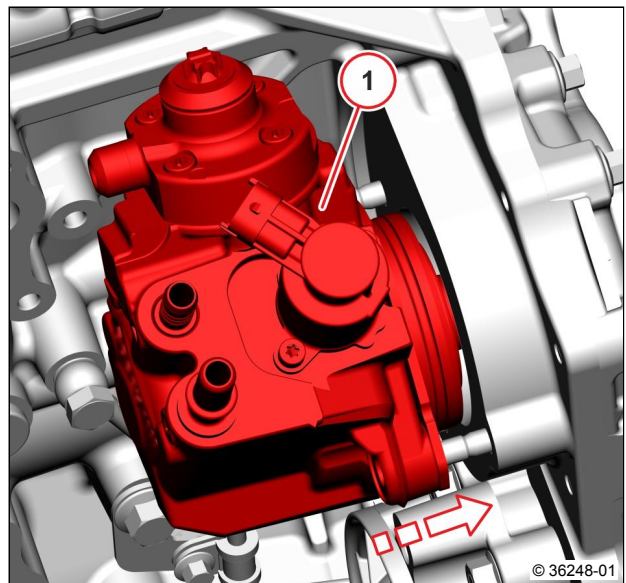


- Insert high pressure pump (1).



ATTENTION

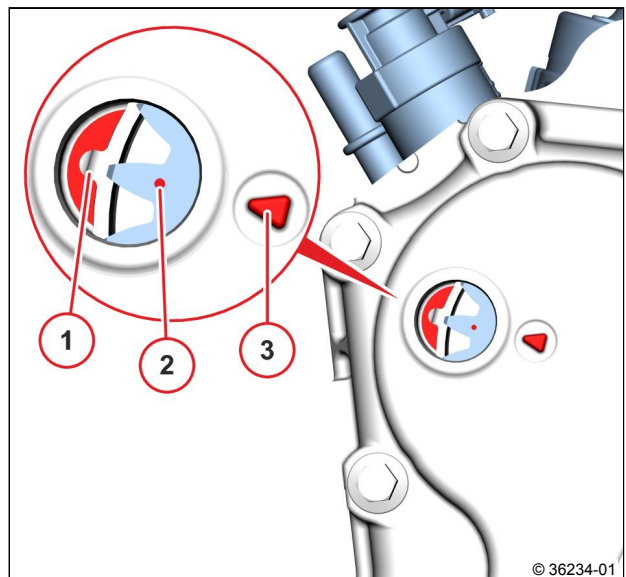
Do not twist the high-pressure pump.



- (1) Marking gear case (recess)
- (2) Marking high-pressure pump gear wheel
- (2) Marking gear case (arrow)



Markings (1), (2) and (3) must be in alignment.

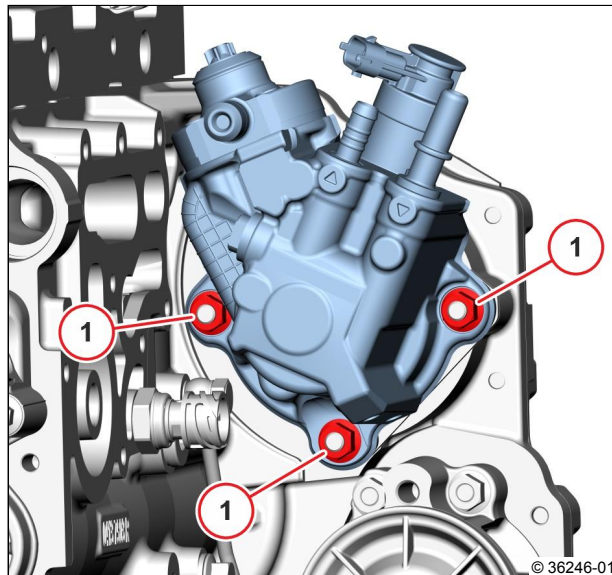




ATTENTION

Do not twist the high-pressure pump.

- Screw on nuts (1).



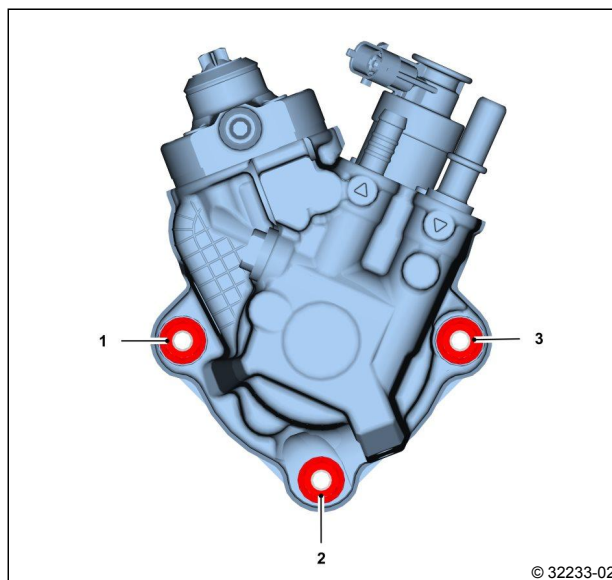
ATTENTION

Observe tightening sequence.

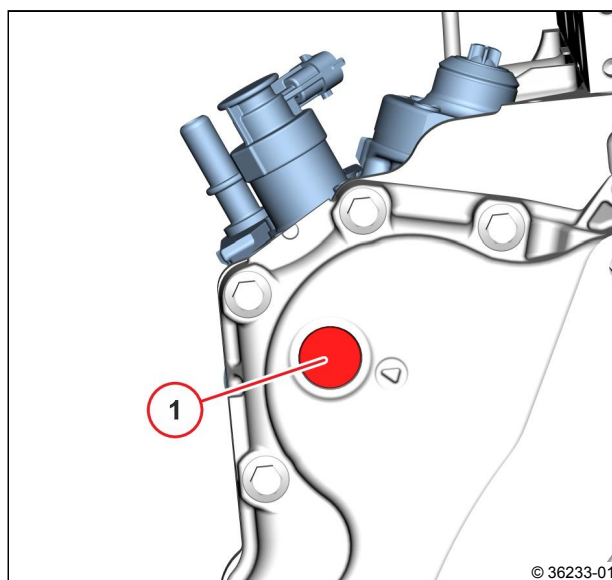
Tighten nuts according to the tightening sequence.

 Stage 1: 10 Nm

 Stage 2: 22 Nm



- Install lubricating oil filter housing.
 Module 15
- Remove turning gear / locking device.
 Module 49
- Install new sealing cover (1).
 Module 09
- Fit fuel lines.
 Module 21
- Fit new high-pressure line.
 Module 21
- Plug in and lock cable plug.



Removing and installing the injector



Conventional tools

Special tools:

- Diagnostic tool SerDia 2010
- Assembly pliers 01899050
- Hexalobular tool kit 01899092
- Locking plugs/caps 01899368
- Lever tool 02992117
- Disassembly tool 02992127
- Extraction tool 02992138
- Slide hammer 02992294



- Safety information / User information
- Operating manual
- Service Bulletin
- SerDia manual 2010



DANGER

Do not carry out work on the fuel system when the engine is running.

The fuel system is under high pressure - risk of death.

Even after the engine shuts down, the fuel pressure may still be up to several 100 bar for a long time. The fuel pressure here does not drop until the fuel system is opened and the fuel can escape to the outside.



ATTENTION

Ensure the utmost cleanliness when performing all work.

Remove any paint residue and dirt particles before disassembly.

Carefully clean the area around the components concerned. Blow wet parts dry with compressed air.

Observe safety regulations and national regulations when working with fuels.

Close all connections immediately after opening with new, clean locking plugs/caps.

Do not remove locking plugs/caps until immediately before assembling.



Collect leaking operating media in suitable vessels and dispose of them according to regulations.

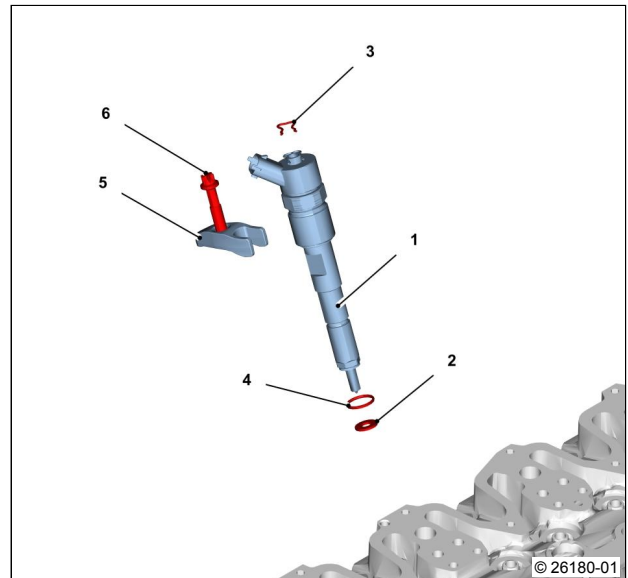
Vent the fuel system after doing any work on it - see operating manual.



For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

Removing the injector

- 1 Injector
- 2 Sealing disc
- 3 Clip
- 4 O-ring
- 5 Clamping claw
- 6 Hexalobular screw



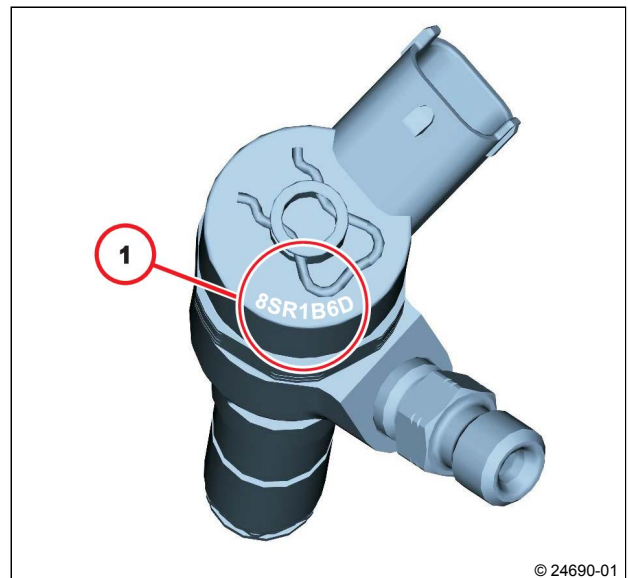
1600 bar injection system

(1) IMA code



ATTENTION

Note assignment of the injector to the cylinder. The injector is assigned by the relevant IMA code (1) to the corresponding cylinder. The assignment is saved in the control unit. Each time an injector is replaced/renewed, the correct assignment to the relevant cylinder must be made by transferring the new IMA code in the control unit. Observe installed injection system! The IMA codes of the different injection systems are fundamentally different. The injector calibration depends on the installed injection system. Reset injector correction values (ZFL). The exact procedure can be taken from the listed documentation and must be observed.



Diagnostic tool SerDia 2010
SerDia manual



Report back changed data record to
DEUTZ AG.
Email address:
service-kompakmotoren.de@deutz.com



Service Bulletin 0199-99-11045



The following work procedure describes the removal and installation of one injector. The procedure is the same to remove another injector.

- Unlock and pull off the cable plug.
- Disconnect the fuel line from the injector.

 Module 21



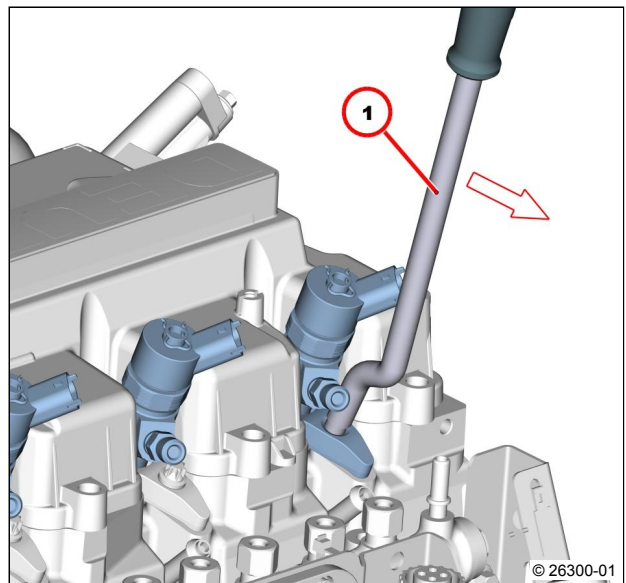
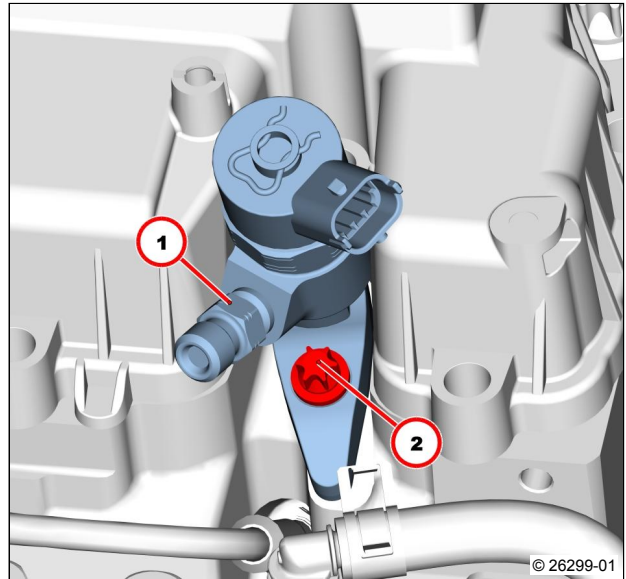
ATTENTION

The screw-in nozzle (1) of the injector must not be loosened. If the screw-in nozzle is loosened the injector must be renewed.

- Hold screw-in nozzle (1).
- Remove injection line.

 Module 21

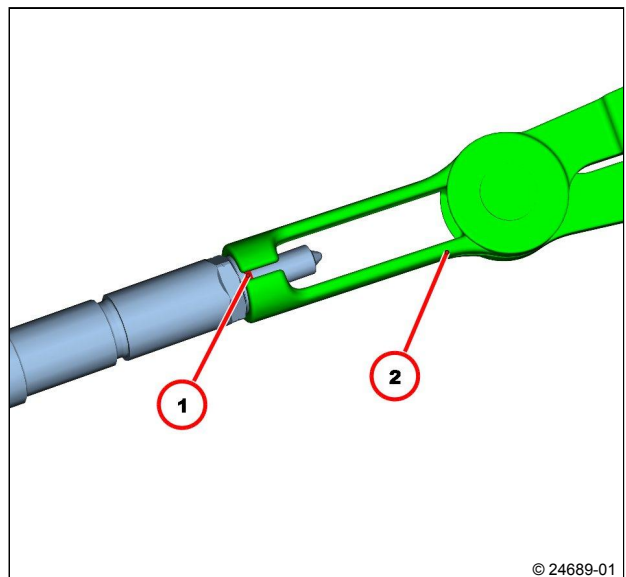
- Unscrew screw (2).
- Insert lever tool (1) into clamping claw.
- Loosen injector by moving the lever tool (1) in the direction of the arrow.
- Remove injector and clamping claw.



ATTENTION

Do not brush down nozzle head of the injector. Do not damage the nozzle head on the injector during disassembly of the sealing disc (1).

- Grip fixed sealing disc (1) using the assembly pliers (2) and pull off with slight turning movements.
- Visually inspect the components.

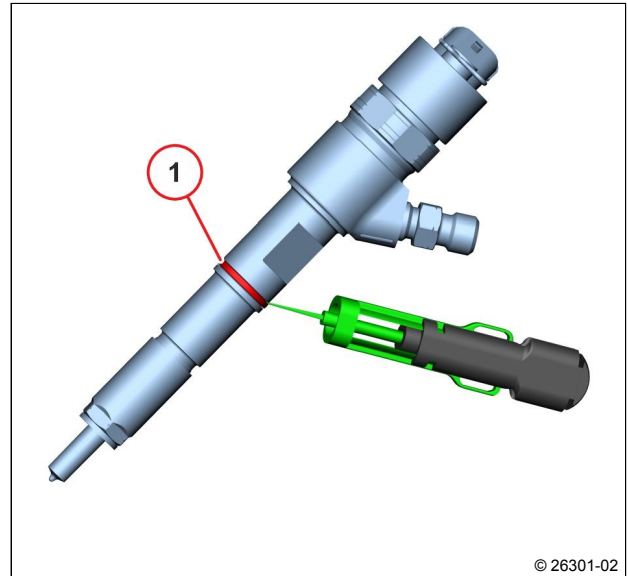


- Carefully remove O-ring (1) from injector with disassembly tool.



ATTENTION

Do not damage the injector.



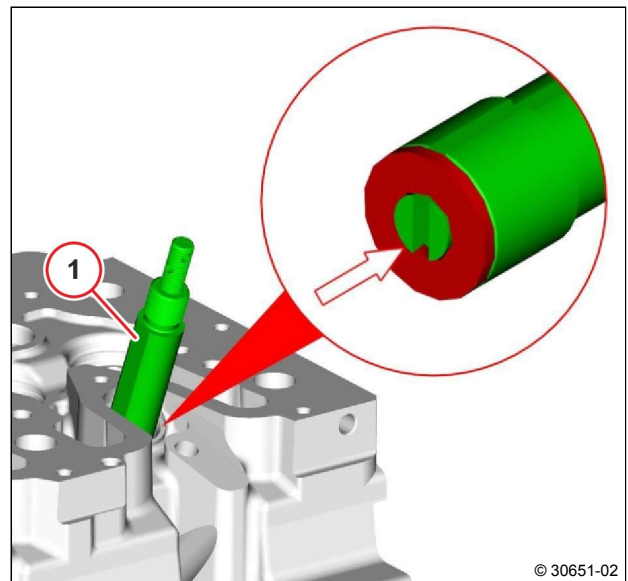
© 26301-02

Removing fixed sealing disc at cylinder head

- Insert extraction device (1).



The supports (arrow) must rest in the bore of the sealing disc.



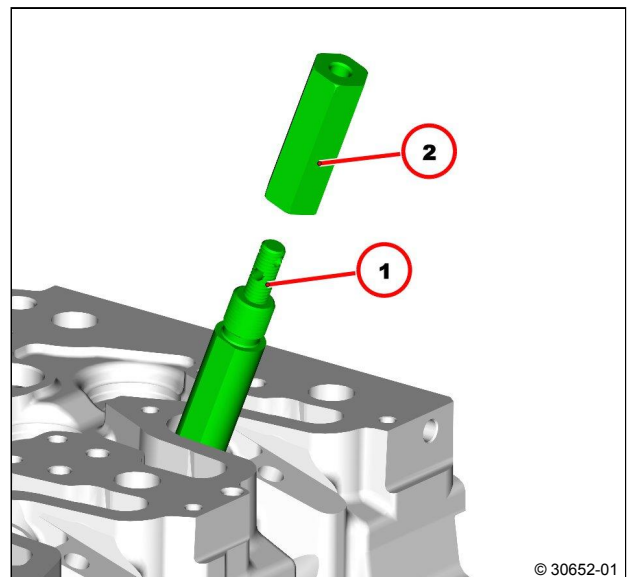
© 30651-02

- Screw in spindle (1) until the sealing disc is fixed to the extraction device.



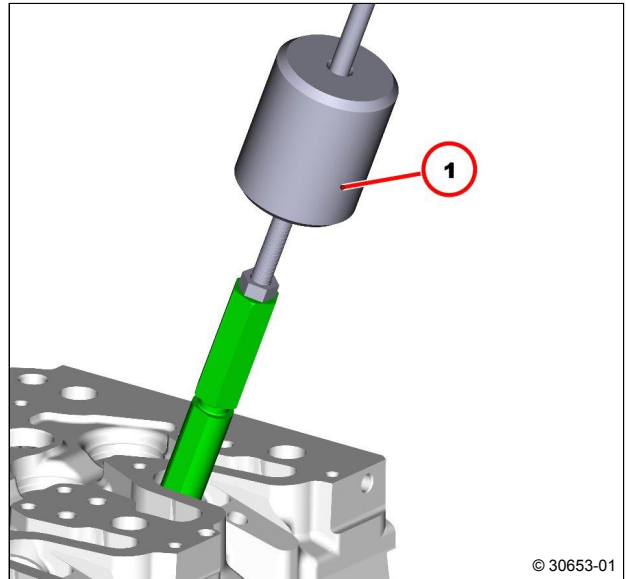
Hold extraction device at the hexagon.

- Attach adaptor (2) to the extraction device.



© 30652-01

- Attach slide hammer (1) to the extraction device.
- Pull out fixed sealing disc.



Installing the injector



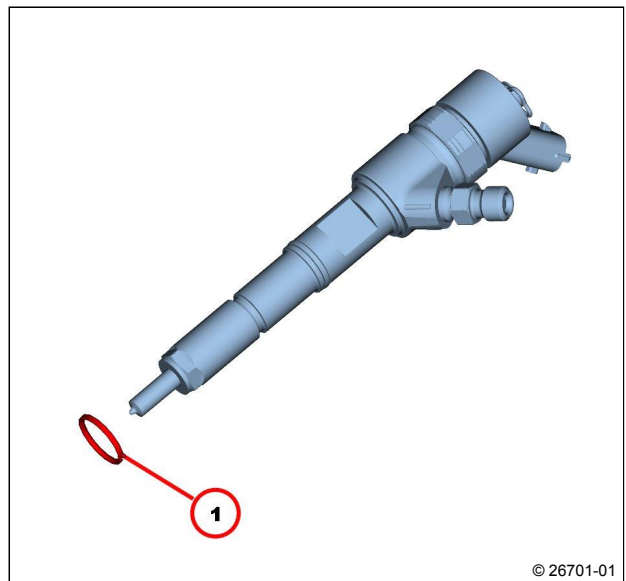
ATTENTION

Do not twist or overtighten the O-ring.
Do not damage O-ring!

- Mount a new O-ring (1).



Use a suitable assembly aid.
Provide protection for sharp edges.

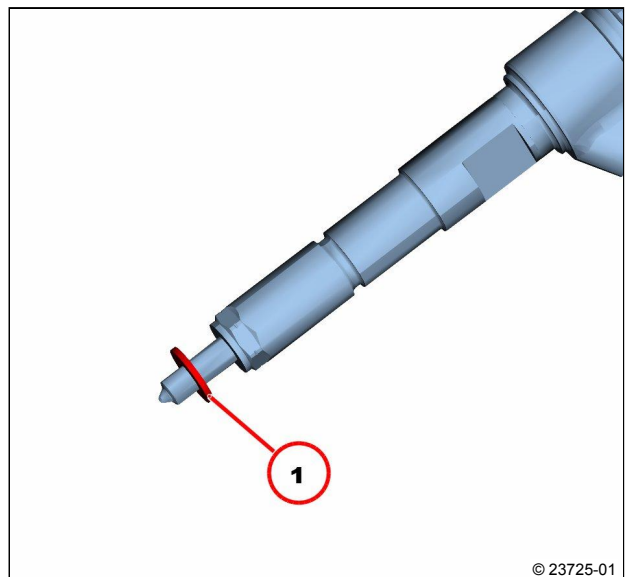


- Mount the new sealing disc (1) on injector.



ATTENTION

The hole on the cylinder head must be carefully cleaned of combustion residues before the injector is assembled.
Extract dirt particles.





ATTENTION

Note assignment of the injector to the cylinder
– see IMA code.
Ensure that the installation position is correct.
Note order of assembly.
Install injector without tension.

- Carefully insert injector into the cylinder head.
- Mount clamping claw.
- Insert screw (1).



Only tighten the screw after installation of the injection line.

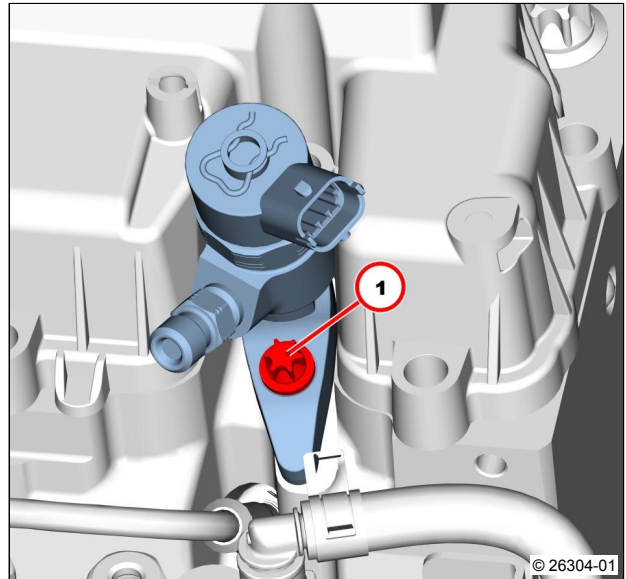
- Fit new injection lines.



Module 21



Do not tighten union nuts.



© 26304-01



ATTENTION

The screw-in nozzle (1) of the injector must not be loosened.
If the screw-in nozzle is loosened the injector must be renewed.

- Tighten screw (2).
 30 Nm
- Tighten union nuts of the injection line.
 Module 21
- Connect fuel line.

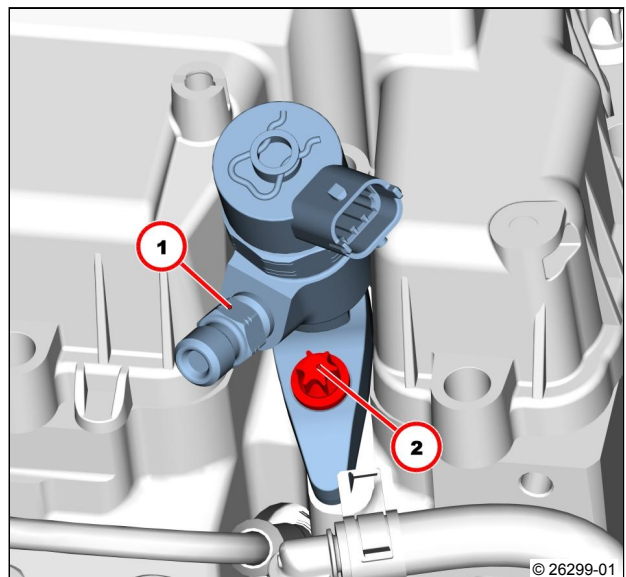


ATTENTION

Removed, missing and bent clips must be renewed.
The clip must spring back to the hold position automatically. Otherwise renew the clip.



Module 21



© 26299-01

- Plug in and lock cable plug.



Ensure that there is a proper connection.

Fuel pre-filter



Conventional tools

Special tools:

- Locking plugs / caps

01899368



- Safety information / User information
- Operating manual



DANGER

Do not carry out work on the fuel system when the engine is running.

The fuel system is under high pressure - risk of death.

Even after the engine shuts down, the fuel pressure may still be up to several 100 bar for a long time. The fuel pressure here does not drop until the fuel system is opened and the fuel can escape to the outside.



ATTENTION

Ensure the utmost cleanliness when performing all work.

Remove any paint residue and dirt particles before disassembly.

Carefully clean the area around the components concerned. Blow wet parts dry with compressed air.

Observe safety regulations and national regulations when working with fuels.

Close all connections immediately after opening with new, clean locking plugs/caps.

Do not remove locking plugs/caps until immediately before assembling.

Observe DEUTZ AG installation guidelines.

Observe installation guideline / documentation of the vehicle manufacturer / equipment manufacturer.

The documentation of the vehicle manufacturer / equipment manufacturer must be complied with for dismantling and installing.



Collect leaking operating media in suitable vessels and dispose of them according to regulations.

Vent the fuel system after doing any work on it - see operating manual.



For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

Disassembly / Assembly

1 Bracket

2 Filter cartridge

 Tighten according to the operating manual.

 Operating manual

3 Level sensor

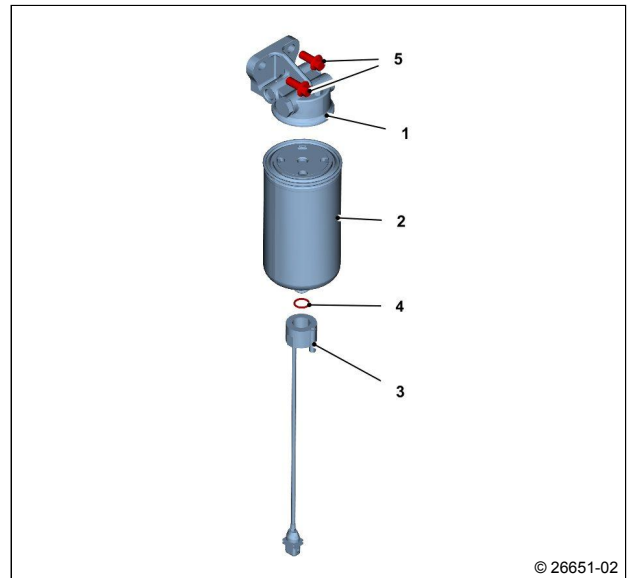
4 Sealing ring

5 Hexagon head screw

 32 Nm



Use a new sealing ring.



Fuel filter



Conventional tools

Special tools:

- Locking plugs / caps

01899368



- Safety information / User information
- Operating manual



DANGER

Do not carry out work on the fuel system when the engine is running.

The fuel system is under high pressure - risk of death.

Even after the engine shuts down, the fuel pressure may still be up to several 100 bar for a long time. The fuel pressure here does not drop until the fuel system is opened and the fuel can escape to the outside.



ATTENTION

Ensure the utmost cleanliness when performing all work.

Remove any paint residue and dirt particles before disassembly.

Carefully clean the area around the components concerned. Blow wet parts dry with compressed air.

Observe safety regulations and national regulations when working with fuels.

Close all connections immediately after opening with new, clean locking plugs/caps.

Do not remove locking plugs/caps until immediately before assembling.



Collect leaking operating media in suitable vessels and dispose of them according to regulations.

Vent the fuel system after doing any work on it - see operating manual.



For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

Disassembly / Assembly

- 1 Bracket
- 2 Filter cartridge
-  Tighten according to the operating manual.

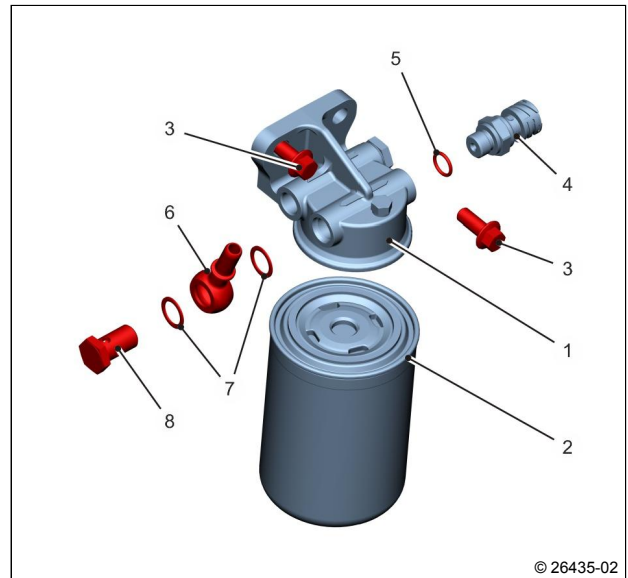
 Operating manual
- 3 Hexagon head screw

 42 Nm
- 4 Pressure sensor
- 5 O-ring
- 6 Ring piece
- 7 Sealing ring
- 8 Hollow screw

 39 Nm



Use new O-ring.
Use new sealing rings.



© 26435-02

- 6 Ring piece
Dimension X

 $30^{\circ} +1^{\circ} -1^{\circ}$

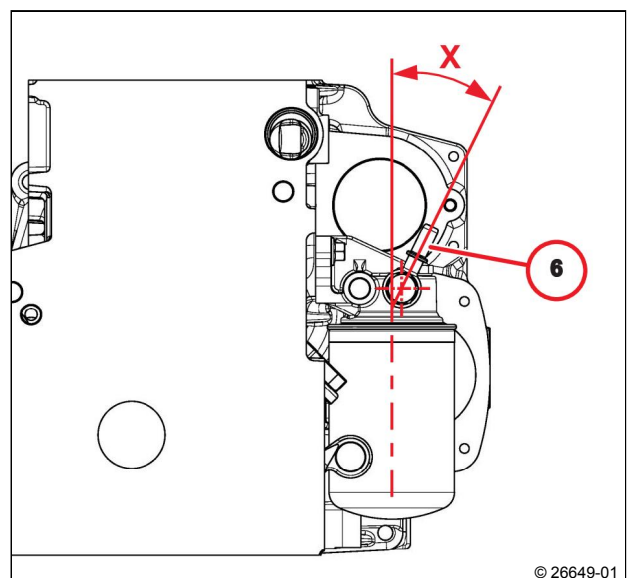


ATTENTION

Ensure that the installation position is correct.



Installation shown as example.



© 26649-01

Pressure sensor installation (Fuel pressure)



Conventional tools

Special tools:

– Locking plugs / caps

01899368



– Safety information / User information

– Operating manual



DANGER

Do not carry out work on the fuel system when the engine is running.

The fuel system is under high pressure - risk of death.

Even after the engine shuts down, the fuel pressure may still be up to several 100 bar for a long time. The fuel pressure here does not drop until the fuel system is opened and the fuel can escape to the outside.



ATTENTION

Ensure the utmost cleanliness when performing all work.

Remove any paint residue and dirt particles before disassembly.

Carefully clean the area around the components concerned. Blow wet parts dry with compressed air.

Observe safety regulations and national regulations when working with fuels.

Close all connections immediately after opening with new, clean locking plugs/caps.

Do not remove locking plugs/caps until immediately before assembling.



Collect leaking operating media in suitable vessels and dispose of them according to regulations.

Vent the fuel system after doing any work on it - see operating manual.



For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

Disassembly / Assembly

- (1) Bracket
(2) Pressure sensor

 25 Nm

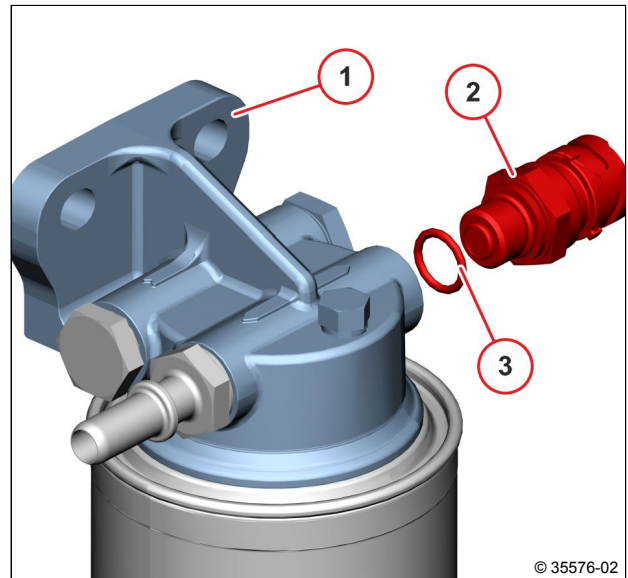
- (3) O-ring



ATTENTION
Use new O-ring.



