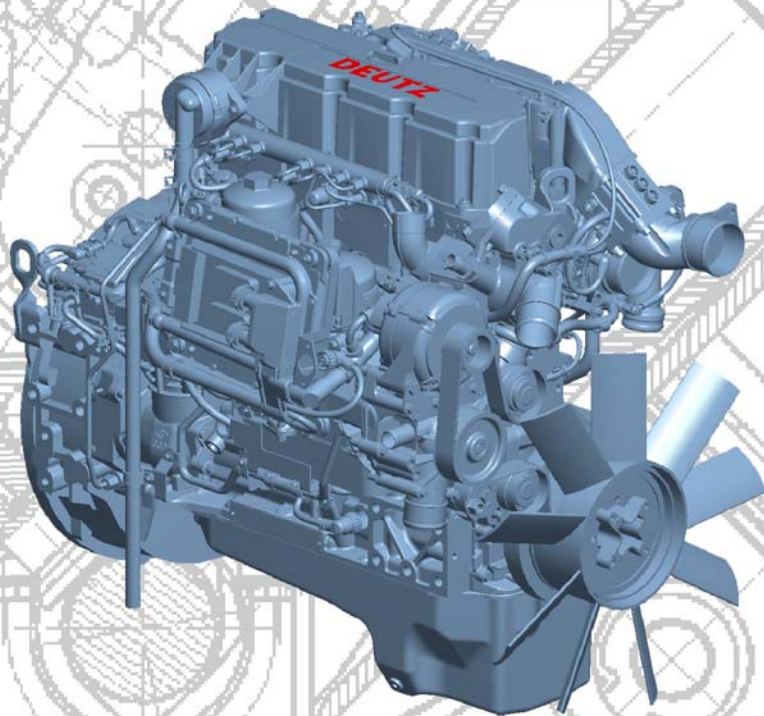




Operation Manual

TCD 2012 L04/06 4V

TCD 2013 L04/06 4V



Notes

- 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.
- Use for the intended purpose also includes observance of the operating, maintenance and repair conditions specified by the manufacturer. The engine should only be operated, serviced and repaired by personnel trained in its use and the hazards involved.

The pertinent rules for the prevention of accidents and other generally recognised safety and industrial medicine rules must be observed.

- When the engine is running there is a danger of injury caused by:
 - rotating and hot components
 - on motors with external ignition (high electrical voltage). Contact must be avoided!
- Unauthorised engine modifications will invalidate any liability claims against the manufacturer for resultant damage.
- Equally, manipulations to the injection and control system can affect the engine's performance and the exhaust characteristics. Adherence to legislation on pollution can no longer be guaranteed under such conditions.
- Do not change the cooling air feed area to the blower of fan. An unobstructed cooling air supply must be guaranteed.

The manufacturer will accept no liability for damage resulting from this.

- When carrying out maintenance work on the en-

gine, the use of DEUTZ original parts is prescribed. These are specially designed for your engine and guarantee perfect operation.

Non-compliance results in the expiry of the warranty!

Maintenance/cleaning work on the engine may only be carried out when the engine is not running and has cooled down.

When doing this, make sure that the electrical system is switched off (remove ignition key).

The specifications for accident prevention with electrical systems (e.g. VDE-0100/-0101/-0104/-0105 Electrical protective measures against dangerous contact voltages) must be observed.

Cover all electrical components tightly when cleaning with liquids.

- Do not work on the fuel system while the engine is running - **Danger to life!**

Wait for the pressure to drop after the engine has come to a standstill (in engines with DEUTZ Common Rail about 5 minutes, otherwise 1 minute) because the system is under high pressure - **Danger to life!**

During the first trial run do not stand in the danger area of the engine.

Danger due to high pressure in case of leaks - **Danger to life!**

- In case of leaks immediately contact workshop.
- When working on the fuel system, make sure that the engine is not started inadvertently during repairs - **Danger to life!**

Dear customer,

Congratulations on the purchase of your DEUTZ engine.

DEUTZ air/liquid-cooled engines are developed for a broad spectrum of applications. Consequently, a wide range of variants is offered to meet the requirements of specific cases.

The engine is equipped accordingly for the particular installation situation, i.e. not all the components described in the operating manual are installed in your engine.

We have endeavoured to highlight any differences so that you will be able to locate the operating and maintenance instructions applicable to your engine more quickly and easily.

Please make sure that this operating manual is available to everyone involved in the operation, maintenance and repair of the engine and that they have understood the contents.

If you have any queries, please contact us, we'll be happy to advise you.

Sincerely,

DEUTZ AG

Engine serial number

Please enter the engine serial number here. This will simplify the handling of customer service, repair and spare parts queries.

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Notes

We reserve the right to make technical changes to the descriptions and data in this operating manual in the interest of further development of the engines.

This document may only be reprinted and reproduced, even in part, with our express permission.

Order number

0312 3536 en

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DEUTZ diesel engines

DEUTZ diesel engines are the product of years of research and development. Profound know-how combined with high quality requirements are the guarantee for the production of engines with a long life, high reliability levels and low fuel consumption. Obviously the high requirements for the protection of the environment are also met.

Safety precautions when the engine is running

Maintenance work or repairs may only be performed on the shut-down engine. Make sure that the engine cannot be started inadvertently - **Danger of accident!**

When the work is complete, be sure to refit any panels and guards that have been removed.

Observe industrial safety regulations when running the engine in an enclosed space or underground.

When working on the running engine, work clothing must be close fitting.

Never fill the fuel tank while the engine is running.

Service and Maintenance

Service and maintenance are also decisive for whether the engine satisfactorily meets the set demands. Recommended service intervals must therefore be observed and service and maintenance work must be carried out conscientiously.

Special care should be taken under abnormally demanding operating conditions.

Original DEUTZ parts

Original DEUTZ parts are subject to the same strict quality demands as the DEUTZ engines. Further de-

velopments for improving the engines are also introduced in the original DEUTZ parts of course. Only the use of original DEUTZ parts manufactured according to the state-of-the-art can guarantee perfect functioning and high reliability.

DEUTZ Xchange components

DEUTZ replacement parts are a low-cost alternative. Of course, the quality standards here are just as high as for new parts. DEUTZ replacement parts are equal to the original DEUTZ parts in function and reliability.

Asbestos

The gaskets used in this engine contain no asbestos. Please use the appropriate spare parts for maintenance and repair work.

Service

We want to preserve the high performance of our engines, and with it the confidence and satisfaction of our customers. We are therefore represented worldwide by a network of service branches.

The DEUTZ name does not merely stand for engines that are the products of extensive development work, DEUTZ also stands for complete service packages that ensure optimum operation of our engines, and for customer services operations that you can count on.

Please contact your service partner 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.

The DEUTZ home page gives you a continuously up-to-date overview of the service partners in your vicin-

ity with notes on product responsibilities and services. Or you can use another fast, convenient way via the Internet under www.deutzshop.de. The DEUTZ P@rts Online parts catalogue gives you a direct contact to your nearest local service partner.

California

Proposition 65 Warning

Diesel engines and some of its constituents are known to the State of California to cause cancer, birth defects and other reproductive harm.

Masthead

DEUTZ AG

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51149 Cologne

Telephone: +49 (221) 822-0

Fax: +49 (221) 822-5850

www.deutz.com

E-mail: info@deutz.com

General

Danger



This symbol is used for all safety instructions which, if not observed, present a direct danger to life and limb for the person involved. Observe these carefully. The attention of operating personnel should be drawn to these safety instructions. Furthermore, the legislation for "general regulations for safety and the prevention of accidents" must be observed.

Caution

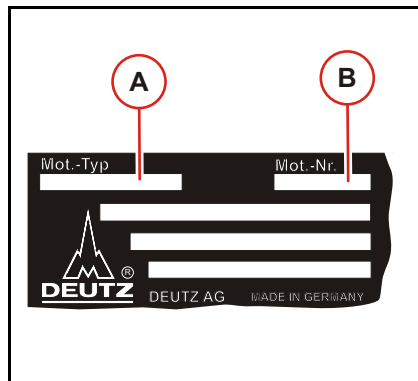


This symbol indicates a danger to the part and engine. The relevant instructions must be observed, failure to do so can lead to destruction of the part and the engine.

Notes



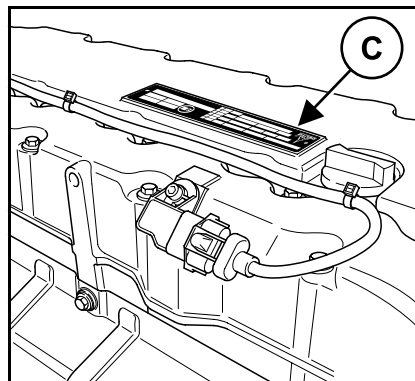
This symbol accompanies notes of a general kind.



Rating plate

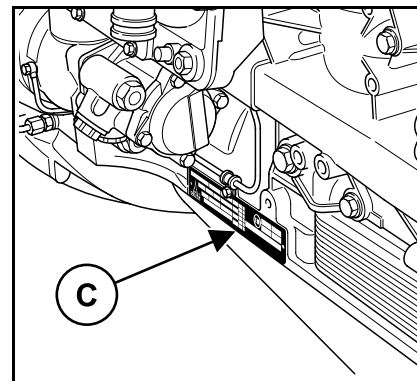
The engine type **A**, engine number **B** and the power data are stamped on the rating plate.

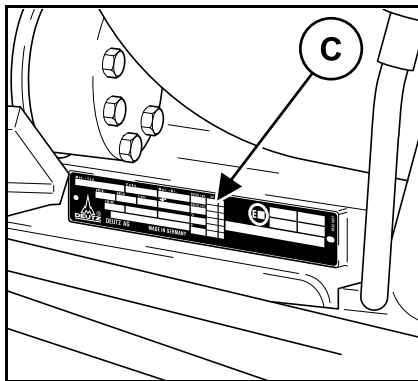
The engine type and number must be stated when purchasing spare parts.



Location of the rating plate

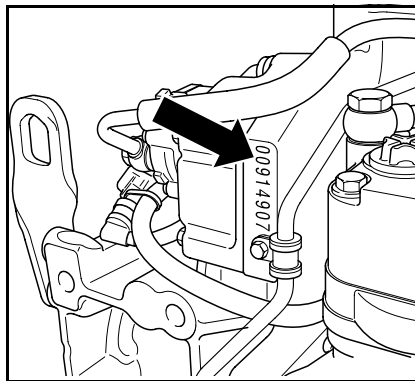
The rating plate **C** is mounted on the cylinder head cover or crankcase.





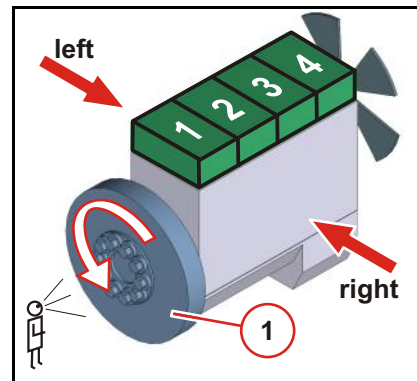
Rating plate

Or the **C** rating plate is fixed sideways on the fly-wheel side



Engine serial number

The engine number is stamped onto the crankcase (arrow) and onto the rating plate.



Cylinder numbering

Cylinder arrangement

The cylinders are counted consecutively starting from flywheel (1).

Direction of rotation

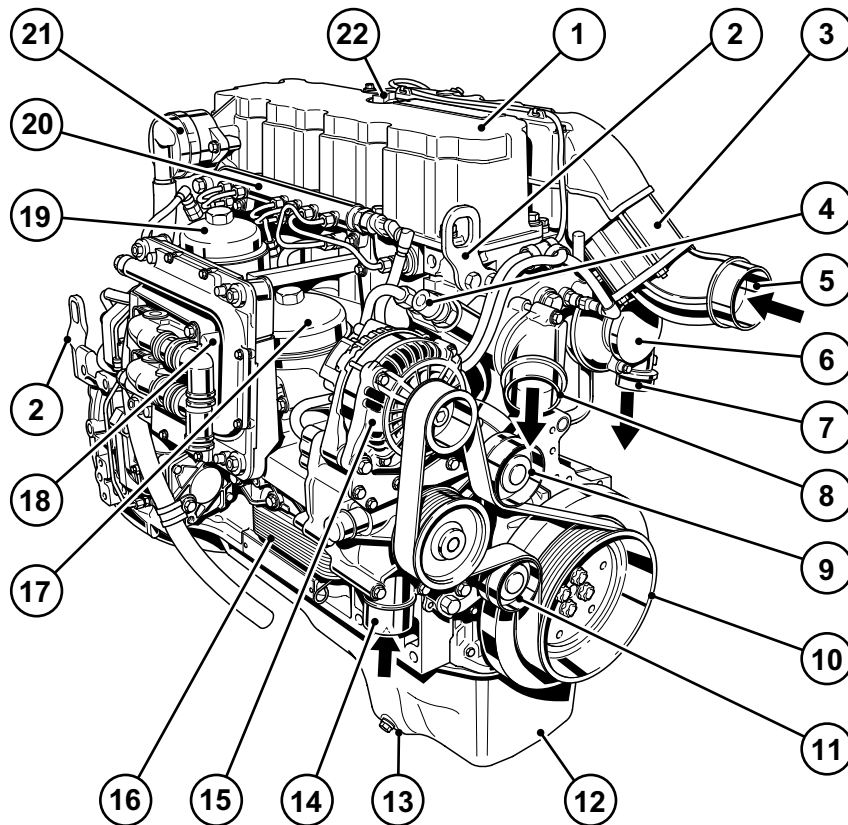
Looking at the power transmission side.
rotating to the left: counter-clockwise.

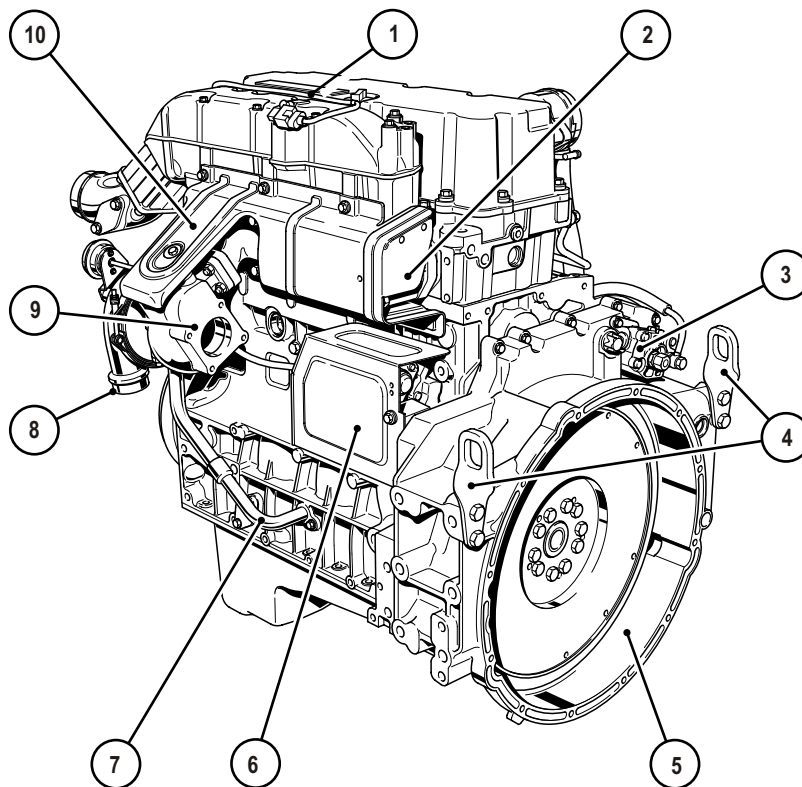
Engine sides

Looking at the power transmission side.

TCD 2013 L04 4V engine, view from right (example)

- 1 Cylinder head cover
- 2 Transport device
- 3 Heating flange
- 4 Cab heater connection
- 5 Combustion air inlet
- 6 Connection from air filter
- 7 Combustion air outlet to the charge air cooler
- 8 Coolant outlet
- 9 Deflection pulley
- 10 Belt pulley on crankshaft
- 11 Tension pulley
- 12 Lubricating oil sump
- 13 Lubricating oil drain plug
- 14 Coolant inlet
- 15 Generator
- 16 Lube oil cooler
- 17 Lubricating oil filter
- 18 Engine control unit
- 19 Fuel filter
- 20 Rail with pressure reducing valve and pressure sensor
- 21 Crankcase ventilation (open system)
- 22 Lubricating oil filling

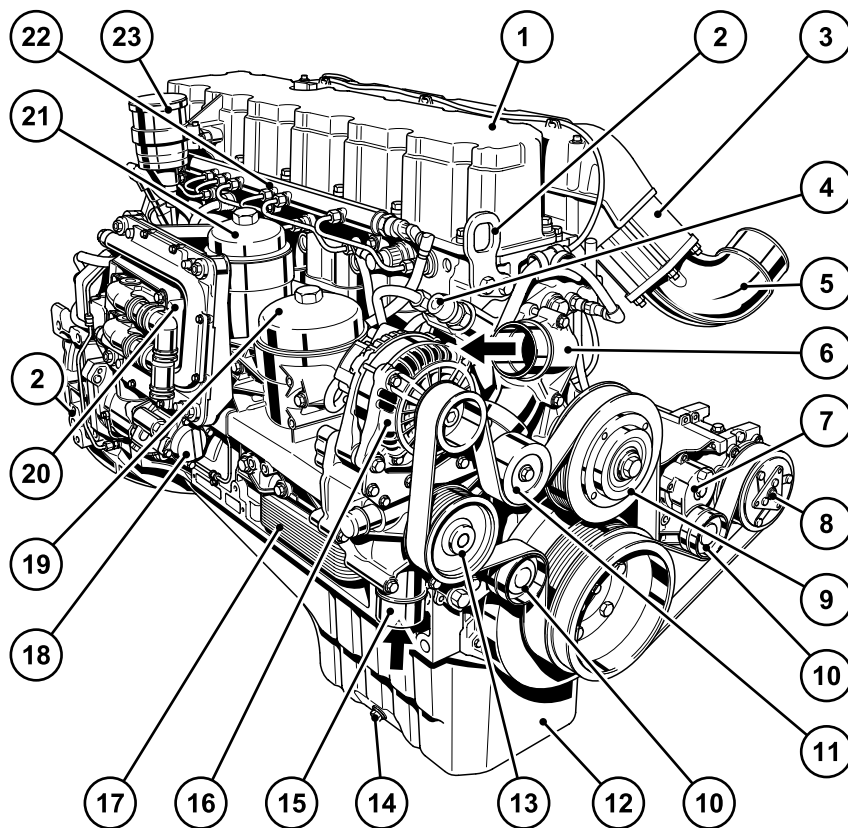




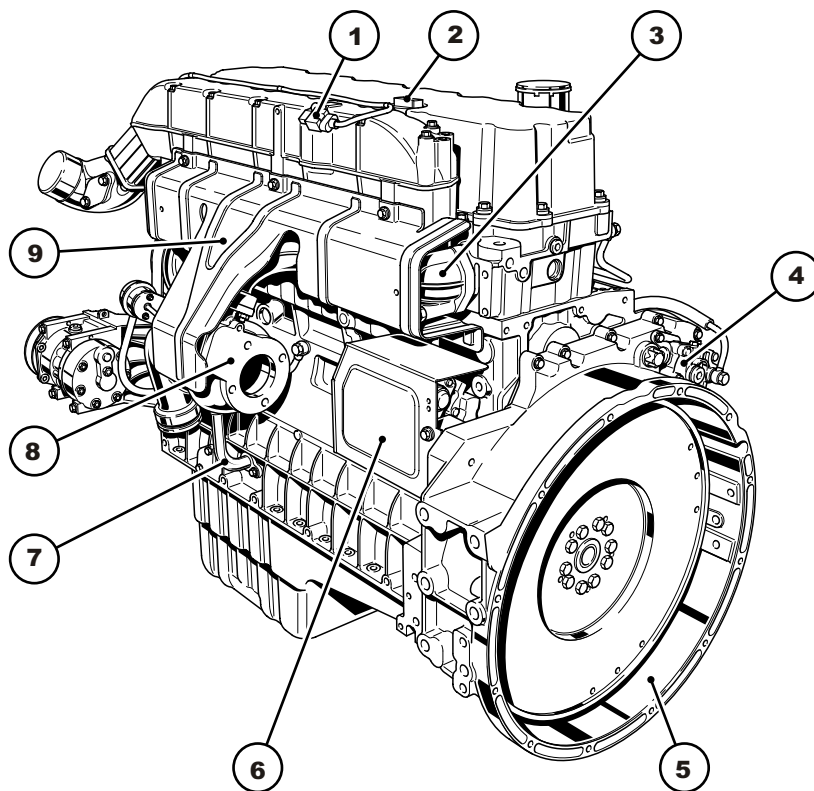
TCD 2013 L04 4V engine, view from left (example)

