- Read and observe the information in this documentation. You will avoid accidents, retain the manufacturer's warranty and possess a fully functional and ready to operate engine.
- This engine is built exclusively for purpose according to the scope of delivery - defined by the equipment manufacturer (use for the intended purpose). Any use above and beyond this is considered improper use. The manufacturer will not be liable for damages resulting from this. The user bears the sole risk.
- Use for the intended purpose also includes observance of the operating, maintenance and repair instructions specified by the manufacturer. The engine may only be used, maintained and repaired by persons who are familiar with this and are aware of the risks involved.
- Make sure that this documentation is available to everyone involved in the operation, maintenance and repair and that they have understood the contents.
- Failure to observe this documentation may lead to malfunctions and engine damage as well as injury to persons for which the manufacturer will not accept any liability.
- Prerequisite for proper maintenance and repair is the availability of all the necessary equipment, conventional and special tools and their perfect condition.
- Engine parts such as springs, clamps, elastic retaining rings etc. pose an increased risk of injury when handled incorrectly.
- The pertinent rules for the prevention of accidents and other generally recognised health and safety regulations must be observed.
- Maximum economy, reliability and long life is only guaranteed when using DEUTZ original parts.
- Repair of the engine must correspond to its use for the intended purpose. Only parts released by the manufacturer for the respective purpose may be used for conversion work. Unauthorised modifications to the engine exclude manufacturer liability for resulting damages. Failure to observe this will void the warranty!
- The engines made by DEUTZ are developed for a wide range of applications. A wide range of variants ensures that the respective special requirements are met.
- The engine is equipped according to the installation case, i.e. not all the parts and components described in this documentation are installed in your engine necessarily.
- We have done our best to highlight the differences so that you can easily find the operating, maintenance and repair instructions relevant to your engine.

We are at your service for any questions you may have in this matter.

Your DEUTZ AG

3.1 General

The documentation of the workshop manual has been created based on the engine available at the time of going to press.
There may be deviations in the descriptions, illustrations and parts due to further developments.

The maintenance work described in the operation manual and in the workshop manual must be carried out on schedule and completely. The maintenance personnel must have the necessary technical knowledge to perform the work. Safety and protection devices which are removed during maintenance work must be replaced again afterwards.

Caution!

The rules for the prevention of accidents and the safety regulations must be observed during maintenance work.

Reference is made in the workshop manual job cards to the regulations in chapter 3.2. These must be read before working on the engine and must be strictly followed.

The maintenance intervals and the work to be performed are specified in the maintenance schedule of the operation manual. The job cards contain technical documentation on the execution of maintenance work.

3.2 Specifications

3.2.1 Accident prevention and safety regulations

The legally prescribed rules for the prevention of accidents must be observed. These are available from professional associations or from dealers. These are dependent on the application site, operating mode and the operating and auxiliary materials being used.

Special protection measures are specified depending on the work being carried out, and are identified in the job description.

Among other things it generally applies that:

- for the personnel:
  - Only briefed personnel may operate or maintain the engine. Unauthorised persons are prohibited access to the machine room.
  - Wear close-fitting clothing and ear protectors in the machine room when the engine is in operation.
  - Only deploy trained personnel to do repairs and maintenance work.
  - Do not work on the fuel system when the engine is running. The fuel system is under high pressure - danger of death.
  - Go to the workshop immediately in case of leaks in the fuel system.
- for the engine room:
  - Ensure adequate ventilation (do not cover air shafts).
  - Provide first aid kit and suitable fire extinguishers. Check the filling and readiness for operation regularly.
  - Only store inflammable materials in the machine room if they are essential for operation of the system.
  - Smoking and naked flames are prohibited in the machine room.
- for operation, maintenance and repairs on the engine:
  - After all work on the fuel system, it must be bleeded - see the operation manual, chapter "6.2 Fuel system“.
  - Only start the engine when all the protective devices have been fitted. Make sure no-one is standing in the danger area.
  - Cleaning, maintenance and repair work may only be performed with the engine at a standstill and secured against starting.
  - Injection lines and high pressure pipes must not be deformed.
  - Damaged injection lines and high-pressure pipes must be renewed.

ID no.	Name	Information	Series			Value	Unit
General engine data							
P00 01	Length of engine		D 2008	L3		538	mm
				L4		627	mm
P00 02	Width of engine		D 2008			480	mm
P00 03	Height of engine		D 2008			620	mm
P00 04	Engine weight according to DIN 70020-A approx.		D 2008	L3		155	kg
				L4		189	kg
P00 10	Working procedure		D 2008			four-stroke diesel	-
P00 20	Combustion system		D 2008			naturally aspirated engine with indirect injection	-
P00 30	Total volume		D 2008	L3		1170	cm^3
				L4		1560	cm^3
P00 31	Bore		D 2008			76	mm
P00 32	Stroke		D 2008			86	mm
P00 40	Compression ratio		D 2008			23,5 : 1	-
P00 50	Direction of rotation	looking onto the flywheel	D 2008			left	-
P00 60	Max. declared speed		D 2008			3000	[rpm]
P00 61	Min. idling speed		D 2008			900	[rpm]
P00 71	Ignition sequence		D 2008	L3		1-2-3	-
				L4		1-3-4-2	-
Power train							
P02 34	Permissible axial backlash of crankshaft		D 2008			0,13 - 0,56	mm
P02 71	Piston, diameter, standard		D 2008			74^{+1}_{-0}	mm