Installation shown as example.
Observe the spare parts documentation.



**Level sensor
(Fuel pre-filter)**

Conventional tools



- Safety information / User information
- Operating manual



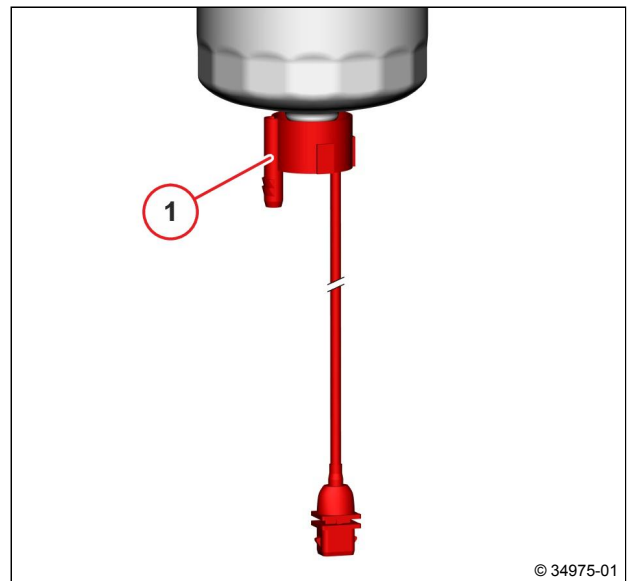
For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

Disassembly / Assembly

(1) Level sensor



1.6 Nm



© 34975-01

Fuel supply pump (electric)



Conventional tools

Special tools:

- Locking plugs / caps

01899368



- Safety information / User information
- Operating manual
- Installation guidelines



DANGER

Do not carry out work on the fuel system when the engine is running.

The fuel system is under high pressure - risk of death.

Even after the engine shuts down, the fuel pressure may still be up to several 100 bar for a long time. The fuel pressure here does not drop until the fuel system is opened and the fuel can escape to the outside.



ATTENTION

Ensure the utmost cleanliness when performing all work.

Remove any paint residue and dirt particles before disassembly.

Carefully clean the area around the components concerned. Blow wet parts dry with compressed air.

Observe safety regulations and national regulations when working with fuels.

Close all connections immediately after opening with new, clean locking plugs/caps.

Do not remove locking plugs/caps until immediately before assembling.

Observe DEUTZ AG installation guidelines.

Observe installation guideline / documentation of the vehicle manufacturer / equipment manufacturer.

The documentation of the vehicle manufacturer / equipment manufacturer must be complied with for dismantling and installing.



Collect leaking operating media in suitable vessels and dispose of them according to regulations.

Vent the fuel system after doing any work on it - see operating manual.

All illustrations are shown as examples.



For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

Disassembly / Assembly

- 1 Fuel supply pump
- 2 Holders
- 3 Blade receptacle



ATTENTION

Ensure that the installation position is correct.
The fuel outlet is facing upwards.

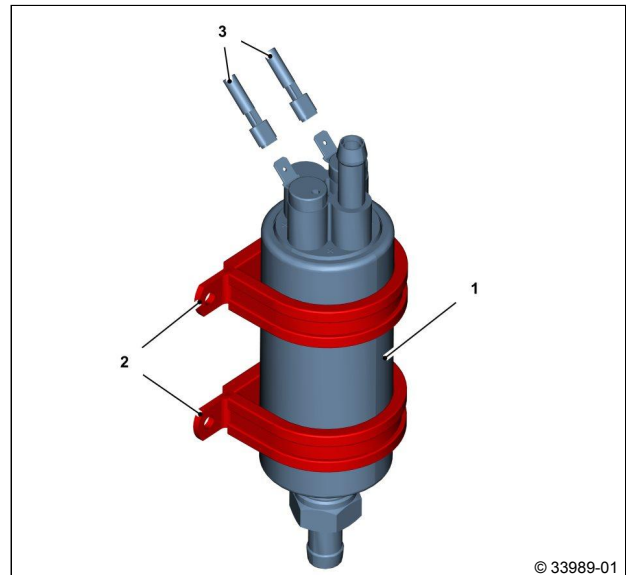


Affix the fuel supply pump holders with screws.
The screws are not included in the DEUTZ scope of delivery.

Attachment of the holders:

- 4x screws M5-8.8

 5 Nm



© 33989-01

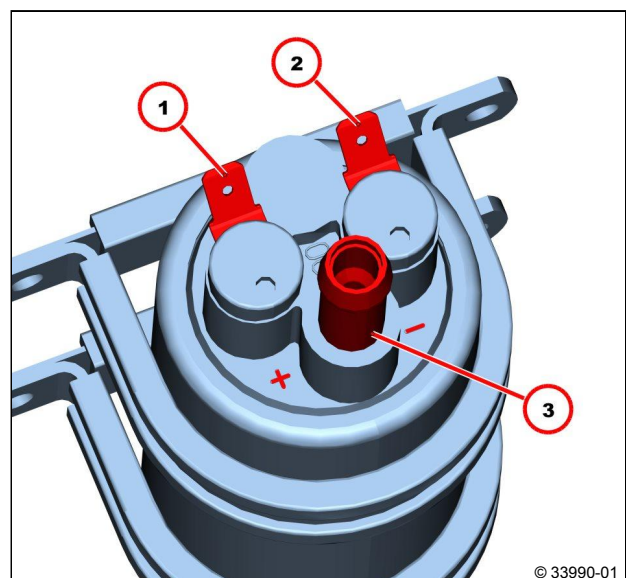
Electrical connections (version with integrated flat plugs)

- (1) Plus terminal
- (2) Minus terminal
- (3) Fuel outlet connection nozzle



ATTENTION

Connections (1), (2):
Ensure that the cable connection is correct.
Pay attention to the assignment and polarity of the electrical connections!



© 33990-01

Removing and installing the rail



Conventional tools:

- Wrench insert
spanner size 14 mm

Special tools:

- Hexalobular tool kit 01899092
- Locking plugs/caps 01899368
- Special wrench 02992477



- Marker pen, waterproof,
permanent



- Safety information / User information
- Operating manual



DANGER

Do not carry out work on the fuel system when the engine is running.

The fuel system is under high pressure - risk of death.

Even after the engine shuts down, the fuel pressure may still be up to several 100 bar for a long time. The fuel pressure here does not drop until the fuel system is opened and the fuel can escape to the outside.



ATTENTION

Ensure the utmost cleanliness when performing all work.

Remove any paint residue and dirt particles before disassembly.

Carefully clean the area around the components concerned. Blow wet parts dry with compressed air.

Observe safety regulations and national regulations when working with fuels.

Close all connections immediately after opening with new, clean locking plugs/caps.

Do not remove locking plugs/caps until immediately before assembling.



Collect leaking operating media in suitable vessels and dispose of them according to regulations.

Vent the fuel system after doing any work on it - see operating manual.



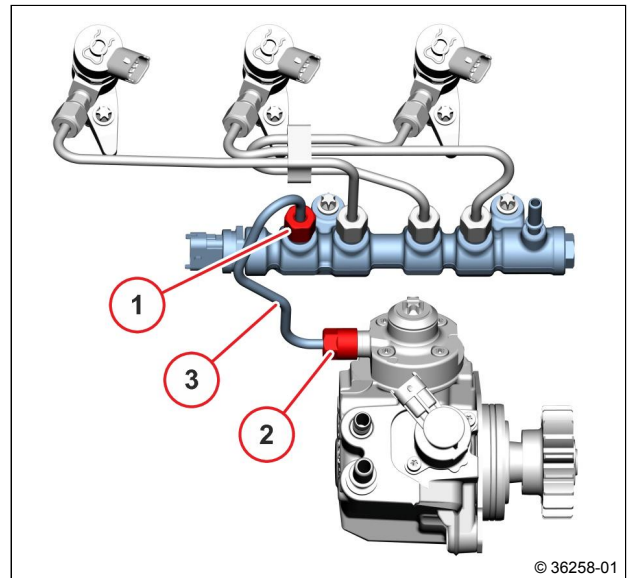
For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

Removing high-pressure line



Collect any escaping fuel and dispose of it according to regulations.

- Remove fuel return line.
- Unscrew union nut (1) with special wrench.
- Unscrew union nut (2) with special wrench.
- Remove high-pressure line (3).

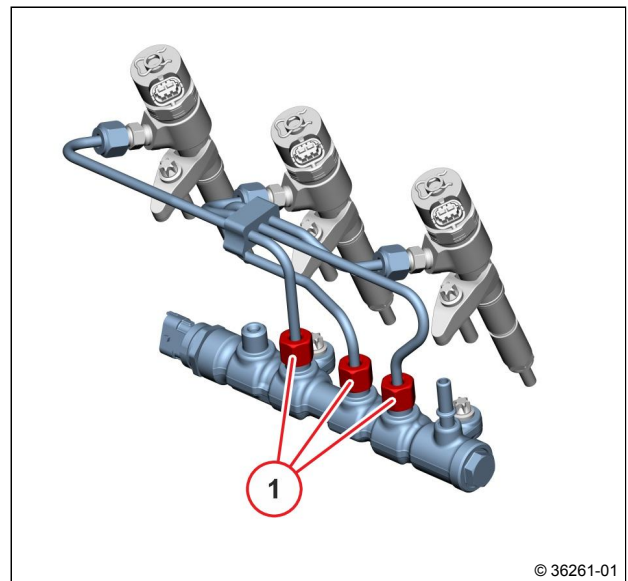


Remove injection lines



Collect any escaping fuel and dispose of it according to regulations.

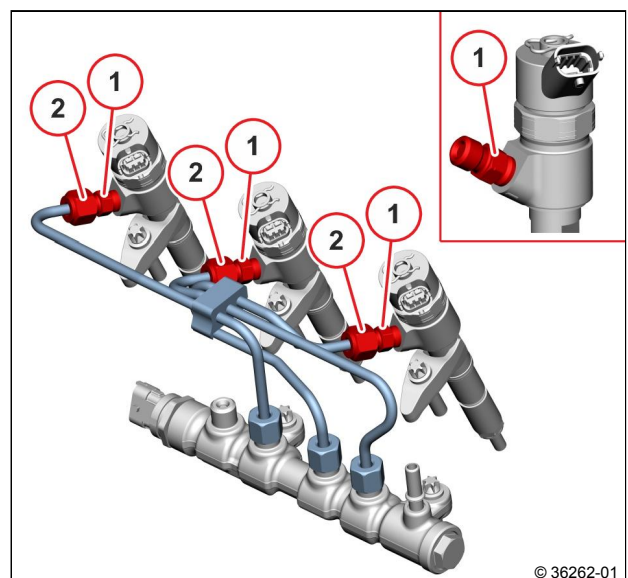
Unscrew union nuts (1) with special wrench.



ATTENTION

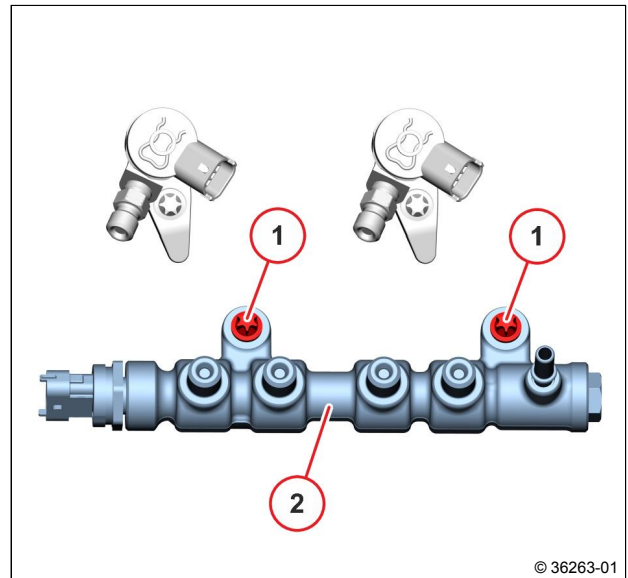
The screw-in nozzle (1) of the injector must not be loosened. If the screw-in nozzle is loosened the injector must be renewed.

- Undo union nuts (2) while holding the screw-in nozzle (1) of the respective injector in such a way that unintentional loosening of the screw-in nozzle is prevented.
- Remove injection lines.



Remove the rail

- Unlock cable plug.
- Pull off cable plug.
- Unscrew screws (1).
- Remove rail (2).
- Visually inspect components.

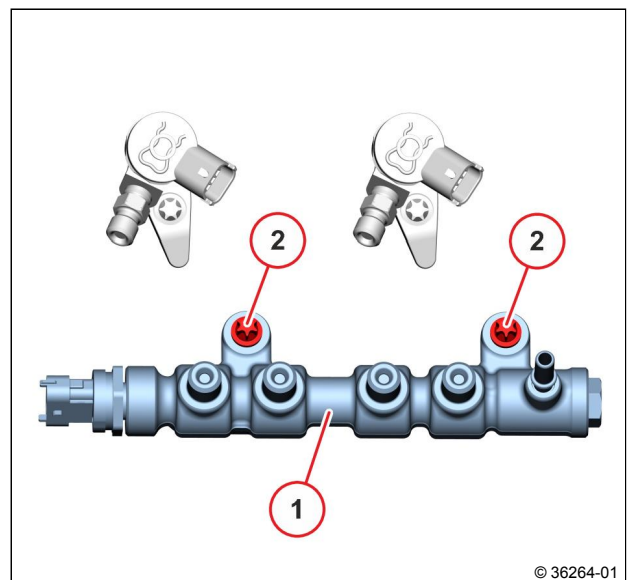


Install rail

- Mount rail (1).
- Loosely pre-assemble rail (1) with screws (2).



Do not tighten the screws.



Install injection lines



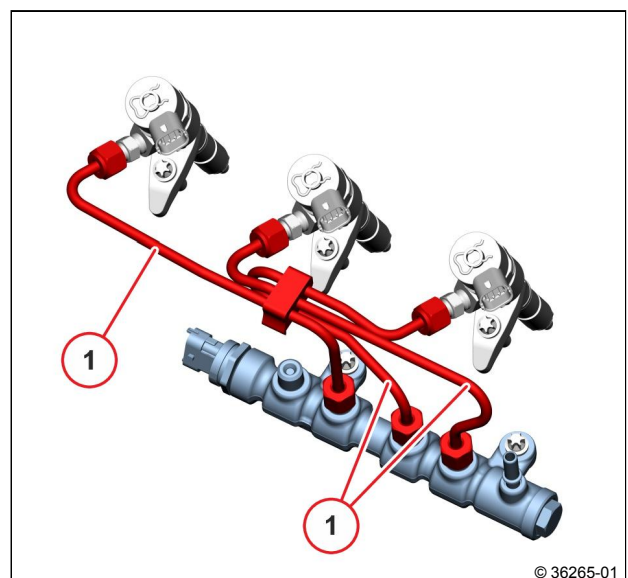
ATTENTION

The injection lines must always be replaced after being dismantled.



Different injection lines — see spare parts documentation.
Make sure the assignment and installation position of the injection lines are correct.

- Mount new injection lines (1).

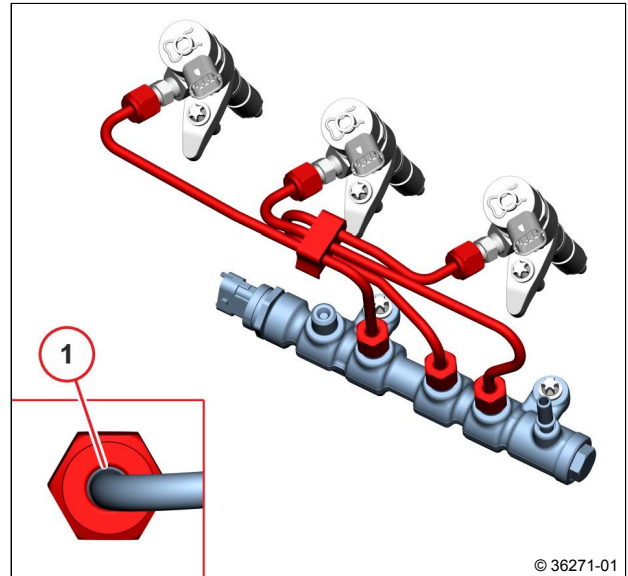




ATTENTION

Pay attention to alignment of the injection pipes.
Lines must not be in the bores (1) of the union nuts.
Install injection lines without tension and without touching.
They must be a safe distance away from adjacent parts.

- Align injection lines.
- Screw on union nuts hand-tight.



Installing high-pressure line



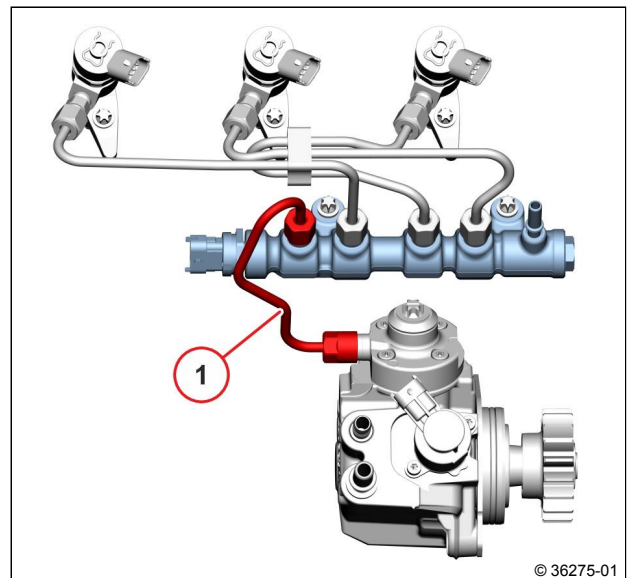
ATTENTION

The high-pressure line must always be renewed after dismantling.



Ensure that the installation position is correct.

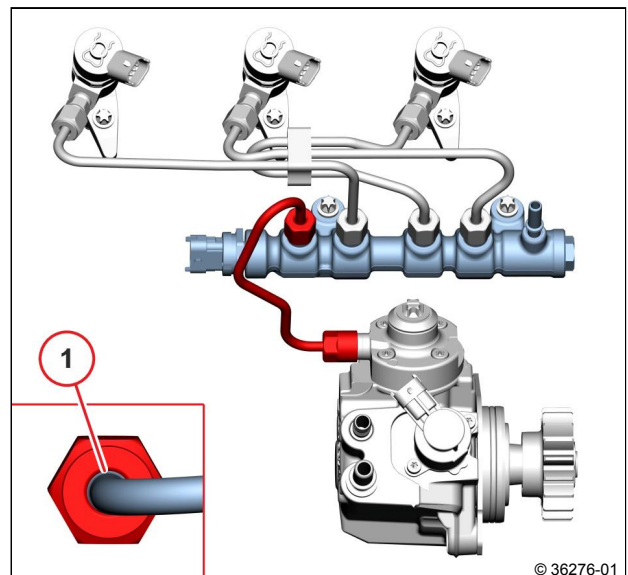
- Mount new high-pressure line (1).



ATTENTION

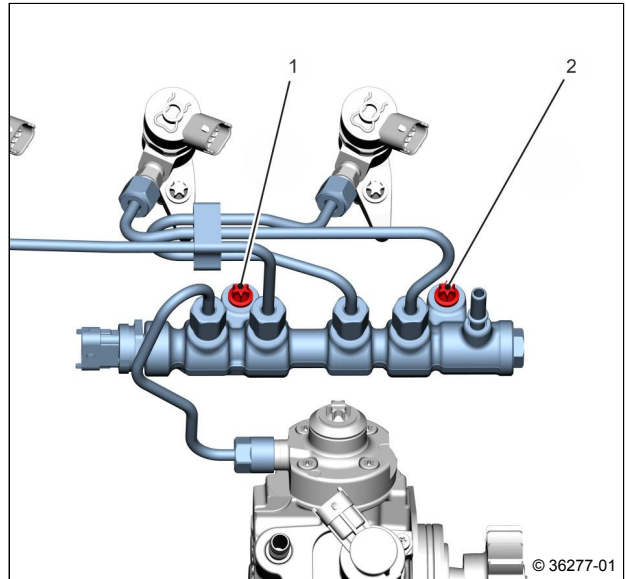
Pay attention to alignment of the high-pressure line.
Line may not be in the bore (1) of the union nut.
Install high-pressure line without tension and contact.
They must be a safe distance away from adjacent parts.

- Align high-pressure line.
- Screw on union nuts hand-tight.



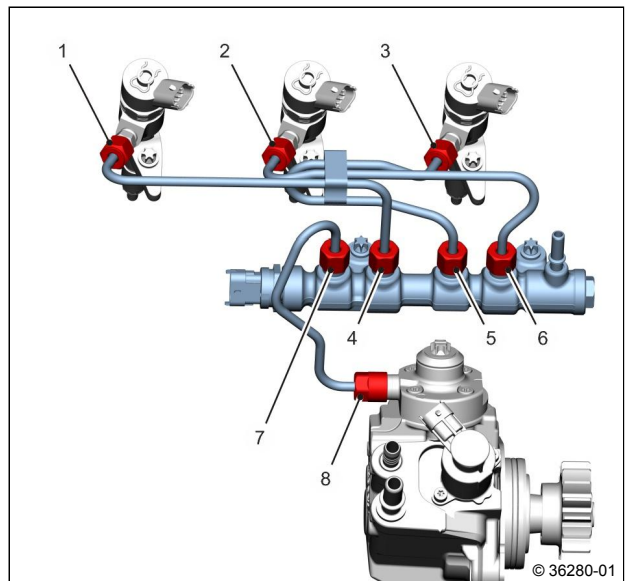
- Tighten the screws in order.

 30 Nm



- Tighten the union nuts in order.

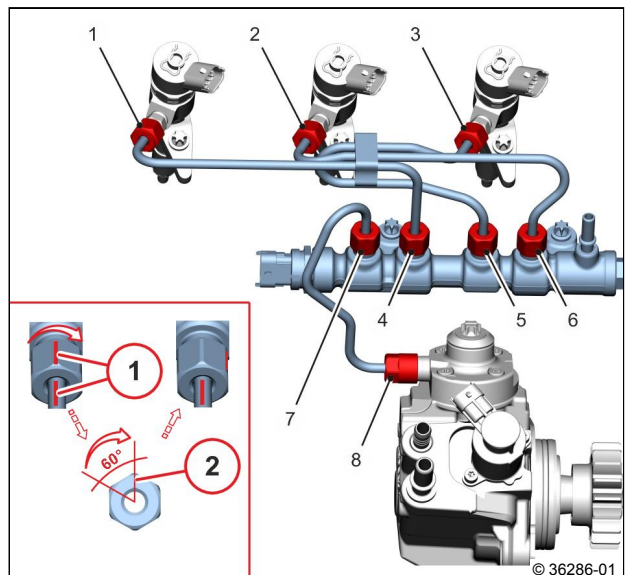
 Stage 1: 15 Nm



- Draw help markings (1).
- Tighten the union nuts in order.
- Check injection lines for perfect installation position.
- Check high pressure pipes for correct installation position.
- Install fuel return line.
- Plug in and lock cable plug.



Ensure that there is a proper connection.



Removing and installing the pressure relief valve (Rail)



Conventional tools

Special tools:

– Locking plugs/caps

– Disassembly tool



– Assembly grease

01899368

02992127

01016496



– Safety information / User information

– Operating manual



DANGER

Do not carry out work on the fuel system when the engine is running.

The fuel system is under high pressure - risk of death.

Even after the engine shuts down, the fuel pressure may still be up to several 100 bar for a long time. The fuel pressure here does not drop until the fuel system is opened and the fuel can escape to the outside.



ATTENTION

Ensure the utmost cleanliness when performing all work.

Remove any paint residue and dirt particles before disassembly.

Carefully clean the area around the components concerned. Blow wet parts dry with compressed air.

Observe safety regulations and national regulations when working with fuels.

Close all connections immediately after opening with new, clean locking plugs/caps.

Do not remove locking plugs/caps until immediately before assembling.



Collect leaking operating media in suitable vessels and dispose of them according to regulations.

Vent the fuel system after doing any work on it - see operating manual.



For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

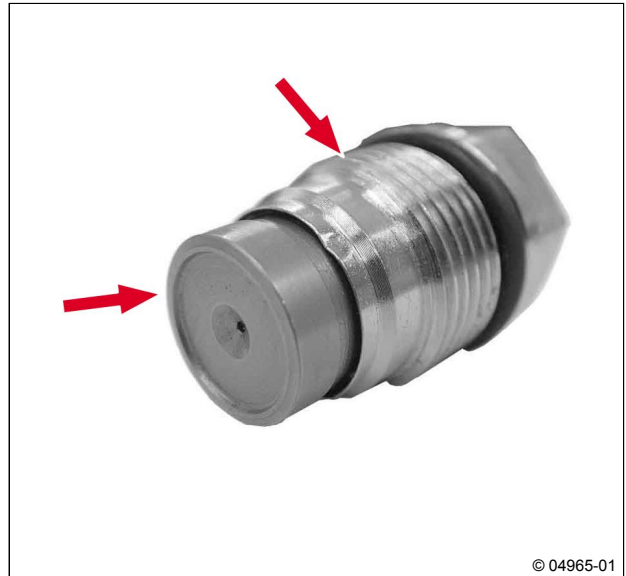
Removing the pressure relief valve

- Unscrew pressure relief valve.



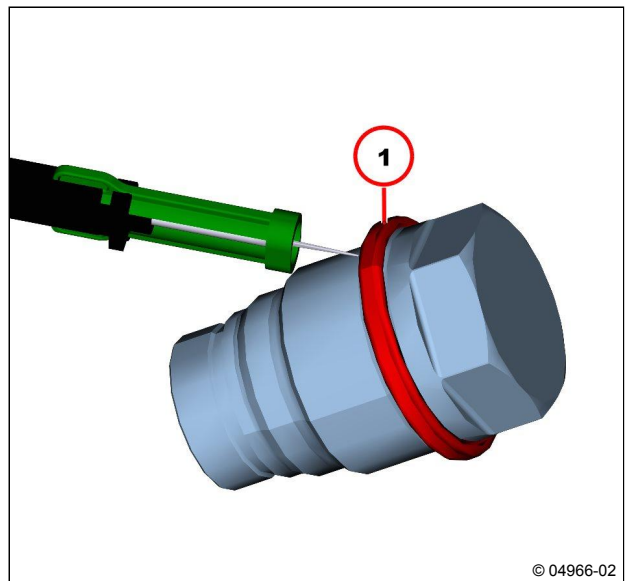
Collect any escaping fuel and dispose of it according to regulations.

- Visually inspect thread and sealing edge of the pressure relief valve.



© 04965-01

- Remove O-ring (1) with disassembly tool.



© 04966-02

Installing the pressure relief valve



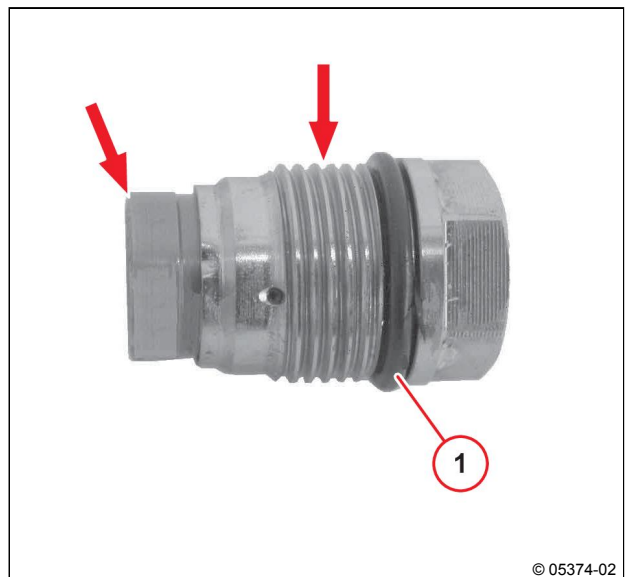
ATTENTION

No foreign matter must get into the rail. Ensure utmost cleanliness. Especially on the thread and sealing surface of the rail. Observe the spare parts documentation. In case of replacement, the rail pressure sensor and the pressure relief valve must be replaced as a pair. Do not twist or overtighten the O-ring. Do not damage O-ring!

- Clean thread and sealing edge of the pressure relief valve.
- Mount new O-ring (1).

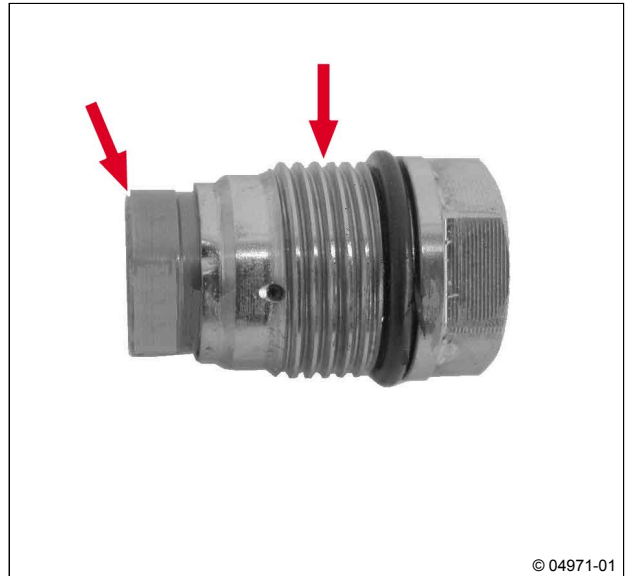


Use a suitable assembly aid. Provide protection for sharp edges.



© 05374-02

- Lightly coat the thread and sealing edge of the pressure relief valve with assembly grease.
- Clean thread and sealing area of the rail.
- Screw in pressure relief valve.
- Tighten pressure relief valve.

 100 Nm

Removing and installing the rail pressure sensor



Conventional tools

Special tools:

- Socket wrench insert 01899132
Spanner size 27 mm
Design long

- Locking plugs/caps 01899368



- Assembly grease 01016496



- Safety information / User information
- Operating manual



DANGER

Do not carry out work on the fuel system when the engine is running.

The fuel system is under high pressure - risk of death.

Even after the engine shuts down, the fuel pressure may still be up to several 100 bar for a long time. The fuel pressure here does not drop until the fuel system is opened and the fuel can escape to the outside.



ATTENTION

Ensure the utmost cleanliness when performing all work.

Remove any paint residue and dirt particles before disassembly.

Carefully clean the area around the components concerned. Blow wet parts dry with compressed air.

Observe safety regulations and national regulations when working with fuels.

Close all connections immediately after opening with new, clean locking plugs/caps.

Do not remove locking plugs/caps until immediately before assembling.



Collect leaking operating media in suitable vessels and dispose of them according to regulations.

Vent the fuel system after doing any work on it - see operating manual.



For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

Removing the rail pressure sensor

- Unscrew rail pressure sensor using socket wrench insert.



Collect any escaping fuel and dispose of it according to regulations.



ATTENTION

To avoid electrostatic discharges, do not touch the pin contacts of the rail pressure sensor with your bare hands. Ensure the utmost cleanliness of the plug connection.

- Visually inspect thread and sealing edge (arrows) of the rail pressure sensor.



© 04983-01

Installing the rail pressure sensor



ATTENTION

No foreign matter must get into the rail. Ensure utmost cleanliness. Especially on the thread and sealing surface of the rail. Observe the spare parts documentation. In case of replacement, the rail pressure sensor and the pressure relief valve must be replaced as a pair. To avoid electrostatic discharges, do not touch the pin contacts of the rail pressure sensor with your bare hands. Ensure the utmost cleanliness of the plug connection.

- Clean thread and sealing edge of the rail pressure sensor.
- Lightly coat the thread and sealing edge of the rail pressure sensor with assembly grease.
- Clean thread and sealing area of the rail.



ATTENTION

Only tighten rail pressure sensor with the hexagon.

- Screw in rail pressure sensor.
- Tighten rail pressure sensor with the socket wrench insert.



70 Nm



© 04983-01

Removing and installing the fuel line (injector, rail, high-pressure pump)



Conventional tools

Special tools:

- Spring band pliers 01899112
- Locking plugs/caps 01899368



- Mounting compound
DEUTZ AP 1908



- Safety information / User information
- Operating manual



DANGER

Do not carry out work on the fuel system when the engine is running.

The fuel system is under high pressure - risk of death.

Even after the engine shuts down, the fuel pressure may still be up to several 100 bar for a long time. The fuel pressure here does not drop until the fuel system is opened and the fuel can escape to the outside.



ATTENTION

Ensure the utmost cleanliness when performing all work.

Remove any paint residue and dirt particles before disassembly.

Carefully clean the area around the components concerned. Blow wet parts dry with compressed air.

Observe safety regulations and national regulations when working with fuels.

Close all connections immediately after opening with new, clean locking plugs/caps.

Do not remove locking plugs/caps until immediately before assembling.



Collect leaking operating media in suitable vessels and dispose of them according to regulations.

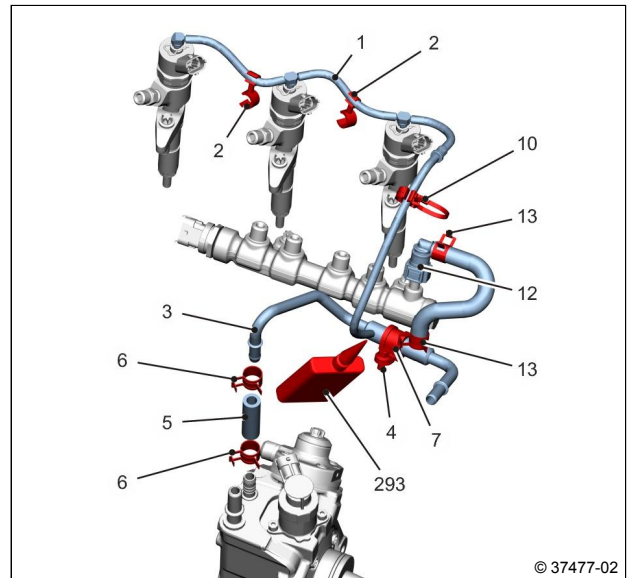
Vent the fuel system after doing any work on it - see operating manual.



