en **Service manual**

Wheel loader

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Manufacturer: Liebherr-Werk Bischofshofen GmbH
Valid for: L 508-1817

Contact

Liebherr-Werk Bischofshofen GmbH
Dr. Hans Liebherr-Straße 4
A – 5500 Bischofshofen

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010.1.3.4 Operator

Responsibility

Operator is responsible for following:
- Read the operator's manual.
- Read included documentation:
  - Operator's manuals for components
  - Operator's manuals from third party manufacturers
  - Additional instructions
- Wear personal protective equipment.
- Operate machine as intended.
- Avoid working methods that can endanger safety.
- Adhere to safety regulations at place of use.
- Maintain visual contact or voice contact with spotter.
- During operation, do not allow any other persons on machine.
- Report all changes to machine that affect safety to operating company.
- If it is no longer possible to work safely, stop operating the machine immediately.
- Only perform retrofittings of machine after consultation with manufacturer.
- Use original Liebherr spare parts wherever possible.

Requirement

The operator has following qualification and skills:
- Has completed the legally specified minimum age.
- Is physically and mentally capable of operating the machine safely.
  - Satisfactory eyesight
  - Satisfactory hearing ability
  - Quick reactions
  - Is able to estimate distance, height and gaps.
- Has the necessary authorisation for operation of machine.
- The operator has the necessary education (theoretical and practical) for the following:
  - Handling the machine type
  - Attaching
  - Spotting
  - Handling fire extinguishing equipment
- Knows all means of escape in an emergency.
- Is not under any physical or mental impairment that limits one of the prescribed requirements.
- Is not under the influence of alcohol.
- Is not under the influence of drugs.

010.1.3.5 Maintenance staff

Responsibility

The maintenance staff are responsible for the following:
- Read the operator's manual.
- Read included documentation:
  - Operator's manuals for components
  - Operator's manuals from third party manufacturers
  - Additional instructions
- Maintain machine for safe and reliable function.
- Execute all maintenance tasks specified for maintenance staff in the maintenance and inspection schedule.

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Injuries

Incorrect protection

- If there is a danger of falling objects: Exclusively use machines with suitable falling object protective structures.
- If there is a danger of objects penetrating the operator's cab: Exclusively use machines with suitable falling object protective structures.
- If machine is used in toxic environment: Insert filters approved for the use in air conditioning.
- If machine is used in dust-intensive environment: Insert filters approved for the use in air conditioning.

Incorrect refuelling

- Do not touch fuels with your skin.
- Do not inhale fuel vapours.

Incorrect maintenance

- Make sure there is nobody in the danger area.
- Park machine and secure to prevent rolling or driving away.
- Park machine on level, firm ground.
- Park machine with lowered working attachment.
- When searching for leaks in the hydraulic system wear protective gloves.
- Exclusively search for leaks in the hydraulic system with cardboard or similar material.
- Hydraulic system must be depressurised before work can be carried out on it.
- Repairs to hydraulic hoses and hose lines are carried out by authorised specialist staff only.
- Lay and install hydraulic hoses and hose lines professionally.
- Do not weld or solder accumulators.
- Do not perform mechanical work on accumulators.
- Make sure that the permanent labelling of the accumulators (operating data) is kept visible.
- Be especially careful when removing or inserting bolts and pins as this can cause serious injury.
- Make sure that machine is supported in a proper and secure manner.

Crushing injuries

Unexpected movements of machine

- Make sure there is nobody in the danger area.
- Park machine and secure to prevent rolling or driving away.
- Do not work under working attachment unless it is supported or resting on ground.

Unintentional closing of service access points

- Ensure that the service access points cannot close unintentionally.

Incorrect lifting tackle

- Exclusively use undamaged lifting accessories.
- Ensure that the load and tensile capacity of the lifting tackle is sufficient.

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Designation	ID no.	Use	Remark
Valve insert remover	11834779	All wheel loaders	For changing valve inserts in filling port of air conditioning hoses.
Vacuum pump	7027552	All wheel loaders	For evacuating the air conditioning system
4-valve test fitting	7027558	All wheel loaders	For testing, evacuating and filling the air conditioning system
Filling hose, blue 1500 mm	7027553	All wheel loaders	For the test fitting
Filling hose, yellow 1500 mm	7027554	All wheel loaders	For the test fitting
Filling hose, red 1500 mm	7027555	All wheel loaders	For the test fitting
Car coupling 253a	7027556	All wheel loaders	For the test fitting
Car coupling 254a	7027557	All wheel loaders	For the test fitting

Tab. 13: Special tools for air conditioning system

010.2.11 Special tools for cab glazing

Description	ID no.	Use	Remarks
Toolbox complete with suction cups	10021147	All wheel loaders	For removing and installing bonded panes

Tab. 14: Special tools for cab glazing

010.2.12 Special tools for the central lubrication system

Designation	ID number	Use	Remark
Liebherr filling press	10009239	All wheel loaders with Liebherr central lubrication system	For quickly filling the reservoir
Filling press	10333342	All wheel loaders with Liebherr central lubrication system	For quickly filling the reservoir
Liebherr filling port	7029283	All wheel loaders with Liebherr central lubrication system	For quickly filling the reservoir

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010.4 Preservation guidelines

010.4.1 General information

All parts of a construction machine are exposed to corrosion when out of use. Corrosion can be compared to wear. However, the effects can be much more serious than mechanical wear and can significantly reduce the service life of the parts. This means the machines and their components must be preserved according to certain guidelines when out of use.

Generally these guidelines are based on the following time-scales:
- Out of service for an unknown period of time
- Putting the machine out of service
  - Out of service for up to 2 months
  - Out of service for up to 12 months
  - Out of service for longer than 12 months
- Putting back into service

The required measures are also scaled according to the time periods. The preservation measures are not strictly standardized, and are to be shortened or lengthened depending on necessity (e.g. because of environmental conditions).

Such conditions are, for example:
- The machine's location (e.g. in unprotected open space, in closed space, with roof, temperature-controlled environment)
- The type of climate (e.g. extreme temperatures, storage near the sea or the coast, etc.)

010.4.2 Machine out of service for an unknown period of time

If the machine is out of use for a lengthy period without preservation, it must be **put back into service at intervals of no more than 14 days** in order to prevent increased corrosion and the resulting damage.

- All oil levels must be checked before putting into service and filled up where necessary.
- Carry out all the prescribed daily maintenance work every day before putting into service. Carry out all the additional maintenance work subject to time limits as per the inspection plan and the additional diesel engine operator's manual by the specified intervals at the latest.
- Put machine back into service according to operating instructions and operate until the diesel engine and hydraulics system have reached the prescribed operating temperature in the hydraulic tank and in the coolant circulation.
- Activate all the functions of the travel and working hydraulics and of the other hydraulic components, and operate alternately for approx. 20 minutes in total. Hydraulic cylinders must each be extended and retracted over their full stroke length.
- When switching off the machine, retract all the hydraulic cylinders completely if possible, and fill up the fuel tank. If the surface is soft, put the machine on wooden blocks or similar, and secure against rolling.
- Check batteries and, if necessary, remove and recharge. Check electronic contact points and grease with terminal grease if needed.

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	Designation	Unit	Value
	Bucket capacity as per ISO 7546 C)	m^3	1.0
	Bucket width	mm	2100
	Specific material weight	t/m^3	1.8
A	Dumping height at maximum lifting height and 42° tilt out angle	mm	2640
B	Dump height	mm	3000
C	Maximum bucket base height	mm	3180
D	Maximum bucket pivot point height	mm	3370
E	Maximum bucket upper edge height	mm	4260
F	Reach at maximum lifting height and 42° tilt out angle	mm	810
F max.	Maximum reach at 42° tilt out angle	mm	1600
G	Digging depth	mm	57
H	Height above operator's cab	mm	2460
I	Height above exhaust	mm	1810
J	Ground clearance	mm	325
K	Wheelbase	mm	2150
L	Overall length	mm	5515
	Turning radius over bucket outer edge (transport position)	mm	4465
	Breakout force (SAE)	kN	56
	Tipping load when straight	kg	4400
	Tipping load when articulated (ISO 14397-1)	kg	3850
	Operating weight	kg	5600

Tab. 20: Complete machine with loading bucket

A) Z-bar kinematics including quick coupler
B) Welded tooth holder with plug-in teeth
C) In practice, the bucket capacity can be around 10% greater than as calculated using the ISO 7546 standard. This depends on the type of material.

020.1.2 Working attachment: 4 in 1 bucket

Valid for: L508-1817;

Values stated refer to machine:

- With 340/80R18 tyres
- Including all lubricants
- With a full fuel tank
- With ROPS/FOPS cab and operator
- On level and stable ground

Note
Tyres and working attachments affect operating mass and tip load.

▶ Note tyre and working attachment specifications.

▶ See separate operator's manual for more information.

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Description	Unit	Value
Stroke length	mm	380
Weight	kg	51.2
Tightening torque of piston rod bearing	Nm	800
Tightening torque of piston	Nm	400
Tightening torque of piston nut	Nm	200

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020.12 Steel parts of the basic machine

020.12.1 Ballast weight

Valid for: L508-1817;

Description	Unit	Value
Ballast weight	kg	987

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030.3.3 Converting hydraulic system from mineral oils to biodegradable hydraulic fluids

For operation of Liebherrearth moving machines with biodegradable hydraulic fluids, we recommend **Liebherr Hydraulic Plus**.

In the case of a machine equipped with biodegradable hydraulic fluid at the factory, a corresponding information label is attached.

Procedure for later conversion

NOTICE
Non-approved oil!
Damage to the hydraulic system.

- ▶ Only use oil that meets the Liebherr specifications.
- ▶ Do not mix different oils.

- ▶ In case of subsequent conversion of machine to a biodegradable hydraulic fluid, contact Liebherr customer service!
- ▶ Request **instructions** and **conversion guidelines** from Liebherr and observe them!

030.3.4 Diesel fuels

Valid for: L508-1817;

030.3.4.1 Minimum quality requirement

Approved diesel fuels	As per DIN EN 590, ASTM D 975 1-D / 2-D
	Emission stage V
Maximum sulphur content	10 ppm
Minimum cetane number	45
Lubricity at 60 °C (HFRR)	Maximum 460 µm

Tab. 27: Minimum quality requirement

Do not mix diesel fuel with additives.

030.3.4.2 Operating temperatures of diesel fuels

Approved diesel fuels according to DIN EN 590	Cloud point	Ambient temperature
Class standard	-7 °C	to -10 °C
Arctic class 0	-10 °C	to -13 °C
Arctic class 1	-16 °C	to -20 °C

Tab. 28: Operating temperatures of diesel fuels

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CAUTION
Engine hood falling shut
Injury.

▶ Only open the engine hood when the gas-filled springs function properly.

To open engine bonnet:

▶ Open the lock with the ignition key.

▶ Open the engine hood **2** with the handle **1**.
▷ The engine hood **2** is held in this position by gas-filled springs.

Troubleshooting
If the gas-filled spring does not hold the hood open:

▶ Contact Liebherr customer service.

To close engine bonnet:

▶ Close the engine hood **2** with the handle **1**.

▶ Close the lock with the ignition key.

030.4.2.3 Turning off battery main switch

Valid for: L508-1817;

Battery main switch is located on left side of engine compartment.

For certain maintenance tasks, battery main switch must first be turned off.

Find out from descriptions of relevant maintenance tasks whether battery main switch must be turned on or off.

Turn on battery main switch after completing these maintenance tasks.

NOTICE
Voltage fluctuations!
Damage to the electrical system.

▶ Never turn off the battery main switch when the engine is running.

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2 Locking screw **4** Sample container

Note
Contaminated fuel sample!
Incorrect analysis result.

- ▶ Clean hand pump **3** only with clean cloth.
- ▶ Ensure that sampling hose **1** is new.
- ▶ Clean sampling point before opening.

- ▶ Screw in new sampling container **4** immediately after removing cover in hand pump **3**.
- ▶ Shorten new sampling hose **1** to suitable length.
- ▶ Guide sampling hose **1** through hand pump **3** into sampling container **4**.
- ▶ Screw locking screw **2** closed.
  ▷ Sampling hose **1** is clamped air tight in hand pump **3**.

Preparing sample container for shipping

- ▶ Fill out sample information form (For more information see: Operating fluid analysis: filling out sample information form, page 030-36) .
- ▶ Glue barcode of sample information form to sample container.
- ▶ Separate sample receipt from sample information form and keep it safe.
- ▶ Insert sample information form into outer opening of plastic bag.
- ▶ Place sample container into plastic bag.
- ▶ Close plastic bag.
- ▶ Enter sender data on front of plastic bag.
- ▶ Enter details of sampling area on plastic bag.
- ▶ Apply postage to shipping bag.
  ▷ Sample container is ready for shipment.

Note

The operating fluid analysis is performed by Oelcheck GmbH.

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Cover colour	Appearance	Wear	Additives	Contamination	PQ index	Viscosity 40 °C	Viscosity 100 °C	Viscosity index	Oxidation	IR index	Water with IR	Water according to K. F.	Neutralisation number	Optical particle counting
●	x	x	x	x	x	x	x	x	x	x		x	x	x

Tab. 59: Scope of analysis of transmission oils

Transmission

Transmission oils

Cover colour	Appearance	Wear	Additives	Contamination	PQ index	Viscosity 40 °C	Viscosity 100 °C	Viscosity index	Oxidation	IR index	Water with IR	Water according to K. F.	Neutralisation number	Optical particle counting
●	x	x	x	x	x	x	x	x	x	x	x			
●	x	x	x	x	x	x	x	x	x	x		x		
●	x	x	x	x	x	x	x	x	x	x		x	x	x

Tab. 60: Scope of analysis of transmission oils

Pump distributor gear oils

Cover colour	Appearance	Wear	Additives	Contamination	PQ index	Viscosity 40 °C	Viscosity 100 °C	Viscosity index	Oxidation	IR index	Water with IR	Water according to K. F.	Neutralisation number	Optical particle counting
●	x	x	x	x	x	x	x	x	x	x	x			
●	x	x	x	x	x	x	x	x	x	x		x		

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Draining oil

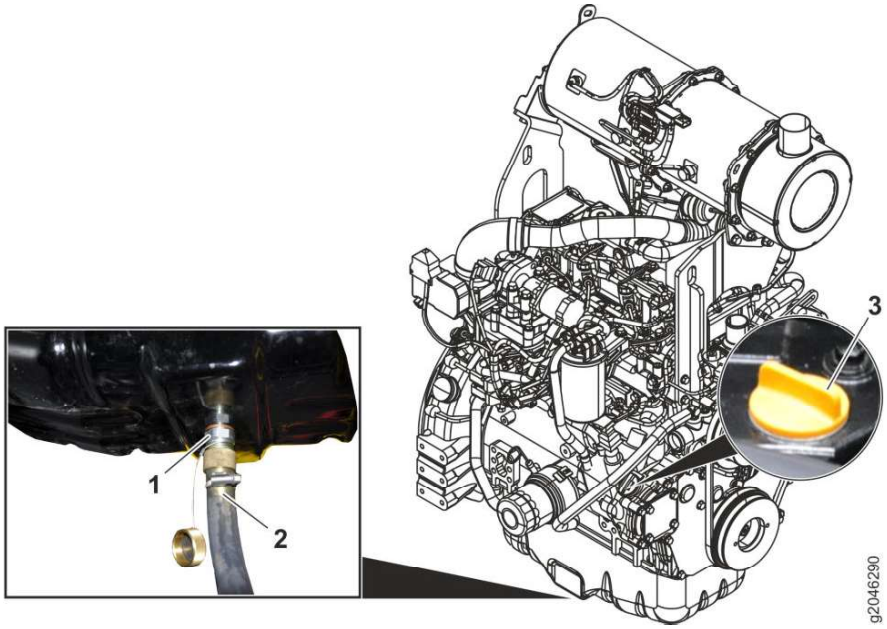

Fig. 113: Draining oil

1 Drain valve
2 Drain hose
3 Cover

▶ Unscrew cover **3**.
▷ Crankshaft housing is ventilated. Flow of engine oil is thereby accelerated.