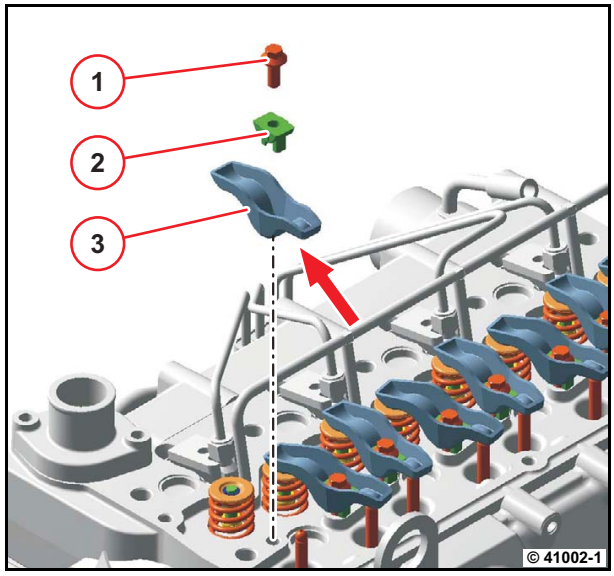
ID no.	Name	Screw type	Notes / Remarks	Series			Pre-clamping value	Post-clamping value
A00 003	Engine mounting on crankcase	M10 x 1.5		D/TD 2008/ 2009			41 Nm	
A01 001	Cylinder head on crankcase	M12 x 1.75	Use new screws	D/TD 2008/ 2009			35 Nm	35 Nm 60° 60°
A01 002	Rocker arm bracket on cylinder head	M8 x 1.25		D/TD 2008/ 2009			27 Nm	
A01 004	Cylinder head cover on cylinder head	M8 x 1.25		D/TD 2008/ 2009			27 Nm	
A01 092	Lifting log on cylinder head	M8 x 1.25		D/TD 2008/ 2009			41 Nm	
A02 010	Main bearing housing on crankcase	M8 x 1.25		D/TD 2008/ 2009			15 Nm	27 Nm
A02 012	Main bearing housing on crankcase	M10 x 1.5	Locking screw	D/TD 2008/ 2009			41 Nm	
A02 013	Main bearing housing (assembly)	M8 x 1.25	Hexagon socket	D/TD 2008/ 2009			21 Nm	
A02 020	Big end bearing cap on connecting rod	M8 x 1.0		D/TD 2008/ 2009			35 Nm	
A03 020	Gear case cover on crankcase	M8 x 1.25		D/TD 2008/ 2009			27 Nm	
A03 030	Lubricating oil pan on crankcase	M8 x 1.25		D/TD 2008/ 2009			32 Nm	
A03 031	Drain plug on lubricating oil pan	M14 x 1.5		D/TD 2008/ 2009			39 Nm	
A03 080	Connection housing to crankcase	M14 x 1.5		D/TD 2008/ 2009			81 Nm	

Installing the rocker arm

- Grease the rocker arm (arrow) lightly.
- Mount rocker arm (3) and rocker arm bearing (2).

Align rocker arm centred to the valve spring!

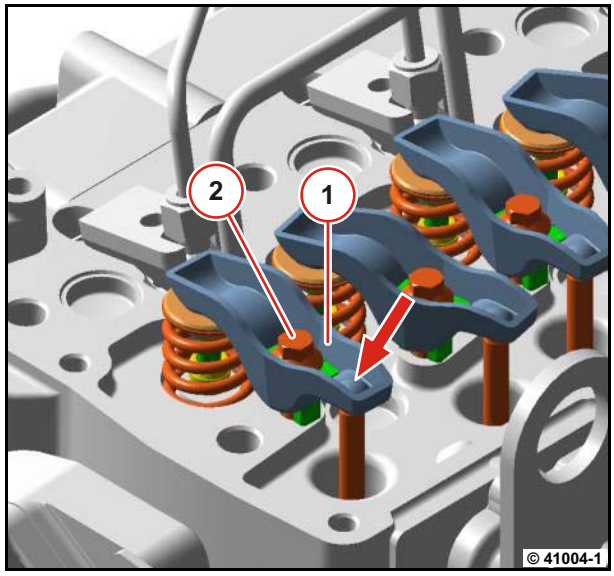
- Fasten screw (1).



- Press down rocker arm (1) and pushrod.
- Tighten screw (2).

27 Nm

Oil rocker arm lightly!



- Clean sealing surfaces.

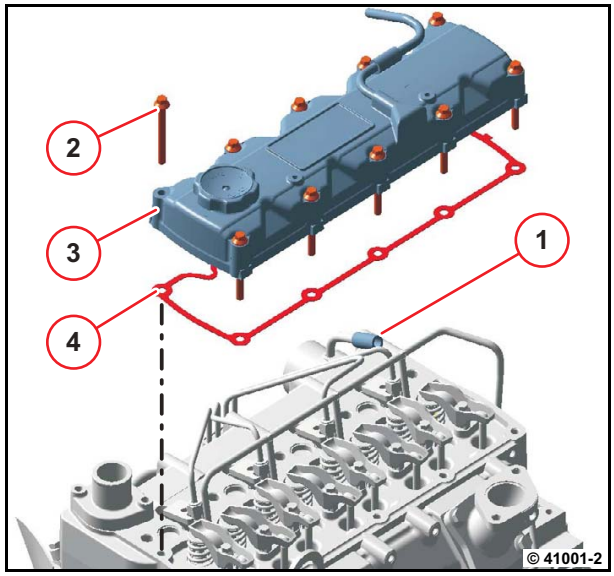
The sealing surfaces must be dry and free from grease and dirt.