For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

Removing the fuel line

- 1 Return line
- 2 Hose holder
- 3 Fuel line
- 4 Hexagon head screw
- 5 Hose line
- 6 Spring band clip
- 7 Pipe clip
- 10 Cable tie
- 12 Coupling plug
- 13 Spring band clip
- 293 Mounting compound



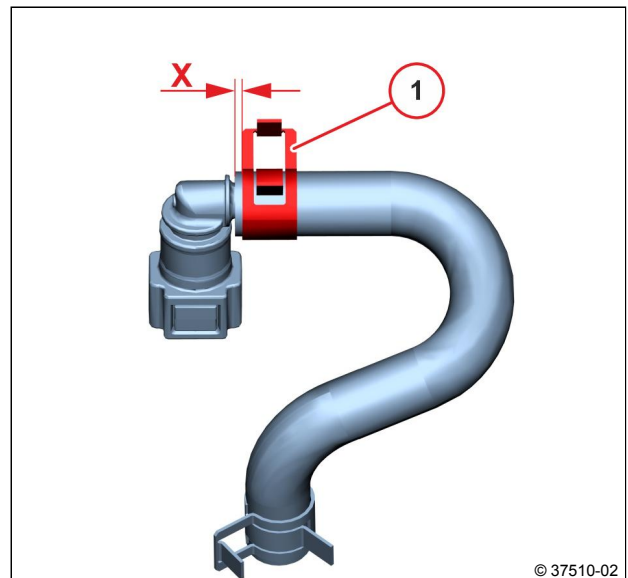
(1) Spring band clip

- Dimension X
- 2^{+2}_0 mm



ATTENTION

Ensure that the installation position is correct.

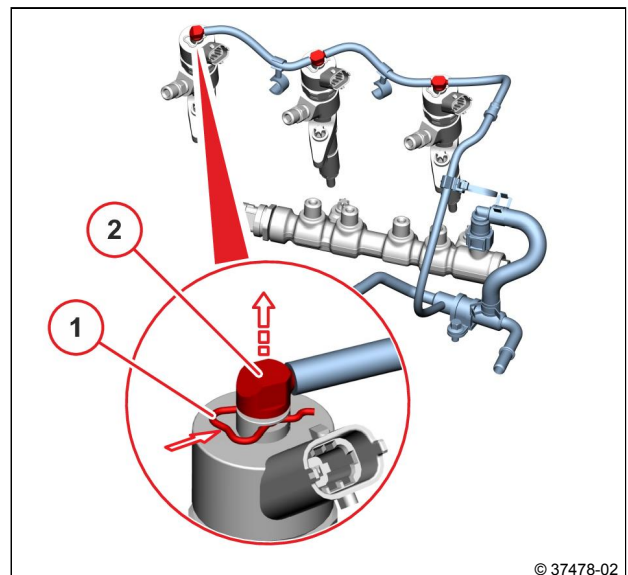


ATTENTION

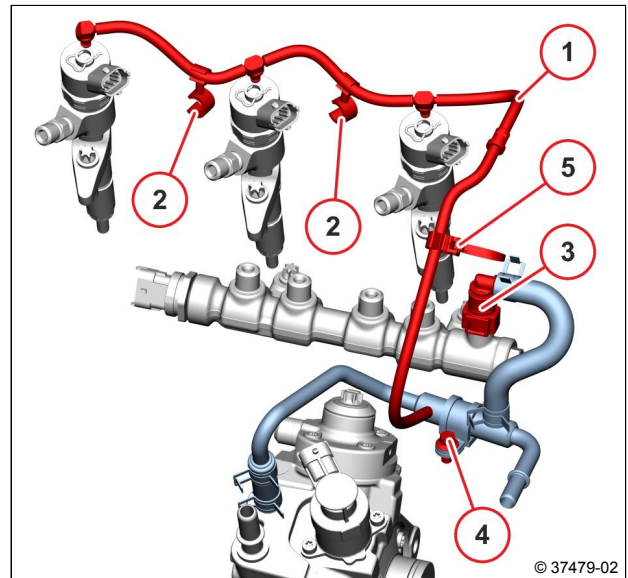
Removed, missing and bent clips must be renewed.

The clip must spring back to the hold position automatically. Otherwise renew the clip.

- Press in the clip (1) to the stop.
- Pull out return line (2).



- Remove return line (1) from hose holder (2).
- Unlock coupling plug (3) and pull off.
- Unscrew screw (4).
- Disconnect cable ties (5).

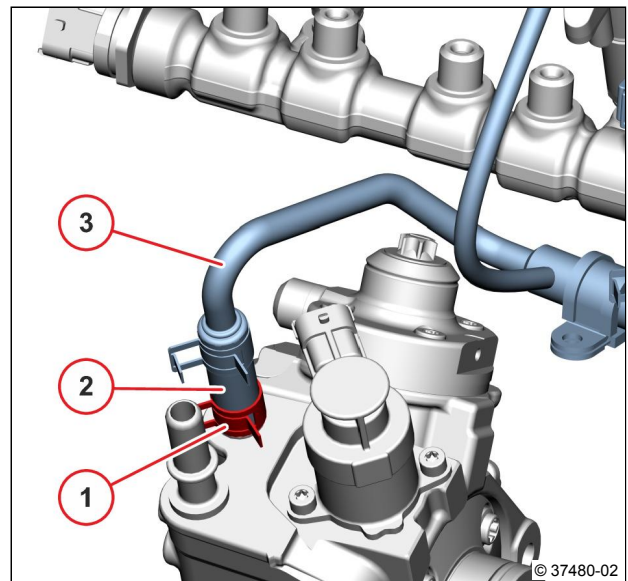


- Loosen spring band clip (1) with spring band pliers.
- Pull off hose pipe (2).
- Remove fuel line (3).
- Visually inspect the components.
- Replace damaged components.



ATTENTION

Damaged fuel lines must be replaced completely.



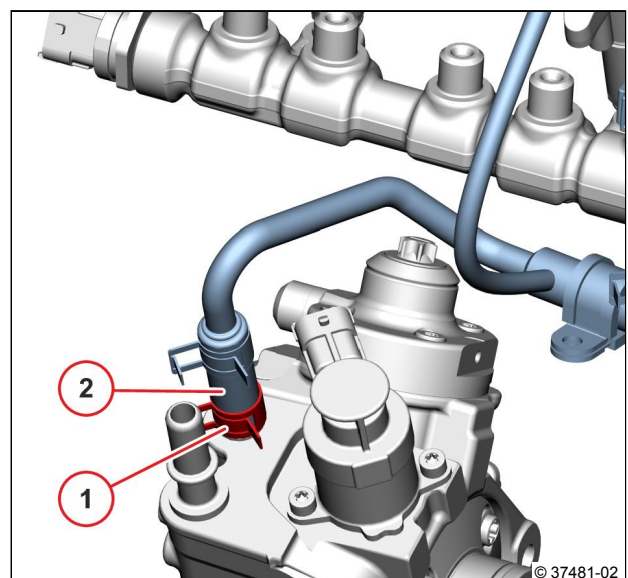
Mounting the fuel line



ATTENTION

Damaged fuel lines must be replaced completely. Ensure that the installation position is correct. Lines must be pushed on so that they are flush.

- Position fuel line.
- Position spring band clip (1) with spring band pliers.
- Connect hose pipe (2).





ATTENTION

Ensure that the installation position is correct.

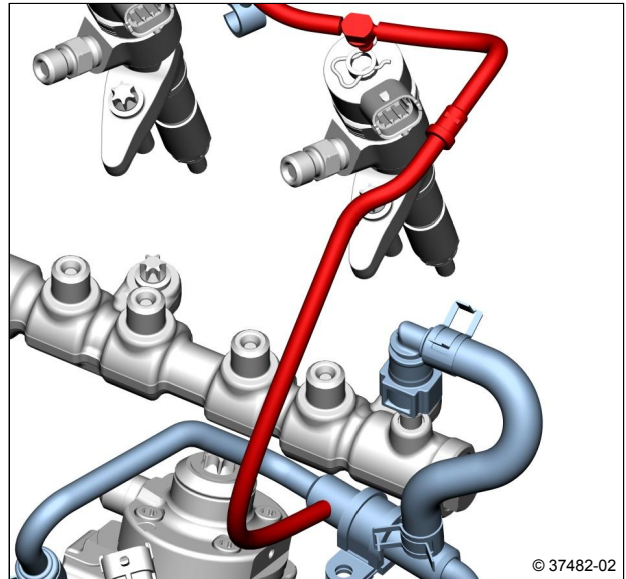
Fuel line with fabric casing:

If a hose piece is pulled off of the hose connection, the hose line must be replaced completely.

Push hose piece onto the hose connection up to the end stop!



Use mounting compound.



© 37482-02

- Position fuel line.
- Insert return line (1) in hose holder (2).
- Mount coupling plug (3) and lock into place.
- Position pipe clip (4).
- Screw in screw (5).
- Tighten cable ties (6).

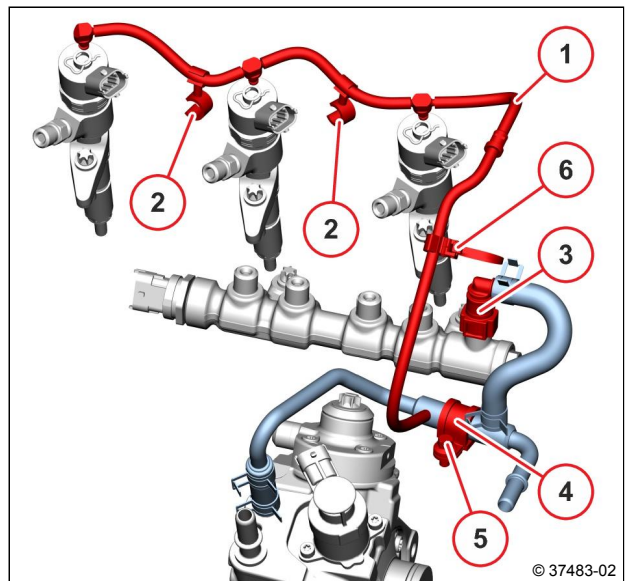


ATTENTION

Damaged fuel lines must be replaced completely.

Ensure that the installation position is correct. Lines must be pushed on so that they are flush.

Lay fuel lines free from tension and chafing.



© 37483-02



ATTENTION

Removed, missing and bent clips must be renewed.

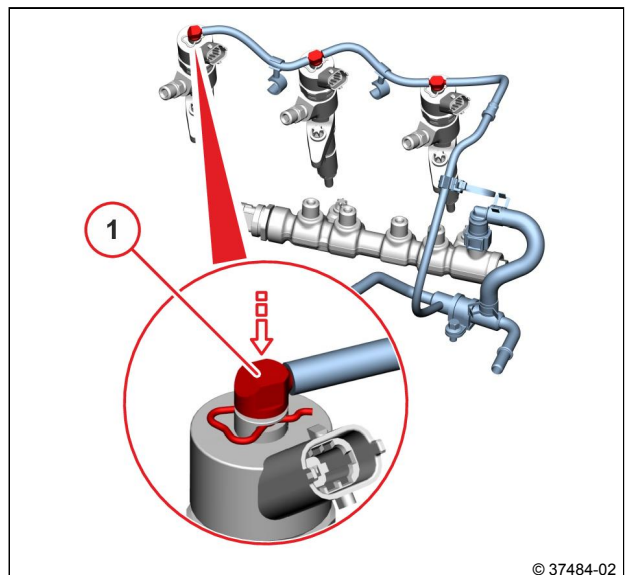
The clip must spring back to the hold position automatically. Otherwise renew the clip.

- Position return line (1) vertically to the injector.
- Insert return line (1) into injector by hand.



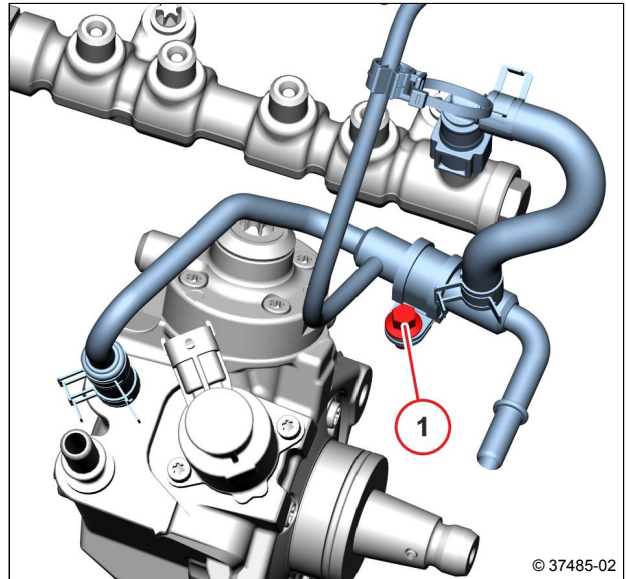
ATTENTION

Ensure that the installation position is correct. Return line must snap in audibly.



© 37484-02

- Tighten screw (1).
 13 Nm
- Carry out a trial run.
- Check fuel system for leaks.
 - Visual inspection for leaks



Removing and installing the charge air line



Conventional tools



– Safety information / User information



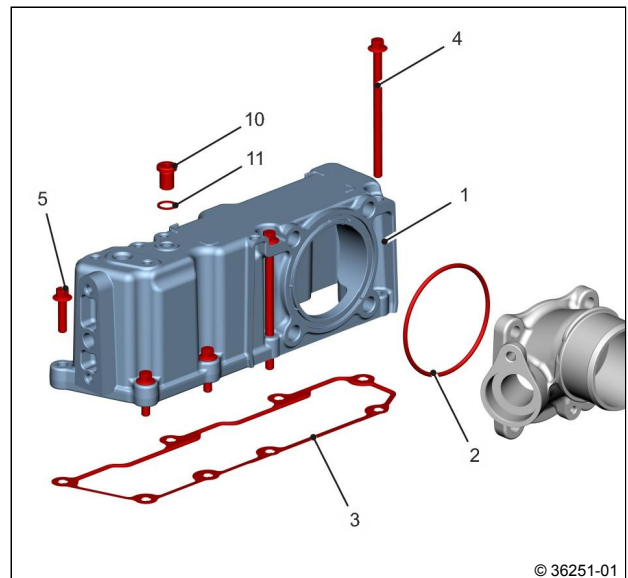
For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

Removing the charge air line

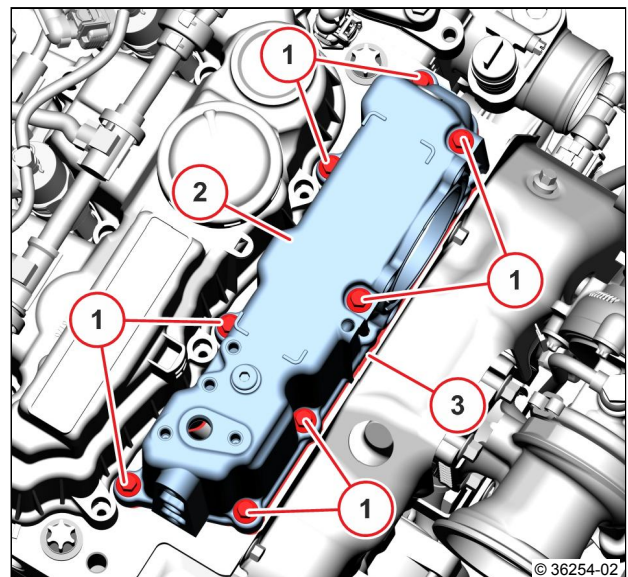
- 1 Charge air line
- 2 O-ring
- 3 Seal
- 4 Hexagon head screw
- 5 Hexagon head screw
- 10 Locking screw
-  13 Nm
- 11 Sealing ring



Use a new sealing ring.



- Removing charge air manifold.
 Module 22
- Remove the ventilation line.
 Module 01
- Remove the pressure sensor.
 Module 22
- Unscrew screws (1).
- Remove charge air pipe (2).
- Remove gasket (3).

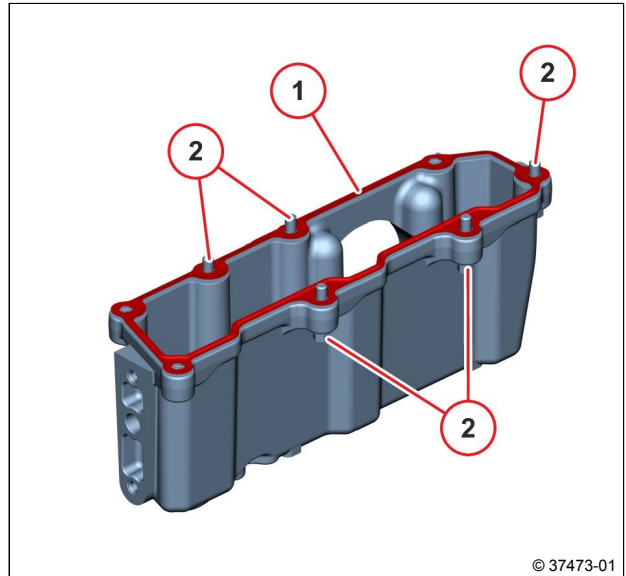


Installing the charge air line

- Mount new seal (1).
- Tighten screws (2).



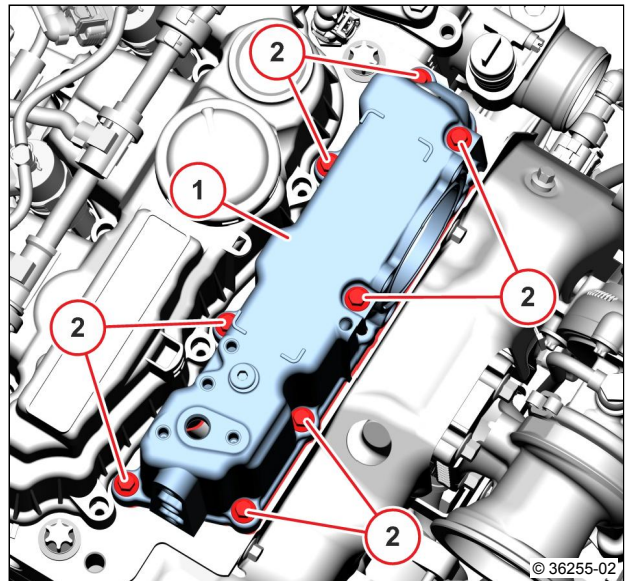
Note different screw lengths.
The seal is locked by the screw thread.



- Attach charge air line (1).
- Tighten screws (2).



Note different screw lengths.



- Tighten screws according to the tightening sequence.



8.5 Nm

- Install the pressure sensor.



Module 22

- Install the ventilation line.

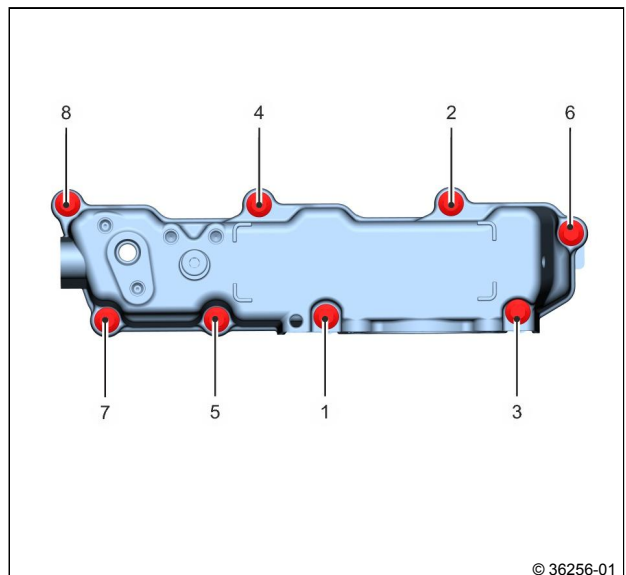


Module 01

- Installing charge air manifold.



Module 22



Removing and installing the mixing pipe



Conventional tools



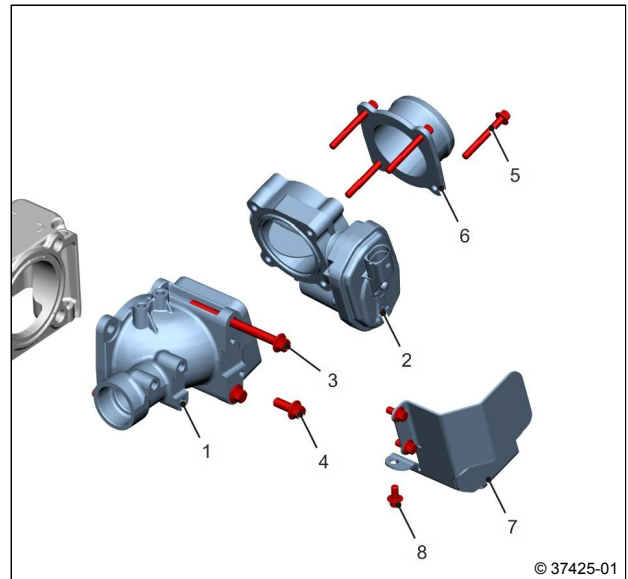
– Safety information / User information



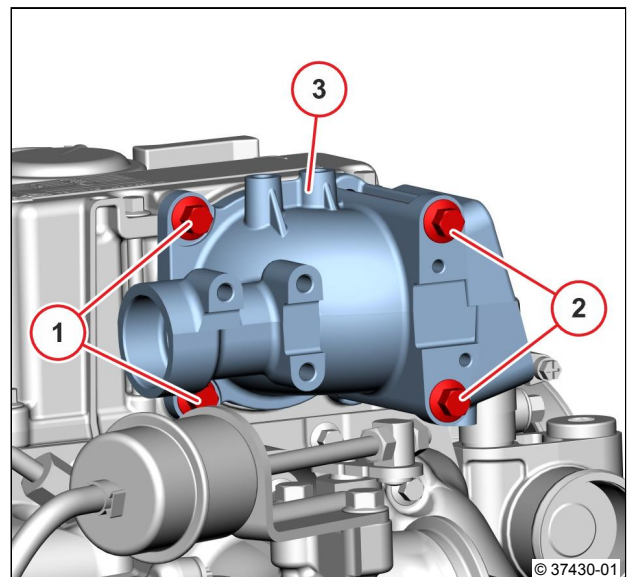
For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

Remove mixing pipe

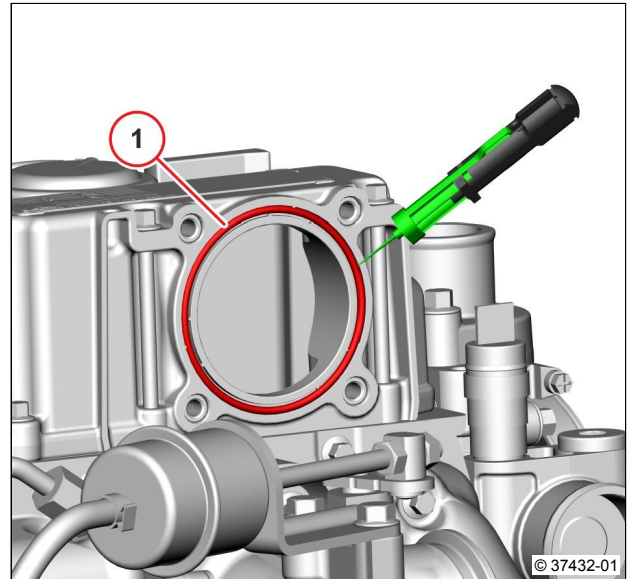
- 1 Mixing pipe
- 2 Throttle valve
- 3 Hexagon head screw
- 4 Hexagon head screw
- 5 Hexagon head screw
- 6 Hose connection
- 7 Shield plate
- 8 Hexagon head screw



- Remove Venturi pipe.
 Module 41
- Remove throttle valve.
 Module 22
- Unscrew screws (1).
- Unscrew screws (2).
- Remove mixing pipe (3).
- Visually inspect the components.

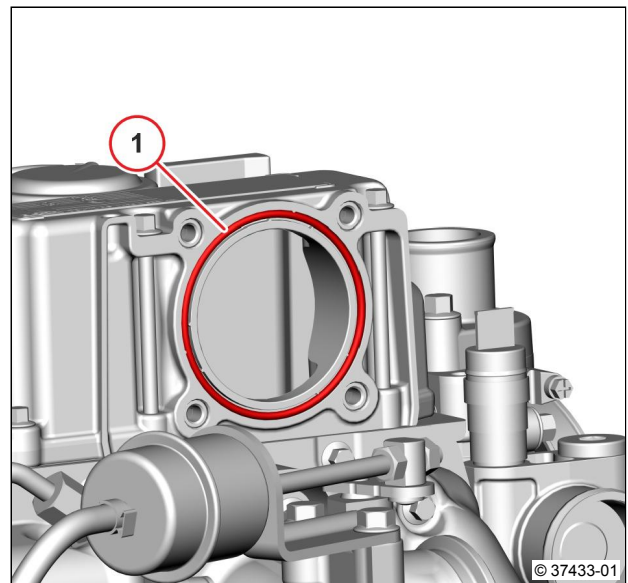


- Remove sealing ring (1) using disassembly tool.



Mount mixing pipe

- Clean sealing surfaces.
- Mount new sealing ring (1).



- Attach mixing pipe (1).
- Tighten screws (2).
- Tighten screws (3).
- Tighten all screws alternately.

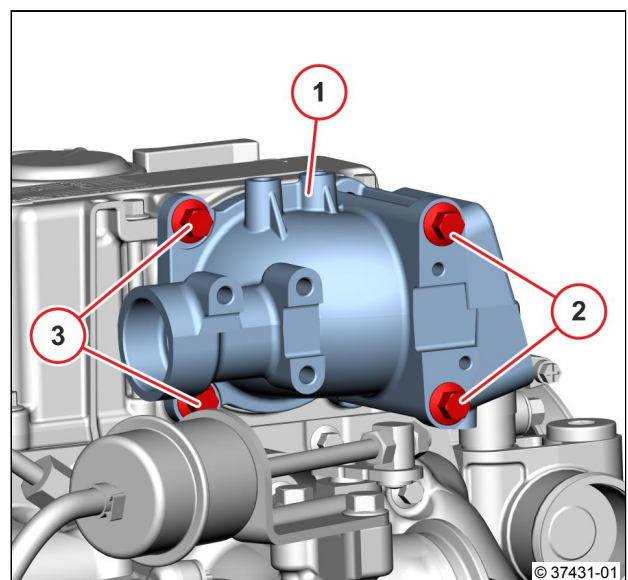
 20 Nm

- Install throttle valve.

 Module 22

- Install Venturi pipe.

 Module 41



Removing and installing the throttle valve



Conventional tools



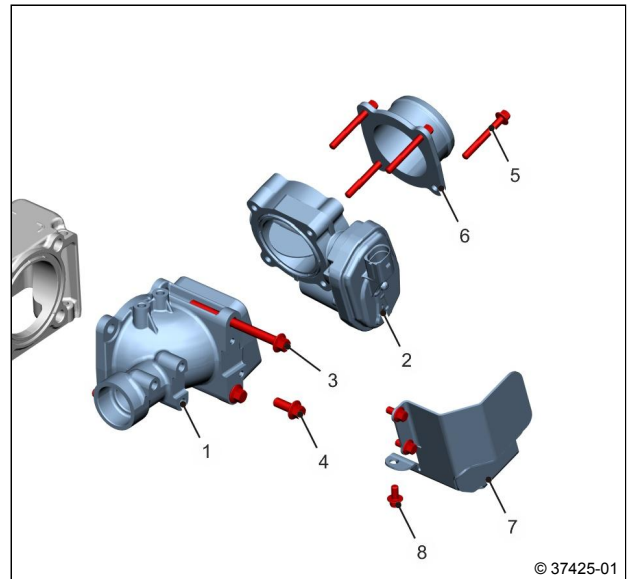
– Safety information / User information



For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

Remove throttle valve

- 1 Mixing pipe
- 2 Throttle valve (with moulded seals)
- 3 Hexagon head screw
- 4 Hexagon head screw
- 5 Hexagon head screw
- 6 Hose connection
- 7 Shield plate
- 8 Hexagon head screw

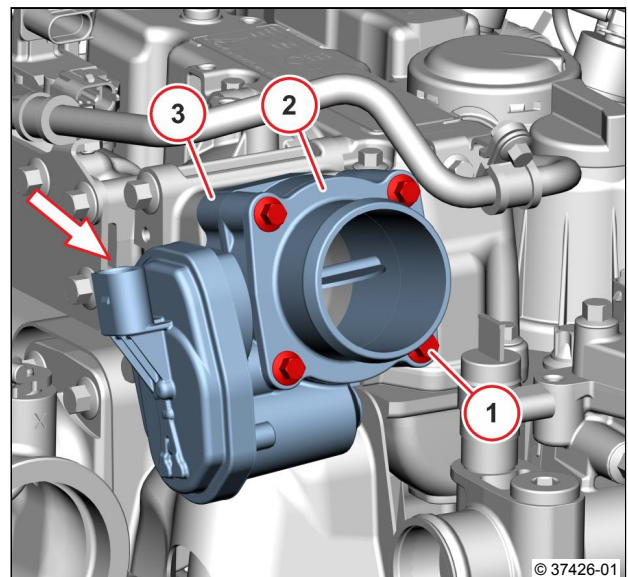


- Remove shielding plate.
 Module 22
- Unlock and pull off cable plug (arrow).
- Unscrew all screws (1).
- Remove hose connection (2).
- Remove throttle valve (3).



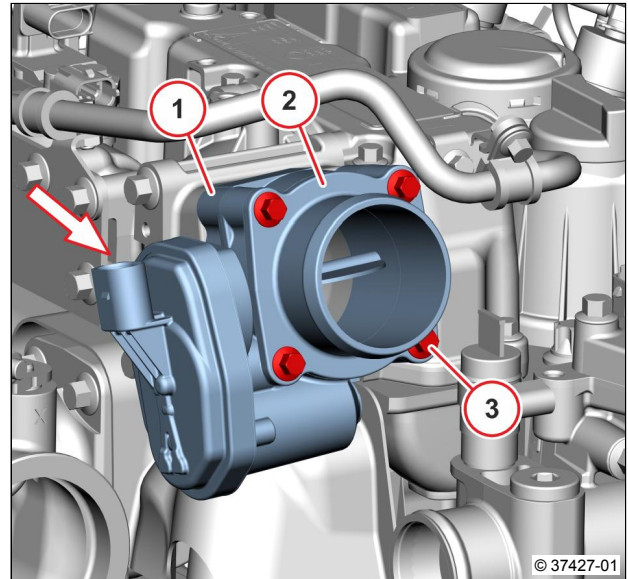
Ensure that the moving parts move smoothly.

- Visually inspect component.



Mount throttle valve

- Clean sealing surfaces.
- Attach throttle valve (1).
- Mount hose connection (2).
- Screw on all screws (3).
- Tighten all screws (3) alternately.
 20 Nm
- Insert cable plug (arrow) and lock into place.
- Mount shielding plate.
 Module 22



Removing and installing the coolant pump



Conventional tools

Special tools:

– Disassembly tool

02992127



– Mounting compound
DEUTZ AP 1908



– Safety information / User information
– Operating manual



DANGER

Observe specifications for working on the cooling system - see operating manual.



Collect escaping operating media in suitable vessels and dispose of them according to regulations.
For emptying and filling the engine, the corresponding operating manual must be observed.



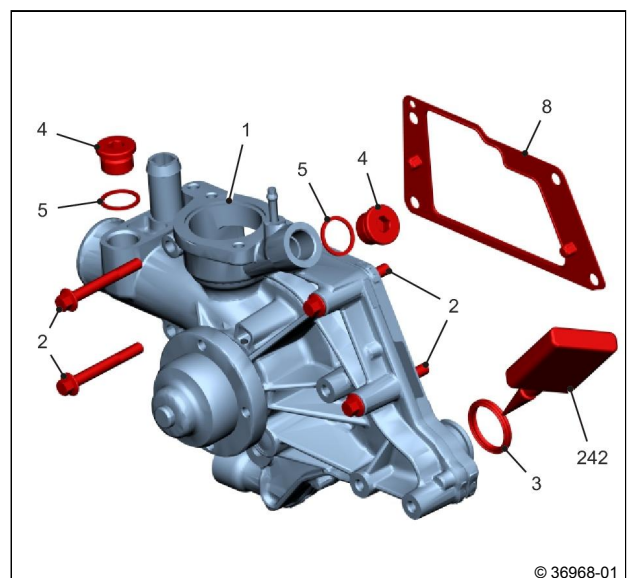
For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

Removing the coolant pump

- 1 Coolant pump
- 2 Hexagon head screw
- 3 Sealing ring
- 4 Locking screw
 60 Nm
- 5 Sealing ring
- 8 Seal
- 242 Mounting compound



Use new sealing rings.
Use a new gasket.



- Remove the V-belt / V-ribbed belt.
 Operating manual
- Remove the V-belt pulley / V-ribbed pulley.
 Module 37
- Remove the belt tensioner.
 Module 44
- Remove generator.
 Module 44
- Remove the coolant pipe.
 Module 38



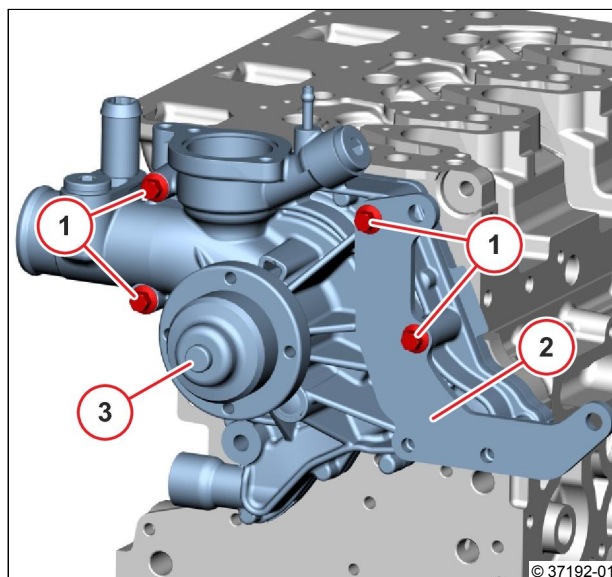
Only in design with coolant pipe (coolant pump - crankcase).

- Unscrew screws (1).
- Remove holding plate (2).