▶ Place collecting pan under diesel engine.

CAUTION
Hot fluids!
Burns.

▶ Avoid skin contact with fluids.

Drain valve **1** is on underside of diesel engine.

▶ Screw drain hose **2** onto drain valve **1**.
▷ Open drain valve. Engine oil drains out.

▶ Unscrew drain hose **2**.

▶ Change oil filter. (For more information see: Diesel engine: changing oil filter, page 030-56)

Topping up oil

NOTICE
Non-approved oil!
Damage.

▶ Only use oil that meets the Liebherr specifications.

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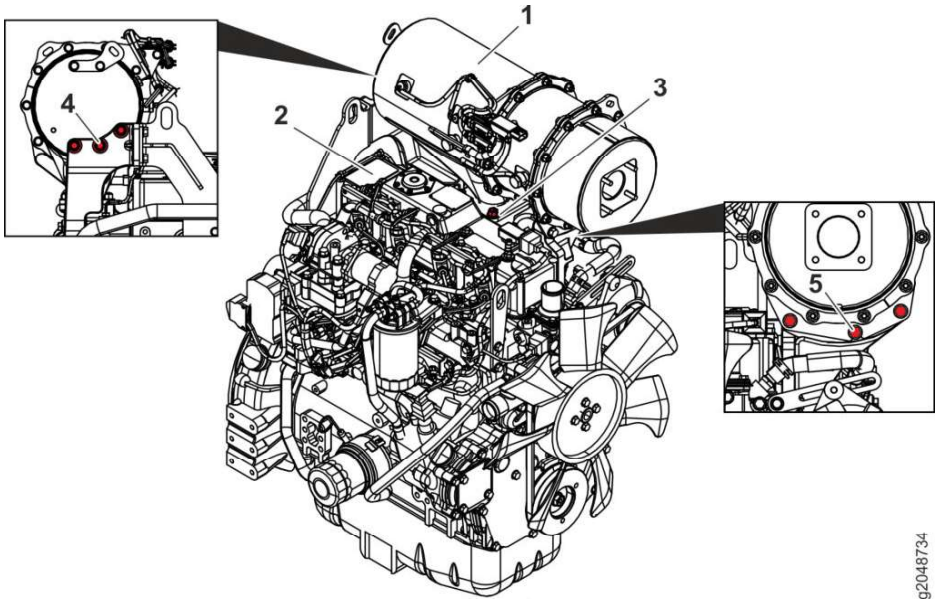

Fig. 125: Removing DPF, exposing valves

1 Diesel particulate filter (DPF)
2 Valve cover
3 Screws on exhaust manifold (4x)
4 Screws on input module (3x)
5 Screws on output module (3x)

- ▶ Replace seal on the exhaust manifold.
- ▶ Position screws on the exhaust manifold **3**.
- ▶ Position screws on the input module **4**.
- ▶ Position screws on the output module **5**.
- ▶ Tighten screws on the exhaust manifold **3** to a tightening torque of 49 $^{\pm 4.9}$ Nm.
- ▶ Tighten screws on the output module **5** to a tightening torque of 49 $^{\pm 4.9}$ Nm.
- ▶ Tighten screws on the input module **4** to a tightening torque of 49 $^{\pm 4.9}$ Nm.
- ▶ Connect the electrical cables on the diesel particulate filter **1**.
- ▶ Start diesel engine and let it run for 3 minutes at medium idling speed.

WARNING
Rotating parts!
Risk of injury.

- ▶ Do not touch rotating parts of the engine.

WARNING
Hot components!
Risk of injury.

- ▶ Do not touch components of the exhaust system and the engine.

- ▶ Check that valve cover and valve cover seal do not leak.
- ▶ Turn off diesel engine.

Installing the main element

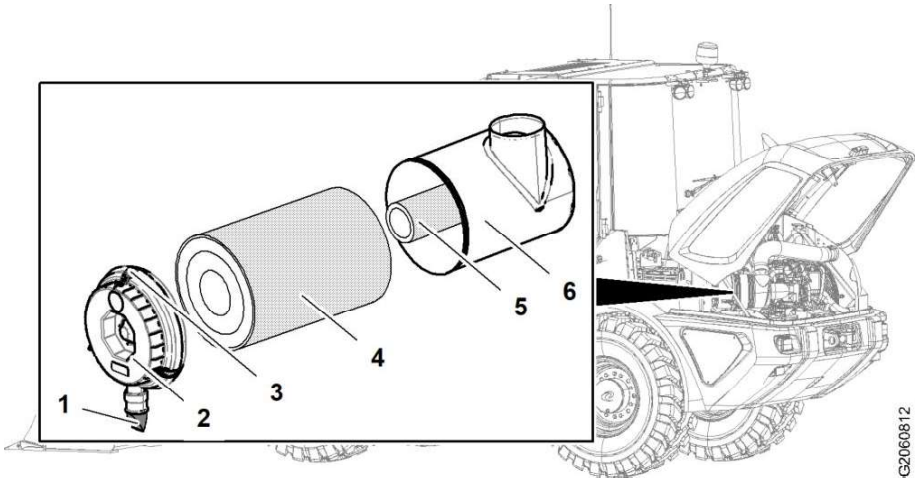

Fig. 136: Installing the main element

1	Dust discharge valve	**4**	Main element
2	Service cover	**5**	Safety element
3	Fixing clips	**6**	Filter housing

- ▶ Lightly oil the sealing face of the main element **4**.
- ▶ Install the main element **4**.
- ▶ Put the clean service cover **2**, with the dust discharge valve **1** facing down, on the filter housing **6**.
- ▶ Close the fixing clips **3**.

Note
If *air filter contamination* symbol lights up again a few operating hours after main element has been cleaned:

- ▶ Change main element.

Note
If *air filter contamination* symbol remains lit after main element has been changed:

- ▶ Change safety element.

030.4.4.14 Changing the safety element of the air filter system

Valid for: L508-1817;

NOTICE
Always carry out maintenance correctly.
Damage to the engine.

- ▶ Do not clean the safety element.
- ▶ Only replace the safety element.

Make sure that following requirements are met:
- ❑ Machine is in maintenance position 1.
- ❑ Service access is open.

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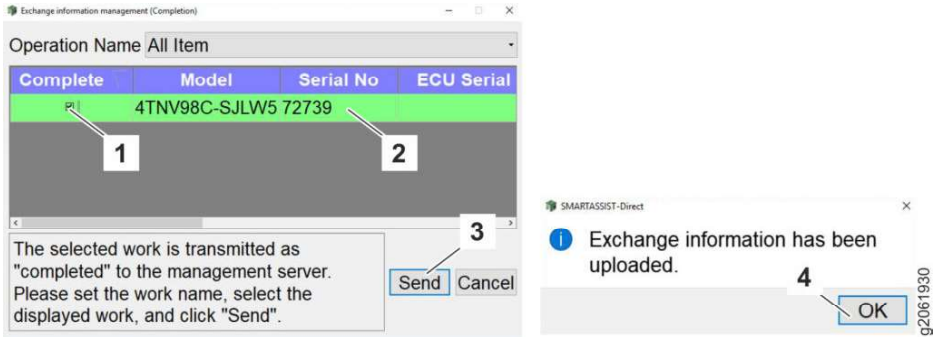

Fig. 147: Sending data to Yanmar server

1 Checkbox
2 Data record
3 “Send” function
4 “OK” function

▶ Select Checkbox **1** for data record **2** of corresponding diesel engine.

▶ Select “Send” function **3**.
▷ Data is sent to Yanmar server.

▶ Select “OK” function **4**.
▷ Sending data to Yanmar server is completed.

030.4.5 Cooling system

030.4.5.1 Checking coolant level in cooling system

Valid for: L508-1817;

Make sure that following requirements are met:
❑ Machine is in maintenance position 1.
❑ Service access is open.
❑ Diesel engine has cooled down.

Checking coolant level

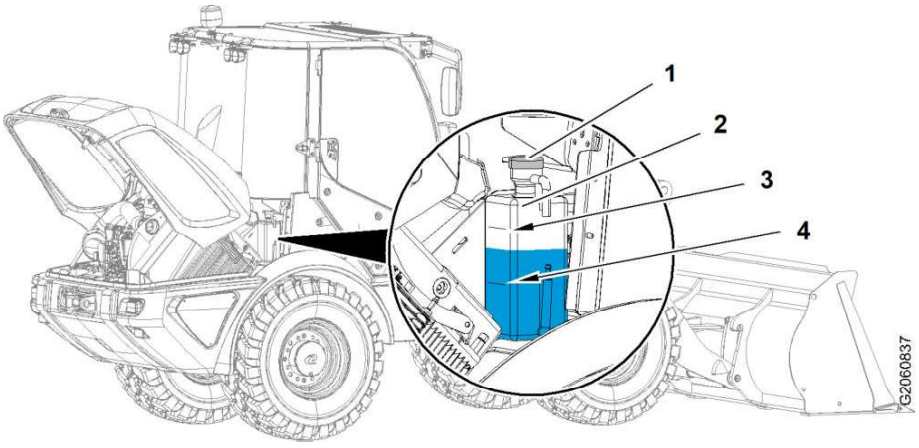

Fig. 148: Checking the coolant level

1 Equalising reservoir cap
2 Equalising reservoir
3 Maximum coolant level
4 Minimum coolant level

▶ Check coolant level in equalising reservoir **2**.
▷ The coolant level must be between the maximum **3** and minimum **4**.

NOTICE
Incorrect cleaning!
Damage to diesel engine.

▶ When cleaning with engine bonnet open, close opening to air filter system so is it watertight.

NOTICE
Incorrect cleaning!
Damage to the cooling system.

▶ Do not use hard objects or excessive water pressure.

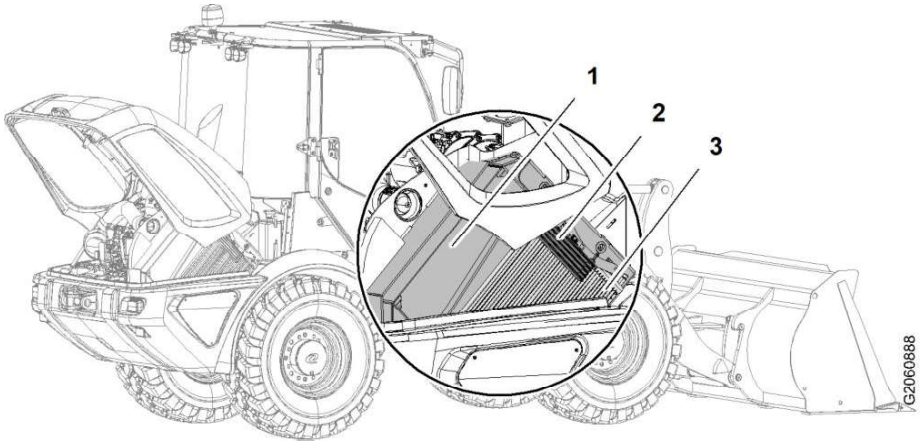

Fig. 157: Cleaning cooling system

1 Cooler unit
2 Fuel cooler
3 Condenser unit (option)

▶ Clean cooler units **1**, fuel cooler **2** and condenser unit **3** with a high-pressure cleaner or compressed air.

030.4.5.4 Cooling system: changing coolant

Valid for: L508-1817;

Make sure the following preconditions are met:
❑ Machine is cold.
❑ Machine is in maintenance position 1.
❑ Service access is open.

Make sure that following tools are ready:
❑ Drain hose
❑ Receptacle (12 l)

Make sure that following consumables are ready:
❑ Coolant as specified in table. (For more information see: 030.2.2 Fuel and operating fluid filling quantity, page 030-13)

Note
Information on coolant specification:

▶ See “Lubricants and fuels: Diesel engine coolants”. (For more information see: 030.3.7 Coolant, page 030-17)

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▶ Mount guard **5** with fastening bolts **4**.

▶ Top up oil.

Topping up oil

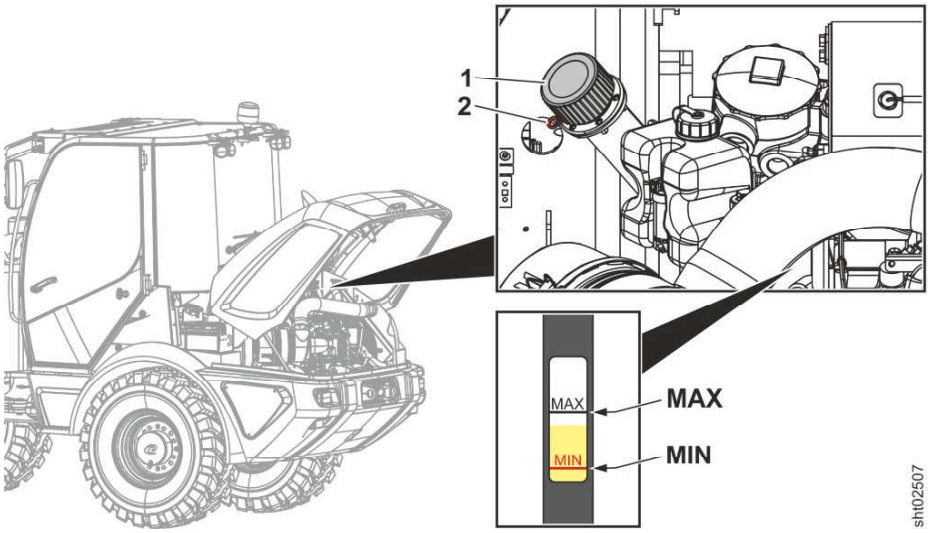

Fig. 167: Topping up oil

1 Breather filter with filler strainer
2 Plug connection
MIN Minimum oil level
MAX Maximum oil level

NOTICE
Contamination in hydraulic oil!
Damage to hydraulics.

▶ Always top up oil through filler strainer into hydraulic tank.

▶ Fill oil through filler strainer **1** into hydraulic tank up to maximum oil level **MAX**.

▶ Screw on breather filter **1** and tighten it.

▶ Start diesel engine.

▶ At medium engine speed, operate all functions of working hydraulics to their furthest extent.
▷ Oil is circulated.

▶ Put machine in maintenance position 1.

▶ Unscrew bleeder filter **1**.

▶ Fill oil through filler strainer **1** into hydraulic tank until oil level is between minimum **MIN** and maximum **MAX**.

▶ Screw on breather filter **1** and tighten it.

▶ Pull out plug connection **2** and keep it in a safe place.
▷ Breather filter **1** is protected from accidental opening.

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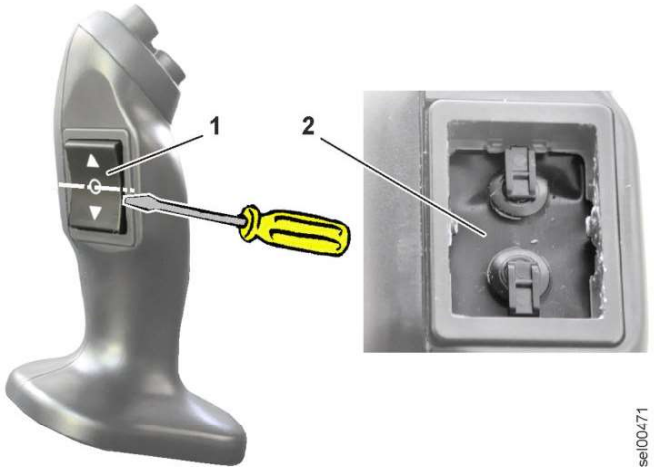

Fig. 178: Changing the travel direction switch

1 Rocker **2** Seal

NOTICE
Thin seal!
Damage to the seal.