- Mount new gasket (4).
- Mount cylinder head cover (3).
- Fit on the venting hose (1).
- Tighten screws (2).

27 Nm

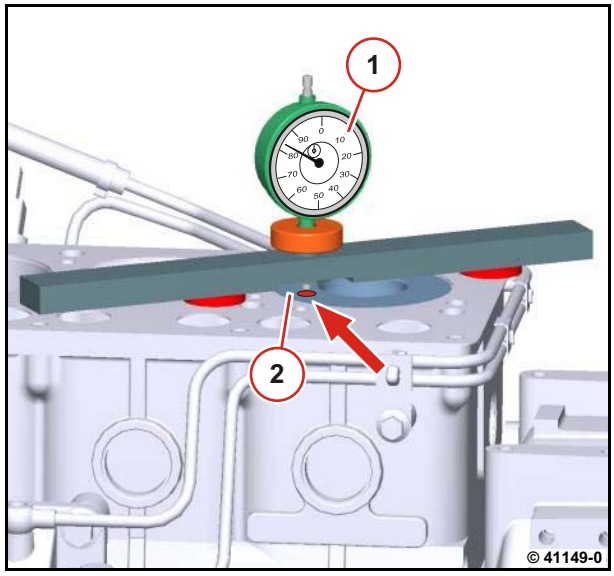
Tightening sequence: From the centre outwards.

- Tighten hose clip (1).

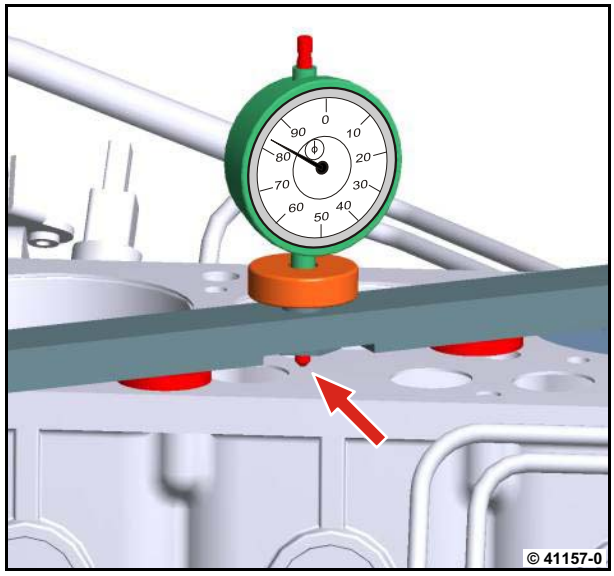


- Insert dial gauge into measuring beam.
- Place shims (1) and measuring beam (2) on the sealing surface of the crankcase.
- Apply the stylus to the piston base (arrow) under pre-tension.
- Continue turning the crankshaft evenly until the reversal point of the pointer on the dial gauge is reached.

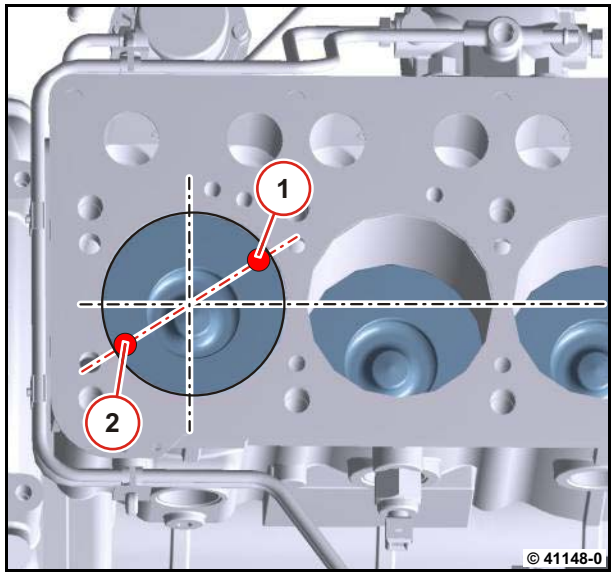
The piston is now at top dead centre (TDC).



- Move the measuring beam.
- Apply stylus of the dial gauge to the crankcase sealing surface with pre-tension (arrow).
- Adjust dial gauge to "0".



Measuring points see diagram.
Measuring points (1) and (2).



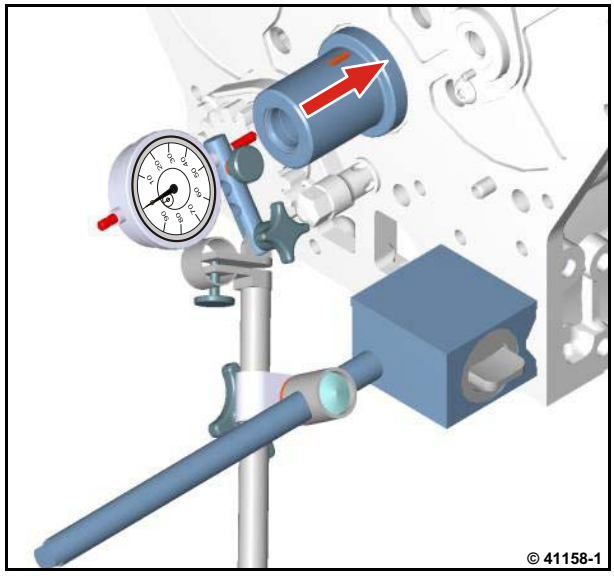
Checking the axial clearance of the crankshaft