- 1 Charge air temperature/pressure transmitter
- 2 Exhaust manifold line
- 3 Fuel supply pump
- 4 Transport device
- 5 Gear connection (SAE housing)
- 6 Starter cover
- 7 Lubricating oil return line from the exhaust turbo-charger
- 8 Combustion air outlet to the charge air cooler
- 9 Exhaust gas outlet of the turbocharger
- 10 Shield (thermal protection)

TCD 2013 L06 4V engine, view from right (example)



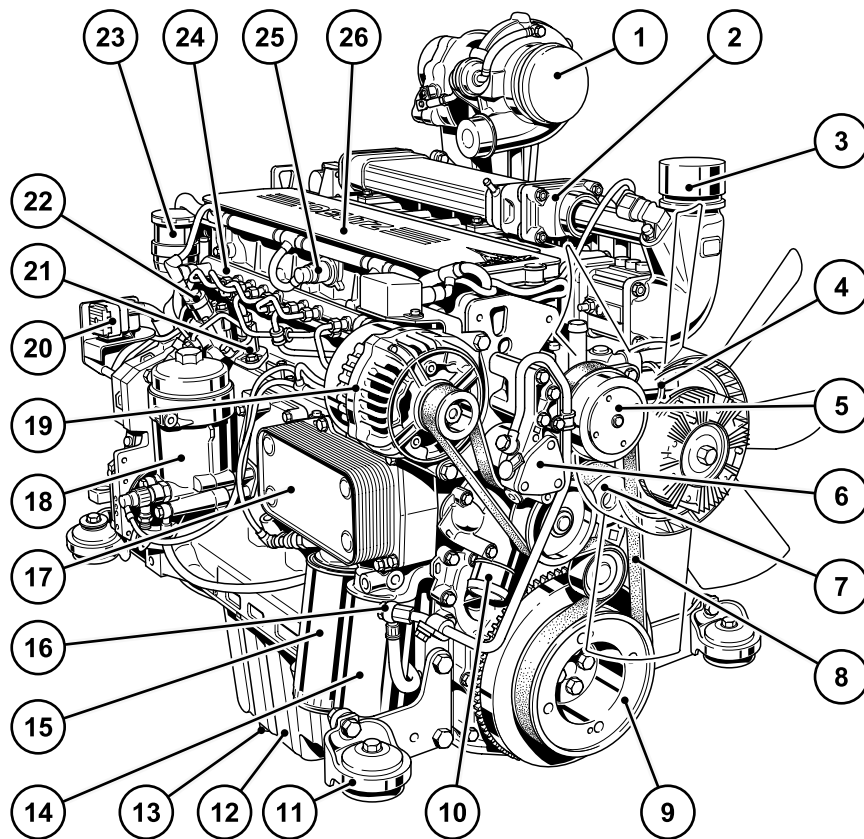
- 1 Cylinder head cover
- 2 Transport device
- 3 Heating flange
- 4 Cab heater connection
- 5 Combustion air inlet
- 6 Coolant outlet
- 7 Tension pulley
- 8 Hydraulic pump or compressor mounting (optional)
- 9 Belt pulley for fan attachment
- 10 Tensioning pulley (s)
- 11 Deflection pulley
- 12 Lubricating oil sump
- 13 Belt pulley for coolant pump
- 14 Lubricating oil drain plug
- 15 Coolant inlet
- 16 Generator
- 17 Lube oil cooler
- 18 Hydraulic pump or compressor installation (optional)
- 19 Lubricating oil filter
- 20 Engine control unit with fuel cooling
- 21 Fuel filter
- 22 Rail with pressure reducing valve and pressure sensor
- 23 Crankcase ventilation valve



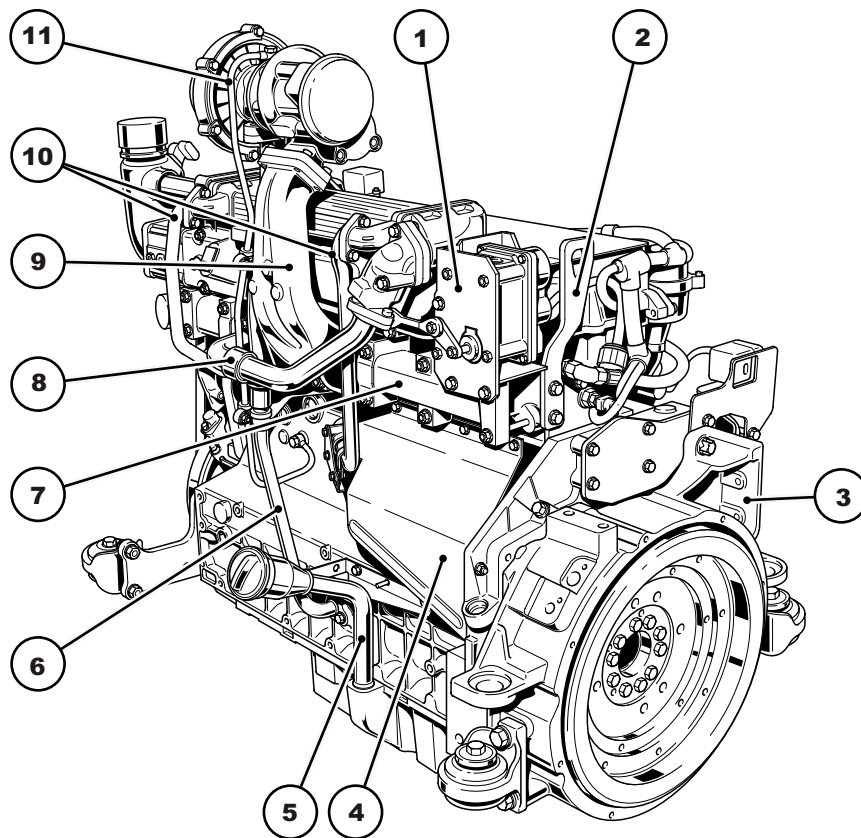
TCD 2013 L06 4V engine, view from left (example)

- 1 Charge air temperature/pressure transmitter
- 2 Lubricating oil filling (optional)
- 3 Exhaust manifold line
- 4 Fuel supply pump
- 5 Gear connection (SAE housing)
- 6 Starter cover
- 7 Lubricating oil return line from the exhaust turbo-charger
- 8 Turbocharger
- 9 Shield (thermal protection)

TCD 2012 L04 4V Agri Power engine, view from right (example)



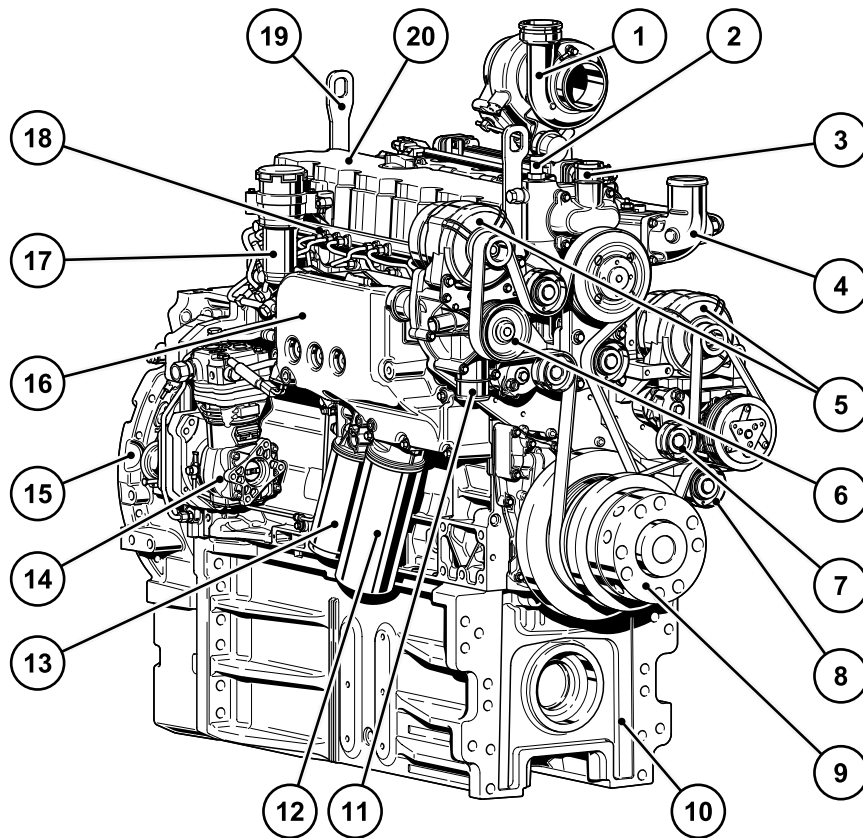
- 1 Turbocharger
- 2 Exhaust gas recirculation system (EGR)
- 3 Combustion air inlet
- 4 Coolant outlet
- 5 Coolant pump
- 6 Fuel supply pump
- 7 Tension pulley
- 8 V-rib belt
- 9 Front power take-off
- 10 Coolant inlet
- 11 Engine mounting
- 12 Lubricating oil sump
- 13 Lubricating oil drain plug
- 14 Exchangeable fuel filter
- 15 Lube oil replacement filter
- 16 Fuel connection from tank
- 17 Lube oil cooler
- 18 Fuel pre-filter
- 19 Generator
- 20 central plug
- 21 Electronic Control Unit (ECU)
- 22 High-pressure pump
- 23 Crankcase ventilation valve
- 24 Deutz common rail with pressure reducing valve
- 25 Connection injectors
- 26 Cylinder head cover



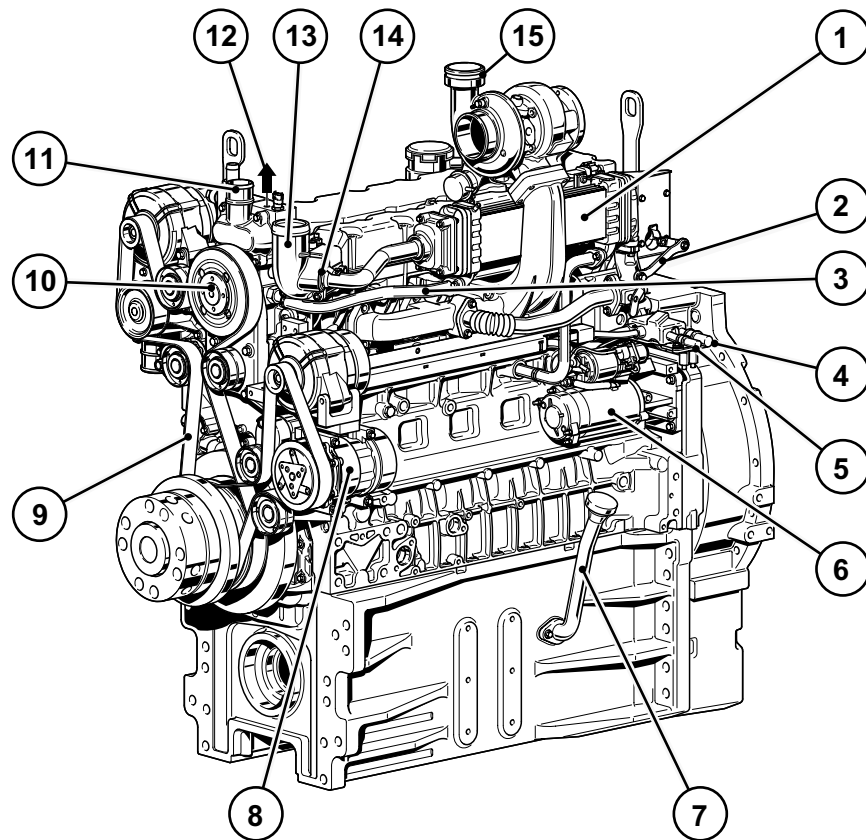
TCD 2012 L04 4V Agri Power engine, view from left (example)

- 1 Throttle lever for exhaust gas recirculation (EGR)
- 2 Transport device
- 3 Gear connection (SAE housing)
- 4 Starter cover
- 5 Lubricating oil filling (optional)
- 6 Lubricating oil return line from the exhaust turbo-charger
- 7 Exhaust manifold line
- 8 EGR line to the cooler
- 9 Exhaust manifold
- 10 Cooling line for the exhaust gas recirculation system
- 11 Lubricating oil pressure line to the turbocharger

TCD 2013 L06 4V Agri Power engine, view from right (example)



- 1 Turbocharger
- 2 Coolant supply flow to the cab heating
- 3 Coolant outlet
- 4 Combustion air inlet
- 5 Generator
- 6 Coolant pump
- 7 Tension pulley
- 8 Deflection pulley
- 9 Front power take-off
- 10 Lubricating oil sump
- 11 Coolant inlet
- 12 Lube oil replacement filter
- 13 Exchangeable fuel filter
- 14 Compressor (optional)
- 15 Gear connection (SAE housing)
- 16 Lube oil cooler
- 17 Crankcase ventilation valve
- 18 Deutz common rail with pressure reducing valve
- 19 Transport device
- 20 Cylinder head cover

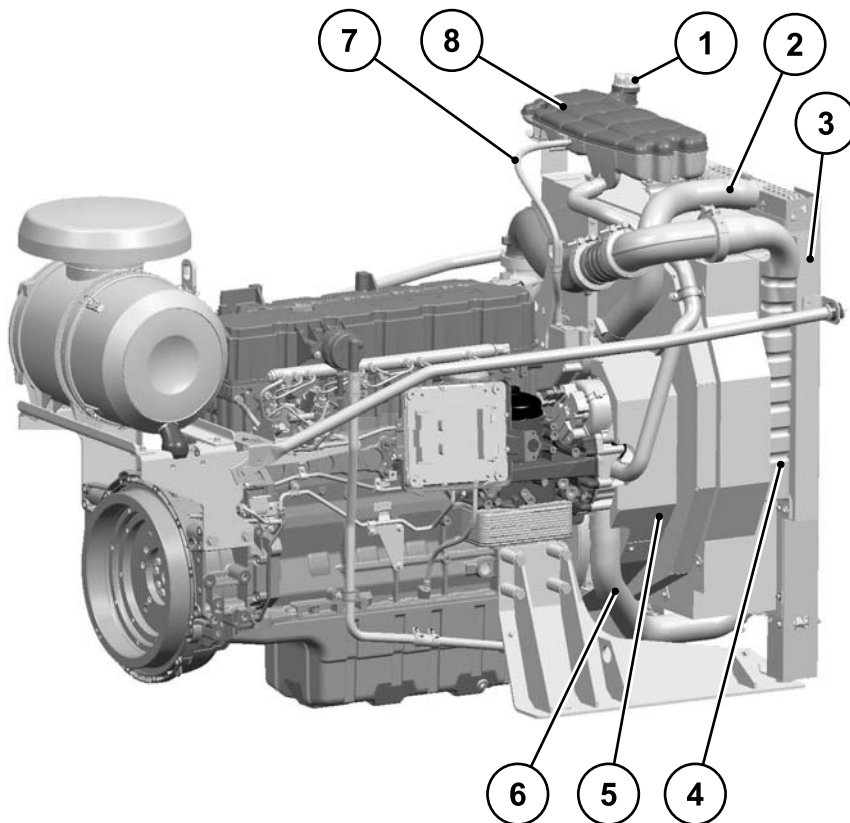


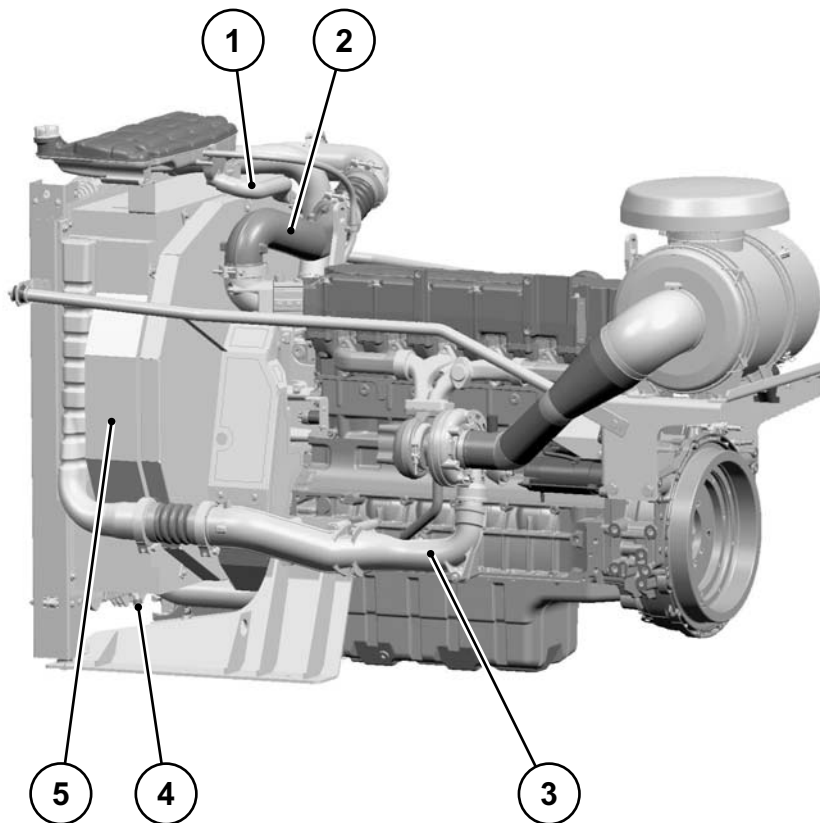
TCD 2013 L06 4V Agri Power engine, view from left (example)

- 1 Exhaust gas recirculation system (EGR)
- 2 Throttle lever for exhaust gas recirculation
- 3 Cooling line for the exhaust gas recirculation system
- 4 Fuel connection from tank
- 5 Fuel connection to the tank
- 6 Starter
- 7 Lubricating oil filling (optional)
- 8 Air conditioning compressor
- 9 V-rib belt
- 10 Coolant pump
- 11 Coolant outlet
- 12 Ventilation line to the cooler
- 13 Combustion air inlet
- 14 Exhaust gas recirculation from the EGR cooler
- 15 Combustion air outlet to the charge air cooler

TCD 2013 L06 4V Genset engine, view from right (example)