▶ Do not put in the screwdriver more than 5 mm.

▶ Insert tip of a small screwdriver between rocker **1** and travel direction switch below the central axis.

▶ Prise out rocker.

▶ Check seal **2** for damage.

If seal is damaged:
▶ Replace travel direction switch.

▶ Fit a new rocker on the travel direction switch.

Changing push button covering (option)

Make sure the following preconditions are met:
❑ Machine is in maintenance position 1.

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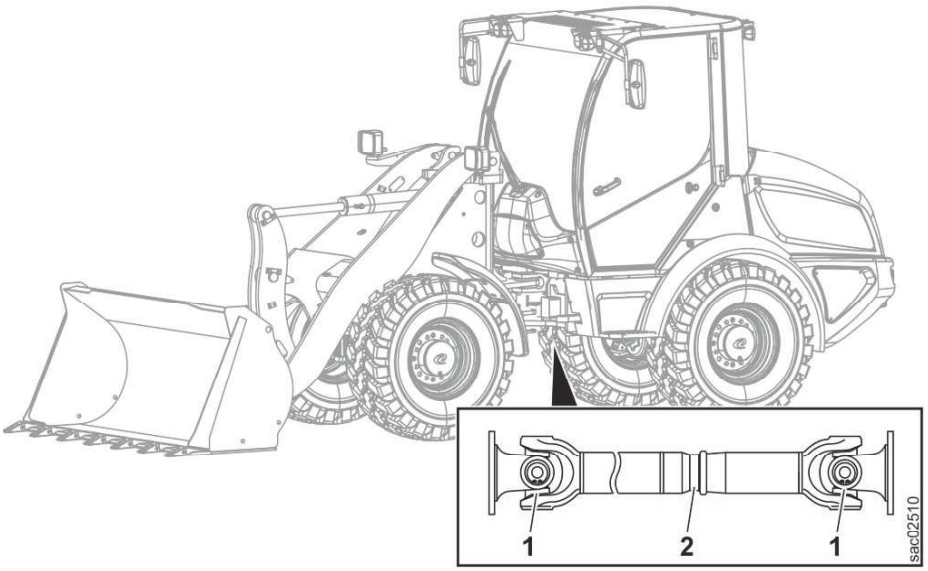

Fig. 188: Checking drive shafts

1 Universal joint (2x) **2** Extension

▶ Check drive shaft for play in universal joints **1** and extension **2**.

Note

There may not be any play at all in universal joints and extension.

If there is play in a universal joint **1** or extension **2**:

▶ Replace drive shaft.

030.4.11.5 Tyres: checking tyre pressure

Valid for: L508-1817;

Make sure the following preconditions are met:

❑ Machine is in maintenance position 1.

❑ You have the recommended tyre pressures from the manufacturer or dealer at hand.

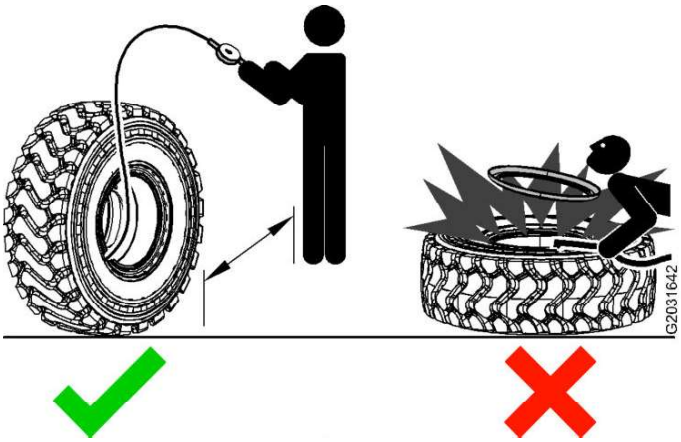

Fig. 189: Tyres: checking tyre pressure

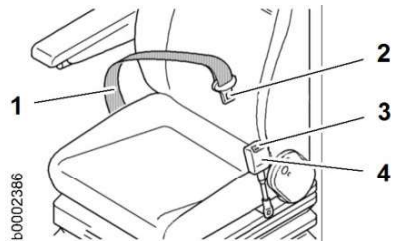

Fig. 200: Safety belt: checking condition and function

1	Strap	**3**	Unlock button
2	Lug	**4**	Belt lock

▶ Check operator's seat safety belt for proper function and damage.

▶ Replace damaged parts.

030.4.14.4 Windscreen washer system: testing

Valid for: L508-1817;

Make sure that following requirements are fulfilled:
- ❑ The machine is parked in a safe place.
- ❑ The electrical system of the machine is switched on.

To check the front windscreen washer system:

▶ Activate the windscreen washer system using the steering column switch.
- ▷ Washer fluid is squirted onto the front windscreen.
- ▷ The windscreen wiper is switched on.

To check rear windscreen washer system:

▶ Activate the windscreen washer system using the switch.
- ▷ Washer fluid is sprayed onto the rear windscreen.
- ▷ The windscreen wiper is switched on.

030.4.14.5 Windscreen washer system: filling windscreen washer fluid

Valid for: L508-1817;

Make sure that following requirements are fulfilled:
- ❑ Machine is in maintenance position 1.
- ❑ Service access is open.

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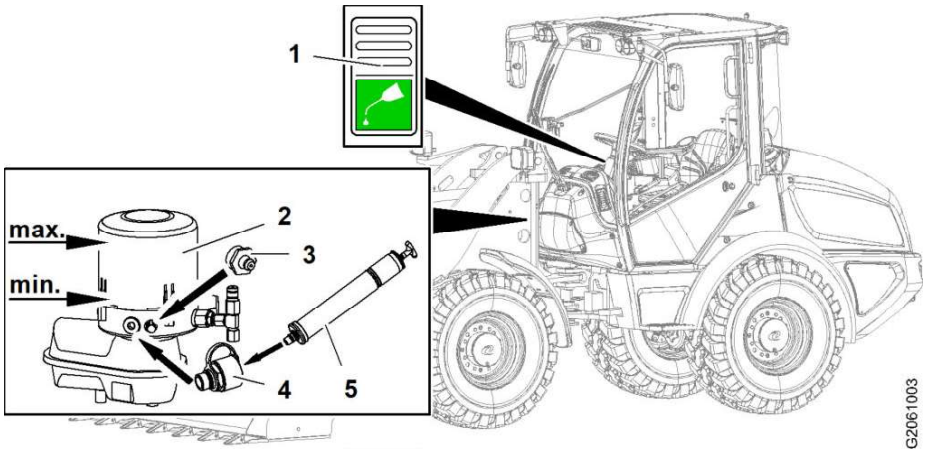

Fig. 211: Central lubrication system: checking level in grease reservoir

1 *Central lubrication system* button
2 Grease reservoir
3 Grease fitting
4 Filling coupling (fast filling)
5 Fast filling pump

▶ Visually check the level in the grease reservoir **2**.
▷ It must be within the minimum and maximum lubricant levels.

Note
Mixing of lubricant greases!
Malfunction in central lubrication system.

▶ Ensure proper miscibility of lubricant greases.

▶ If necessary, contact **Liebherr Lubricant Hotline**.

NOTICE
Dirty grease reservoir!
Damage to the central lubrication system.

▶ Pay attention to cleanliness when filling the grease reservoir.

To fill grease reservoir:
▶ Fill grease reservoir via grease fitting **3**.
or

for rapid filling, connect the fast filling pump **5** to the filling coupling **4**.

030.4.15.2 Central lubrication system: checking pipes, hoses and lubrication points for leaks and damage.

Valid for: L508-1817;

This equipment is optional.

Make sure the following preconditions are met:
❑ Machine is in maintenance position 2.

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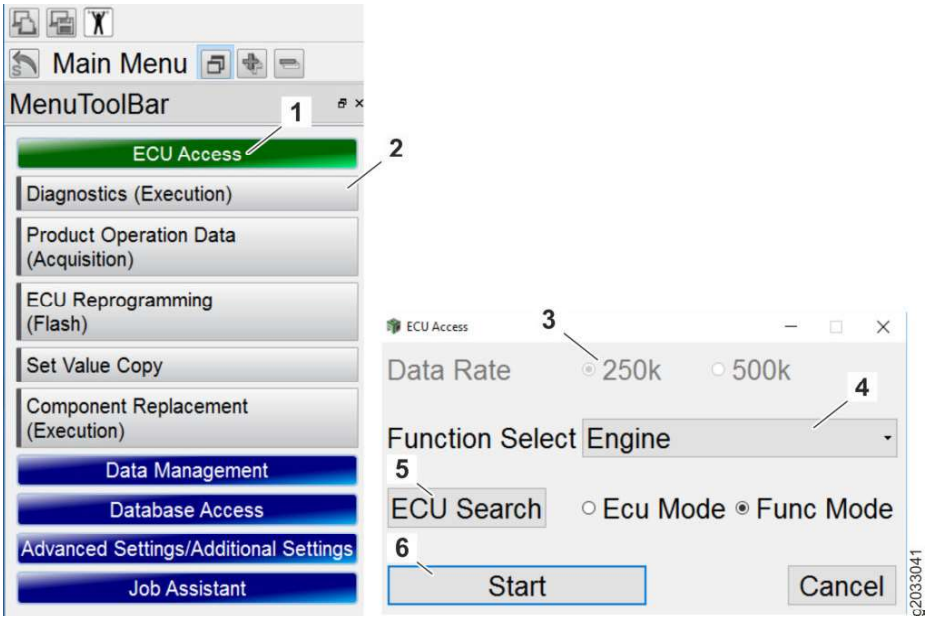

Fig. 216: Connect the SMARTASSIST-Direct diagnostics software to the diesel engine.

1	ECU Access tab	**4**	Engine function
2	Diagnostics (Execution) function	**5**	ECU Search function
3	Data Rate function	**6**	Start function

▶ Select the ECU Access tab **1**.

▶ Select the Diagnostics (Execution) function **2**.

▶ For the Data Rate function **3** select a connection speed of 250k.

▶ Select the Engine function **4**.

▶ Select the ECU Search function **5**.
▷ A connection is made to the engine control unit (ECU).

▶ Select the Start function **6**.
▷ The “Diagnostics” screen opens.

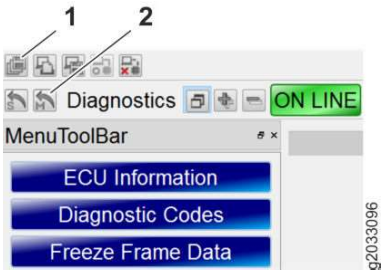

Fig. 217: “Diagnostics” screen

1	ECU DATA SAVE function	**2**	Main Menu function

▶ Select the ECU DATA SAVE function **1**.
▷ Data is loaded by the engine and saved internally in the SMARTASSIST-Direct diagnostic software.

▶ Select the Main Menu function **2**.
▷ The “Main Menu” screen opens.

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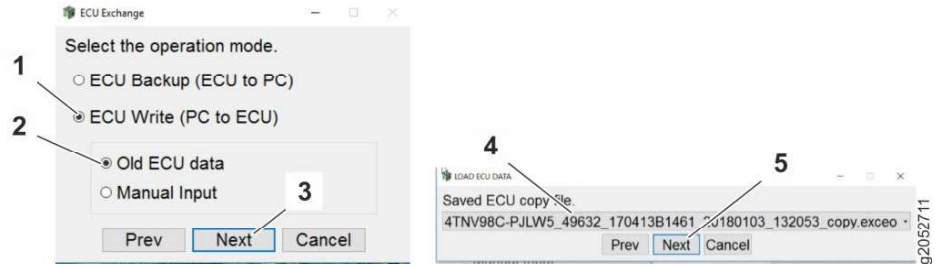

Fig. 233: Transferring setting data of old engine control unit

1 *Write (PC to ECU)* function
2 *Old ECU data* function
3 *Next* function
4 Setting data of old engine control unit
5 *Next* function

▶ Select *Write (PC to ECU)* function **1**.

▶ Select *Old ECU data* function **2**.

▶ Select *Next* function **3**.

▶ Select setting data of old engine control unit **4**.

▶ Select *Next* function **5**.

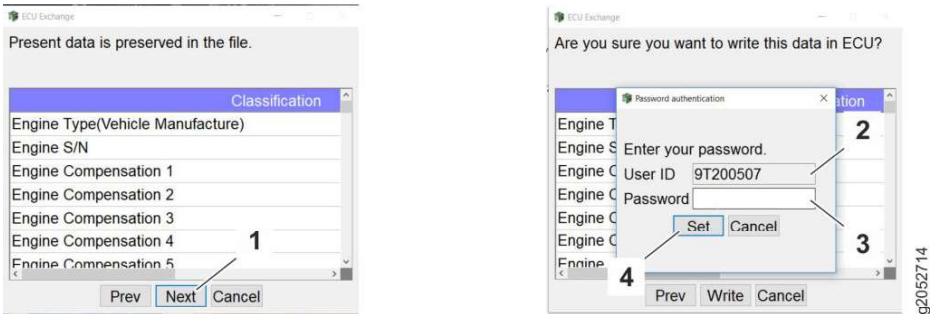

Fig. 234: Transferring setting data of old engine control unit

1 *Next* function
2 User number
3 Password
4 *Set* function

▶ Select *Next* function **1**.

For security reasons, transmission of setting data must be confirmed by entering password **3**.

▶ Enter password **3**.

▶ Select *Set* function **4**.
▷ Setting data is transferred.

▶ Check the routing of the hydraulic line, correct if necessary.

If the condition deteriorates:
▶ Replace the hydraulic lines.

Moist surfaces, no visible oil leak

Moist spots can be seen on the surface. An oil leak or oil drops are not visible. As long as you do not observe an obvious oil leak, it is classified as minor damage.

Fig. 242: Moist surfaces, no visible oil leak

▶ Document the damage and observe whether the condition deteriorates.

If the condition deteriorates:
▶ Replace the hydraulic lines.

Medium damage to the hydraulic lines

Cracks or cuts up to the steel fabric or steel fabric exposed due to damage to the outer jacket

The damage to the outer jacket (such as cracks, cuts or abrasions) through which the steel fabric is exposed is classified as medium damage if the steel fabric is undamaged. Damage to the steel fabric is classified as severe damage.

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- ▶ Connect a pressure gauge (600 bar) to high pressure test connection **MH** on travel pump.
- ▶ Start diesel engine.

DANGER
Unintentional movement of the machine!
Fatal injury.

- ▶ Make sure there is nobody in danger area.
- ▶ Be ready to brake.

- ▶ Select forward travel direction.
- ▶ Carefully increase diesel engine speed until travel high pressure **MH** is exactly 400 bar.
- ▶ Check that diesel engine speed matches specified value.

Description	Unit	Value
Engine speed at high pressure of 400 bar	rpm	1650 $^{\pm 100}$

If required value is not reached:
- ▶ Turn off diesel engine and take out ignition key.
- ▶ Adjust eccentric adjusting screw **1**.

Note
Position of control lens **5** is adjusted with cam **2** of eccentric adjusting screw **1**.

- ▶ Check position of cam **2** using monitoring groove **4**.

- ▶ Repeat check and adjustment until required value is reached.

If required value is reached:
- ▶ Turn off diesel engine and take out ignition key.
- ▶ Disconnect pressure gauge from high pressure test connection **MH**.

030.6.6.5 Travel pump: high pressure relief valves

Valid for: L508-1817;

Note
Opening pressure of high pressure relief valves is above opening pressure of pressure cut-off.

- ▶ Before testing, set pressure cut-off to a higher value. (For more information see: Preparations, page 030-186)

Make sure that following requirements are fulfilled:
- ❑ Hydraulic oil is at operating temperature.
- ❑ Machine is in maintenance position for adjustment procedures.
- ❑ Machine is in blocked condition.
- ❑ Service access is open.