Commercial available tools:
– Magnetic measuring stand
– Micrometer gauge

Special tools:
– Dial gauge. 100400

Checking the axial backlash

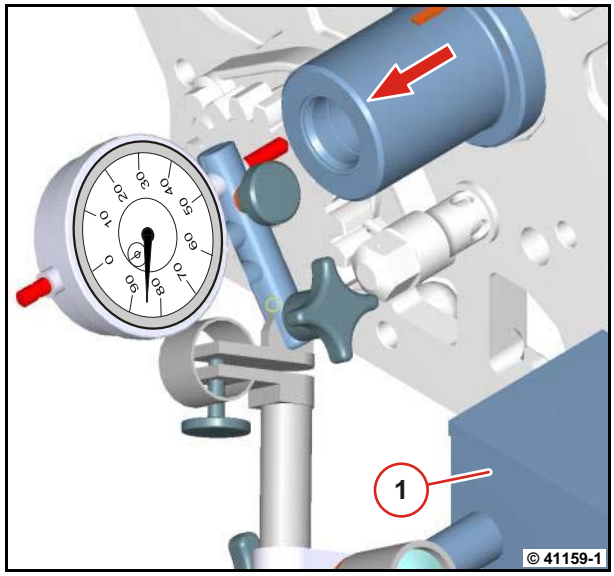
- Mount magnetic measuring stand.
- Insert dial gauge.
- Apply stylus to the crankshaft end with pre-tension.
- Press crankshaft in direction of arrow.
- Adjust dial gauge to "0".



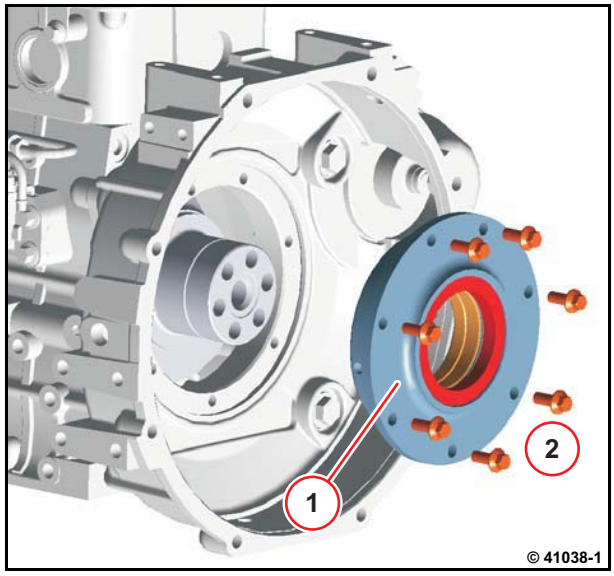
- Push crankshaft in the direction of the arrow and read off the value on the meter.

  P02 34

- Compare actual value with setpoint value.
- Remove magnetic measuring stand.
- Remove dial gauge.



- Install main bearing housing (1).
- Tighten screws (2).
  - Step 1:
    15 Nm
  - Step 2:
    27 Nm
- Renewing the crankshaft sealing ring.
  W 02-02-02



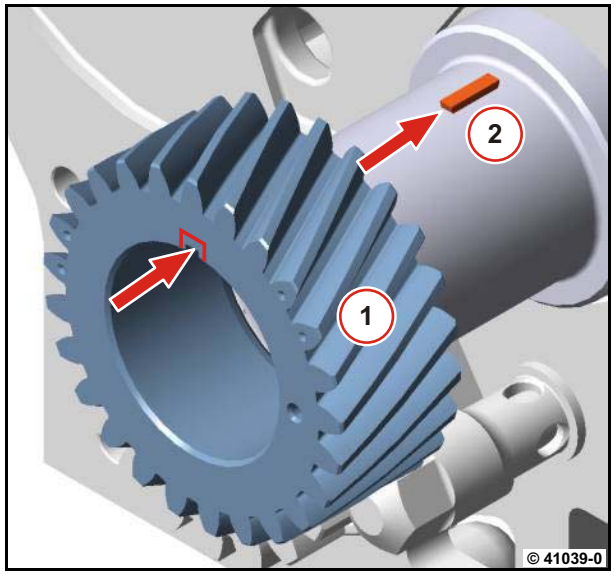
- Check axial backlash of crankshaft.
  W 02-01-04
- Heat up crankshaft toothed wheel to approx. 100 °C.

Danger!
Danger of burning!

- Mount crankshaft toothed wheel (1).

Note installation position of Woodruff key (2) and groove.

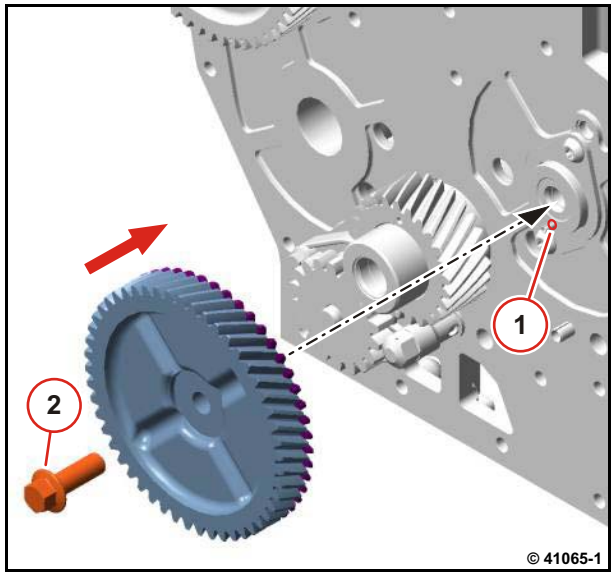
- Install oil pressure regulating valve.
  W 08-11-10



- Mount camshaft toothed wheel.

