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Diesel Engine

D934 A7 D936 A7 D946 A7- With Exhaust Gas After-Treatment System Diesel Particulate Filter

From serial number 2012030001 / 2012040001

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Manufacturer:	LIEBHERR MACHINES BULLE S.A.
Type:	D934 A7 D936 A7 D946 A7 With Exhaust Gas After-Treatment System Diesel Particulate Filter
Type no.:	
Serial no. from:	2012030001 / 2012040001

Contact

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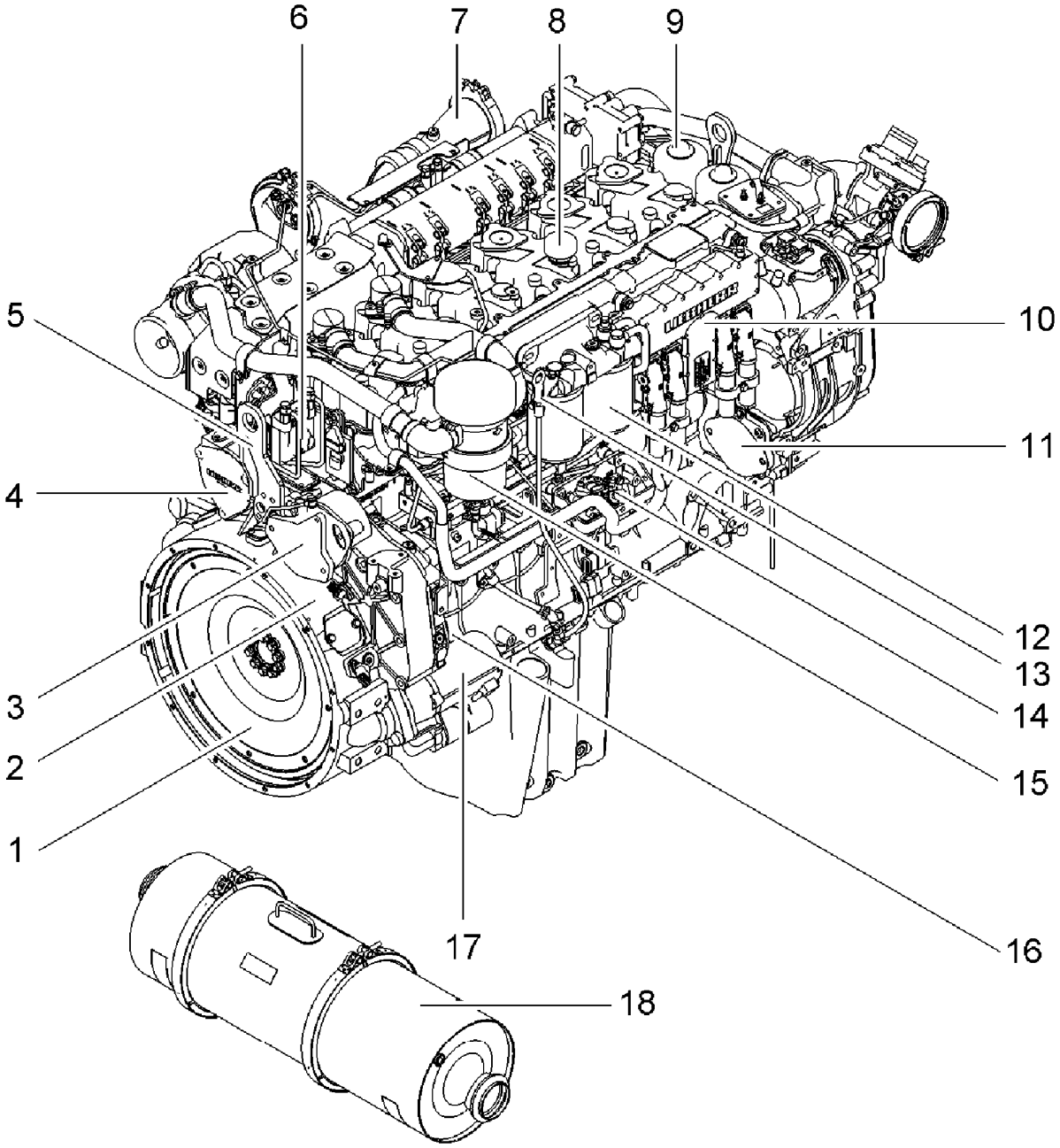