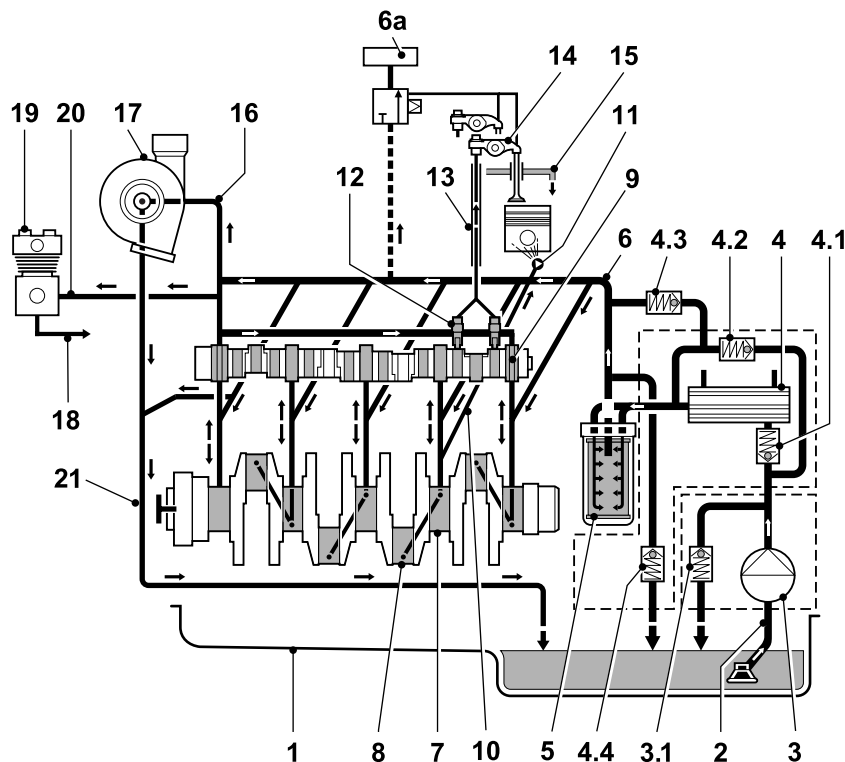
- 1 Cap of the compensation tank
- 2 Coolant supply from the thermostat to the heat exchanger
- 3 Heat exchanger
- 4 Charge air cooler
- 5 Fan cover
- 6 Line from the heat exchanger to the coolant pump
- 7 Ventilation line from the thermostat housing to the compensation tank
- 8 Compensation tank





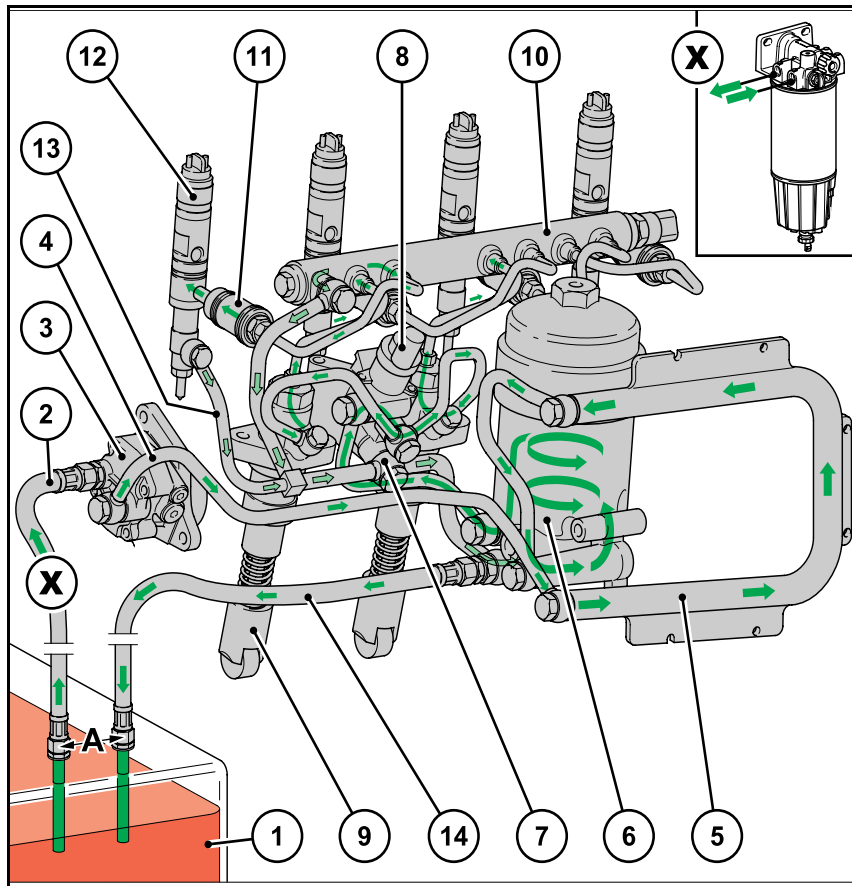
TCD 2013 L06 4V Genset engine, view from left (example)

- 1 Line between the compensation tank and the coolant pump
- 2 Charge air line from charge air cooler
- 3 Charge air line from the turbocharger to the charge air cooler
- 4 Coolant drain plug
- 5 Fan cowl



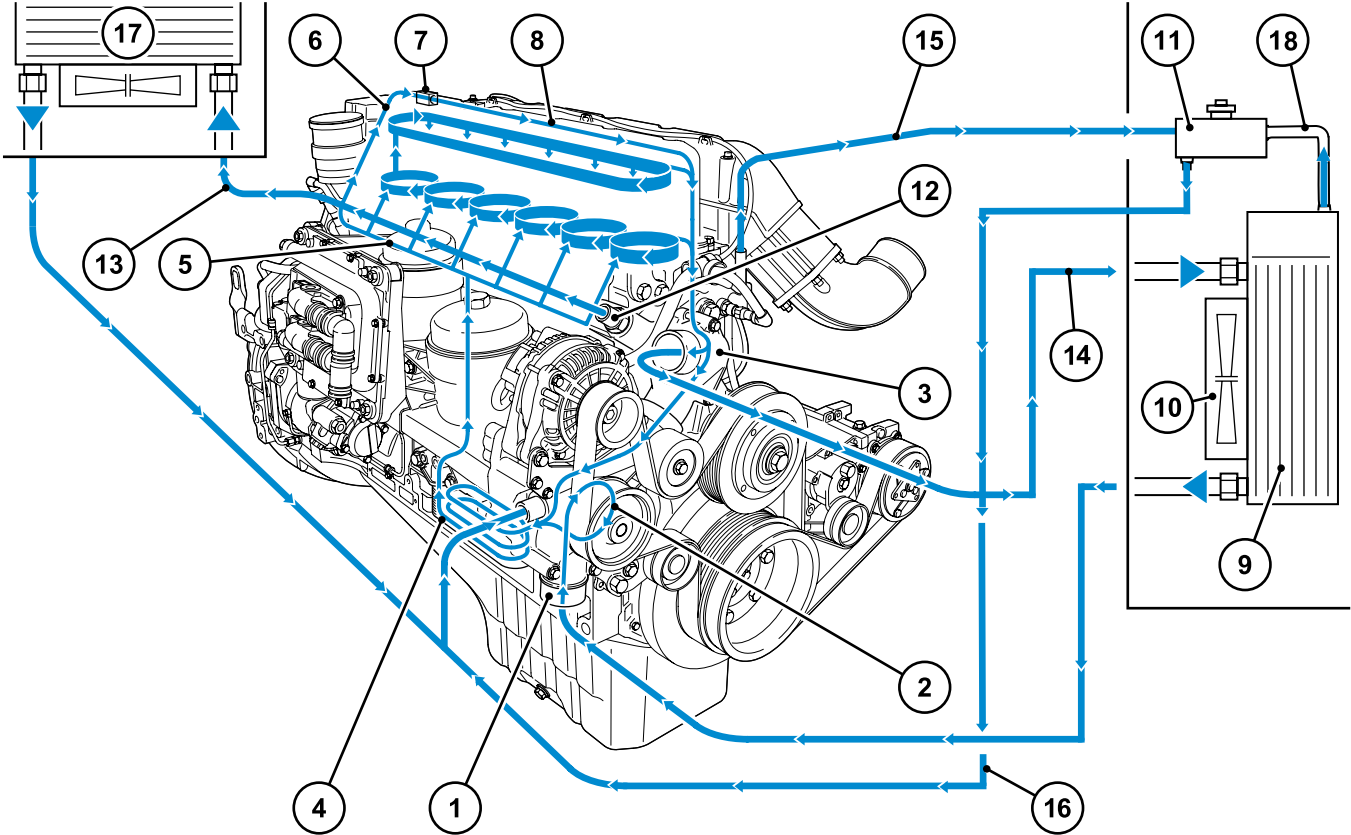
Lubricating oil schematic (example)

- 1 Lubricating oil sump
- 2 Lubricating oil suction intake pipe
- 3 Lubricating oil pump
 - 3.1 Overpressure valve
- 4 Lube oil cooler
 - 4.1 Return flow shutoff valve (only for 2012)
 - 4.2 Bypass valve
 - 4.3 Bypass valve for lubricating oil filter
 - 4.4 Pressure control valve
- 5 Lube oil replacement filter
- 6 Main lubricating oil lines
 - 6a Internal connected exhaust gas recirculation
- 7 Crankshaft bearing
- 8 Big-end bearing
- 9 Camshaft bearing
- 10 Line to injector nozzle
- 11 Piston cooling nozzle with pressure holding valve
- 12 Tappet with impulse lubrication of the rocker arm
- 13 Tappet rod, lubricating oil feed to the rocker arm lubrication
- 14 Rocker arm
- 15 Return line to the lubricating oil pan
- 16 Lubricating oil pipe to the turbocharger
- 17 Turbocharger
- 18 Return line from the compressor/hydraulic pump to the crankcase
- 19 Air compressor or hydraulic pump
- 20 Lubricating oil line to the crankshaft and camshaft, compressor/hydraulic pump
- 21 Return line from the turbocharger



Fuel schematic (example)

- 1 Fuel container
- X= The fuel must be pre-filtered in the fuel line to the fuel supply pump.
- 2 Line to the fuel supply pump
- 3 Fuel supply pump
- 4 Line to the fuel filter
- 5 Fuel cooling for the Engine Control Unit ECU (without cooler, top-right in the image)
- 6 Fuel filter
- 7 Return line
- 8 FCU Control Unit
- 9 Tappet rollers on camshaft
- 10 DCR rail
- 11 Injection line to injection valve
- 12 Injector
- 13 Fuel oil leakage line
- 14 Fuel return to fuel tank

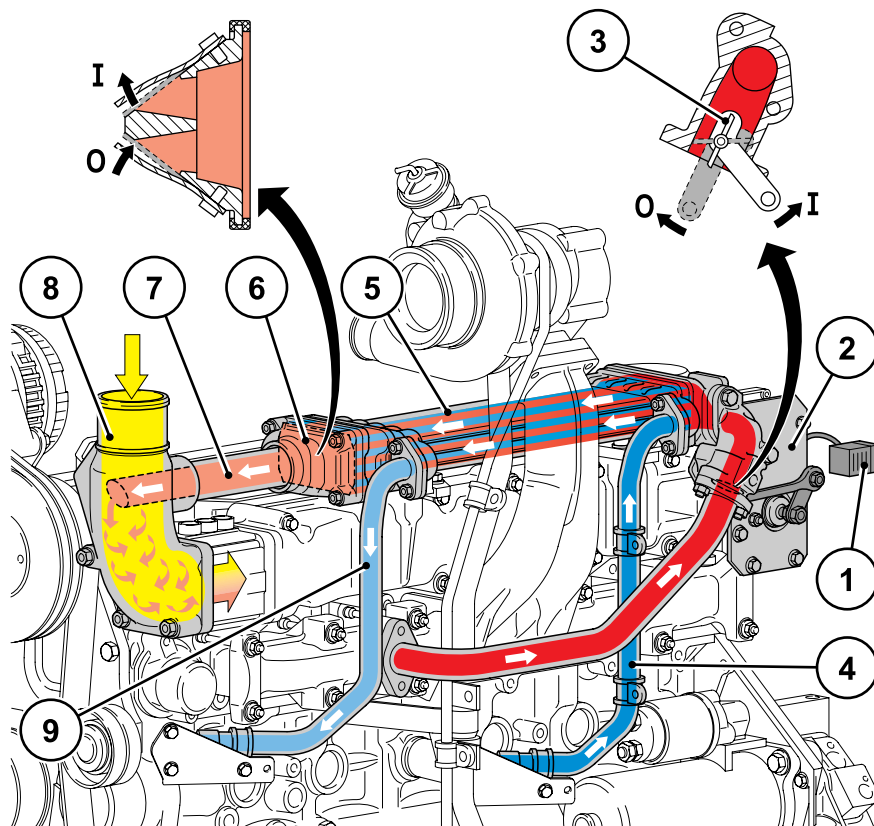


Coolant schematic (example)

- 1 Coolant inlet to engine
- 2 Coolant pump
- 3 Thermostat
- 4 Lube oil cooler
- 5 Cylinder pipe/head cooling
- 6 Coolant supply for EGR cooling, ( 23)(optional)
- 7 Engine brake cooling (optional)
- 8 Return line to the thermostat (optional)
- 9 Heat exchanger (by customer)
- 10 Fan (by customer)
- 11 Compensation tank
- 12 Cab heater connection
- 13 Coolant supply flow to the cab heating
- 14 Engine outlet to the cooler
- 15 Engine ventilation to compensation tank
- 16 Compensation line from the compensation tank to the coolant pump
- 17 Cab heating (optional)
- 18 Cooler breather

Exhaust gas recirculation (example)

- 1 EGR actuator plug
- 2 EGR actuator
- 3 Throttle valve (check valve)
- 4 Coolant line to the EGR cooler
- 5 EGR cooler
- 6 Flapper valve
- 7 Exhaust gas outlet from the cooler
- 8 Fresh air intake elbow
- 9 Coolant return line of the cooler



Information about the engine electronics

This engine is equipped with an electronic DEUTZ control unit.

The equipping of the respective system depends on the desired scope of function and the planned type of engine application.

The resultant wiring with pin assignment can be seen in the appropriate wiring diagram.

The installation regulations of the DEUTZ AG must also be taken into account.

Precautions



The connections of the control units are only dust and water proof when the mating plugs are plugged (protection class IP69K)! The control units must be protected against spray water and moisture until plugging in the mating plugs!

Reverse polarity can lead to failure of the control unit.

To avoid damaging the control units, all the connections on the control unit must be disconnected before electric welding work. Interventions in the electrical system contrary to the DEUTZ regulations or by unqualified personnel can permanently damage the engine electronics and have serious consequences which are not covered by the manufacturer's guarantee.



It is strictly prohibited:

- a) to make changes or connections to the wiring of the electrical control devices and the data transmission cable (CAN lines).
 - b) to switch control units.
- Diagnostic and maintenance work may only be carried out by authorised personnel using equipment approved by DEUTZ.

Installation instructions

The control units are calibrated to the respective engine and identified by the engine number. Every engine may only be operated with the appropriate control unit.

Setpoint transmitters (pedal value transmitters) necessary for vehicle operation must be connected to the vehicle side cable harness and calibrated with the DEUTZ diagnostic program SERDIA (SERVICE DIAGNOSIS). Wiring and cable assignment of the vehicle side cable harness must be taken from the connection diagram of the DEUTZ installation consulting.

Supply voltage

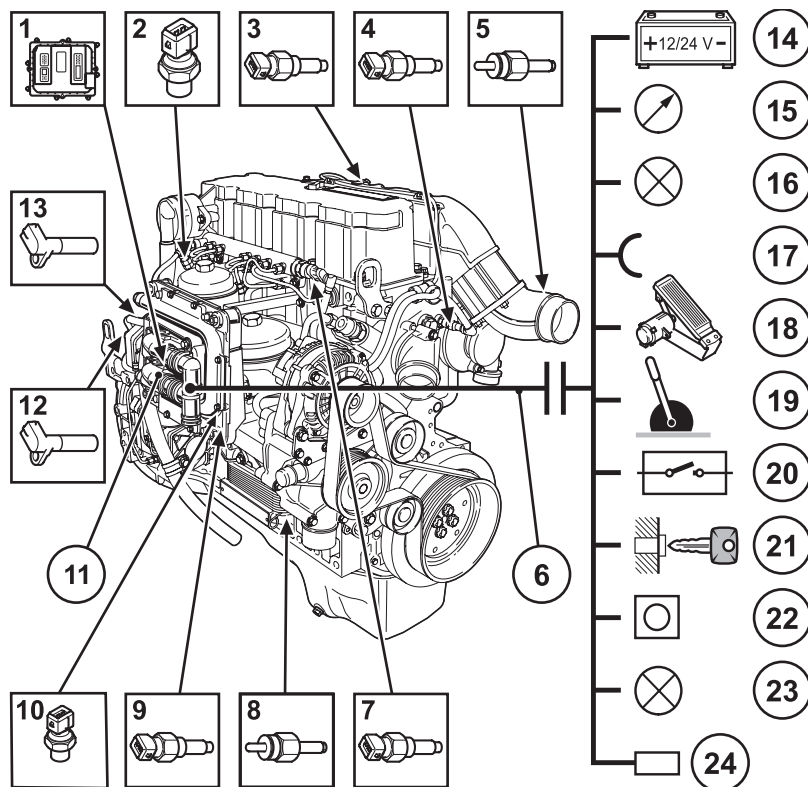
DEUTZ diesel engines must be operated with a 12 V or 24 V supply. An adequate charging condition of the battery must be ensured. Interruption of the power supply when the engine is running can lead to damage to the electrics/electronics. Failure of the supply voltage leads to engine standstill.

Voltages above 32 Volt will destroy the control unit.

Diagnostics

DEUTZ control units are equipped with self-diagnosis. Active and passive error entries are saved in the error memory. Active errors are displayed by error lamp/diagnostic lamp (🔦 65). The active errors can be called by blink codes or by the DEUTZ diagnostic program SERDIA. Passive errors must be deleted by SERDIA.

- with error lamp (optional).
- via diagnostic socket (SERDIA).



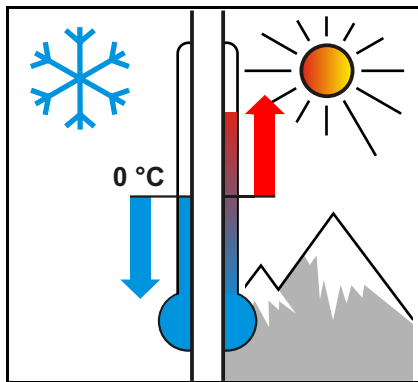
Electrical cable connections for monitoring (example)

Engine side

- 1 Control unit example EMR3, E.M.S II
- 2 Fuel pressure
- 3 Charge air pressure/temperature transmitter
- 4 Coolant temperature
- 5 Cold start aid
- 6 Cable harness for rail pressure sensor
- 7 Lubricating oil level transmitter (optional)
- 8 Lubricating oil level transmitter in the lubricating oil pan
- 9 Lubricating oil pressure sensor
- 10 Lubricating oil pressure transmitter
- 11 Control unit plug
- 12 Pick-up on SAE housing
- 13 Speed transmitter via camshaft

Equipment side

- 14 Power supply (battery)
- 15 Multifunction displays
- 16 Outputs (configurable, e.g. for lamps, torque (PWM), speed, engine running signal, etc.)
- 17 Inputs (configurable)
- 18 Accelerator
- 19 Hand throttle (optional)
- 20 Switch functions (optional, e.g. for P-factor, regulator type, peak curves, fixed speeds etc. also multi-step switches)
- 21 Detachable key switch Start/Stop
- 22 Diagnostic button
- 23 Error lamp with blink code
- 24 Diagnostic interface/CAN bus



Low ambient temperatures

Lubricating oil

- Select lubricating oil according to ambient temperature
- If cold starting occurs frequently cut the lube oil changing interval by half.