Mount camshaft toothed wheel with the bore on the clamping pin (1).

- Fasten screw (2).



Removing and installing the camshaft

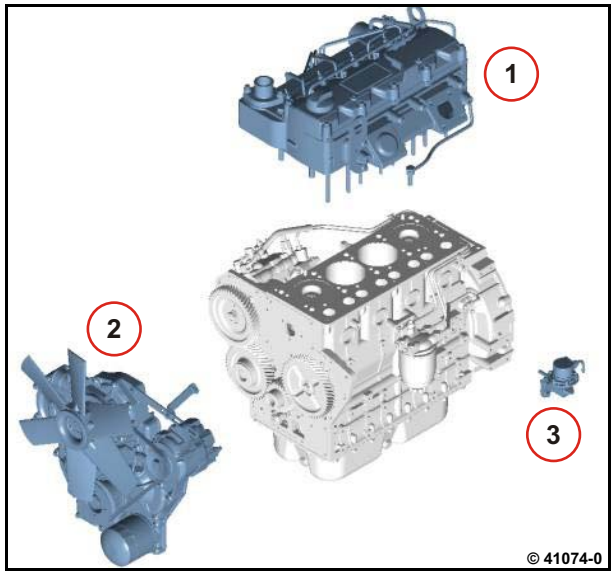
Commercial available tools

Special tools:
– Fixing pin 144180
– Dial gauge. 100400

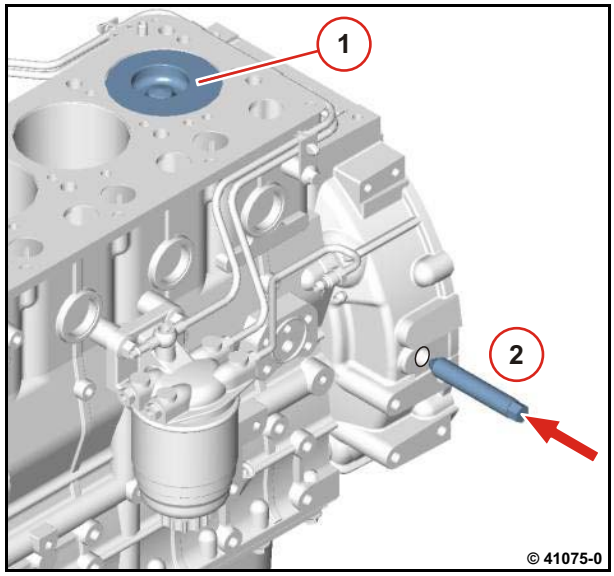
– W 01-04-04
– W 04-04-09
– W 07-11-01

Removing the camshaft

- Remove cylinder head (1).
  W 01-04-04
- Remove gearcase cover (2).
  W 04-04-09
- Remove fuel supply pump (3).
  W 07-11-01

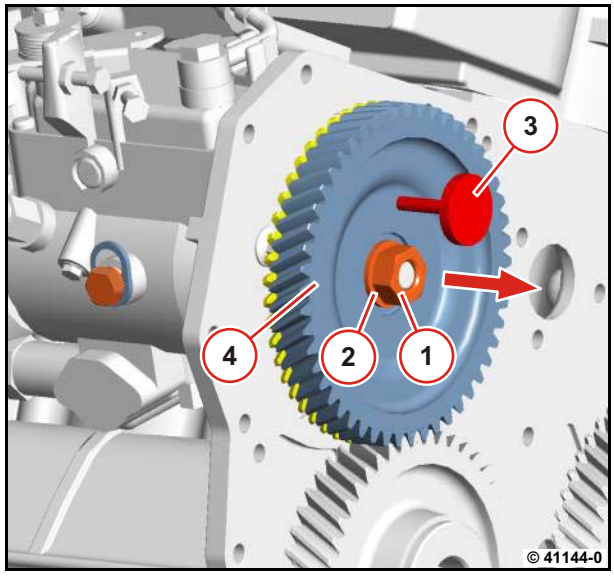


- Set piston (1) at top dead centre.
- Fix flywheel with fixing pin (2).

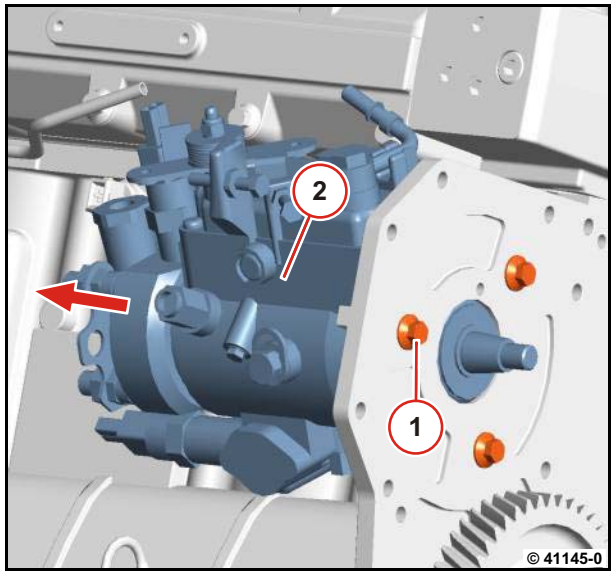


- Unscrew nut (1).
- Remove washer (2).
- Remove measuring pin (3).
- Pull off fuel injector toothed wheel (4).