Fig. 2: Components of diesel engine D936 A7 / View from the right

1	Flywheel	**7**	Connecting line	**13**	Oil dipstick
2	Flywheel housing	**8**	Oil filling inlet	**14**	Dosing unit
3	Power take-off NA1	**9**	Oil filter	**15**	Crankcase ventilation
4	Power take-off NA2	**10**	Engine control unit	**16**	Power take-off NA3
5	Transport device	**11**	Power take-off NA4	**17**	Starter
6	eAGR-actuator	**12**	Fuel fine filter	**18**	Diesel particulate filter

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2 Notes on safety

Working on the diesel engine is extremely hazardous to user, machine operator or maintenance technician. Dangers and accidents can be avoided if the various notes on safety are frequently read and adhered to.

This applies in particular for personnel carrying out maintenance tasks opportunely on the diesel engine.

Conscientious adherence of the safety guidelines, specified as follows, will guarantee the safety of yourself and others, as well as safeguarding against damage to the diesel engine.

All necessary safety precautions relevant to the description of tasks which could cause injury to personnel, or damage to the diesel engine, are described in this book.

2.1.1 Designation of warning information

	This is a warning sign. It warns against potential risks of injury. All measures stipulated for this warning sign must be adhered to if injuries and fatalities are to be prevented.

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The warning sign is always displayed in correlation with the signal words

DANGER
WARNING
ATTENTION

	**DANGER**	signifies an immediately dangerous situation which could result in fatalities or serious injury if it is not prevented.
	**WARNING**	signifies a dangerous situation which could result in fatalities or serious injury if it is not prevented.
	**ATTENTION**	signifies a dangerous situation which could result in minor or significant injury if it is not prevented.
	CAUTION	signifies a dangerous situation which could result in material damage if it is not prevented.

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Further designations

	**Note**	signifies useful notes and tips.

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3 Operation, Servicing

3.1 Control and operating elements

The control elements and operating elements are integral parts of the machine and are described in the documentation of the manufacturer.

Data pertaining to oil pressure, coolant temperature, speed, operating hours and service code, for example, are transferred to the machine via the electronic interface on the diesel engine for operation and regulation of the diesel engine.

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4 Malfunctions

Troubleshooting can prove difficult for diesel engines. For possible problems of the diesel engine with potential causes and correction measures, see the table Faults - Cause - Remedy.

	Note	Faults in the diesel engine are indicated via error code on the machine display for diagnosis. An explanation and a remedy are described in the respective machine documentation.

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Fundamental logical steps for diagnosis are included in the following list:
- Knowing the diesel engine and all associated systems.
- Scrutinise the problem thoroughly.
- Relate the problem and knowledge of the diesel engine and its systems.
- Diagnose the problem, whereby the simplest assumptions are worked upon.
- Double check before beginning disassembly.
- Establish the causes and perform repair work thoroughly.
- Following repair, allow the diesel engine to run under normal operating conditions and check whether the problem and the cause have been remedied.

4.1 Faults - Cause - Remedy

Malfunction / error	Cause	Remedy
Starter is not turning	Main fuse burned out	Replace the fuse
	Battery connections loose or corroded	Clean and tighten loose connections
	Battery voltage too low	Charge or replace battery
	Starter current circuit broken or contacts corroded	Consult Liebherr after-sales services
	Starter faulty	Consult Liebherr after-sales services
Starter is only turning slowly	Battery voltage too low	Charge or replace battery
	Battery connections loose or corroded	Clean and tighten loose connections
	Ambient temperature too low	Observe the measures for winter operation