Fuel

- Use winter fuel below 0 °C (▮36).

Battery

- A good charging condition of the battery (▮60) is the prerequisite for starting the engine.
- Heating up the battery to approx. 20°C improves the starting behaviour of the engine. (Remove and store the battery in a warm room).

Cold start aid

- Depending on the type of engine, glow plugs, heating plugs, heating flange, flame glow system can be used as cold starting aids.(▮29)

Coolant

- Mixing ratio anti-freeze/cooling water.

High ambient temperatures, high altitude



Under the operating conditions listed below, the amount of fuel is reduced automatically, controlled by the electronic control unit.

Under the following application and operating conditions, the amount of fuel must be reduced.

- above 1000 m altitude
- above 30 °C ambient temperature

Reason: Air density decreases as altitude or ambient temperature increase. This reduces the amount of oxygen in the engine intake air and the fuel-air mixture would be too rich if the injected amount of fuel were not reduced.

- The results would be:
 - black smoke in the exhaust
 - high engine temperature
 - reduction in engine performance
 - possible impairment of starting behaviour

Consult your equipment supplier or DEUTZ partner if you have any other questions.

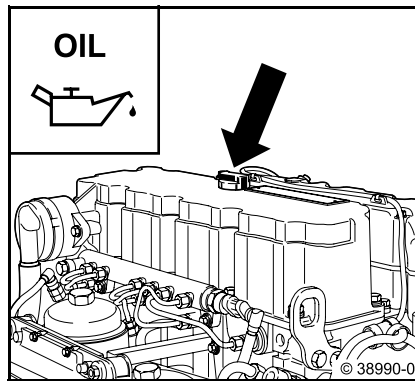
Preparations for initial commissioning

(Maintenance schedule E 10)

- Remove engine corrosion protection
- Remove any transport devices.
- Check the battery and cable connections and mount if necessary.
- Check belt tension (▮ 53).
- Have the engine monitor or warning system checked by authorised personnel.
- Check the engine mounting.
- Check that all hose unions and clips fit properly.

The following additional work must be carried out on generally overhauled engines:

- Check the fuel pre-filter and main filter and change if necessary.
- Check the intake air cleaner (if available, maintain according to maintenance indicator).
- Fill with engine lube oil.



Fill with engine lube oil

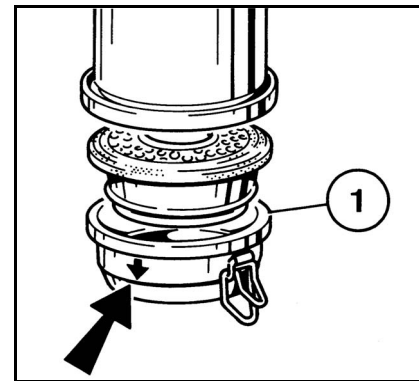


Low lubricating oil level and overfilling lead to engine damage.



The engines are generally supplied without lubricating oil filling. Select lubricating oil quality and viscosity before filling. Order DEUTZ lubricating oils from your DEUTZ partner

- Fill the engine with lubricating oil via the lubricating oil filler neck.
- Observe the lubricating oil filling level (▮ 70).
- Check lubricating oil level, if necessary top up.

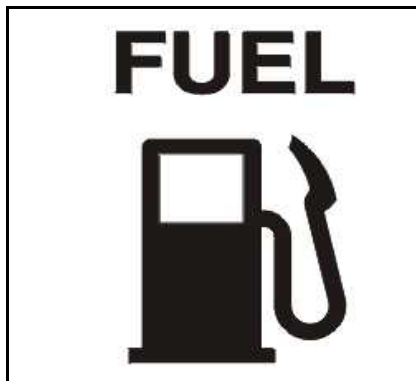


Fill oil-bath air filter with lubricating oil



No lubricating oil may be filled in the cyclone pre-separator that may be connected upstream.

- Fill lubricating oil pan (1) of the oil-bath filter with lubricating oil as far as the marking arrow.



Pour in fuel

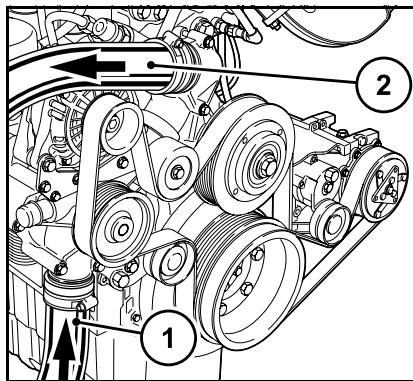


Only re-fuel when the engine is not running. Ensure cleanliness. Do not spill fuel. Additional venting of the fuel system by a 5 minute trial run at idle speed or on low load is absolutely essential.

- The fuel low pressure system must be vented before the first start-up after filling with the manually supply pump.

Only use clean commercially available brand diesel fuel. Observe fuel quality (▮ 36).

Use summer or winter-grade fuel, depending on the ambient temperature.



Filling the coolant system



The coolant must have a prescribed concentration of cooling system corrosion protection agent. Never operate the engine without coolant, even for a short time!



Order coolant corrosion protection agent from your DEUTZ partner.

- Connect coolant outlet (2) and coolant inlet (1) to the cooling system. Connect the feed line of the compensation tank to the coolant pump or to the coolant inlet line (2).
- Connect ventilation line from the engine and, if necessary, from the cooler to the compensation tank.
- Fill cooling system via the compensation tank.
- Close compensation tank with valve.

- Start the engine and run up until the thermostat opens (line (2) heats up).
- Engine operation with open thermostat 2 - 3 minutes.
- Check the coolant level in the compensation tank and top up coolant if necessary.
- If required, repeat procedure with engine start.
- Fill up coolant to the MAX mark on the compensation tank and close the cooling system cap.
- Switch on any available heating and set to the highest level so that the heating circuit is filled and vented.
- Observe the filling volume of the cooling system (▮ 70).
- If required, repeat procedure with engine start.

Trial run



Venting of the fuel system by operating for 5 minutes on no load or with low load is absolutely essential.

Carry out a brief trial run up to operating temperature (approx. 90 °C) after preparations.

Do not load the engine if possible.

- Work with the engine not running:
 - Check engine for tightness.
 - Check the lubricating oil level and top up lubricating oil if necessary.
 - Check the coolant level and top up coolant if necessary.
- Work during the trial run:
 - Check engine for tightness.

Starting



Before starting, make sure that nobody is standing in the immediate vicinity of the engine or work machine.

After repair work: Check that all guards have been replaced and that all tools have been removed from the engine.

When starting with the flame glow plug/ glow plug/heating flange system do not use any other starting aid (e.g. injection with start pilot). Risk of accident!

If the engine does not start properly when the heating flange is automatically actuated (starter does not receive current as a result of a fault in the equipment/customer electrical control system) the starting procedure must be abandoned (set the ignition switch to OFF, disconnect the power supply to the heating flange).

- Engine is controlled electronically, e.g. delivered with electronic engine control EMR3 and the necessary function configurations.
 - Separate engine from driven devices by disconnecting if possible.
 - Do not run up the engine immediately to high idling speed / full load operation from cold.
 - If the starter is connected to the EMR3 by a relay,
 - the maximum starting time is limited by the EMR3.
 - The pause between two start attempts is pre-set by the EMR3.
- If the touch start function is programmed, a short start command with the ignition key in position 2 or a start button, if available, suffices.

- The start is then continued automatically by the EMR3.
- The EMR3 can be programmed for special applications by data record so that the control unit can also carry out further start attempts automatically if the engine fails to start.



If the engine does not start and the error lamp blinks, the EMR3 system has activated the start lock to protect the engine.

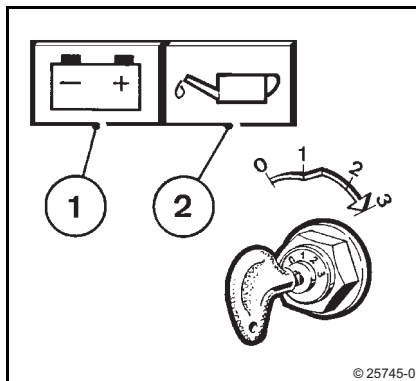
The start lock is released by switching off the system with the ignition key for about 30 seconds.

Separate the engine if possible by disengaging driven units.

Do not actuate the starter for more than 20 seconds. If the engine does not start up, wait for one minute and then repeat the starting process.

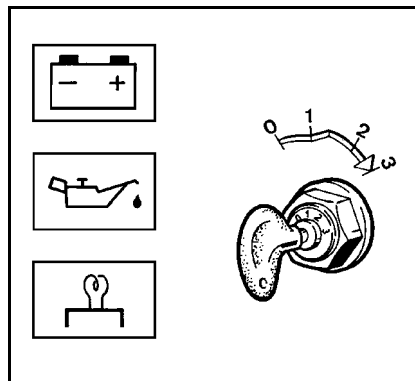
If the engine does not start up after two attempts, determine the cause as per fault table (62).

Do not run up the engine immediately to high idling speed / full load operation from cold.



Without cold start aid

- Insert key.
- Turn key to the right.
 - Position 1 = operating voltage.
 - Pilot lamps (1) and (2) light up.
- Push the key in and turn further clockwise against spring pressure.
 - Level 2 = no function.
 - Level 3 = start.
- release the key as soon as the engine starts up.
 - The pilot lamps will go out.



Glow plugs/heating flange with cold start aid

- Insert key.
 - Position 0 = no operating voltage.
- Turn key to the right.
 - Position 1 = operating voltage.
 - Pilot lamps (1), (2) and (3) light up.
 - Preheat until the glow display goes out; an error has occurred if the preheating indicator flashes; e.g. the preheating relay is stuck, which can discharge the battery completely when at a standstill.
 - Engine is ready for operation.
- Push the key in and turn further clockwise against spring pressure.
 - Level 2 = start.
- release the key as soon as the engine starts up.
 - The pilot lamps will go out.

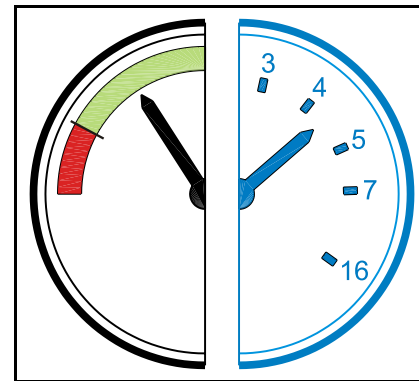
Operation monitoring by EMR3

The EMR3 system monitors the engine condition and itself.

The statuses are displayed by the error lamp.

- Lamp test:
 - The error lamp lights up for approx. 2 s after switching on the ignition (ignition lock stage 1)
- Steady light:
 - There is a system error or an engine variable (temperature, pressure etc.) is in the warning range.
The EMR3 can reduced the engine performance depending on the error to protect the engine.
- Fast flashing:
 - Attention, the engine is in danger and must be switched off.
 - The control unit switches the engine off automatically depending on the application.
 - The control unit can preset a forced engine operation with low idling speed to cool down the engine before switching off, automatic switch-off if necessary.
 - There may be a start lock after engine stop.
 - The start lock is released by switching off the system with the ignition key for about 30 seconds.
 - Additional control lamps, e.g. for lubricating oil pressure or lubricating oil temperature, are switched on if necessary.

- The power reduction can be bypassed, the automatic switch-off delayed or a start lock bypassed with the override key on the instrument panel to avoid critical situations. This brief deactivation of the engine protection functions is logged in the control unit.



Display instrument

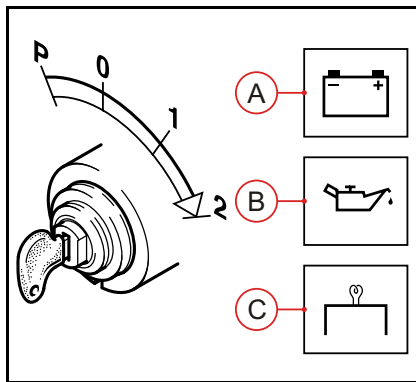
Possible displays:

- Colour scale
 - Display of the operating state by coloured arrows (green = OK/red = take suitable action).
- Measured value scale
 - Actual value can be read off directly. The nominal value should be taken from the Technical Data (72).

Instruments and symbols

Instruments/symbols	Designation	Possible display:	Measure
	Lubricating oil pressure display	Lubricating oil pressure below minimum	Switch off engine
	Lubricating oil pressure display	Lubricating oil pressure in the red area	Switch off engine
	Coolant temperature	Coolant temperature too high	Switch off engine
	Lubricating oil pressure pilot lamp	If the pilot lamp lights up after starting the engine or while the engine is running, the lubricating oil pressure is too low	Switch off engine
	Lube oil level	If the pilot lamp lights up after starting the engine or while the engine is running, the lubricating oil level is too low	Check lubricating oil level / if necessary top up
	Coolant level	If the control lamp lights up after the engine starts or while the engine is running, the coolant level is too low	Switch off the engine, allow to cool down and top up coolant
	Operating hours counter	Indicates the previous operating time of the engine	Observe the maintenance intervals
	Horn	With acoustic signal	See fault table (62).

Stop procedure



Shutting off



Avoid switching off from full load (coking/blockage of the remaining lubricating oil in the turbocharger bearing housing). The lubricating oil supply of the turbocharger is then no longer guaranteed! This shortens the life of the turbocharger.

Run the engine in low idling speed for approximately one minute after relieving the load.

The control unit remains active for about another 40 seconds to save the system data (lag) and then switches off automatically.

B = lube oil pressure pilot light
C = pilot light for pre-heating system
P = gear position: park
0 = gear position: switch off engine
1 = gear position: pre-heat engine
2 = gear position: start engine

Electrical shutdown (optional)

- Move the key to position 0.
Control lamps A+B+C go out.
A = charge pilot light

General

Modern diesel engines place very high demands on the lubricating oil to be used. The specific engine performances which have increased constantly over the last few years lead to an increased thermal load on the lubricating oil. The lubricating oil is also more exposed to contamination due to reduced oil consumption and longer oil change intervals. For this reason it is necessary to observe the requirements and recommendations described in this operating manual in order not to shorten the life of the engine.

Lubricating oils always consist of a base oil and an additive package. The most important tasks of a lubricating oil (e.g. wear protection, corrosion protection, neutralisation of acids from combustion products, prevention of coke and soot deposits on the engine parts) are assumed by the additives. The properties of the base oil are also decisive for the quality of the product, e.g. with regard to thermal load capacity.

In principle, all engine oils of the same specification can be mixed. However, mixing of engine oils should be avoided because the worst properties of the mixture are always dominant.

The **lubricating oil quality** has a considerable influence on the life, performance and thus also on the costs-effectiveness of the engine. It basically applies that: The better the lubricating oil quality, the better these properties.

The **lubricating oil viscosity** describes the flow behaviour of the lubricating oil depending on the temperature. The lubricating oil viscosity has no influence and effect on the lubricating oil quality.

Synthetic lubricating oils are used increasingly and have advantages. These oils have a better tem-

perature and oxidation stability as well as a relatively low cold viscosity. Since some processes relevant to the definition of the lube oil change intervals are not essentially dependent on the lube oil quality (such as the incorporation of soot and other contaminations), the lube oil change interval when using synthetic lube oils may not be increased in relation to the specifications of the lube oil change intervals.

Biodegradable lubricating oils may be used in DEUTZ engines if they meet the requirements of this operating manual.

Quality

Lubricating oils are classified by DEUTZ according to their efficiency and quality class (DQC: DEUTZ Quality Class). It basically applies that: with increasing quality class (DQC I, II, III, IV) the lubricating oils are more efficient and higher quality. The appended quality class designation (- 02 / - 05) indicates in which year the classification was made.

Lubricating oils according to other comparable specifications can be used as long as they meet DEUTZ requirements. In regions in which none of these qualities are available, please contact your responsible DEUTZ partner.

The following lubricating oils are specified for the engines described in this operating manual.

With open crankcase breather:

DQC II - 05

DQC III - 05

DQC IV - 05

With closed crankcase breather:

DQC III - 05

DQC IV - 05

Recommended quality class		
DEUTZ	ACEA	API
DQC II - 05	E3-96 / E5-02 / E7-04	CG-4 / CH4 / C I-4
DQC III - 05	See TR 0199-99-3002	
DQC IV - 05	Please contact your DEUTZ partner	

DEUTZ lubricating oils DQC II-05 TLS - 15W40 D	
Container	Order number
5 litre container	0101 6331
20 litre container	0101 6332
209 litre barrel	0101 6333

DEUTZ lubricating oils DQC III-05 TLX - 10W40 FE	
Container	Order number
5 litre container	0101 6335
20 litre container	0101 6336
209 litre barrel	0101 6337

DEUTZ lubricating oils DQC IV-05 synthetic	
Container	Order number
20 litre container	0101 7849
209 litre barrel	0101 7850

Lubricating oil change intervals

- The intervals depend on:
 - lubricating oil quality
 - sulphur content in the fuel
 - type of application of engine
- The lubricating oil change interval must be halved if at least one of the following conditions applies:
 - Constant ambient temperature below -10 °C (14 °F) or lube oil temperature below 60 °C (84 °F).
 - sulphur content in the diesel fuel of 0.5 - 1 weight %.

– operation with bio-diesel fuel

- If the oil change intervals for vehicle engines are to be carried out according to operating hours, the oil change intervals for built-in engines apply.
- If the lubricating oil change intervals are not reached within a year, the oil should be changed at least once a year.

Viscosity

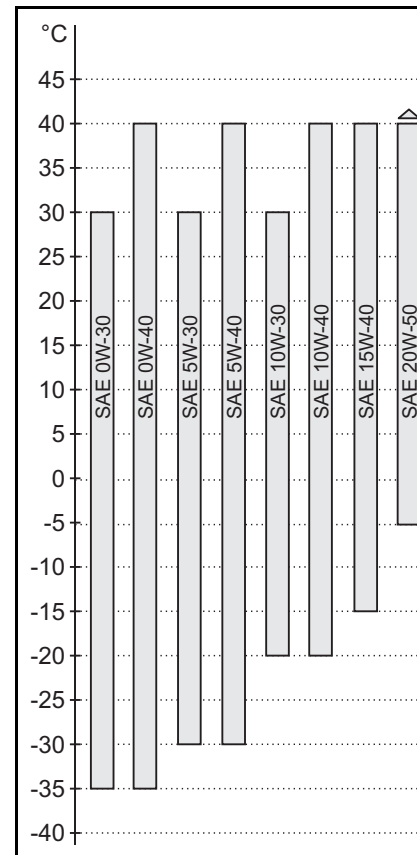
The ambient temperature at the installation site or in the application area of the engine is decisive for choosing the right viscosity class. Too high a viscosity can lead to starting difficulties, too low a viscosity can endanger the lubrication effect and cause a high lubricating oil consumption. At ambient temperatures below -40 °C, the lubricating oil must be pre-heated (e.g. by storing the vehicle or the machine in a hall).

The viscosity is classified according to SAE. Multi-purpose lubricating oils should be used basically. Single-purpose lubricating oils can also be used in enclosed, heated spaces at temperatures >5 °C.

Depending on the ambient temperature we recommend the following common viscosity classes:



The prescribed lubricating oil quality must be observed when selecting the viscosity class!



Permissible fuels

The following fuel specifications / standards are approved:

- In engines with increased power rating and engines with high loads we recommend the use of DEUTZ TLX10W.40FE Europa.
- Diesel fuels according to DIN EN 590
 - Nato F-54 (equivalent to diesel fuel in accordance with DIN EN 590)
- US diesel fuel according to ASTM D 975 Grade-No.1-D and 2-D
- Japanese diesel fuel JIS K 2204 Grade 1 Fuel and Grade 2 Fuel with lubricating properties according to diesel fuel EN 590 (HFFR max. 460 micrometer according to EN ISO 12156)

Use commercially available fuels with a sulphur content below 0.5 %. The lubricating oil change intervals must be halved at a higher sulphur content.