Make sure that following tools are ready:
- ❑ Laptop with Sculi diagnostic software
- ❑ Pressure gauge (600 bar)

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To save the setting:

▶ Press the button for 1 second in save mode:
  ▷ The setting is saved.

After setting the service hours:

▶ Attach the rubber sleeve **2**.

▶ Mount the display.

2.8 Oil pump

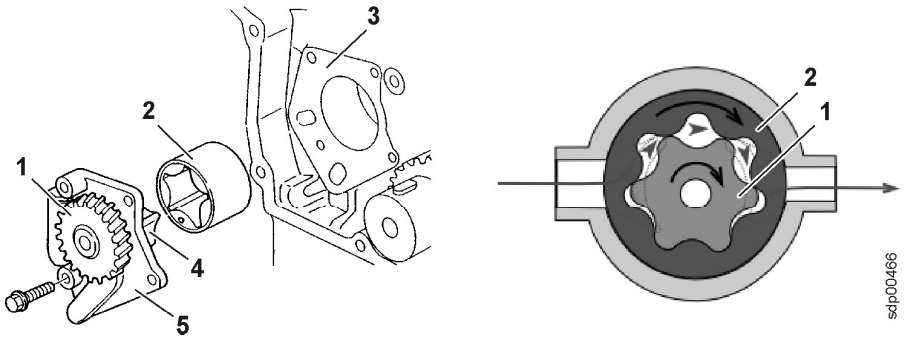

Fig. 265: Oil pump

1	Drive gear	**4**	Internal gear
2	Outer gear rim	**5**	Cover plate
3	Transmission housing		

Oil pump is situated in front transmission housing **3**. It is driven by same transmission as camshaft and fuel injection pump.

Oil pump is an internal gear pump. Oil flows between internal gear **4** and outer gear rim **2.** Teeth of internal gear mesh with those of outer gear rim. This displaces oil and builds up pressure.

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040.1.4.3 Vacuum switch for air filter

Valid for: L508-1817;

1.1 Layout

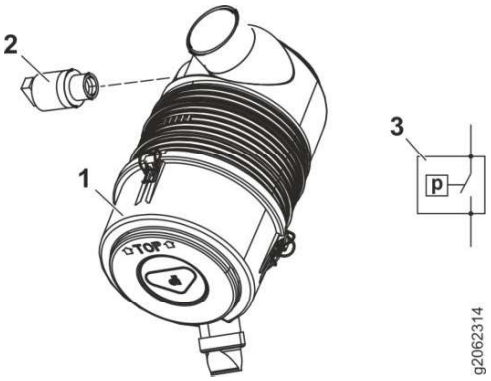

Fig. 276: Vacuum switch for air filter with symbol

1 Air filter
2 Vacuum switch for air filter B4
3 Symbol

Air filter vacuum switch **2** is fitted on air filter **1**.

2.1 Function

Air filter vacuum switch **2** monitors pressure behind air filter **1** and is an N/O contact. It triggers air filter contamination symbol in display when filters are dirty (excessive vacuum detected).

When there is neutral pressure, vacuum switch is open and closes when vacuum reaches 54 mbar.

040.1.5 Exhaust system

LBH/12242502/04/211-20210126_072043/en

050.2 Cooler

050.2.1 Water cooler

Valid for: L508-1817;

1 Layout

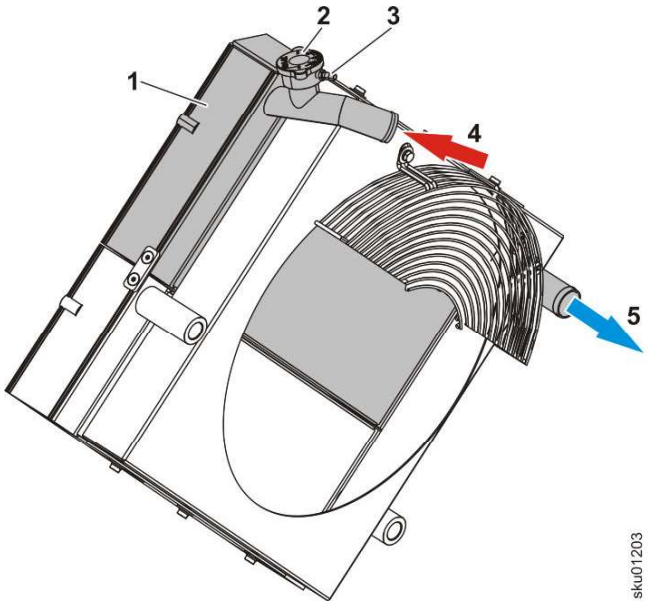

Fig. 293: Water cooler

1	Water cooler	**4**	Thermostat
2	Cooler cover	**5**	Coolant pump
3	Equalising reservoir connection		

The water cooler **1** is integrated in the cooler mount.

A serpentine pipe runs through the water cooler to which the cooler fins are attached. The surface of the pipe is thereby increased and the cooling output accordingly improved.

The cooler cover **2** and the equalising reservoir **3** are located at the highest point.

2 Function

2.1 Basic function

When the coolant temperature reaches 71 °C, the thermostat **4** opens. When the coolant temperature reaches 85 °C, the thermostat is completely opened. The hot coolant flows through the water cooler **1**.

The fan draws ambient air in through the water cooler. The cooler fins transfer the heat from the coolant into the air.

The water pump **5** draws in the cooled coolant once more.

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2.2 Priority valve

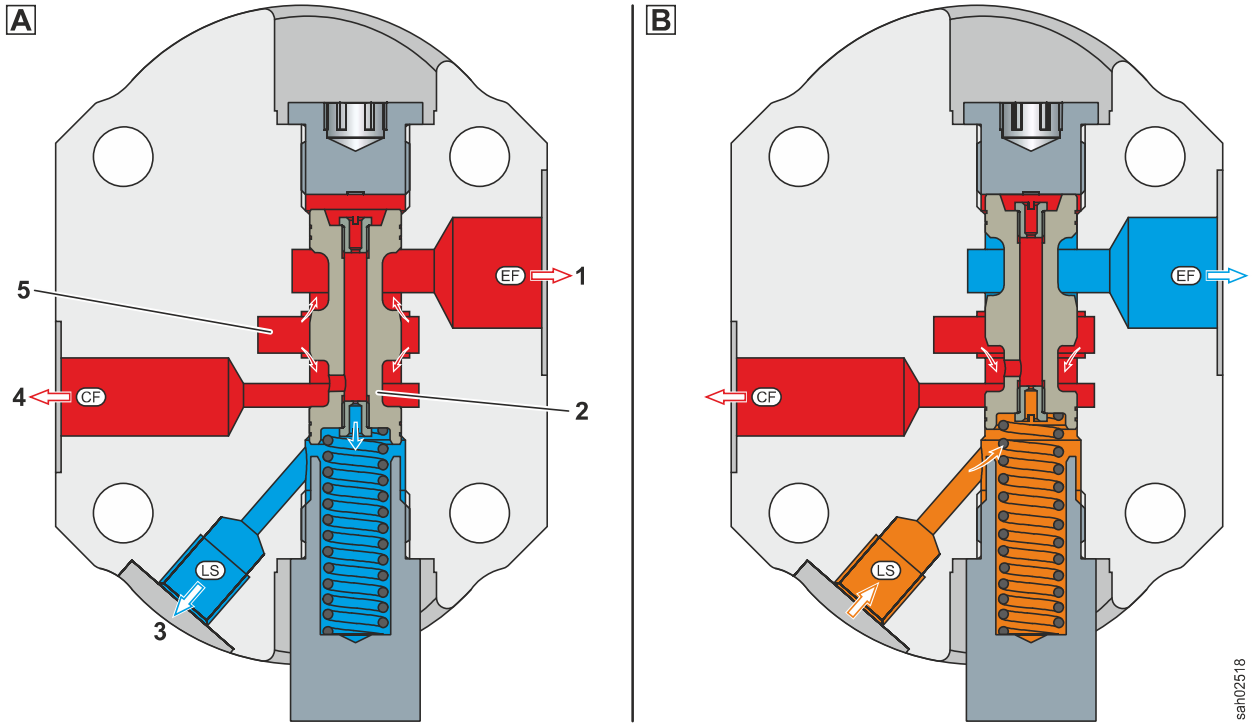

Fig. 302: Priority valve with steering not actuated / priority valve with steering actuated

1 Oil supply for control valve block
2 Priority valve
3 Load sensing signal from servostat
4 Oil supply to servostat
5 Connection to gear pump

Priority valve **2** distributes oil supplied by gear pump **5** to following systems:
– Steering system
– Working hydraulics

The oil supply for the steering system has priority.

If working hydraulics and steering system are not actuated, readjusting spring sets priority valve **2** so that oil from gear pump **5** flows to servostat **4**. If pressure in steering system exceeds spring force of readjusting spring, this pressure pushes priority valve **2** back against spring force of spring. As a result, oil flows to control block **1**. However, once pressure in steering system drops below spring force of readjusting spring, priority valve **2** opens again to steering system. For this reason, there is always a standby pressure at servostat **4**. Due to this standby pressure, steering movement begins immediately when servostat is actuated.

When the servostat **4** is actuated, it generates a load sensing signal **3**. This load sensing signal **3** moves priority valve **2** so that pressure in steering system corresponds to that of load sensing signal **3**.

Oil that is not needed by steering system is directed by priority valve **2** to control block **1** and therefore working hydraulics.

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Feeder valves **2** prevent cavitation during rapid working movements by allowing oil to flow from tank side **2** to consumer **1** via feeder valves **3**. Cavitation occurs, for example when quickly lowering lift arms with a full bucket, because lift arms are lowered by their own weight.

2.6 Working hydraulics lockout

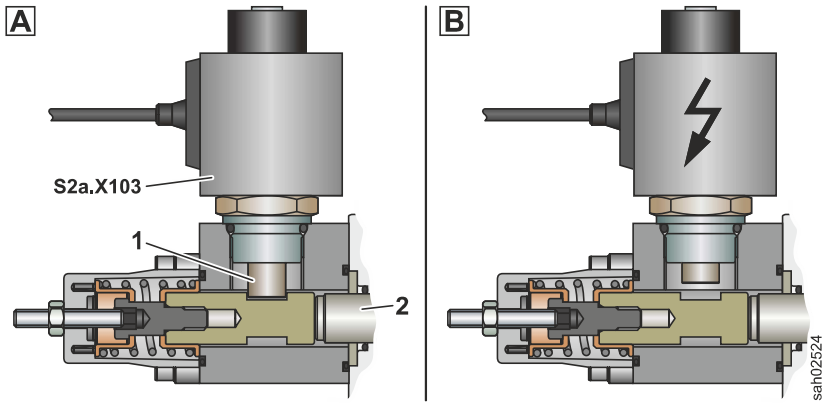

Fig. 315: Working hydraulics lockout activated / working hydraulics lockout deactivated (example: spool for tilt cylinder)

1 Pin **2** Spool valve

BMK	Function
S2a.X103	Retaining magnet for working hydraulics lockout (tilt cylinder)

Tab. 96: Equipment codes

Spool for tilt cylinder and spool for lift cylinder are equipped with an electromechanical working hydraulics lockout. If working hydraulics lockout is activated, retaining magnets **S2a.X103** and S2a.X102 are de-energised. As a result, compression springs push pins **1** in recess in spools **2**, blocking them mechanically.

3rd function is not secured.

2.7 3rd function, 4th function

3rd function is actuated by additional control lever.

If control lever lock function is activated, spool for 3rd function of retaining magnets for control lever lock S2a.X104 is kept in front position.

Since control block is not expandable, 4th function can exclusively be realised via comfort control option. (For more information see: 060.6.1 4. Function with comfort control – overview, page 060-32)

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15 Steel tank
16 Sight glass for hydraulic oil level
17 Hydraulic oil drain valve
18 Replenishing pump suction port
19 Travel pump leak oil
39 Diesel engine
40 Check valve
41 Pilot control hydro accumulator
45 **Control block for 3rd function with electrohydraulic pilot control**
46 Primary pressure relief valve
61 Lift cylinder
62 Tilt cylinder
63 Quick coupler for 3rd function (2x)
64 Open solenoid valve for quick coupler
65 Quick coupler locking hydraulic cylinder

Name	Test point
PA	Working hydraulics high pressure

Tab. 104: Test points

BMK	Function	BMK	Function	BMK	Function
B8	Hydraulic oil temperature sensor	**Y20**	Solenoid for ride control	**Y203 a**	Proportional solenoid for 3rd function B1
S2a.X 102	Retaining magnet for working hydraulics lockout (lift cylinder)	**Y53**	Solenoid for opening quick coupler		
S2a.X 103	Retaining magnet for working hydraulics lockout (tilt cylinder)	**Y203**	Proportional solenoid for 3rd function A1		

Tab. 105: Equipment codes

If 3rd function has electrohydraulic pilot control, spool for 3rd function **48** is moved with oil from replenishing pump **36**.

060.5.2 Control block for 3rd function with electrohydraulic pilot control

Valid for: L508-1817;

This equipment is optional.

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5 Inlet valve 0.03 bar
6 Filler strainer 800 µm
7 **Return suction filter**
8 Temperature valve
9 Throttle
10 Filter element 10 µm
11 Strainer for replenishing pump
12 Preload valve 0.5 bar
13 Feeder valve
14 Bypass valve 2.5 bar
15 Steel tank
20 Return flow from inching valve
21 Return flow from servostat
25 **Working pump**
26 Gear pump
27 Priority valve
28 Throttle 1
29 Throttle 2
30 Load sensing signal from servostat
31 Oil supply to servostat
35 Travel pump
36 Diesel engine
42 Throttle for setting flow rate
43 Throttle
44 Solenoid valve for regulated flow rate
45 Pressure relief valve for setting delivery pressure
46 Control block
50 **Double check valve**
51 Check valve 8.0 bar
52 Check valve 0.5 bar
53 Quick coupling for oil supply with rear accessory kit
54 Quick coupling for return flow with rear accessory kit

Name	Test point
PA	Working hydraulics high pressure

Tab. 113: Test points

BMK	Function	BMK	Function
B8	Hydraulic oil temperature sensor	**Y230**	Solenoid for regulated flow rate

Tab. 114: Equipment codes

Regulated flow rate option limits oil flow to rear accessory kit to a pre-set value. Flow rate and pressure are independent of diesel engine speed. This ensures a constant ejection during operation of a spreader.

Working pump **25** draws oil from hydraulic tank **1** and pumps it to valve block for regulated flow rate **40**.

If regulated flow rate function is not activated, solenoid valve for regulated flow rate **44** is de-energised. As a result, priority valve **41** to hydraulic tank **1** is relieved. Delivery pressure moves priority valve **41** against spring force of readjusting spring. Majority of oi flows to control block **46**. For connection for rear accessory kit **53**, a greatly throttled quantity of oil now flows. Since oil primarily flows to control block **46** due to low resistance, at connection for rear accessory kit **53**, pressure is hardly present and preloaded check valve 8.0 bar **51** separates oil supply for rear accessory kit.

If regulated flow rate function is , solenoid valve for regulated flow rate **44** is energised. As a result, priority valve **41** regulates oil current to rear accessory kit **53** to set value.

Check valve0.5 bar **52** is installed, since when connecting attachment on quick coupling **53**, a small amount of oil must escape from line, so that locking of quick coupling **53** can be opened.