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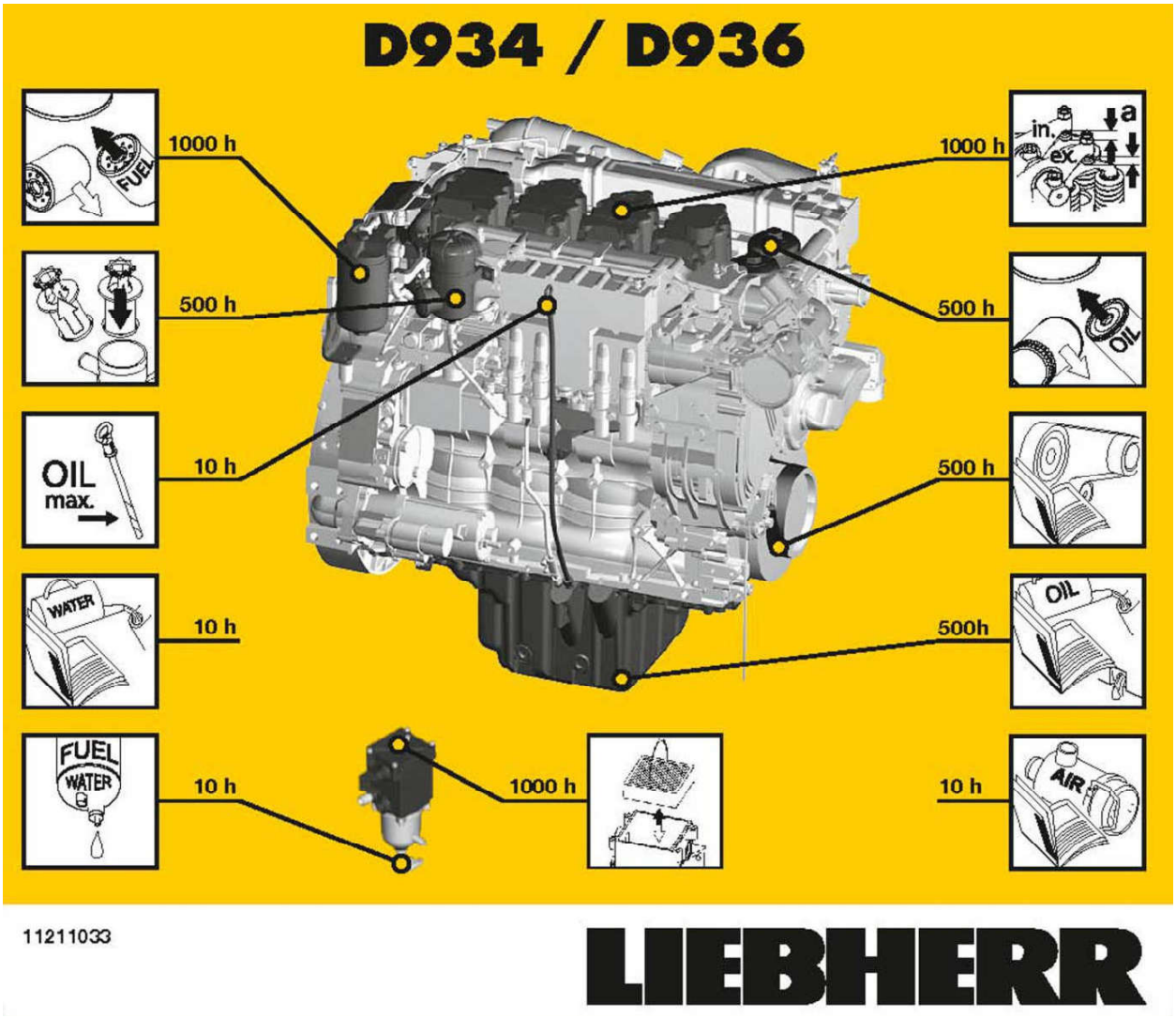

Fig. 35: Lubrication chart

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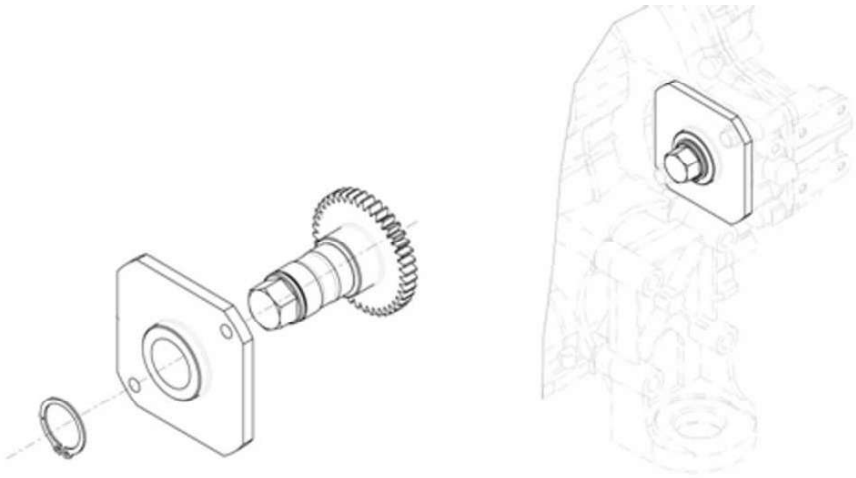

Fig. 43: Turning gear - Mounting the power take-off NA4 special tool no. 30d

The turning gear special tool no. 30d is optional and is not included in the delivery scope of the diesel engine.