If other fuels are used which do not meet the requirements of the operating manual, the warranty will be voided.

The certification measurements to satisfy the legal emission limits are performed with the test fuels defined by law. These correspond to the diesel fuels according to EN 590 and ASTM D 975 described in this operating manual. No emission values are guaranteed with the other fuels described in this operating manual.

Winter operation with diesel fuel



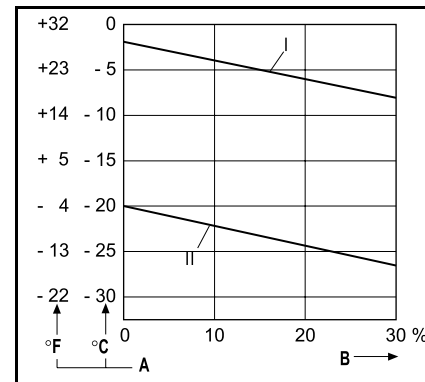
Only carry out mixing in the tank. Fill with the appropriate amount of paraffin first, then add the diesel fuel. Normal and high grade fuels may not be mixed.

At low ambient temperatures paraffin discharges can lead to blockages in the fuel system and cause operating faults. Below 0 °C ambient temperature use winter diesel (down to -20 °C) (filling stations provide this in good time before the cold season starts).

- Below -20 °C paraffin should be added. The relevant percentages are given in the adjacent diagram.
- Special diesel fuels can be used for arctic climates to -44 °C.

If it is necessary to use summer diesel fuel below 0°C, paraffin can also be added by up to 30 % as per the diagram on the right.

Usually a sufficient cold resistance can be achieved by adding a flow improver. Ask your DEUTZ partner.



I Summer-grade diesel fuel

II Winter-grade diesel fuel

A Outdoor temperature

B Percentage of paraffin to be added

General



Never operate the engine without coolant (even for a short time)!

In liquid-cooled engines, the coolant must be conditioned and monitored, otherwise the engine could be damaged by:

- corrosion
- cavitation
- freezing

Water quality

The right water quality is important for conditioning the coolant. Clear, clean water within the following analysis values should always be used:

Analysis values		min	max
ph value at 20 °C		6,5	8,5
Chloride ion content	[mg/dm ³]	-	100
Sulphate ion content	[mg/dm ³]	-	100
Total hardness (carbonate hardness percentage of the total hardness min. 3 dGH)	[°dGH]	3.0	12.0

Specifications of the water quality are made by the local water board.

The water must be conditioned if it deviates from the analysis values.

- **pH value too low:**

Addition of diluted sodium or potassium lye.
Small trial mixtures are advisable.

- **Total hardness too high:**

Mixing with softened water (pH neutralized condensate or water softened by ion exchanger).

- **Total hardness or carbonate hardness too low:**

Mixing with harder water (harder water is usually available in the form of drinking water).

- **Chlorides and/or sulphates too high:**

Mixing with softened water (pH neutralized condensate or water softened by ion exchanger).

Cooling system corrosion protection agent



Health damaging nitrous amines form when nitrite-based cooling system corrosion protection agents are mixed with amine-based agents!



Cooling system corrosion protection agents must be disposed of in an environmentally friendly way.

The conditioning of the coolant for liquid-cooled DEUTZ compact engines is performed by mixing an anti-freeze with corrosion protection inhibitors based on ethylene glycol into the water.

DEUTZ cooling system corrosion protection agent	
Container	Order number
5 litre container	0101 1490
20 litre container	0116 4160
210 litre barrel	1221 1500

This cooling system corrosion protection agent is

free from nitrite, amine and phosphate and is adapted to the materials in our engines. Order from your DEUTZ partner.

Please contact your DEUTZ partner if the DEUTZ cooling system corrosion protection agent is not available.

The cooling system must be monitored regularly. This also includes checking the coolant system corrosion protection agent concentration in addition to checking the coolant level.

The cooling system corrosion protection agent concentration can be checked with conventional test instruments (e.g. refractometer).

Cooling system corrosion protection agent percentage	Water percentage	Cold protection up to
min. 35 %	65 %	-22 °C
40 %	60 %	-28 °C
max. 45 %	55 %	-35 °C

At temperatures below -35 °C, please contact your responsible DEUTZ partner.

It is possible to use other cooling system corrosion protection agents (e.g. chemical corrosion protection agents) in exceptional cases. Consult your DEUTZ partner.

Assignment of the DEUTZ maintenance and service schedules to maintenance intervals

Standard maintenance schedule TD/TCD 2012/2013 L04/06 4V				Standard and EPA ¹⁾ certified engines
Stage	Activity	see	To be carried out by:	Industrial engines/vehicle engines (everyoh/km)
E10	Initial commissioning	( 27)	Authorised specialists	For measures to be taken during the run-in phase or commissioning of new or overhauled engines, see ( 27)
E20	Daily inspection		Customer	1x daily or every 10 operating hours in continuous operation
E30	Maintenance	2)		500 oh ³⁾ / 45,000 km ³⁾ / 60,000 km ³⁾ / 80,000 km ³⁾
E40	Extended maintenance I			1,000 oh / 100,000 km
E45	Interim stage			1,500 oh ⁴⁾ / 200,000 km ⁴⁾
E50	Extended maintenance II		Authorised specialists	3,000 oh / 400,000 km
E60	Intermediate overhaul			(only for EPA) 6,000 oh
E70	General overhaul			12,000 oh

¹⁾ EPA (Environmental Protection Agency).

²⁾ The oil load may be high depending on the application. Shorter maintenance intervals are necessary in this case, 250 oh (15,000 km).

³⁾ Specification for lubricating oil change interval related to the lubricating oil quality DQC III and an average drive speed of: approx. 25 km/h (local traffic), approx. 40 km/h (regional traffic), approx. 60 km/h (long distance traffic).

⁴⁾ For TCD 2012 L04/06 4V and TCD 2013 L06 4V engines, the valve clearance must be set for the first time after 500 oh and then, after every 1500 oh.

Maintenance measures

Changing the pre-filter cartridge depends on the degree of dirt contamination of the fuel being used. If other fuels are used which do not meet the requirements of the operating manual, the warranty will be voided.

A self-adhesive maintenance diagram is provided with every engine. This should be stuck to the engine or device in a prominent position.

Order number: 0312 2452 (TCD 2012 4V) and 0312 2453 (TCD 2013 4V)

Stage		Measure	Page
E10		The measures are listed in chapter 3.	27
E20	Check	Lubricating oil level (if necessary top up)	41
		Coolant level (top up if necessary)	47
		Engine tightness (visual inspection for leaks)	28
		Suction air filter/dry air filter (maintain in accordance with maintenance indicator)	50
E30	Clean	Fuel pre-cleaner and fuel pre-filter with water trap (renew the filter insert if necessary). If the warning system responds (lamp/horn), the water trap bowl must be emptied immediately.	46
	Check	V-belt/V-rib belt (retighten if necessary, replace if damaged)	53
		Coolant (additive concentration)	47
		Coolant level (top up if necessary)	47
	Replace	Lubricating oil (lubricating oil change intervals depending upon the engine application). See TR 0199-99-3002 for an optimum lubricating oil utilisation/change strategy. Ask your DEUTZ-partner for information.	41
		Lubricating oil filter/insert (every time the lubricating oil is changed)	42
E40	Check	Charge air cooler (drain lubricating oil and condensation)	47
		Check glow plugs and heating flange for functioning.	30
		Flame glow system (check for functioning)	
		EGR compensator line (replace if damaged)	
		Battery and cable connectors	60
		Engine monitor, warning system Maintenance only to be carried out by authorised service personnel	31
		Filter cartridge of the crank space ventilation valve	
		Tighten engine mountings, if necessary (renew in case of damage)	
		Fastenings, hose unions / clips (renew if damaged)	
	Replace	Fuel filter insert (main filter)	44
		Suction air filter/dry air filter (maintain in accordance with maintenance indicator)	50
		Fuel pre-cleaner and fuel pre-filter with water trap (renew the filter insert if necessary). If the warning system responds (lamp/horn), the water trap bowl must be emptied immediately.	46

Stage		Measure	Page
E50	Check	V-rib belt and tensioning pulley (replace if wear limit is fallen below)	54
		EGR (optional) adjustment lever and valve; replace if necessary	23
	Replace	EGR (optional) adjusting bar	
E60	Check	Electronic injector test via EMR3 (only for DEUTZ Common Rail System)	24
	Clean	Charge air cooler inlet area/charge air cooler, lubricating oil/drain condensation (only with EPA).	
		Non-return valve of the exhaust gas recirculation system (optional).	
		Cooler of the exhaust gas recirculation system.	
	Replace	Fuel injector valve (only with EPA).	
		Flame glow plugs	30
		Crankcase breather valve/incl. Filter (only with EPA)	
annually	Clean	Charge air cooler inlet area (lubricating oil/drain condensation), (only with EPA)	47
	Replace	Fuel pre-cleaner / fuel pre-filter (change filter insert if necessary)	46
		Engine monitor, warning system Maintenance only to be carried out by authorised service personnel	31
Every 2 years	Check	EGR (optional) adjustment lever and valve; replace if necessary	
	Replace	Coolant (additive concentration)	47
		V-belt, V-rib belt and tensioning pulley	54
		Filter insert of the crankcase breather valve (only with EPA)	

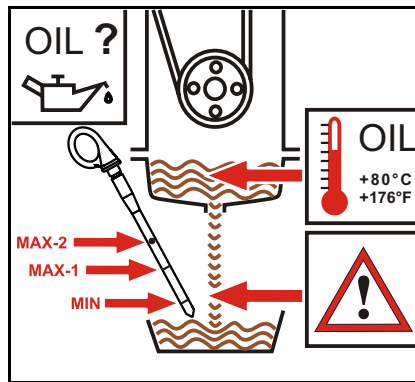
Specifications when working on the lubricating oil system



Do not work when the engine is running!
Smoking and naked lights prohibited!
Danger of scalding from hot lubricating oil!



Pay attention to utmost cleanliness when working on the lubricating oil system. Clean the area around the components concerned carefully. Blow damp parts dry with compressed air. Observe the safety regulations and national specifications for handling lube oils. Dispose of leaking lubricating oil and filter elements properly. Do not allow used oil to seep away into the ground. Perform a trial run after all work. Pay attention to tightness and lubricating oil pressure and then check the engine oil level. In case of fuels containing more than 1% sulphur, contact your corresponding DEUTZ partner.



Check lubricating oil level



Low lubricating oil level or overfilling lead to engine damage!

The lubricating oil level may only be checked with the engine in a horizontal position and switched off. If the engine is warm, switch off the engine and check the lubricating oil level after 5 minutes.



Be careful of hot lubricating oil. Danger of scalding!

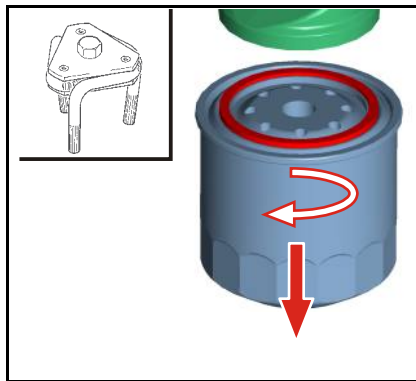
- Pull out the lubricating oil dipstick and wipe off with a lint-free, clean cloth.
- Insert the lubricating oil dipstick as far as it will go.
- Extract the lubricating oil dipstick and read off the oil level.

- The lubricating oil level must always be between the MIN and MAX-1 marks. Fill up to the MAX-1 mark if necessary.

The lubricating oil dipstick shows an apparent overfilling owing to the recirculating oil (e.g. filter) when the engine is cold. The MAX-2 mark is used for this.

Changing the lubricating oil

- Warm up the engine (lubricating oil temperature > 80 °C).
- Ensure that the engine or vehicle is in a level position.
- Switch off the engine.
- Place a collecting receptacle underneath the lube oil drain screw.
- Unscrew the lube oil drain screw, drain oil.
- Fit a new sealing ring to the lube oil drain screw, insert and tighten. (tightening torque 100 Nm).
- Pour in lube oil.
 - Quality/viscosity data.
 - Filling volume (▮ 70).
- Check engine lubricating oil level (see previous chapter).

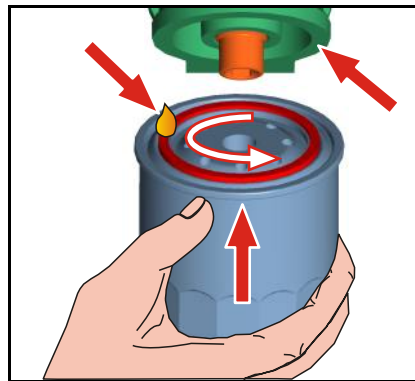


Change lubricating oil filter



The filter cartridge should never be pre-filled. There is a danger of dirt contamination!

- Remove the clips if an anti-rotation lock is fitted.
- Loosen and unscrew the filter cartridge with the tool (**order no. 170050**) .
- Collect draining lubricating oil
- Clean the sealing surface of the filter support with a lint-free, clean cloth.



- Oil the gasket of the new DEUTZ original filter cartridge lightly.
- Screw on new filter by hand until the gasket is in place and then tighten with a torque of 15-17 Nm.
- If necessary, fix the clips of the anti-rotation lock.

Specifications when working on the fuel system



Engine must be switched off!
Smoking and naked lights prohibited!
The common rail system is under high pressure.
Do not get near to a leak in the high pressure system because the fuel jet can cause severe injury.
Wait 30 seconds after switching off the engine before working on the fuel system.
No injection/high pressure pipes may be disconnected while the engine is running.
In case of leaks in the fuel system, contact your DEUTZ partner immediately.



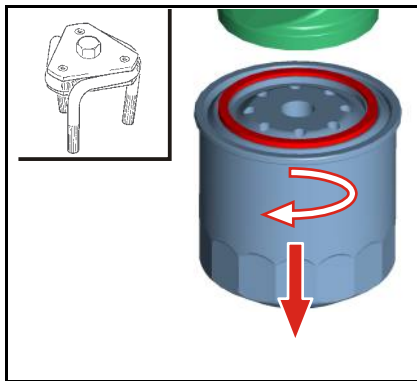
Additional venting of the fuel system by a 5 minute trial run at idle speed or on low load is absolutely essential.



Caution when handling hot fuel!
Pay attention to utmost cleanliness when refuelling and working on the fuel system. Clean the respective affected parts carefully. Blow damp areas dry with compressed air.
Observe the safety regulations and national specifications for handling fuels.
Dispose of leaking fuel and filter elements properly. Do not allow fuel to seep away into the ground.
After all work on the fuel system, the system should be vented, a trial run performed and the tightness checked.
It will be necessary to vent the fuel system when commissioning for the first time, after maintenance work or if the tank has been run dry.



Pay attention to utmost cleanliness due to the high production accuracy of the system!
The fuel system must be tight and closed. Make a visual inspection for leaks/damage in the system.
Clean and dry the engine and engine compartment thoroughly before beginning work.
Areas of the engine compartment from which dirt could be loosened must be covered with a fresh, clean foil.
Work on the fuel system may only be carried out in an absolutely clean environment. Contamination of the air such as dirt, dust, moisture etc. must be avoided.

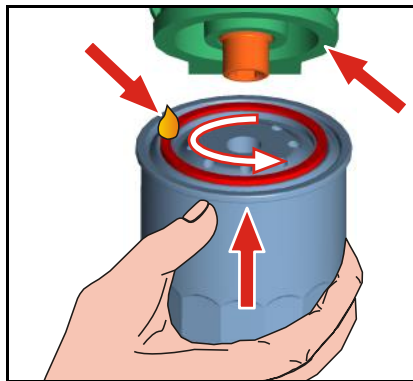


Change the fuel filter cartridge

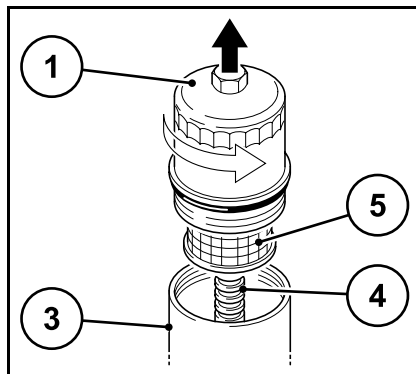


The filter cartridge should never be pre-filled. There is a danger of dirt contamination!

- Remove the clips if an anti-rotation lock is fitted.
- Loosen and unscrew the filter cartridge with the tool (**order no. 170050**) .
- Catch any escaping fuel.
- Clean the sealing surface of the filter support with a lint-free, clean cloth.
- Oil the gasket of the new DEUTZ original filter cartridge lightly.
- Screw on new filter by hand until the gasket is in place and then tighten with a torque of 15-17 Nm.
- If necessary, fix the clips of the anti-rotation lock.



- Vent the fuel system.

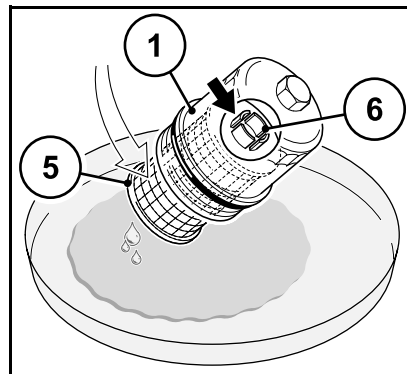


Change the fuel filter cartridge

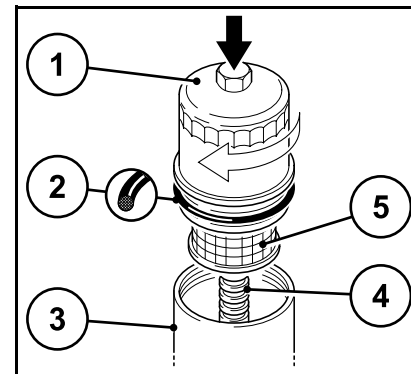


The filter cartridge should never be pre-filled. There is a danger of dirt contamination!

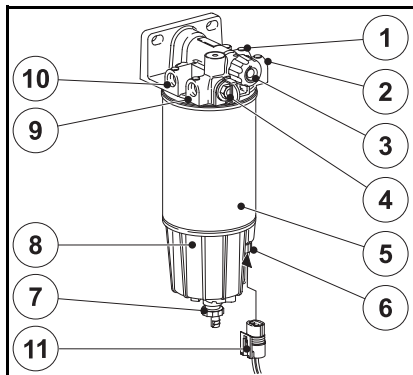
- Switch off the engine.
- Loosen lubricating oil filter cap (1) with 2 to 3 turns and wait 30 seconds.
- Unscrew fuel filter cap (1) with paper filter cartridge (5) anticlockwise.
- Carefully loosen paper filter cartridge (5) upwards from the guide (4) located in the housing (3).
- Catch any escaping fuel.



- Collect any fuel oil that escapes.
- Bend the paper filter cartridge (5) in the collecting vessel slightly sideways until the cartridge comes off the clamp (6).
- Clean any dirt from the sealing area of the filter media and fuel filter cap (1) as well as guide (4).



- Replace round sealing ring (2) and grease lightly.
- Press new paper filter cartridge (5) into the clamp (6) and carefully insert into the guide (4).
- Screw in fuel filter cap (1) clockwise (25 Nm).
- Start engine.