Use suitable puller if necessary.



- Disconnect cables.
- Unscrew screws (1).
- Remove fuel injector pump(2).

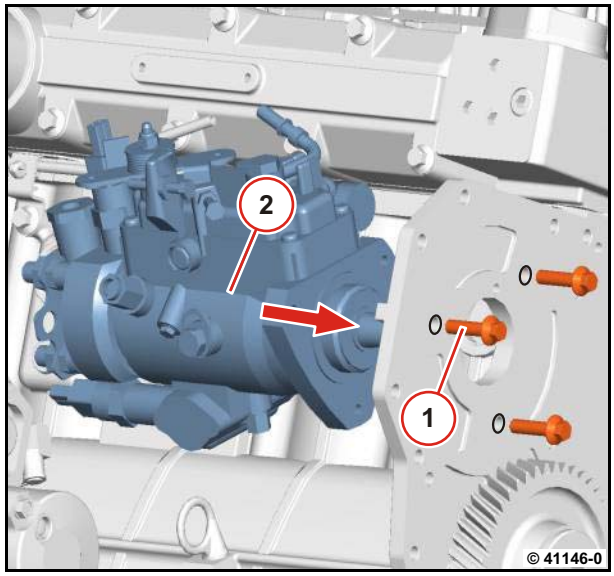


Installing the fuel injector pump

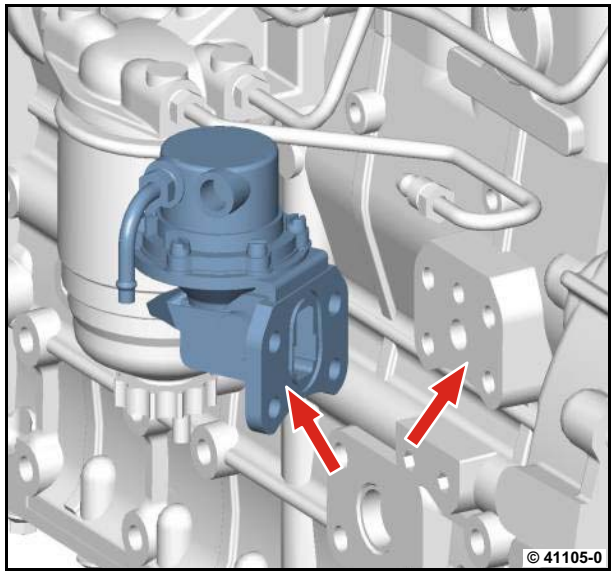
- Mount fuel injector pump (2).
- Tighten screws (1).

21 Nm

Attention!
The blocking screw may not be loosened.



- Clean sealing surfaces.



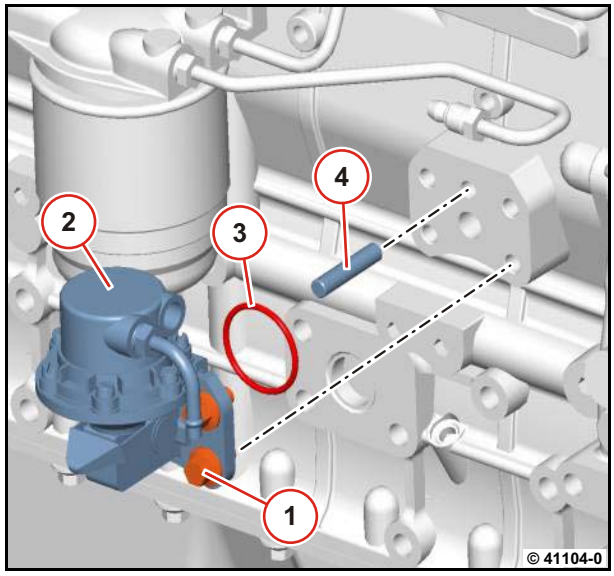
Installing the fuel supply pump

- Push in pump plunger (4).
- Turn crankshaft.

The pump plunger must touch the base circle of the camshaft.

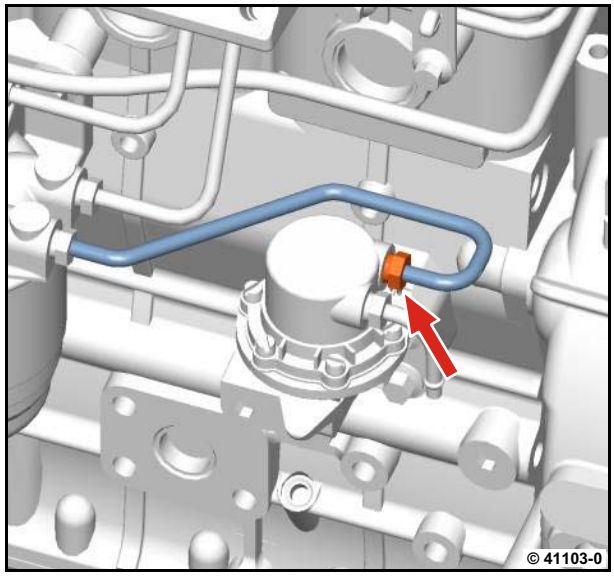
- Mount new O-ring (3).
- Mount fuel supply pump (2).
- Tighten screws (1).
- Tighten screws (1).