No.	ID no.	Designation	See section
30d	10134822	Turning gear	Check / adjust valve clearance

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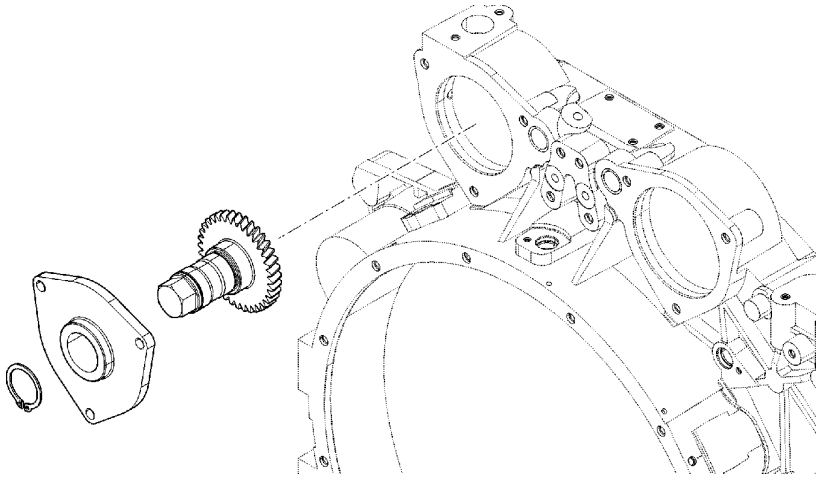

Fig. 44: Turning gear - Mounting the power take-off NA2 special tool no. 30e

The turning gear special tool no. 30e can only be mounted if the idler is included in the delivery scope of the diesel engine (not featured as standard).

No.	ID no.	Designation	See section
30e	10138480	Turning gear	Check / adjust valve clearance

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Note

- ▶ Protect the ribbed V-belt against escaping oil when replacing the oil filter cartridges!
- ▶ After replacing the oil filter, remove all traces of oil on the diesel engine, as well as behind the vibration damper in order that this will not be later diagnosed as leaks in the rotary shaft seal.

- ▶ Loosen the oil filter cartridges **1** with a strap wrench or hexagonal wrench SW 30 and unscrew the filter.
- ▶ Clean the sealing faces of the filter bracket.
  ▷ Old filter seal and its residues have been removed.
- ▶ Apply a thin coat of diesel engine oil to the rubber sealing ring on the new oil filter cartridge.
- ▶ Screw on the new oil filter cartridge until the sealing ring is resting on the filter bracket
  ▷ The sealing ring is resting on the filter bracket:
- ▶ Tighten the oil filter cartridge; 3/4 to 1 full turn / 20 Nm- 5 Nm.