Clean/purge or change the fuel pre-filter

- 1 Fuel supply flow to the pump
- 2 Fuel return flow from the control block FCU (Fuel Control Unit)
- 3 Fuel manual pump with bayonet lock for locking and unlocking
- 4 Thermostat valve with stop lever (optional)
- 5 Filter insert
- 6 Connection option for electrical water level sensor
- 7 Water drain tap
- 8 Water collecting vessel (bowl)
- 9 Fuel inlet from the fuel tank
- 10 Fuel return to fuel tank
- 11 Connection for electrical warning lamp/horn

Filter replacement

- Close fuel shutoff tap (with high-level tank).
- Place fuel collection vessel underneath the fuel

pre-filter.

- Release the water drain tap (7), drain the water and the fuel completely.
- Unscrew the filter insert (5) with water collection vessel (8) in anticlockwise direction and remove. Close fuel shutoff tap (with high-level tank).
- Loosen water collecting vessel (8) anticlockwise from the old filter cartridge (5) and remove.
 - The special tool can be ordered under part number **8192** ( 74).
- Drain remaining fuel into the fuel collecting vessel and clean water collecting vessel (8).
- Screw water collecting vessel (8) clockwise onto the new filter cartridge (5).
- Clean any dirt from the sealing area of the new filter cartridge (5) and opposite side of the filter head.
- Lightly moisten sealing areas of the filter cartridge (5) with fuel and screw onto the filter head again clockwise (17-18 Nm).
- Open the fuel shutoff tap and vent the system, see venting the fuel system.
- Properly dispose of the collected fuel and old filter cartridge (5).

Vent the fuel system

- Unlock bayonet lock of the fuel manual pump (3) by pressing and turning anticlockwise at the same time. The pump piston is now pressed out by the spring.
- Keep pumping until a very strong resistance can be felt and the pumping only progresses very slowly.
- Now continue pumping several times. (The return line must be filled).

- Lock bayonet lock of the fuel manual pump (3) by pressing and turning clockwise at the same time.
- Start the engine and operate approx. 5 minutes in idling mode or at low load. Check the pre-filter for leaks while doing this.

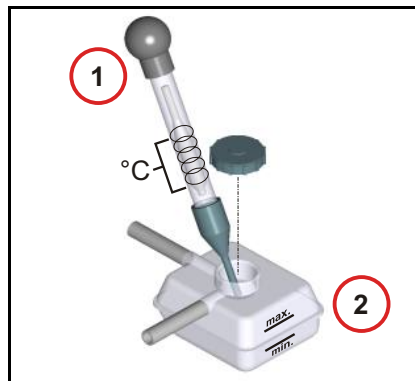
Specifications when working on the cooling system



Danger of scalding from hot coolant!
Cooling system under pressure! Only open the cap when cool!
The coolant must have a prescribed concentration of cooling system corrosion protection agent!
Observe safety regulations and national specifications when handling cooling media.
Observe the manufacturer's specifications for an external cooler.
Dispose of leaking liquids properly and do not allow them to seep into the ground.
Order coolant corrosion protection agent from your DEUTZ partner.
Never operate the engine without coolant (even for a short time)!

Checking the coolant level with an external cooler

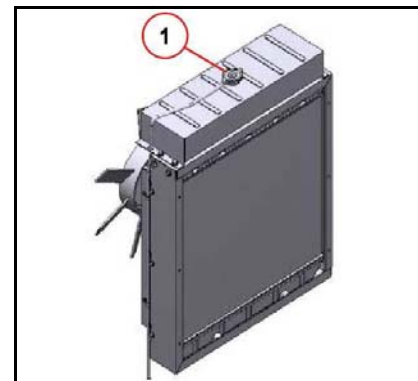
- Fill in new coolant and vent the system according to the specifications of the cooling system manufacturer.
- Open the cooling system cap (1) carefully.
- The coolant level must always be between the MIN and MAX marks of the compensation tank! Fill up to the MAX mark if necessary.



Check coolant additive concentration

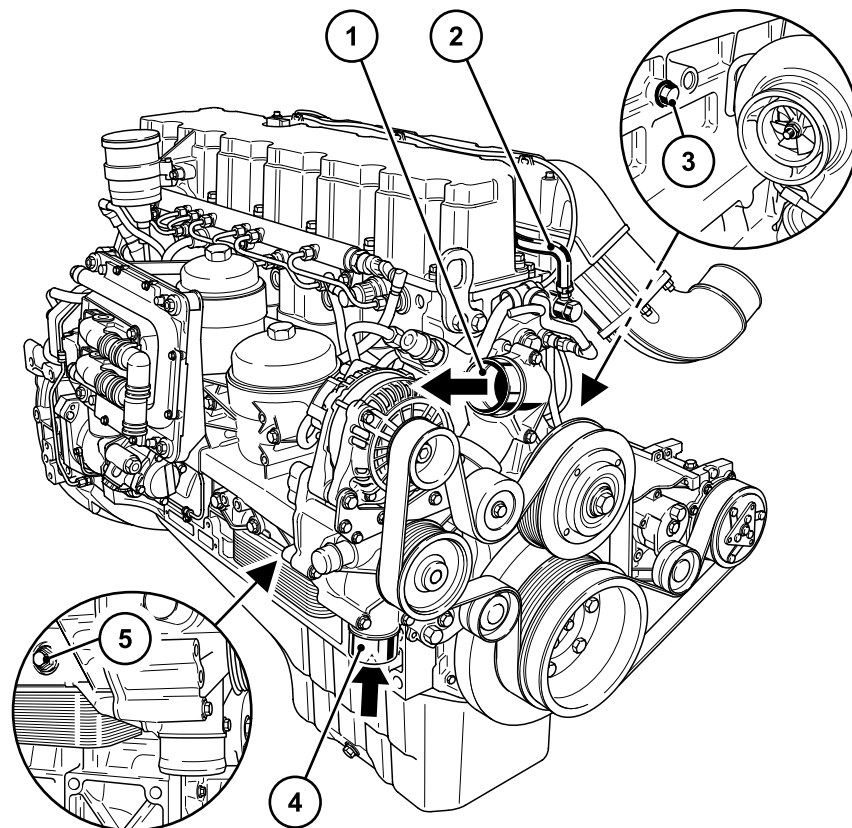
- Open the cooling system cap (1) carefully.
- Check the coolant additive concentration in the cooler / compensation tank (2) with a conventional freeze protection measuring instrument (1) (e.g. hydrometer, refractometer).
- Necessary coolant additive concentration Coolant mixing ratio (▮ 37)

You can order the appropriate test instrument from your DEUTZ partner under order number 1824.



Fill the cooling system

- Open the cooling system cap (1) carefully.
- Fill up coolant to the MAX mark on the compensation tank and close the cooling system cap (1).
- Switch on any available heating and set to the highest level so that the heating circuit is filled and vented.
- Run engine up to operating temperature (opening temperature of the thermostat). (▮ 70).
- Switch off the engine.
- Check coolant level in cooled engine and top up to the MAX mark on the compensation tank if necessary.



Empty/fill and ventilate cooling system

- Position the collecting dish underneath the locking screw (5) and the coolant supply (4).
- Verschlusschraube (5) am Kurbelgehäuse entfernen und Schlauch an (4) abziehen.
- Loosen the vent screw (2).
- Drain coolant.
- Re-tighten the locking screw (5) and the hose on (4) and the vent screw (2).
- If the locking screw (3) is not accessible, the drainage can be carried out at the engine oil cooler (coolant duct).
- Fill and ventilate cooling system.

Fill and ventilate cooling system

- Open cooler locking cap.
- Loosen the vent screw (2).
- Fill with coolant as far as the max. marking or filling limit (heating valve of the system must be opened, if necessary).
- Tighten the vent screw (2) and the locking screw (5).
- Close cooler locking cap.
- Start the engine and warm up until the thermostat opens.
- Switch off the engine.
- Check coolant level when the engine is cold and refill if necessary.
- Close and ventilate cooler locking cap (1).
- The cooling system, which was installed in compliance with our installation guidelines, is automatically drained after filling.

Cleaning work



For all cleaning work, make sure that no parts are damaged (e.g. bent cooler mesh). Cover electrical/electronic parts and connections to clean the engine (e.g. control units, generator, solenoid valves etc.). Do not aim the water/steam jet directly at them. Allow engine to warm up.



Only carry out cleaning work on the engine when it is not running!
Remove the engine cover and cooling air cover if available and remount after cleaning.

General

The following causes of soiling make it necessary to clean the engine:

- High dust content in the air.
- Chaff and chopped straw in the area of the engine.
- Coolant leaks
- Lubricating oil leakage
- Fuel leaks

Because of the different application conditions, cleaning depends on the degree of dirt contamination.

Cleaning with compressed air

- Blow dirt off or out. Always blow out the cooler and cooling fins from the exhaust air side to the fresh air side.

Cleaning with cold cleaner

- Spray the engine with cold cleaner and leave it for about 10 minutes to take effect.
- Spray the engine clean with a high pressure water jet.
- Warm up the engine so that the water residues evaporate.

Cleaning with a high pressure cleaner

- Clean the engine with a steam jet (maximum spray pressure 60 bar, maximum steam temperature 90 °C, distance at least 1m).
- Always clean the cooler and cooling fins from the exhaust air side to the fresh air side.
- Warm up the engine so that the water residues evaporate.

6

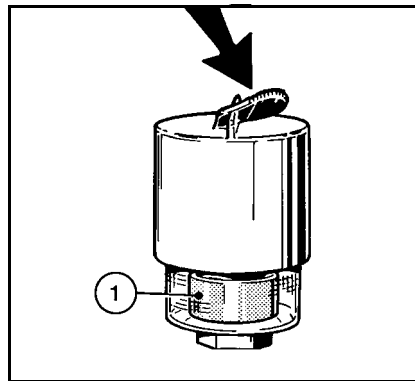
Regulations for working on the intake system



Do not work when the engine is running!



Pay attention to utmost cleanliness when working on the intake system, close intake openings if necessary. Dispose of old filter elements properly.



Maintenance indicators for dry air filter

- The dry air filter is maintained according to a maintenance switch or maintenance indicator.
- Maintenance is necessary when:
 - the yellow warning light of the **maintenance switch** lights up when the engine is running.
 - the red field (1) of the **maintenance indicator** is fully visible.
- After carrying out maintenance work, reset the signal by pressing the button on the maintenance indicator. The maintenance indicator is now ready for operation again.

Renewing the safety cartridge of the dry air filter

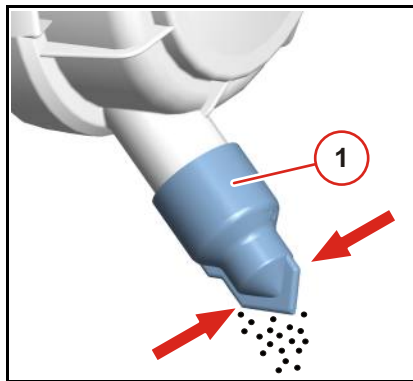


Never clean the safety cartridge (4).



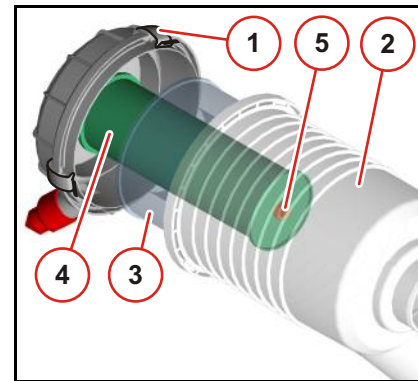
Do not clean the filter element (3) with petrol or hot liquids!
Renew damaged filter elements.

- Renew safety cartridge (4) according to the interval in the maintenance schedule
- To do this:
 - Unscrew hexagon nut (5), pull out safety cartridge (4).
 - Insert new safety cartridge, screw on hexagonal nut.
- Insert filter element (3), mount hood (2) and fix with clamping yoke (1).



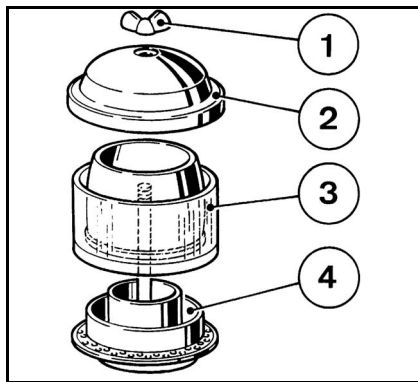
Clean the dust discharge valve of the dry air filter

- Empty the dust discharge valve (1) by pressing together the discharge slit.
- Remove any caked dust by pressing together the upper section of the valve.
- Clean the discharge slit.



Maintaining the dry air filter

- Maintain the filter element (3) according to the interval in the maintenance schedule
- Lift up the clamping yoke (1).
- Remove the filter hood (2) and pull out the filter element (3).
- Filter element (3):
 - blow out with dry compressed air (max. 5 bar) from the inside to the outside if soiling is only slight,
 - renew if heavily soiled.

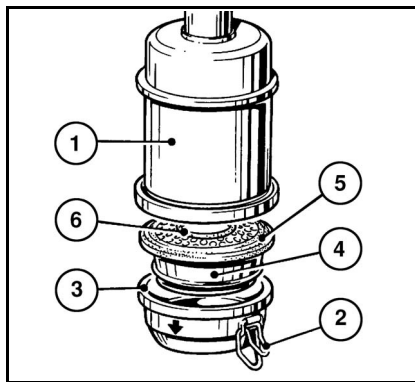


Emptying the cyclone precleaner



Never fill the dust container (3) with lubricating oil!

- Loosen wing nut (1) and lift off housing cover (2).
- Remove the dust container (3) from the base (4) and empty it. Clean the container using a brush and clean diesel fuel. Then dry.
- Place the dust container (3) on the base (4) and tighten the housing cover (2) with wing nut (1).



Cleaning oil bath air filter



Never clean the filter with petrol!



Dispose of the old lubricating oil in accordance with the regulations. Select the engine lubricating oil according to the requirements before filling the filter.

- Shut down engine and wait about 10 minutes until the lubricating oil has collected in the lubricating oil pan (3).
- Loosen the quick release clamps (2) and remove the lubricating oil pan (3) with filter insert (4).
- Dispose of dirty lubricating oil.
- Clean lubricating oil pan (3), filter cartridge (4) and filter housing (1) with a brush and clean diesel fuel.
- Visually inspect the rubber gaskets (5), (6) and

renew if damaged.

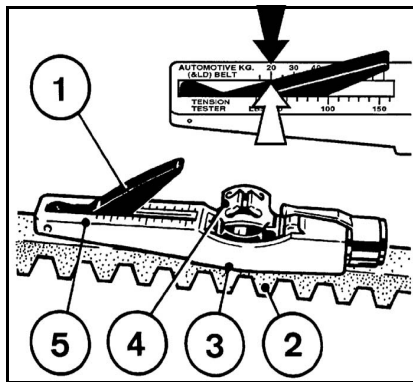
- Fill the lubricating oil pan (3) of the oil bath air filter with engine oil up to the mark (arrow).
- Mount the lubricating oil pan (3) with filter insert (4) on the filter housing (1) and close the quick release clamps (2).
- Start engine and check for tightness.

Checking the belt drive



Only carry out work/function check on the belt drive when the engine is not running! Only check / change V-belts when the engine is not running! Refit the V-belt guard! Retension the new V-belts after 15 minutes running time. In the event of wear of the double belts or damage to one of the V-belts always replace both belts as a pair. The difference in length of the new V-belts must not exceed 0.15 % one to the other.

- Check the whole belt drive visually for damage.
- Renew damaged parts.
- Remount protective devices if necessary.
- Pay attention to correct fit of new belts, check the tension after running for 15 minutes.

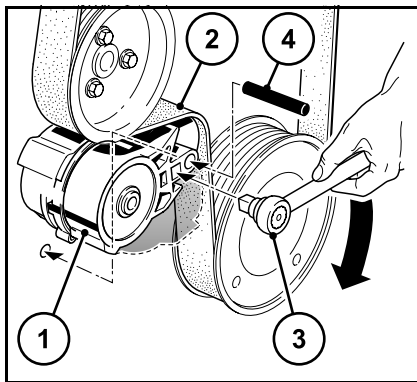


Checking the belt tension

- Lower indicator arm (1) into the measuring device.
- Place guide (3) between two belt pulleys on the V-belt (2). The stop have to be at the side.
- Press the button (4) at right angles to the V-belt (2) evenly until you hear or feel the spring snap in.
- Lift the measuring device carefully without altering the position of the indicator arm (1).
- Read the measured value at the point of intersection (arrow), scale (5) and indicator arm (1).
- If necessary, re-tension belt and measure again.

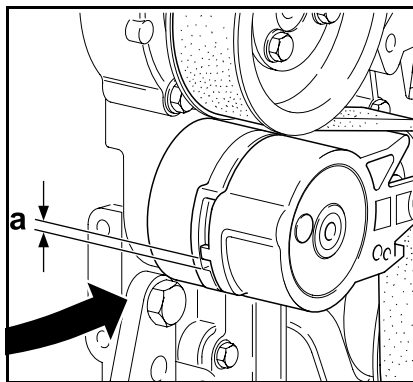
Tools

Belt tension measuring device (**order number: 8115**) can be obtained from your DEUTZ partner.



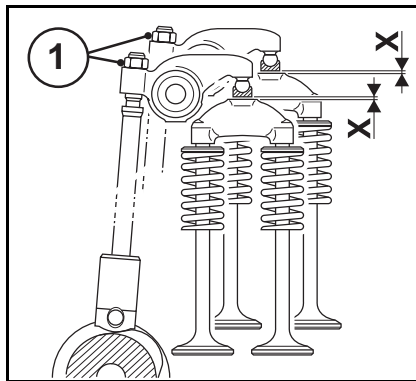
Replace V-rib belt

- Press tensioning pulley (1) with pin wrench (3) in the direction of the arrow until a holding pin Ø 6 mm (4) can be fixed in the assembly bore. The V-rib belt (2) is now free of tension.
- First remove the V-rib belt (2) from the smallest pulley or from the tensioning pulley.
- Mount V-rib belt (2).
- Retain tensioning pulley using the pin wrench and remove the holding pin.
- Re-tension using the tensioning pulley and pin wrench (3). Check whether the V-rib belt is correctly in its guide.



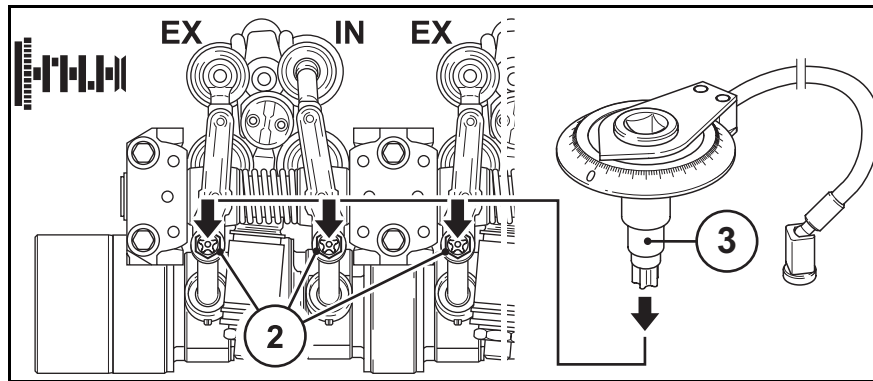
Check belt length

- Check wear limit of the V-rib belt as follows.
- Spacing between the nose of the moving tensioning arm and the limit stop of the fixed tensioning housing.
- If gap "a" is less than 3 mm, the belt must be replaced along with a tensioning pulley.



Set valve clearance for TCD 2013 L04/06 4V

- Loosen breather valve and swing it to the side.
- Remove the cylinder head hood.
- Let the engine cool down for at least 30 minutes before setting the valve clearance: Lubricating oil temperature below 80 °C.
- Place turning gear over fastening screws of the belt pulleys.
- Tool (▣ 74).
- Turn the engine until reaching valve overlap, cylinder no. 1.
The cylinders to be set can be seen in the setting schematic.
- Note: Crankshaft means:
- Outlet valve **EX** is not yet closed, inlet valve **IN** begins to open.