27 Nm



- Mount fuel pipe.
- Tighten screw.

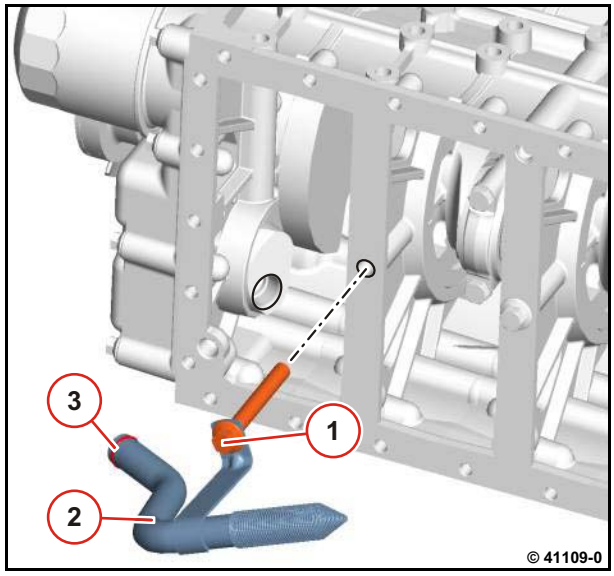
15 Nm



Installing the oil suction pipe.

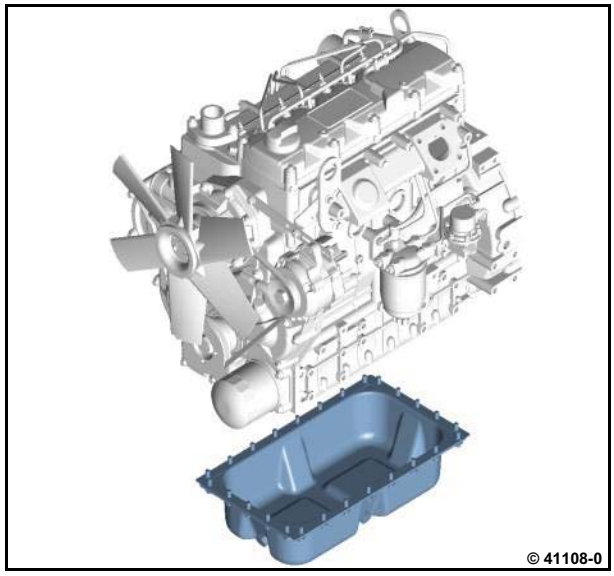
- Insert new O-ring (3).
- Lightly oil O-ring (3).
- Mount oil suction pipe (2).
- Tighten screw (1).

41 Nm



- Install lubricating oil pan.

W 08-04-07



Removing and installing the coolant pump

Commercial available tools

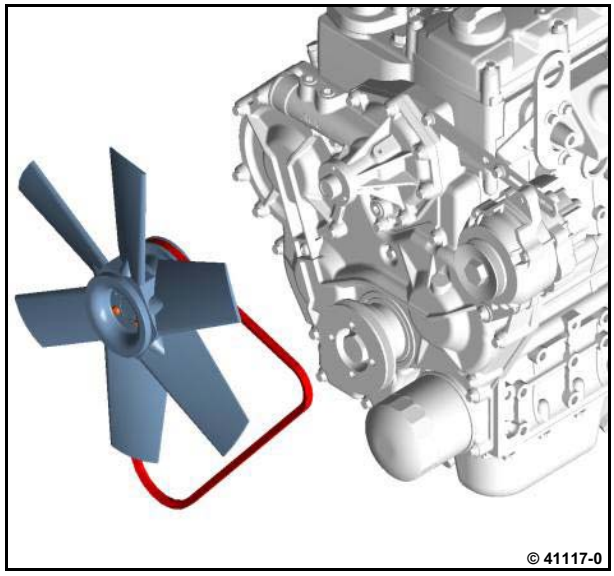
– W 12-02-02

Collect leaking operating substances in suitable vessels and dispose of according to regulations.
The appropriate documentation of the vehicle/equipment manufacturer should be observed for emptying and filling the cooling system.

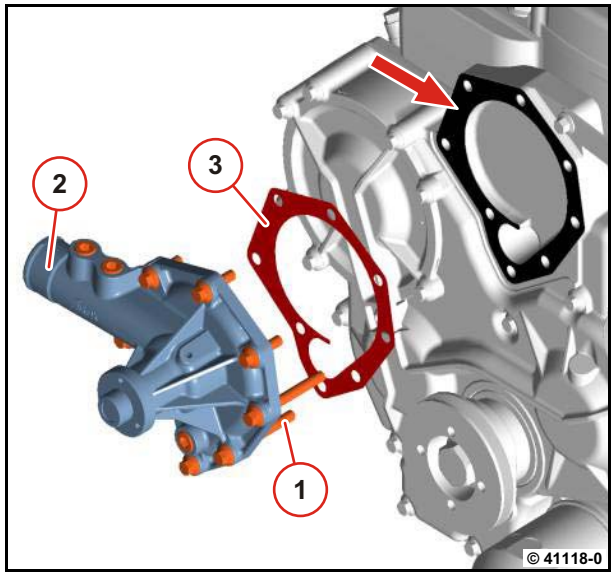
Removing the coolant pump

- Remove fan impeller.
- Remove V-belt pulley.