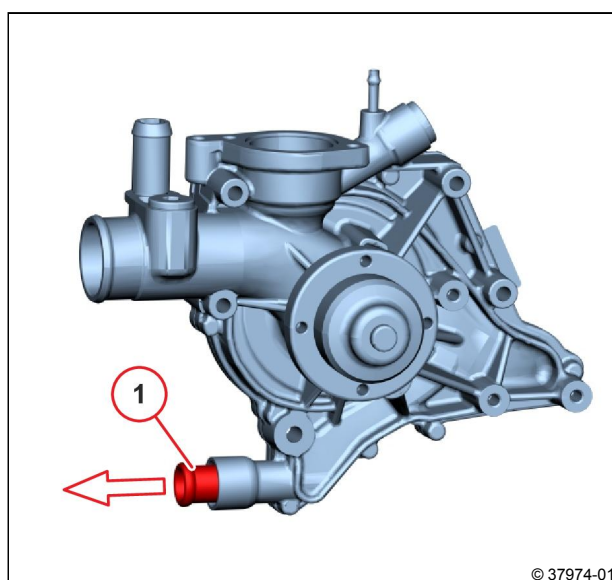
The holding plate is shown as an example.

- Remove coolant pump (3).

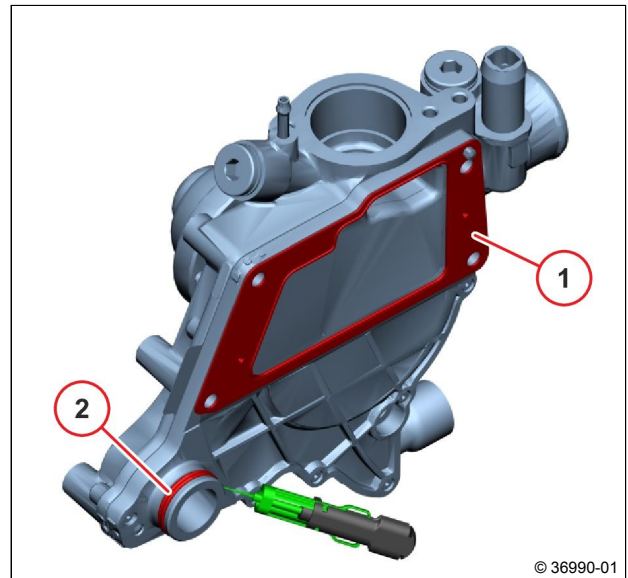


Only in design with plug piece.

- Remove plug piece (1) in direction of arrow.

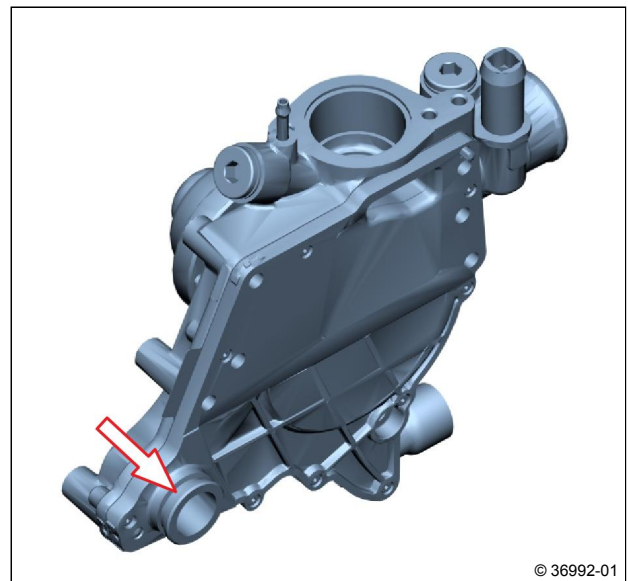


- Remove gasket (1).
- Remove sealing ring (2) using disassembly tool.



Installing the coolant pump

- Clean sealing surfaces.
- Coat the contact surface of the sealing ring (arrow) with mounting compound.

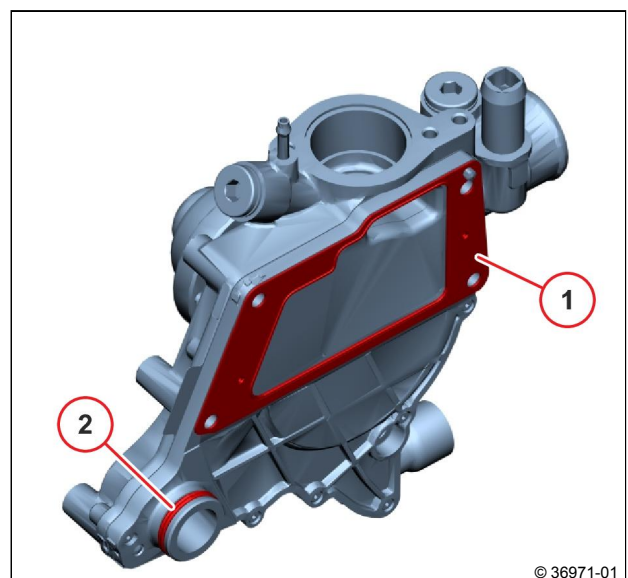


- Mount new seal (1).
- Coat new sealing ring (2) with mounting compound.
- Insert new sealing ring (2).



ATTENTION

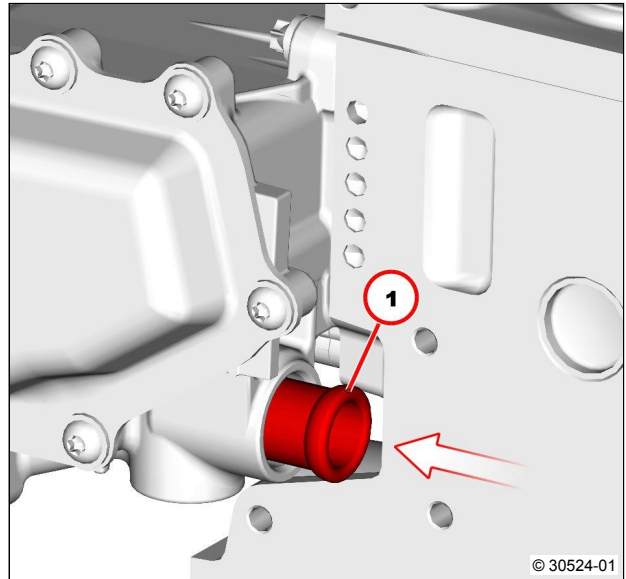
Do not twist or overtighten sealing ring.
Ensure that the installation position is correct.





Only in design with plug piece.

- Coat new plug piece (1) with mounting compound.
- Insert new plug piece (1).
- Push in the plug piece (1) in the direction of the arrow as far as the limit stop.



- Clean sealing surfaces.
- Mount coolant pump (1).
- Attach holding plate (2).



The holding plate is shown as an example.

- Screw on screws (3) alternately.
- Tighten screws (3) alternately.

 30 Nm

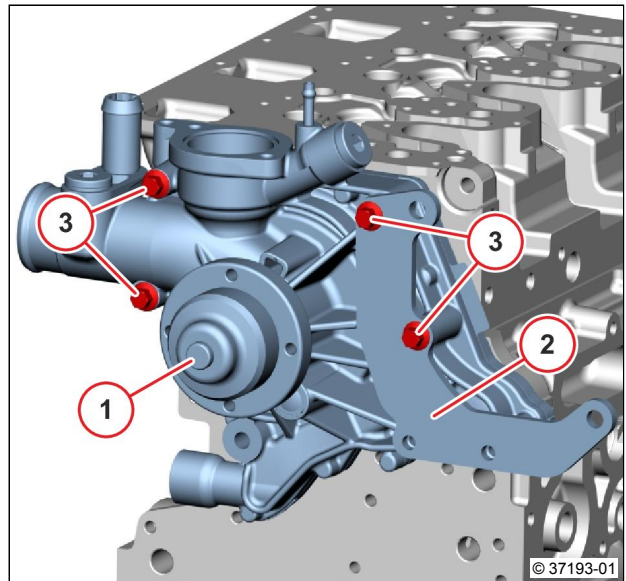
- Install coolant pipe.

 Module 38



Only in design with coolant pipe (coolant pump - crankcase).

- Mount generator.
 Module 44
- Install the belt tensioner.
 Module 44
- Install the V-belt pulley / V-ribbed pulley
 Module 37
- Fit and tension V-belt / V-ribbed belt.
 Operating manual



Removing and installing the thermostat



Conventional tools

Special tools:

– Disassembly tool

02992127



– Safety information / User information

– Operating manual



If there is no gasket, a new gasket must be used when installing the thermostat.

Collect leaking operating media in suitable vessels and dispose of them according to regulations.

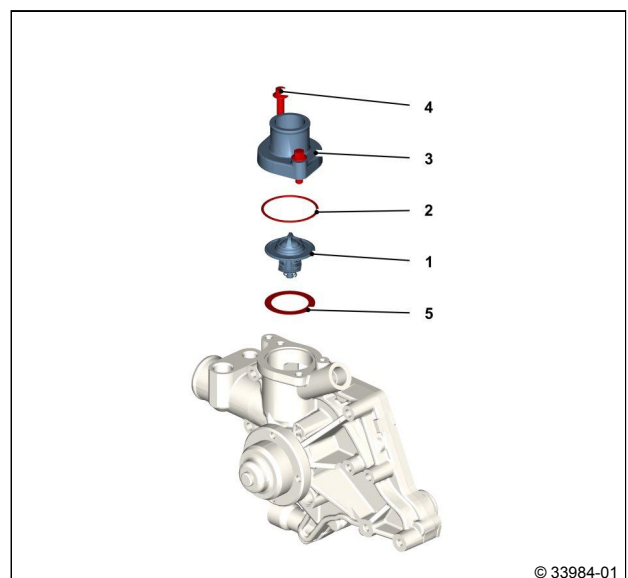
For emptying and filling the engine, the corresponding operation manual must be observed.



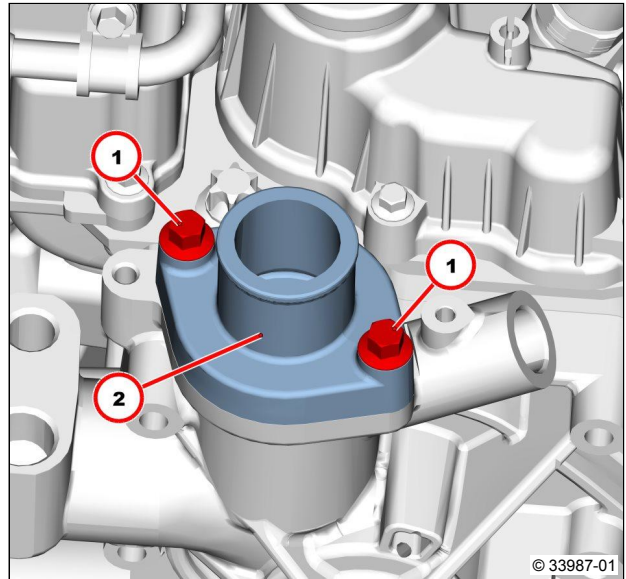
For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

Removing the thermostat

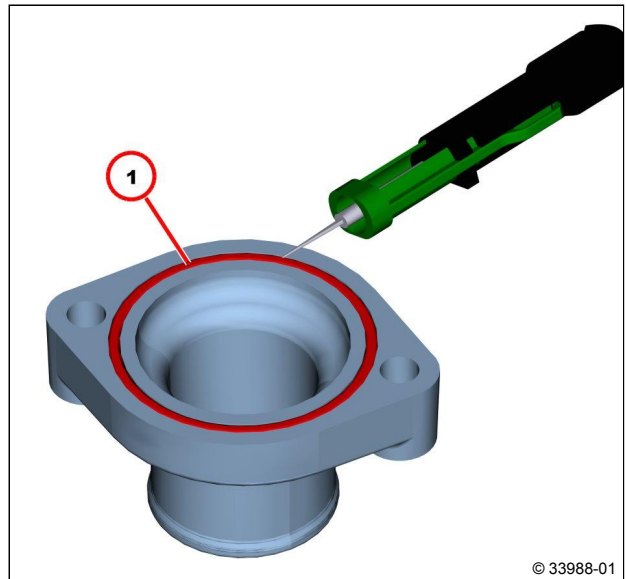
- 1 Thermostat
- 2 O-ring
- 3 Outlet nozzle
- 4 Hexagon head screw
- 5 Seal



- Drain coolant, collect and dispose of according to regulations.
- Remove the coolant pipe.
- Unscrew screws (1).
- Remove outlet nozzle (2).

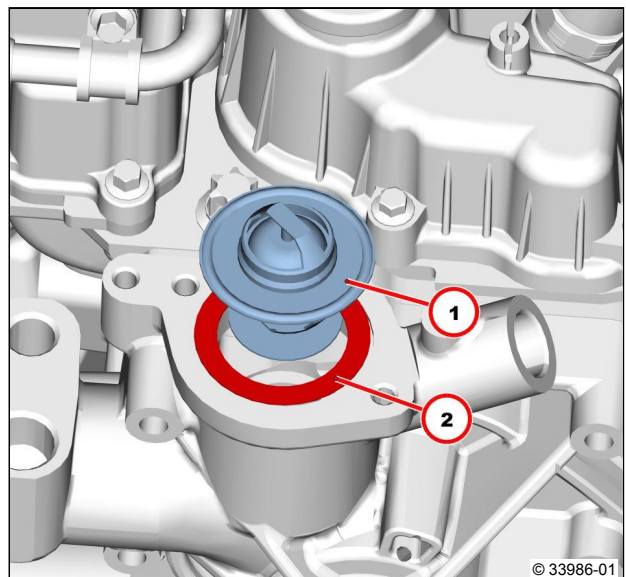


- Remove O-ring (1) with disassembly tool.



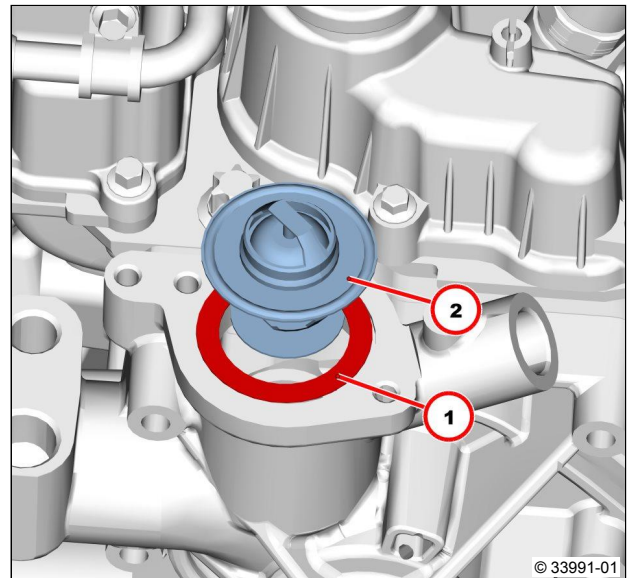
- Remove thermostat (1).
 - If present:
- Remove gasket (2).
- Visually inspect the components.
- Check thermostat.

 Module 38

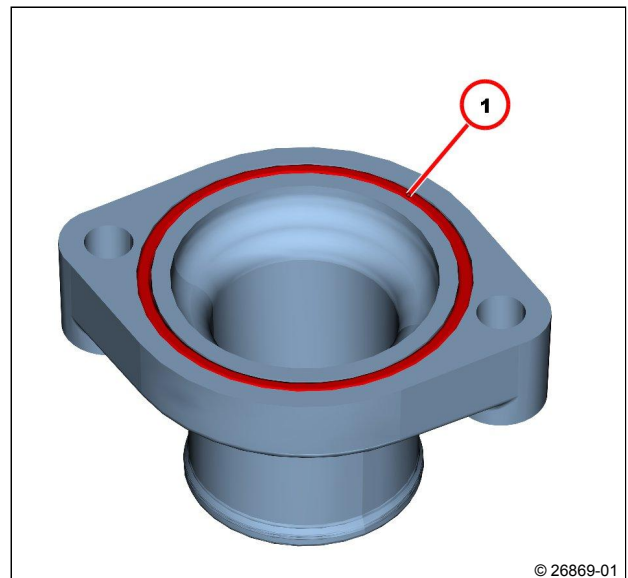


Install thermostat

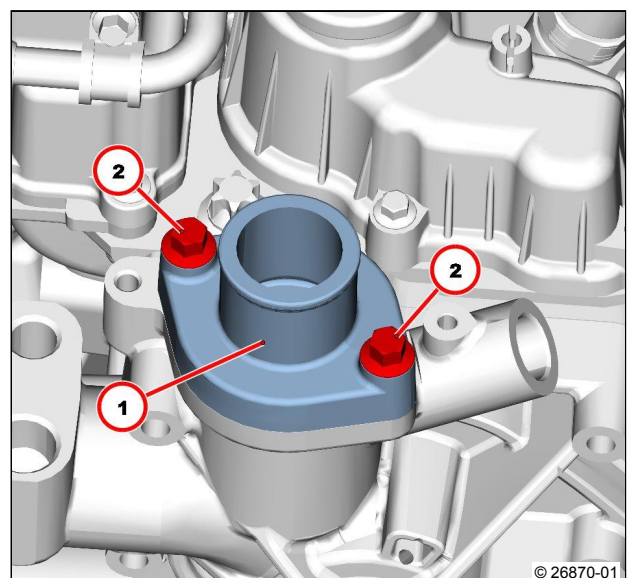
- Clean sealing surfaces.
- Insert new seal (1).
- Insert thermostat (2).



- Clean sealing surfaces.
- Insert new O-ring (1).



- Mount outlet nozzle (1).
 - Tighten screws (2).
 - Tighten screws (2).
-  13 Nm
- Install coolant pipe.
 - Fill cooling system according to operating manual.
-  Operating manual



Checking the thermostat (when removed)



Conventional tools:
– Thermometer



– Safety information / User information

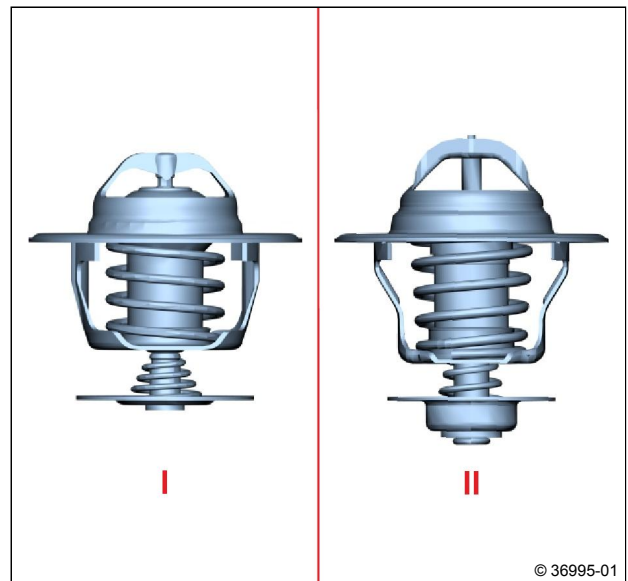


DANGER
Risk of injury!
Hot water and hot components.

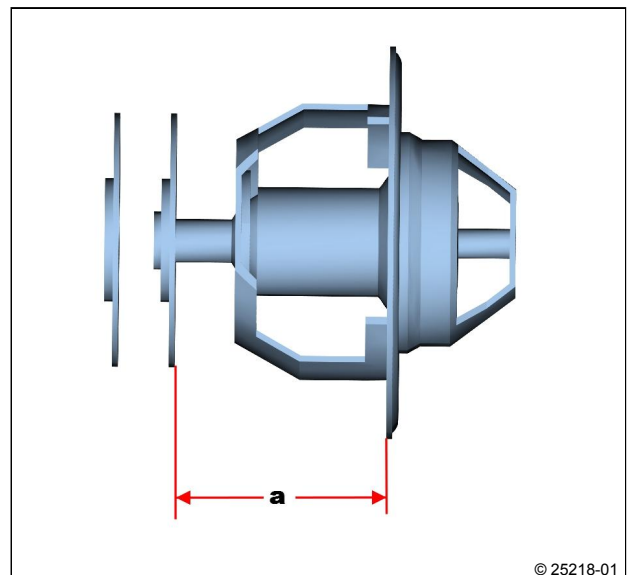
Check thermostat



In the following test procedure, different target values are specified for versions (I) and (II).
The thermostat in the graphics below is shown as an example.



- Measure start of stroke, dimension (a).
- Note the measured value, dimension (a).



- Heat up the thermostat in the water bath.
- Determine the start of opening.



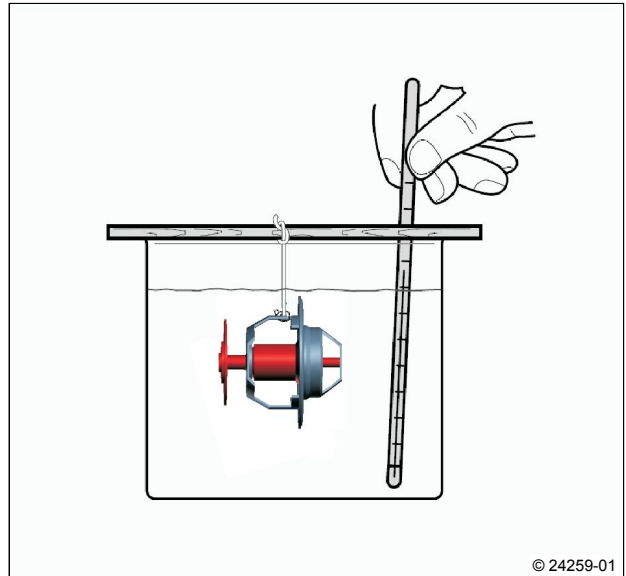
To determine the exact start of opening, the temperature should be measured as close to the thermostat as possible.
Do not touch the thermostat.
In doing so, the water must be stirred constantly to ensure uniform temperature distribution. The temperature should not rise faster than 1 °C/min otherwise the start of opening is delayed accordingly.

- Target value (Version I):

 86 – 90 °C

- Target value (Version II):

 81 – 85 °C



- Measure water temperature.

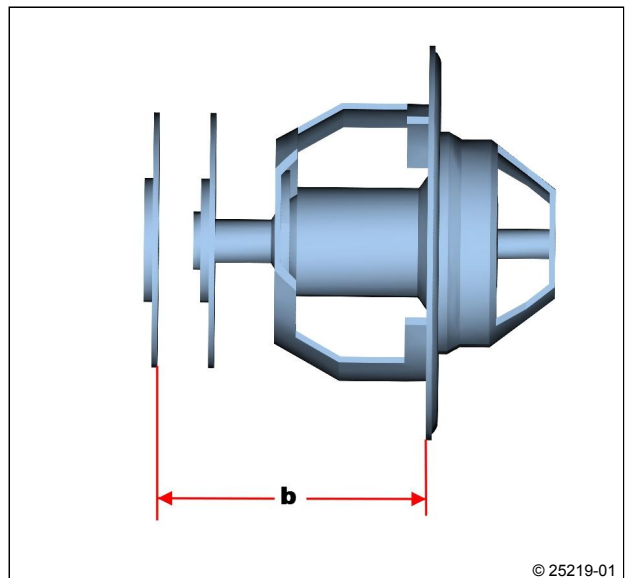
- Target value (Version I):

 99 – 102 °C

- Target value (Version II):

 95 °C

- Measure end of stroke, dimension (b).
- Note the measured value, dimension (b).



- Determine stroke.

Calculation example

Desired:	Stroke
Measured:	Start of stroke, dimension (a)
Measured:	End of stroke, dimension (b)
Calculation:	Dimension (b) - Dimension (a)
Result:	Stroke

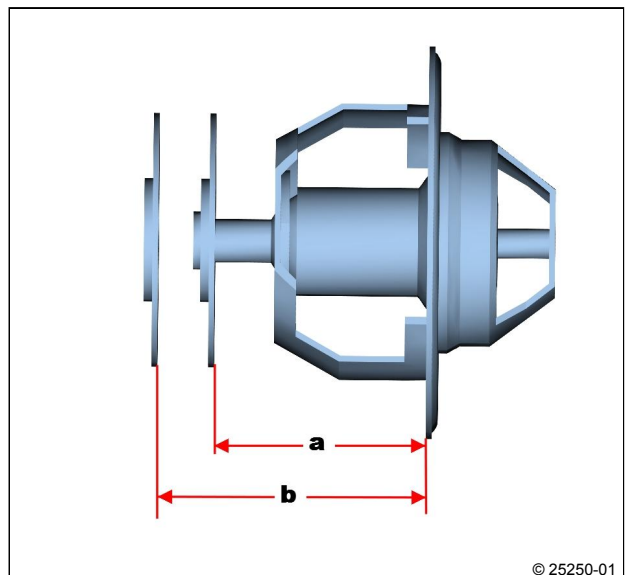
- Compare result with nominal value.

- Target value (Version I):

 9 mm

- Target value (Version II):

 8 mm



Removing and installing the Venturi tube



Conventional tools

Special tools:

– Disassembly tool 02992127



– Mounting compound

DEUTZ AP 1908

– Locking agent DEUTZ DW 72



– Safety information / User information

Removing the Venturi tube

1 Venturi tube

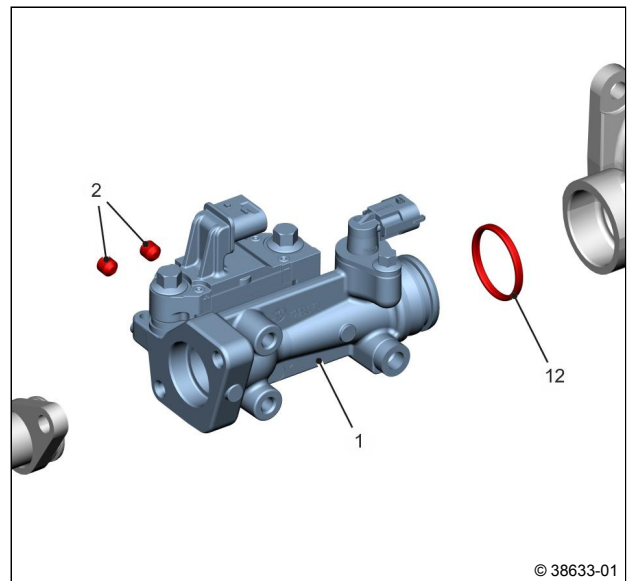
2 Threaded pin

 hand tight

12 O-ring



Insert threaded pins with a locking agent.



- Remove line (exhaust gas return).

 Module 41

- Remove pressure sensor attachment (exhaust gas back pressure).

 Module 41

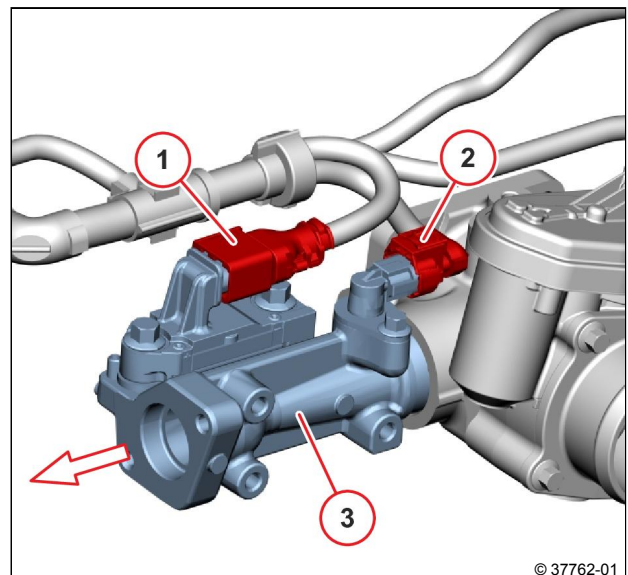
- Remove shielding plate.

 Module 22 or 41

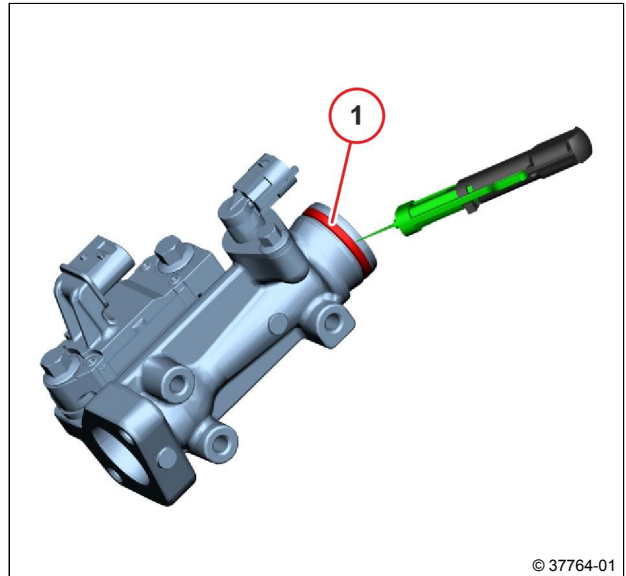
- Unlock and pull off cable plug (1).

- Unlock and pull off cable plug (2).

- Pull out Venturi tube (3) in direction of arrow.

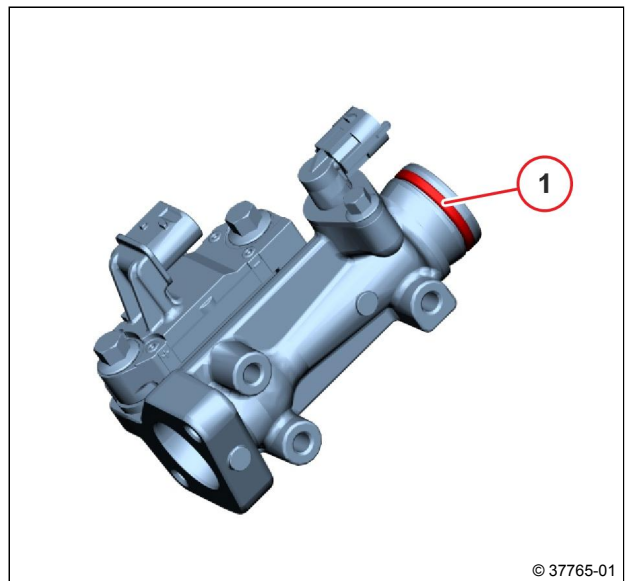


- Remove O-ring (1) with disassembly tool.
- Visually inspect component.

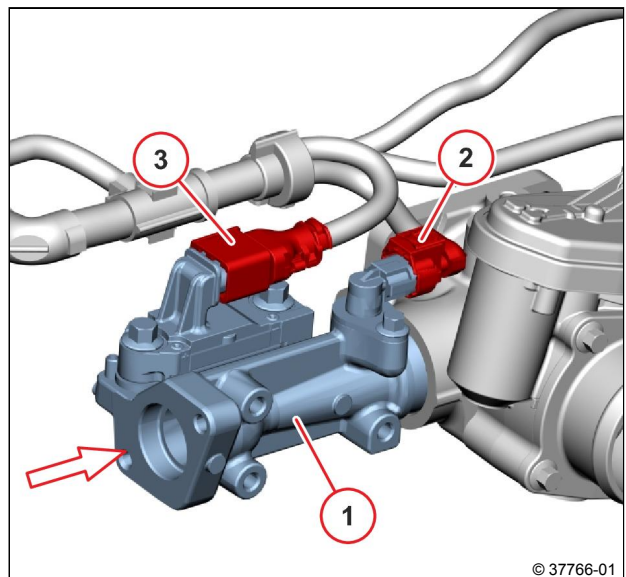


Installing the Venturi tube

- Clean sealing surfaces.
- Coat new O-ring slightly with mounting compound.
- Mount new O-ring (1).



- Slide in the Venturi tube (1) in the direction of the arrow.
- Insert and lock cable plug (2) into place.
- Insert and lock cable plug (3) into place.
- Mount shielding plate.
 -  Module 22 or 41
- Install pressure sensor attachment (exhaust gas back pressure).
 -  Module 41
- Install line (exhaust gas return).
 -  Module 41



Removing and installing the temperature sensor (Exhaust gas recirculation)



Conventional tools

Special tools:

– Disassembly tool

02992127



– Mounting compound
DEUTZ AP 1908



– Safety information / User information



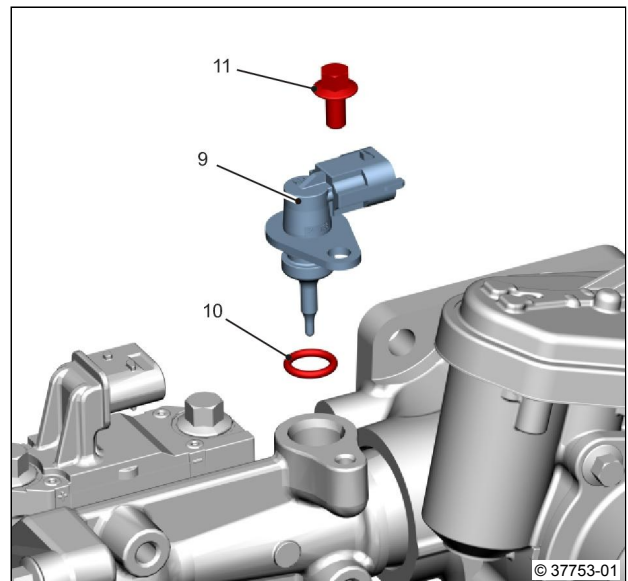
For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

Removing the temperature sensor

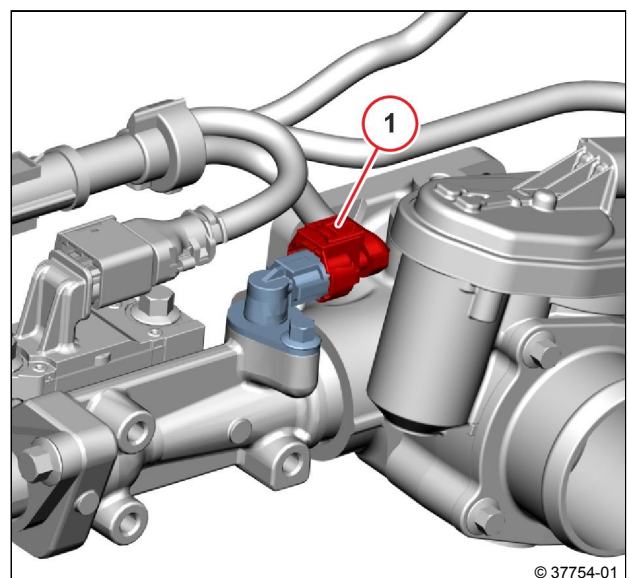
9 Temperature sensor

10 O-ring

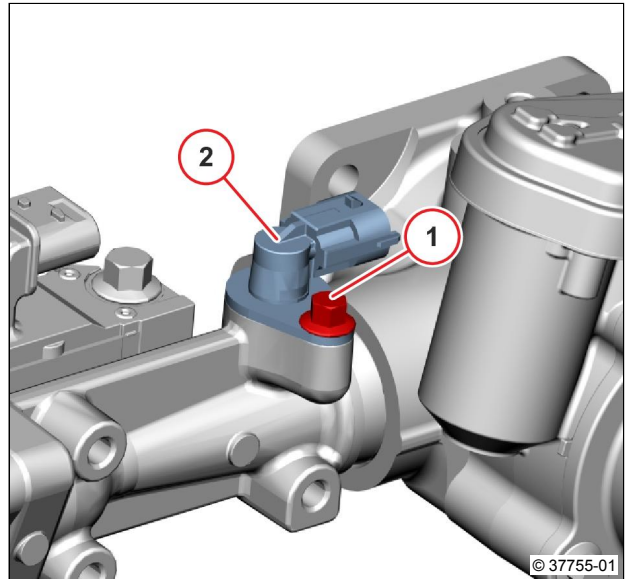
11 Hexagon head screw



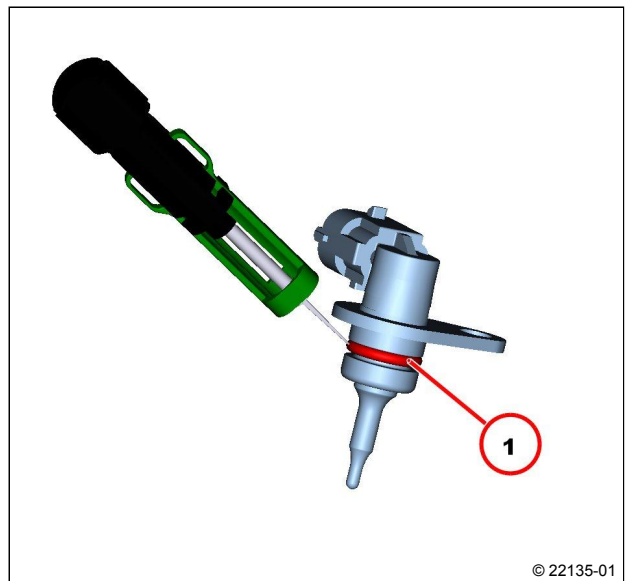
- Unlock and pull off cable plug (1).