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– Travel motor (For more information see: 070.3.1 Travel motor, page 070-20)
– Inching valve (For more information see: Inching valve, page 100-12)
– Hydraulic oil cooler (For more information see: 050.2.2 Hydraulic oil cooler, page 050-5)

2 Function

2.1 Basic function

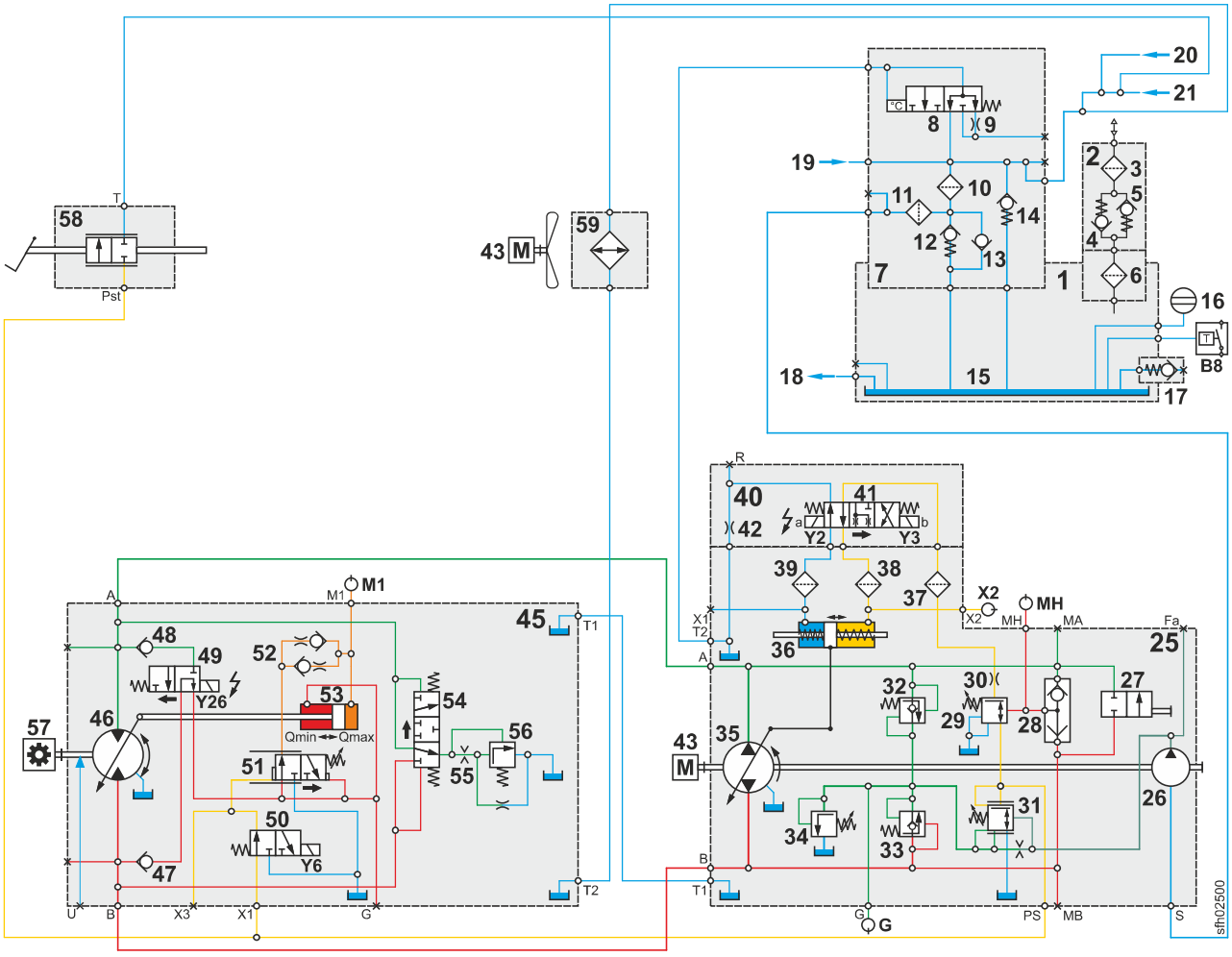

Fig. 338: Diagram of travel hydraulics (forward travel direction)

1	**Hydraulic tank**	**20**	Return flow from stabilization module (option)	**42**	Swivel restrictor 0.8 mm
2	**Breather filter**	**21**	Return flow from servostat	**43**	Diesel engine
3	Fine filter	**25**	**Travel pump**	**45**	**Travel motor**
4	Outlet valve 0.35 bar	**26**	Replenishing pump	**46**	Axial piston rotary group
5	Inlet valve 0.03 bar	**27**	Towing bypass valve	**47**	Check valve
6	Filler strainer 800 µm	**28**	Shuttle valve	**48**	Check valve
7	**Return suction filter**	**29**	Pressure cut-off valve	**49**	Travel direction solenoid valve
8	Temperature valve	**30**	Swivel restrictor 1.6 mm	**50**	Solenoid valve for 1st travel range
9	Throttle	**31**	Control valve	**51**	Spool

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2.3 Replenishing pressure relief valve

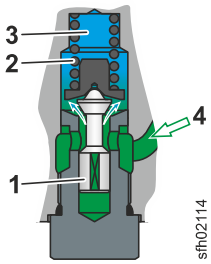

Fig. 347: Replenishing pressure relief valve

1	Replenishing pressure relief valve	**3**	Connection to pump housing
2	Compression spring	**4**	Oil from the replenishing pump

Replenishing pressure relief valve **1** performs following tasks:
- Limiting replenishing pressure
- Draining excess oil from the replenishing pump **4** into the pump housing **3** of travel pump

With the diesel engine running, the oil flows continuously via the replenishing pressure relief valve **1** into the pump housing **3** of travel pump and from there into the hydraulic tank. This cools the travel pump.

2.4 Variable displacement pump

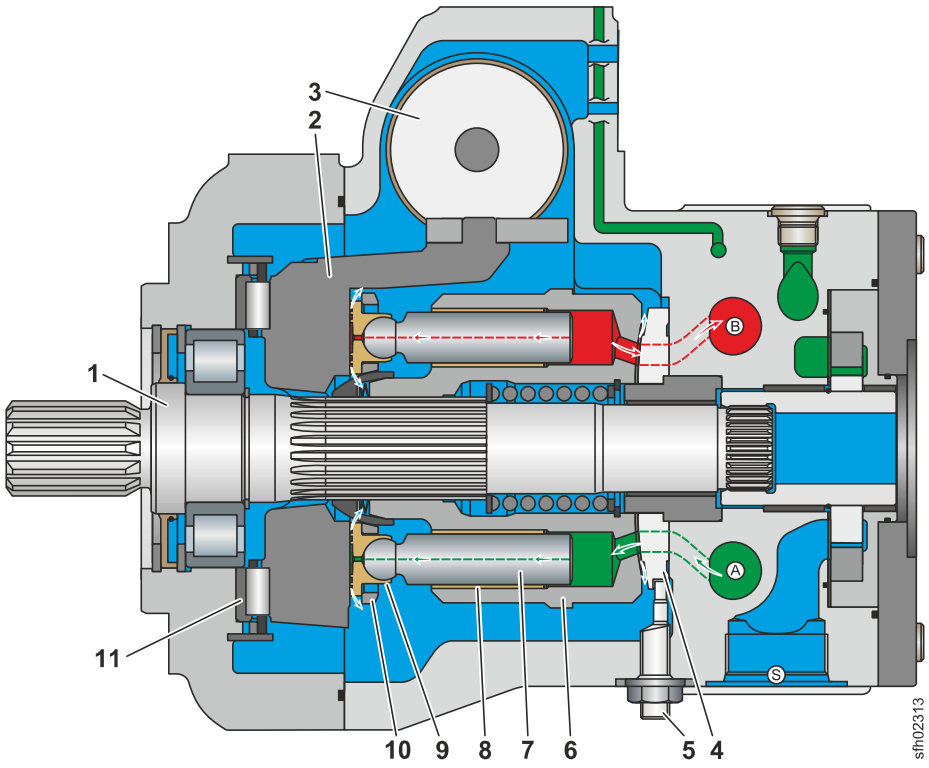

Fig. 348: Variable displacement pump (forward travel direction)

1	Drive shaft	**7**	Piston
2	Swivel plate	**8**	Sliding bushing
3	Positioning piston	**9**	Glide shoe

See next page for continuation of the image legend

9 Oil supply from travel pump (forward travel direction high pressure)

Name	Test point
M1	Travel motor servo pressure

Tab. 136: Test points

BMK	Function	BMK	Function
Y6	Travel range 1 solenoid	**Y26**	Travel direction solenoid (travel motor)

Tab. 137: Equipment codes

2 Function

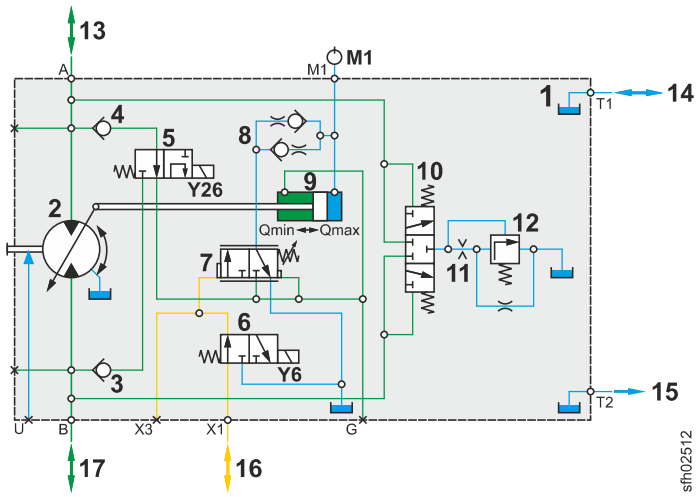

Fig. 357: Travel motor: hydraulic diagram (diesel engine is running)

1 **Travel motor**
2 Axial piston rotary group
3 Check valve
4 Check valve
5 Travel direction solenoid valve
6 Solenoid valve for 1st travel range
7 Spool
8 Throttle check valve
9 Positioning piston
10 Discharge valve
11 Orifice 1.4 mm
12 Pressure relief valve
13 Oil supply from travel pump (reverse travel direction high pressure)
14 Leak oil from travel pump
15 Leak oil to hydraulic oil cooler
16 Control pressure from travel pump
17 Oil supply from travel pump (forward travel direction high pressure)

Name	Test point
M1	Travel motor servo pressure

Tab. 138: Test points

080 Hydraulic components

Contents

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2.4 Bypass valve

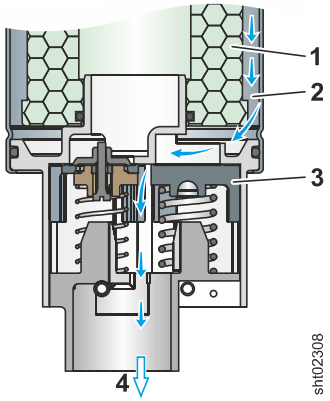

Fig. 372: Bypass valve

1	Filter element 10 µm	**3**	Bypass valve
2	Filter housing	**4**	Connection to steel tank

Bypass valve **3** protects system from excessive pressure.

If not enough hydraulic oil passes through filter element because oil is cold or filter element **1** is clogged, some of oil flows unfiltered via bypass valve **3** directly into steel tank **4**. This prevents hydraulic components being damaged.

2.5 Temperature valve

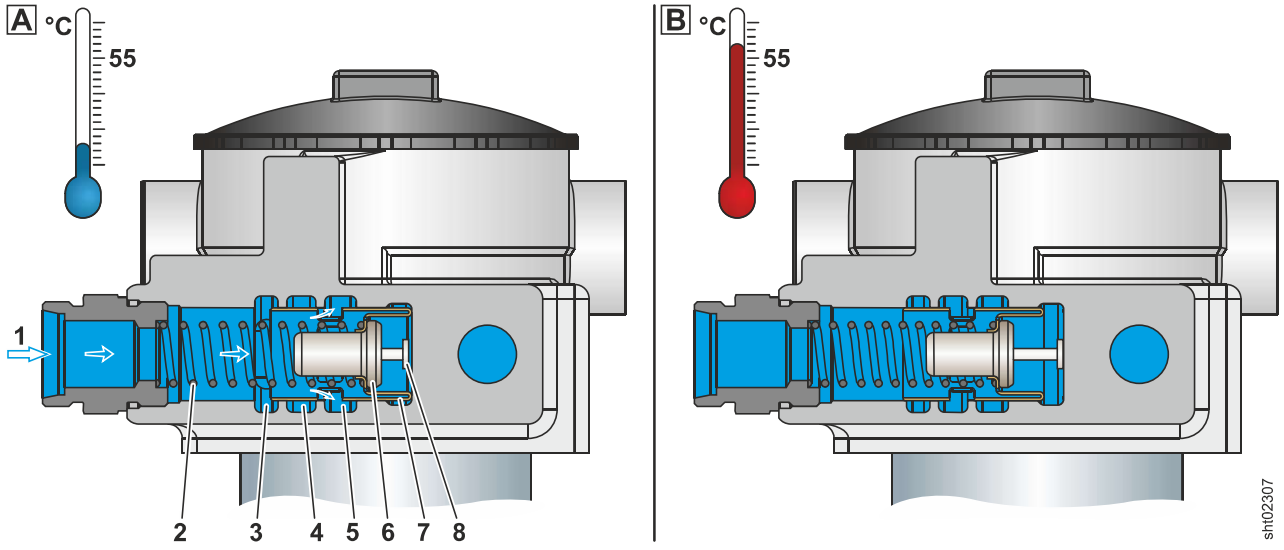

Fig. 373: Temperature valve with cold hydraulic oil / temperature valve with hot hydraulic oil.

1	Leak oil from travel pump and travel motor	**4**	Bypass channel (closed at one end)	**7**	Valve sleeve
2	Compression spring	**5**	Connection to filter housing	**8**	Pin
3	Bypass channel with restrictor (closed at one end)	**6**	Temperature element		

Leak oil connections from travel pump and travel motor **1** are connected with hydraulic oil cooler and, via temperature valve, return-suction filter.

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2.2 Secondary pressure relief valves

Secondary pressure relief valves **12** and **13** protect steering system from excessive pressure caused by pressure peaks and external force.

2.3 Feeder valves

The feeder valves **10** and **11** protect the steering cylinders from cavitation.

2.4 LS pressure relief valve

LS pressure relief valve **14** protects steering system from excessive pressure by limiting load sensing pressure **19** of steering system. If pump pressure **18** exceeds maximum permitted value, it pushes priority valve in control valve block against (limited) load sensing pressure of steering system **19**. Priority valve then directs some of the oil to the control block, which drains surplus oil to hydraulic tank.

2.5 Emergency steering function

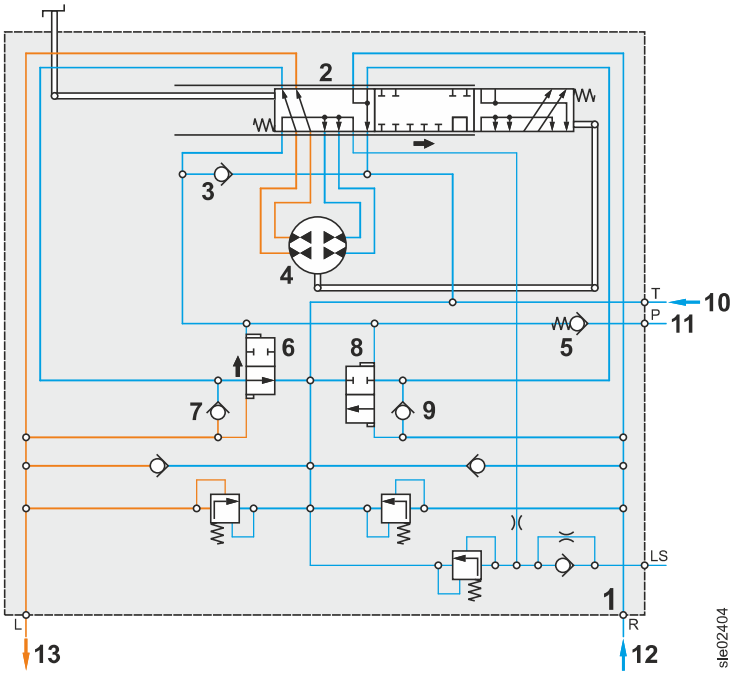

Fig. 382: Emergency steering function: hydraulic diagram (steering to left)

1	**Servostat**	**8**	Chamber isolation for steering right (emergency steering function)
2	Valve spool	**9**	Check valve
3	Emergency steering feeder valve	**10**	Return flow to return suction filter
4	Metering pump	**11**	Oil supply from working pump
5	Check valve	**12**	Connection for steering to the right
6	Chamber isolation for steering left (emergency steering function)	**13**	Connection for steering to left
7	Check valve		

Servostat **1** includes an emergency steering function. If the oil supply from the working pump fails **11** it allows a limited range of steering movements.