  W 12-02-02



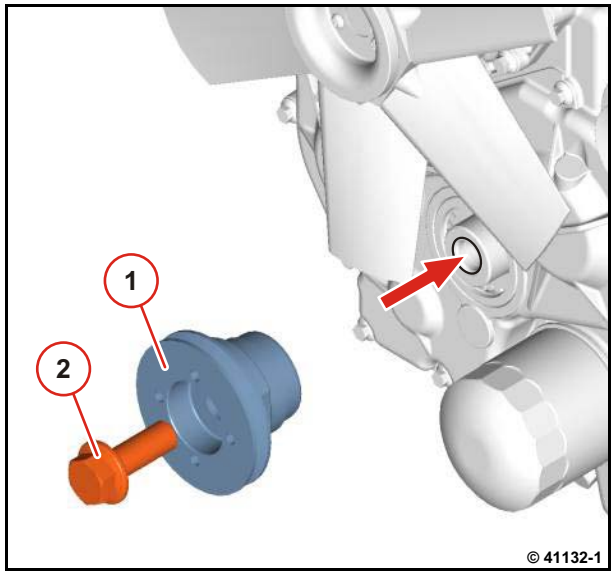
- Unscrew screws (1).
- Remove coolant pump (2).
- Remove gasket (3).
- Clean sealing surfaces.



Installing the V-belt, V-belt pulley

- Mount V-belt pulley (1).
- Tighten screw (2).

  300 Nm



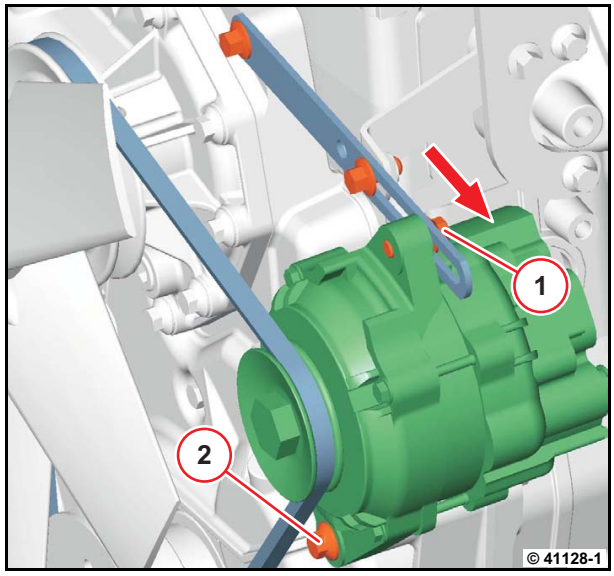
- Fit V-belt.
- Fasten screw (1).
- Press generator in direction of arrow.
- Tighten screw (1).

  21 Nm

- Tighten screw (2).

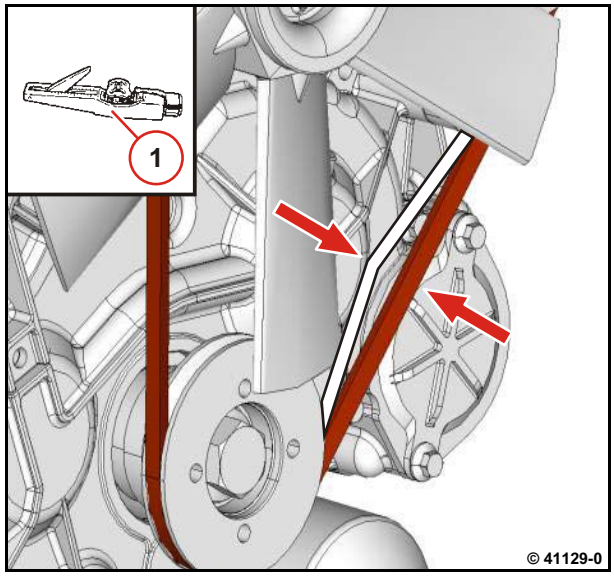
  22 Nm

- Check V-belt tension.



Check V-belt tension with V-belt tension measuring device

- Lower indicator arm (1) into V-belt tension measuring device.
- Mount V-belt tension measuring device on V-belt.

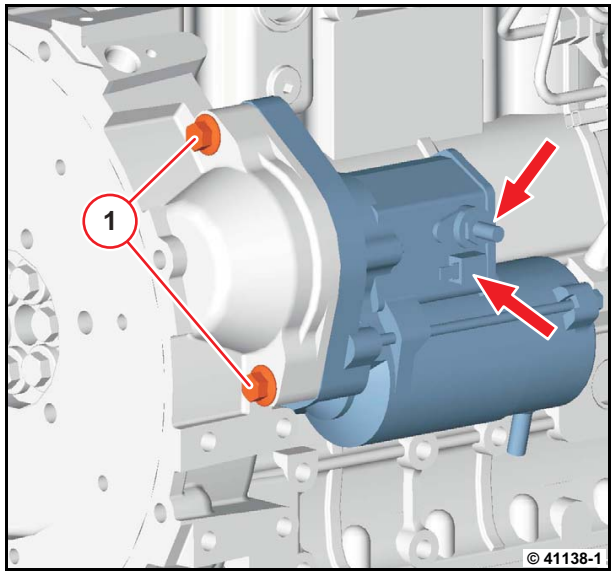


Removing and installing the starter

Commercial available tools

Removing the starter

- Disconnect the battery's negative terminal.
- Disconnect cables.
- Unscrew screws (1).
- Remove starter.
- Visually inspect the component.



Installing the starter

- Insert starter.
- Tighten screws (1).

  41 Nm

- Connect cables.

  A13 071

Note the assignment of the terminal designations.

- Connect the battery's negative terminal.