- Unscrew screw (1).
- Remove temperature sensor (2).
- Visually inspect component.

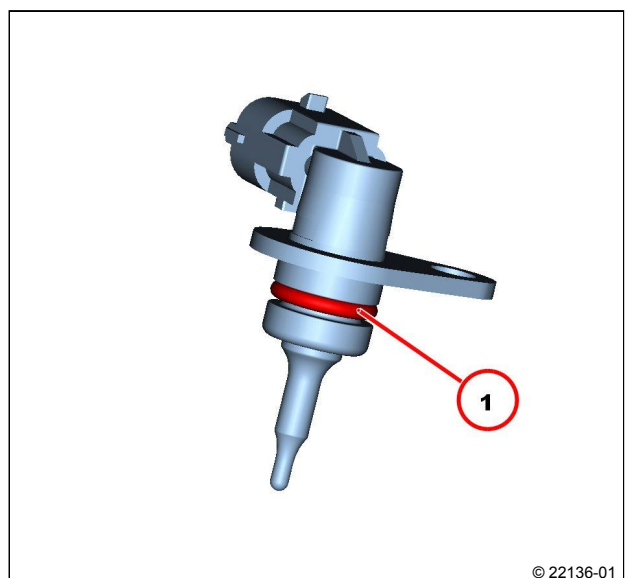


- Remove O-ring (1) with disassembly tool.
- Visually inspect component.



Installing the temperature sensor

- Clean sealing surfaces.
- Coat new O-ring slightly with mounting compound.
- Mount new O-ring (1).



- Carefully press in temperature sensor (1) by hand.

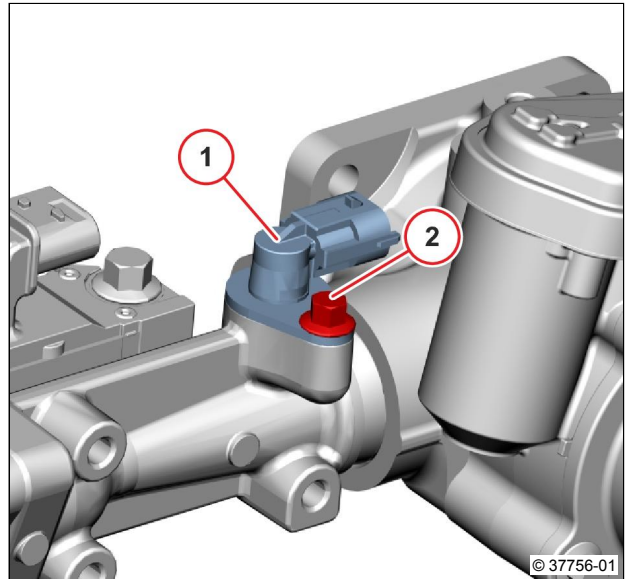
**ATTENTION**

Ensure that the installation position is correct.

- Tighten screw (2).



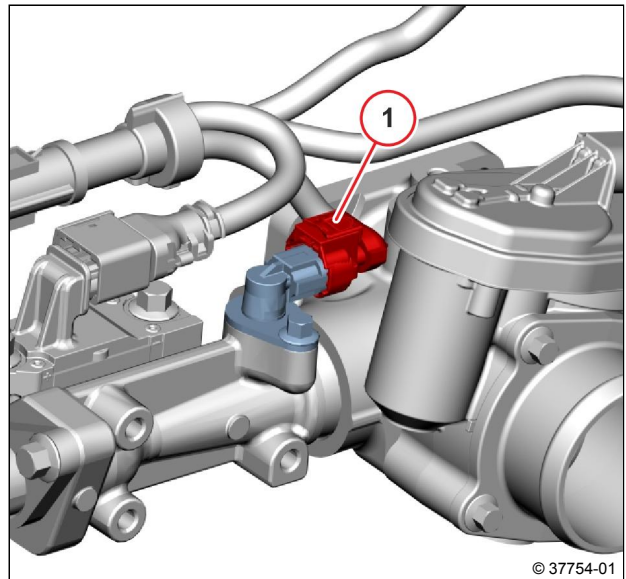
8.5 Nm



- Insert and lock cable plug (1) into place.

**ATTENTION**

Ensure that there is a proper connection.



Removing and installing the pressure sensor (Exhaust gas recirculation)



Conventional tools

Special tools:

– Disassembly tool

02992127



– Mounting compound
DEUTZ AP 1908



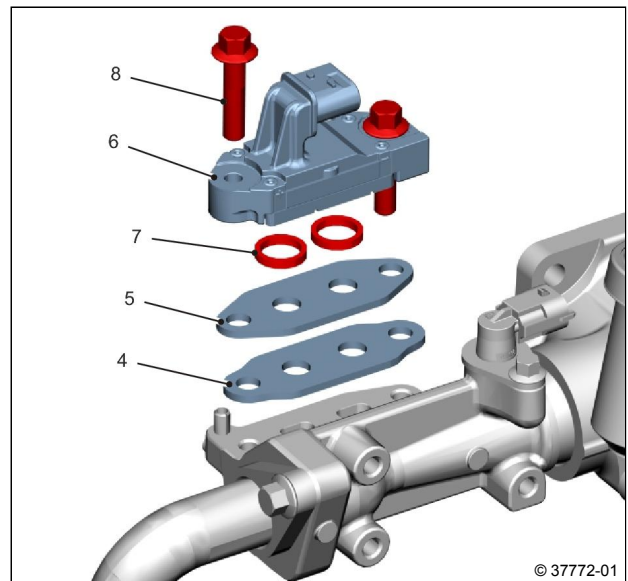
– Safety information / User information



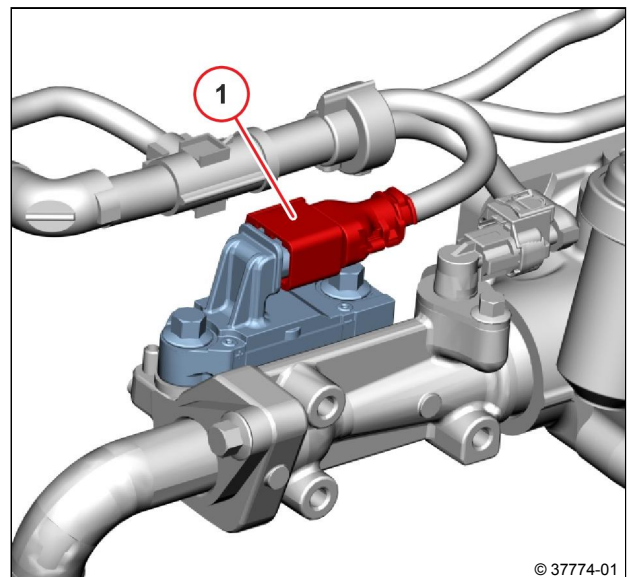
For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

Removing the pressure sensor

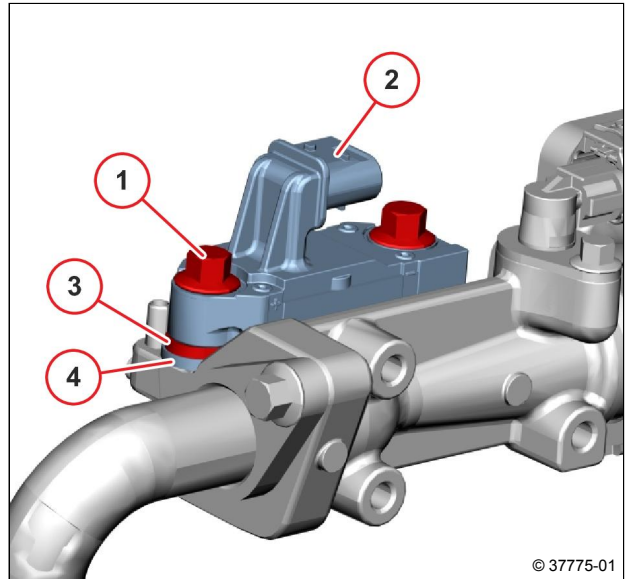
- 4 Insulating plate
- 5 Adapter
- 6 Pressure sensor
- 7 Sealing ring
- 8 Hexagon head screw



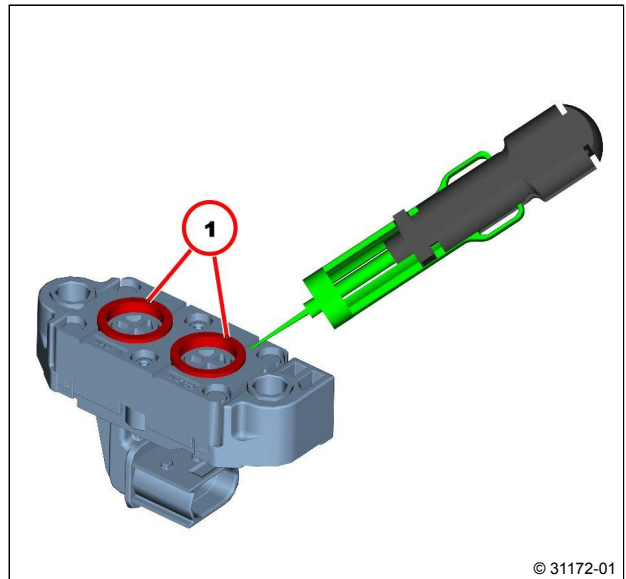
- Unlock and pull off cable plug (1).



- Unscrew screws (1).
- Remove pressure sensor (2).
- Remove adapter (3).
- Remove insulating plate (4).
- Visually inspect the components.

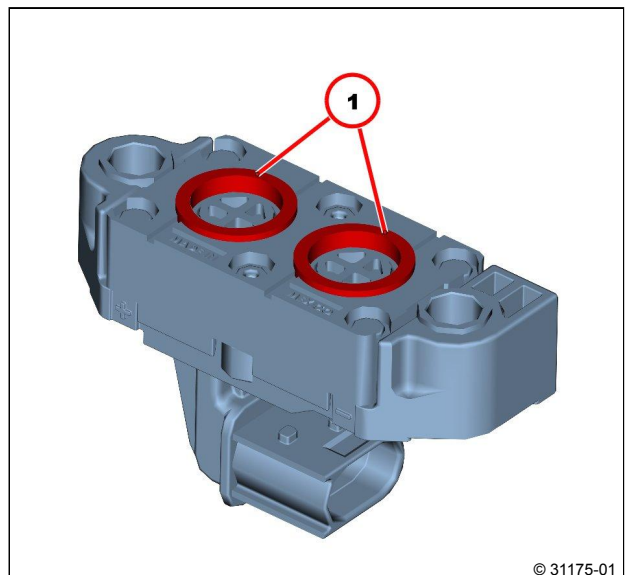


- Remove sealing rings (1) using disassembly tool.
- Visually inspect component.



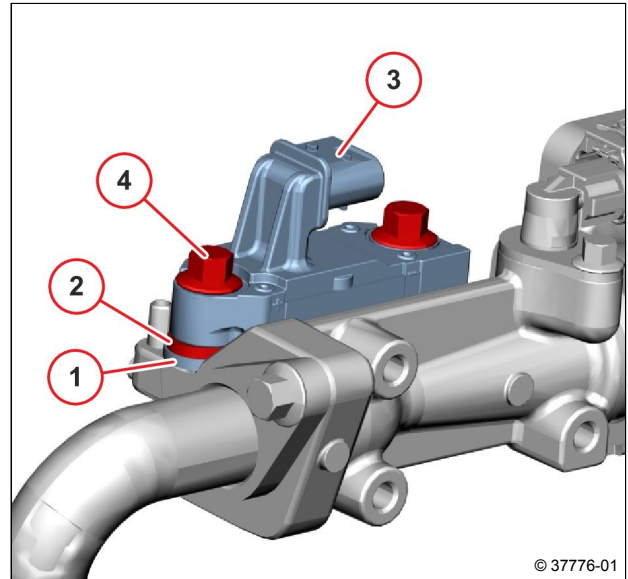
Installing the pressure sensor

- Clean sealing surfaces.
- Coat new sealing rings (1) with mounting compound.
- Insert new sealing rings (1).



- Mount insulating plate (1).
- Mount adapter (2).
- Carefully insert pressure sensor (3).
- Tighten screws (4).

 20 Nm

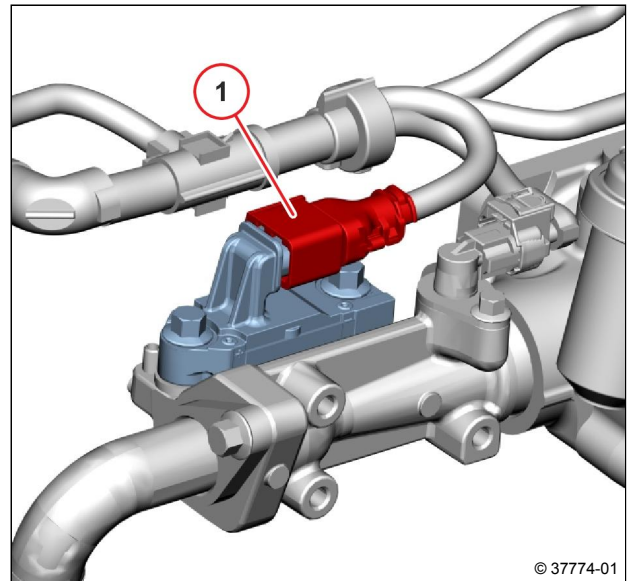


- Insert and lock cable plug (1) into place.



ATTENTION

Ensure that there is a proper connection.



Pressure sensor installation (Exhaust gas back pressure)



Conventional tools

Special tools:

- Socket wrench insert
Spanner size 27 mm
Design long 01899132
- Locking plugs/caps 01899368



– Safety information / User information



ATTENTION

Ensure the utmost cleanliness when performing all work.
Remove any paint residue and dirt particles before disassembly.
Carefully clean the area around the components concerned. Blow wet parts dry with compressed air.
Close all connections immediately after opening with new, clean locking plugs/caps.
Do not remove locking plugs/caps until immediately before assembling.



Different add-on variants are used depending on the engine.
The following procedure is described, using one installation variant as an example.
The procedure is the same for other installation variants.
All illustrations are shown as examples.



For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

Disassembly / Assembly

- 1 Pressure sensor

 25 Nm

- 2 O-ring

- 3 Bracket

- 4 Hexagon head screw

 8.5 Nm

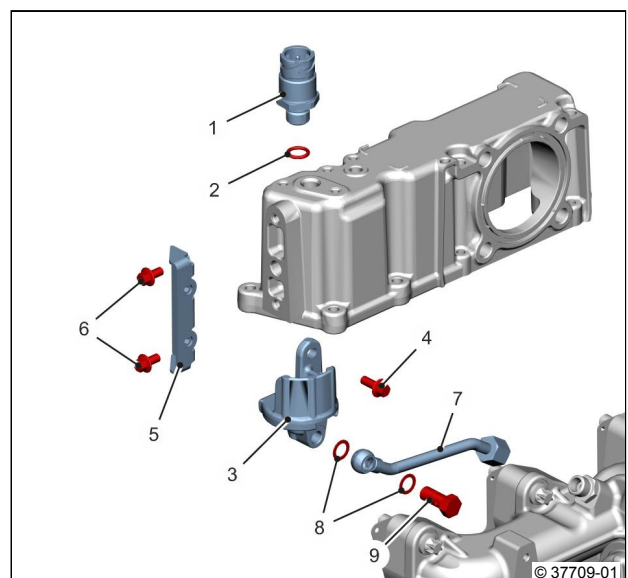
- 5 Holder

- 6 Hexagon head screw

 8.5 Nm

- 7 Line
(union nut)

 56 Nm



- 8 Sealing ring
- 9 Hollow screw

 18 Nm



ATTENTION

Use new sealing rings.

Use new O-ring.

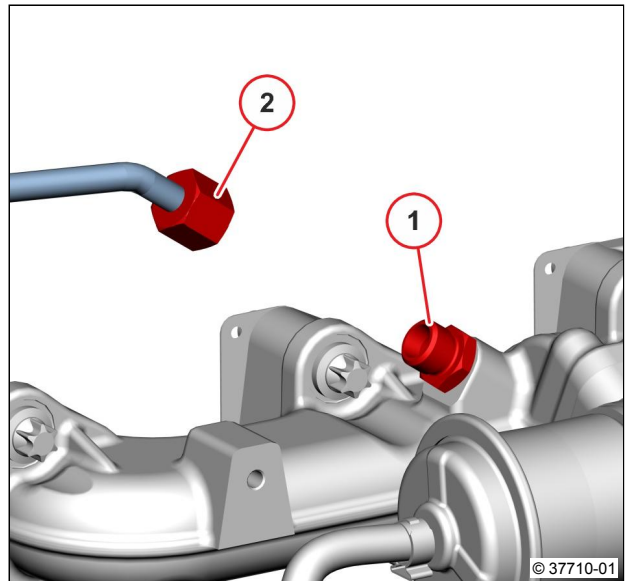
To avoid electrostatic discharges, do not touch the plug contacts with your bare hands.

Ensure utmost cleanliness.



ATTENTION

Hold threaded socket (1) when loosening/tightening the union nut (2).



Line (Exhaust gas recirculation)



Conventional tools

Special tools:

– Disassembly tool

02992127



– Mounting compound
DEUTZ AP 1908



– Safety information / User information



For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

Disassembly / Assembly

13 Line

14 O-ring

15 Hexagon head screw

 20 Nm

16 Seal

- Coat O-ring lightly with mounting compound.

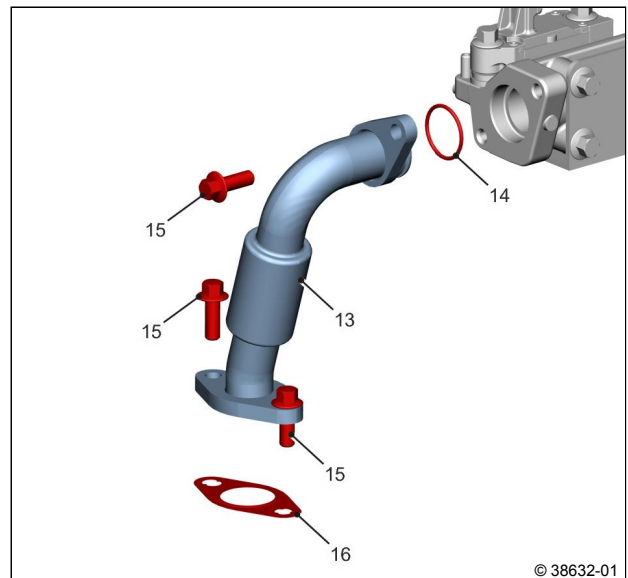


Use new O-ring.
Use a new gasket.



ATTENTION

Ensure that the installation position is correct.



© 38632-01

Exhaust manifold (Exhaust gas recirculation)



Conventional tools



– Safety information / User information



For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

Disassembly / Assembly

- 1 Exhaust manifold
- 4 Seal
- 5 Hexalobular screw
- 6 Seal

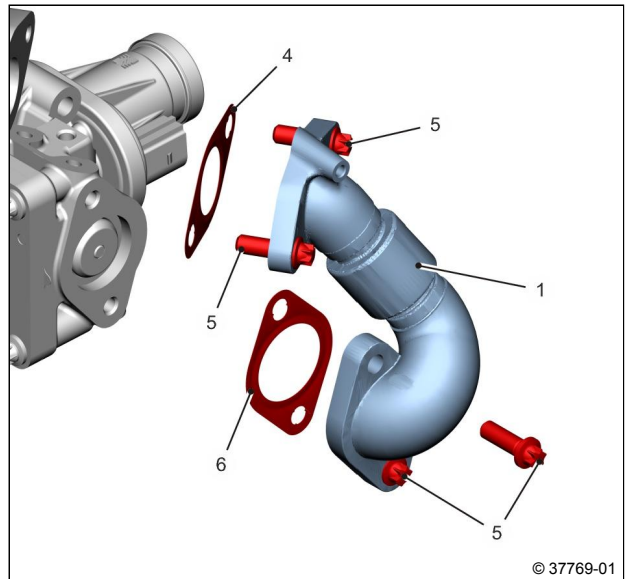


Use new gaskets.



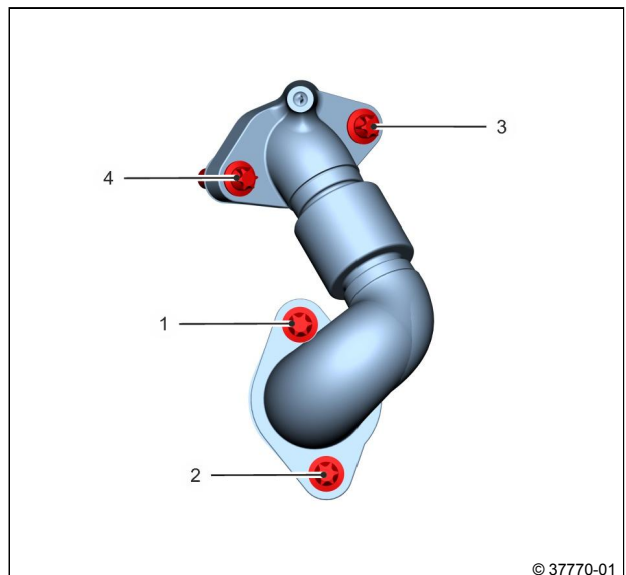
ATTENTION

Install exhaust manifold without tension.



- Tighten all screws according to the tightening sequence.

 20 Nm



Removing and installing the exhaust gas turbocharger



Conventional tools



– Safety information / User information



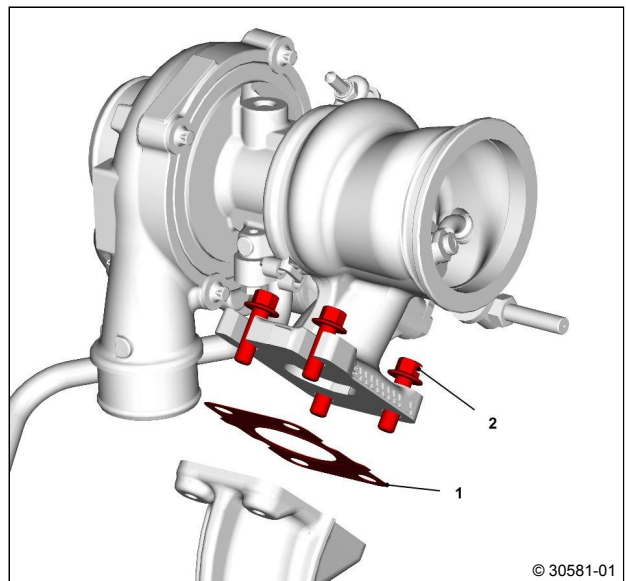
Different add-on variants are used depending on the engine.
The following procedure is described, using one installation variant as an example.
The procedure is the same for other installation variants.
All illustrations are shown as examples.



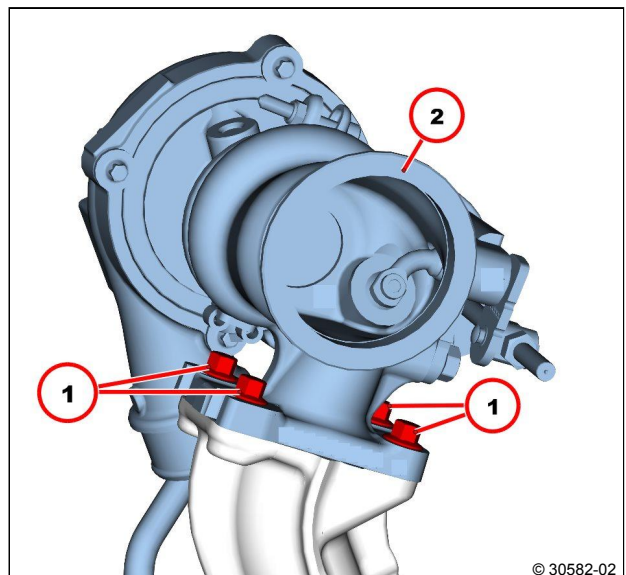
For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

Removing the exhaust gas turbocharger

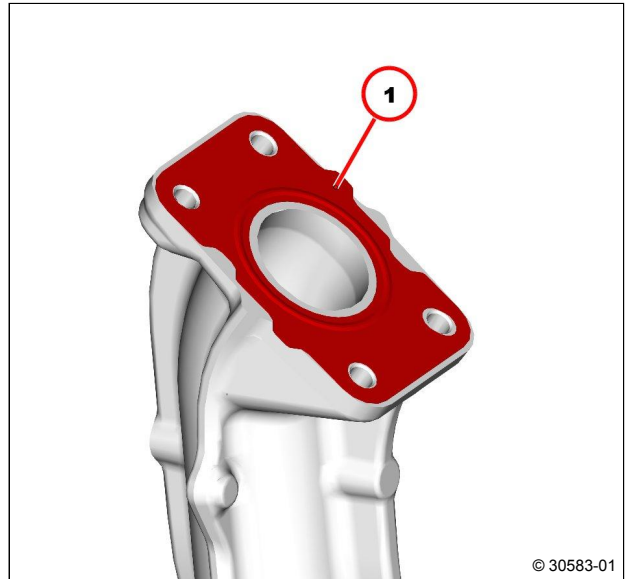
- 1 Seal
- 2 Hexagon head screw



- Remove charge air pipe.
 Module 22
- Remove the lubricating oil line.
 Module 43
- Remove lubricating oil return line (pipe, at the bottom).
 Module 43
- Unscrew screws (1).
- Remove exhaust turbocharger (2).
- Remove lubricating oil return pipe (conduit, above).
 Module 43

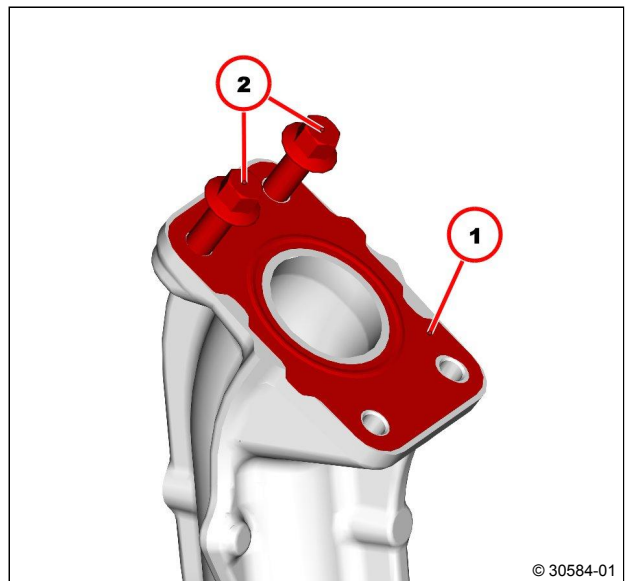


- Remove gasket (1).

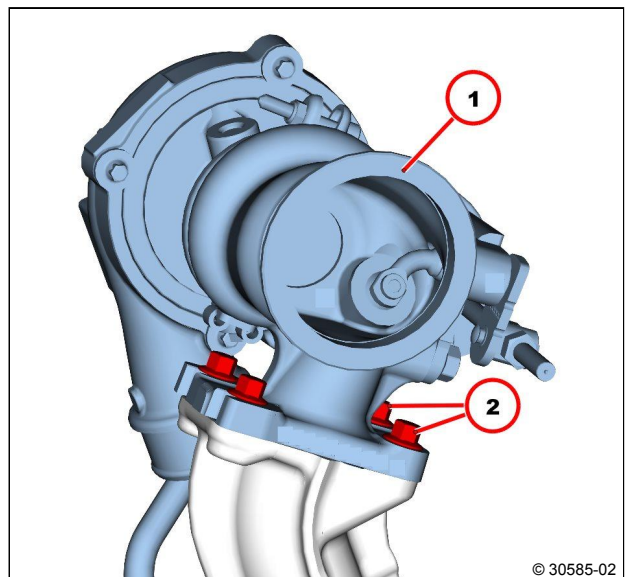


Installing the turbocharger

- Clean sealing surfaces.
- Mount new seal (1).
- Mount two new screws (2).



- Mount exhaust turbocharger (1).
- Mount two new screws (2).
- Tighten all screws (2).
 21 Nm
- Install lubricating oil return pipe (conduit, above).
 Module 43
- Install lubricating oil return pipe (conduit, above).
 Module 43
- Install lubricating oil line.
 Module 43
- Install the charge air pipe.
 Module 22



Removing and installing the belt tensioner (V-ribbed belt)



Conventional tools



– Retaining pin
diameter 8 mm,
length at least 30 mm



– Safety information / User information
– Operating manual



Either a splint driver of a corresponding retaining pin can be used to hold the belt tensioner.



For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

Removing the belt tensioner



DANGER

Risk of injury!
High spring tension!

Turn the belt tensioner via inner square socket (1) to the end stop (2) in the direction of the arrow.

– Hold the belt tensioner in this position against the spring tension.

- Push retaining pin (3) into place as far as it will go.



DANGER

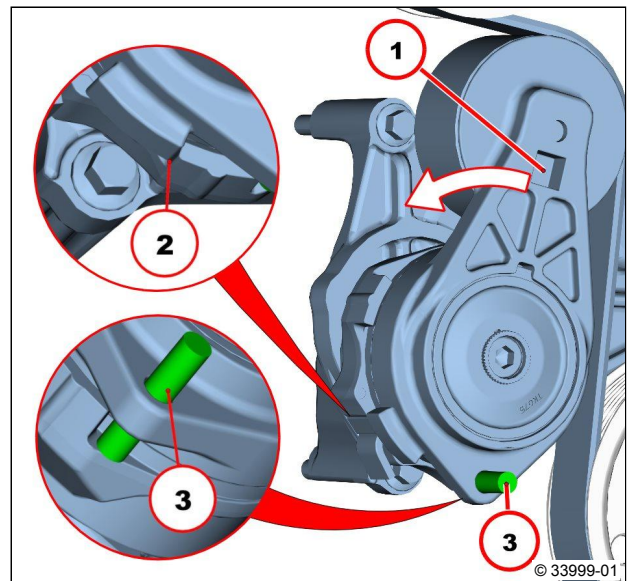
Ensure that the installation position is correct.

- Carefully position the belt tensioner in the direction of the starting position in the opposite direction to the arrow.
 - The belt tensioner is held by the retaining pin (3).
- Check the correct installation position of the retaining pin (3).



DANGER

Ensure that the installation position is correct.



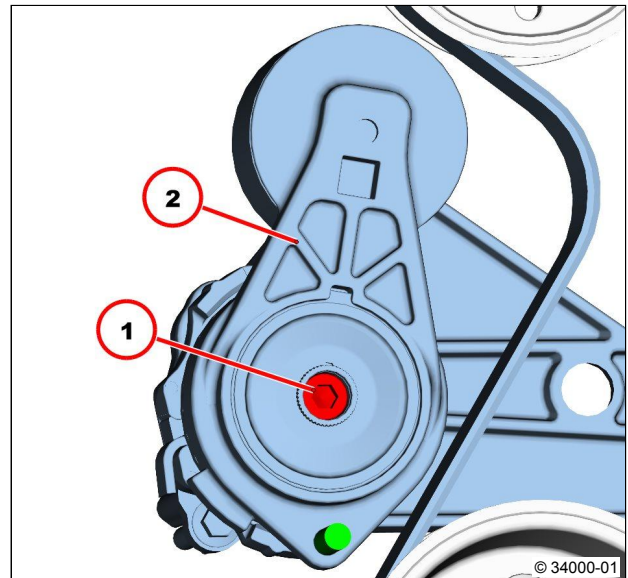
© 33999-01

- Remove V-ribbed belt.
- Unscrew screw (1).
- Remove belt tensioner (2).
- Visually inspect component.



DANGER

Risk of injury!
High spring tension!
Do not remove the retaining pin.



Installing the belt tensioner



DANGER

Risk of injury!
High spring tension!
Do not remove the retaining pin.
Ensure that the installation position is correct.