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2.2 Adjuster

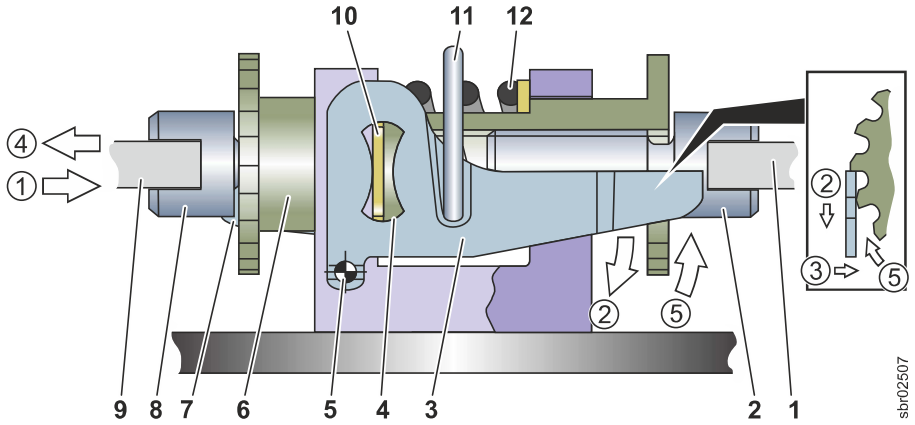

Fig. 391: Adjuster when turning clockwise (top view)

1	Right brake shoe	**7**	Adjuster lever for anticlockwise rotation
2	Threaded pin for left brake shoe	**8**	Threaded pin for right brake shoe
3	Adjuster lever for clockwise rotation	**9**	Left brake shoe
4	Recess for adjuster	**10**	Adjuster disc
5	Adjuster pivot point	**11**	Clasp
6	Adjuster tube	**12**	Compression spring

Adjuster prevents gap from exceeding 0.5 mm.

If brake drum is turning clockwise during braking, right brake shoe **1** is pushed against adjuster.

If brake drum is turning anticlockwise during braking, left brake shoe **9** is pushed against adjuster.

Brake shoe **9** pushes against adjuster and thus moves adjuster tube **6** towards compression spring **12**. Adjuster disc **10** moves along with adjuster tube **6**. Adjuster disc **10** thus presses against recess in adjuster lever **4** and turns lever around pivot point **5**.

At same time, clasp **11** pushes end of adjuster lever **3** against teeth on adjuster tube **6**.

Distance adjuster tube **6** moves while braking depends on brake lining gap. Of adjuster tube **6** move too far because gap is too big, adjuster lever **3** moves so far that end of it jumps on one more tooth.

If brake is then released, compression spring **12** pushes adjuster tube **6** back to its initial position. Adjuster lever **3** also moves back to its initial position. Adjuster lever **3** turns on adjuster tube **6**, thus unscrewing two threaded pins **2** and **8**.

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BMK	Function	BMK	Function
F01	Main fuse	Mp5a	Grounding point
F02	Fuse for starter	Mp6	Grounding point
F03	Fuse for pre-heat system	X44	Diagnostic plug for engine
F07a	Hazard warning system fuse	Y2	Forward travel direction solenoid valve
F200	Engine terminal 30 fuse	Y3	Reverse travel direction solenoid valve
F201	Exhaust gas recirculation fuse	Y6	Travel range 1 solenoid valve
G2a	Battery	Y26	Travel motor direction solenoid valve
H40	Warning buzzer	Y53	Quick coupler solenoid valve

Tab. 158: Component designations

2.1 Other electrical components

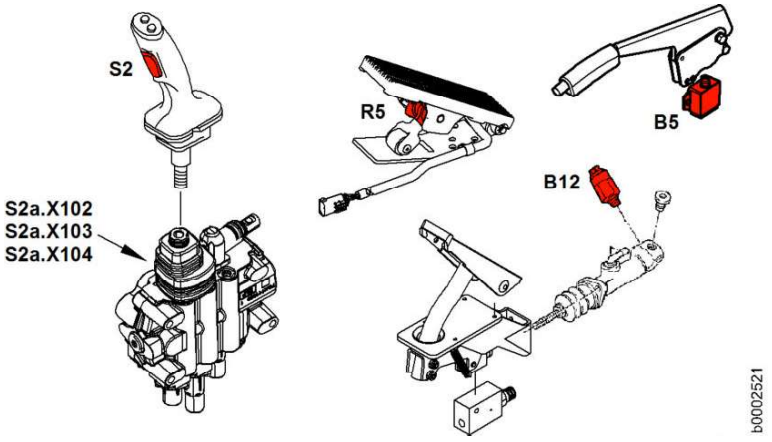


Fig. 404: Other electrical components

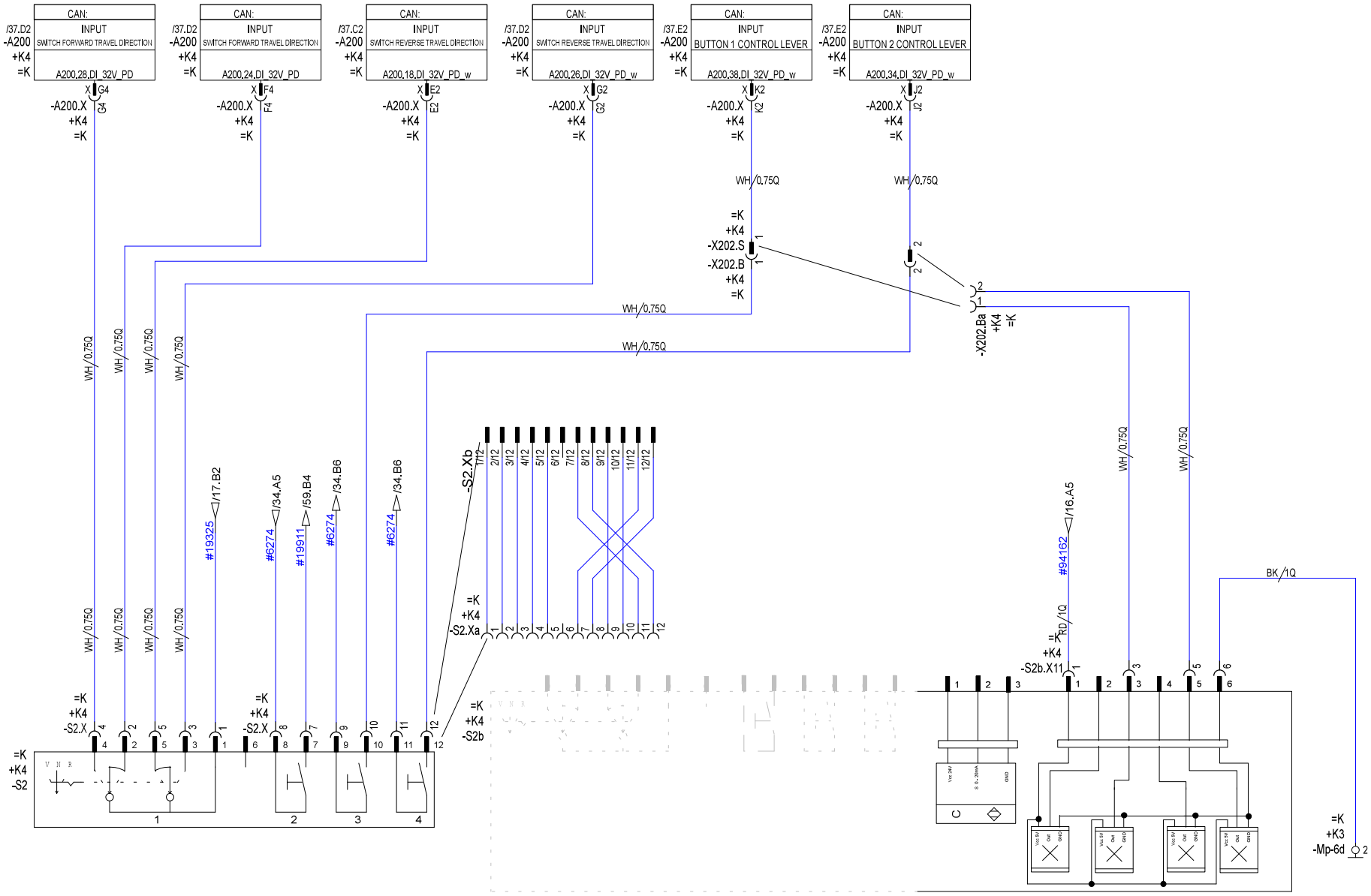
BMK	Function	BMK	Function
B5	Parking brake switch	S2a.X102	Retaining magnet for working hydraulics lockout (lift cylinder)
B12	Brake light pressure switch	S2a.X103	Retaining magnet for working hydraulics lockout (tilt cylinder)
R5	Accelerator pedal angle sensor	S2a.X104	Retaining magnet for control lever lock (option)
S2	Control lever		

Tab. 159: Component designations

LBH/122425O2/04/211-20210126_072043/en

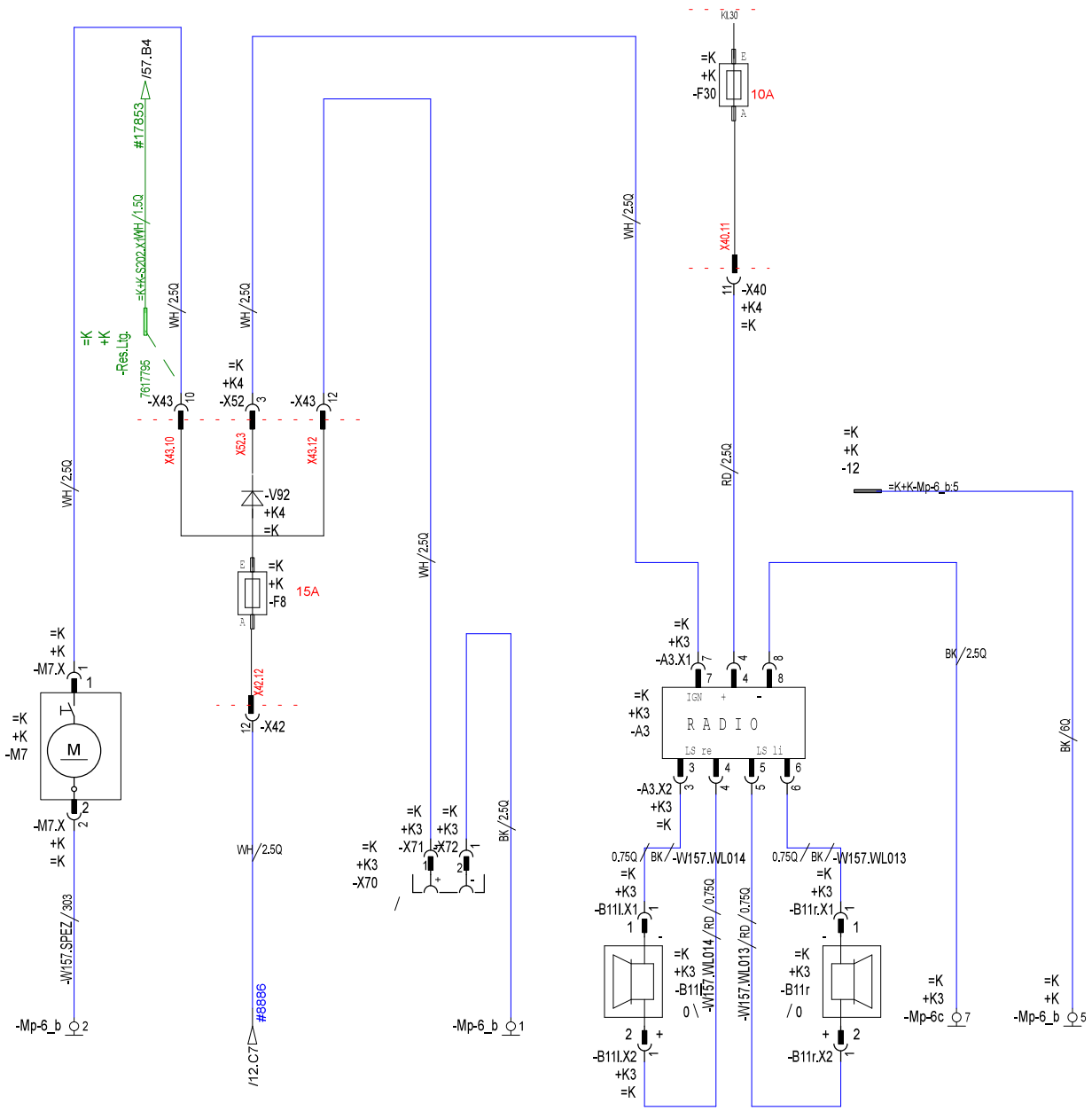
BMK	SYSTEM	LOCATION	FUNCTION	PAGE
-E1.X3.S_a *	=H	+H	OPTION FRONT SECTION SOCKET	/55.B3
-E1.X4	=B	+B1	CONNECTOR REVERSING HEADLIGHT RIGHT	/21.E3
-E1.X5	=B	+B1	CONNECTOR REVERSING HEADLIGHT RIGHT	/21.E3
-E2	=K	+K3	INTERIOR ILLUMINATION	/20.D8
-E2.X1	=K	+K3	CONNECTOR INTERIOR ILLUMINATION	/20.D8
-E2.X2	=K	+K3	CONNECTOR INTERIOR ILLUMINATION	/20.E8
-E2.X3	=K	+K3	CONNECTOR INTERIOR ILLUMINATION	/20.E8
-E3	=V	+V1	DRIVING HEADLIGHT FRONT LEFT	/21.E4
-E3.X	=V	+V1	CONNECTOR DRIVING HEADLIGHT FRONT LEFT	/21.E4
-E4	=V	+V1	DRIVING HEADLIGHT FRONT RIGHT	/21.E5
-E4.X	=V	+V1	CONNECTOR DRIVING HEADLIGHT FRONT RIGHT	/21.E5
-E5	=B	+B2	REVERSING HEADLIGHT LEFT	/21.E6
-E5.X1	=B	+B2	CONNECTOR REVERSING HEADLIGHT LEFT	/21.E6
-E5.X2	=B	+B2	CONNECTOR REVERSING HEADLIGHT LEFT	/21.E6
-E5.X3	=B	+B2	CONNECTOR REVERSING HEADLIGHT LEFT	/21.E6
-E5.X3.B	=H	+H	CONNECTOR REVERSING HEADLIGHT	/21.D6
-E5.X3.B_a *	=H	+H	OPTION FRONT SECTION SOCKET	/55.D3
-E5.X3.S_a *	=H	+H	OPTION FRONT SECTION SOCKET	/55.D3
-E5.X4	=B	+B2	CONNECTOR REVERSING HEADLIGHT LEFT	/21.E6
-E5.X4.B	=H	+H	CONNECTOR REVERSING HEADLIGHT	/21.E6
-E5.X5	=B	+B2	CONNECTOR REVERSING HEADLIGHT LEFT	/21.E6
-E10	=K	+K3	WORKING HEADLIGHT FRONT LEFT	/20.D1
-E10.X	=K	+K3	CONNECTOR WORKING HEADLIGHT FRONT LEFT	/20.D1
-E11	=K	+K3	WORKING HEADLIGHT FRONT LEFT	/20.D2
-E11.X	=K	+K3	CONNECTOR WORKING HEADLIGHT FRONT LEFT	/20.D2
-E12	=K	+K3	WORKING HEADLIGHT FRONT RIGHT	/20.D7
-E12.X	=K	+K3	CONNECTOR WORKING HEADLIGHT FRONT RIGHT	/20.D7
-E13	=K	+K3	WORKING HEADLIGHT FRONT RIGHT	/20.D7
-E13.X	=K	+K3	CONNECTOR WORKING HEADLIGHT FRONT RIGHT	/20.D7
-E14l *	=H	+H1	LICENCE PLATE LIGHT RIGHT	/21.E7
-E14l.X *	=H	+H1	CONNECTOR LICENCE PLATE LIGHT RIGHT	/21.E7
-E14r *	=H	+H1	LICENCE PLATE LIGHT LEFT	/21.E7
-E14r.X *	=H	+H1	CONNECTOR LICENCE PLATE LIGHT LEFT	/21.E7
-E701	=K	+K4	DPF REGENERATION	/31.E4
-E701.X	=K	+K4	CONNECTOR DPF REGENERATION	/31.D4
-F1	=K	+K	FUSE QUICK COUPLER	/29.D8