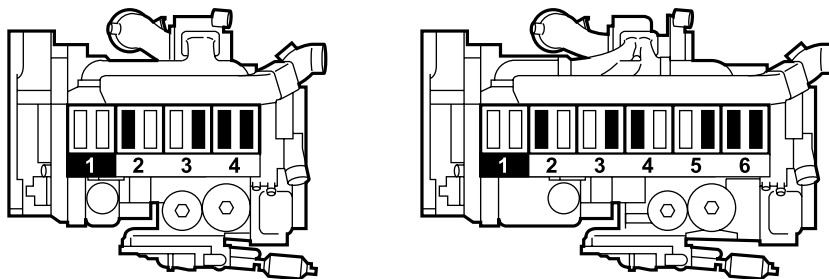


- Loosen rotation angle disc (3) (**order no.: 8190**) and place pin wrench insert (**order no.: 8193**) on the valve clearance setting screw (2).
- Loosen locking nut (1) with special tool (**order no.: 8199**).
- Fix magnet of the rotation angle disc.
- Turn rotation angle disc clockwise to the stop (rocker arm without clearance) and set the scale to zero.
- Turn rotation angle disc anticlockwise until reaching the specified rotation angle:
- Secure the rotation angle disc (3) against twisting.
- Tighten the locking nut (1) (torque 20 Nm).
- Perform the setting procedure on every cylinder.
- Mount gasket (new gasket if necessary).
- Visually inspect screws and rubber elements, replace if necessary.
- Mount cylinder head cover (with a new gasket if necessary) and tighten the screws according to

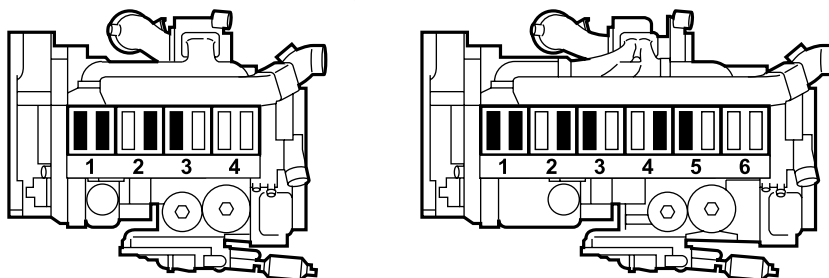
- tightening specification: 9 Nm (▣ 74).
- Swing breather valve into position and fasten.

6

1

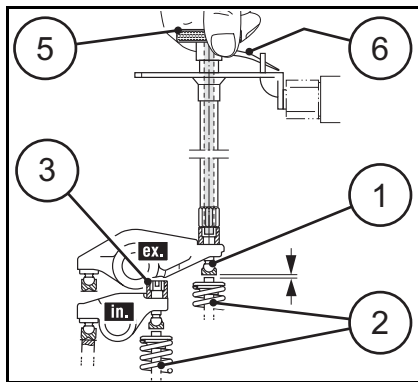


2



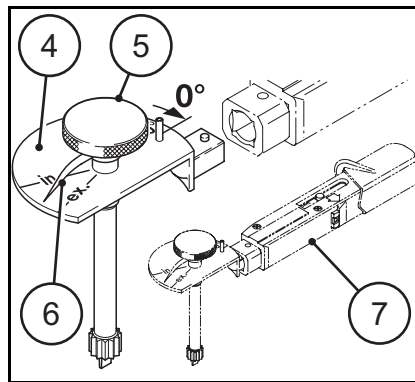
Valve-clearance setting schematic

- Crankshaft/camshaft control time assignment is ensured when re-assembling using the markings on the toothed wheels.
- The crankshaft can be turned using different turning gears:
 - On the dynamic damper with
order no.: 100 330
 - On the toothed starter ring with
order no.: 100 360
- **Crankshaft position 1**
- Turn the crankshaft until both valves overlap on cylinder 1 (outlet valve not yet closed, inlet valve starts to open).
- The rocker arms to be set have clearance in delivered/new state.
- Setting of the valve clearance:
 - Loosen locking nuts on marked rocker arms (see image).
 - Tighten setting screw using the angle method IN = 75° EX = 105°
 - Tighten locking nut with 20 Nm.
- **Crankshaft position 2**
- Turn the crankshaft one more time, i.e. by 360°, valve overlap on the cylinder 4 or 6 according to the type.
- Now set the rocker arms marked in figure 2 as described above.



Set valve clearance for TCD 2012 L04/06 4V

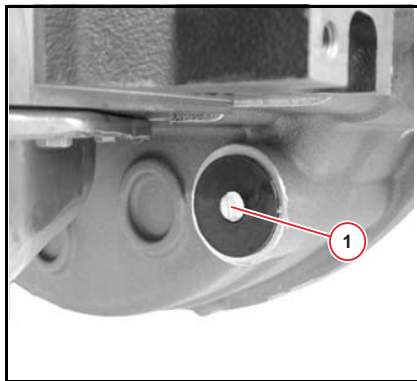
- Remove the cylinder head hood.
- Let the engine cool down for at least 30 minutes before setting the valve clearance: Lubricating oil temperature below 80 °C.
- Place turning gear over fastening screws of the belt pulleys.
- Tool (▣ 74).
- Turn the engine until reaching valve overlap, cylinder no. 1.
The cylinders to be set can be seen in the setting schematic.
- Note: Crankshaft means:
- Outlet valve **EX** is not yet closed, inlet valve **IN** begins to open.



- Set valve clearance on the corresponding cylinder using the valve clearance setting device (**Order no.: 100340**).
- Loosen all locking nuts (3) of the rocker arm assembly to be set.
- Turn the setting screws (1) back by one rotation anticlockwise.
- Turn the setting screw (1) without clearance clockwise on the rocker arm to be set. This means, there must not be any clearance between the rocker arm and the valve (2) and no pressure may be applied to the valve.
- Set pointer (6) on the knurled handle (5) of the measuring plate (4) to "0°"; do not twist the knurled handle (5) anymore.
- Hold the measuring plate (4) exactly in this position and turn the setting screw (1) anticlockwise using the knurled handle (5) until the pointer (6) reaches the "in" or "ex" marking.
- Hold the knurled handle (5) exactly in this position and tighten the locking nut (3) using the

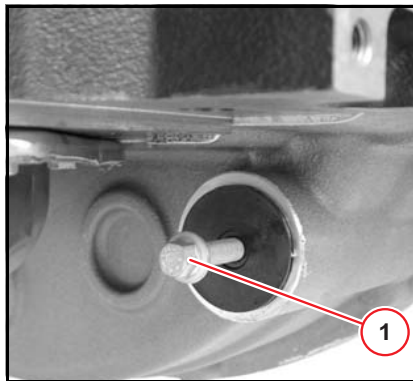
torque wrench (7) according to the 20 Nm tightening specification.

- Perform the setting procedure on every cylinder.
- Mount gasket (new gasket if necessary).
- Visually inspect screws and rubber elements, replace if necessary.
- Mount cylinder head cover (with a new gasket if necessary) and tighten the screws according to tightening specification: 9 Nm (▣ 74).
- Swing breather valve into position and fasten.

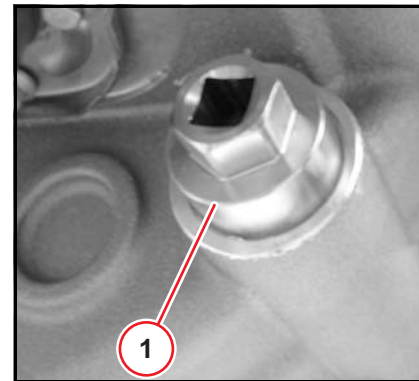


Install turning gear

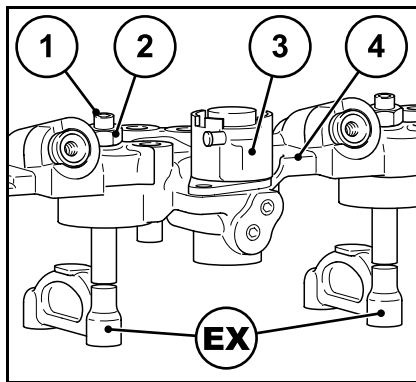
- Unscrew threaded stopper (1) from stopper.



- Turn in M8 screw (1) into stopper.
- Pull out stopper using the screw.

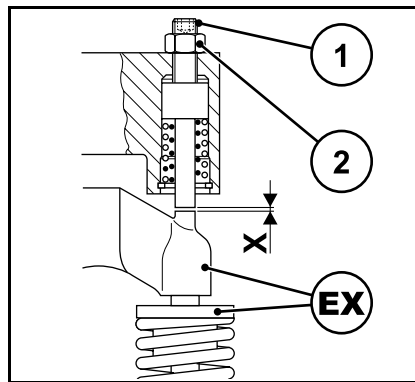


- Insert turning gear (1) and set valve clearance as described.



Check/set control piston clearance for the engine brake

- after valve clearance has ben set.
 - Control unit for the engine brake has already been mounted.
 - Turn the engine until reaching valve overlap, cylinder no. 1
 - Carry out control piston clearance for every outlet valve.
 - Further procedure similar to that for the valve clearance.
- Note:**
- Valve overlap means:
 - Outlet valve is not yet closed, inlet valve begins to open, see valve-setting schematic.



- If necessary, set control piston clearance, for this:
 - Loosen locking nut (2).
 - Mount the control piston clearance X on the setting screw (1) in EX (▮55) using the setting device and set as follows:
 - Fix magnet
 - Then, turn back at an angle of 432° (manually or using a torque wrench):
 - Turn the setting device until the control piston reaches the valve bridge without clearance; set scale to "0".
- EX=** outlet valve at 432° for M8 thread (corresponds to 1.5 mm clearance)
- Tighten locking nut (2).
 - Check and adjust valve clearance on all remaining cylinders.
 - Reinstall cylinder head cover, with new gasket.

- Swing breather valve into position and fasten.
EX = outlet valve

1	Setting screw for valve clearance
2	Locking nut
3	Solenoid valve (electronic control)
4	Control board

Regulations for working on the electrical system



Do not touch the voltage conducting parts, faulty warning lamps should be immediately replaced.



Pay attention to correct polarity of the connections.
Cover electrical/electronic parts and connections before cleaning the engine (e.g. control units, generator, solenoid valves etc.) Do not aim the water/steam jet directly at them. Run the engine warm afterwards to evaporate moisture residues.
Touching a lead against the frame to check whether it is live must not, under any circumstances, be carried out.
For electrical welding work, the ground terminal of the welding gear must be clamped directly to the part being welded.
Three-phase current generator: Never disconnect the cables between battery, generator and regulator while the engine is running.

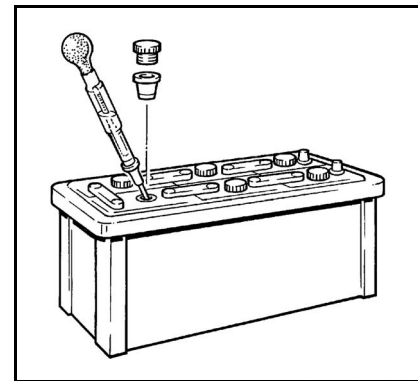
Battery



Electronically stored data could be lost if the battery is disconnected.
Keep battery clean and dry.
Make sure the battery is fitted correctly and securely.
Dispose of old batteries in an environmentally friendly way.



Danger of explosion! The gases emitted by the battery are explosive!
Fire, sparks, smoking and naked lights are prohibited!
Danger of acid burns! Wear protective gloves and glasses! Avoid contact with skin and clothing!
Danger of short circuit! Do not rest tools on the battery!



Check acid level

- Unscrew caps.
- Note the manufacturer's specifications concerning the liquid level.
The liquid should normally be 10-15 mm above the top edge of the plate or reach up to any available control device.
- Only use distilled water to top up the battery.
- Screw in caps.

Checking the voltage

- Check the battery voltage with a conventional voltmeter. The voltage indicates the charging state. It should be between 12 and 14.4 Volt depending per battery.

Check acid density

- Unscrew caps.
- Measure the electrolyte density of individual cells with a commercial hydrometer. Hydrometer

reading indicates battery's state of charge. The acid temperature when measuring should be 20 °C if possible.

- Check the acid level before recharging.
- Screw in caps.

Acid density [kg/ l]		Charge status	Measure
Normal	Tropical		
1,28	1,23	good	none
1,20	1,12	half	charge
1,12	1,08	empty	charge

Removing the battery

- Always disconnect the minus pole first when removing the battery. Otherwise there is a danger of short-circuit!
- Remove the fastenings and take out the battery.

Charging the battery

- Unscrew caps.
- Charge the battery with a conventional battery charger. Observe the manufacturer specifications!
- Screw in caps.

Installing the battery

- Insert new or charged battery and attach the fastenings.
- Clean the terminals and battery poles with fine emery paper.
- Connect the plus pole first and then the minus pole. Otherwise there is a danger of short-circuit! Make sure the terminals have good contact. Tighten clamp bolts hand-tight.
- Grease the assembled terminals with an acid-

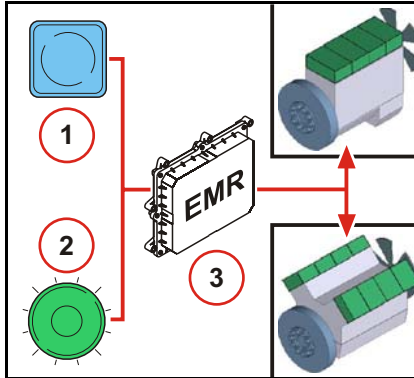
free, acid-resistant grease.

Faults and remedies

Faults	Causes	Measures
Engine does not start or is difficult to start	Not disconnected (if possible)	Check coupling
	Below starting limit temperature	Check
	Lubricating oil level too low	Fill up lube oil
	Lube oil level too high	Check lube oil level, if necessary drain off.
	Lube oil cooler defective	Check
	Exhaust gas backpressure too high	Check
	Belt/V-rib belt (fuel pump in belt drive)	Check whether torn or loose
	Wrong SAE viscosity class of the engine lubricating oil	Change the lubricating oil
	Fuel quality does not comply with operating manual	Change the fuel
	Air in fuel system	Vent fuel system
	Battery defective or discharged	Check battery
	Cable connection to starter loose or oxidized	Check cable connections
	Starter defective or pinion does not engage	Check starter
Engine does not start and diagnostic lamp flashes	Engine electronics prevents starting	Check error according to error code and eliminate error if necessary
Engine starts, but runs irregularly or fails	Belt/V-rib belt (fuel pump in belt drive)	Check whether torn or loose
	Incorrect valve clearance	Settings
	Injector defective	Change
	Injection valve defective	Change
	Glow plugs defective	Change
	Air in fuel system	Vent
	Fuel filter contaminated	Clean
	Fuel quality does not comply with operating manual	Change the fuel
	Injection line leaks	Check injection line
	Injection valve defective	Check fuel injector / change if necessary

Faults	Causes	Measures
Speed changes are possible and diagnostic lamp lights up	Engine electronics has detected a system error and activates an equivalent speed	Check error according to error code and eliminate error if necessary
Engine becomes excessively hot. Temperature warning system activates	Ventilation line of the coolant system blocked	Clean
	Injector defective	Change
	Coolant heat exchanger soiled	Clean
	Coolant pump defective (V-rib belt torn or loose)	Check whether torn or loose
	Low coolant	Fill up
	Charge air line leaking	Check charge air line
	Belt/V-rib belt (fuel pump in belt drive)	Check whether torn or loose
	Lube oil filter contaminated on the air or lube oil side	Change
	Lubricating oil level too low	Fill up lube oil
	Lube oil level too high	Check lube oil level, if necessary drain off.
	Air filter clogged / turbocharger defective	Check/replace
	Air filter maintenance switch / maintenance indicator defective	Check/replace
	Fan defective/V-rib belt torn or loose	Check fan/V-belt, change if necessary
	Heat short-circuit in the cooling system	Check the cooling system
	Resistance in cooling system is too high / flow volume too low	Check the cooling system
Engine output is deficient	Lube oil level too high	Check lube oil level, if necessary drain off.
	Fuel quality does not comply with operating manual	Change the fuel
	Air filter clogged / turbocharger defective	Check/replace
	Air filter maintenance switch / maintenance indicator defective	Check/replace
	Charge air line leaking	Check charge air line
	Charge air cooler soiled	Clean
	Injection line leaks	Check injection line
	Injector defective	Change
	Injection valve defective	Check fuel injector

Faults	Causes	Measures
Engine performs poorly and diagnostic lamp lights	Engine electronics reduce performance	Check error according to error code and eliminate error if necessary
Engine does not run on all cylinders	Injection line leaks	Check injection line
	Injection valve defective	Check fuel injector / change if necessary
Engine lubricating oil pressure is non-existent or excessively low	Lubricating oil level too low	Fill up lube oil
	Excessive inclination of engine	Check engine mounting / reduce inclination
	Wrong SAE viscosity class of the engine lubricating oil	Change the lubricating oil
Engine lubricating oil consumption excessive	Lube oil level too high	Check lube oil level, if necessary drain off.
	Excessive inclination of engine	Check engine mounting / reduce inclination
Engine producing blue smoke	Lube oil level too high	Check lube oil level, if necessary drain off.
	Excessive inclination of engine	Check engine mounting / reduce inclination
Engine producing white smoke	Below starting limit temperature	Check
	Fuel quality does not comply with operating manual	Change the fuel
	Injection valve defective	Check fuel injector / change if necessary
Engine producing black smoke	Air filter clogged / turbocharger defective	Check/replace
	Air filter maintenance switch / maintenance indicator defective	Check/replace
	Charge air line leaking	Check charge air line
	Injection valve defective	Check fuel injector / change if necessary
	Injector defective	Change



Engine protection function of the EMR3 system

Depending on the design of the monitoring functions, the EMR3 can protect the engine from damage in certain error situations by monitoring important limit values during operation and checking the correct functioning of the system components.

Override switch (if configured)

The switch-off procedure for the engine is bypassed using the override switch. This can destroy the engine. The actuation of the override switch is stored in the control unit

Diagnostic key and error lamp

The diagnostic key (1) and the error lamp (2) are accommodated in the vehicle drive stand. The blink-code release can be activated using the diagnostic key (1).

The error lamp can release the following signals:

- Function test
 - Ignition on, error lamp lights up for approx. 2 seconds and then goes out.
 - Check the error lamp if there is no reaction after switching on the ignition.
 - Steady light
 - Error in the system.
 - Operation continued with restrictions.
 - The engine must be checked by a DEUTZ partner.
 - Flashing
 - Serious error in the system.
 - The engine has reached switch-off condition.
 - The switch-off process has been accomplished.
 - Blink code
 - Errors that may occur can be classified.
 - The blink codes can only be interpreted by a DEUTZ partner.
- The flashing error lamp may have the following meaning depending on the engine configuration:
- Switch off prompt for the operator. Attention: Failure to do so will lead to loss of guarantee!
 - Automatic shutdown of the engine after a short warning time, possibly in connection with a start lock.
 - Engine forced to run at low idle speed to cool the engine, with automatic shutdown if necessary.
 - Start lock



DEUTZ Electronic Display

In order to show measured values and error messages of the EMR control unit, a CAN display (**TN 0440 6060**) is optionally available, which can be integrated into the dashboard of the driver's position of working machines.

The display unit communicates with the control unit through a CAN BUS in accordance with SAE J1939 under consideration of the DEUTZ CAN specification.