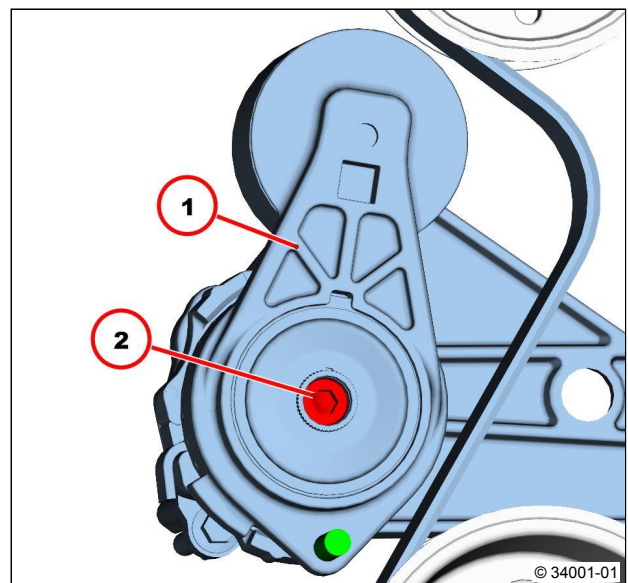
- Mount belt tensioner (1).
- Screw in screw (2).
- Tighten screw (2).
- Fit V-ribbed belt according to the running direction.



55 Nm



Operating manual



DANGER

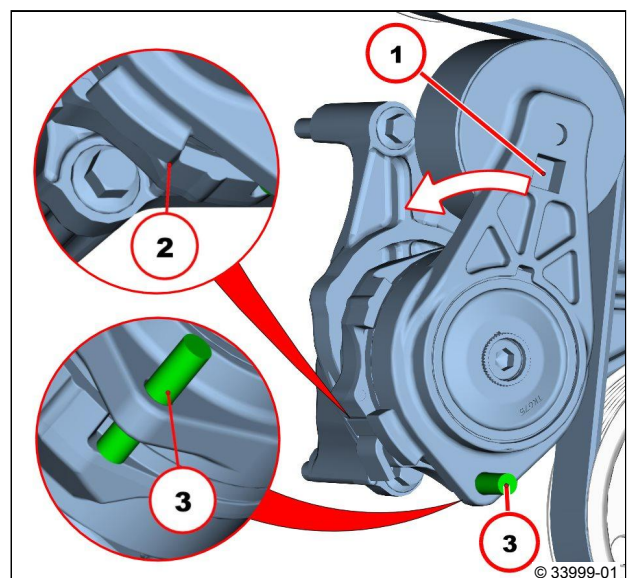
Risk of injury!
High spring tension!

- Turn the belt tensioner via inner square socket (1) to the end stop (2) in the direction of the arrow.
- Hold the belt tensioner in this position against the spring tension.
- Remove the retaining pin (3).
- Carefully position the belt tensioner in the opposite direction to the arrow until the tensioning pulley rests against the v-ribbed belt.



ATTENTION

Ensure that the installation position is correct.



Removing and installing the generator (Fastening parts)



Conventional tools



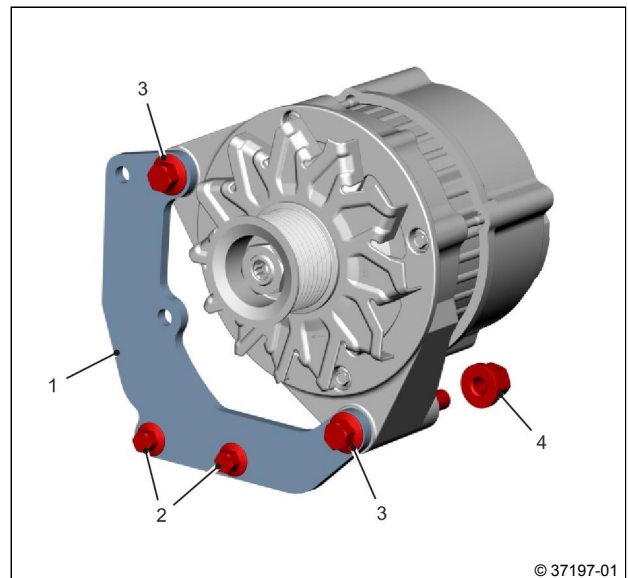
- Safety information / User information
- Operating manual



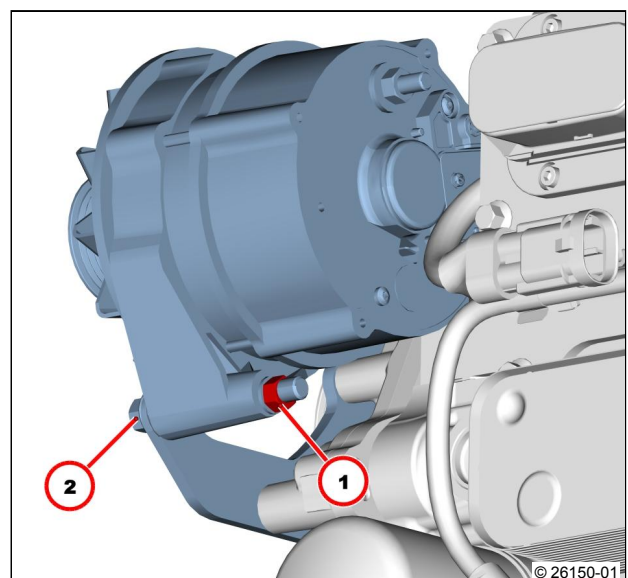
For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

Removing the generator

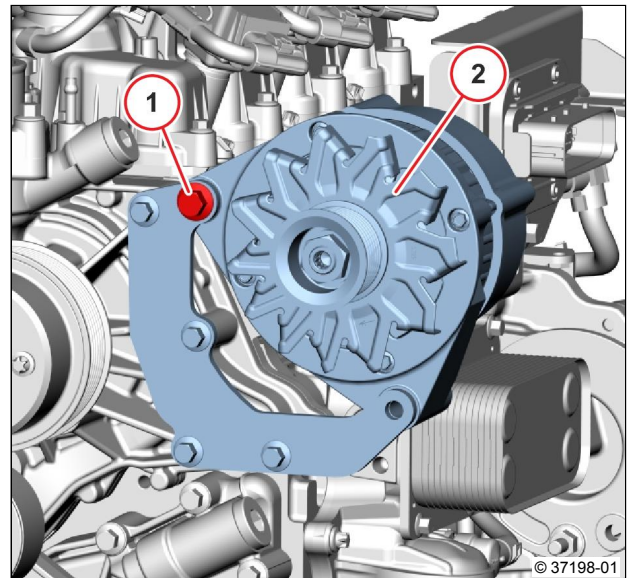
- 1 Holding plate
- 2 Hexagon head screw
 30 Nm
- 3 Hexagon head screw
- 4 Hexagon nut



- Remove V-ribbed belt.
 Operating manual
- Disconnect the negative pole of the battery.
- Remove cable from the generator.
- Hold nut (1).
- Unscrew screw (2).



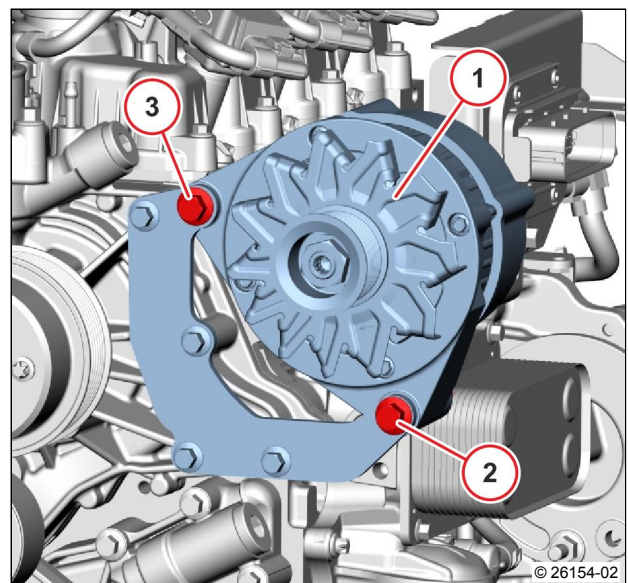
- Unscrew screw (1).
- Remove generator (2).
- Visually inspect the components.



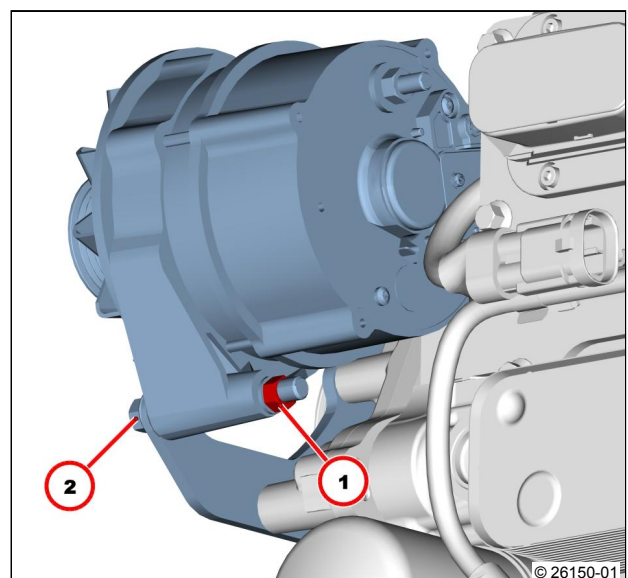
Installing the generator

- Position generator (1).
- Insert screw (2).
- Tighten screw (3).

 42 Nm



- Screw on nut (1).
 - Hold screw (2).
 - Tighten nut (1).
-  42 Nm
- Attach cable to the generator.
- Alternator
 Module 44
- Connect the negative pole of the battery.
 - Position V-ribbed belt.
-  Operating manual



Removing and installing the deflection pulley (V-ribbed belts, air compressor)



Conventional tools



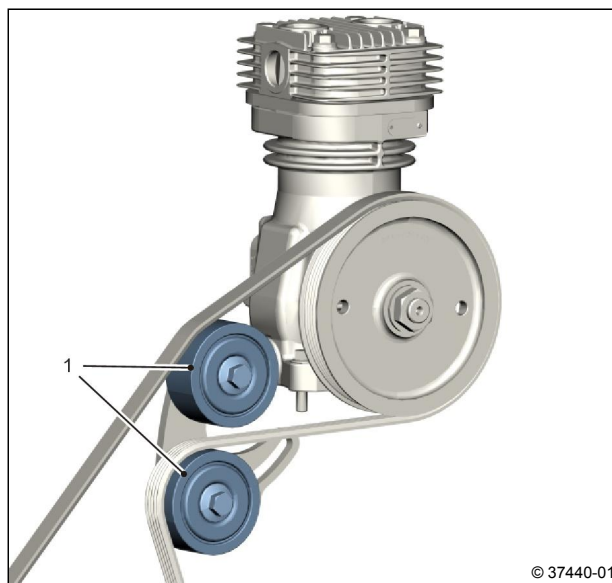
– Safety information / User information



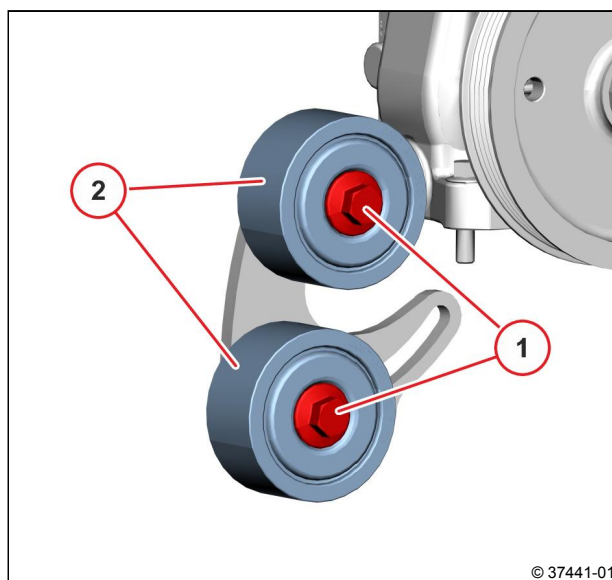
For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of $\pm 10\%$ is permissible.

Removing the deflection pulley

1 Deflection pulley

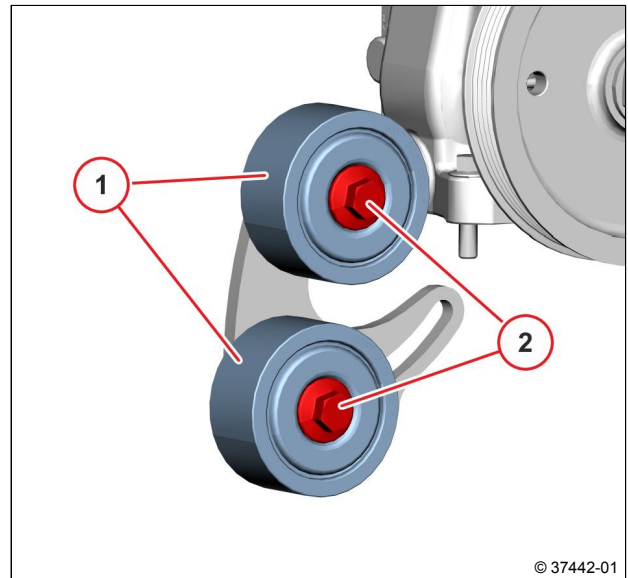


- Remove V-ribbed belt.
- Unscrew screw (1).
- Remove deflection pulley (2).
- Visually inspect the components.



Mounting the deflection pulley

- Mount deflection pulley (1).
- Tighten screw (2).
 42 Nm
- Place and tension the V-ribbed belts in accordance with the running direction.



Generator



Conventional tools:

- Socket wrench insert 1/4",
spanner size 8 mm

Special tools:

- Multi-tooth socket wrench optional 01899069
- Serrated screwdriver bit 01899098
- Insert holder, long 01899185
- Torque screwdriver 01899464



– Safety information / User information



For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

Disassembly / Assembly

1 Alternator

Terminal D+ (L)

 2.7 – 3.8 Nm

2 Fan

3 Collar nut

Variant without clamping cone.

 90 Nm

Hexagonal nut in conjunction with clamping cone and V-rib belt pulley

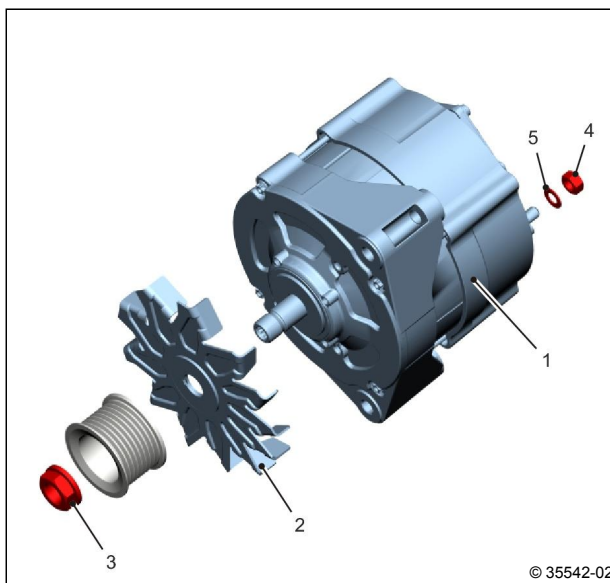
 75 Nm

4 Hexagonal nut

Terminal B+

 7.5 – 8 Nm

5 Spring washer



© 35542-02



ATTENTION

Position 3: Observe the spare parts documentation.

Console (belt tensioner, deflection pulley)



Conventional tools



– Safety information / User information



For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of $\pm 10\%$ is permissible.

Disassembly / Assembly

- 1 Bracket
- 2 Belt tensioner
- 3 Deflection pulley
-  55 Nm
- 4 V-ribbed belt
- 5 V-ribbed pulley
- 6 Cylinder head screw
- 7 Hexagon head screw
-  30 Nm

- Removing and installing the belt tensioner (V-ribbed belt).

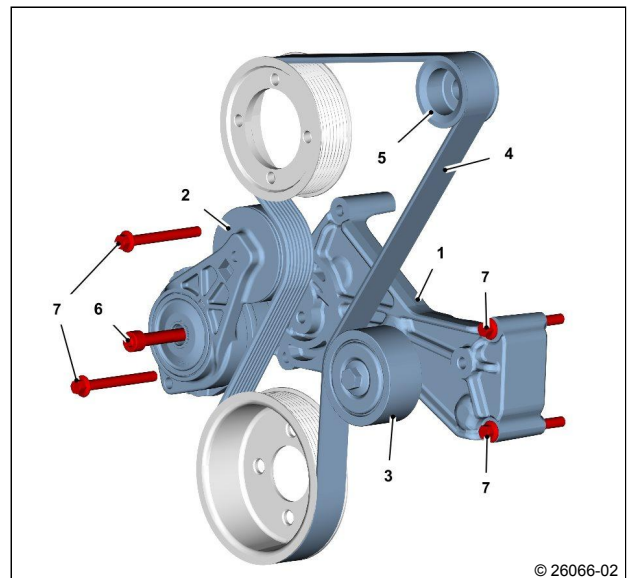
 Module 44



Position 5:

– Generator

 Module 44



© 26066-02

Starter



Conventional tools



– Safety information / User information



For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of $\pm 10\%$ is permissible.

Disassembly / Assembly

1 Starter

2 Hexagon head screw



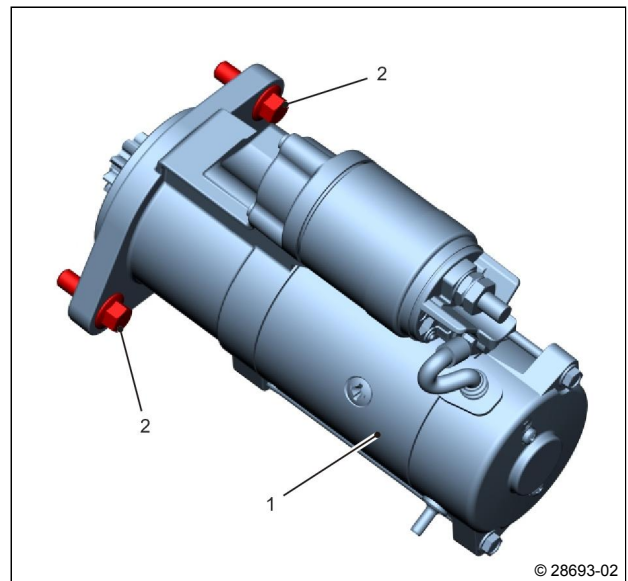
Observe vehicle/device manufacturer's documentation.

- Disconnect the negative pole of the battery.



ATTENTION

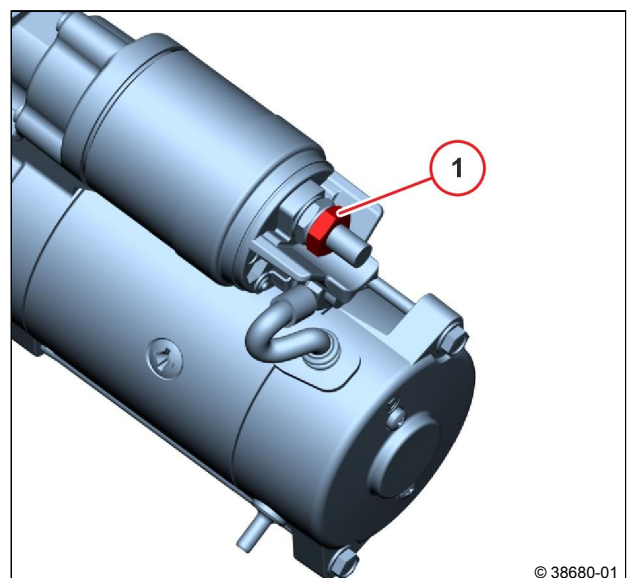
Lay cable free from chafing and tension. Ensure that there is a proper connection.



(1) Hexagon nut (terminal 30)



15 Nm



Temperature sensor (Coolant)



Conventional tools

Special tools:

- Socket wrench insert,
spanner size 19 mm

01899408



– Safety information / User information

– Operating manual



For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

Disassembly / Assembly

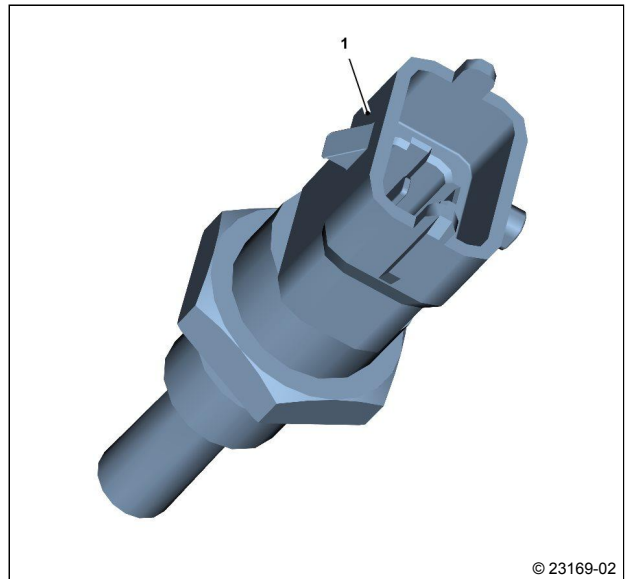
1 Temperature sensor



20 Nm



Use a new sealing ring.



© 23169-02

Pressure sensor installation (Fuel pressure / lubricating oil pressure)



Conventional tools

Special tools:

- Locking plugs/caps 01899368
- Crow foot wrench 01899406
spanner size 24 mm
- Disassembly tool 02992127



- Safety information / User information
- Operating manual



DANGER

Do not carry out work on the fuel system when the engine is running.

The fuel system is under high pressure - risk of death.

Even after the engine shuts down, the fuel pressure may still be up to several 100 bar for a long time. The fuel pressure here does not drop until the fuel system is opened and the fuel can escape to the outside.



ATTENTION

Ensure the utmost cleanliness when performing all work.

Remove any paint residue and dirt particles before disassembly.

Carefully clean the area around the components concerned. Blow wet parts dry with compressed air.

Observe safety regulations and national regulations when working with fuels.

Close all connections immediately after opening with new, clean locking plugs/caps.

Do not remove locking plugs/caps until immediately before assembling.



Collect leaking operating media in suitable vessels and dispose of them according to regulations.

Vent the fuel system after doing any work on it - see operating manual.



For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

Disassembly / Assembly

(1) Pressure sensor

(2) O-ring

**ATTENTION**

Ensure utmost cleanliness.

- Remove round sealing rings with disassembly tool.

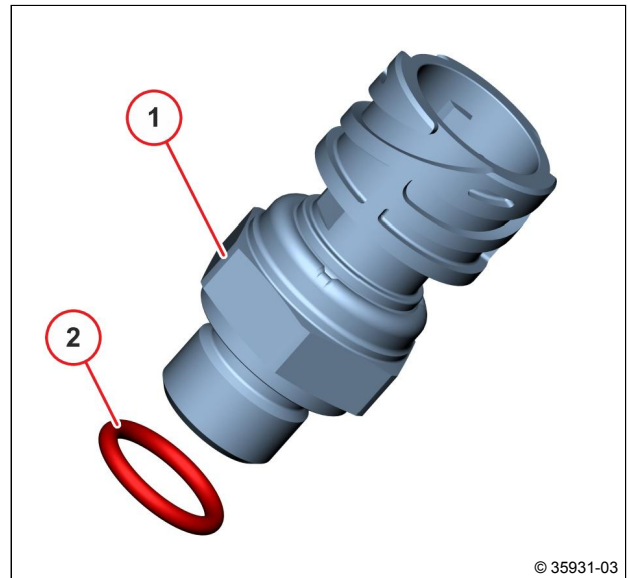


Use new O-ring.

- Hold pressure sensor holder.
- Tighten pressure sensor (1) with crowfoot wrench.



25 Nm



Relay (Heating flange, starter, glow plugs)



Conventional tools



– Safety information / User information



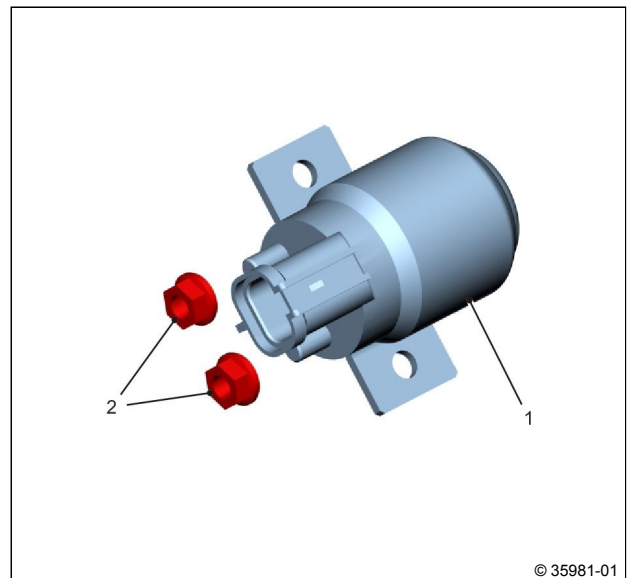
For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

Disassembly / Assembly

- 1 Relay
- 2 Hexagon nut
 4.5 – 5.5 Nm



ATTENTION
Ensure that the installation position is correct.



Check cooling system for leaks



Conventional tools

Special tools:

- Cooling system pressure testing device 01899415



– Safety information / User information



DANGER

Danger of scalding from hot coolant!
The cooling system is pressurized!
Only open the cap when cool!
Hot vapour and/or hot coolant can escape.
Only check the cooling system for leaks when it is cool.



ATTENTION

Observe vehicle/device manufacturer's documentation.

Observe the permissible pressure specifications for the cooling system.

Do not load the manometer beyond the terminal value.

The cooling system must be sufficiently filled with cooling fluid and ventilated.

Prior to removing the pressure pump, activate the bleed valve and release pressure.

Observe safety regulations and national specifications when handling cooling media.



The leak test on the cooling system must be performed in accordance with the operating instructions and the corresponding vehicle/device manufacturer documentation/regulations.

Collect escaping operating media in suitable vessels and dispose of them according to regulations.

A self-test must be performed by the pressure pump in order to prevent incorrect measurements.

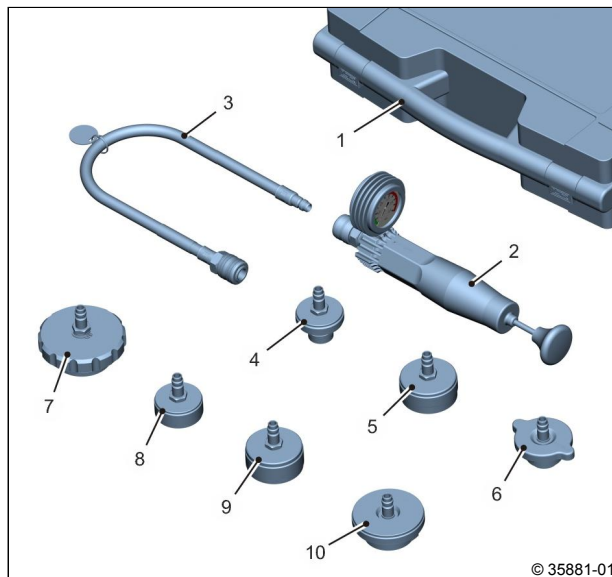
Self-test: By activating (pumping) the pressure pump, generate appropriate pressure and observe the manometer. The pressure pump must maintain the generated pressure.

After using the pressure pump, carefully blow the surface of the drain valve from the outside with compressed air every now and then.

If the quick-release coupling is difficult to release, thinly coat the interior of the quick-release coupling with clean oil.

Check

- 1 Case
- 2 Pressure pump
01899423
- 3 Flexible hose pipe
01899422
- 4 Test adapter
01899416
- 5 Test adapter
01899417
- 6 Test adapter
01899418
- 7 Test adapter
01899420
- 8 Test adapter
01899421
- 9 Test adapter
01899425
- 10 Test adapter
01899424



The above-mentioned tools are components of the cooling system pressure device 01899415.



DANGER

The cooling system is pressurized!
Only open the cap when cool!
Hot vapour and/or hot coolant can escape.

- Remove the cap from the equalization tank or cooler.
- Install the appropriate test adapter.
- Connect the pressure pump to the test adapter using the quick coupling.



Depending on the accessibility of the equalization tank or the cooler, the flexible hose can be used.

- Generate pressure from 1 bar to 1.5 bar using the pressure pump.



ATTENTION

Observe vehicle/device manufacturer's documentation.
Observe the permissible pressure specifications for the cooling system.
Do not load the manometer beyond the terminal value.



If the pressure remains constant, the cooling system is tight.
If the pressure decreases, this indicates a leak in the cooling system.
Find the leak.

**ATTENTION**

Prior to removing the pressure pump, activate the bleed valve and release pressure.

Removing and installing the speed sensor (Crankshaft)



Conventional tools



– Mounting compound
(anhydrous)

01008420



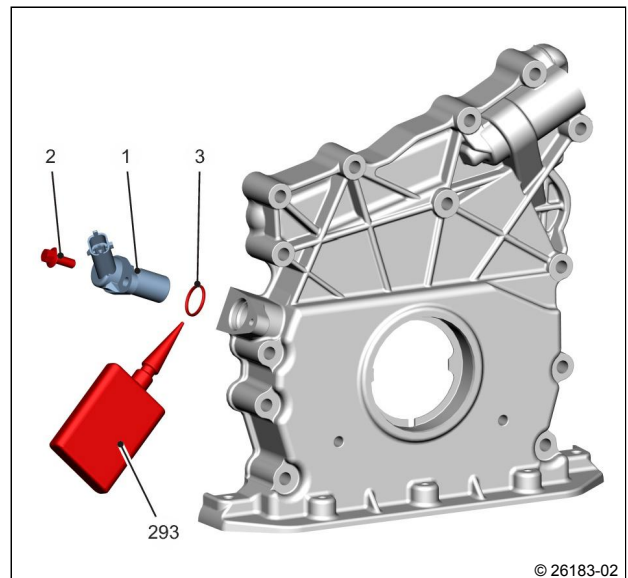
– Safety information / User information



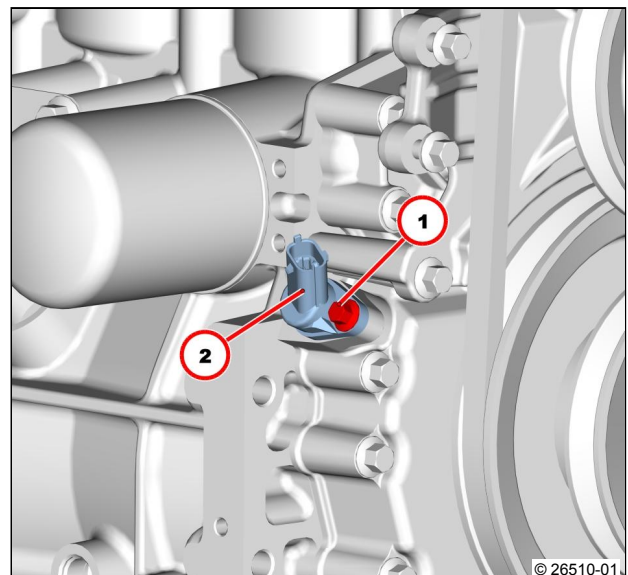
For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

Remove speed sensor

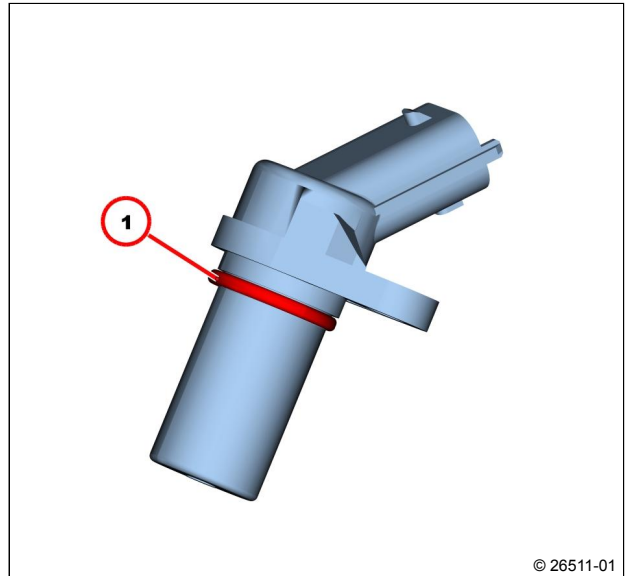
- 1 Speed sensor
- 2 Hexagon head screw
- 3 O-ring
- 293 Mounting compound



- Unlock and pull off the cable plug.
- Unscrew screw (1).
- Remove impulse transmitter (2).

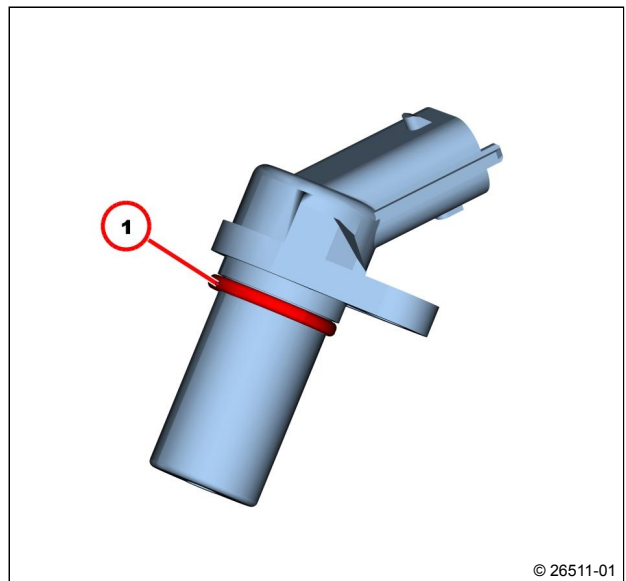


- Remove O-ring (1).
- Visually inspect component.



Install the speed sensor

- Clean the contact surfaces.
- Mount new O-ring (1).
- Coat new O-ring (1) with mounting compound.