BMK	SYSTEM	LOCATION	FUNCTION	PAGE
-F2	=K	+K	FUSE LIGHTING LEFT	/21.B4
-F3	=K	+K	FUSE LIGHTING RIGHT	/21.B5
-F4	=K	+K	FUSE LIGHTING RIGHT	/21.B5
-F5	=K	+K	FUSE LIGHTING LEFT	/21.B4
-F6	=K	+K	FUSE LIGHTING RIGHT	/21.B5
-F7	=K	+K	FUSE LIGHTING LEFT	/21.B4
-F8	=K	+K	FUSE RADIO SEAT COMPRESSOR 12V SOCKET	/25.C2
-F9	=K	+K	FUSE REAR WINDOW HEATER	/26.C1
-F01	=B	+B1	FUSE T. 30 FUSE BOARD	/12.E2
-F01.X	=B	+B1	CONNECTION FUSE BOX	/12.E2
-F02	=B	+B1	FUSE DIESEL ENGINE ACTIVE	/12.E2
-F02.X	=B	+B1	CONNECTOR FUSE DIESEL ENGINE ACTIVE	/12.E2
-F03	=B	+B1	FUSE PRE-HEAT SYSTEM	/12.E3
-F03.X	=B	+B1	CONNECTOR FUSE PRE-HEAT SYSTEM	/12.E3
-F04	=B	+B1	OPTION FUSE TELEMATICS SYSTEM	/12.E3
-F04.X	=B	+B1	CONNECTOR FUSE OPTION TELEMATICS SYSTEM	/12.E3
-F07a	=B	+B2	FUSE HAZARD WARNING SYSTEM	/18.C1
-F10	=K	+K	FUSE PARKING BRAKE	/30.F2
-F11	=K	+K	FUSES REAR WINDOW HEATER	/26.C6
-F12	=K	+K	FUSE SWITCH LIGHTING	/17.C5
-F13	=K	+K	FUSE REGULATED FLOW RATE	/54.A1
-F14	=K	+K	FUSE DPF REGENERATION	/31.D1
-F15	=K	+K	FUSE SENSORS	/17.D3
-F15A	=K	+K4	FUSE TERMINAL 15	/34.D2
-F16	=K	+K	FUSE STARTER	/29.B3
-F17	=K	+K	FUSE RESERVE T. 15	/33.D3
-F18	=K	+K	FUSE WINDSCREEN WIPER REAR	/19.B4
-F19	=K	+K	FUSE HEATING AND AIR CONDITIONING SYSTEM	/27.E7
-F20	=K	+K	FUSE WINDSCREEN WIPER FRONT HORN	/19.B3
-F21	=K	+K	FUSE PARKING LIGHT	/21.E2
-F22	=K	+K	FUSE CENTRAL LUBRICATION SYSTEM	/58.B4
-F23	=K	+K	RESERVE FUSE	/33.D5
-F24	=K	+K	FUSE OPTION PIPE BREAK PROTECTION OPERATOR'S CAB FAN	/58.B5
-F25	=K	+K	FUSE BEACON STEERING COLUMN SWITCH	/19.B3
-F26	=K	+K	FUSE CENTRAL CONTROL UNIT	/39.A3
-F27	=K	+K	FUSE DRIVING HEADLIGHT T. 15	/21.E2



MACHINE TYPE	SERIAL NUMBER			
LIDOS Gerät	XXXXX	LIEBHERR FACTORY LBH	CONTROL LEVER E-SCHEMA	PAGE 15 OF
				CREATION DATE 10.09.2019 10:44

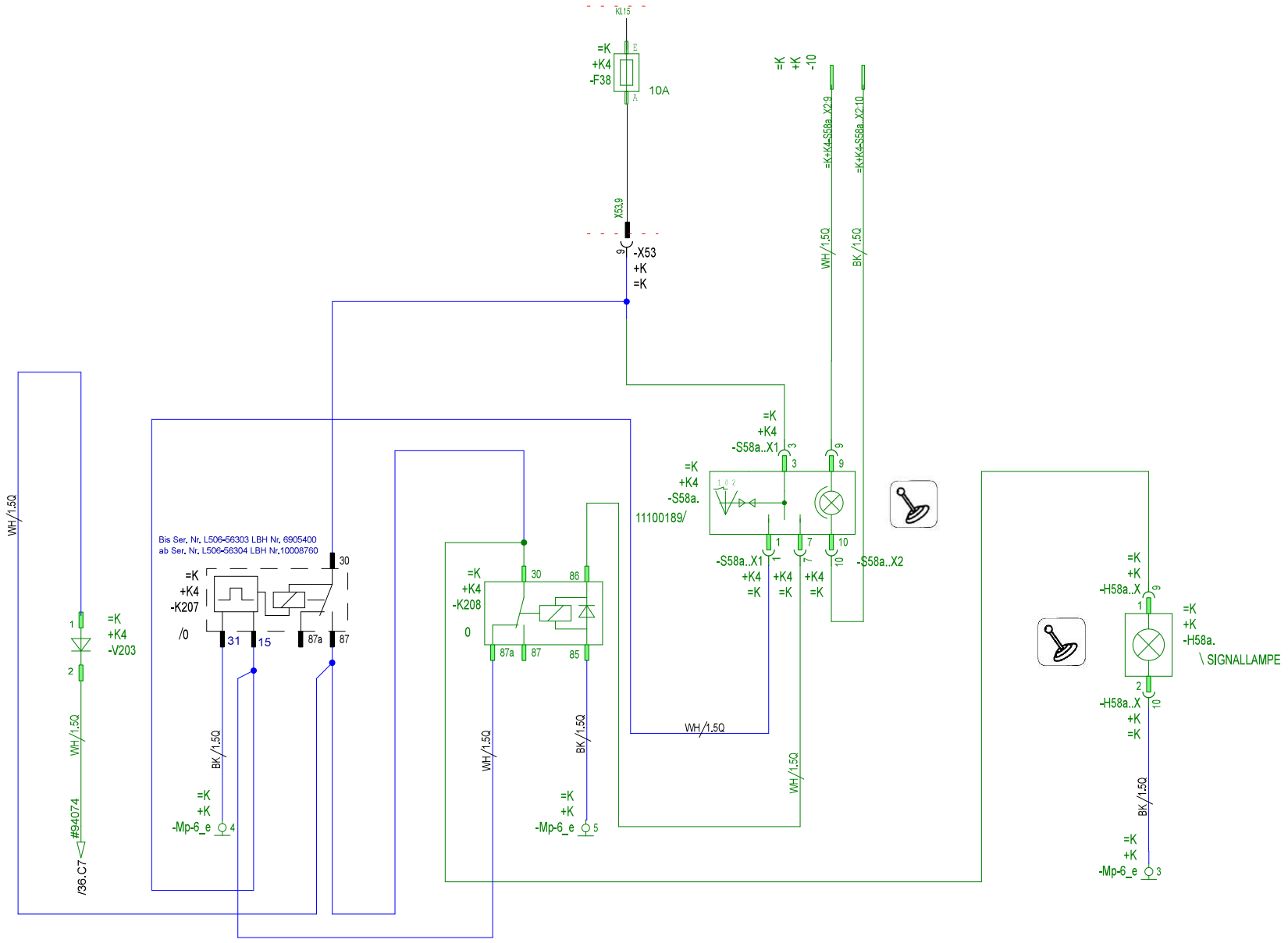
RADIO OPERATOR'S SEAT 12V SOCKET



PROJECT Kompaktlader_EU_USA | ITEM CODE 12829112
DRAWING NUMBER 1817 00090 01 00 | DRAWING INDEX 001

MACHINE TYPE	SERIAL NUMBER			
LIDOS Gerät	XXXXX	LIEBHERR FACTORY LBH	RADIO OPERATOR'S SEAT 12V SOCKET E-SCHEMA	PAGE 25 OF
				CREATION DATE 10.09.2019 10:44

OPTION 3 FUNCTION (ELECTRIC LEVER LOCK BUTTON)



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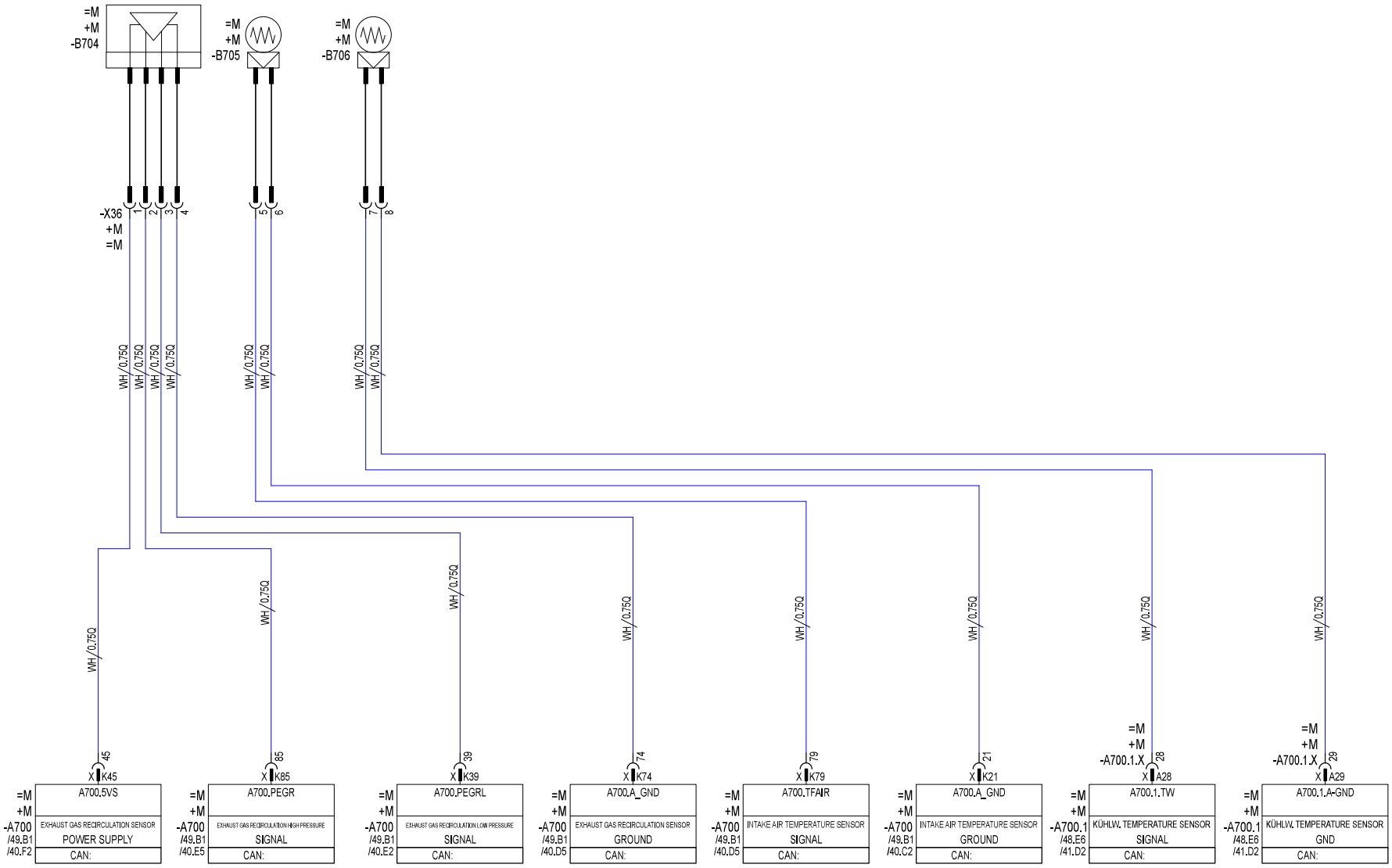
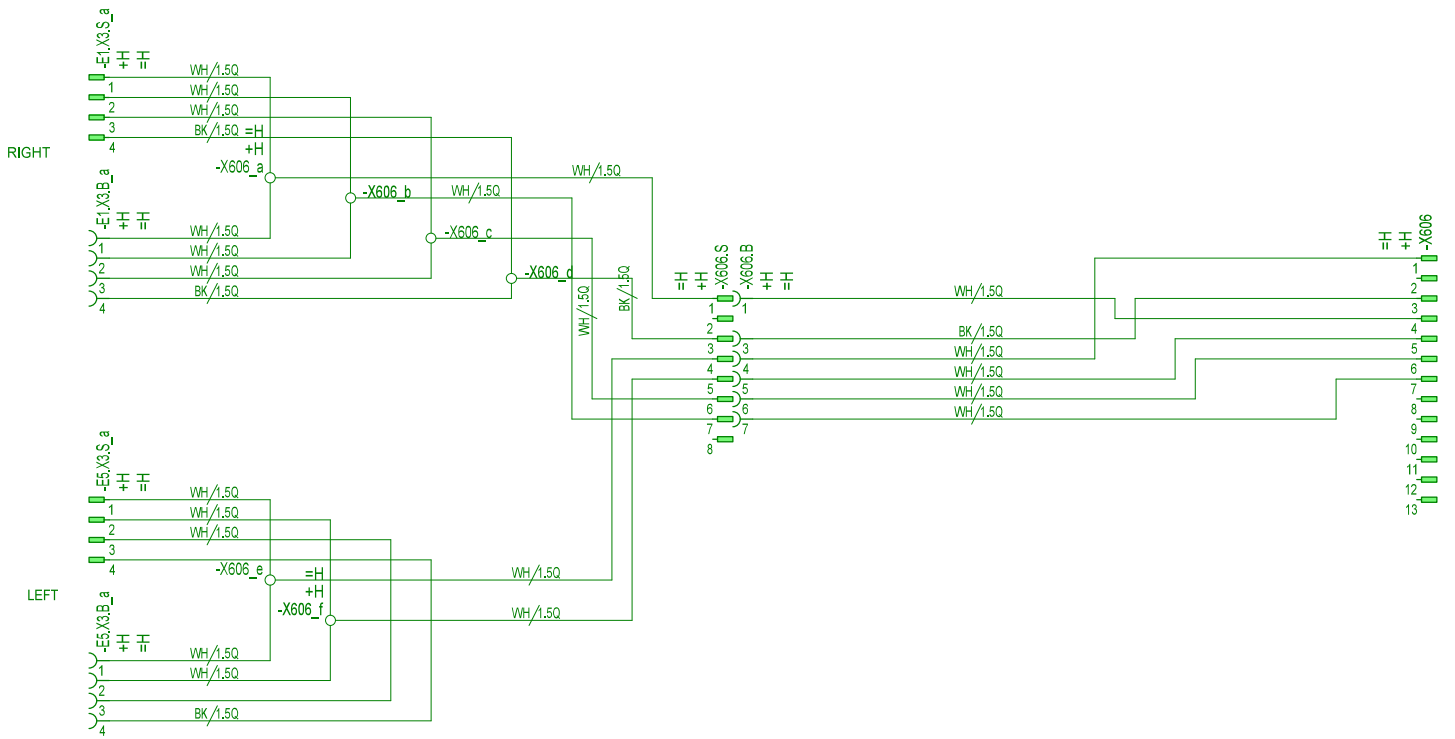
ITEM CODE: 12829112
DRAWING INDEX: 001