Filling diesel engine oil

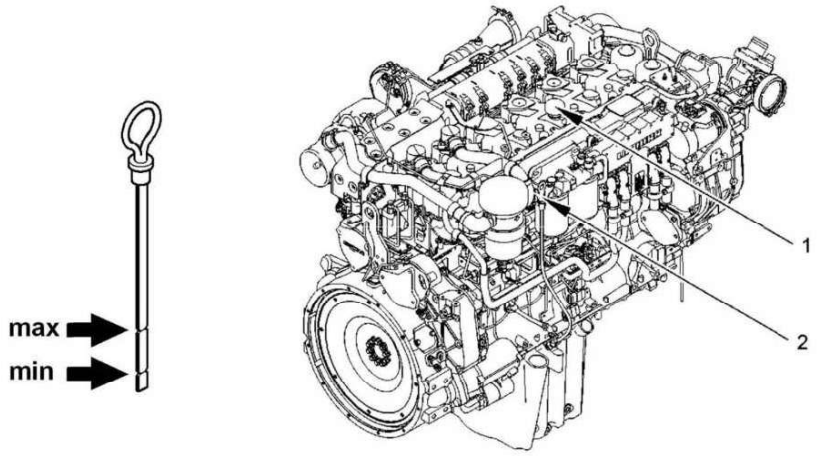

Fig. 53: Diesel engine-oil filler nozzle

- ▶ Fill in oil via the filler neck **1**.
- ▶ Do not fill oil into the diesel engine above the “max.” marking.
- ▶ Clean the filler cap, fit onto the filler neck and tighten.
- ▶ Start the diesel engine and check the oil pressure.
- ▶ Switch off the diesel engine and after 2 - 3 minutes check the oil level on the dipstick.

Troubleshooting
The oil level is not within min. and max.?

- ▶ Rectify the oil level.

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Checking valve clearance and adjusting with engine auxiliary brake system (ZBS)

Checking and adjusting intake valve clearance

- ▶ Remove the cylinder head covers.
- ▶ Fit the turning gear.
- ▶ Continue to turn the crankshaft with turning gear in the direction of rotation until the valves of the cylinder being adjusted overlap. For details, see the table “Valve of the cylinder D934 A7” or “Valves of the cylinder D936 A7 / D946 A7”.

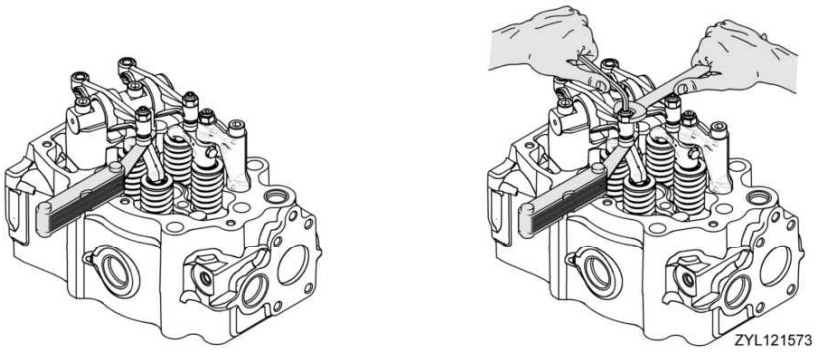

Fig. 62: Checking / adjusting intake valve clearance

- ▶ Insert feeler gauge between valve fitting and rocker arm and check valve clearance.

Troubleshooting
The clearance does not correlate with the adjustment values (see the chapter “Technical data, valve clearance”)?

- ▶ Loosen the lock nut on the adjusting screw of the respective rocker arm and adjust the setting.
- ▶ Tighten the lock nut with 45 Nm.

- ▶ Check the setting again.
- ▶ Following checking and/or adjustment of all valves, fit the cylinder head covers with inspected and approved damage-free seals.
- ▶ Dismantle the turning gear.

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Draining the coolant

DANGER
Hot refrigerant!
Burns.

- ▶ Before opening the filler neck, allow the engine to cool.
- ▶ Beware of overpressure when opening the filler neck.
- ▶ Under no circumstances should the cooling system be filled when the engine is still hot.

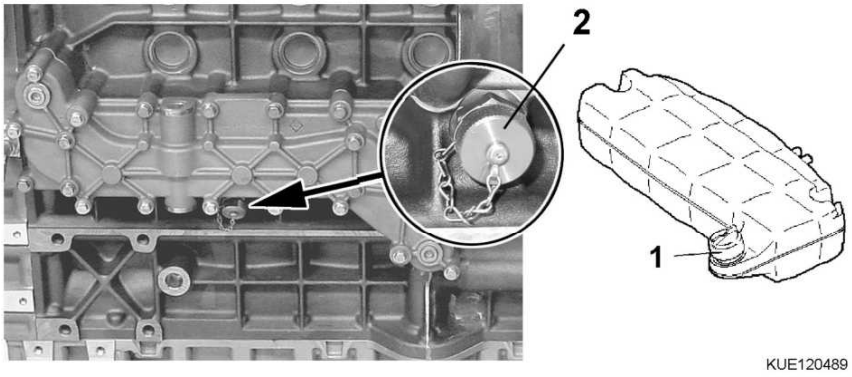

Fig. 72: Draining the coolant

- ▶ Turn the sealing cap **1** slightly in an anticlockwise direction to allow excess pressure to dissipate, then open.