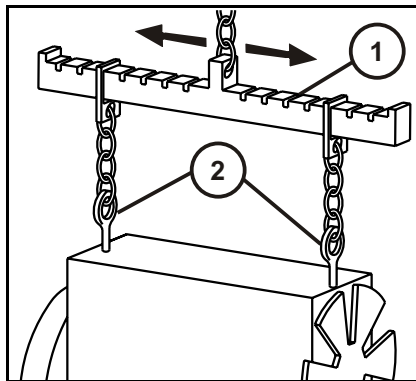
All data sent from the EMR control unit through CAN can be displayed.

- Engine speed
- Engine torque (current)
- Lubricating oil temperature
- Coolant temperature
- Suction intake air temperature
- Exhaust gas temperature
- Gear oil temperature

- Lubricating oil pressure
- Coolant pressure
- Charge air pressure
- Fuel pressure
- Gear oil pressure
- Battery voltage
- Accelerator position
- Fuel consumption

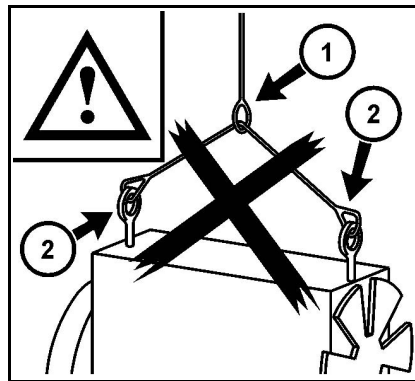
Error messages are displayed in clear text and acoustically; the error memory of the control unit can be read out.

For a detailed description, refer to the operating instructions enclosed with the DEUTZ Electronic Display.



Suspension equipment

- Always use proper suspension equipment when transporting the engine.
- The suspension device (1) must be adjustable for the engine's centre of gravity.
- After transportation and before commissioning of engine: remove attachment eyes (2).



Danger to life!

The engine may tip over or fall down if suspended incorrectly!

- The fastening attachment cannot be fixed securely above the centre of gravity (1).
- The fastening attachment can slip, the engine swings backwards and forwards (1).
- Too short a fastening attachment causes bending torques in the transport device (2) and can damage it.

General

Engines contain the following types of corrosion protection:

- Interior corrosion protection
- Exterior corrosion protection



Your DEUTZ partner has the right corrosion protection agent for your needs.

The following measures for corrosion protection **after taking the engine out of operation** meet the requirements for 12 months corrosion protection.

The following corrosion protection work may only be carried out by persons familiar with it and instructed in the potential dangers.

If these measures are deviated from by exposing the corrosion-protected engines or parts to unfavourable conditions (installation outdoors or storage in damp, badly aired places) or damage to the corrosion protection layer, a shorter corrosion protection duration is to be expected.

The engine corrosion protection should be checked about every 3 months by opening the covers. If corrosion is detected, the corrosion protection should be renewed.

At the end of the corrosion protection work the crank drive may no longer be turned so that the corrosion protection agent in the bearings, bearing liners and cylinder liners is not scraped off.

Before operating a corrosion protected engine, the corrosion protection must be removed.

Interior corrosion protection

- Interior corrosion protection is always provided by wetting of the walls with the implemented cor-

rosion protection agent in a corrosion protection run of the engine.

- The corrosion protection run can be performed once to protect the different systems:

Fuel system

- Fill the fuel tank with a mixture of:
 - 90 % distilled fuel
 - 10 % corrosion protection oil SAE 20W-20
- Perform a corrosion protection run with no load for at least 5 minutes.

Lubricating oil system

- Drain lubricating oil from warm engine.
- Thoroughly clean lube oil tray, cylinder head with rocker arms, valves, valve springs with diesel fuel or cleaning agent.
- Fill the engine with corrosion protection oil SAE 20W-20 up to the MAX mark and perform a corrosion protection run for at least 5 minutes so that all the components of the lubricating oil system are wetted or wet all accessible parts with corrosion protection oil and pump corrosion protection oil through the engine with a separate pump until all bearings and bearing liners are wetted.

Air compressor

- If a compressor is installed, a corrosion protection agent must be sprayed into the compressor suction system after shutting down the engine until it emerges visibly from the pressure nozzle.

Cooling system

- Depending on the series the engines are equipped with cooling air, cooling oil or cooling

fluid system (cooling water with cooling system protection agent).

- Cooling air system, see the Exterior corrosion protection section.
- In engines of the oil-cooled series the circulating lubricating oil serves simultaneously for cooling. The cooling chambers are protected automatically against corrosion with the lube oil system.
- If a coolant with corrosion protection properties is poured into liquid-cooled engines, no further action is necessary after draining.
- If not, the coolant must be drained and, to ensure the formation of a covering layer on the inside surfaces of the cooling system, a corrosion protection run performed with a mixture of:
 - 95 % treated water
 - 5 % corrosion protection agent
- The duration of the corrosion protection run and the concentration of the corrosion protection agent are specified by the manufacturer of the corrosion protection agent.
- Then drain the coolant.

Air intake pipes

- After the corrosion protection run, remove the cylinder head cover and deinstall injectors. The respective piston must be set to LT.
- The accessible part of the cylinder liner should be coated with corrosion protection oil with a spray lance through the opening.
- Spray corrosion protection oil SAE 20W-20 into the suction air intake line.

Exterior corrosion protection

- The engine must be cleaned thoroughly with a cleaning agent before exterior corrosion protec-

tion. Any signs of corrosion and damage to the paintwork must be removed.

Cooling air system in air-cooled engines

- The air guidance compartment of the engines is unpainted and must be sprayed with a corrosion protection agent.

Bare exterior surfaces and parts

- Coat or spray all bare exterior parts and surfaces (e.g. flywheel, flange faces) with corrosion protection agent.

Rubber parts

- Rubber parts (e.g. muffs) which are not painted over must be rubbed down with talcum powder.

Belt drive

- Remove V-belts and V-rib belts and store packed.
- Spray V-belt pulleys and tension rollers with corrosion protection agent.
- Toothed belts for engine control may not be removed.

Engine openings

- All engine openings must be fitted with air-tight, water-tight covers to delay the vapourisation process of the corrosion protection agents.
- With installed air compressor, the suction and pressure connection must be sealed by a cap.
- Air should be excluded to avoid ventilation of the engine (chimney effect) for the suction from an air supply pipe.



Also close the fuel/tank/supply line to the engine so that the sensitive rail system is protected against dirt and dust. Protect the electronics against moisture/corrosion (77).

Storage and packaging

- After being protected against corrosion, the engine must be stored in a dry, ventilated hall and suitably covered.
- The cover must be placed loosely over the engine so that the air can circulate around it to prevent condensation from forming. Use a desiccant if necessary.

Removal of corrosion protection

- The corrosion protection must be removed from the corrosion protected engine before starting.
- The packaging and all covers over the closed openings must be removed.
- Any corrosion deposits and paint damage should be remedied.

Fuel system

If there is a mixture of diesel fuel/corrosion protection oil in the fuel tank, drain it.

- Fill the fuel tank and fuel system with the proper fuel.

Coolant system

- If the implemented corrosion protection agent is compatible with the intended cooling system protection agent, this can be filled directly into the coolant system as specified.
- If it is uncertain whether the implemented corrosion protection agent is compatible with the cooling system protection agent, the cooling system should be purged with fresh water for about 15 minutes before filling.

Removal of exterior corrosion protection

- All areas and components coated with corrosion protection agent must be washed off with distilled fuel or a suitable cleaning agent.
- Wash out grooves of V-belt pulleys if necessary.
- Mount V-belts or V-rib belts as specified.
- Fill with coolant.
- Connect fuel/tank/supply line to the engine. Pay attention to cleanliness.
- Start the engine.

General technical data

Engine type		TCD 2012 L04 4V	TCD 2012 L06 4V
No. of cylinders		4	6
Cylinder arrangement		upright in row	
Bore	[mm]	101	
Stroke	[mm]	126	
Total displacement	[cm ³]	4038	6057
Compression ratio	[ε]	18	
Functional principle/combustion method		Four-stroke diesel with charging and direct injection	
Charge air cooler		with	
Charge air temperature outlet at rated power	[°C]	50	
Direction of rotation looking onto the flywheel		left	
Injection system		DCR	
Deutz Common Rail (DCR)			
Weight excluding cooling system to DIN 70020-A	[approx. kg]	450	570
Engine power rating according to ISO 3046	[kW]	Engine performance, speed and start of pumping, among other things, are stamped on the engine rating plate.	
Speed (nominal revolutions)	[min ⁻¹]		
Valve clearance: inlet/outlet			
Setting with special tool	[°]	Value specified by special tool 100 340	
Ignition pressure	[kPa (bar)]	16000 (160)	
start of delivery	[°CABTDC]	Engine performance, speed and start of pumping, among other things, are stamped on the engine rating plate.	
Firing order of the engine		1-3-4-2	1-5-3-6-2-4
V-belt tension		Pre-tensioning/Re-tensioning	
Generator	[N]	650/400 ± 50	
Fuel pump/Coolant pump	[N]	650/400 ± 50	

Engine type		TCD 2012 L04 4V	TCD 2012 L06 4V
V-rib belt tensioning The V-rib belt has an automatically tensioning spring-loaded tensioning pulley and is not re-tensioned.		Spring-loaded tensioning pulley	
Cooling		Liquid-cooled/cooling system protection	
Coolant volume (engine content only without cooler)	[approx. ltr.]	5,6	7,3
Permissible continuous coolant temperature	[°C]	max. 110	
Temperature difference between coolant inlet/outlet	[°C]	4-8	
Start of thermostat opening	[°C]	87	
Thermostat fully open	[°C]	102	
Coolant preheating		Only necessary in winter operation.	
Lubrication		Pressure lubrication	
Lubricating oil SAE ( 34)			
Lube oil temperature in the lube oil tray, maximum	[°C]	125	
Lubricating oil pressure in warm state (114°C) and low idle, minimum	[kPa (bar)]	80 (0,8)	
Lube oil first fill quantities			
Specified lubricating oil filling volumes apply for the standard versions. The lubricating oil filling volume may vary in engines which deviate from the standard, e.g. different lubricating oil pan/lubricating oil dipstick variants and/or special inclined versions. The lubricating oil dipstick mark is always decisive.			
Lube oil first fill quantity without filter, minimum / maximum	[approx. ltr.]	12,5/15,0	23,5/26,0
Lube oil first fill quantity with filter, minimum / maximum	[approx. ltr.]	13,0/15,5	24,0/26,5

General technical data

Engine type		TCD 2013 L04 4V	TCD 2013 L06 4V
No. of cylinders		4	6
Cylinder arrangement		upright in row	
Bore	[mm]	108	
Stroke	[mm]	130	
Total displacement	[cm ³]	4761	7142
Compression ratio	[ε]	18	
Functional principle/combustion method		Four-stroke diesel with charging and direct injection	
Charge air cooler		with	
Charge air temperature outlet at rated power	[°C]	50	
Direction of rotation looking onto the flywheel		left	
Injection system		DCR	
Deutz Common Rail (DCR)			
Weight excluding cooling system to DIN 70020-A	[approx. kg]	530	620
Engine power rating according to ISO 3046	[kW]	Engine performance, speed and start of pumping, among other things, are stamped on the engine rating plate.	
Speed (nominal revolutions)	[min ⁻¹]		
Valve clearance: inlet/outlet			
Setting with special tool	[°]	Angular degree 75/105	
Ignition pressure	[kPa (bar)]	16000 (160)	
start of delivery	[°CABTDC]	Engine performance, speed and start of pumping, among other things, are stamped on the engine rating plate.	
Firing order of the engine			
V-belt tension		1-3-4-2	1-5-3-6-2-4
Generator	[N]	Pre-tensioning/Re-tensioning	
Fuel pump/Coolant pump	[N]	650/400 ± 50	

Engine type		TCD 2013 L04 4V	TCD 2013 L06 4V
V-rib belt tensioning The V-rib belt has an automatically tensioning spring-loaded tensioning pulley and is not re-tensioned.		Spring-loaded tensioning pulley	
Cooling		Liquid-cooled/cooling system protection	
Coolant volume (engine content only without cooler)	[approx. ltr.]	7,5	9,8
Permissible continuous coolant temperature	[°C]	max. 105	
Temperature difference between coolant inlet/outlet	[°C]	4-8	
Start of thermostat opening	[°C]	86	
Thermostat fully open	[°C]	102	
Coolant preheating		Only necessary in winter operation.	
Lubrication		Pressure lubrication	
Lube oil SAE (🛢️ 34)			
Lube oil temperature in the lube oil tray, maximum	[°C]	125	
Lubricating oil pressure in warm state (114°C) and low idle, minimum	[kPa (bar)]	80 (0,8)	
Lube oil first fill quantities			
Specified lubricating oil filling volumes apply for the standard versions. The lubricating oil filling volume may vary in engines which deviate from the standard, e.g. different lubricating oil pan/lubricating oil dipstick variants and/or special inclined versions. The lubricating oil dipstick mark is always decisive.			
Lube oil first fill quantity without filter, minimum / maximum	[approx. ltr.]	12,5/15,0	23,5/26,0
Lube oil first fill quantity with filter, minimum / maximum	[approx. ltr.]	13,0/15,5	24,0/26,5

Tool ordering

The special tools described in this chapter can be ordered from:

Fa. Wilbär

Taubenstraße 5

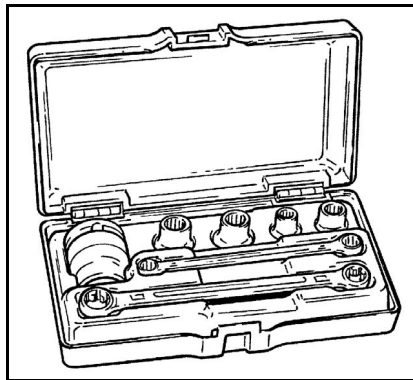
D-42826 Remscheid

Tel.: 0049 (0) 2191-9339-0

Fax: 0049 (0) 2191-9339-200

E-mail: info@wilbaer.de

<http://www.deutz-tools.com>

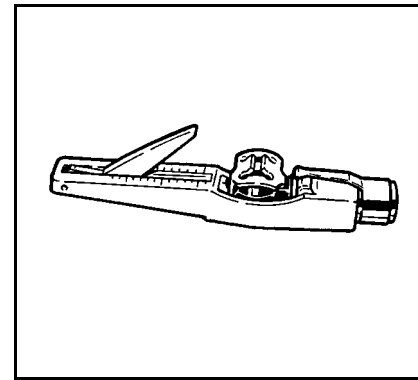


Torx tool

Order no.: 8189

The Torx screw system is used in engines in this series among other things. This system was introduced for a number of reasons:

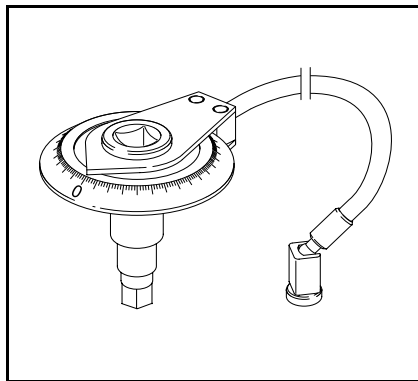
- Excellent accessibility
- High force transmission when loosening and tightening
- Slipping or breaking of the key and risk of injury are practically excluded.



V-belt tension measuring instrument

Order number: 8115

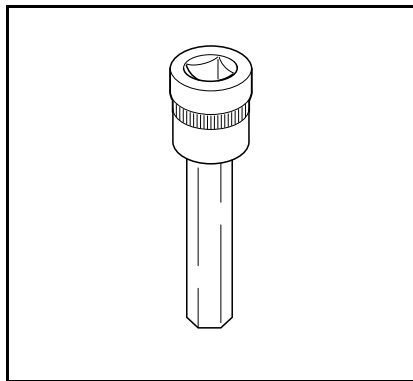
Measuring instrument for checking the specified V-belt tensions.



Rotation angle disc

Order no.: 8189

Rotation angle disc for setting the valve and control piston clearance

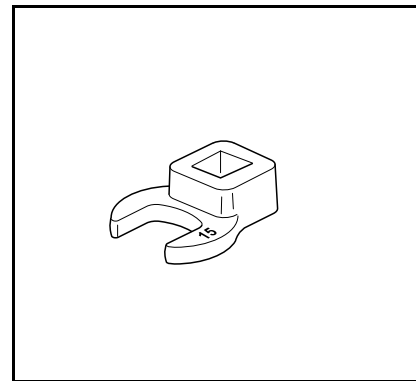


Pin wrench insert

Order no.: 8193 (5 mm) valve clearance

Order no.: 8194 (4 mm) control piston clearance

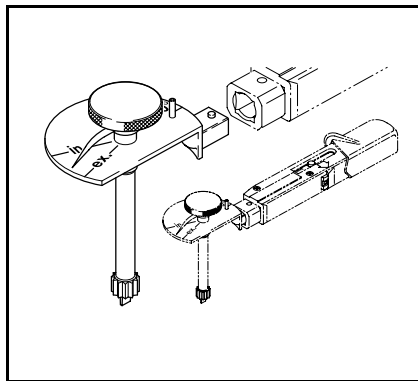
Pin wrench inserts for rotation angle disc



Crow foot wrench

Order no.: 8199

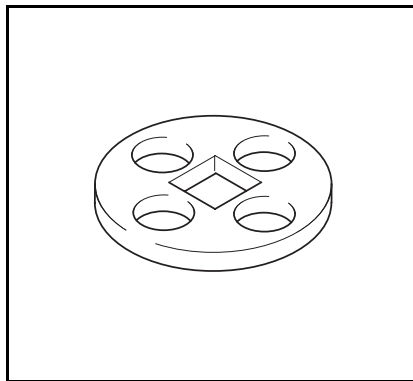
Crow foot wrench for rotation angle disc 8190 in connection with conventional square bar extension.



Valve clearance setting tool

Order no.: 100 340

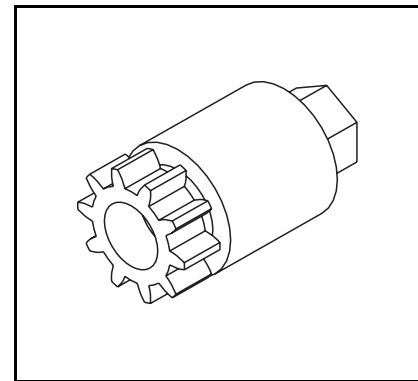
For setting the valve clearance for TCD 2012 4V.



Turning gear

order no.: 100 330

For turning over the engine as an attachment for the torsional vibration damper



Turning gear

order no.: 100 360

For turning over the engine on the toothed starter ring.



Bowl key

Order no.: 8192

Special tool for removing the water collection vessel in the fuel pre-filter (Racor type)



Closing plugs and caps

Order no.: 170 160

A set of closing plugs and caps for sealing fuel lines.

DEUTZ Oil



DEUTZ Oil DQC II-05

ACEA E5-02 / E3-96 / B3-04
API CG-4

TLS-15W40D (DQC II-05)	
5 L	0101 6331
20 L	0101 6332
209 L	0101 6333



DEUTZ Oil DQC III-05

ACEA E7-04 / E5-02 / E3-96 / B4-04 / A3-04
API CI-4 / SL GLOBAL DHD-1

TLX-10W40FE (DQC III-05)	
5 L	0101 6335
20 L	0101 6336
209 L	0101 6337



DEUTZ Oil DQC IV-05 (Synthetic)

ACEA E7-04 / E5-02 / E4-99

DEUTZ Oil DQC IV-5W30 (DQC IV-05)	
5 L	-
20 L	0101 7849
209 L	0101 7850



The engine company.

DEUTZ AG

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