MACHINE TYPE	SERIAL NUMBER		OPTION 3RD FUNCTION	PAGE 35 OF
LIDOS Gerät	XXXXX	LIEBHERR FACTORY LBH	E-SCHEMA	CREATION DATE 10.09.2019 10:44



MACHINE TYPE	SERIAL NUMBER		INTERFACE CONNECTOR DIESEL ENGINE X36	PAGE 45 OF
LIDOS Gerät	XXXXX	LIEBHERR FACTORY LBH	E-SCHEMA	CREATION DATE 10.09.2019 10:44

OPTION FRONT SECTION SOCKET



PROJECT	Kompaktlader_EU_USA
DRAWING NUMBER	1817 00090 01 00
ITEM CODE	12829112
DRAWING INDEX	001

MACHINE TYPE	SERIAL NUMBER			
LIDOS Gerät	XXXXX	LIEBHERR FACTORY LBH	OPTION FRONT SECTION SOCKET E-SCHEMA	PAGE 55 OF CREATION DATE 10.09.2019 10:44

SWITCH AND BUTTON ASSIGNMENT

OPTION	OPTION	OPTION	OPTION	OPTION	OPTION	OPTION	OPTION	OPTION
S216	S45a	S205		S230	S202	S9		
/ 9514846	/ 6002120	/ 6905201	/ 6905290	/ 7363088	/ 6905524	/ 6000848	FLASHING LIGHT	CENTRAL LUBRICATION SYSTEM
6905595	6905592	6905595	6905592	6905360	6905592	6905592		

S700			S20	S19		S23	/ 6905320		
11651378			/ 6002144	6905663		/ 6905320			
			6905592	6905662		6905360			
S4	S6	S7	S8	S13		S58			
6000846	/ 10801495	/ 6000844	/ 6000843	/ 6000847		11100189			
6905589	6905591	6905592	6905592	6905598		6905597			

2.1 Battery

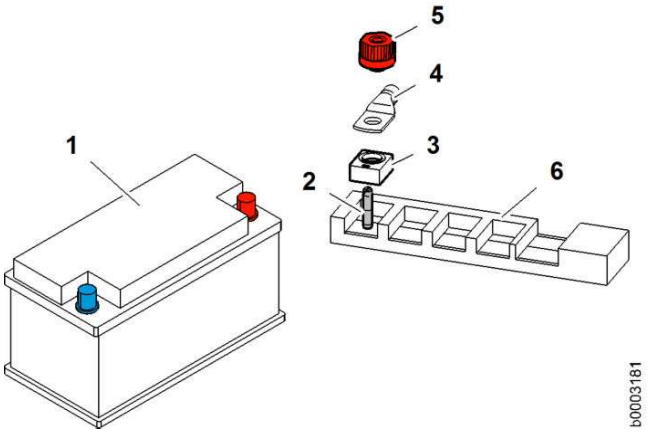


Fig. 414: Battery and fuse holder

1	Battery	**4**	Electrical lead
2	Threaded pin	**5**	Insulating nut
3	Fuse insert	**6**	Fuse carrier

Battery **1** consists of six cells, each with 2 volts.

The battery is connected to the electrical lines through the fuse holder **6**. Electric lines are secured to fuse holder with insulating nuts **5** (tightening torque 10 Nm).

Insulating nut **5** fastens electrical cable via a threaded pin **2** to fuse. At same time, insulating nut separates electrical cable from threaded pin. This separation is necessary, as otherwise, function of fuse is disabled.

Note
Insulating nut ensures that electrical cable is separated from threaded pin. Without this separation, electrical cable would be directly connected to positive terminal of battery. Fuse would be bypassed and therefore useless.

- ▶ Always fasten electrical cables to the fuse carrier with the appropriate insulating nuts.
- ▶ Check the insulating nuts for damage and replace them if necessary.

Charge levels				
Acid density at 27 °C	**Charge level**	**Battery voltage**	**Voltage per cell**	**Remark**
1.28 to 1.26	100%	over 12.60	over 2.10	Battery OK
1.25 to 1.24	75%	12.54 to 12.40	2.10 to 2.07	
1.24 to 1.18	50%	12.40 to 12.18	2.07 to 2.03	Charge battery
1.18 >	25%	12.18 >	2.03 >	Battery not OK

Tab. 168: Table of charge levels

The acid density should be about the same in all 6 cells. If it is much lower in one of the cells, there is probably a short circuit.

When the diesel engine is running, the batteries are charged by the alternator.

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2.4 Wheel hub

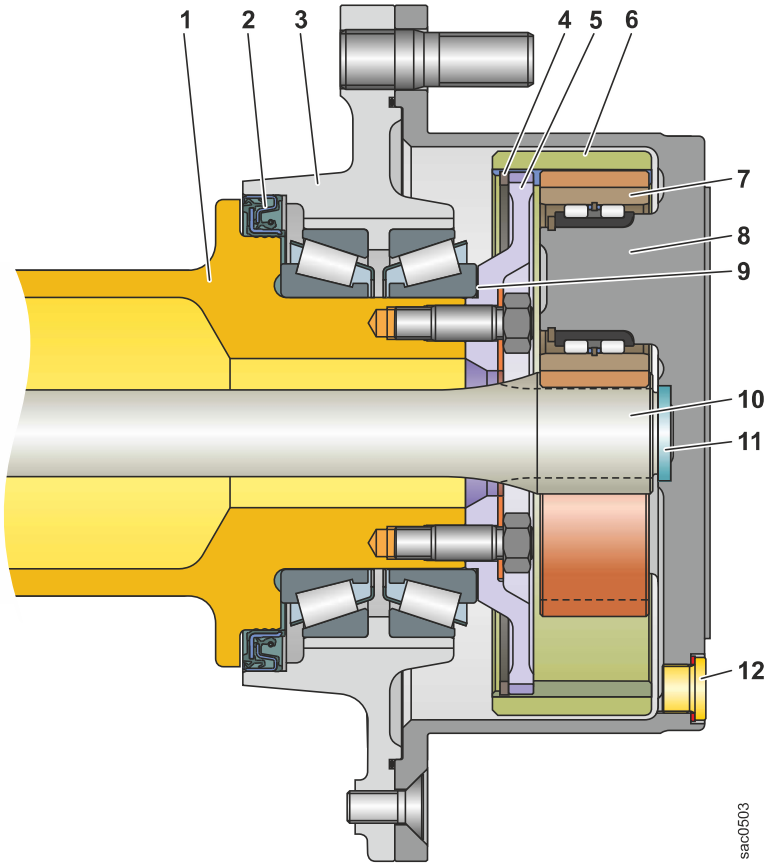

Fig. 418: Wheel hub: sectional view

1	Axle casing	**7**	Planetary gear
2	Axial face seal	**8**	Planetary carrier
3	Hub	**9**	Washer for bearing preload
4	Snap ring	**10**	Half shaft with sun gear
5	Ring gear carrier	**11**	Sliding washer
6	Ring gear	**12**	Oil drain plug

There is a planetary gear in wheel hub. Through planetary gear speed is reduced and torque is increased.

Sun gear on half shaft **10** drives three planetary pinions **7**. Planetary pinions **7** rest against ring gear **6**. This causes planetary carrier **8** and hub **3** to rotate.

Ring gear **6** is connected to axle casing **1** via ring gear carrier **5** and accordingly does not rotate.

2.5 Drum brake

Drum brake is service brake and parking brake. (For more information see: 100.2.1 Drum brake, page 100-5)

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Bucket bearing **3** is also sealed against dirt.

2 Function

Advantages of Z kinematics:
- Very high torque in loading position, therefore very high breakout force.
- Tilted-out bucket goes into loading position when lowered.
- Fewer moving parts, so requires less maintenance.
- Low weight, therefore high tipping load.

Drawbacks of Z kinematics:
- Low torque at upper lift arm position. Heavy working attachments (such as a timber grabber) can pull out tilt cylinder or prevent equipment from being tilted in again.
- No parallel movement. Bucket tilts out slightly when lifting.

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160.1 Overview of operator's cab, heating and air conditioning unit

Valid for: L508-1817;

1 Layout

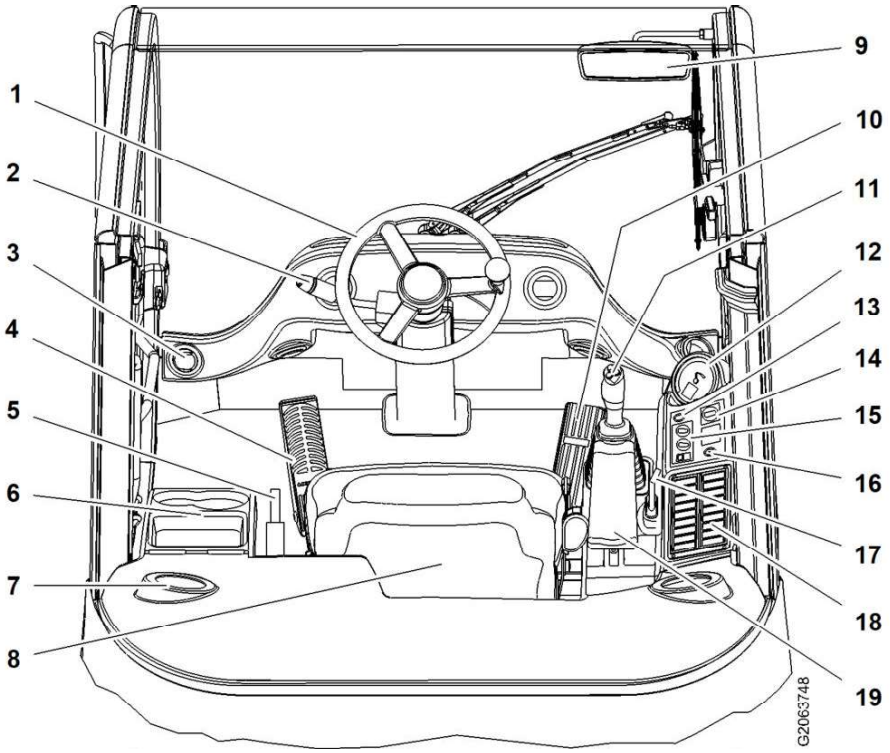

Fig. 429: Operator's cab

1 Steering wheel
2 Steering-column switch (S3)
3 Heating, ventilation and air conditioning nozzles (option)
4 Inching brake pedal
5 Parking brake
6 Storage compartment
7 Speaker (B11)
8 Operator's seat
9 Interior mirror
10 Accelerator pedal (R5)
11 Control lever (S2)
12 Display (A10)
13 12V socket
14 Manual inching (R1a) (Option)
15 Heating, ventilation and air conditioning control unit (option)
16 Starting switch (S1)
17 Additional control lever (option)
18 Switch panel
19 Adjustable arm rest

2.1 Basic function

The operator's cab is mounted on a flexible bearing on the rear section.

The operator's cab is equipped with warm water heating. Optionally, air conditioning can be also installed.

Entry to operator's cab is via cab access and door on left.

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If there is a malfunction with the angle encoder, the engine control unit assumes an equivalent voltage. The engine runs at lower idling speed.

2.2 Plug assignment

Pin	Function	Pin	Function
A	Sensor 1 output voltage	D	Sensor 2 power supply
B	Sensor 1 earth	E	Sensor 2 earth
C	Sensor 1 power supply	F	Sensor 2 output voltage

Tab. 180: Pin assignment table

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160.4 Air conditioning

160.4.1 Basic function of the air conditioning unit

Valid for: L508-1817;

1 Layout

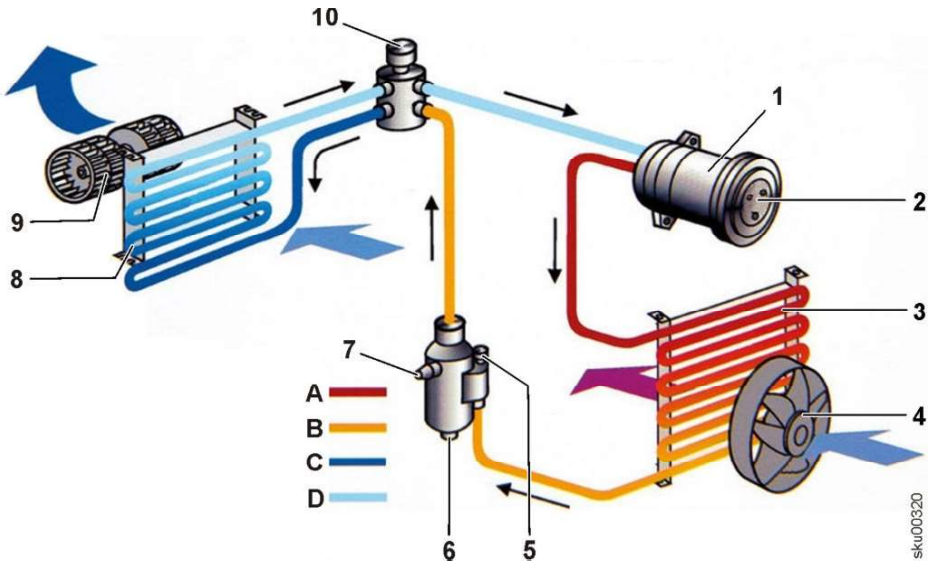

Fig. 465: Refrigerant circuit

1	Air conditioning compressor	**8**	Evaporator
2	Magnetic coupling	**9**	Blower
3	Condenser	**10**	Expansion valve
4	Fan	**A**	Liquid/gaseous refrigerant, high pressure
5	Air conditioning pressure switch B27	**B**	Liquid refrigerant, high pressure
6	Dryer	**C**	Liquid/gaseous refrigerant, low pressure
7	Sight glass (optional)	**D**	Gaseous refrigerant, low pressure

2 Basic function

The air conditioning compressor **1** takes in the warm gaseous refrigerant and compresses it. Compression heats up the refrigerant.

The generated heat is dissipated in the condenser **3**. Cooling down in condenser causes refrigerant to condense and become liquid.

The refrigerant flows from the condenser to the dryer **6**. Any water residue is removed in dryer to protect expansion valve **10** and evaporator **8** from icing up. The refrigerant flows from the dryer into the expansion valve.

The expansion valve sprays the liquid, pressurised refrigerant into the evaporator.

The refrigerant expands. The expansion reduces the pressure energy in the refrigerant and quickly cools the evaporator.

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170 Lubrication system

Contents

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After the piston **III** is moved, the lubricant flows to the left side of the piston **I** (piston position **C**). The piston **I** moves to the right and presses the lubricant out of the right pressure chamber of the piston to outlet **4**.

Then the pistons **II** and **III** pump the lubricant to the outlets **5** and **6**.

After the piston **III** moves, the lubricant flows back to the right side of the piston **I** (piston position **A**) and a new cycle of the progressive distributor starts. This function is repeated for as long as lubricant is pumped to the progressive distributor.

2.1.1 Effects of malfunctions

Malfunctions can occur in the network of lubrication lines or in the distributor.

Malfunctions include:
- Blocked lubrication lines
- Twisted split bushings

These malfunctions interrupt the flow of lubricant. This blocks the distributor.

When the distributor is blocked, lubricant escapes via the pressure relief valve of the central lubrication pump.

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