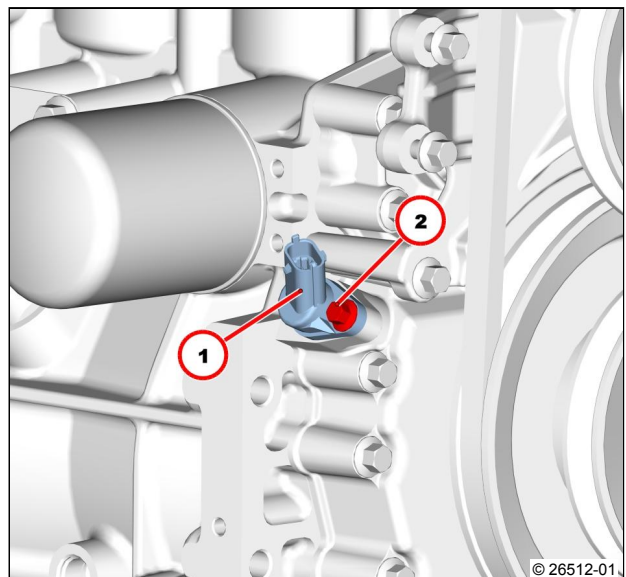
- Insert impulse transmitter (1).
- Tighten screw (2).

 8.5 Nm

- Plug in and lock cable plug.



Ensure that there is a proper connection.



Removing and installing the speed sensor (Camshaft)



Conventional tools

Special tools:

– Disassembly tool

02992127



– Mounting compound
(anhydrous)

01008420



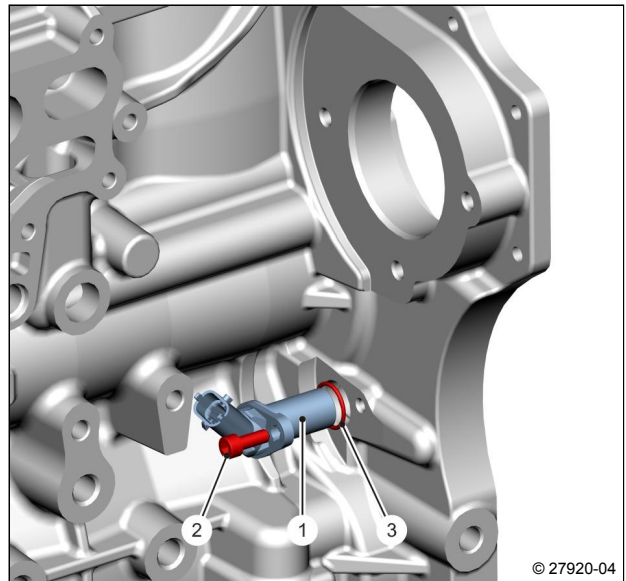
– Safety information / User information



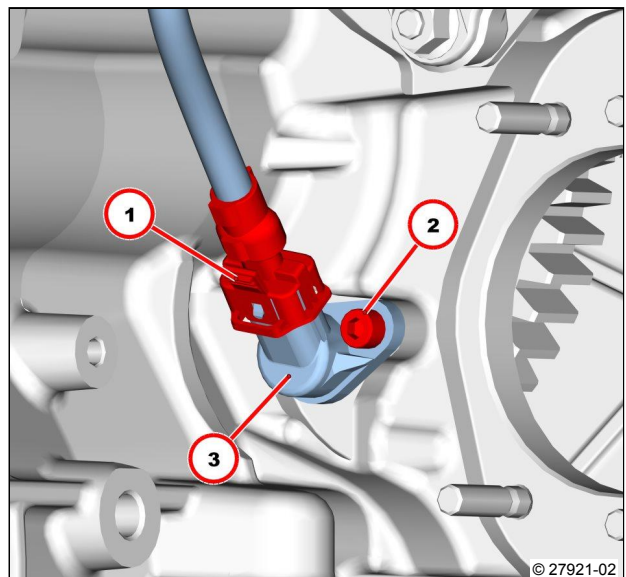
For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

Remove speed sensor

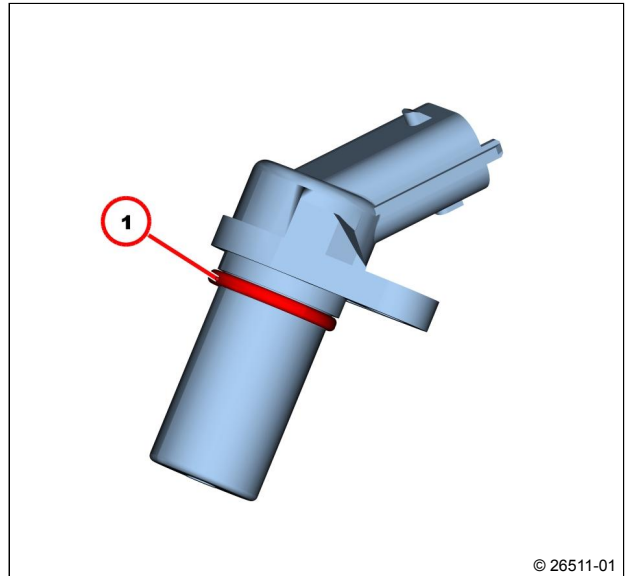
- 1 Speed sensor
- 2 Cylinder head screw
(with surface coating)
- 3 O-ring



- Unlock and pull off cable plug (1).
- Unscrew screw (2).
- Remove impulse transmitter (3).

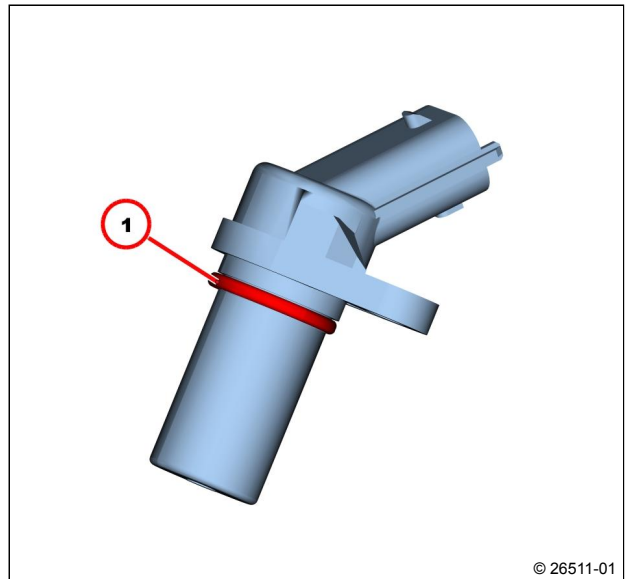


- Remove O-ring (1) with disassembly tool.
- Visually inspect component.



Install the speed sensor

- Clean the contact surfaces.
- Mount new O-ring (1).
- Coat new O-ring (1) with mounting compound.



- Clean threaded bores.
- Clean the contact surfaces.
- Insert impulse transmitter (1).

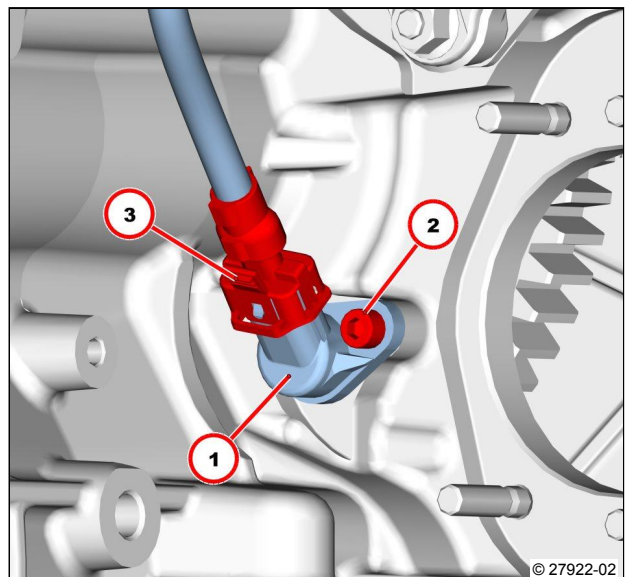


ATTENTION
Use new screw.

- Tighten new screw (2).
- Insert and lock cable plug (3) into place.



ATTENTION
Ensure that there is a proper connection.



Removing and installing pressure/temperature sensor (Charge air)



Conventional tools

Special tools:

– Disassembly tool

02992127



– Safety information / User information



Different add-on variants are used depending on the engine.

The following procedure is described, using one installation variant as an example.

The procedure is the same for other installation variants.

All illustrations are shown as examples.



For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

Removing pressure/temperature sensor

1 Pressure sensor / temperature sensor

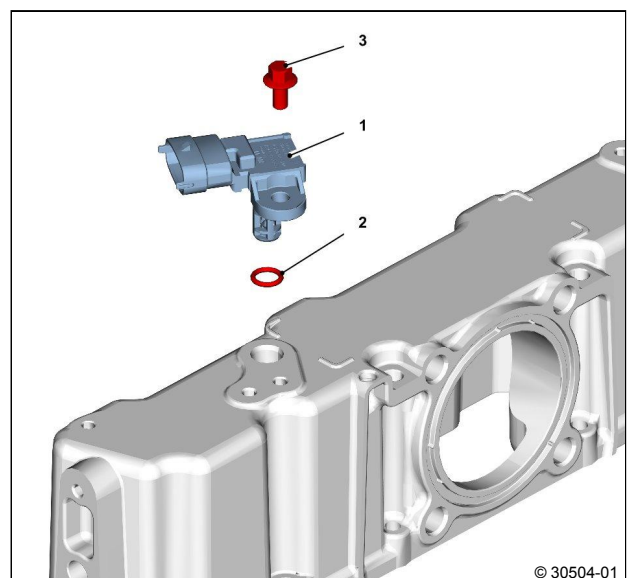
2 O-ring

3 Hexagon head screw



ATTENTION

Note assignment and installation position according to installation variant.
Ensure that the installation position is correct.



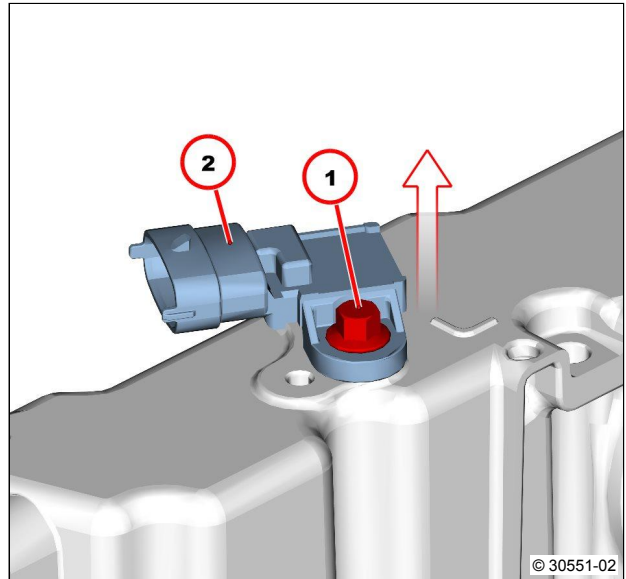
© 30504-01



ATTENTION

To avoid electrostatic discharges, do not touch the plug contacts with your bare hands. Ensure utmost cleanliness.

- Unlock cable plug and disconnect.
- Unscrew screw (1).
- Remove pressure/temperature sensor (2) in direction of arrow.



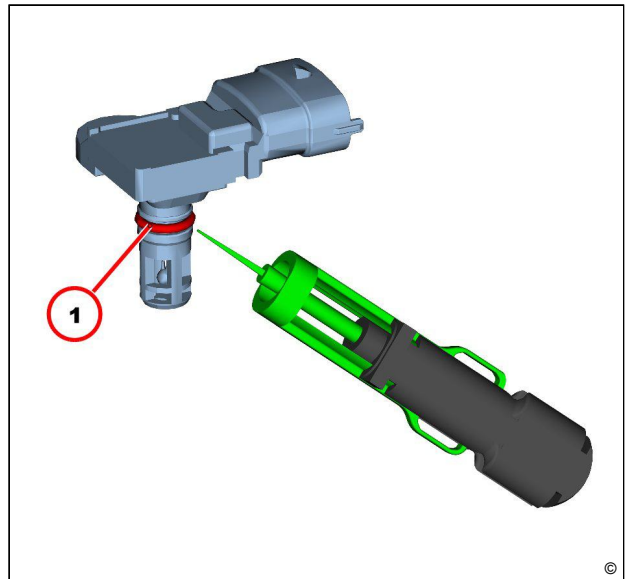
- Remove O-ring (1) with disassembly tool.



ATTENTION

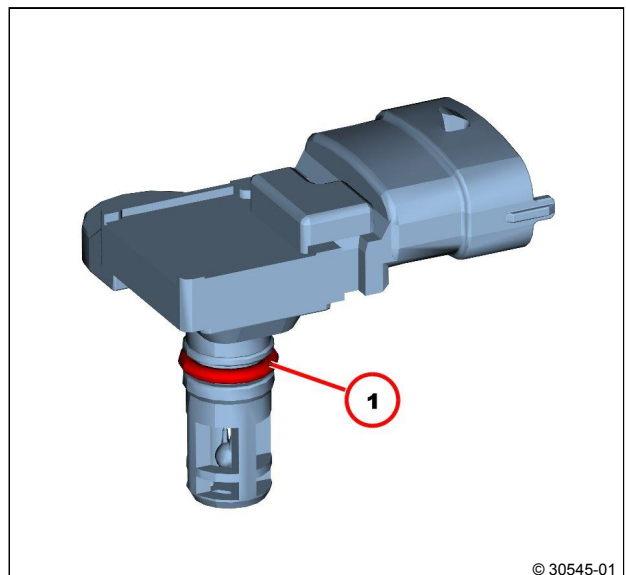
Do not damage the component.

- Clean the component.
- Visually inspect component.



Install pressure/temperature sensor

- Insert new O-ring (1).



- Carefully insert pressure/temperature sensor (1) in direction of arrow.



Ensure that the installation position is correct.

- Tighten screw (2).

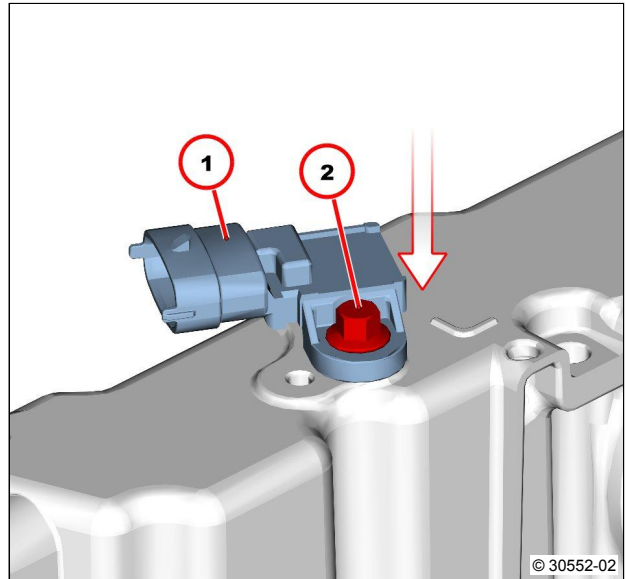


8.5 Nm

- Plug in and lock cable plug.



Ensure that there is a proper connection.



Pressure sensor installation (Lubricating oil pressure)



Conventional tools

Special tools:

- Crow foot wrench
spanner size 24 mm

01899406



– Safety information / User information



For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

Disassembly / Assembly

- 1 Pressure sensor



25 Nm

- 2 O-ring

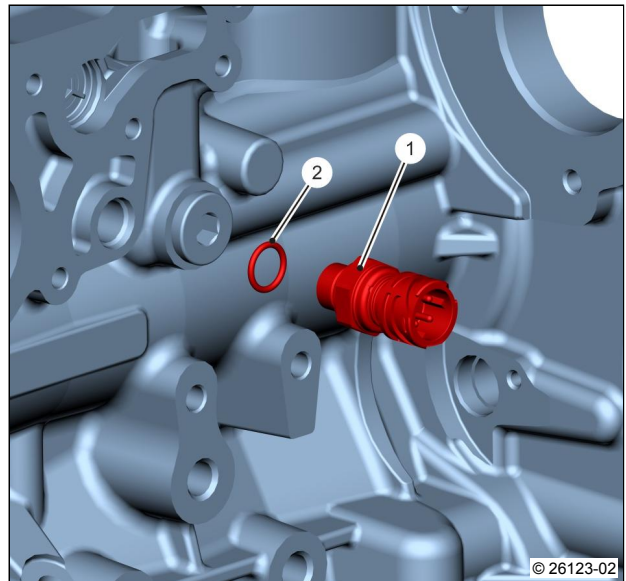


ATTENTION

Ensure utmost cleanliness.



Use new O-ring.



© 26123-02

Temperature sensor (Coolant)



Conventional tools

Special tools:

- Socket wrench insert,
spanner size 19 mm

01899408



– Safety information / User information



For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

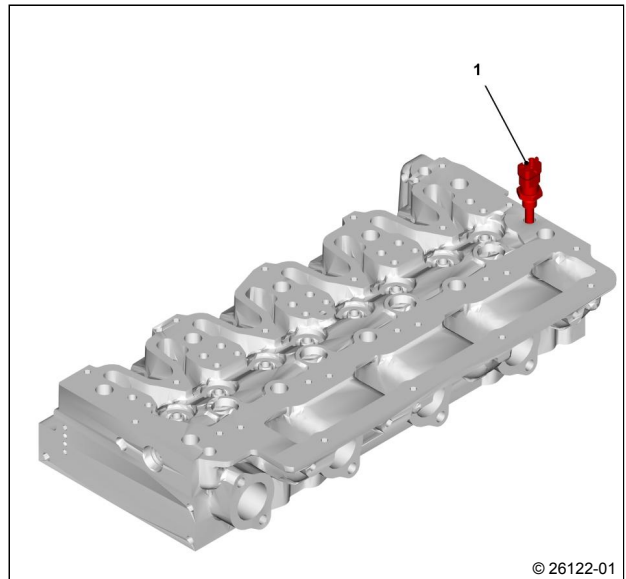
Disassembly / Assembly

- 1 Temperature sensor



20 Nm

- Tighten the temperature transmitter (1) with the socket wrench insert.



© 26122-01

Dismantling and assembling the diesel particle filter (Module size 5.66")



Conventional tools:
– Industrial vacuum cleaner



– Cleaning fleece
– Marker pen, waterproof,
permanent



– Safety information / User information



DANGER

Hot parts!

Danger of burns!

Let the engine / components cool down sufficiently (to at least ambient temperature).

Carry out filter regeneration before a planned filter disassembly.

The filter regeneration must be deactivated or, in systems with a filter regeneration prompt, not activated before performing service work.

Do not carry out work on the fuel system and particle filter component when the engine is running.

Place the diesel particle filter on a level and secure surface.

Secure the diesel particle filter against tipping over.

This work procedure should only be carried out together with a second authorised person.

Wear a respirator with at least protection class FFP2, goggles and protective gloves as protection against fine dust and soot particles.

If the filter was not regenerated, the soot must be extracted from the end faces with an industrial vacuum cleaner.

Do not blow compressed air onto soot-covered areas.



ATTENTION

The installation situation is application and equipment-dependent.

Externally damaged components must be renewed.

The documentation of the vehicle manufacturer/equipment manufacturer must be complied with for dismantling and installing.

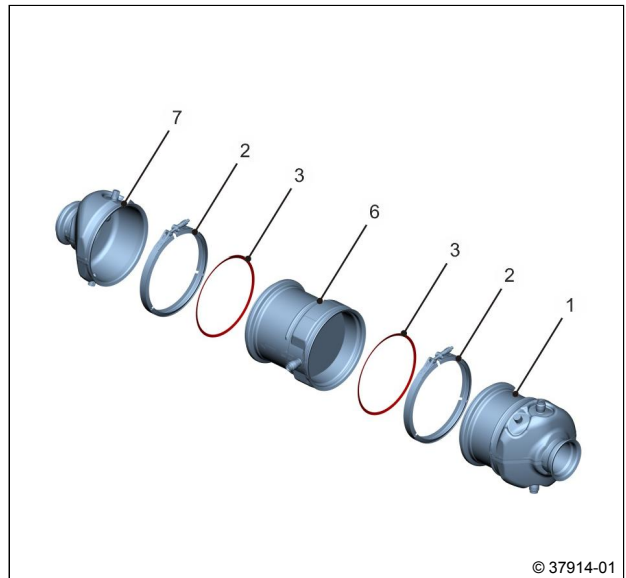
Dismantling and assembly should only be done in the vertical position.



For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

Dismantling the diesel particle filter

- 1 Inlet
- 2 Seal
- 3 V-belt clip
- 6 Diesel particle filter
- 7 Outlet



- Remove necessary sensors and transmitters.
 Module 71
- Loosen the holder and remove the diesel particle filter.
 Module 71
- Place the diesel particle filter on a level and secure surface.



DANGER

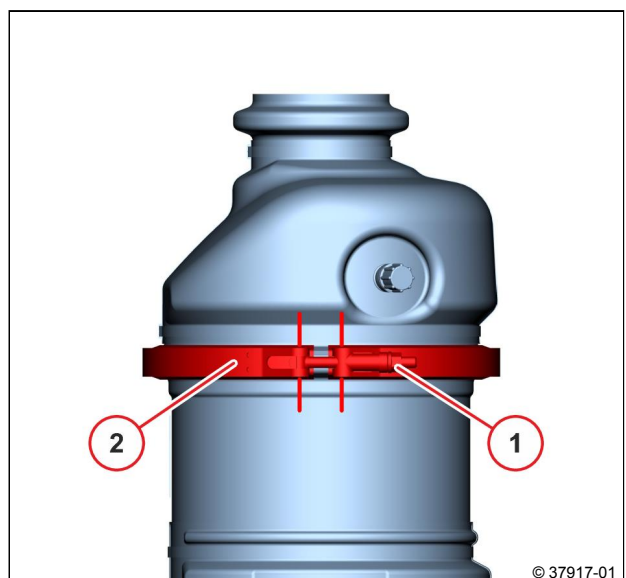
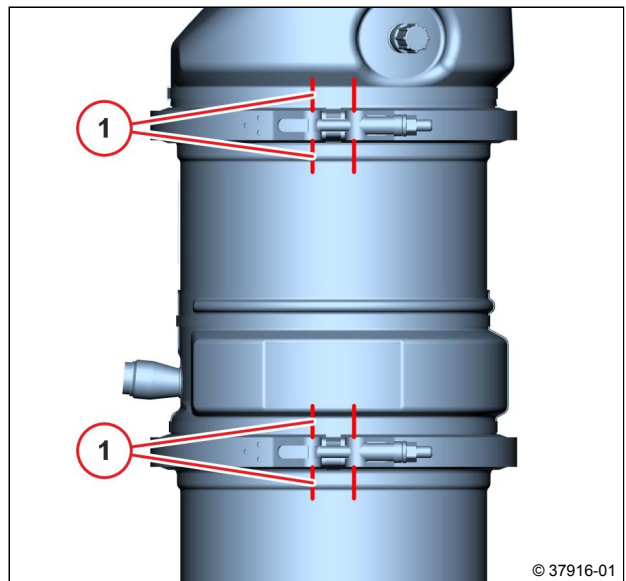
Secure the diesel particle filter against tipping over.



ATTENTION

Ensure that all the structural components can be reassembled in the same mounting position.
Do not scratch or damage surfaces.

- Mark installation position of the V-belt clips (1).
- Loosen nut (1).
- Remove V-belt clip (2).

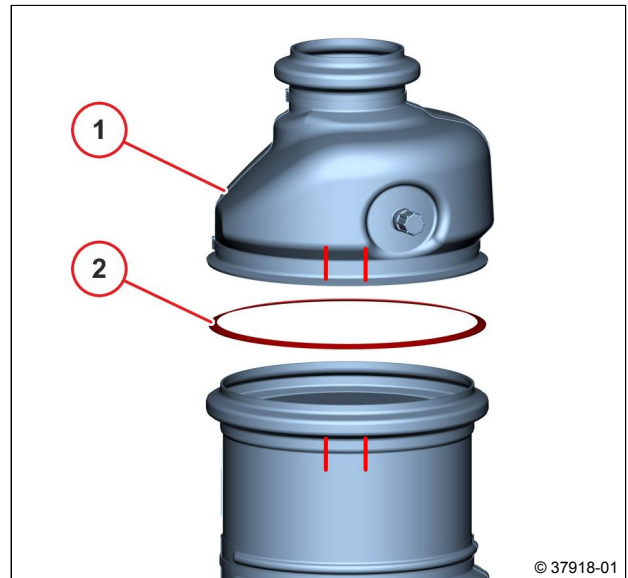


- Remove outlet module (1).
- Remove seal (2).



ATTENTION

Dispose of gasket properly.



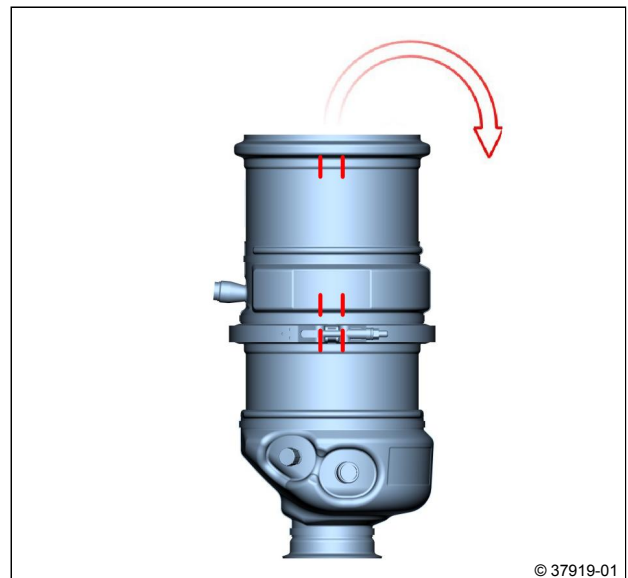
© 37918-01

- Turn diesel particle filter 180°.
- Set down diesel particle filter.



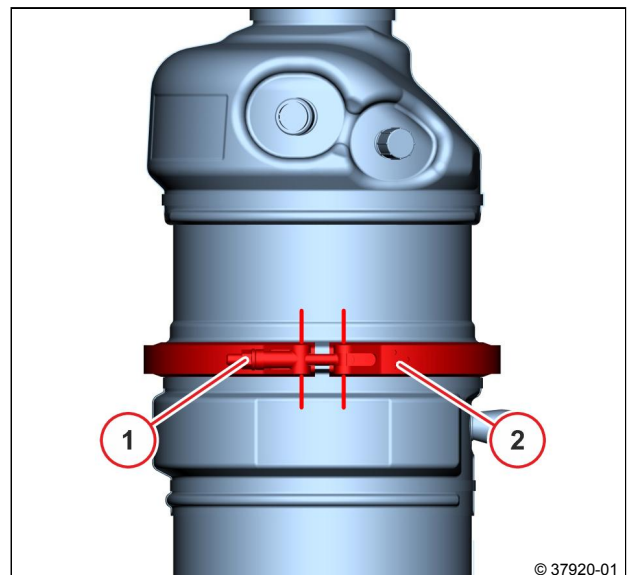
DANGER

Secure the diesel particle filter against tipping over.



© 37919-01

- Loosen nut (1).
- Remove V-belt clip (2).



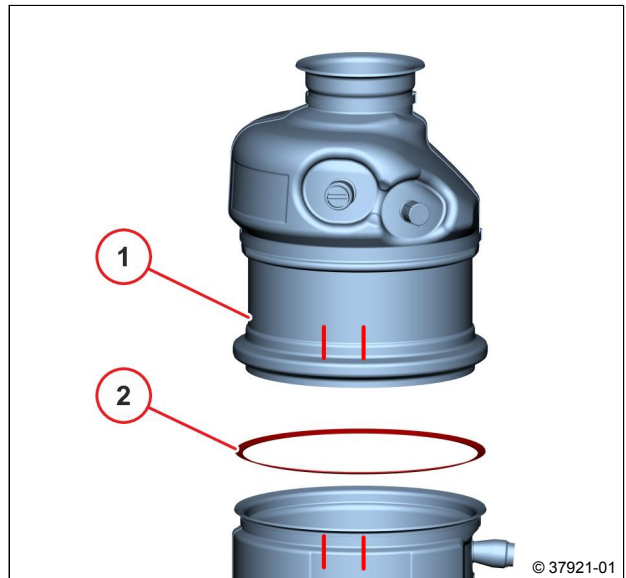
© 37920-01

- Remove inlet module (1).
- Remove seal (2).



ATTENTION

Dispose of gasket properly.



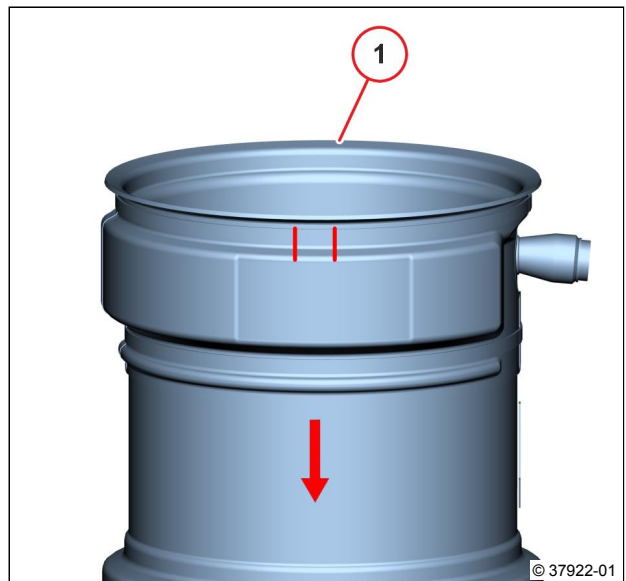
Assembling the diesel particle filter



ATTENTION

All the help markings must be transferred when renewing/changing a component.

- Clean sealing surface (1).



ATTENTION

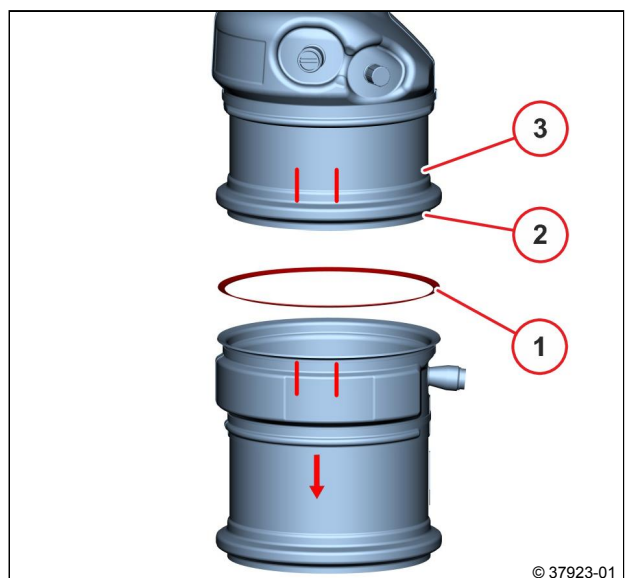
Ensure that the installation position is correct.

- Fit new seal (1).
- Clean sealing surface (2).
- Attach inlet module (3).



ATTENTION

Note flow direction.
The arrow indicates the flow direction.
The arrow is on the diesel particle filter.

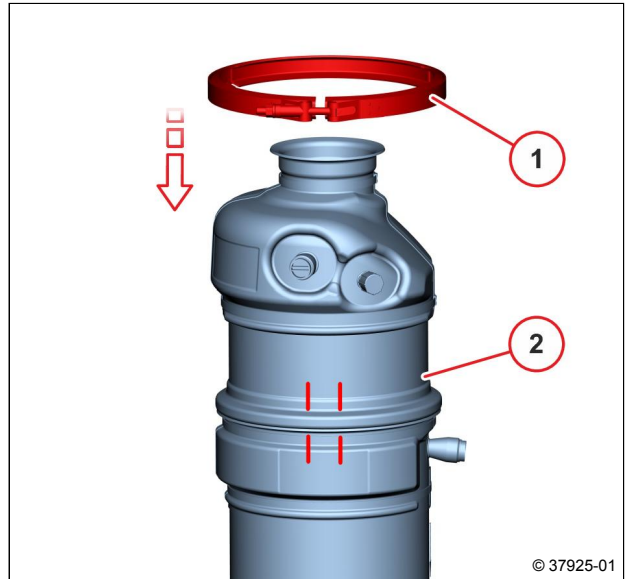




ATTENTION

V-belt clips must be replaced each time they are loosened.

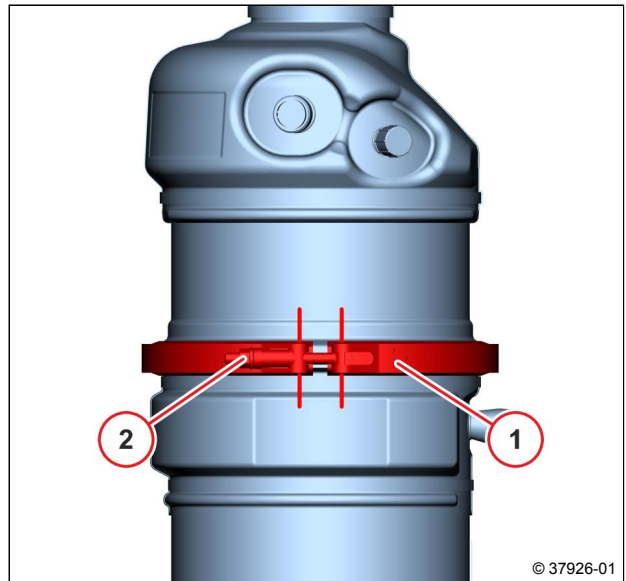
- Mount new V-belt clip (1).
- Position inlet module (2).



- Position V-belt clip (1) according to guide markings.
- Tighten nut (2).

 Stage 1: 10 Nm

 Stage 2: 20 Nm

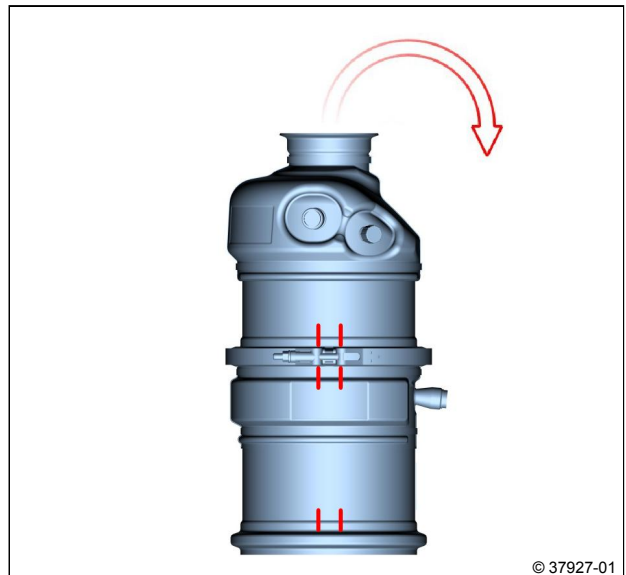


- Turn diesel particle filter 180°.
- Set down diesel particle filter.