CAUTION
Coolant can cause injury to the eyes and lead to allergic skin reactions!

- ▶ Avoid contact of coolant with skin at all costs.
- ▶ Refer to the manufacturer's instructions.
- ▶ When mixing coolant, always wear rubber gloves and protective glasses.
- ▶ Wash out any splashes in the eyes or onto skin immediately with water.

- ▶ Position a collecting vessel beneath the diesel engine.
- ▶ Open the protective cap **2** from the drain valve on the radiator plate on the left-hand side of the diesel engine.
- ▶ Screw the drainage hose onto the drain valve, the drain valve opens.
- ▶ Open the drain plug on the cooler (see documentation of the machine manufacturer).
  ▷ The coolant from the oil cooler housing and cooler flows into the tank.
- ▶ Once the coolant has drained, unscrew the drainage hose from the drain valve.
- ▶ Fit the protective cap and close the cooler again.

Filling in coolant

- ▶ Fill in the ready-mixed coolant prepared in accordance with specifications in the chapter “Diesel engine coolant” via the filler neck.

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- ▶ Open the bleed screw **1**.
- ▶ Turn the marking **2a** “PU” in the direction of the arrow (in an anticlockwise direction).
- ▶ Continue to actuate the manual delivery pump **2b** until bubble-free fuel flows out at the bleed screw **1**.
- ▶ Tighten the bleed screw with a tightening torque of 6 Nm.

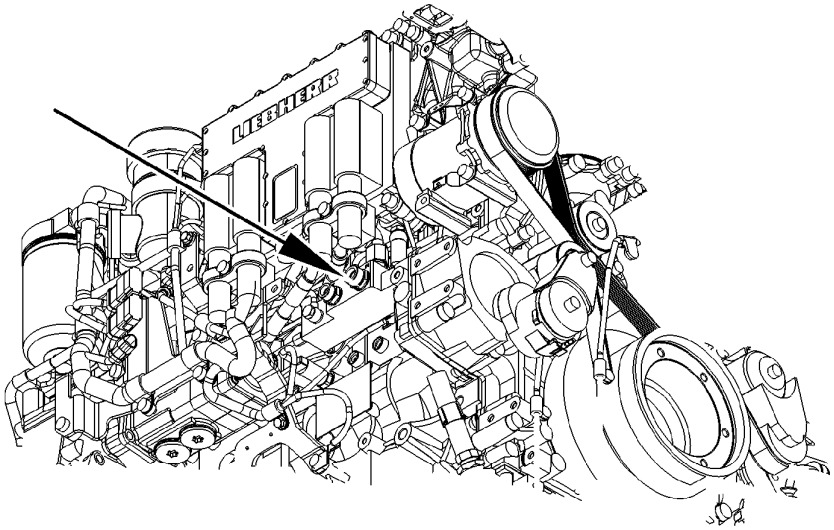

*Fig. 78: Connection **MOTOR IN***

- ▶ Open the cap nut of the fuel supply line at connection **MOTOR IN**.
- ▶ Continue to actuate the manual delivery pump.

If bubble-free fuel is flowing from the loosened pipe connection **MOTOR IN**:
- ▶ Screw in the opened fuel line **MOTOR IN** again with the corresponding tightening torque.
- ▶ Continue to actuate the hand pump until a significant resistance can be felt.

To allow start-up of the diesel engine:
- ▶ Turn the “arrow” marking **2c** in the direction indicated by the arrow (clockwise).
- ▶ Start the diesel engine.

Troubleshooting
The engine has still not started after approx. 20 seconds?

- ▶ Wait for 1 minute.

When this action has been repeated three times:
- ▶ Repeat the bleed procedure.

Procedure for bleeding the fuel system if the manual delivery pump is mounted after the fuel prefilter.

NOTICE
Bleed screw on the fuel prefilter is open.
System is not bled properly, whereby not all of the air is dissipated at the prefilter.

- ▶ Do **not** open the bleed screw at the fuel prefilter.

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Fig. 85: Foam insert - Inner rings

5.20.3 Authorised Liebherr service points

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5.20.4 Sending the diesel particulate filter module

Note

- ▶ Only Liebherr packaging may be used for sending of the diesel particulate filter module.
- ▶ Use the “Service particle filter” form.

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