DANGER

Secure the diesel particle filter against tipping over.

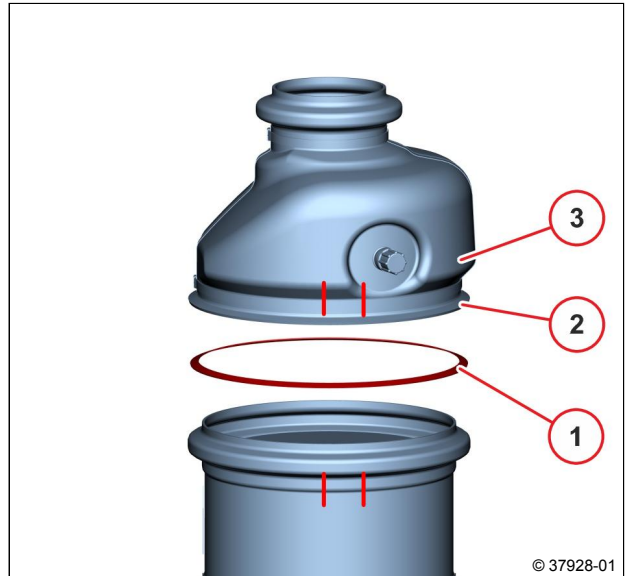




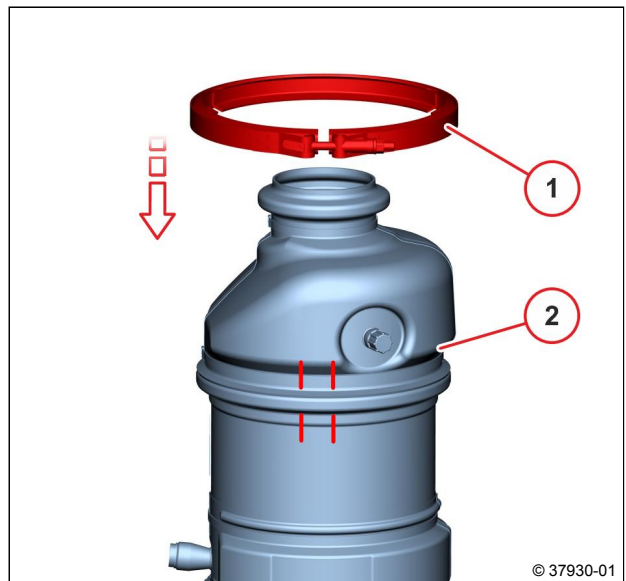
ATTENTION

Ensure that the installation position is correct.

- Fit new seal (1).
- Clean sealing surface (2).
- Attach outlet module (3).



- Mount new V-belt clip (1).
- Position the outlet module (2).



ATTENTION

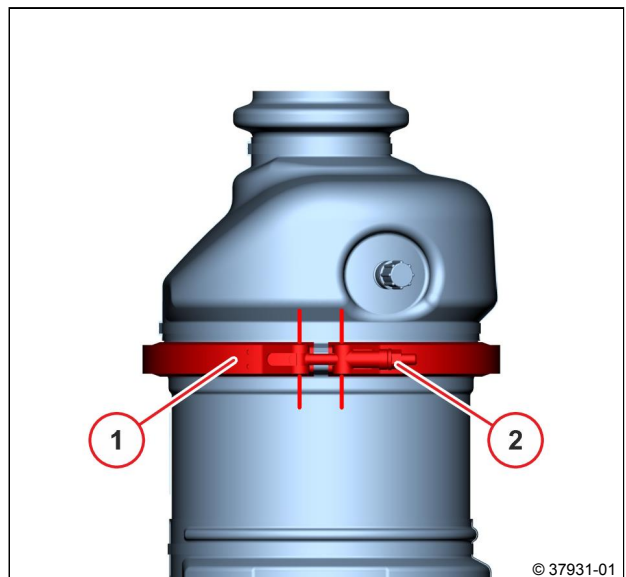
V-belt clips must be replaced each time they are loosened.

- Position V-belt clip (1) according to guide markings.
- Tighten nut (2).
-  Stage 1: 10 Nm

 Stage 2: 20 Nm
- Insert and position the diesel particle filter and tighten the holder.

 Module 71
- Install sensors and transmitters.

 Module 71
- Perform leak test.



Order of assembly (Installing catalyst)**DOC (Diesel Oxidation Catalyst), SCR (Selective Catalytic Reduction)**

Conventional tools



- Safety information / User information
- Installation guidelines

**DANGER**

Hot parts!

Risk of burns / Risk of explosion!

Let the engine / components cool down sufficiently (to at least ambient temperature).

**ATTENTION**

Note the installation position.

The installation situation is application and equipment-dependent.

The documentation of the vehicle manufacturer / equipment manufacturer must be complied with for dismantling and installing.

Externally damaged components must be renewed.

V-belt clips must be replaced each time they are loosened.

The gaskets must be disposed of properly and always renewed.



Different add-on variants are used depending on the engine.

The following procedure is described, using one installation variant as an example.

The procedure is the same for other installation variants.

All illustrations are shown as examples.



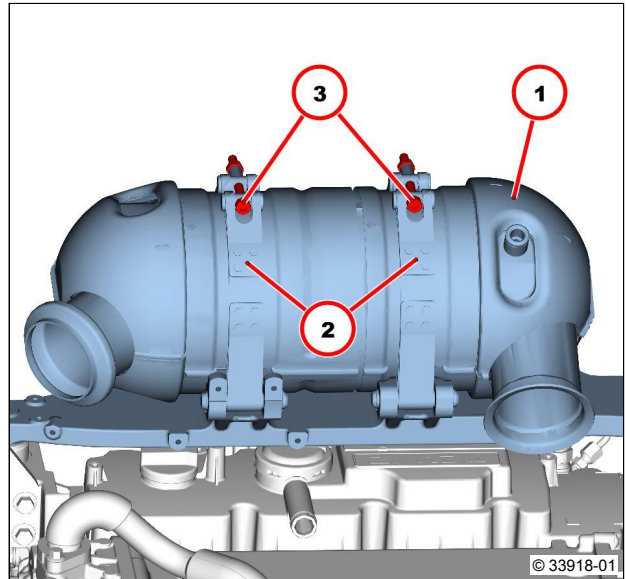
For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

Assembly

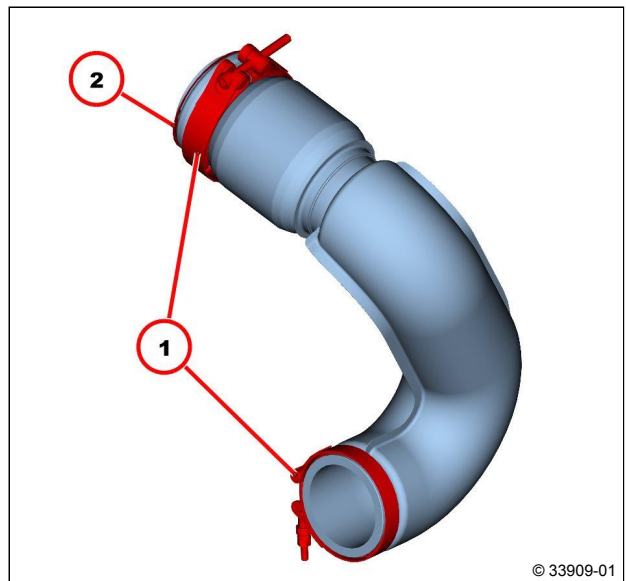
- Position diesel oxidation catalyst (1).
- Position the straps (2).
- Screw on screws (3).



Do not tighten the screws.
Diesel oxidation catalyst must be freely movable.



- Position new V-belt clips (1).
- Mount new seal (2).



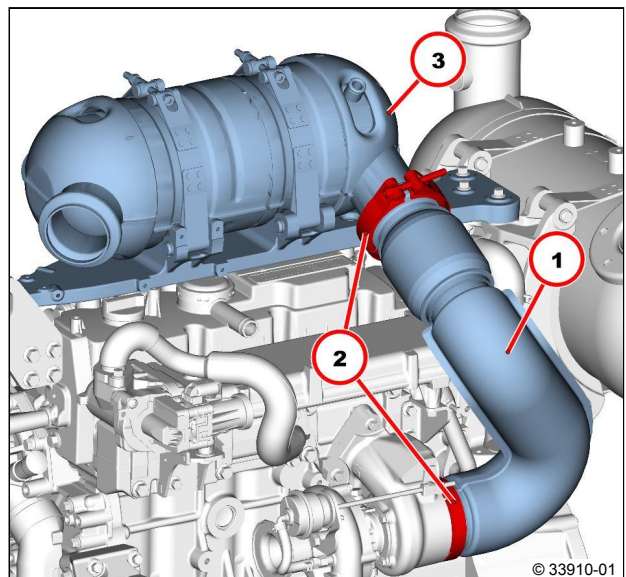
- Position exhaust pipe (1).



ATTENTION

Ensure that the installation position is correct.

- Attach new V-belt clips (2).
- Position diesel oxidation catalyst (3) on the exhaust pipe (1).



- Hold the screws.
- Turn nuts according to the tightening sequence.

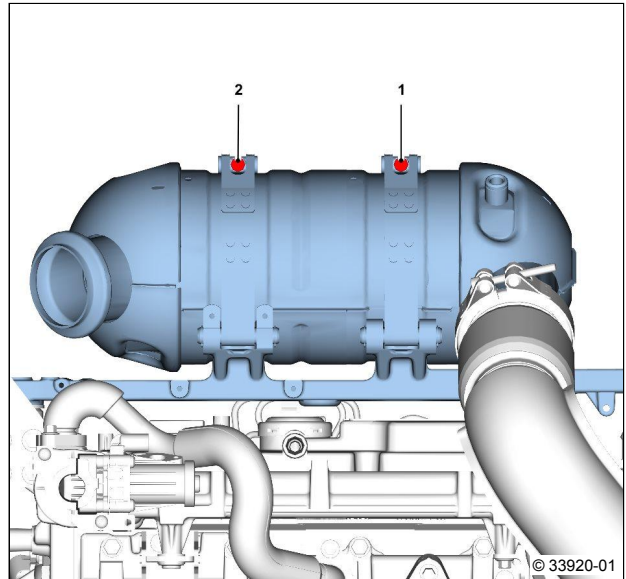


Stage 1: hand tight



ATTENTION

Diesel oxidation catalyst is no longer permitted to be moveable.



- Tighten V-belt clip (1).



12 Nm

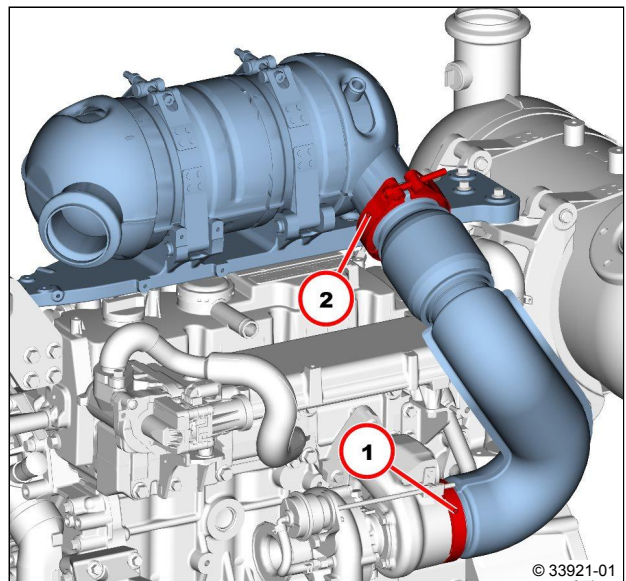
- Tighten V-belt clip (2).



12 Nm



Observe tightening sequence.



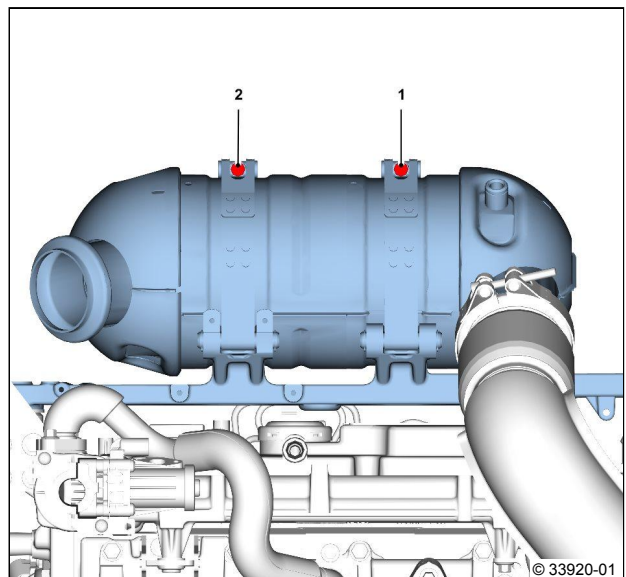
- Hold the screws.
- Tighten nuts according to the tightening sequence.



Module 71



Tightening torque of the holder depends on the respective module size.

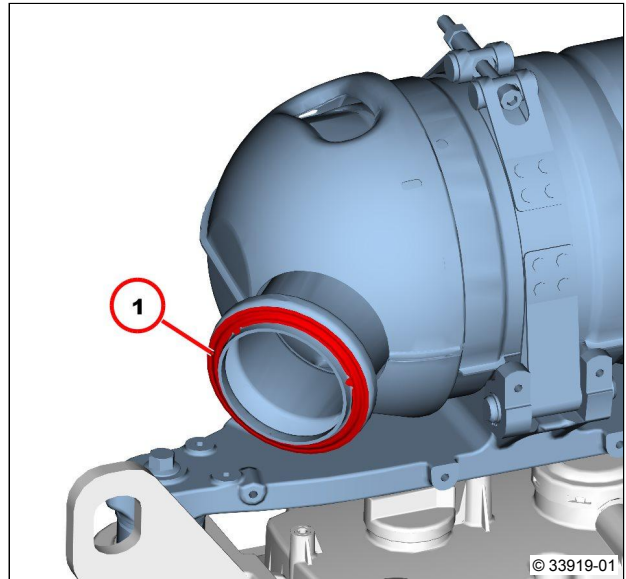


- Mount new seal (1).



ATTENTION

Ensure that the installation position is correct.

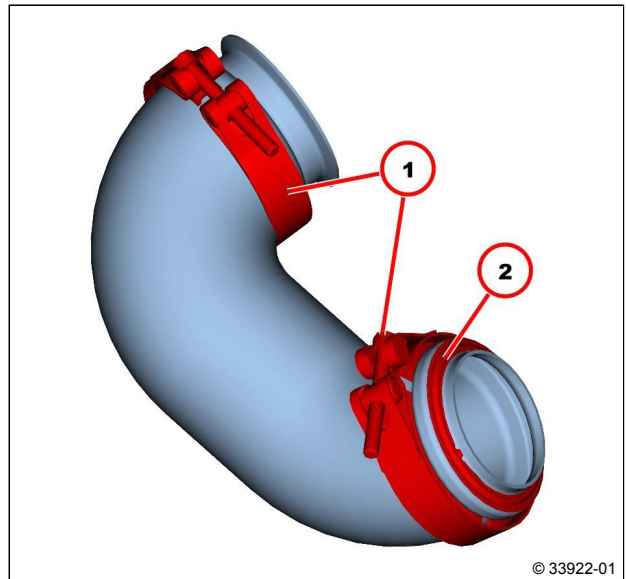


- Position new V-belt clips (1) on the pipe.
- Mount new seal (2).



ATTENTION

Ensure that the installation position is correct.



- Pre-assemble the pipe (1) on the diesel oxidation catalyst (2).

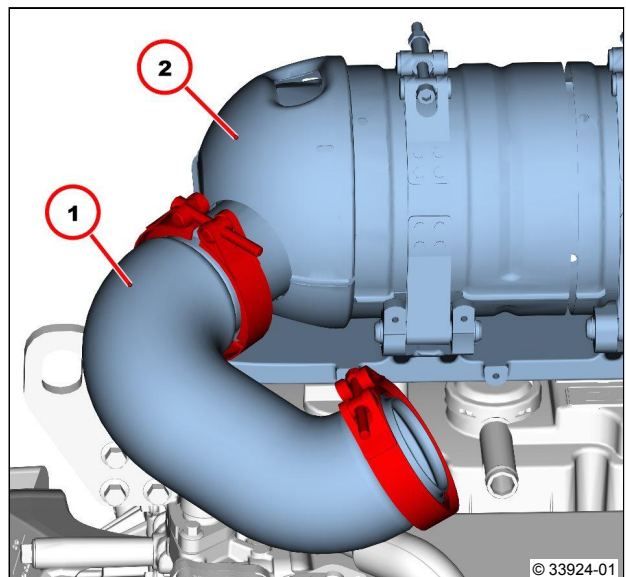


ATTENTION

Do not tighten V-belt clip.



The pipe must be moveable.



- Loosen screws (1).



SCR catalyst must be freely movable.

- Position SCR catalyst (2).
- Position the straps (3).



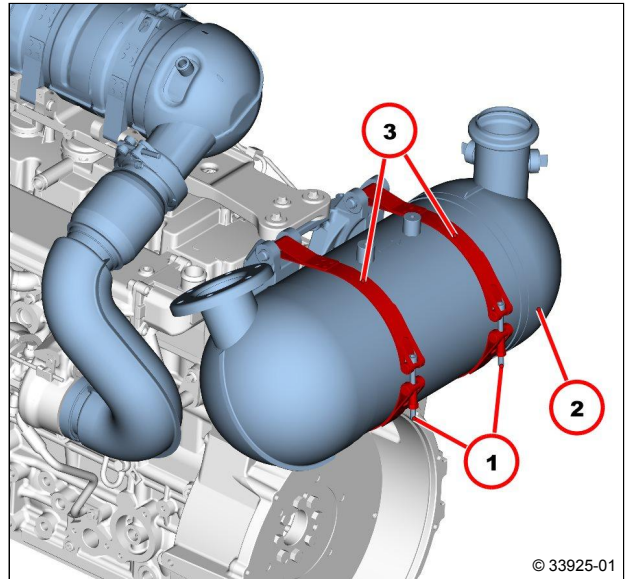
ATTENTION

The strap must not be in contact with the transport or weld seam.

- Screw on screws (1).



Do not tighten the screws.
SCR catalyst must be freely movable.



- Fit new gasket (1).
- Attach mixing pipe (2).



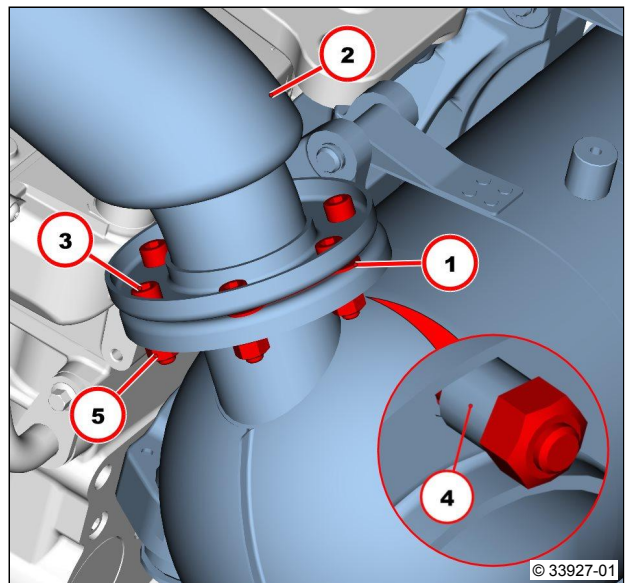
ATTENTION

Ensure that the installation position is correct.

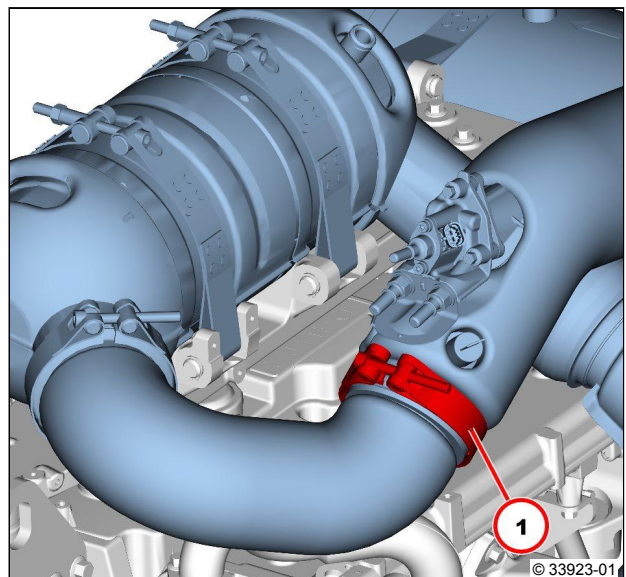


Use new screws, sleeves and nuts.

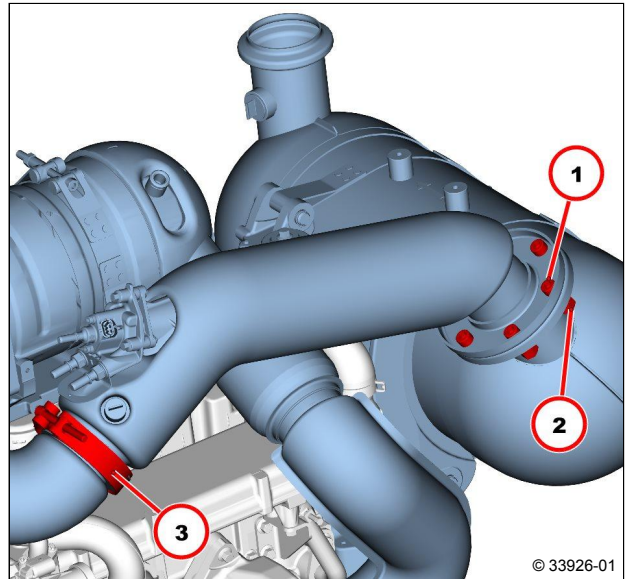
- Mount all screws (3).
- Mount all sleeves (4).
- Screw all nuts (5).



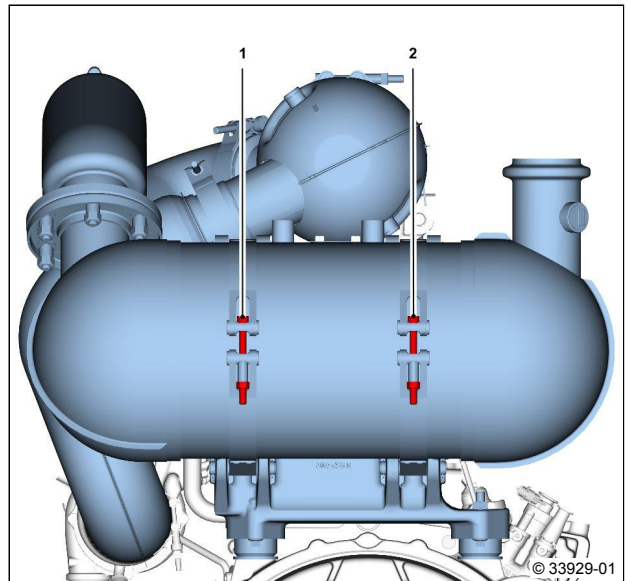
- Attach V-belt clip (1).



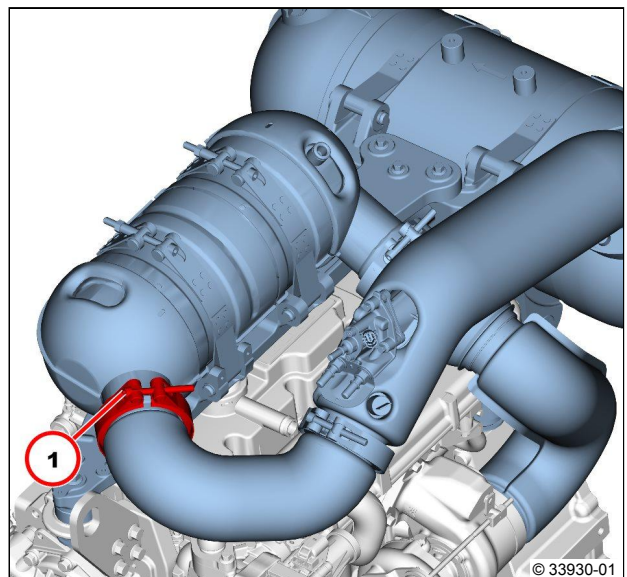
- Hold the screws (1).
 - Tighten nuts (2) alternately.
-  Stage 1: hand tight
 Stage 2: 17 Nm
 Stage 3: 32 Nm
 Stage 4: 43 Nm
- Tighten V-belt clip (3).
-  12 Nm



- Hold the screws.
 - Tighten nuts according to the tightening sequence.
-  Module 71
-  Tightening torque of the holder depends on the respective module size.



- Tighten V-belt clip (1).
-  12 Nm



Sealing parts (diesel oxidation catalytic converter/diesel particle filter, SCR catalytic converter) (temperature sensor, differential pressure sensor of diesel particulate filter)



Conventional tools



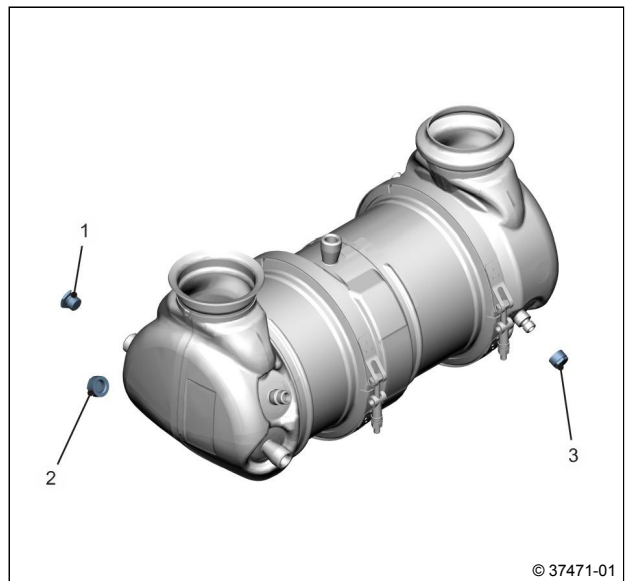
- Safety information / User information
- Operating manual



For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

Disassembly / Assembly

- 1 Locking screw
temperature sensor
 15 Nm
- 2 Cap
Differential pressure sensor in front of diesel
particle filter
 15 Nm
- 3 Cap
Differential pressure sensor behind diesel particle
filter
 15 Nm



Holder (Module size 5.66")



Conventional tools



– Safety information / User information



DANGER

Hot parts!

Risk of burns / Risk of explosion!

Let the engine / components cool down sufficiently (to at least ambient temperature).



ATTENTION

Note installation position.

The installation situation is application and equipment-dependent.

The documentation of the vehicle manufacturer/equipment manufacturer must be complied with for dismantling and installing.

Externally damaged components must be renewed.



All illustrations are shown as examples.
Observe the spare parts documentation.



For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

Disassembly / Assembly

- 1 Holder nut

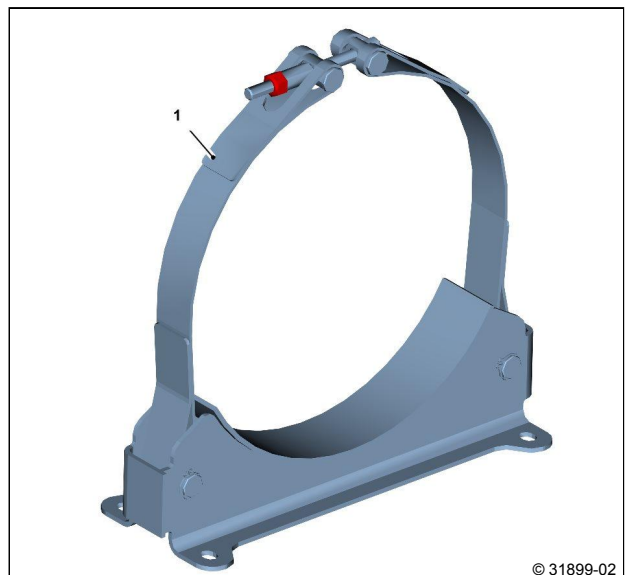


18 Nm



ATTENTION

All components must be assembled without tension.



© 31899-02

Differential pressure sensor (diesel particle filter)



Conventional tools

Special tools:

– Locking plugs / caps

01899368



– Safety information / User information

– Operating manual

– Installation guidelines



DANGER

Hot parts!

Risk of burns / Risk of explosion!

Let the engine / components cool down sufficiently (to at least ambient temperature).

The filter regeneration must be deactivated or, in systems with a filter regeneration prompt, not activated before performing service work.



ATTENTION

Ensure the utmost cleanliness when performing all work.

Remove any paint residue and dirt particles before disassembly.

Carefully clean the area around the components concerned. Blow wet parts dry with compressed air.

Close all connections immediately after opening with new, clean locking plugs/caps.

Do not remove locking plugs/caps until immediately before assembling.

Disassembly / Assembly

- (1) Differential pressure sensor
- (2) Cover sheet
- (3) Connection
nach diesel particle filter
- (4) Connection
before diesel particulate filter

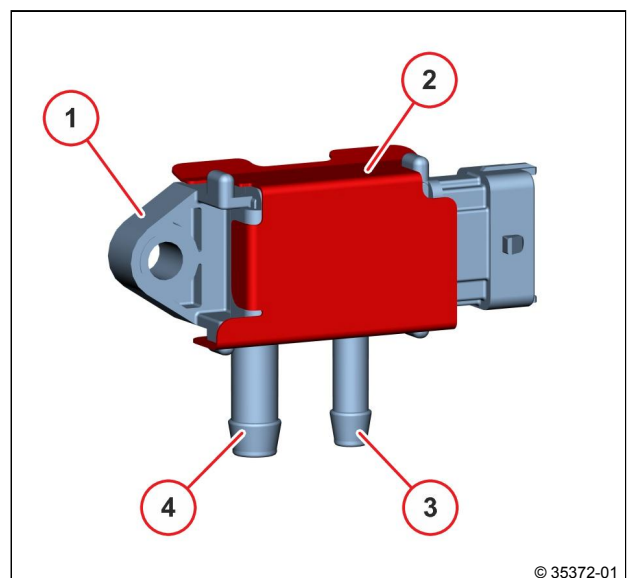


ATTENTION

Observe DEUTZ AG installation guidelines.
Observe installation guideline / documentation of the vehicle manufacturer / equipment manufacturer.

Note the allocation and the installation position.

Ensure that the installation position is correct.



© 35372-01

Temperature sensor

(Air intake temperature, Ambient air temperature)



Conventional tools

Special tools:

- Locking plugs/caps 01899368
- Disassembly tool 02992127



– Safety information / User information

– Installation guidelines



ATTENTION

Ensure the utmost cleanliness when performing all work.
Remove any paint residue and dirt particles before disassembly.
Carefully clean the area around the components concerned. Blow wet parts dry with compressed air.
Close all connections immediately after opening with new, clean locking plugs/caps.
Do not remove locking plugs/caps until immediately before assembling.
Observe installation guideline / documentation of the vehicle manufacturer / equipment manufacturer.

Disassembly / Assembly

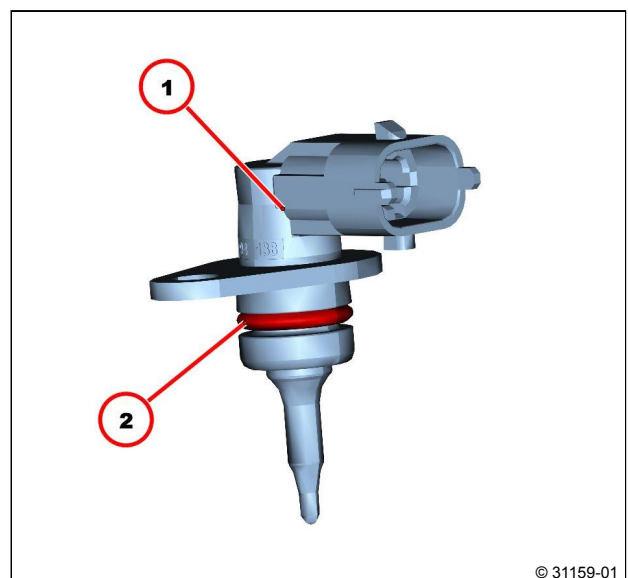
- 1 Temperature sensor
- 2 O-ring

- Remove round sealing rings with disassembly tool.



ATTENTION

Use new O-ring.
Observe DEUTZ AG installation guidelines.
Observe installation guideline / documentation of the vehicle manufacturer / equipment manufacturer.
Note the allocation and the installation position.
Ensure that the installation position is correct.



© 31159-01

Sealing parts (lubricating oil line)



Conventional tools



– Safety information / User information



Different add-on variants are used depending on the engine.
All illustrations are shown as examples.



For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

Disassembly / Assembly

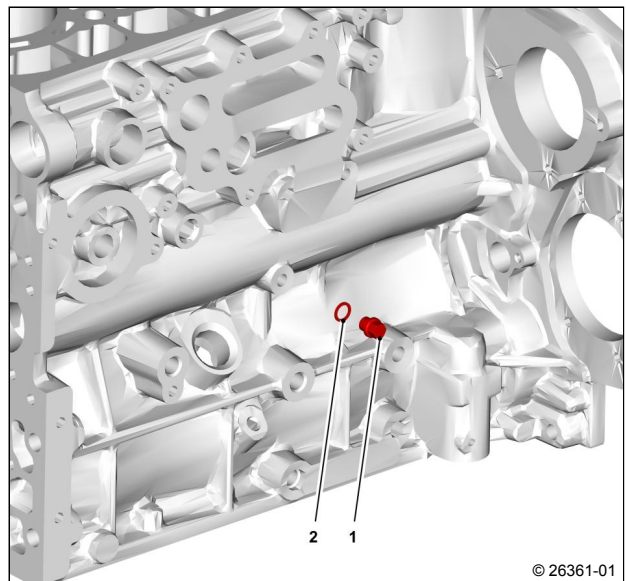
- 1 Locking screw

 30 Nm

- 2 Sealing ring



Use a new sealing ring.



© 26361-01